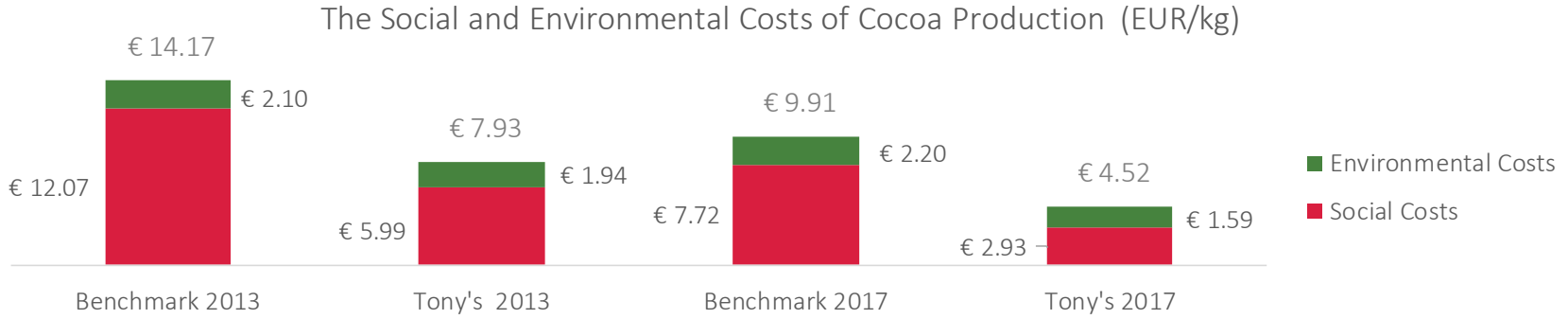
The True Cost of Cocoa

Tony's Chocolonely

2018 progress report. V3.2

True Price™ Prepared for: TONY'S CHOCOLONELY

Executive Summary



Towards slave-free, sustainable chocolate

Tony's Chocolonely has a mission to make 100% slave-free chocolate the norm in the chocolate industry. In addition, its company-wide mission is to have sustainable operations and supply chains.

Using true costs

A key question on the path to reach this goal is how to measure progress. The true price of a product provides a clear measure. The true price consists of the market price of a product and all external costs (true costs) associated with production. The lower the true cost, the more sustainable the cocoa.

Tony's Chocolonely cocoa is more sustainable than the average cocoa

The figure above shows the key results. The true cost of Tony's Chocolonely cocoa is €4.52 per kilogram. This is 54% lower than the true cost of the average cocoa in Côte d'Ivoire and Ghana (€9.91).

This is mainly because Tony's Chocolonely performs better on the impacts *underearning of smallholder farmers* (that receive a Tony's Chocolonely premium), *child labor* and *forced labor* (that Tony's Chocolonely actively seeks to prevent). In addition, Tony's Chocolonely's farms have higher yields, which also helps to reduce the true costs per kilogram cocoa.

Tony's Chocolonely has improved since 2013, but there are still external costs

Results can also be compared to 2013, when Tony's Chocolonely performed a first true price scan. After this, Tony's Chocolonely formed an impact team and worked on decreasing its external costs of production and reducing its true price.

The true cost of one kilogram of cocoa from Tony's Chocolonely farms has declined from €7.93 in 2013 to €4.52 in 2017. This shows that a significant reduction in external costs is possible and sets an example for the sector as a whole. The current true cocoa cost for both Tony's Chocolonely and the sector benchmark however show that there is still work to be done.

What are true costs?

A central element to sustainable production is negative externalities: costs that affect people or planet that are not compensated for. Modern slavery (or 'forced labor') is a prime example: the physical and psychological damage that enslaved people bear is not represented in the cocoa price. Child labor, insufficient income, and contribution to climate change are other examples.

True pricing is a methodology to make all key social and environmental external costs visible. The true cost expresses all external costs in a single unit (Euro damage per kilogram cocoa), which makes the different impacts directly comparable.

Contents

About this report

For this report, the true cost of cocoa used in Tony's Chocolonely chocolate bars was calculated. This report starts by defining the concept of true pricing and explaining its value.

It continues by discussing the results of the true cost study of cocoa. It then provides an in-depth analysis of the factors having the most important impact on the true cost of cocoa used in Tony's Chocolonely chocolate bars. A brief analysis regarding greenhouse gas emissions in the supply chain is included and an exploratory analysis of the impacts of chocolate bars including milk and sugar (the other two main ingredients of the chocolate bars) is given.

Finally, conclusions are drawn regarding this study and the sustainability of Tony's Chocolonely's supply chain for cocoa. The report describes a roadmap towards a sustainable cocoa industry and suggests applications of the current study.

The appendices as attached to this report contain the relation to earlier TP work, assumptions and recommendations, details on the methodology, a list of acronyms and the bibliography.

Colofon

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About True Price

True Price is a social enterprise with a mission to contribute to an economy that creates value for all. We do that by helping organizations to quantify, value and improve their impact on society. True Price assists multinationals, SMEs, NGOs and governmental organizations in risk management and strategic decisions, by providing insight in their impacts and related risks and opportunities.

Introduction

Tony's Chocolonely aims for 100% slave-free chocolate and sustainable supply chains

Tony's Chocolonely's mission is to make 100% slave-free chocolate the norm in the chocolate industry. In addition, its company-wide mission is to have sustainable operations and supply chains. This translates to producing a chocolate bar free of negative externalities.[1]

In 2013 Tony's Chocolonely calculated its so-called 'true price'. The true price of a product is the sum of the product's market price and the social and environmental external costs involved in producing the product. Examples of such costs are underpayment to workers, land use and water or air pollution. All external costs together are referred to as true costs.

After learning about its 2013 true costs, Tony's Chocolonely formed an impact team and worked on decreasing its external costs of production to reduce its true costs. Tony's Chocolonely focused on the external costs of underearning, child labor, forced labor, and climate change. This aimed at bringing the true cost of cocoa to zero by the end of the decade.

1) Note that there are both positive and negative externalities. Positive externalities are benefits for society that are not factored into the price of a product, such as job creation or social cohesion. This report looks at negative externalities.

This study assesses the true cost of cocoa in Ivory Coast and Ghana, for Tony's Chocolonely and the sector benchmark

Figure: Tony's Chocolonely sources its cocoa from Côte d'Ivoire and Ghana. Most cocoa in 2017 came from Côte d'Ivoire (91%), the remainder was from Ghana (9%).

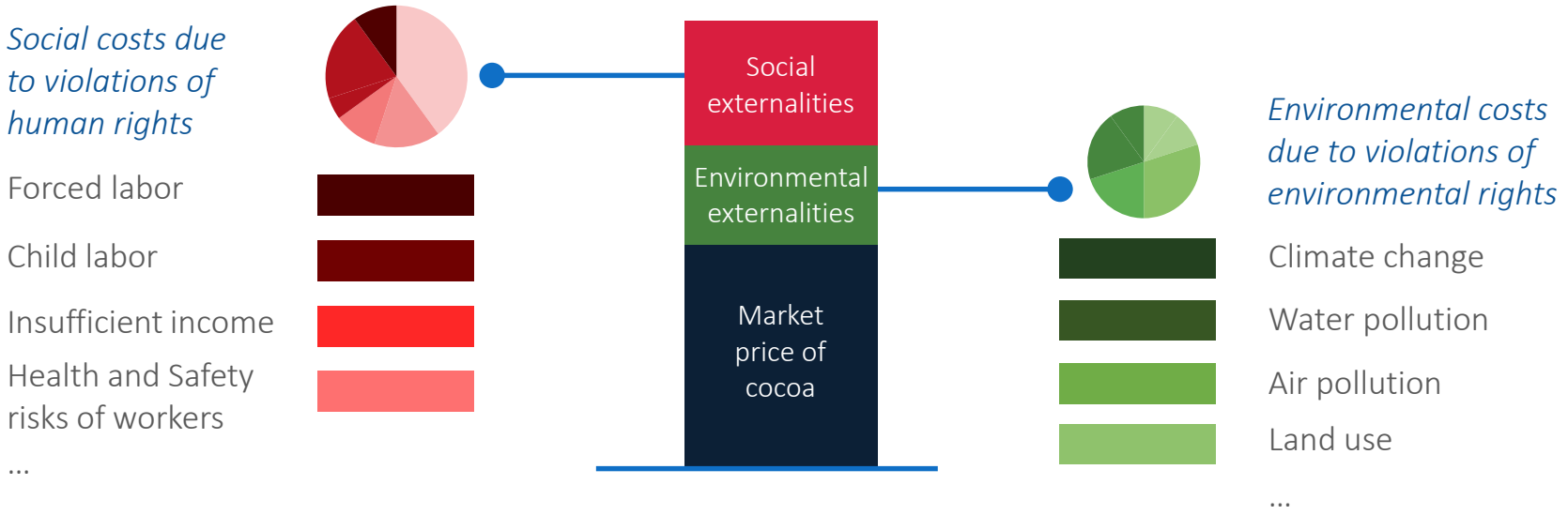
Figure: four systems in scope of this study. In each of the four systems, a weighted average of farms in Ghana and in Côte d'Ivoire is used.

The goal of the assessment presented in this report is to provide Tony's Chocolonely with insight into the environmental and social costs of cocoa production in its value chain since 2013. This report updates a true price assessment of Tony's Chocolonely's cocoa from 2013. In the meantime, the true price methodology has developed, and more and better sources for social and environmental impacts have become available.

To guarantee comparability, the 2013 results have been recalculated with the 2018 true pricing methodology. The study now shows how Tony's Chocolonely has progressed over the last 4 years. It also compares the performance of farms from cooperatives that supply to Tony's Chocolonely to the average cocoa produced in Ghana and Côte d'Ivoire (the 'benchmark'). The report compares cocoa production according to four systems, as shown above.

Additionally, this report highlights areas in which Tony's Chocolonely can achieve advancements to diminish its external costs, and work towards zero true costs.

A true price consists of the market price plus social and environmental externalities



External costs are the basis of the concept of a true price. External costs occur when producing a good (such as cocoa) imposes a cost upon a third party. This represents the total amount that society as a whole "pays" for a product, rather than what the buyer pays. External costs can be classified as social or environmental external costs.

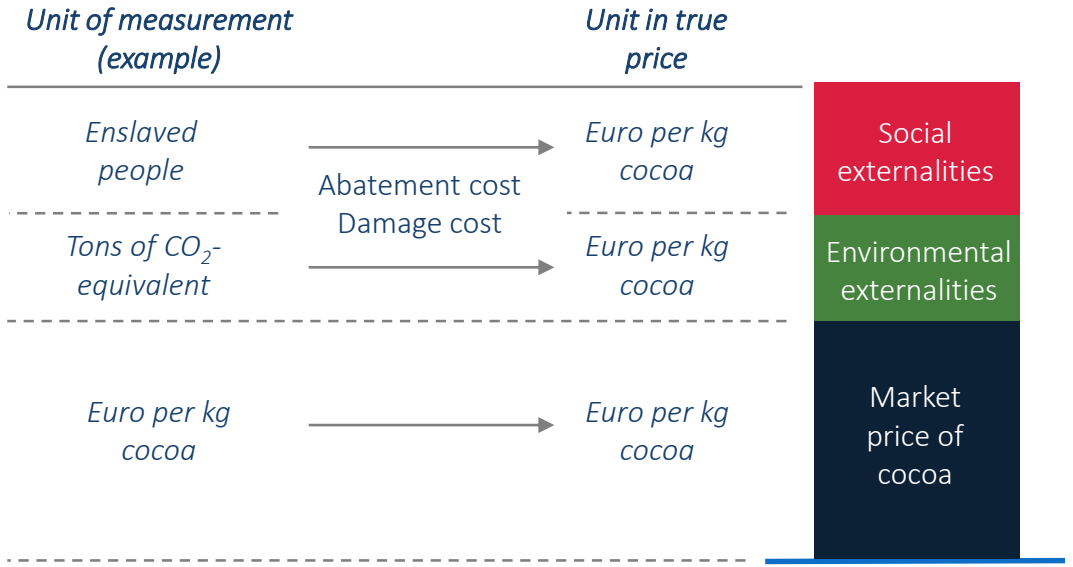
An example of a social cost is the cost related to underearning of smallholder farmers. Cocoa farmers are often poor smallholders that make much less than a living income. A living income is an income sufficiently high so that they can provide themselves and their families with a decent living: access to food, healthcare, and education amongst other things. When the cocoa price is so low that smallholders face underearning, they are effectively bearing part of the cost of the chocolate that consumers buy in the supermarket.

An example of an environmental external cost is the cost related to carbon dioxide (CO_2) emissions. Cocoa beans are transported from Ghana and Côte d'Ivoire to Belgium to be made into chocolate. This transport leads to carbon dioxide (CO_2) emissions, as does the processing. Carbon dioxide emissions lead to climate change. The cost of climate change will be felt by future generations and are already being felt now by communities located in areas that face rising sea levels.

This means that not only the consumers pay for chocolate, but many other stakeholders in the supply chain bear part of the cost too.

The figure above schematically shows the true price of cocoa. The figure gives a number of examples of the elements of the true costs. The full scope is defined below (page 11).

The elements of the true cost are monetized through the abatement cost and the damage cost approach



To express the environmental and social costs in Euros, they need to be monetized: translated from their environmental units (e.g. tons of CO_2 equivalents) into monetary terms. This is done using several techniques. The preferred technique is the 'abatement cost approach': monetizing the costs to prevent or restore a negative externality. This ensures that the damage left at the end of the day is as small as possible.

Not all externalities can easily be abated: When a child is forced to work and consequently misses schooling, it lags behind on education, which will impact the rest of the child's educational life and/or career. While one can pay the child compensation for what it missed in schooling, the child can never travel back in time as to obtain the schooling she deserved. When abatement is not possible, external costs can be monetized using a 'damage cost approach': monetizing the welfare effects of an externality.

Note that it is often more cost-effective to prevent externalities from occurring than to compensate for them in hindsight. Harassment of workers is an example: while the extent of compensation for harassment may be difficult to measure and monetize, the minimal compensation will include the cost of therapy sessions and the cost of personal compensation for being harassed. If harassment can be prevented (e.g., through clear audits), none of this is required.

While there are many conceptualizations of sustainability, to have no external costs is a fundamental element of the sustainability of a product. This is directly reflected in products with zero (or very small) true costs.

True pricing helps producers and consumers with sustainable decisions

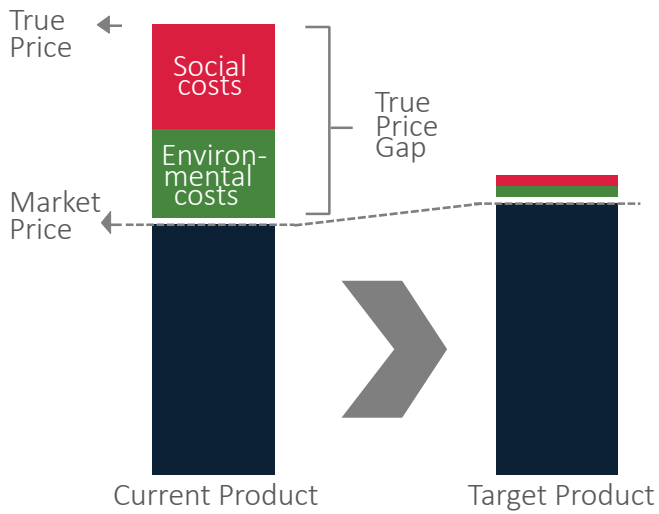


Figure: smart innovations can drive the true costs down, while keeping the market price (approximately) constant. ***Bring true costs down to zero is a shared responsibility of all actors in the supply chain,*** *and from a broader perspective, the whole sector. For instance, to close the 'earning gap' of smallholder entrepreneurs, farmers have a responsibility to work towards sufficiently high yields, and the chocolate value chain has the responsibility to pay a decent price.*

As shown on the previous page, the true costs are a direct measure of how sustainable the product is. This has direct applications for both producers and consumers.

Producers

For producers, the interest in calculating a true price is threefold: Firstly, some companies see it as an opportunity to develop products which are both profit generating and simultaneously have a positive impact on the environment and society. Tony's Chocolonely is a clear case in point here.

Secondly, true costs can function as a roadmap for improvement for the whole value chain. As shown in the figure above, reducing the true costs does not require products to become more expensive. Instead, smart innovations can drive the true costs down, while at the same time making sense businesswise. Indeed one of the conclusions of this report is that Tony's Chocolonely has reduced its external costs, with very limited impact on the price of their chocolate.

Thirdly, companies can also use information on true prices to communicate to the world how well they are operating with regards to sustainability, or how much better they are doing compared to others in the industry. Tony's Chocolonely is a brand that is clearly built on the promise of sustainability.

Consumers

Consumers can use the true cost of products to make better-informed choices on their consumption. If the price of a product is within a reasonable price range, many consumers would prefer buying more sustainable products. However, in most cases, consumers do not know how to do so. This lack of information is resolved by calculating and communicating the true price.

This study analyzes 8 environmental and 6 social externalities

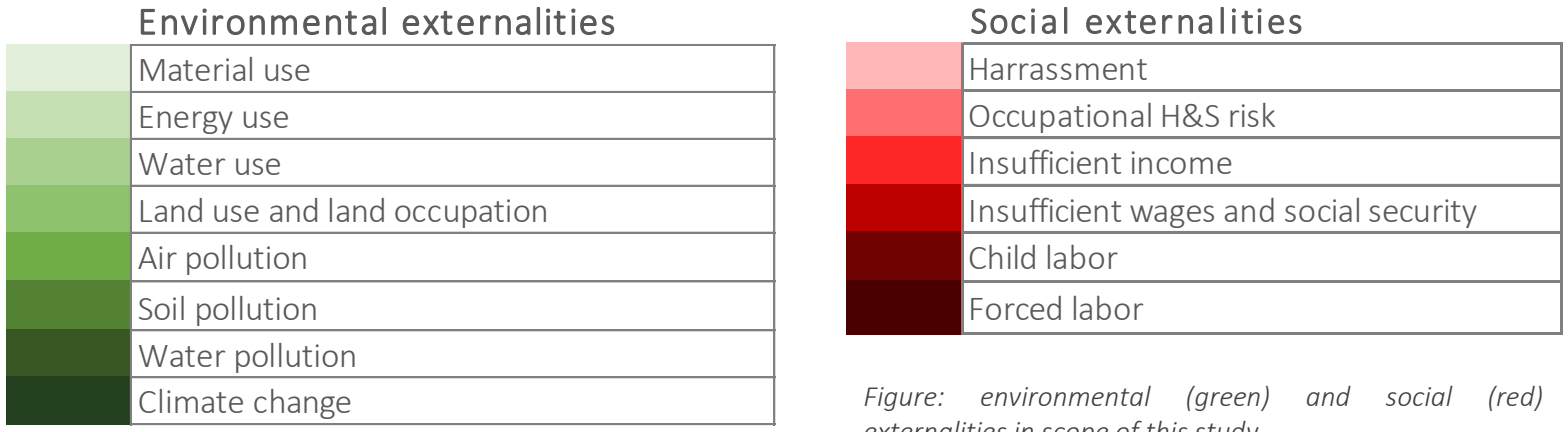


Figure: environmental (green) and social (red) externalities in scope of this study.

This study calculates the true cost of Tony's Chocolonely cocoa. This entails the assessment of 8 environmental impacts and 6 social impacts. The impacts include all external costs that have been widely in the news: child and forced labor, low earnings of smallholder farmers and their staff, and deforestation (that leads to greenhouse gas emissions and unsustainable land use change).[1)]

Impacts are calculated using primary data collected by Tony's Chocolonely where available. When little data was available, an estimate is made based on available secondary data. True Price has verified data points where possible but cannot guarantee that all data points are correct.

Tony's Chocolonely sources cocoa from Ghana and Côte d'Ivoire. Initially, true costs are calculated for the two countries separately. The resulting true costs are the weighted average of the two, based on the amount of cocoa sourced (approximately 91% in Côte d'Ivoire and 9% in Ghana).

The time frame in scope is the calendar year 2017. This contains elements of the cocoa years 2016/17 and 2017/18 (a cocoa year runs from October to September). Note that this 'flattens out' the price drop of cocoa that occurred in Côte d'Ivoire in March 2017. The government of Ghana decided to continue to guarantee the high price for all of 2017.

The true cost of Tony's Chocolonely cocoa is compared to the true cost of the average cocoa in the two countries ('benchmark'), that is calculated from secondary literature. The same relative weights as for Tony's Chocolonely are applied to Ghana (9%) and Côte d'Ivoire (91%) to make results best comparable.

Results over 2017 are compared to those over 2013 to study the developments. Where possible, this is done using direct data points for each of the years. When these are not available, the most recent available years are used, and data for 2013 or 2017 are modeled.

See the appendix for more details on the scope and methodology.

1) Two additional social impacts are not in scope for this study, mainly due to data availability: insufficient overtime compensation and gender discrimination through wage differences between male and female workers

Results

The true costs of Tony's Chocolonely are below those of the benchmark

The key result of this study is that the true cost of Tony's Chocolonely cocoa in 2017 is lower than the true cost of the benchmark cocoa.

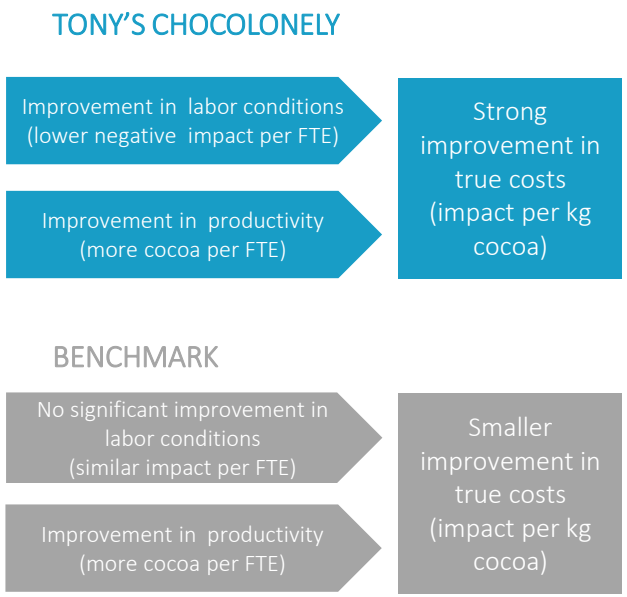
The main differences are found in social impacts, which is consistent with Tony's Chocolonely's main focal points. A kilogram of cocoa produced for Tony's Chocolonely harbors €2.93 of social costs, which is significantly lower than the benchmark's €7.72.

Compared to the benchmark, farmers and workers producing the cocoa used in Tony's Chocolonely chocolate bars have better incomes, work under safer circumstances, and are less likely to be forced to work or to be underaged.

On environmental costs, Tony's Chocolonely performs only slightly better than the benchmark (€1.59 vs €2.20). The main driver here are higher yields, that turn similar costs per hectare into smaller costs per kilogram cocoa. Tony's Chocolonely has relatively few targeted policies to reduce environmental costs at the farmer level.

The true cost of both Tony's Chocolonely and benchmark cocoa have declined per kilogram over the last years, though for different reasons. This is discussed on the next page.

The true cost of cocoa has declined since 2013



	Benchmark 2013	Tony's 2013	Benchmark 2017	Tony's 2017
Material use	€ 0.13	€ 0.11	€ 0.13	€ 0.09
Energy use	€ 0.02	€ 0.01	€ 0.02	€ 0.01
Water use	€ 0.00	€ 0.00	€ 0.00	€ 0.00
Land use and land occupation	€ 0.62	€ 0.57	€ 0.65	€ 0.47
Air pollution	€ 0.13	€ 0.15	€ 0.14	€ 0.11
Soil pollution	€ 0.40	€ 0.37	€ 0.42	€ 0.30
Water pollution	€ 0.29	€ 0.26	€ 0.31	€ 0.22
Climate Change	€ 0.51	€ 0.46	€ 0.53	€ 0.38
Total environmental costs	**€ 2.10**	**€ 1.94**	**€ 2.20**	**€ 1.59**
Harassment	€ 1.42	€ 0.78	€ 0.96	€ 0.48
Occupational H&S risk	€ 1.22	€ 0.60	€ 0.86	€ 0.46
Insufficient income	€ 4.72	€ 1.79	€ 2.51	€ 0.97
Insufficient wages and social security	€ 0.46	€ 0.42	€ 0.49	€ 0.39
Child labor	€ 3.57	€ 1.99	€ 2.43	€ 0.63
Forced labor	€ 0.69	€ 0.41	€ 0.46	€ -
Total social costs	**€ 12.07**	**€ 5.99**	**€ 7.72**	**€ 2.93**

The figure above shows the key results of the true cost analysis. The true cost of a kilogram of cocoa beans from Tony's Chocolonely has declined from €7.93 to €4.52 between 2013 and 2017. This is a 43% reduction. This is partly due to higher labor productivity (+32%), but also strongly to improvements of Tony's Chocolonely's policies – in particular for child labor, forced labor and insufficient income, where the impact per FTE has strongly declined. Overall impact per FTE has improved by 25%.

The average cocoa in Côte d'Ivoire and Ghana ("benchmark farms") have at the same time seen a true cost reduction from €14.17 to €9.91. This is a 30% improvement. However, this is only due to the strong increase in labor productivity (+46%). This relates to the fact that the average farm size has grown. This allows for higher efficiency, and cocoa can be grown with relatively less labor (Cocoa barometer 2013, 2015).

The next couple of pages zoom into some key externalities and how impacts of Tony's Chocolonely and the benchmark compare to each other. These pages will zoom into the key impacts: forced labor, child labor, underearning, underpayment, health & safety, water & soil pollution, and climate change.

The final part of this section provides more information on how other steps in the value chain contribute to the true price of chocolate.

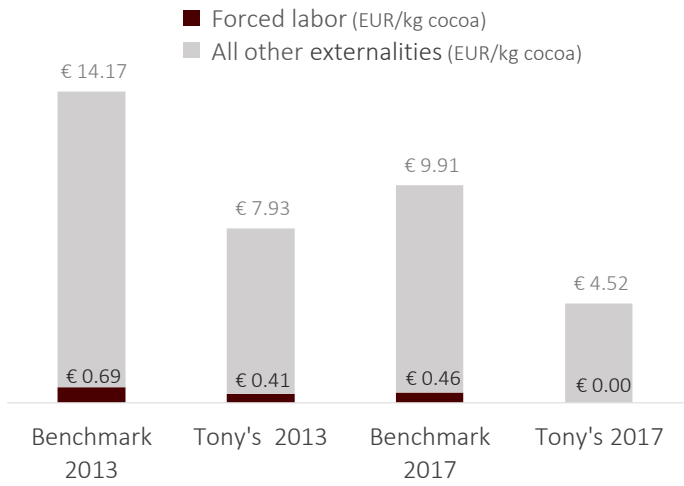
Improvement relative to 2013 of:	
Sector benchmark	30%
Tony's Chocolonely	43%

Improvement relative to sector benchmark of:	
Tony's 2013	44%
Tony's 2017	54%

Forced labor: zero current cases reported for Tony's Chocolonely's partner cooperatives

REPORTED 2018:
Forced labor

- ~17,700 forced laborers in Ghana
- ~12,000 forced laborers in Ivory Coast



Tony's Chocolonely was founded after public attention to modern slavery on cocoa plantations. According to the latest Global Slavery Index (2018), ~12,000 and ~17,700 adults and children in Côte d'Ivoire and Ghana respectively still qualify as forced laborers. These people are not free to move, are often in debt bondage, and a majority is abused in some form. In addition, a number of children is forced to work.

When assessing the impact of forced labor, a distinction is made between forced labor that is restricted and forced labor that is not restricted.

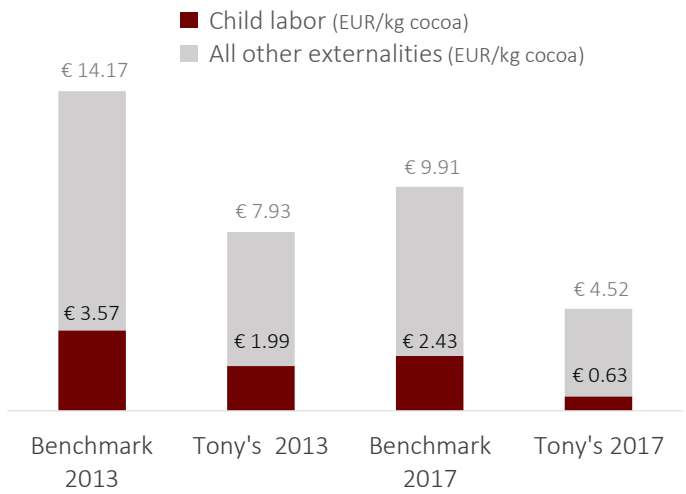
Additional fines are given depending on the share of forced workers not having access to identification documents, who are in debt bondage, who are abused and/or in need of repatriation.

This latter impact is related to issues around human trafficking, which Tony's Chocolonely has signaled to be a problem, particularly in child labor.

Tony's Chocolonely aims to work towards 100% slave-free chocolate. Not only their chocolate, but all chocolate worldwide. The company aims to leads by example. Assessing whether forced labor occurs on the farms that supply to them, is an integral part of the audit processes run.

No current and past incidents of forced labor were observed at Tony's Chocolonely's partner cooperatives in Côte d'Ivoire in 2017. In Ghana, several cases were identified in the past, none of which are still occuring. As a result, the forced labor part of the true cost is zero for Tony's Chocolonely in 2017. Due to data availability, this could not be concluded robustly for 2013.

Child labor: research shows this is a persistent problem in the sector



Child labor is a key externality in cocoa production and a main focus point for Tony's Chocolonely. The law in Ghana and Côte d'Ivoire allows children from a minimum age to help on cocoa farms for a limited number of hours per week, provided that their work is not hazardous (ILO, 2018).

In practice, over 1,200,000 child laborers in Côte d'Ivoire and over 900,000 in Ghana violate these conditions (Tulane, 2015), mainly because they engage in hazardous activities. This includes working with machetes and pesticides.

This study estimates the current impact based on national child laborer count and on the development of labour requirements.

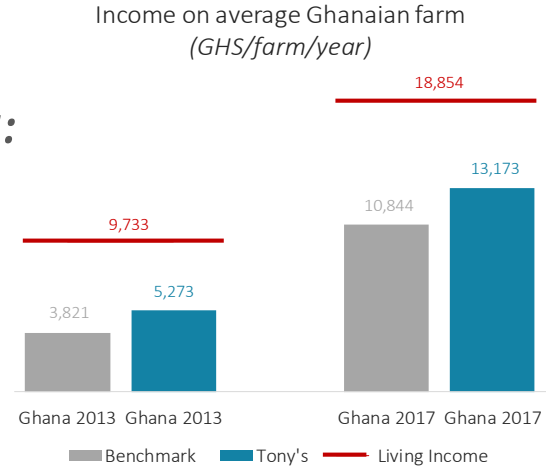
Currently, the occurrence of child labor on farms supplying to Tony's Chocolonely is around 40% of the sector average.

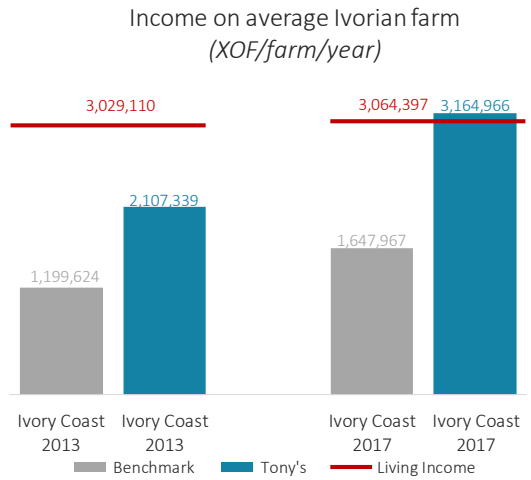
Since 2013, the impact of child labor per kg cocoa has declined both for Tony's Chocolonely and the benchmark, but child labor remains a main externality in both systems.

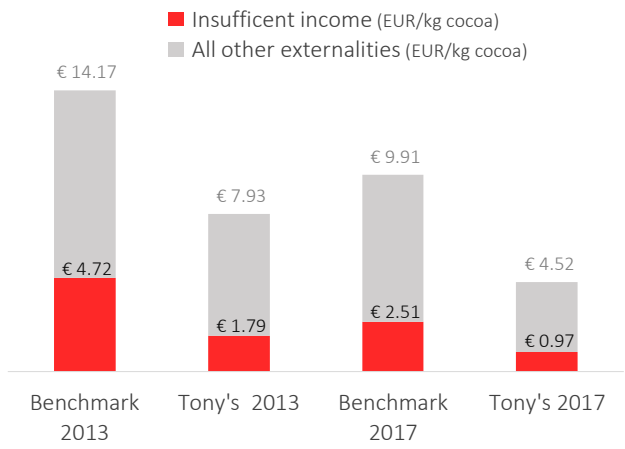
The assessment of child labor uses four categories of unlawful underage labor, differentiating in age and the type of labor (hazardous/non-hazardous). In addition, the number of children that are not able to go to school is taken into account by accounting for their education costs, as well as the missed income later in life due to loss of a year of education.

Currently, Tony's Chocolonely is implementing the Child Labor Monitoring & Remediation System (CLMRS). This measurement system is initiated by the International Cocoa Initiative and Nestlé and will ensure increasingly detailed and reliable data. Tony's Chocolonely will continue to use this system to further steer on child labour impacts.

Underearning of smallholder farmers: Tony's Chocolonely premium brings average Ivorian farmer to living income







The poverty of cocoa farmer households is a key externality. If a household does not earn enough to buy healthy food, appropriate housing, and adequate healthcare, the members of the household cannot have a decent life. Underearning of farmer households is also a driver for other social externalities, such as child labor.

Underearning is calculated as the difference between the living income target and actual household income. The living income target is based on global standards, such as the Global Living Wage Coalition. See the appendix for more details[1]. Actual farm income is calculated based on farm size, yields, FTE[2], cocoa prices[3] and non-cocoa income.

All farmers in the benchmark systems (that are based on national averages) earn below the living income target. This means that the farms are too small (2.60 ha in Ghana and 3.50 ha in Côte d'Ivoire for 2017), and/or the yields too low (420 and 490 kg/ha, respectively), and/or the cocoa price too low to make ends meet for a decent livelihood (Cocoa Barometer, 2015). In Ghana, an additional reason is that inflation has strongly pushed the living income target.

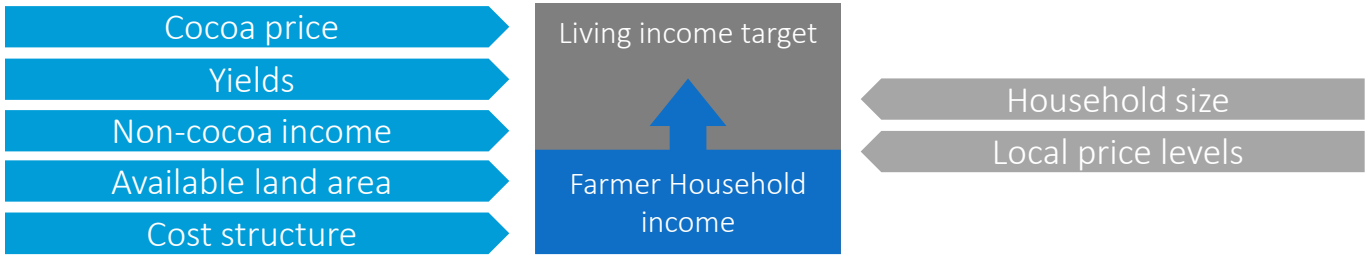
The vast majority of Tony's Chocolonely cocoa is sourced from Côte d'Ivoire. In 2017, the average farmer producing for Tony's Chocolonely in Côte d'Ivoire earned just above the living income at XOF 3.164.966 per farm per year. Note that this does not mean that all Tony's Chocolonely suppliers from Côte d'Ivoire make close to a living income. About half of the farmers still make less than a living income. Suppliers of the remaining 9% of cocoa that is sourced from Ghana, earn on average about 30% below the living income in 2017.

The lower true costs of Tony's Chocolonely compared to the sector is mainly driven by the premium that Tony's Chocolonely pays on top of the farm gate price of 27% in Côte d'Ivoire and 14% in Ghana.[4] Also, (Fairtrade) certification provides access to (productivity) training and programs to earn more.

The higher true costs of suppliers from Ghana is driven by a lower average yield. Also, high inflation after the premium was set contributed to higher costs in Ghana.

1) Also see the appendix for a brief discussion on how to include taxes in the living incomes. 2) For the calculation of the amount of hired and household FTE a regression was carried out using data of the study of True Price and Fairtrade (2018). 3) The average price paid to cocoa farmers in the benchmark in Ghana was €1,538/ton over 2017, as the government has guaranteed the high farm gate price over the entire year. In Côte d'Ivoire, the price dropped during the calendar year, so that the national average over the year is €1,269/ton. 4) Tony's Chocolonely pays a premium of $400/ton and $175/ton in Ivory Coast and Ghana respectively, on top of the $200/ton Fairtrade premium, part of which goes to the cooperative and part goes directly as cash to the farmers.

Zoom in: measures to further close the living income gap



Closing the living income gap is a shared responsibility of all actors in the value chain, who can take multiple measures to reduce this gap. A key measure that Tony's Chocolonely takes is an additional premium paid to their cocoa suppliers. The policy is designed in such a way that an average farm which has a yield of 800kg/ha reaches a living income. Averages are determined based on statistics on household size, living income cost of cocoa production, farm gate cocoa price, non-cocoa income and land size.

There are two reasons why this policy is currently not sufficient to close the living income gap. Firstly, the yield target is not reached by many farmers. The average current yields are lower with 573 kg/ha in Ghana and 680 in Côte d'Ivoire. Secondly, individual farmers' scores on the other statistics deviate from the averages used in the policy, which leaves them with insufficient income even if they receive the premium. For example, a farmer's land size is too small or its family size is too large.

Also, in the future Tony's Chocolonely premium policy alone is unlikely to be sufficient to close the living income gap. The main reason is that even if all farmers increase productivity to 800kg/ha, an income driver such as a farmers' land area (which is difficult to increase) could be too small to earn sufficient for a living income. Only farmers with at least 4.0 ha in Côte d'Ivoire and 2.6 ha Ghana will then earn more than a living income.

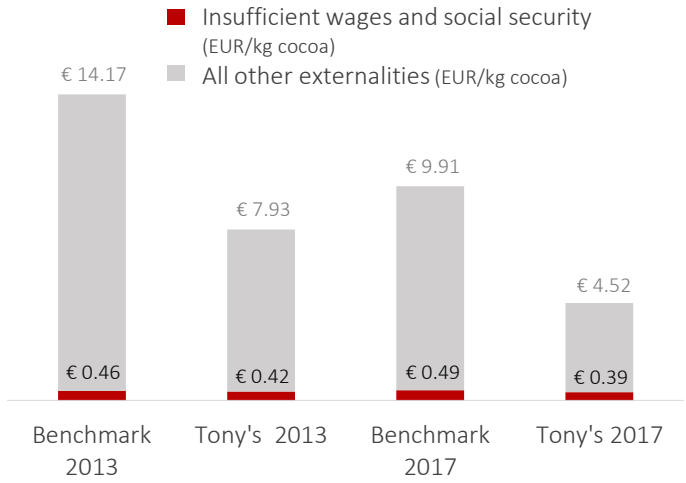
At first sight the difference between the average yield and the target yield seem at odds with the observation that suppliers from Ivory Coast currently – on a average – earn a living income. However, the premium paid by Tony's Chocolonely in 2017 used an average living income estimate of 2016, that was higher than average income estimation used to calculate the gap over 2017. The same policy would leave a higher gap if the premium was set on data available in 2017.

How can the gap be closed in the years ahead?

Firstly, closing the living income gap is a shared responsibility of all players in the value chain, who can all take appropriate measures. For example, farmers can improve their yields, with help of support organizations, traders can reduce margin escalation, certifiers can give trainings, governments can increase minimum prices, brands and retailers can demand supplier's social compliance and consumers can choose responsibly produced products.

Secondly, a premium payment is not the only possible and necessary measure that Tony's Chocolonely could take on farm level to drive farmer income. Next to price, measures could focus on yield increase, non-cocoa income (incl. food for own consumption), available land area and a farm's cost structure to bring the gap down. Also, Tony's Chocolonely needs to continue its value chain engagements to bolster additional collective action.

Underpayment of hired workers: potentially large impact that requires direct research



All people in cocoa cultivation have a right to a decent livelihood. Farmers and plantations regularly use external labor for seasonal work and heavy or dangerous tasks, such as clearing, weeding and spraying (Deppeler, 2014). Instead of a (household) living *income*, as discussed on the previous page, these hired workers should make a living *wage*.

The living wage is assessed at €2,048/FTE/year in Ghana and at €2,170/FTE/year in Côte d'Ivoire. These are directly related to the (family) living incomes mentioned on the previous page, and household composition (with 1.86 and 2.15 working adults per household, respectively).

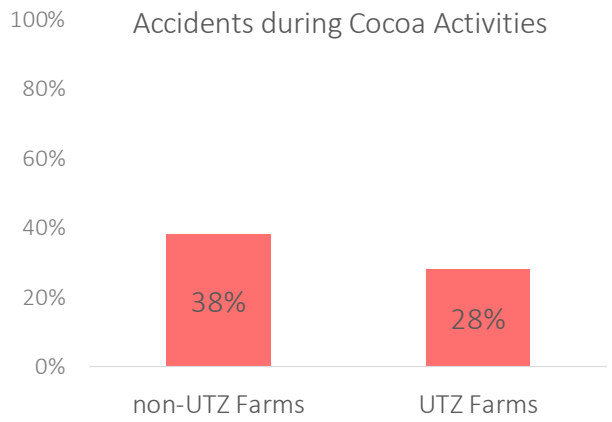
Wage levels of hired workers vary greatly but are in general far below the living wage. Wages mentioned in Deppeler (2014) for Ghana translate to €764 per year on full-time basis at the price level of 2017. Deppeler notes that there is no clear relation between certification and wage level. In Côte d'Ivoire, True Price and Fairtrade (2018) find an average yearly wage of €643/FTE, again far below the target.

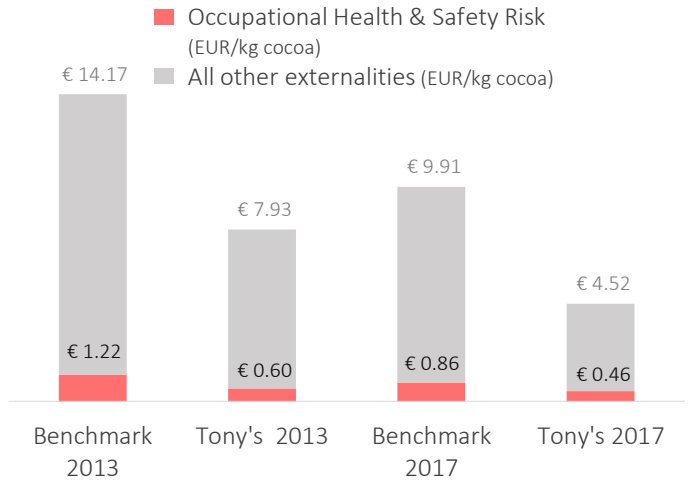
Lack of social security (e.g., no continuation of pay when an employee is sick) adds further to the true costs.

On a per kilogram basis, underpayment gives a lower contribution to the true costs than underearning. This reflects the fact that most of the farm work (80% or more) is done by the owner and his or her family. When yields increase, so does the amount of external labor required. The same holds if the amount of child labor is reduced. This makes sufficient payment of hired workers extra important towards the future.

For the farms cooperating with Tony's Chocolonely, the contributions of underpayment and underearning are closer together, especially in 2017. The Tony's Chocolonely premium specifically aims to help farmers make a living income. It also takes hired workers into account. Monitoring the impact of the premium is difficult because farmers are not explicitly required to spend part of the amount on wages. The current model makes a conservative assumption about actual salaries paid. The main recommendation is to investigate salaries of hired workers in more detail.

Health and Safety issues: high number of accidents merits special monitoring





Growing cocoa involves working with sharp objects (e.g., machetes) and toxic chemicals (e.g., pesticides). With good protective equipment and conscious behavior, farming can be reasonably save, but advised measures are not always implemented (Muilerman, 2013).

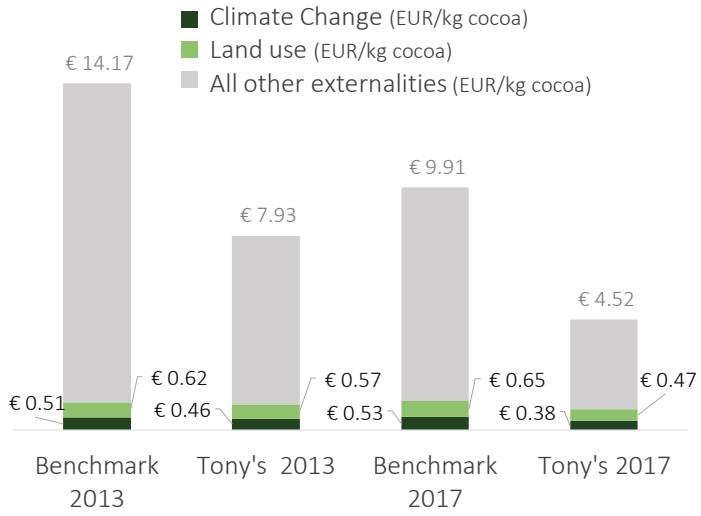
This leads to a high frequency of accidents. Of non-certified farmers, 38% report at least one accident over the last year (Ingram, 2014). For farmers who comply with UTZ certification, this is lower, but still at 28%.

The true costs contain compensation for health damage. In addition, there is a penalty for safety violations, which apply mainly to preventable accidents. Lastly, there is a contribution towards making the workplace safer in the future.

The true cost regarding health and safety is sizable due to violations at benchmark farms. Due to UTZ and Fairtrade certification, the negative impact on farms that produce for Tony's Chocolonely is expected to be lower than that of the benchmark.

Deforestation and carbon emissions: pressing impact, but mitigation is possible

Deforestation is a key driver of carbon emissions



Growing chocolate requires land. Higonnet et al. (2017) report that the cocoa industry is responsible for deforestation and transformation of national parks and protected areas to cocoa growing areas.

Higonnet mentions that deforestation is not necessary for cocoa production, with shade-grown agroforestry as a sustainable alternative. Traceability is key if chocolate manufacturers want to steer on the issue.

Land use change and its impact on biodiversity has been estimated in this study based on the average age of plantations. Note that for the benchmark in particular, this holds high uncertainty, and the effect might be higher than reported above.

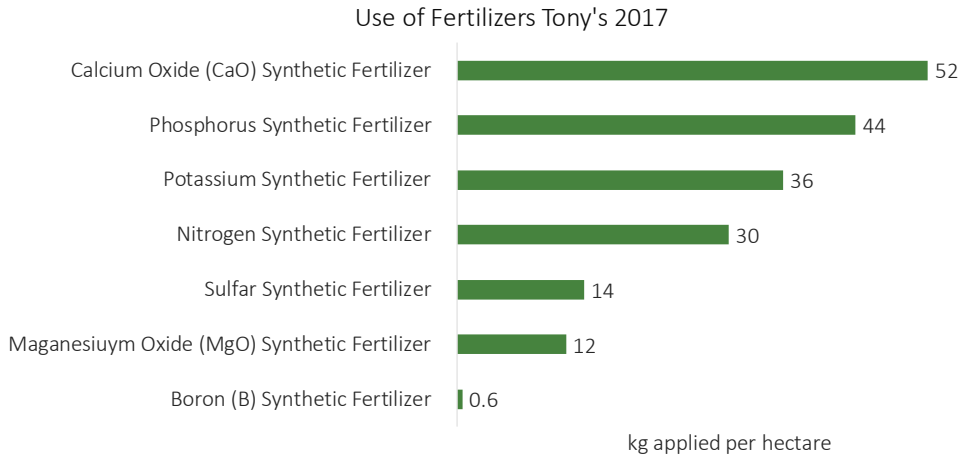
Deforestation, and land use change in general, also contribute strongly to greenhouse gas emissions. The same holds for chemical fertilizer use, which is energy intensive commodity in terms of manufacturing.

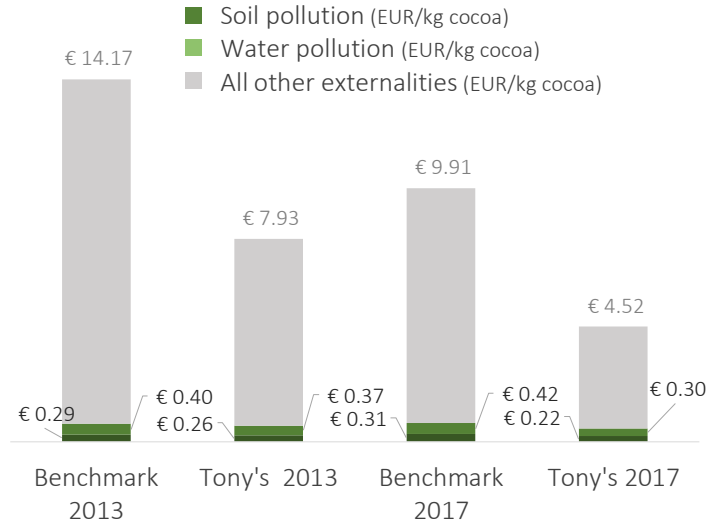
In addition, there are some greenhouse gas emissions later in the chain, during transport and manufacturing processes. Note that this is not included in the main graphs of this report which focus on the impact of cocoa as it leaves the farms. See also page 22 of this report.

In chocolate, other ingredients are also known to have a high carbon footprint. This is particularly the case for milk powder. See page 23 for information on the true costs of milk powder, where a large part of the environmental impact is incurred through greenhouse gas emissions.

As part of their mission towards sustainable chocolate, Tony's Chocolonely has started a collaboration with Justdiggit, a Dutch NGO which works on landscape restoration. As the restored landscapes buffer CO2, this can be used to offset carbon emissions. In this way, Tony's Chocolonely works towards climate neutrality.

Water and soil pollution: the main environmental externalities





Cocoa farmers use chemical fertilizers and pesticides to help their plants grow faster and protect them from various fungi, insects, and other pests.

Chemical fertilizers contribute to eutrophication in marine and freshwater ecosystems. When the water becomes overly enriched with nutrients, algae can grow very fast. The film of algae on the water prevents oxygen from entering the water. As a result, the water can sustain very little life.

Pesticide use mainly has a large impact on soil quality through terrestrial ecotoxicity. Imidacloprid and copper compounds are widely used on cocoa farms.

Together these chemicals give rise to the true cost elements of water and soil pollution.

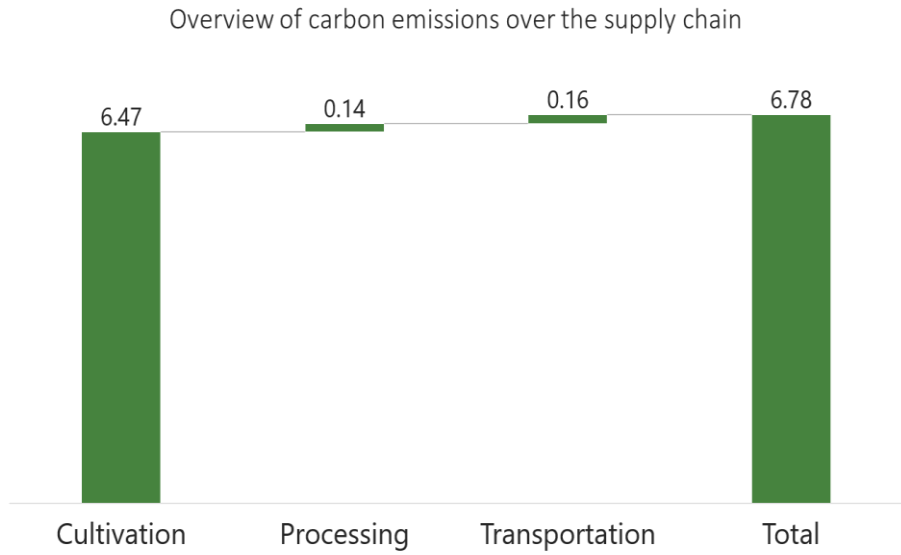
In some cases, fertilizer is provided by the cooperatives to their members free of charge, or at reduced rates. This applies for instance at some Fairtrade certified farms (Fairtrade and True Price, 2018).

The figures above indicate fertilizer use per hectare. Note that this is lower than advised by approximately 50%. Higher use can give rise to higher yields. This makes fertilizer use a complex driver of the true costs. The fact that it contributes to pollution does not mean that it should be avoided. In fact social externalities are expected to decline as yields increase, as this results in higher income for farmers.

Depending on how much the yields increase, the natural capital contribution of the true costs per kilogram of cocoa can move in either way when more fertilizer is applied.

The differences between the true costs for Tony's Chocolonely and the benchmark are limited. The fact that the yields are higher on farms that supply to Tony's Chocolonely is the driving factor behind this (small) difference. Through the yield differences, similar true costs per hectare can correspond to smaller true costs per kilogram cocoa. Additionally, the organic certification of ABOCFA in Ghana helps to reduce the true costs.

The true cost of cocoa over the supply chain: cultivation main driver



The analysis so far focused on the cultivation phase. All true costs reported relate to a kilogram of cocoa beans, as they leave the cocoa farms.

From the farm, the cocoa beans are transported to harbors in Ghana and Côte d'Ivoire (typically by truck), and to a chocolate manufacturer in Europe (by ship). Tony's Chocolonely produces liquid chocolate (so-called couvertures) at Barry Callebaut in Belgium. The liquid chocolate is shipped to two bar makers (Altaea and Kim's Chocolate) where the actual chocolate bars are produced. The bars are then shipped to distribution centers in the Netherlands (by truck) and in the US (by ship), from where they find their ways to the shops.

The value chain analysis in the figure above, zooms in on greenhouse gas emissions. These can occur over the entire value chain. Most of the social externalities, on the other hand, only occur at the farm level.

Land use change and fertilizer use are the key driving impacts at farm level, where 94% of greenhouse gas emissions occur. This percentage is also high due to Tony's Chocolonely's supplier choice and reduction initiatives.

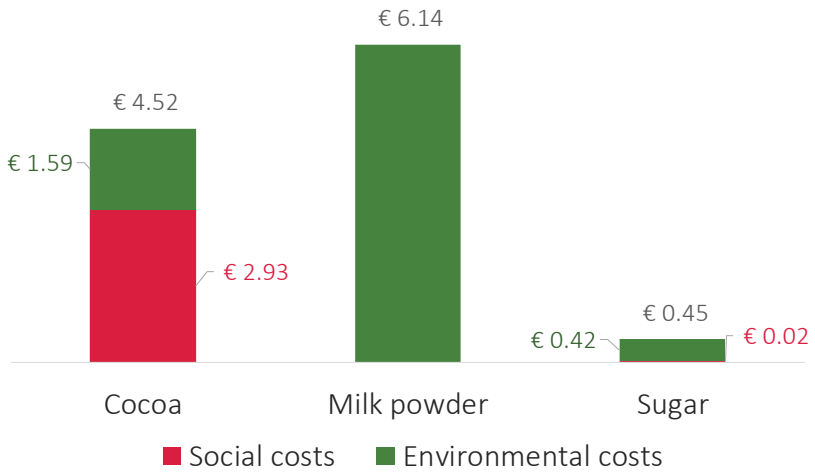
Emissions from transportation are relatively limited at ~3%. The participation of Tony's Chocolonely in the Goodshipping initiative can further reduce this in the upcoming years.

Similarly, the contribution of the processing steps is limited (~3%). This is partly due to initiatives of manufacturers to use renewable energy. In particular, bar maker Kim's Chocolate reports that their operations are now fully climate neutral (Kim's Chocolates, 2016).

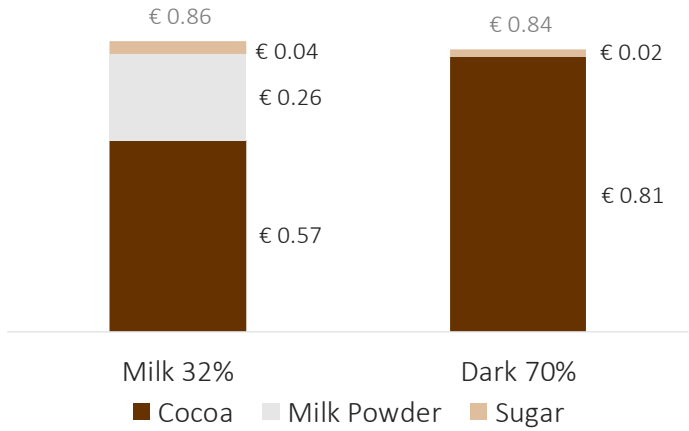
The true cost of chocolate bars: cocoa drives social, milk powder environmental externalities

Exploratory results; input of milk and sugar are estimates

Social and environmental costs of key ingredients (EUR/kg ingredient)



Cost of externalities for chocolate bar ingredients
(EUR/bar of 180 grams)



All Tony's Chocolonely bars are composed of five basic types of chocolate, or couvertures: white, milk 32%, dark milk 42%, dark 52% and dark 70%. All of these contain sugar next to cocoa. The white, milk and dark milk couvertures contain milk powder. Lastly, all couvertures contain a small amount of soy lecithin as an emulsifier.

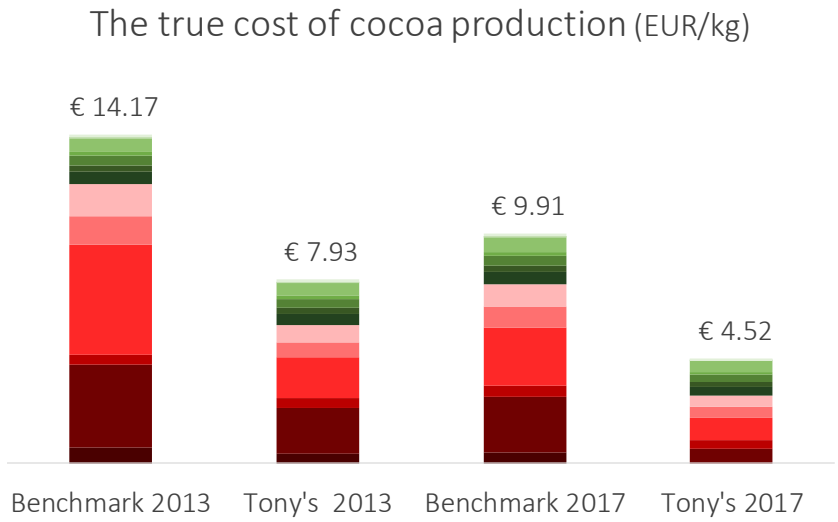
The figure on the left above gives an indication of the true costs for the key ingredients cocoa, milk powder and sugar. Note that results are not very robust, as input for milk and sugar are estimated, based on a True Price study for Tony's Chocolonely in 2015 (the latest True Price method is not incorporated).

It is interesting to note that the true cost of cocoa and milk powder are relatively similar, while that of sugar is much lower. A bar with a high amount of sugar (as opposed to cocoa or milk powder) has relatively low true costs.

The figure on the right shows the results of an exploratory analysis of the true cost of a chocolate bar. The total true cost is comparable for sweeter milk chocolate (42% sugar) and pure chocolate (27% sugar). The environmental part of the true costs is highest for the milk bar though, as this contains 23% milk powder with a high environmental footprint.

Conclusions

How well is Tony's Chocolonely doing in producing a low-impact chocolate bar?



Tony's Chocolonely was founded in 2005 to prove that producing chocolate without forced labor (and child labor) is possible. More recently, Tony's Chocolonely set the goals that farmers should be able to make the living income and that carbon emissions should be prevented or compensated.

A dedicated audit system was set up to monitor the occurrence of child labor and forced labor. This shows that child labor still occurs, but at a lower rate than in the rest of the sector. Tony's Chocolonely is working actively to further reduce the occurrence of child labor.

The average farmer in Côte d'Ivoire earns approximately the living wage now, although this does not guarantee that all farmers can get by. Carbon emissions are lower than at the benchmark, and a collaboration has been initiated with Justdiggit.

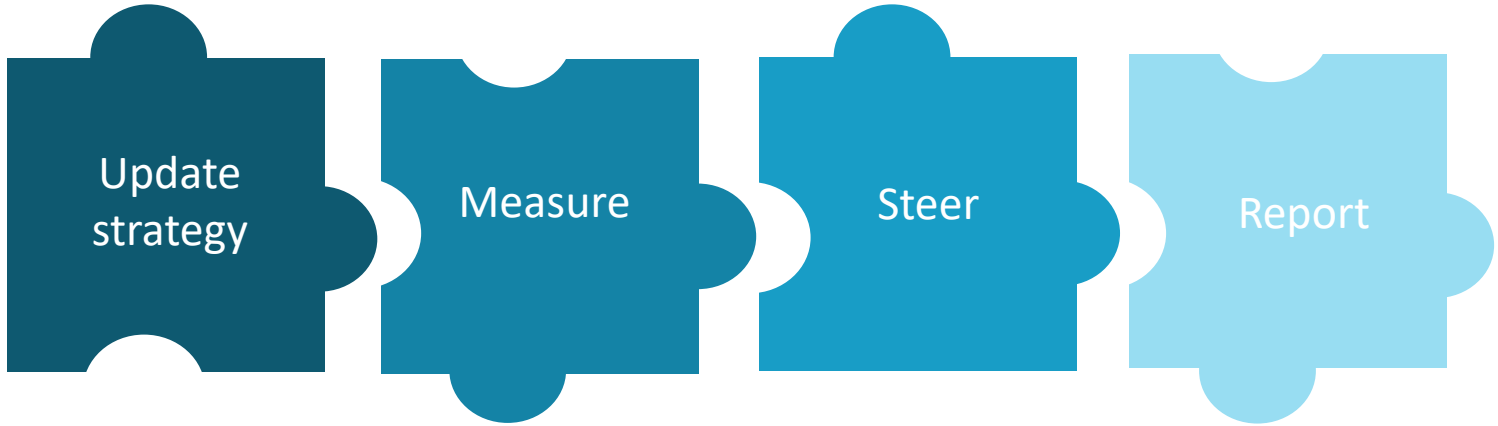
Tony's Chocolonely has had a less explicit focus on reducing other social and environmental externalities. These include underpayment of hired workers, health and safety incidents, and soil and water pollution. Tony's Chocolonely typically performs somewhat better than the benchmark. This relates to the fact that all farms supplying to Tony's Chocolonely are UTZ and Fairtrade certified and that yields are relatively high. With specific focus, more substantial steps can be taken. A first step should be a more specific measurement of KPI's related to these external costs.

Part of Tony's Chocolonely's mission is also to create change in the sector. It is difficult to measure to what extent this has worked. Indeed impacts have reduced between 2013 and 2017 – however, this is primarily due to higher efficiency (higher labor productivity). The growing share of certified farms is a promising note (UTZ Cocoa Statistics, 2016).

The conclusion is that Tony's Chocolonely has made substantial steps towards reducing externalities. This results in true cost reduction of 43% for Tony's Chocolonely cocoa between 2013 and 2017.

Although the external costs of cocoa production have declined for the sector as a whole too, the road towards cocoa with zero negative impact is still long.

How to pave the way towards lower impact?



Update strategy

All actors in the cocoa value chain share the responsibility to bring true costs down. Focussing on specific externalities such as child labor or forced labor, helps to reduce the negative impact, as the true cost reduction at Tony's Chocolonely over the last four years shows.

An example of a key externality deserving extra attention is the underearning of smallholder cocoa farmers. The actors along the cocoa value chain should aim to pay a fair price, and farmers themselves should work towards sufficiently high yields. These goals should become part of their respective strategies.

Measure

As a next step, ways should be developed to measure progress on indicators in focus.

Child labor is a persistent problem in the cocoa industry[1)]. Monitoring systems such as the Child Labour Monitoring and Remediation System (CLMRS) are successfully being implemented by a few pioneers[2)]. This system makes child labour measurable and open for remediation, which prevents it from becoming hidden.

Monitoring systems like the CLMRS enable companies to continuously measure their performance on key indicators.

Steer

Insight through reliable measurements creates possibilities to actively steer on reduction of negative impacts.

External costs can for example be managed through systems within the company, as for Tony's Chocolonely. This works well in their case for smallholder earning, and can be extended to other impacts.

Report

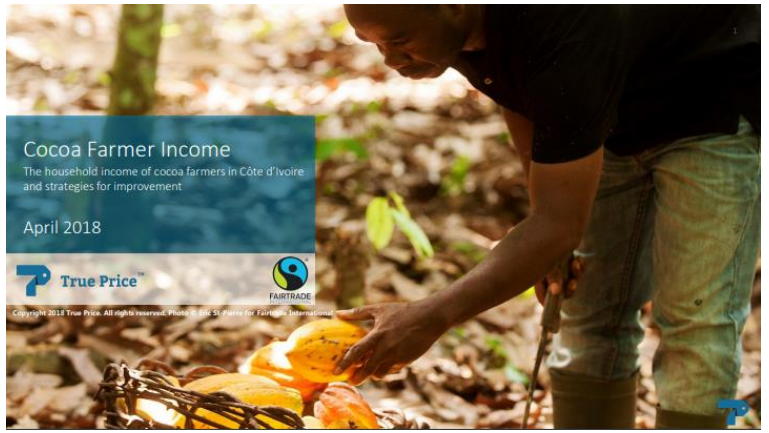
Active communication about sustainability goals and achievements can create a ripple effect throughout the whole sector, as it stimulates others to do the same, and at the same time provides the possibility to share knowledge and best practices.

Reporting on sustainability efforts also strengthens the brand value to consumers. Showing consumers regularly that a company continues to improve, helps strengthen the message.

1) Cocoa Barometer (2018). 2) See for example cocoainitiative.org/our-work/our-work/supply-chain/

Appendix: Method & Supplements

Relation to earlier True Price work



Earlier work of True Price and Tony's Chocolonely

Tony's Chocolonely was one of the first companies worldwide conduct a full true price scan of its product. Qualitative results of this study in 2013 have been included in Tony's Chocolonely's annual reports and communications material.

The true pricing methodology has been significantly reviewed since 2014. As a result, the originally reported values cannot be directly compared to the newest results. In order to facilitate a meaningful comparison of Tony's Chocolonely's performance now with that of four years ago, the 2013 results have been recalculated and the corresponding values have been included in this report.

In 2015 a scan of the impact of milk and sugar was performed. The results of this analysis have been used to estimate the impact for complete chocolate bars. Results have not been recalculated in line with the methodology updates.

In 2016 a living wage scan for Ghana an Côte d'Ivoire was performed. This report updates the analysis.

Côte d'Ivoire national rural living income

True Price has worked on the living income of cocoa farmers in Côte d'Ivoire before, together with Fairtrade. The research has been published online as Fairtrade & True Price (2018), and the results have been quoted in i.a., the Cocoa Barometer 2018.

The research specifically focusses on cocoa farmers supplying to Fairtrade. The year of analysis is 2016. The farmers live in multiple regions of Côte d'Ivoire, while farmers supplying to Tony's Chocolonely are more confined and the year of analysis is 2017.

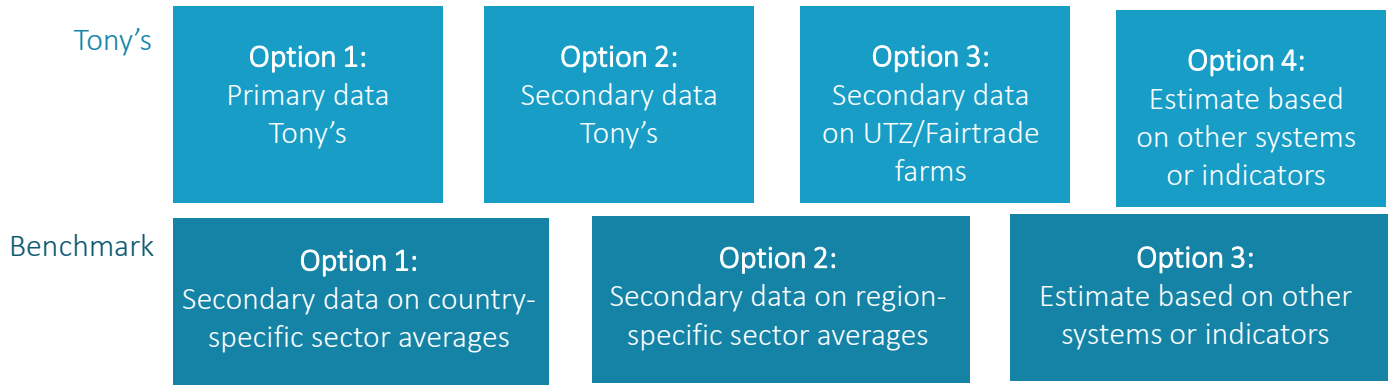
The farmers supplying to Fairtrade indicate relatively high family sizes in direct surveys (median 8, average 9.0). This is above those in the samples of this report (average 6.39 for Côte d'Ivoire).

As a result the living income is higher in the study with Fairtrade (USD 7,318 per household per year, or approximately EUR 6,500 at the exchange rate of 2017) than in this study (EUR 4,529 per household per year).

Per capita differences are smaller (EUR 808 versus EUR 709). The main difference is in a regional value for housing used in this study. In addition, the approach to taxes was reviewed.

Assumptions and limitations

Different methods of data collection ordered by level of preference



The analysis in this report is based on data provided by Tony's Chocolonely and from publicly available sources.

Some sources give results segmented for farms with and without a certification standard (e.g., UTZ). For use in the benchmark, a weighted average was calculated. The certified value was used for Tony's Chocolonely, when necessary.

Data used are from the year closest to the year of analysis (2013 and 2017). Numbers were adapted if they were only available for other years. This is in particular necessary for financial data points, where inflation plays a role. Note that the inflation in Ghana is particularly high (10-18% per year over the last 4 years).

Monetary results are first calculated in local currency units (XOF and GHS). Results in Euros always use 2017 exchange rate. This maximizes comparability of the results. For 2013, the local currency values are first corrected for inflation to 2017 local currency and then transferred to Euro 2017.

The same holds for monetization factors. These are always from 2017, even if underlying data have been updated (e.g., new estimates of the social cost of carbon).

When no numbers were available for a specific system (e.g., 'benchmark 2013'), they were estimated based on numbers from the other systems.

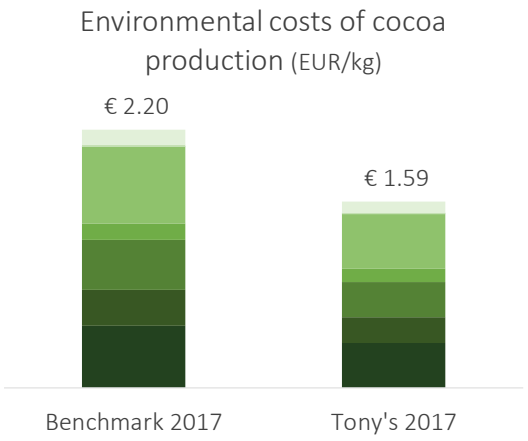
These were most notably used for the 2013 benchmark when 2017 data was not available. For some impacts, this was also applied to Tony's Chocolonely, for impacts that are not specified in the scope of Tony's Chocolonely current improvement programs. In these cases, it was checked whether there are concrete indications that the impacts at Tony's Chocolonely are different at the benchmark. The true price scan can be more precise if Tony's Chocolonely collects data more directly, as also discussed under recommendations.

Most social impacts scale with the amount of labor per kilogram cocoa. This is typically lower where area and yields are higher: the amount of cocoa harvested grows faster than the amount of labor required.

Similarly most environmental impacts scale with the yields (the amount of cocoa per hectare).

Results are based on true price method as of 2018. There have been significant developments since 2014 when the previous project was conducted. Results can therefore not be compared directly.

Quantification and monetization of environmental external costs (1/2)



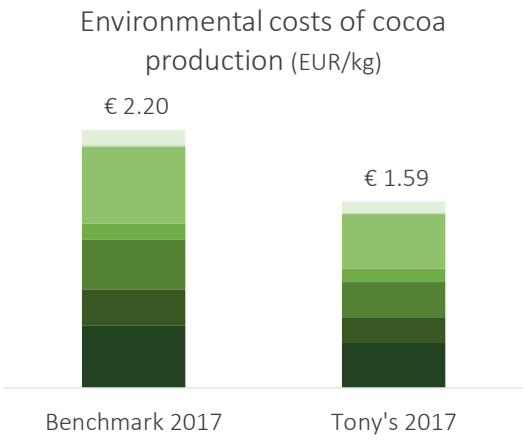
	Benchmark 2013	Tony's 2013	Benchmark 2017	Tony's 2017
Material use	€ 0.13	€ 0.11	€ 0.13	€ 0.09
Energy use	€ 0.02	€ 0.01	€ 0.02	€ 0.01
Water use	€ 0.00	€ 0.00	€ 0.00	€ 0.00
Land use and land occupation	€ 0.62	€ 0.57	€ 0.65	€ 0.47
Air pollution	€ 0.13	€ 0.15	€ 0.14	€ 0.11
Soil pollution	€ 0.40	€ 0.37	€ 0.42	€ 0.30
Water pollution	€ 0.29	€ 0.26	€ 0.31	€ 0.22
Climate Change	€ 0.51	€ 0.46	€ 0.53	€ 0.38
Total environmental costs	**€ 2.10**	**€ 1.94**	**€ 2.20**	**€ 1.59**

Climate change contributions are measured as the emission of greenhouse gases from deforestation, the use of fossil fuels and production and use of fertilizers. Costing consists uses the so-called Social Cost of Carbon that discounts future cost to health, agriculture and the economy because of climate change caused by greenhouse gas emissions.

Land use is measured by the area of natural ecosystems displaced by agricultural land, in the case of cocoa mostly through deforestation. Valuation is based the cost of restoring the ecosystem and ecosystem services where possible. This takes into account the opportunity cost of land occupation and there is a correction for the degree of biodiversity that is conserved based on the predominant agricultural system. Note that if this works out, net greenhouse gas emissions also decrease strongly.

Water use is measured by the total input of freshwater per hectare from ground and surface water sources. Water is only costed to the degree that it is scarce, according to the Water Stress Index. Costing relates to cost of replacement. As irrigation on cocoa farms is not widely used, the true cost of water use is low.

Quantification and monetization of environmental external costs (2/2)



	Benchmark 2013	Tony's 2013	Benchmark 2017	Tony's 2017
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Water use	€ 0.00	€ 0.00	€ 0.00	€ 0.00
Land use and land occupation	€ 0.62	€ 0.57	€ 0.65	€ 0.47
Air pollution	€ 0.13	€ 0.15	€ 0.14	€ 0.11
Soil pollution	€ 0.40	€ 0.37	€ 0.42	€ 0.30
Water pollution	€ 0.29	€ 0.26	€ 0.31	€ 0.22
Climate Change	€ 0.51	€ 0.46	€ 0.53	€ 0.38
Total environmental costs	**€ 2.10**	**€ 1.94**	**€ 2.20**	**€ 1.59**

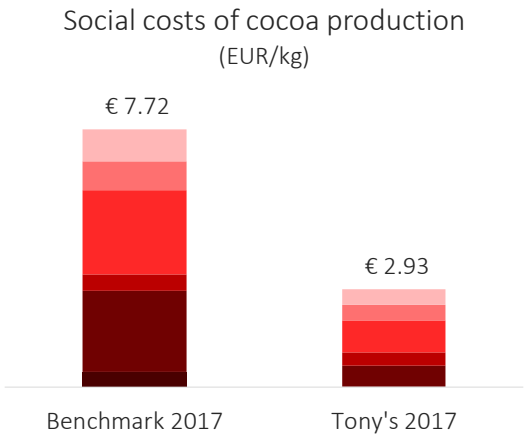
Soil pollution quantifies the application of chemical and organic fertilizers, and various pesticides. Ingredients can be harmful to human health and ecosystems. Costing relates to restoration, and takes into account the health and ecosystem damage.

Water pollution mainly measures the application of excess nitrogen and phosphorus from chemical and organic fertilizers. Excess P and P from chemical and organic fertilizers leads to algal bloom in water bodies, which reduces biodiversity and ecosystem values. Pesticides have a similar, but smaller contribution (their main effect is on soil quality). Costings relates to restoring ecosystems where possible, and compensating for damage where restoration is not feasible.

Air pollution quantifies the emissions of harmful air pollutants from fertilizer and energy use, in particular ammonia and ozone layer degrading substances. Costing relates to the health and ecosystem damage.

Materials use represents the cost to future generations of using finite and scarce materials today, making them unavailable in the future, unless properly recycled. The market price of scarce material is used as a proxy for (future) scarcity of the material.

Quantification and monetization of social external costs (1/2)



	Benchmark 2013	Tony's 2013	Benchmark 2017	Tony's 2017
Harassment	€ 1.42	€ 0.78	€ 0.96	€ 0.48
Occupational H&S risk	€ 1.22	€ 0.60	€ 0.86	€ 0.46
Insufficient income	€ 4.72	€ 1.79	€ 2.51	€ 0.97
Insufficient wages and social security	€ 0.46	€ 0.42	€ 0.49	€ 0.39
Child labor	€ 3.57	€ 1.99	€ 2.43	€ 0.63
Forced labor	€ 0.69	€ 0.41	€ 0.46	€ 0.00
Total social costs	**€ 12.07**	**€ 5.99**	**€ 7.72**	**€ 2.93**

Insufficient income is measured by comparing the actual net income of small producers to a living income that is required for a decent standard of living. Note that there can be underearning even if the *average* farmer earns above the living income, as there might be a large group of farmers that are still below.

Incomes of farmers are modeled based on cocoa yields, prices and cost estimates. Obviously, a direct assessment of farmer incomes (e.g., survey based), would increase the precision to which underearning can be assessed.

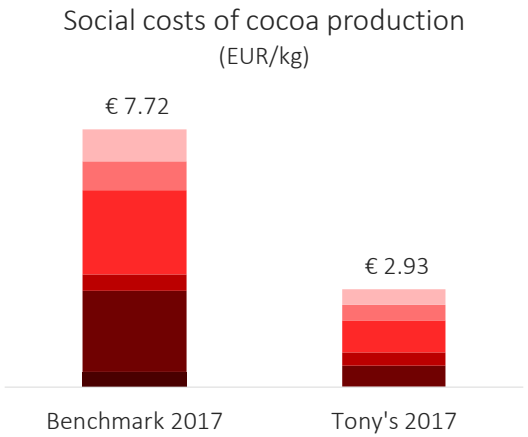
Technically, the True Price method evaluates the distribution of living incomes and integrates the difference between actual incomes and the living income target. There is a small correction to prevent farmers with very small farms or very low harvests (<50% of the average yield and area of all systems) to influence the results too much.

The costing for underearning is based on the restoration of past missed income, including a penalty for not providing farmers with a living income. A detailed explanation of the living wages is given later in this appendix.

Insufficient wages and social security relates to hired workers. The impact is very similar to 'insufficient income', that applies to smallholder entrepreneurs. Instead of living income, the target that wages for external workers should comply with, is typically referred to as living wage. The approach to costing is similar to that in insufficient income.

Two related impacts are **violations of overtime regulation**, and **differences in pay between man and women** (part of gender discrimination). These have not been assessed in this study, but are suggested for the scope of future true cost scans.

Quantification and monetization of social external costs (2/2)



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Forced labor	€ 0.69	€ 0.41	€ 0.46	€ 0.00
Total social costs	**€ 12.07**	**€ 5.99**	**€ 7.72**	**€ 2.93**

Child labor is measured per child below the age of 12, 15 or 18, depending on whether the work is hazardous and/or physically intensive. Costing of child labor consists of reintegration costs of children that have worked in hazardous conditions, the cost of education, future income losses, a penalty for violating human rights and programs to prevent child labor in the future. If children work ful-time, penalties are higher than if they work only a limited number of hours per week. The actual result is quite sensitive to the number of hours that children are allowed to work per week. This is set in line with Ghana law, and with a differentiation per age group.

Harassment is measured per worker that has experiences abuse. There are several categories, based on whether the abuse is physical or not, and whether it is sexual or not. The costs considered include wage loss due to absenteeism, medical costs of both physical and mental health issues, the cost of well-being loss due to mental health issues, a penalty for violating human rights. Lastly, the cost of prevention is added to stop the abuse from happening again in next years.

Occupational health and safety is measured per fatal or non-fatal occupational incident and per FTE that works without training, without personal protective equipment or in an unsafe or unhealthy environment. The costing includes all medical costs not covered by an employer, the cost of wellbeing loss due to incidents and the cost of preventive measures.

Forced labor is measured by the amount of forced labor and uses several categories dependent on whether laborers are victims of abuse, have access to identification documents, are in debt bondage and are physically restricted. Costing includes penalties for violating human rights, medical treatment costs of harassment and injuries, well-being loss due to physical and mental health issues, reintegration, recovering identification documents, repayment of any debt outstanding, and repatriation to the country of origin, where necessary.

Living income methodology (1/2)

Food	*Food basket is based on a calorie intake of 2200 Kcal per day. Children are assumed to need 2/3 of the amount adults need.*
Housing	*Housing costs are based on local living wage studies and/or national expenditure data*
Clothing	*Clothing costs are based on national expenditure data ; Clothing costs of children are assumed to be the same as for adults*
Transportation	*Transportation is based on national expenditure data*
ICT	*ICT costs consist of the cheapest phone subscription per adult*
Healthcare	*Healthcare costs are based on national expenditure data*
Education	*Education costs are based on national expenditure data*
Childcare	*Childcare costs are based on the availability of adults within a household that are not working. If not enough adults are available, the costs are based on missed income from staying home*
Savings	*Savings consist of 5% of the basic living basket*
Income from pensions	*The income from pensions is based on # of pension receiving retirees per household and the state guaranteed pension*
Retirement insurance	*The retirement insurance is based on amongst others the living income, the amount of years worked, the amount of pension years and the amount of adults per breadwinner*
Unemployment insurance	*The unemployment insurance is based on labor insecurity, unemployment duration and required living wage*
Sick leave insurance	*The sickness insurance is based on average amount of sick days per year and the required living income including pension*

Insufficient wages and social security and insufficient income impacts are determined by comparing actual income to a living income. This is defined as an income that provides a decent living to an average household.

A living wage is a specific type of living income that applies specifically to people working as employees. The living wage in a given country can be different from the living income if for example some taxation (income tax for the living wage and profit tax for the living income) or social security arrangements are different for subordinate employment as opposed to self-employment. In this study the living wage and the living income are the same and both concepts are used interchangeably.

Estimations of a living income include (i) a basic living basket: food, housing, clothing, transportation, ICT, healthcare costs, education, childcare and savings costs and (ii) social security, savings and tax expenses to determine gross living income.

The total living income is calculated per household. For hired labor, the living income is calculated for a full-time equivalent (FTE), based on the average number of persons per household that are part of the labor force in a country. An FTE is determined by the total working hours per year if a person would work all days and weeks in a year, minus the weekend days and public and paid holidays specified by law.

Living income methodology (2/2)

Food	*Food basket is based on a calorie intake of 2200 Kcal per day. Children are assumed to need 2/3 of the amount adults need.*
Housing	*Housing costs are based on local living wage studies and/or national expenditure data*
Clothing	*Clothing costs are based on national expenditure data ; Clothing costs of children are assumed to be the same as for adults*
Transportation	*Transportation is based on national expenditure data*
ICT	*ICT costs consist of the cheapest phone subscription per adult*
Healthcare	*Healthcare costs are based on national expenditure data*
Education	*Education costs are based on national expenditure data*
Childcare	*Childcare costs are based on the availability of adults within a household that are not working. If not enough adults are available, the costs are based on missed income from staying home*
Savings	*Savings consist of 5% of the basic living basket*
Income from pensions	*The income from pensions is based on # of pension receiving retirees per household and the state guaranteed pension*
Retirement insurance	*The retirement insurance is based on amongst others the living income, the amount of years worked, the amount of pension years and the amount of adults per breadwinner*
Unemployment insurance	*The unemployment insurance is based on labor insecurity, unemployment duration and required living wage*
Sick leave insurance	*The sickness insurance is based on average amount of sick days per year and the required living income including pension*

The living income method used builds upon the living wage method of Anker & Anker (2013). The method of this report enables determination of a living income based a combination of primary data and national statistics, upon availability.

In the case of Ghana, relevant data points could be used from the Global Living Wage Coalition, that recently carried out a living wage analysis for Ghana (2017). The study specifically measures living wages for banana workers in the Lower Volta Area, so a direct one-to-one comparison is not possible.

The method in this report differs from Anker & Anker with respect to the social security needs of individuals. Where Anker & Anker calculate the number of social security expenses based on the social security tax paid to the state by employees, here the actual future income needs in case of retirement, unemployment and sickness are estimated, such that these needs will also be covered in the living income of self-employed people.

Tables of each item are given on the next pages.

Living income items

- All results are first calculated in local currency units. The conversion to Euros is always using the average exchange rate over 2017. This is to prevent that effects of exchange rates dominate the time differences. The 2013 values are corrected for inflation before applying the exchange rate.
- Results are for average household sizes of 6.39 in Côte d'Ivoire and 5.29 in Ghana. Sources that relate to lower family sizes, are scaled accordingly
- We use tax rates for income tax, as entrepreneurs can pay themselves income instead of profit. As in practice these taxes are not paid, in calculating the living income gap, this tax is added to the farmer income as a tax break. In this way, the formal obligation to pay taxes is acknowledged in the living income, but it does not increase the gap.

Euro 2017 per household per year				
	Cote d'Ivoire		**Ghana**	
	2013	**2017**	**2013**	**2017**
Living income per household (in EUR 2017)	**4,618**	**4,658**	**3,751**	**3,807**
Exchange rate	EUR/XOF	0.002	EUR/GHS	0.202
Inflation to 2017	1.051	1.000	1.774	1.000
Food per household	*1,706*	*1,706*	*1,610*	*1,610*
Housing per household	*850*	*850*	*618*	*618*
Clothing per household	*193*	*193*	*188*	*188*
Transportation per household	*349*	*349*	*181*	*181*
ICT per household	*192*	*192*	*65*	*65*
Healthcare per household	*98*	*98*	*53*	*53*
Education costs per household	*31*	*31*	*294*	*294*
Childcare per household	-	-	-	-
Net living basket, excl. Savings	3,418	3,418	3,009	3,009
Savings/unforeseen expenses	*171*	*171*	*150*	*150*
Total living basket per household	3,589	3,589	3,160	3,160
Retirement insurance	*164*	*181*	*167*	*167*
Living wage with pension	3,753	3,770	3,327	3,327
Unemployment insurance	*331*	*326*	*163*	*181*
Sick leave insurance	*83*	*83*	-	-
Living wage with insurance and pension	4,167	4,179	3,490	3,508
Income tax	*451*	*479*	*262*	*298*
Living wage with insurance and pension, after tax	4,618	4,658	3,751	3,807
Total pension contribution to household	-	-	-	-
Gross living wage	**4,618**	**4,658**	**3,751**	**3,807**

List of acronyms

CLMRS	Child labor Monitoring & Remediation System
FTE	Full-Time Equivalent
H&S	Health & Safety
KPI	Key performance indicator
NGO	Non-Governmental Organization
PPE	Personal protective equipment
ROI	Return-on-investment
TP	True Price
UTZ	UTZ certified
Ha	Hectare
Kg	Kilogram
EUR	Euro
GHS	Ghanaian Cedi (currency Ghana)
XOF	Communaute Financiere Africaine franc (currency Côte d'Ivoire)
N_2O	Nitrous oxide
NH_3	Ammonia
NMVOC	Non-Methane Volatile Organic Compounds
NO_x	Nitrogen oxides
PM10	Particulate matter
SO_2	Sulfur Dioxide

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