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Carbon Report - 2020

Summary

Third Man Limited (Upendo Honey) is an organic honey and wax company based in Kigoma in Western Tanzania. This report gathers the endeavours of the company to measure its carbon footprint by looking at carbon emissions (in all steps of the operation) and by estimating the positive impact of the company's activity on forest conservation (carbon storage in biomass). Based on an projected production level of 700T of comb honey per year, we estimate the upper bound of our company's carbon emissions to be approximately 1013 T of CO_2 per year. Using the actual production data for 2020 (120T of comb honey), we estimate the upper bound of our company's carbon emissions to be approximately 221 T of CO_2. We estimate the lower bound of our company's possible positive impact to be 204,152 T CO_2 per year (this figure does not change due to production for reasons explained below). When balancing both results, we concluded that Third Man Limited activity is saving at least about 203,931 T CO_2 from being released in the atmosphere every year. As the company is expanding both the forests we work in and the beekeeper base from which we are buying, these gains are likely to continue increasing in the future.

Introduction

Third Man Limited (Upendo Honey) is an organic honey and wax company based in Kigoma in Western Tanzania. This report sets out our carbon footprint of our full operation. Emissions due to production of our products, transportation of product and people, and construction of our processing facility are balanced against the impact of helping protect native forests from clearing.

In the fight against climate change, trees are one of our greatest assets. Deforestation is a double blow, since the existent carbon stock in the trees is released and CO_2 is no longer removed from the atmosphere by trees photosynthesising, day in day out. The default mode of nature is growth: preventing deforestation automatically creates the conditions for the natural regeneration of forests, where trees will store carbon through growth while removing CO_2 from the atmosphere (Chazdon & Uriarte 2016). While deforestation has numerous drivers, at base it revolves around the amount of money that can be made from either having trees standing or not (whether it is clearing for farming, grazing, firewood, or any other use). Payments for ecosystem services are an increasing part of the climate change toolkit, however they remain relatively marginal and controverted (Kronenberg & Hubacek 2013). Directly monetising standing forest for the people who use it on a daily basis also benefits the planet as it is less ecologically destructive than timber harvesting and contributes to the development of local communities (Arnold & Pérez 1998). The creation of a market for non-wood forest products – in our case honey and beeswax – was one of the key motivations for the establishment of our company.

The designation of a forested area as a 'reserve' by a government slows but does not stop deforestation from the area. Smallholder farmers and people seeking timber for firewood and charcoal encroach around the edges and logging firms cut rudimentary roads into areas with valuable timber and limited patrols (Blomley *et al.* 2008). While clearly preferable to open/unreserved forests, the gazetting of an area alone is insufficient to stop all deforestation. In contrast, actively using a gazetted forest where people work in the forest and extracting a range of non-timber resources while leaving the trees intact stops and often reverses deforestation (Kideghesho 2015). Here, we compare the three regimes of forest governance – open or business as usual, gazetted only, and actively used for non-timber products – and determine the relative effects on carbon stocks, CO_2 emissions and capture.

This report represents a good faith effort to measure our company's carbon footprint. Various methodologies for this exist, a whole industry of consultants has sprung up to help companies do this, and no unified procedure or set of assumptions has been agreed upon (Pandey & Pandey 2011). We put in much thought and took a lot of care in the creation of our numbers and clearly set out our assumptions and where they come from. However, due to the complexity of the task, it is unlikely to be a perfect report. If readers have questions or challenges to our findings, please do get in touch so we can learn more and adjust our conclusions accordingly.

I. Methodology

There are two calculations made in this report: (1) our company's carbon usage and (2) the positive environmental consequences of our company's activities on forests in Tanzania.

To calculate the carbon usage of our company, the first calculation, we will estimate emissions from the following:

- Company's car and motorbike usage
- Rented trucks coming into our central processing facility with raw honey from beekeepers.
- Rented trucks taking processed honey to Dar es Salaam for export.
- Other rented truck trips to move equipment or product. For example, taking empty buckets to beekeepers in the field or other cargo such as packaging equipment coming from Dar es Salaam to our facility.
- Sea freight of processed honey to Europe and North America.
- Sea freight of deliveries of packaging equipment or equipment from China to Dar es Salaam.
- End of life cycle of our products.
- All energy usage at our processing centre.
- All plane trips made by staff on company business.
- One off emission cost of construction of processing facility and warehouse.

For the above estimates, we first used an annual production of 700 tons of honey per year to set our predictions for the next years. This production is 80% more than our current level but within our three-year expansion plans. In 2020, we produced 120 tons of honey. The detailed calculations are presented for a production of 700 tons, and a table summarizing the yearly result for the actual production is presented at the end. We used the Greenhouse Gas Protocol as a guide for formulas and sources to find emission factors.

To calculate the environmental impact of our company's activities on forests in Tanzania, the second calculation, we will compare three scenarios. A **Business as Usual** (BAU) case where forests have no formal protection status, a **Gazetted Only** (GO) case where a forest reserve has been created but no one extracts value or uses the forest on a regular basis, and finally an **Active Use** (AU) case where forests are gazetted but also used on a regular basis.

We currently work with beekeepers in seven reserve areas across western Tanzania. The carbon stock in these forests will be estimated as well as the amount of deforestation/afforestation that occurs under the three scenarios. We provide a market for beekeepers' honey and in the process implicitly monetize the gazetted forests. The impact of our work will be shown in the differences in net annual carbon emissions or savings between the three scenarios. We also work with beekeepers outside reserve areas but for the sake of simplicity and quantification, these forests have been removed from this analysis. The carbon emissions from the production will be included in the analysis but the effect on forests will not be included.

II. Results: Our Carbon Emissions

As mentioned above, the science of measuring carbon emissions is not yet completely settled. Different sources give different estimates for various activities. And of course, local factors such as road condition, altitude, tyre pressure or engine wear all affect engine performance and hence emissions. With this in mind, we present here a low and high estimate of emissions for each source when applicable. When calculating our company's total emissions, we only use the high estimates for all parameters.

1) Company car and motorbike usage

Our company vehicles cover a combined average of 5,500km per month or a total of 66,000km per year. Emissions from passenger vehicles are measured in 'grams of CO_2/km' and range from 80 to 210 grams of CO_2/km (EEA's indicator assessment 2017). Multiplying this out, emissions from company owned vehicles are:

Table 1: Company vehicle emissions (T of CO_2)

Company Vehicle Emissions (T of CO_2)	
Low Estimate	High Estimate
5.3	14

2) Rented trucks coming into our central processing facility with raw honey from beekeepers

To transport 700T of raw honey into our processing facility would require 88 trips of the common 8T trucks used for this purpose. On average one trip is about 800km (a round trip journey to collect the honey). Therefore, this is 70,400km covered by rented trucks. Estimates of emissions from 8T cargo trucks range from 90-300 grams of CO_2/ton-km (CEFIC Report 2011). Multiplying this out (Emission (low or high)*kms travelled*weight of load), emissions from rented trucks transporting raw honey to our processing facility are:

Table 2: Rented truck (8T) emissions (T of CO_2)

8T Rented Truck Emissions (T of CO_2)	
Low Estimate	High Estimate
51	169

3) Other rented truck trips

On other occasions our company rents trucks for moving cargo around Tanzania. For example, to send empty buckets to beekeepers ahead of harvest season or to bring empty packaging materials (drums, bottles, etc) from Dar es Salaam to our processing facility in Kigoma. We used a generous estimate of 20 short trips (350km), usually in 8T trucks, and 20 long trips (1,250km from Dar es Salaam to Kigoma), usually in 20T trucks. Using the emission range estimates and formulas (Emission (low or high)*kms travelled*weight of load) for 8T trucks as above, and emission estimates of 100-300 grams of CO_2/ton-km for20T trucks (CEFIC Report 2011), emissions from other rented trucks transporting cargo to and from our processing facility are:

Table 3: Other rented truck (8T) emissions (T of CO2)

8T Rented Truck Emissions (T of CO_2)	
Low Estimate	High Estimate
24	79

4) Rented trucks taking processed honey to Dar es Salaam for export

After processing in our facility, honey is loaded onto trucks and sent to Dar es Salaam port for export to Europe. To transport 700T of processed products to Dar es Salaam in a 20T truck would require 35 trips. The length of the trip is 1,250km meaning that a total of 43,750km are covered to send our entire inventory to Dar es Salaam. Estimates of emissions from a 20T cargo trucks range from 100-330 grams of CO_2/km (CEFIC Report 2011). Multiplying this out (Emission (low or high)*kms travelled*weight of load), emissions from rented trucks transporting processed product to Dar es Salaam port are:

Table 4: Rented truck (20T) emissions (T of CO_2)

20T Rented Truck Emissions (T of CO_2)	
Low Estimate	High Estimate
131	433

5) Sea freight of processed honey to Europe and North America

We export our honey from Tanzania to customers in Europe (primarily Italy and Germany) and North America (primarily Canada). Honey is shipped as a Full Container Load (FCL) of 20T. 700T of processing product would require 35 FCL trips. Half to Germany (the furthest away common European destination) and half to Montreal (the most common destination in North America). Multiplying this out (GLOMEEP Calculator), emissions from sea freight transporting processed product from the Dar es Salaam port to Hamburg and Montreal are:

Table 5: Sea freight of export's emissions (T of CO_2)

Sea Freight of Exports (T of CO_2)	
Low Estimate	High Estimate
61	221

6) Sea freight of deliveries to Tanzania

Many of our packaging materials and equipment is sourced in China from around the Shenzhen area. To import enough packaging material for 700T of production would require ten 40ft sea containers from China to Dar es Salaam (their onwards movement by truck to Kigoma is covered under item 3). Multiplying this out (GLOMEEP Calculator), emissions from sea freight transporting our deliveries from Shenzhen to Dar es Salaam port are:

Table 6: Sea freight of import's emissions (T of CO_2)

Sea Freight Deliveries to Tanzania (T of CO_2)	
Low Estimate	High Estimate
5	18

7) End of life cycle of our products

Packaging material used by our company consists of food grade epoxy lined 200L steel barrels to export our honey to wholesale customers, and plastic jars to sell our honey directly to consumers. Once the honey has been consumed, the packaging becomes waste, hence producing carbon emission to be treated, or recycled, or incinerated, etc. We used the example of Europe for the data regarding percentages of waste being recycled, put in landfill, or incinerated (APEAL Report 2020 and European

Parliament Report 2018). Every year, about 95% of our production is sold in steel barrels, and 5% only in plastic packaging.

Table 7: End of life cycle of our products (T of CO_2)

End of life cycle of our products (T of CO_2)	
Steel	Plastic
2.72	0.76

8) All energy usage at our processing centre

Our processing centre has a power grid connection and a back-up generator for electricity and a gas hot water system for heating water. Based on actual energy usage of 18 months of operation, our facility uses around 27,000kwh of energy every year (Company's internal data). Multiplying that out by the type of fuel source used to create that energy (diesel for both the grid electricity and our back-up generator and LPG for the hot water system) emissions from energy usage at our processing facility are:

Table 8: Processing centre energy usage (T of CO_2)

Processing Centre Energy Usage (T of CO_2)	
Low Estimate	High Estimate
7	16

9) All plane trips made by staff on company business

Company staff make infrequent trips to visit our customers or attend trade fairs in Europe and North America. Carbon emission estimates from air travel are a lot more refined than other types of transport. Therefore, we offer only one number rather than a high and low estimate thanks to the ICAO Carbon Emissions Calculator. To calculate this number, we used the following flights as representative of all company travel:

- Kigoma-Dar es Salaam Return – 8 journeys
- Dar es Salaam-Frankfurt Return – 8 journeys
- Frankfurt-Toronto Return – 3 journeys

To this date, company travel has not reached this quantity. However, it is not an unreasonable amount of travel to be estimating over the coming years.

Table 9: Company plane journeys' emissions (T of CO_2)

All Plane Journeys (T of CO_2)
Estimate
12.5

10) One-off emission cost of construction of processing facility and warehouse

In 2018 we constructed our own purpose-built warehouse and processing facility. This was a greenfield site construction. Emissions related to this sort of construction cover things such as the emissions used to create the raw materials (cement, steel etc) used to make the building. This is a once off emission cost. Numbers were obtained through the Construction Carbon Calculator and are shown in Table 10. None of our buildings are air conditioned and upkeep emissions are counted in total processing energy use (Table 8). As no precise protocol could be found on the way we would account for the one-off emission of constructing our facility, we suggested to spread the emissions over 7 years, assuming that the building would be used for at least 7 years (Table 10).

Table 10: Emissions from construction (T of CO_2)

Emissions from Construction (T of CO_2)		
	Low Estimate	High Estimate
One-time construction emissions	220	330
Annualised over 7 years	31.4	47.1

11) Summary of the predicted emissions for 700T

A summary table of the categories above for a predicted production of 700 tons of honey is shown in Table 11.

Table 11: Total Company's emissions (T of CO_2)

Number	Emission Source	Low Estimate	High Estimate
1	Company Vehicles	5.3	14
2	Raw Honey In	51	169
3	Other Logistics	24	79
4	Land Freight (exports)	131	433
5	Sea Freight (exports)	61	221
6	Sea Freight (imports)	5	18
7	End of life products	3.5	3.5
8	Processing Energy Usage	7	16
9	Plane journeys	12.5	12.5
10	Construction	31.4	47.1
	Total Tons of CO_2 Emissions	**331.7**	**1013.1**

The highest number on this emissions' list is transporting our honey for export by road from Kigoma to Dar es Salaam. It would be possible to reduce these emissions by using the railway connecting Dar es Salaam and Kigoma (and to use the railway to bring imports from Dar es Salaam to Kigoma). This would also be a cheaper option for our company. We have explored this option at length and sent some goods via the railway as trials. Unfortunately, this service is not a reliable option yet to base our business on due to the unpredictability in the length of the trips. We do send some non-time sensitive cargo via the railway and hope to increase this amount as the service improves. However, to date this does not represent a large portion of our logistics and so it is not included in this analysis. It remains an avenue to be pursued as a potential source of emission and financial savings as and when Tanzanian railway infrastructure further develops.

12) Actual emissions in 2020

In 2020, we produced 120 tons of honey, and consequently emitted less carbon in the atmosphere when comparing to our future estimation with a production of 700T. The difference is mainly due to less transportation. Additionally, the year 2020 was transformed by the Coronavirus crisis which limited our capacity to take flights between Europe and Tanzania. The results of our carbon emissions for the year 2020 are presented in Table 11. We will consider the high estimate of our carbon emissions for the rest of this report, which is equal to **221.4 T of CO_2**.

Table 12: Total Company's emissions (T of CO_2)

Number	Emission Source	Low Estimate	High Estimate
1	Company Vehicles	5.3	14
2	Raw Honey In	8.6	28.8
3	Other Logistics	4	13.5
4	Land Freight (exports)	13	42.6
5	Sea Freight (exports)	14.5	52.2
6	Sea Freight (imports)	0.9	3.2
7	End of life products	0.6	0.6
8	Processing Energy Usage	7	16
9	Plane journeys	3.4	3.4
10	Construction	31.4	47.1
	Total Tons of CO_2 Emissions	**88.7**	**221.4**

III. Results: conserving forested areas

Carbon Stock in Reserve Areas

Our company currently works with beekeepers in seven gazetted Reserve Areas (RAs). As mentioned briefly above we do source honey from other non-gazetted forests. However, this production of honey does not represent a significant proportion of our total production, so these forest areas are not considered in this report. It could easily be argued that deforestation in non-gazetted forested areas is slower where beekeeping or other revenue generating non-timber forest activities are taking place than where they are not (Arnold & Pérez 1998). Regardless, these beekeepers, their honey, and their forests are left out of this analysis.

In total these seven RAs cover over 4,000,000 hectares (Table 12). This is an area greater than the landmass of Denmark. While not completely homogenous in terms of forest type, the dominant ecosystem is *miombo* woodland. All areas are part of the Central Zambezian miombo woodlands ecosystem that covers a large part of central Africa (through Angola, Burundi, Democratic Republic of the Congo, Malawi, Tanzania, and Zambia). Miombo woodlands are excellent carbon sinks, meaning that they can absorb a lot of carbon from the atmosphere (Munishi *et al.* 2010).

Table 12: Reserves where beekeepers harvest honey for the company and their respective surfaces (ha and sqkm)

Reserve Area Name	Hectares	Sqkm
Luganjo Game Controlled Area	165,429	1,654

Mlele Hills Forest Reserve	519,311	5,193
Moyowosi-Kigosi Game Reserve	2,106,000	21,060
Mpanda Line Forest Reserve	441,300	4,413
Msima, North East Mpanda Forest Reserve	502,449	5,024
North Ugalla Forest Reserve	165,429	1,654
Tongwe West Forest Reserve	363,000	3,630
Total	**4,262,918 ha**	**42,629 sqkm**

For ease of analysis, we assumed that the RAs have a uniform forest type and cover. As these are native forests that have never been wholesale cleared for agriculture or other uses (logging etc) this is an acceptable assumption.

Based on several studies of biomass estimation and carbon stock in *miombo* forests, estimates reach an average of 52.2 tons of C per hectare with a high level of uncertainty ranging from 1.3 to 95.7 (Gumbo *et al.* 2018, Woollen *et al.* 2012). For our study, we decided to use the average (52.2 T C/ha) to proceed in our calculations. Table 13 shows the tons of C stocked in each RA. This number will help us to estimate the amount of CO_2 that would be released into the atmosphere if the forest were cleared.

Table 13: Carbon stored in forests per reserve area

Reserve Area Name	Hectares	Estimate of C stored (tons)
Luganjo Game Controlled Area	165,429	8,635,394
Mlele Hills Forest Reserve	519,311	27,108,034
Moyowosi-Kigosi Game Reserve	2,106,000	109,933,200
Mpanda Line Forest Reserve	441,300	23,035,860
Msima, North East Mpanda Forest Reserve	502,449	26,227,838
North Ugalla Forest Reserve	165,429	8,635,394
Tongwe West Forest Reserve	363,000	18,948,600
Total	**4,262,918**	**222,524,320**

We do not work in all RAs to the same extent and therefore our impact varies. To determine where our impact is highest, we decided to examine hives per hectare of forests. The RA with the highest hive density is given an arbitrary impact factor of 1 with the other RAs scaled according to their hive density. Table 14 shows hive density and associated impact factor. The impact factor will be used in a further calculation to determine how much de/afforestation can be attributed to our work.

Table 14: Company's impact factor based on hives per hectare in the different reserve areas

Reserve Area Name	Hives	Hectares	Hives per Hectare	Impact Factor
North Ugalla Forest Reserve/GCA	30,981	165,429	0.19	1.00
Moyowosi-Kigosi Game Reserve	202,720	2,106,000	0.10	0.51
Msima, North East Mpanda Forest Reserve	20,591	502,449	0.04	0.22
Tongwe West Forest Reserve	12,028	363,000	0.03	0.18
Luganjo Game Controlled Area	4,700	165,429	0.03	0.15
Mlele Hills Forest Reserve	8,644	591,311	0.02	0.09
Mpanda Line Forest Reserve	5,699	441,300	0.01	0.07
Total	**285,363**	**4,262,918**	**-**	**-**

Three Scenarios of Forestry Management

When left to their own devices, forests will expand geographically and add density by adding biomass at a rate dependent on local climatic conditions. Unfortunately for forest cover, forests are rarely left to their own devices. To estimate the impact of our work, we will examine the effect of three models of forestry management (Business as Usual - BAU, Gazetted Only - GO, Active Use AU), which lead to different levels of deforestation or forest growth. Table 15 shows the estimated per year change in forest biomass for the models of forestry management. Low estimates for GO and BAU were based on Pfeifer *et al.* 2012 where GO corresponds to protected areas (PAs) and BAU corresponds to unprotected areas; high estimates were based on Blomley *et al.* 2008, where GO corresponds to forest reserves (FR) and BAU corresponds to open areas.

Less or no data is available concerning AU forested areas (Pfeifer *et al.* 2012) so we had to make rough estimates based on data concerning Community Based Forest Management (CBFM) areas. CBFM is practised mainly in village forest reserves but can also occur as Joint Forest Management in forest reserves outside village land. The key concept is that communities are given the responsibility to manage their forest area in accordance with management plans agreed at community level (Blomley & Iddy 2009). So far, CBFM seems to be an efficient way to sustainably manage forests by promoting conservation and regeneration, largely because the community benefits economically from its sustainable use (Blomley *et al.* 2008). In our case, beekeepers do not manage the forest but they have their hives in government forest reserves. However, we believe that in terms of impact our work can be compared to that of CBFM, as a secure market for honey and wax with above (local) market prices is an important economic incentive for forest conservation (Dickson *et al.* 2020), in this case by our beekeepers ensuring sustainability of their income. In the past, beekeepers have been accused of using their trade as an excuse to gain access to forests for other purposes – mainly poaching of wildlife and wood, including illegal charcoal production. Anecdotal evidence from both beekeepers and forest reserve managers indicates that incidents of beekeepers being caught for transgressions in forest reserves has significantly reduced (Bruno Nicholaus, personal communication). This is also borne out by the substantial number of hives that the beekeepers tend to have. The average for our registered beekeepers is 400 hives/beekeeper, with outliers at either end of the scale. So, having a significant income from honey and wax is definitely an incentive for beekeepers and their communities to conserve the forest where they harvest honey. For our calculations, we decided to reduce the estimation of forest growth in AU forests compared to CBFM (Blomley *et al.* 2008) while keeping the general positive trend.

Table 15: Forest growth estimates for the three governance scenarios (BAU, GO, AU)

Scenario	Low Estimate	High Estimate
BAU	-0.8%	-1%
GO	-0.1%	-0.3%
AU	0%	0.2%

Table 15 shows that the BAU and GO governance structures lead to a reduction of trees in the forest whereas the worst-case estimate for AU shows no reduction or gain with the high estimate showing the forest to be adding biomass year on year (Dickson *et al.* 2020). BAU and GO forests suffer from a steady drip feed of deforestation as people cut down trees for cropland, pastureland, and firewood. Gazetting a forest slows, but does not stop, this process. These seemingly small differences in biomass gain or loss become significant for carbon storage or loss over large areas. Applying the above-mentioned average rate of C stored in miombo biomass of 52.2 T C/ha, Table 16 demonstrates the substantial gains to be made by actively using forests.

Table 16: Change of C (T of C per year) estimates for each governance scenario (BAU, GO, AU)

Change of C storage in tons per year		
Scenario	**Low Estimate**	**High Estimate**
BAU	- 1,780,195	- 2,225,243
GO	- 222,524	- 667,573
AU	- 66,757	445,049

Estimating our company's impact

To estimate our impact of providing a stable market for bee products for local beekeepers in forest reserves, we have applied the hive impact factors to forest growth in each of the forest governance scenarios. As explained above the hive impact factor is derived from hives/ha in a particular forest reserve. The data in Table 17 shows that, with local beekeepers and communities incentivised (through a secure market for their products) to protect forests in order to protect their investment, a significant positive balance in C storage can be achieved.

Table 17: Change of C emissions (T of C per year) applied to the company's impact factor

Change of C emissions in tons per year factored		
Scenario	**Low Estimate**	**High Estimate**
BAU	- 636,318	- 795,398
GO	- 79,540	- 238,619
AU	- 23,862	159,080

At present, due to the requirements of our organic market, all our beekeepers have their hives in GO forest. However, the estimates show that in all forest of all governance types, substantial gains can be achieved through economic incentivisation related to bee products. Finally, to assess our company's impact on forest conservation, we need to compare the impact of the three different scenarios to assess the weight of our company's activity in promoting active management of forests (AU).

Table 18: Impact of the company (T of C per year) when comparing different governance scenarios

Impact of the company (in tons of C stocked per year)

Comparison	Low Estimate	High Estimate
Difference between GO and BAU (low-low, high-high)[1]	556,778	556,778
Difference between GO and AU (low-low, high-high)	**55,678**	397,699

Table 18 shows that the largest gains in carbon storage are to be made from more active use of government forests. We decided to only consider the worst-case scenario, meaning that we retained the lowest possible positive effect of the company on forest conservation: allowing about **55,678 T C** to be stored per year.

Using the formula to convert carbon stock into CO2eq sequestrated:

- X metric ton C/year* × (44 units CO_2/12 units C) = - Y metric ton CO_2/year sequestrated annually

We obtain a result of **204,152 T of** CO_2 **equivalent sequestrated annually** thanks to the activities of Third Man Limited as shown in Table 19.

Table 19: Impact of the company (T of CO_2 eq per year) when comparing different governance scenarios

Impact of the company (in tons of CO_2 eq sequestrated per year)		
Comparison	**Low Estimate**	**High Estimate**
Difference between GO and BAU (low-low, high-high)	- 2,041,521	- 2,041,521
Difference between GO and AU (low-low, high-high)	**- 204,152**	- 1,458,229

IV. Carbon balance of the company

To calculate our total carbon emissions, we combined the results from our company's emissions (see *I. Results: our carbon emissions*) and the impact of our company on forested areas in Western Tanzania (see *II. Results: conserving forested areas*). As explained previously, we chose to consider the lowest possible positive impact of our company loss of 204,152 T CO_2/year avoided and the highest possible carbon emission of the company 221.4 T of CO_2/year to arrive a minimum **saving of at least 203,930.6 T CO_2 from being released in the atmosphere every year**. As the company is expanding both its markets and the beekeeper base from which we are buying, these gains are likely to be even larger in the future. For 2021, we hope to achieve 210,000 T CO_2 as an overall positive footprint of our company.

[1] The same number appears for low and high estimates as the ratio between growth rate is the same in this case.

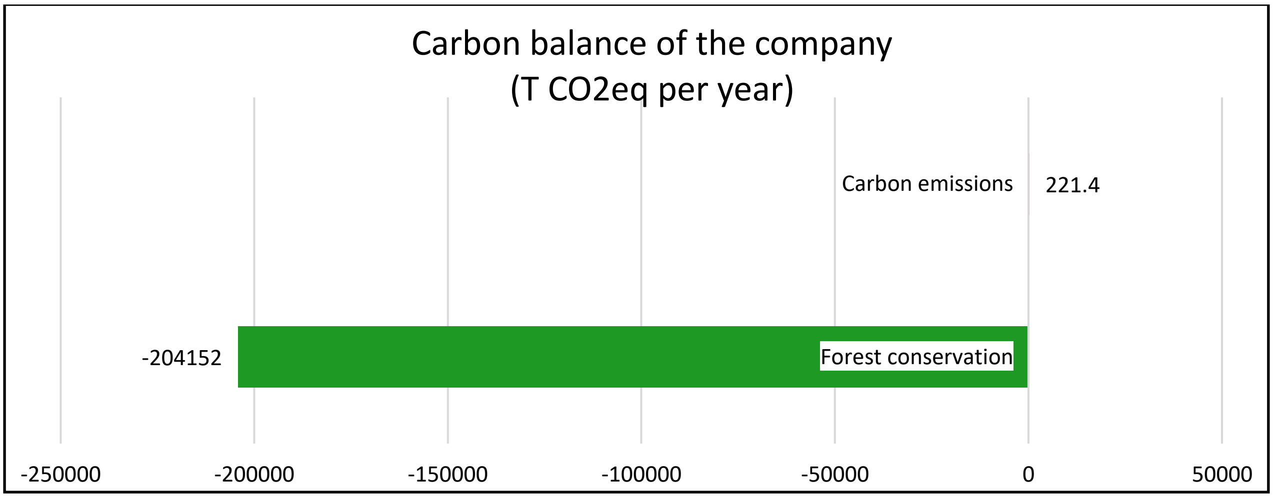

Figure 1: Carbon balance of the company. The green bar corresponds to the positive impact of the company's activity on forests in Western Tanzania. The orange bar corresponds to the total carbon emissions of the company.

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Annex: Identifying the different scopes in our emissions

According to the Greenhouse Gas Protocol, companies' carbon emissions can be divided in three different scopes:

- Scope 1 corresponds to all direct emissions that are taking place within the company.
- Scope 2 corresponds to emissions from purchased or acquired electricity, steam, heat and cooling.
- Scope 3 corresponds to all the emissions a company is responsible for outside of its own walls—from the goods it purchases to the disposal of the products it sells.

In our case, the partition of our carbon emissions' sources is the following:

- Scope 1: trucks coming in the facility with raw honey; trucks leaving from the facility with empty buckets; cars and motorbikes used in the daily work tasks of our company; yearly emission cost for the facility's construction.

We decided to include these emissions in Scope 1 as our company's main activity is to collect and process the honey. Getting the honey from remote villages in Western Tanzania can hence be included in our direct emissions.

- Scope 2: energy used in the processing centre.

Here we count the upstream carbon emission to produce the energy used daily in our processing centre.

- Scope 3: trucks going to Dar es Salaam for export, sea freight for export, sea freight for import of material; trucks coming in Kigoma for import of material; national and international flights; packaging; end of life cycles of our products.

The summary of our carbon emissions according to the previous scope definitions is presented in the graph below. While the Greenhouse Gas Protocol is unclear about where such a compensation could be included in our total carbon emissions, we believe that it concerns Scope 3, as it is an indirect outcome of our activity.

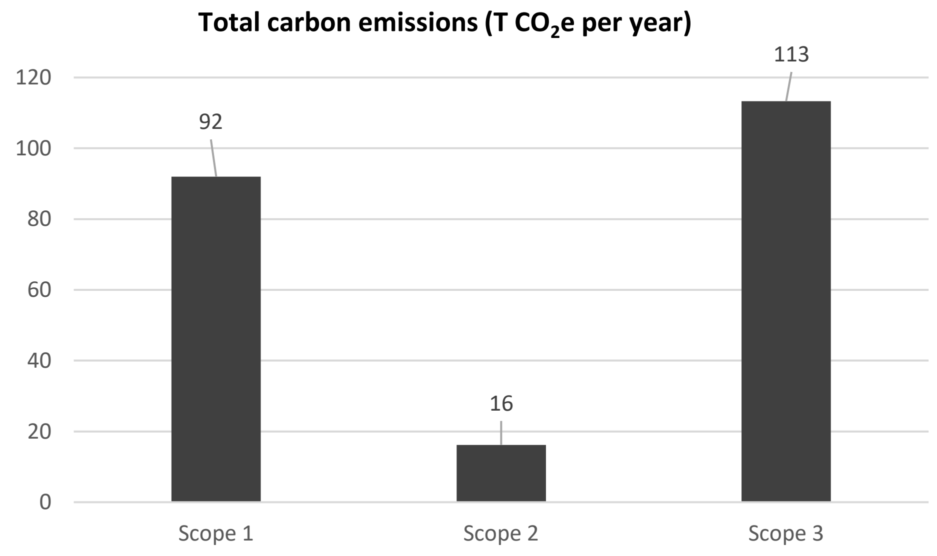

Figure 2: Carbon emissions of the company divided in the three scopes (1, 2 and 3).