Step-by-Step guide for determination of Deforestation Free volumes for palm oil

Version 2 (Dec 2022)

1. Overview

This document provides a concise, step-by-step description of how Daemeter determines Deforestation & Conversion Free (DCF) volumes for palm oil. The method is premised on using data derived from (i) data exports from Daemeter's Traceability Portal, (ii) satellite monitoring of estate or concession boundaries, or (iii) certification status. The method entails assessment of how raw material inputs are produced, and for palm oil is tailored to three types of fresh fruit bunch (FFB) suppliers:

- **Estates** (own or third party)
- **Direct supplying farmers** (e.g. plasma, KKPA, coops or other)
- **Aggregators** (who buy and then on-sell FFB produced by other parties, typically farmers

The method determines DCF status only for the portion of a mill's supply base that is deemed "traceable" according to requirements defined in the portal; non-traceable volumes are treated as non-DCF volumes.

2. Traceability data required

In the method, fruit sources are divided into three types: estates, direct supplying farmers, aggregators. For computing DCF volumes, the following data must be available for each type, for the time period specified in the analysis:

- **Estates**: Name, Geocoordinate, area (in hectares), volumes supplied (tons). Concession or estate boundaries are optional.
- **Direct supplying farmers**: Name, Geocoordinate, area (in hectares), volumes supplied (tons). Farm boundaries are optional.
- **Aggregator**: Name, geocoordinate, volumes supplied (tons), complete list of all desa/mukim where fruit is sourced by the aggregator.

When concession, estate or other boundary data are available, they can be incorporated into the analysis as explained below.
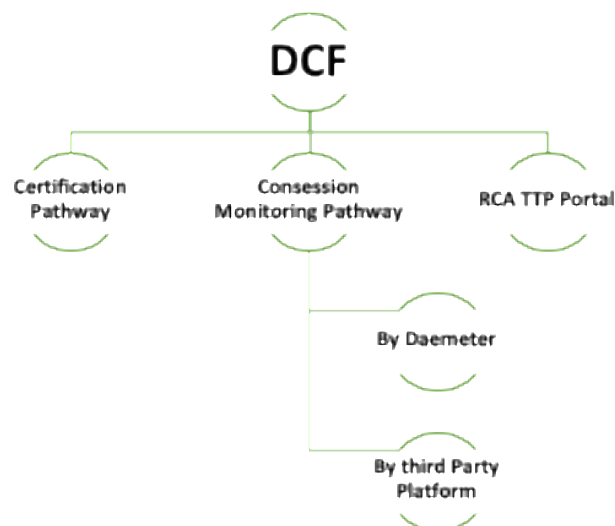
3. Forest & Deforestation Data

Daemeter's deforestation performance measure is a tally of cumulative forest loss occurring from January 2016-20 within a specified production area. (For future alignment with emerging EU requirements under the Deforestation Free Products regulation, the method can be adapted to tally deforestation post 31 Dec 2020, per the EU cut-off.) Daemeter maps forest at a granularity of ~0.1 ha, updated annually. It is derived from Matt Hansen tree cover data, after modification to better represent natural forest (logged and unlogged) rather than tree cover. It also maps mature agro-forestry as part of the "forest" map, which would also be mapped as High Carbon Stock (HCS) under the HCS Approach. From this forest cover layer, we then remove known plantation areas including oil palm, fiber and rubber, using a combination of public and private data sources. This layer is >85% accurate in mapping forest across Indonesia and Malaysia.

Daemeter updates its deforestation map once annually across the entirety of Indonesia and Malaysia. Using the Jan 2016 forest cover layer as a reference, we tabulate deforestation for any forest loss event that exceeds 1ha in size over the period 2016-20 (inclusive). As a default we compute aggregate deforestation over the period 2016-2020, but this can be customized to other time periods. For example, once our deforestation map is updated to include 2021 and 2022 forest losses, we could calculate deforestation in accordance with the new EU regulation on Deforestation Free Production (i.e. post 31 Dec 2020).

4. Step-by-Step Deforestation Free methods

As mentioned, there are three pathways for computing DCF, using data derived from (i) Daemeter's Traceability Portal, (ii) satellite monitoring of estate or concession boundaries, (iii) certification status. Using the **certification pathway**, valid certificate data must be obtained for mills that have obtained certification under the RSPO or ISCC, the only two certification schemes that we currently consider to be a credible proxy for DCF production. Certificate data must be obtained via public or private sources, and the certificate must be valid for the sourcing period under consideration. For the **concession monitoring pathway**, concession boundaries must be made available to Daemeter, or data must be obtained from the appointed concession monitoring provider, covering the period of concern and consistent with a definition of DCF that meets or exceeds

Daemeter's threshold for allowable deforestation (see below). This must then be combined with traceability data to convert the concession-level DCF status to DCF volumes. For the **Traceability Portal pathway**, a complete, fully validated data report must be downloaded from the Portal, covering the period and mill of concern.

Below, we describe methods for each of these three pathways.

4.1   Certification Pathway

The certification pathway for determining DCF volumes is the most straightforward to compute. It requires for each mill a valid certificate under the RSPO or ISCC, covering the sourcing period under consideration. Certificate data must be obtained via public (on-line) or private sources (i.e. from the mill), and the certificate must indicate the certified FFB volumes that feed into the mill under the certificate. This must be combined with knowledge of the total FFB processed by the mill over the same time period, in order to compute a % DCF for the mill. This is done by taking the certified volumes (tonnage FFB) processed and dividing this by total FFB volumes processed by the mill.

Once the %DCF is determined for the mill, this percentage can then be applied to the CPO, PK or PKO volumes sourced from the mill, in order to determine tonnage of the DCF materials sourced.

<table>
<tr>
<td>%DCF of mill = % Certified FFB Processed</td>
<td>→</td>
<td>DCF Volume sourced from the mill = %DCF of mill x Volume Supplied to Refinery</td>
</tr>
</table>

> ***Example calculation.*** A mill owns plantations that are RSPO MB certified and produces 150,000 tons of certified FFB. The mill processes an additional 100,000 tons of uncertified fruit annually, with nothing known about the DCF status of this fruit. The %DCF of the mill is therefore computed as: (150,000/250,000)*100 = 60% DCF.

This %DCF for the mill is then used to determine the tonnage of DCF materials supplied by the mill. We simply multiply the %DCF of the mil times the tonnage of material(s) sourced from the mill.

> ***Example calculation.*** A mill is 60% DCF based on RSPO certification. A total of 5,000 tons of CPO were purchased from the mill over the period of concern. This means 0.6*5,000=3,000 tons of CPO are counted as DCF volumes. (Note, the MB volumes sourced from this mill can be counted as 100% certified volumes, but for DCF accounting purposes, the volumes must be reduced by the % DCF of the mill)

4.2   Concession Monitoring Pathway

The "top down" concession monitoring pathway for computing DCF volumes entails more steps than the certification pathway but fewer than the "bottom-up" approach based on data exports from the Traceability Portal (Section 4.3 below). In practice, we expect that it will become common for some mills/buyers to use a combination of top-down, bottom-up approaches, where concession monitoring will be used for estate sourced fruit, and TTP data from the Portal (or similar) will be used for other FFB supplier types (e.g. fruit supplied by farmers or third-party aggregators).

The concession monitoring pathway is described as two possible work flows: (1) one is when the monitoring is performed by Daemeter itself, with access to the concession boundary, and (2) the other is when monitoring is performed by a third-party service provider (e.g. Satelligence, Earth Equalizer, other). We first describe the approach when Daemeter conducts the analysis itself, followed by when the monitoring is done by a third-party.

When concession monitoring is done by a third-party, it is important to emphasize that productive, in-depth cooperation with the service provider is necessary. This enables Daemeter to learn about the technology, definitions and decision rules applied by the provider, and for the provider to learn about our definitions for the same. This is discussed more fully below in 4.2.2

4.2.1   When Daemeter conducts the concession monitoring

Currently, we measure total deforestation that occurred within the concession boundary from 2016-2020, inclusive. This will be updated to include 2021 losses in Q1 2022. The decision rule we apply is:

> ***Decision Rule for Concessions***: *Volumes sourced from within a concession are considered DCF if (i) aggregate deforestation post 2015 within the concession is <5% of the total area of concession, and (ii) no single deforestation event within the concession is >10 ha.*

Both conditions must be met for concession-sourced volumes to be classified as DCF.
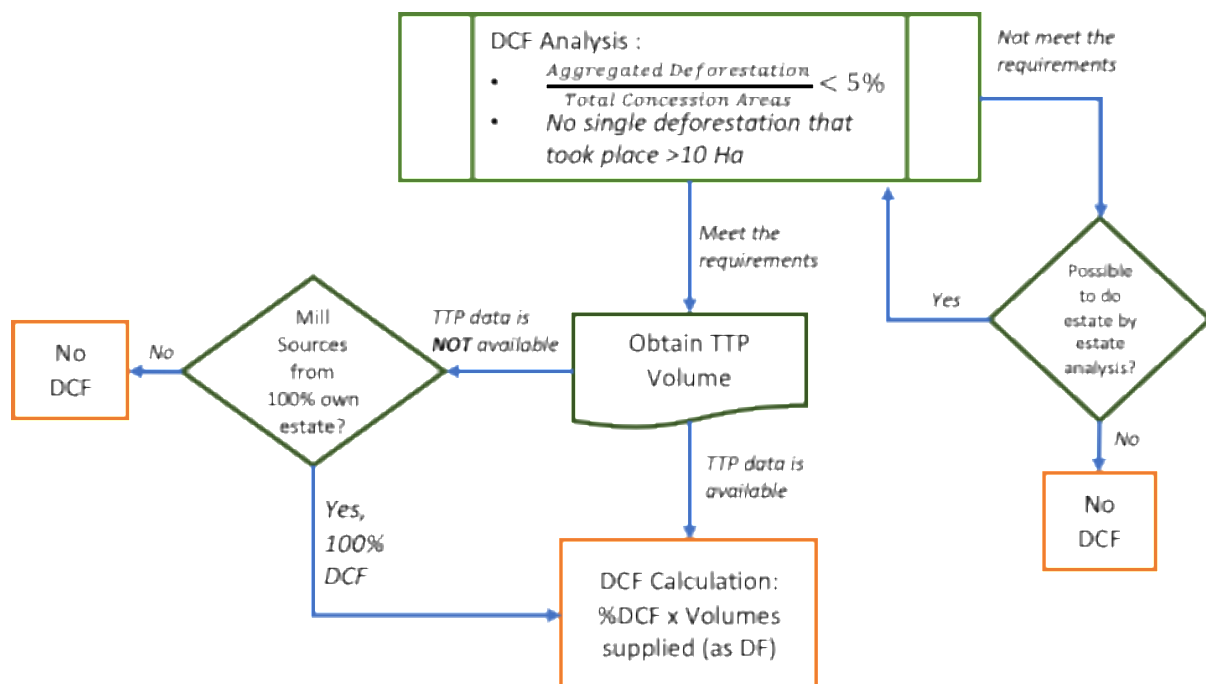
Step-by-Step Procedures

1. Analysing Deforestation within concession:
    a. Using Daemeter's deforestation layer, determine aggregate deforestation that took place within the concession boundary. Divide this total to the total area of the concession, and then determine if this value falls below the 5% threshold required for DCF volumes originating from concessions.

b. Using Daemeter's deforestation layer, determine the rank size of all individual deforestation events that took place over the monitoring period. An event is defined as a contiguous series of loss pixels, whether or not the losses occurred in the same year. In other words, a 12-hectare event that occurred incrementally each year from 2017-19 is treated as one 12-hectare event. Determine if the largest deforestation event within the concession falls below the maximum allowable size of 10 hectares for DCF volumes originating from concessions.

2. If the concession meets **both** performance criteria for DCF, then we treat all volumes originating from the concession as DCF. If it passes one but fails the other, then we treat all volumes originating from the concession as non-DCF, unless it is possible to conduct the analysis on an estate-by-estate basis. For this, data are required on estate locations and size (area), ideally as obtained via the Portal. For more on this, see **Section 4.3 Traceability Portal Pathway**. If the concession fails to meet both criteria, and it is not possible to conduct the analysis on an estate-by-estate basis, then the procedure ends here, and all volumes sourced from the concession are treated as non-DCF.

3. If the concession meets both criteria, then we proceed to obtaining data on FFB tonnage that was sourced from estates within the concession during the reporting period. This determines the amount of DCF tonnage. These data can be obtained from the mill directly, from the monitoring provider (if available), from their buyer (if available) or from the Traceability Portal itself (if available).
    a. If TTP data are not available, we do not recommend guessing what the applicable FFB volumes might be. This has become commonplace where TTP data are lacking, but there does not seem to be a defensible logic for doing this, except in cases where it is known that the mill sources 100% of its fruit from estates within the concession. Where this applies, all materials sourced from the mill can be treated as 100% DCF, because the concession is the sole source of fruit, and the concession as a whole has been deemed compliant with DCF performance criteria.
    b. If TTP data are available, then the FFB tonnage sourced from the concessions are treated as DCF volumes (tons).

4. The % DCF for each mill is then computed as:
    a. Concession-sourced DCF volumes (tonnage FFB) plus
    b. DCF volumes (tonnage FFB) sourced from other FFB supplier types that meet DCF requirements, divided by
    c. Total volumes (tonnage FFB) processed by mill over the same period, and
    d. Multiplied by 100.

5. This % DCF for the mill is then used to determine the tonnage of DCF materials supplied by the mill, by multiplying the % DCF times the tonnage of material(s) purchased from the mill.

> *Example calculation*. A mill owns three estates that are deemed DCF compliant based on monitoring of a concession that encompasses all three estates. Together these estates produce approx. 200,000 tons of fruit annually. In total, the mill processed 250,000 tons of fruit over the monitoring period, with 50,000 tons supplied by aggregators. Nothing is known about the DCF status of these 50,000 tons of non-concession sources.
>
> For this mill, % DCF = (200,000)/(250,000)*100 = 80% DCF.

4.2.2   When third party conducts the concession monitoring

When concession monitoring is carried out by a third party, the procedure is similar, but certain pre-conditions must be met in order for Daemeter to calculate DCF volumes.

Pre-conditions

To begin, deforestation performance data must be obtained from the concession monitoring provider appointed by the mill or its buyer, covering the period of concern. The provider's methods and data sets must meet certain minimum criteria, in order to be used for DCF purposes.

First, the provider must have a definition of (1) forest and (2) deforestation that meets or exceeds Daemeter's definition of forest and deforestation. For example, the forest cover layer must be an updated and reasonable representation of natural forest. It must be mapped at a resolution of minimum 1 ha and it must be updated at least annually.

Second, the deforestation performance measure must include all forest loss for events >1 hectare, per Daemeter's definition, and it may not exclude forest loss events based on decisions rules about where deforestation occurs, e.g. counting only deforestation within larger blocks of forest or only within riparian buffers or other sensitive areas. It may exclude deforestation that is shown to be unrelated to oil palm (e.g. road or other infrastructure construction by local government or mining by a third-party company or other), but exclusions must be justified clearly.

Third, the provider must also have a definition for Deforestation Free that meets or exceeds Daemeter's decision rule for this FFB supplier type. As shown above, this is:

> **Decision Rule for Concessions***: Volumes sourced from within a concession are considered DCF if (i) aggregate deforestation post 2015 within the concession is <5% of the total area of concession, and (ii) no single deforestation event within the concession is >10 ha.*

If the concession monitoring provider applies a decision rule for DCF that is less stringent than criteria used by Daemeter, then it is still possible to proceed with the analysis, provided the monitoring provider will cooperate with us to share monitoring outcomes. For example, we can share with the provider our criteria and cut-offs and ask them to determine whether or not the concession meets these performance criteria, using their monitoring technology. If the provider offers assurance that the concession meets these performance criteria, then fruit sourced from it can be treated as DCF. If not, then such fruit must be treated as non-DCF volumes.
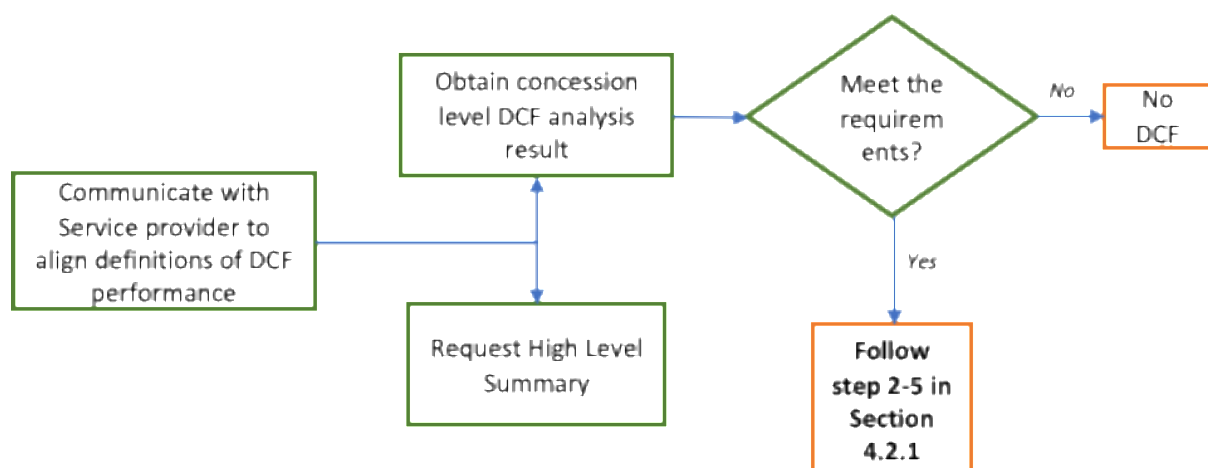
Step-by-Step Procedures

Assuming the above pre-conditions are met, proceed as follows:

1. Communicate with the service provider to ensure they understand Daemeter definitions for DCF performance and agree to apply them. Note, it's critical for this to include deforestation monitoring that begins no later than 1 Jan 2016 and extends to at least 31 Dec 2020.
2. Obtain a determination from the concession monitoring provider that the concession meets both performance criteria required for DCF volumes.
3. Request and obtain from the service provider a high-level summary of the deforestation monitoring results, including (a) total deforestation per year over the period of monitoring, and (b) the size of the largest deforestation event.
4. If the concession does not meet performance criteria for DCF, then all volumes sourced from the concession are deemed non-DCF. The procedure ends here.
5. If the concession meets performance criteria for DCF, then proceed as outlined above in steps 2-5 in **Section 4.2.1**.

4.3   Traceability Portal Pathway

This pathway represents a "bottom up" approach to computing DCF, meaning it begins with traceability data obtained directly from the mill. Using the portal, TTP data are made available for all three supplier types – estates, direct supplying farmers, aggregators (see inset). Minimum data includes geocoordinates, tonnage and statements of area for both estates and direct supplying farmer groups; and for each aggregator, their name, geocoordinate, tonnage and supplying desa/mukim. These data are used for computing DCF status for each supplier type, following methods explained below.
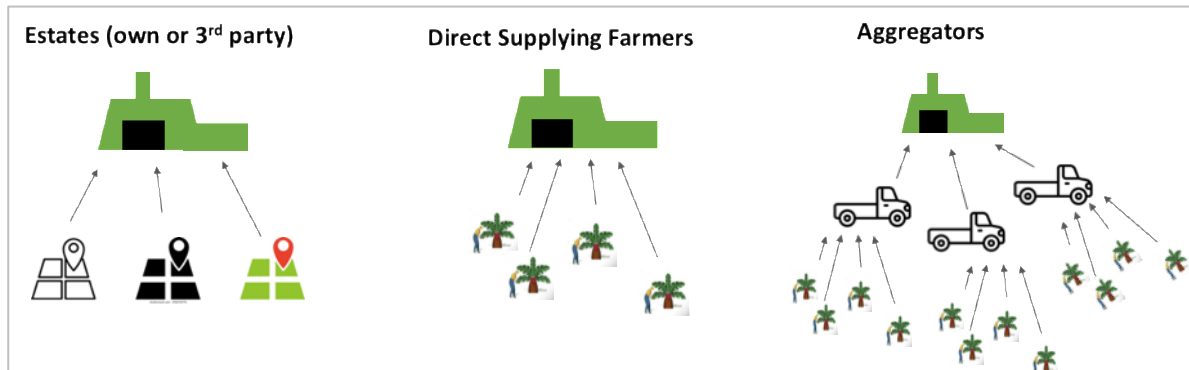

4.3.1   Estates

The decision rule applied for DCF status of estates is the same as for concessions:

> **Decision Rule for Estates**: *Volumes sourced from within estates are considered DCF if (i) aggregate deforestation within the estate post 2015 is <5% of the total area of the estate, and (ii) no single deforestation event within the estate is >10 ha in size.*

Estates are typically embedded within a larger concession boundary, especially when the estate is owned/managed by the same company that owns/operates the mill (see inset). However, we do not always have concession boundaries, because most mills report estate geo-coordinates, tonnage and area, but they do not upload concession boundaries in which estates are located. This means the most

common scenario for computing DCF volumes for estate suppliers in the Portal is the "without concession boundaries" scenario.

Estates within a concession boundary   Estates without a concession boundary
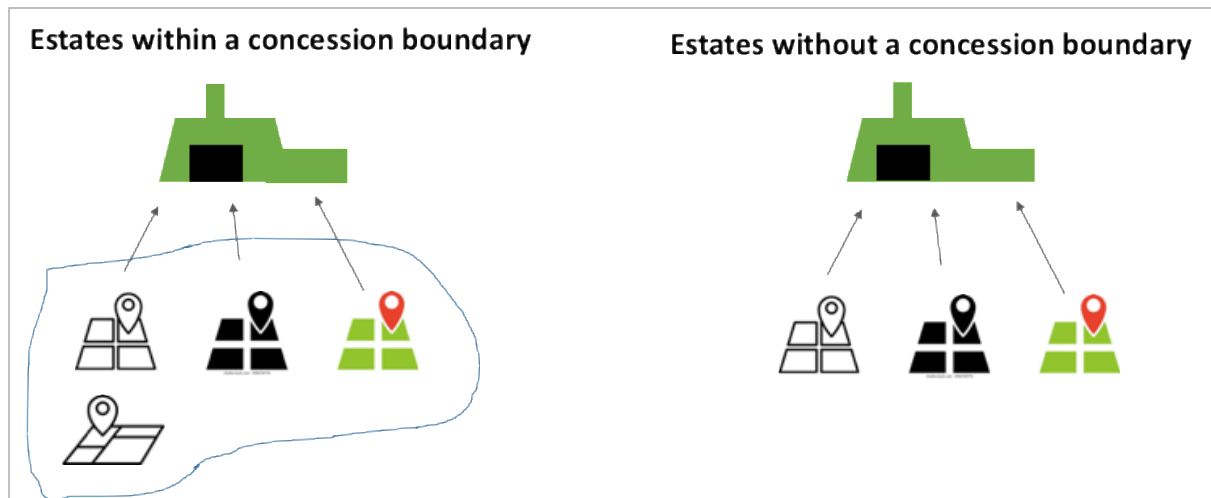
We label the "without concession" situation as Scenario 1, since it's the most common. The "with concession" situation is labelled Scenario 2. In practice, when concession boundaries are available, alongside estate geocoordinates, we recommend beginning with Scenario 2 first, then pursuing Scenario 1 if necessary, based on results, per the decision tree below. [1]

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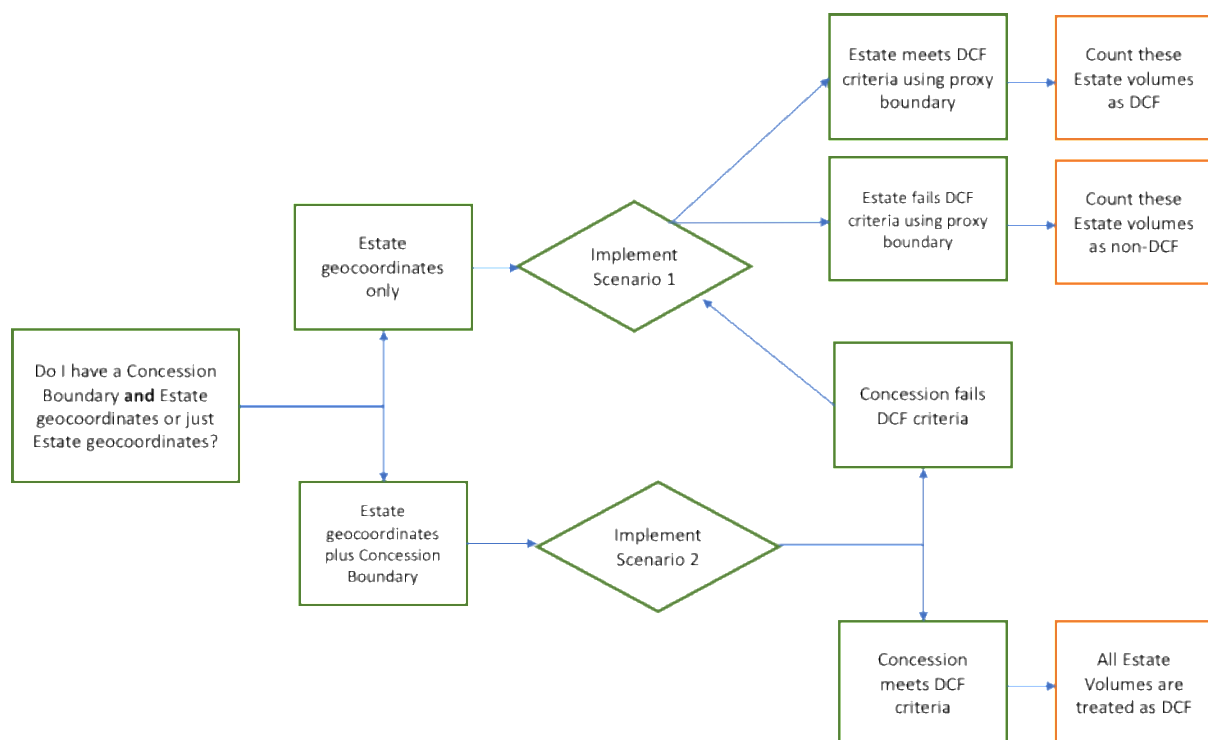
[1] A third, very uncommon scenario occurs when we have boundaries for individual estates. If we do have estate boundaries, computing DCF status of each estate follows exactly the same procedure and decision criteria applied to concessions in Section 4.2. This is explained more fully below.

Scenario 1. Computing DCF status of estates when concession boundary not available

This is the most common scenario when using estate data derived from the Portal. Two talks are required. The first is setting a proxy boundary for the estate(s) in order to measure deforestation performance; the second is determining DCF status of production given deforestation levels observed within the proxy boundary.

*Determining the Proxy Boundary of an estate*

To determine DCF status of an estate, we must first set a boundary within which deforestation is measured. Since uploading boundaries is optional within the portal, and to date no users upload their boundaries, we must set a proxy boundary for the estate based on geo-coordinate provided and the stated area. The Portal does not require mills to explain what the geo-coordinate inputted to the portal represents, e.g. is it the centroid of an estate, is it part of the boundary, is it the upper right corner, lower left corner, or other? Given this, one must come up with a way to estimate an approximate boundary, and in doing so strike a fair balance between minimizing risk of overstating or understating the actual boundary. If we overstate, then we might chronically blame the estate for deforestation that is not linked to their operations. If we understate, then we might chronically treat estates as DCF, when in fact they are responsible for significant deforestation.

Daemeter came up with a procedure, applied in four simple steps (see inset):

1. In the GIS, plot the point(s) reported by the mill for the estate(s).
2. Take the square root of the declared area of each estate. This will be used as the radius for drawing a circle around the point representing each estate. (Note: Taking the square root of the area is the same as computing the length of one side of a square, if the estate were shaped as a square.)
3. We then draw a circle, using the geocoordinate as the center point and the radius determined in Step 2.
4. This circle shall be used as the proxy boundary of the estate. The area of the proxy boundary is 3.14 times the declared area of the estate. The majority of the estate falls somewhere within this proxy boundary, even though we may not know exactly where.
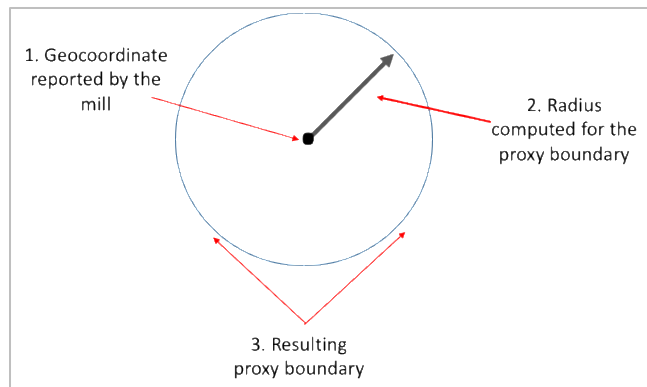
We treat this circle as the proxy boundary in which to determine whether or not the estate meets DCF criteria, using the same procedure and decision criteria described above for concessions in 4.2.1.
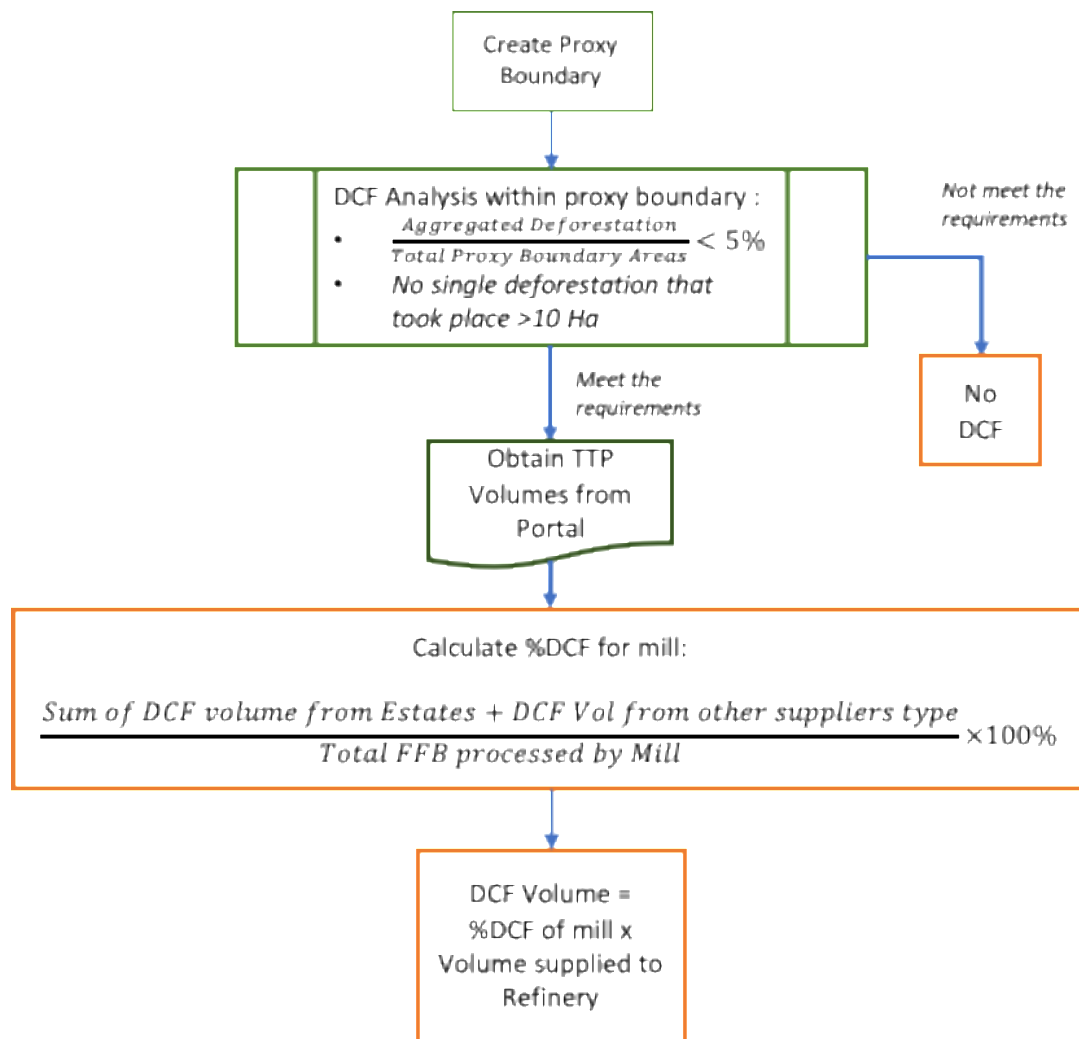
Step-by-Step Procedures

1. Analysing Deforestation within proxy boundary:
   a. Using Daemeter's deforestation layer, determine aggregate deforestation that took place within the proxy boundary. Divide this by the total area of the proxy boundary, and then determine if this value falls below the 5% threshold required for DCF volumes.
   b. Using Daemeter's deforestation layer, determine the rank size of all individual deforestation events that took place within the proxy boundary over the monitoring period. An event is defined as a contiguous series of loss pixels, whether or not the losses occurred in the same year. For example, a 12-hectare event that occurred over three years from 2017-19 is treated as one 12-hectare event. Determine if the largest deforestation event within the proxy boundary falls below the maximum allowable size of 10 hectares for DCF volumes originating from estates.
2. If the estate meets both performance criteria for DCF, then we treat all volumes originating from the estate as DCF. If the estate fails one or more criteria, then the procedure ends here, and all volumes sourced from the estate are treated as non-DCF. It is possible that post analysis, work can be carried out with the mill to determine if the loss events that exceed DCF criteria are, in fact, outside the true estate boundary and/or not related to oil palm cultivation. In this case, the DCF status of the estate could be modified from non-DCF to DCF in the future, but at this point in the procedure, the estate is classified as non-DCF.

3. Steps 1 is repeated for all estates declared by the mill.
4. For estates that meet both DCF criteria, we then proceed to obtaining data on FFB tonnage sourced from them. Such data are obtained from the Traceability Portal itself.
5. For all estates that meet DCF criteria, all FFB (tonnage) sourced from them treated as DCF. All tonnage from estates that failed to meet DCF criteria are treated as non-DCF.
6. The % DCF for each mill is then computed as:
   a. Sum of all FFB volumes (tonnage) obtained from estates that meet DCF criteria, plus
   b. DCF volumes (tonnage), if any, sourced from other FFB supplier types that meet DCF criteria; divided by
   c. Total volume fruit (tonnage FFB) processed by mill over the same period, and
   d. Multiplied by 100.
7. This % DCF for the mill is then used to determine the tonnage of DCF materials supplied by the mill, by multiplying the % DCF times the tonnage of material(s) purchased from the mill.

> **_Example calculation_**. A mill owns three estates. All three are subjected to Daemeter's test for DCF status of estates, using proxy boundaries as described above. Of the three estates, two of them are deemed DCF and one is found to be non-DCF. Together the two DCF estates produce approx. 100,000 tons of fruit annually; the non-DCF estate produces 50,000 tons. In total, the mill processed 150,000 tons of fruit, supplied only by its own estates.
>
> For this mill, a total of 100,000 tons are deemed DCF, and the remaining 50,000 tons are non-DCF. As a result, for this mill, % DCF = (100,000)/(150,000)*100 = 66.7% DCF.

Scenario 2. Computing DCF status of estates when concession boundary is available

When a concession boundary is available to define the license area containing one or more estates, then the DCF analysis can be computed for the concession as a whole, covering all estates that fall within it. This reduces the computations required, compared to testing each individual estate.

In this scenario, the concession analysis is performed using the very same procedure described above in **4.2.1** for FFB originating from concessions being subjected to monitoring*.* If the concession meets requirements for DCF, then volumes sourced from all estates with geocoordinates that fall within the concession are treated as DCF. For estates that fall outside this concession boundary, the estate must be analyzed separately following procedures described above in **Section 4.3.1, Scenario 1** (i.e. by using a proxy boundary).

As explained above at the beginning of Section 4.3.1, if the concession fails to meet DCF criteria, then we have two options: (1) Treat all volumes (FFB tonnage) from estates located in the concession as non-DCF, or (2) test each estate individually following procedures in Scenario 2.

To summarize, when concession boundaries are available, first test the concession as a whole (i.e. apply Scenario 2). If the concession meets DCF criteria under Scenario 2, then all estate sources with geocoordinates that within it can be treated as DCF. If the concession fails to meet DCF criteria, then we revert to Scenario 1 and test each estate separately using the proxy boundary technique.

Scenario 3. Computing DCF status of estates when we have estate boundaries

In the rare case where we have boundaries for individual estates, the same procedure described under 4.2.1 for concessions is applied to the estate. If the estate meets this Decision Rule, then all fruit supplied by the estate is treated as DCF.

> *Example calculation*. A mill owns four estates. A concession boundary is provided by the mill, and geocoordinates for three of the four estates fall within this concession. The concession is tested for DCF compliance (Scenario 2), and the concession is found to meet both criteria for DCF concessions. FFB produced from these three estates totals 100,000 tons.
>
> Because the fourth estate falls outside the concession, it is tested using the proxy boundary procedures (Scenario 1). The estate passes one DCF criterion but fails the other, making it non-DCF. Since no estate boundaries are available for this mill, this non-DCF estate cannot be tested following Scenario 3, and the procedure stops here. This estate produces 30,000 tons of FFB supplied to the mill; all volumes shall be treated as non-DCF.
>
> In total, the mill processed 130,000 tons of fruit over the period, all from the estates analyzed here. For the mill, 100,000 tons of fruit are DCF, and 30,000 tons are non-DCF.
>
> The %DCF for this mill = (100,000)/(130,000)*100 = 76.9%

4.3.2   Direct Supplying Farmers

The second FFB supplier type defined in the Portal is farmers that deliver directly to the mill. Typically, these farmers are plasma, KKPA, or other farmer types associated with the mill; independent cooperatives with their own transportation; or larger independent farmers who own or rent transport. The decision rule for determining DCF status of this supplier type is:

> *Decision Rule for Direct Supplying Farmers: Volumes sourced from within farmer plots are considered DCF if (i) no single deforestation event post 2015 within the assessment area, or partially overlapping the assessment area, exceeds 2 ha in size, and (ii) total aggregate deforestation post 2015 in the assessment area is <5% of the total assessment area.*

Both criteria must be met in order to qualify as non-DCF. For direct supplying farmers, the Portal requires data on geolocation (one coordinate), aggregate area of farmer plots, number of farmers and total production. It is possible to upload polygon data for individual farmers, or groups of farmers, into the Portal, but to date this is not happening. If polygon data are available from the Portal or other sources, then these can be analyzed using Daemeter's deforestation maps to determine how much (if any) deforestation occurred within farm boundaries post 2015, and then applying the decision criteria outlined above.

Since, to date, it is rare to have farmer polygon data, we first describe the procedure for determining DCF status when available data include geocoordinates and statements of area (Scenario 1). We then briefly mention the scenario in which farmer polygon data are available (Scenario 2).

Scenario 1. Computing DCF status of Direct Supplying Farmers (when no farm polygons available)

The mechanics of this procedure are the same as for Scenario 1 under Estates (Section 4.3.1). We must compute a proxy boundary for each Direct Supplying farmer or farmer group, determine how much deforestation took place within the proxy boundary, and then determine if it meets the decision criteria for DCF status.

Any farmer or farmer group that meets both criteria for DCF status – that is, no deforestation event >2 ha in size and total aggregate deforestation is <5% of the proxy area – shall be treated as DCF compliant. All FFB volumes (tonnage) supplied by the farmer or farmer group is treated as DCF volumes in computing %DCF metric for the mill. Any farmer or farmer group that fails one or both criteria shall be treated as non-DCF. If individual farm boundaries become available, then the analysis can be performed for each individual farmer within the group, as described in Scenario 2 below.

> *Example calculation*. A mill is supplied by three estates and 15 farmer groups that make direct deliveries to the mil. (i) The three estates supply 130,000 tons, and all three are found to meet DCF criteria for estates. (ii) The 15 farmer groups are tested for DCF compliance using proxy boundaries. Ten groups who supply 30,000 tons of fruit found to meet DCF criteria. Five groups are found to fail DCF criteria, and together they supply 10,000 tons of fruit.
>
> For this mill, a total of 130,000 tons of estate fruit are DCF; 30,000 tons of farmer fruit are DCF; and 10,000 tons of farmer fruit are non-DCF.
>
> The %DCF for this mill is %DCF=(130,000+30,000)/(170,000)*100 = 94.1% DCF.

Scenario 2. Computing DCF status of Direct Supplying Farmers (when farm polygons are available)

In the case where farmer polygons are available, deforestation can be tallied within each farm to determine DCF status. A farm shall be classified as DCF if is found (i) to contain no deforestation event post 2015 that exceeds 2 hectares, and (ii) not to overlap, even partially, with a deforestation event that exceeds 2 hectares in size. Any farm that fails either of these criteria shall be classified as non-DCF.

> *Decision Rule for Direct Supplying Farmers (where farm boundary is available)*: *Volumes sourced from within farms are considered DCF if no deforestation event within the farm, or partially overlapping the farm boundary, exceeds 2 hectares in size.*

Example calculation. An independent mill relies entirely on 25 farmer groups that make direct deliveries to the mill. (i) Fifteen of these farmer groups are associated with the mill and polygon data are available for them; five groups have geocoordinates and statements of area but no geocoordinates. (ii) The 15 groups with polygons are tested for DCF using farm boundary data, and 10 of the groups meet DCF criteria, supplying 100,000 tons of fruit. The five groups that fail DCF criteria supply 30,000 tons of fruit. (iii) The ten groups for which no polygon data are available are tested using the proxy boundary method, and five of these meet DCF criteria, while five of them fail. The groups that meet DCF supply 30,000 tons, and the groups that fail supply 20,000 tons.

For this mill, a total of 130,000 tons of farmer supplied fruit are classified as DCF, and 50,000 tons of farmer fruit are non-DCF.

The %DCF for this mill is %DCF= (100,000+30,000)/(180,000)*100 = 72.2% DCF.

4.3.3   Aggregators

The final FFB supplier type defined in the Portal is Aggregators. The decision rule for this supplier type to meet DCF criteria is:

> ***Decision Rule for Aggregators***: *Volumes supplied by aggregators are classified as DCF if they are sourced from villages (desa/mukim) that meet Daemeter's definition of No or Low deforestation post 2015. All other aggregator volumes are classified as non-DCF.*

This is the easiest method to apply. It merely requires comparing two lists: (1) the list of desa/mukim from which an aggregator sources fruit, and (2) the list of desa/mukim classified by Daemeter as meeting criteria for DCF
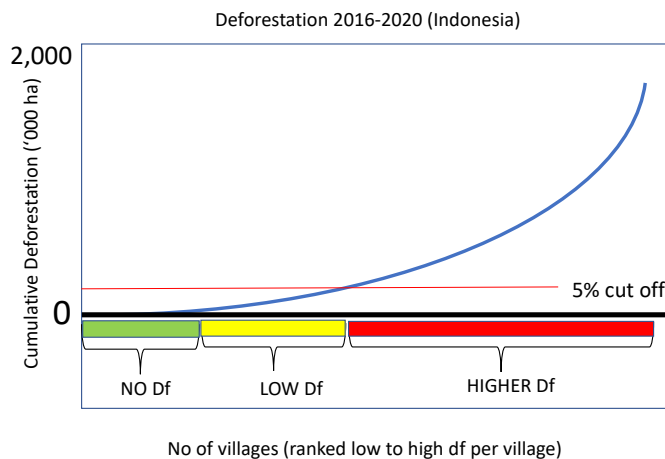
The list of desa/mukim from which aggregators source fruit is provided by data entered into the Portal by the mill. The list of desa/mukim that meet DCF criteria is provided by Daemeter (soon also to be integrated into the Portal).

As mentioned, Desa/mukim that display No or Low Deforestation are treated as DCF sources.

The technical procedure for classifying desa/mukim begins with computing total observed deforestation post 2015 within boundaries of each desa/mukim. No Deforestation desa/mukim are those which show Zero Deforestation within their boundaries post 2015.

Membership in the Low deforestation class is determined by Daemeter as follows. First, all desa/mukim are arranged in rank order from lowest to highest deforestation within the desa/mukim boundary (see inset). Zero Deforestation villages are automatically DCF. Then, moving from low to high, desa/mukim are added to the Low Deforestation group up to a point where the cumulative deforestation that occurrs within Low Deforestation desa/mukim reaches 5% of total deforestation observed across Indonesia (or Malaysia). These desa/mukim are viewed as the "positive outliers" that show exceptionally low deforestation post 2015.

Based on our data for 2016-20, a total of ~59,000 villages across Indonesia showed zero deforestation, and a further ~16,000 meet criteria for Low. On average, villages in the Low Deforestation group experienced approximately six (6) hectare of deforestation during 2016-20, or just over one hectare per annum. The ~9,000 villages in Indonesia classified as Higher deforestation account for 95% of deforestation across the country. They averaged 218 hectares of forest loss over 2016-20, >35x more than villages we classify as Low.

Deforestation 2016-2020 (Indonesia)

Cumulative Deforestation ('000 ha)

2,000

0

5% cut off

NO Df   LOW Df   HIGHER Df

No of villages (ranked low to high df per village)

We advise clients to treat fruit originating from No and Low deforestation villages as meeting requirements for DCF sources, whereas those classified as Higher do not. Alternative decision rules can be applied, but we believe this cutoff offers a reasonable compromise between stringency and tolerance for small scale deforestation potentially unrelated to oil palm.
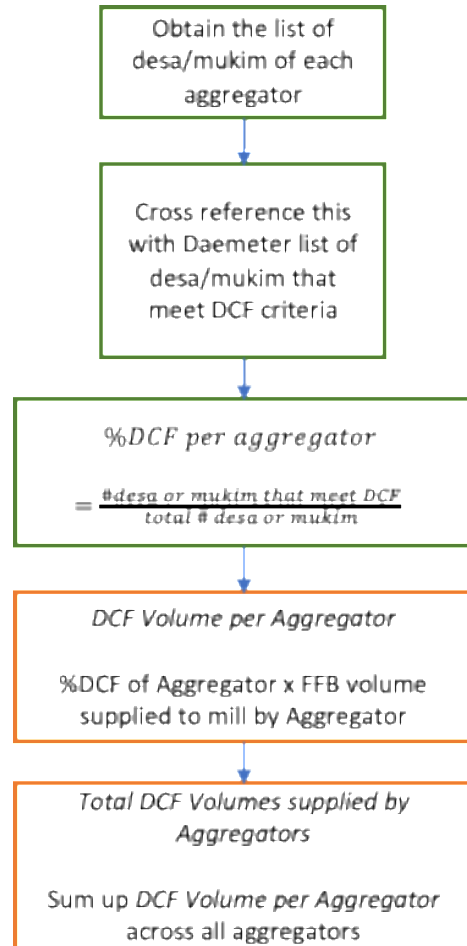
Most aggregators source fruit from multiple desa/mukim. In the portal, **it is compulsory** for mills to report for each aggregator all desa/mukim from which they source fruit, **but it is optional** to report the volumes sourced from each desa/mukim. When it is found that some desa/mukim supplying an aggregator meet DCF criteria but others do not, and volumes sourced from individual desa/mukim are not reported, then we must come up with a way to estimate DCF and non-DCF fruit volumes supplied by the aggregator.

When this occurs, we estimate DCF and non-DCF volumes by assuming that FFB is sourced equally from all desa/mukim.[2] For example, if an aggregator in Indonesia supplies 5,000 tons of fruit sourced from four desa, then we assume it sources 1,250 tons from each desa/mukim. If three of these four desa meet DCF criteria, then 3,750 of the 5,000 tons supplied by the aggregator are considered DCF, while 1,250 tons are non-DCF. The %DCF for the aggregator is thus 75% (i.e., 3 of 4 desa meet DCF criteria).

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[2] Obviously, this is an oversimplification that does not reflect reality, but alternative methods would require making even more assumptions with limited basis for doing so.

Step-by-Step Procedures

1. Obtain the list of desa/mukim linked to each aggregator.
2. Cross-reference this with Daemeter's list of desa/mukim that meet DCF criteria.
3. For each aggregator, classify each desa/mukim as meeting DCF requirements or not
4. Determine the %DCF for each aggregator. This is done by determining the % of desa/mukim reported by each aggregator that meets DCF criteria. For example:
    a. For an aggregator that reports one desa/mukim, and that desa is classified as DCF, then the aggregator is applied a %DCF = 100%.
    b. For an aggregator that reports six desa/mukim, four of which are classified as DCF, this aggregator is applied a %DCF = 66.7%.
    c. For an aggregator that reports three desa/mukim, none of which is classified as DCF, this aggregator is applied a %DCF% = 0%.
5. Once the %DCF is determined for each aggregator, compute the FFB tonnage that meets DCF criteria supplied by each aggregator. For example:
    a. Aggregator 1 has a %DCF = 60% and supplies 5,000 tons of fruit to the mill. Aggregator 1 therefore supplies 3,000 tons of DCF fruit.
    b. Aggregator 2 has a %DCF = 100% and supplies 2,000 tons of fruit. Aggregator 2 therefore supplies 2,000 tons of DCF fruit.
    c. Aggregator 3 has a %DCF = 0% and supplies 2,000 tons of fruit. Aggregator 3 therefore supplies zero tons of DCF fruit.
6. Sum up across all aggregators the tonnage of fruit that meets DCF criteria.
7. This is the total volume (FFB tonnage) of DCF fruit supplied by aggregators.

Obtain the list of desa/mukim of each aggregator

Cross reference this with Daemeter list of desa/mukim that meet DCF criteria

$$\%DCF\ per\ aggregator = \frac{\#desa\ or\ mukim\ that\ meet\ DCF}{total\ \#\ desa\ or\ mukim}$$

DCF Volume per Aggregator

%DCF of Aggregator x FFB volume supplied to mill by Aggregator

Total DCF Volumes supplied by Aggregators

Sum up *DCF Volume per Aggregator* across all aggregators

Example calculation. A large mill processes 220,000 tons of fruit supplied by three estates, 10 farmer groups that make direct deliveries, and three aggregators.

(i) The three estates supply 150,000 tons, and all three meet DCF criteria. (ii) Of the 10 farmer groups, six meet DCF criteria and supply a total of 50,000 tons of fruit classified as DCF. (iii) Of the three aggregators: Aggregator 1 has a %DCF of 75% and supplies 2,000 tons of fruit, making 1,500 tons of fruit that are DCF compliant. (iv) Aggregator 2 has a %DCF of 50% and supplies 6,000 tons of fruit, making 3,000 tons of fruit that are DCF compliant. (v) Aggregator 3 has a %DCF of 100% and supplies 2,000 tons, making 2,000 tons of fruit that are DCF compliant. (vi) The total volume of DCF fruit supplied by Aggregators is therefore 6,500 tons (1500+3000+2000).

For this mill, a total of

- 150,000 tons of estate fruit are DCF
- 50,000 tons of direct farmer fruit are DCF
- 6,500 tons of Aggregator fruit are DCF
- Total DCF tonnage is therefore 206,500 tons

Given this, % DCF for the mill is (206,000)/(220,000)*100 = 93.63% DCF.