

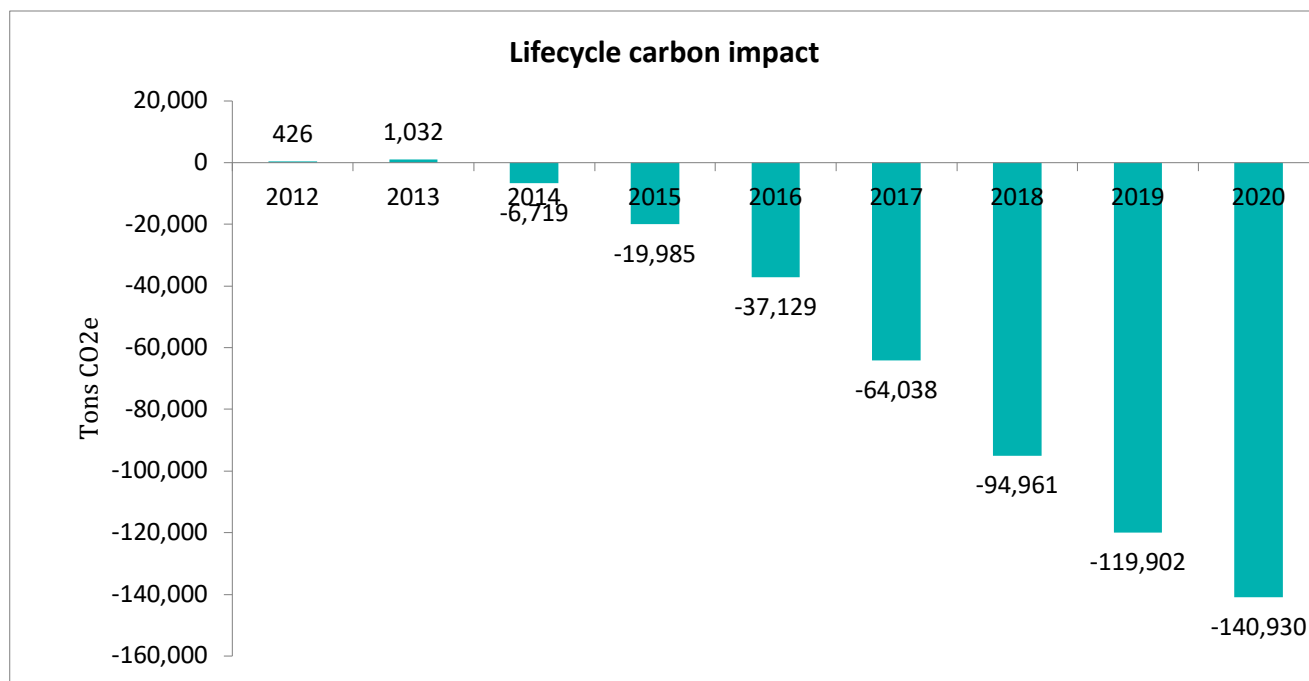


BioLite Environmental Sustainability Report 2020

March 2021

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Executive Summary

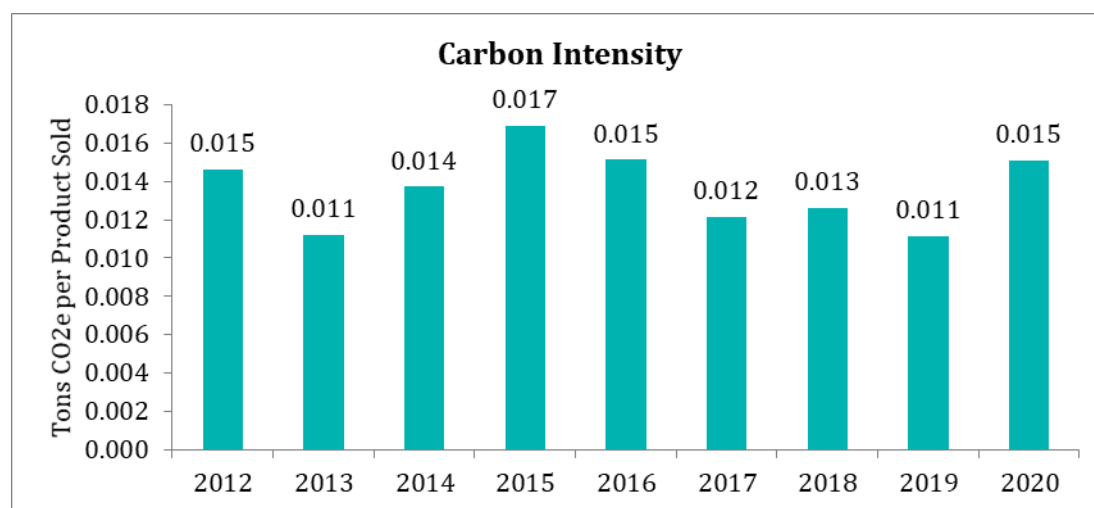
BioLite’s 2020 carbon footprint analysis reveals some key conclusions and trends. First, use of BioLite’s products result in a significant reduction in greenhouse gas emissions compared to emissions produced from BioLite operations. This fact is evident from the graph to the right, which is further explained in the “Lifecycle analysis” section. In fact, each ton of CO₂e released into the atmosphere from BioLite operations during 2012-2020 results in a reduction of approximately 20 tons CO₂e in emissions through 2020 from the use of cookstoves sold in emerging markets.

In 2020, BioLite emitted a total of 7,569 tCO₂e as per our internal model calculations, a 100% increase year-on-year in spite of the pandemic and the resulting wide-spread adjustments in operations. There were two clear drivers of this year’s increase: 1) a 47% increase in sales from 2019 and 2) improved information and data quality.

On the former, whilst this growth enabled us to hit a major milestone of reaching one million people that now have access to clean energy, it was mostly driven by sales of the most resource-intensive and thus higher-emitting products.

On the latter, the availability of information, particularly about the embedded emissions in some of our components, had a significant impact on our Scope 3 emissions. Conversely, albeit on a much smaller scale, improvements in the quality of our internal logistics data led to a reduction in outbound shipping emissions.

Consistent with the assertions above, BioLite’s 2020 carbon intensity, as defined by emissions per product manufactured, increased to a high not seen since 2015:



Along with BioLite’s growth, we expect these themes to continue going forward; as the availability of third-party data continues to improve, and we enhance our internal systems, we will continue to incorporate the latest available and most accurate information in our calculations.

Lastly, BioLite continues to implement and explore new means of greenhouse gas mitigation within its operations, as outlined in the Emissions Mitigation section, and we will continue to offset BioLite’s entire carbon footprint, including scopes 1, 2 and 3.

Overall, BioLite continued to drive impact across a number of metrics in 2020. As referred to above, we hit a major milestone impacting well over one million people, and this also resulted in increases in watt hours generated and installed energy capacity, primarily driven by the continued success of our SolarHome 620 product as well as the launch of the SolarHome 5000. We also continued to expand our cookstove business with an increase in efficient charcoal stoves sales in Kenya, resulting in a significant gain in fuelwood savings and tons of wood avoided. A comprehensive overview of impact metrics is detailed below:

	2014	2015	2016	2017	2018	2019	2020
People Accessing Cleaner Energy	20,975 (breathing cleaner air)	41,085 (breathing cleaner air)	100,000 (breathing cleaner air)	127,235	468,420	797,242	1,785,509

Watt Hours of Electricity Generated by the BioLite Ecosystem	7,755,425	27,517,028	69,314,508	123,141,204	347,011,663	897,649,183	1,971,733,090
Tons of CO ₂ e Offset by BioLite Cookstoves	8,316	30,583	75,253	137,300	206,285	307,053	457,846
Installed Energy Capacity	n/a	n/a	n/a	32.68KW	433.55KW	650.44KW	1760.31KW
Staff members on Emerging Markets teams	10	25	55	30	47	46	46
Fuel Savings by BioLite Customers (\$)	\$1.72M	\$4.86M	\$12.72M	\$25.53M	\$41.38M	\$59.13M	\$84.32M
Tons of Wood Avoided	3,539	11,262	31,895	65,792	99,992	151,547	243,499

These key findings result from the exhaustive analysis of BioLite’s operations, which is outlined in detail in the following report.

Introduction

BioLite is dedicated to creating positive environmental, health, and social impact through the development and distribution of safe, affordable, and desirable clean energy technologies for households living in energy poverty in the developing world.

We at BioLite seek to minimize our resource consumption and create products that have a net benefit to humanity and to the planet. Monitoring our carbon footprint is the first step in understanding whether we are achieving this goal. To that end, we have been measuring our carbon footprint since 2012 and offset our entire footprint each year. This process has been particularly important recently since BioLite has been experiencing significant growth, which we aim to achieve in both a financially and environmentally sustainable way. This report covers BioLite's carbon footprint during the calendar year 2020, while also citing results from previous years in order to identify trends over time.

We serve two distinct markets: 1) "emerging market" families living in energy poverty, and 2) outdoor recreation users seeking fuel-independent cooking, charging, and lighting. Through a process of "parallel innovation,"ⁱ BioLite incubates core technologies for both markets; BioLite reinvests near-term revenue from our outdoor recreation business to support the emerging markets businesses in Africa until they are commercially self-sufficient.

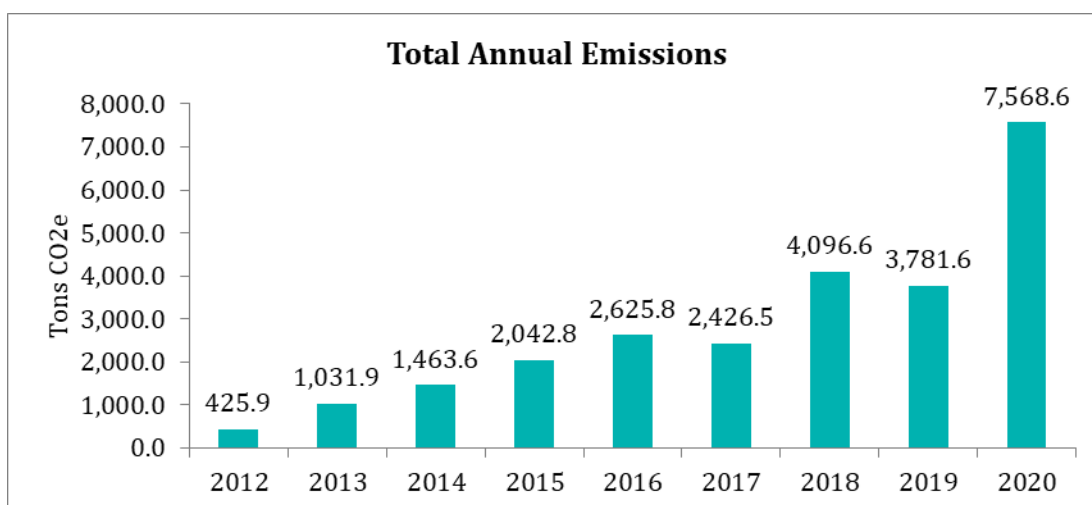
BioLite generates a carbon credit for every metric ton of greenhouse gas (measured in carbon dioxide equivalent) reduced through the use of its products in emerging markets. For instance, when a household in Kenya cooks on the BioLite HomeStove, they emit fewer greenhouse gases compared to the smoky, open fire which they would otherwise use. These savings are independently verified by Gold Standard Foundation, the leading carbon accreditation body.ⁱⁱ We either retire these credits to offset our corporate footprint or we sell them in the open market. We reinvest this revenue into our emerging markets business, to enable poorer and more remote households to purchase BioLite clean energy products. We offset our company footprint through a combination of BioLite carbon credits and high-quality, independently verified carbon credits from strategic partners.

Summary

Historical Performance

BioLite has cumulatively emitted 25,463 metric tons of carbon dioxide equivalent (tCO₂e) since 2012. During the eight-year period from 2012 to 2020, every ton of CO₂e emitted by BioLite has generated a savings of about 20 tons of CO₂e.

In 2020, BioLite emitted a total of 7,569 tCO₂e per the internal model and 7,868 according to Climate Neutral’s model (see appendix A for explanation), and has offset the higher emissions figure with third-party-verified credits purchased from trusted partners.



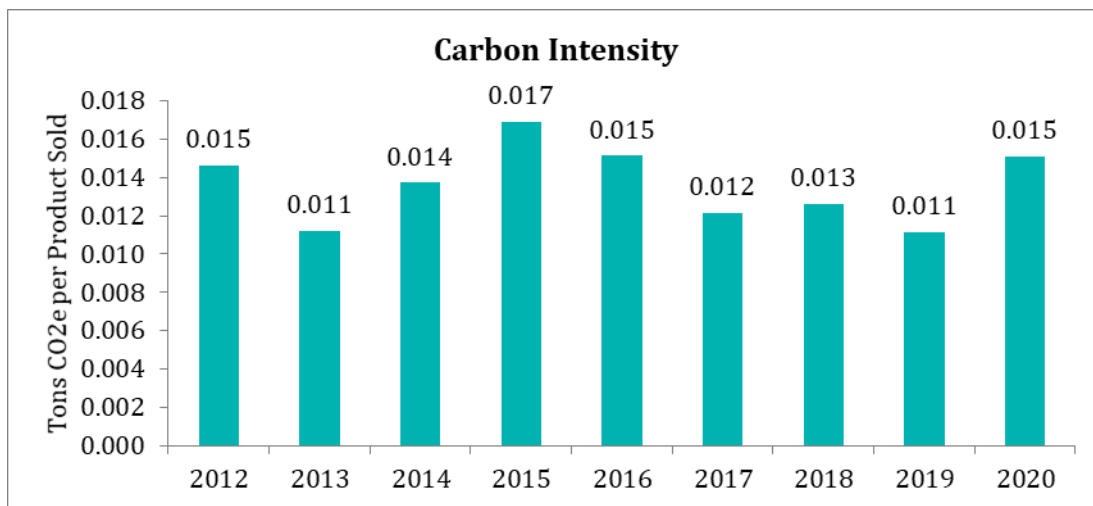
Across the 2012-2016 timeframe, we observed a steady increase in emissions that is roughly proportional to the growth of BioLite’s operational scale. This trend continued until 2017, when we observed a slight decrease in carbon footprint, due to a shift towards less-carbon intensive products, in a pattern similar to the one we observed for 2019. In 2018, the release of the Firepit resulted in high demand for this resource-intensive product, which in addition to increased sales in the SolarHome 620, impacted the carbon footprint for the year.

In 2020 while the pandemic forced us all to shift the way we operate- working remotely and avoiding international travel- sales increased around 47% compared to last year. This resulted from organic business growth and the launch of a number of new products, including the SolarHome 5000, a 50-watt solar system with a 24” TV, a somewhat large raw material-intensive product.

In addition to the significant business growth, an improvement on the information available regarding specific components used in the manufacturing of our products resulted in an

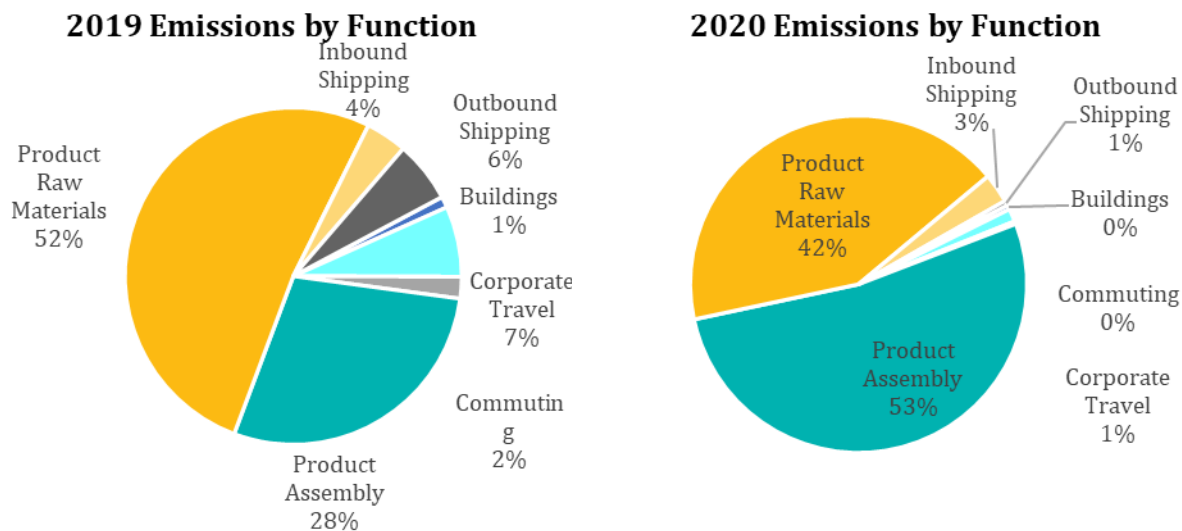
increase in the Scope 3 manufacturing emissions. We include further information on this in the sections below.

This is further reflected in the carbon intensity metric; when the data are normalized for total annual sales to calculate carbon intensity per product, we see that on a per-product basis, emissions range from about 0.011 to 0.017 tCO₂e. In 2020, BioLite’s growth and product expansion resulted in an increase in carbon intensity from 2019 to 0.015 tCO₂, a figure not seen since 2016.



While most categories remained stable year on year – with scope 3 raw materials and product assembly emissions accounting for the vast majority of BioLite’s carbon footprint- the largest change compared with 2019 was observed in outbound shipping, which accounted for 1% of the company’s emissions for 2020 vs. 6% in 2019. This is a result of an improvement in the quality of data available for logistics. We elaborate further on this in the sections below.

Breakdown of Emissions by Function



Methods, Approach, and Function-Specific Results

As with previous years in which BioLite quantified its carbon footprint, we applied the World Resources Institute’s Greenhouse Gas Protocol,ⁱⁱⁱ taking into consideration resource and data constraints and using best efforts to arrive at reasonable and conservative conclusions, i.e. overestimating emissions where uncertainty exists. In this analysis, we quantified all material sources of greenhouse gas emissions throughout our business functions and value chain, as defined in the Greenhouse Gas Protocol.^{iv}

This report was compiled by BioLite staff and an external consultant from January 2021 to March 2021. Due to resource constraints, an external auditor was not engaged to verify the results of this analysis. All of the numbers and claims in this report can be supported by a detailed Microsoft Excel model and references to authoritative third-party documentation for all conversation factors and calculations. However, this model is not publicly available.

Scope 1 Emissions

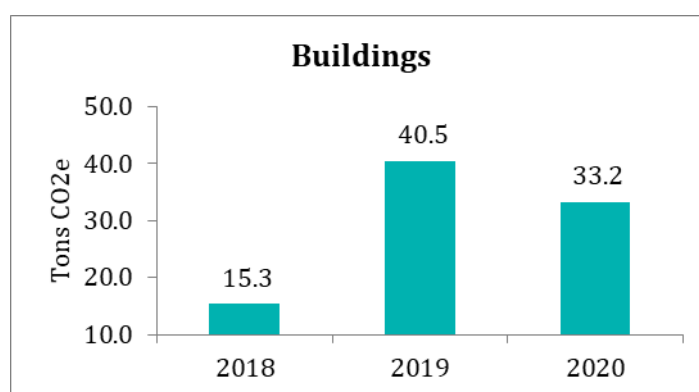
Scope 1 emissions are defined as those originating from emissions sources directly controlled and owned by BioLite. Since BioLite uses an external manufacturing facility to fulfill our manufacturing needs, there are no sources of emissions within operations over which we have direct control. For that reason, scope 1 emissions are zero, while all manufacturing emissions are included in scope 3 below.

Scope 2 Emissions

Scope 2 emissions include those from purchased or acquired electricity, steam, heat and cooling.

Building Emissions

Building emissions are typically the smallest source of emissions, particularly this year, given the pandemic and the adjustment to continue operations on a remote basis since the end of the first quarter. BioLite purchases electricity for two offices and natural gas for heating at only our headquarters office; in the Nairobi office, gas is purchased only for cooking. In 2020, BioLite expanded its Brooklyn headquarters, increasing the office space from 2019, although given the relocation of staff to remote working, this had little impact on the overall emissions. Standard conversion factors were applied to calculate total emissions from the consumption of electricity and natural gas to arrive at the final values.



Scope 3 Emissions

Scope 3 emissions include indirect emissions throughout our value chain, such as corporate travel, employee commuting, purchased goods and services, and transportation and distribution. Similar to most businesses, the overwhelming majority of our emissions are included under scope 3.

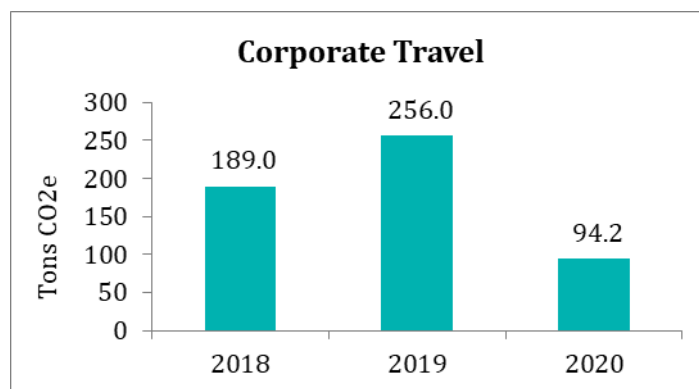
The vast majority of our scope 3 emissions are normally weighted toward purchase of goods and services, as we rely on third parties for the manufacturing of our products; this was particularly true in 2020, given a sharp increase in sales. Further, due to the pandemic, our teams both in the Brooklyn and Nairobi offices worked remotely starting in the end of the first quarter, causing a drop in the travel and commuting categories.

Corporate Travel

The majority of miles traveled and greenhouse gas emissions originated from commercial aircraft, although as mentioned, travel was limited to the first quarter of the year, resulting in a

sharp drop year on year. We do not expect this to be the trend going forward, however as the pandemic recedes.

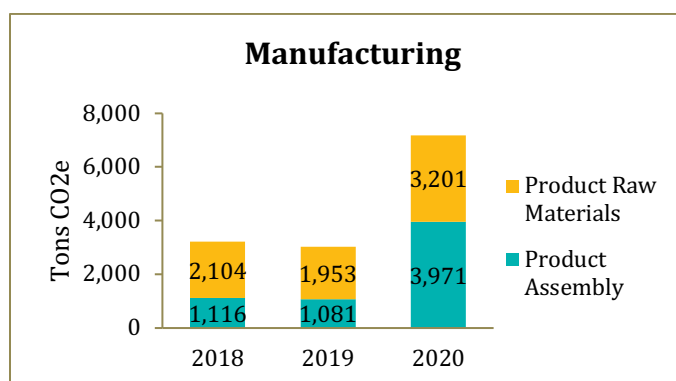
Corporate travel emissions were quantified by examining records of all company travel for the periods in question and calculating the distance traveled for each trip. These distances were then multiplied by industry standard conversion factors based on the type of transport. Where imperfect travel records existed, we compared travel records with accounting records (which are maintained much more closely) and added a commensurate amount of travel to ensure that no underreporting took place.



Commuting

Company employees completed a survey in late 2016 in which they self-reported their commuting patterns, revealing the frequency with which employees commute via public transportation, bicycle, car or by walking. The results of this survey were then scaled to correspond with the average number of BioLite employees in 2020. Approximately 37% of BioLite employees that work in its Brooklyn headquarters either walk, bike or work from home the majority of the week. Less than 2% of BioLite employees at HQ drive at least some of the time, with the balance taking some form of public transportation. Total emissions from employees commuting to Brooklyn has not exceeded 10 tCO₂e since we started measuring them. The majority of carbon emissions from commuting is made up of BioLite’s Emerging Markets team because staff members have to travel a substantial distance to reach customers in rural areas, although as mentioned, these were also limited to the first quarter of 2020, and we have adjusted our assumptions accordingly.

Product Manufacturing



Emissions from raw materials and product assembly increased significantly compared to last year due to increased sales among all products, the launch of new product lines -e.g. our Solar Home System 5000- which are more carbon intensive, and changes in modelling for a specific component as explained below.

Each BioLite product was catalogued by its component parts, their material type and respective masses. Widely accepted embodied energy conversion factors for each material were then applied to calculate a per-unit embodied energy value for each product.^v This was then multiplied by the total number of products sold in 2020 to arrive at a total figure for raw materials.

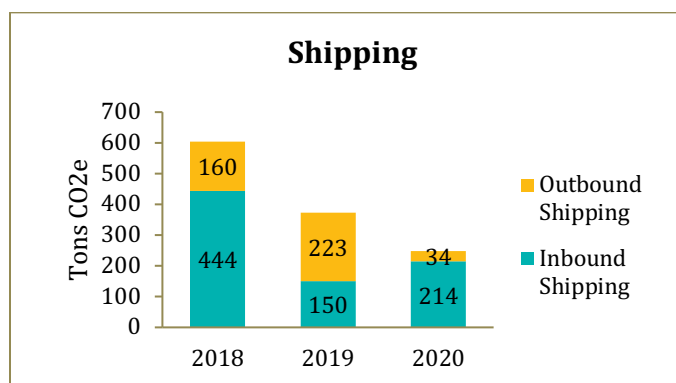
In calculating emissions from product assembly, BioLite was unable to attain direct energy consumption data from our third-party factory in China. Instead, we used publicly available benchmarks from the automotive industry and made minor adjustments to be more applicable to BioLite’s products. We accounted for all processes involved in manufacturing each BioLite product to arrive at the values in the graph above.

Changes in our modelling resulting from further clarity on the treatment of Printed Circuit Boards (PCBs)- a key component in electronics- explains the sharp increase in this category. Understanding among experts about the total embedded emissions in PCBs has changed significantly in recent years, and our calculations this year reflect this reality. In previous years, we had based our estimates on internal assumptions such as the amount of the materials used for the manufacturing of the PCBs. At that time there was limited third party data available on this subject. As further research was recently published, and in consultation with our colleagues at Climate Neutral (CN), we modified the way we measure the emissions resulting from the manufacturing of these components using a combination of the cost of BioLite PCBs and an emissions factor linking cost to total emissions, provided by CN. We have assumed an equal split of emissions resulting from raw materials and assembly, since the emissions factor applied includes emissions from both raw materials and assembly combined. Lastly, as the body of

research on this topic grows, more accurate measurements on this category can be expected going forward.

Shipping

Shipping emissions within BioLite are broken into two categories: inbound and outbound. “Inbound” shipments are from BioLite’s manufacturing facility in China to one of several BioLite warehouse and distribution hubs throughout the world by sea or air. Conversely, “outbound” shipments consist of wholesale shipments to resellers by sea or air, or e-commerce shipments directly to customers by sea, air, or ground freight.



Despite the increase in volume of sales, freight weight and shipping emissions declined significantly in 2020. This is explained by an improvement in the quality of data for outbound shipping. In previous years we were including shipments of product even from larger customers who collect and ship our products to their destination themselves, particularly across Africa. Given improvements in our reporting, we are now able to exclude those shipments from our carbon footprint, as is best practices for quantifying company emissions. The increase in overall sales however, explains the higher emissions related to inbound shipping.

BioLite calculated the distance between the distribution hub and the final destination for each product or product lot. Air distances were calculated using an online calculator for the great-circle distances between two airport codes, sea and ground distances were calculated using Google Maps data. Every effort was made to be as specific as possible, but the level of detail for the final destination varied. For example, in some cases, the destination zip code was available, but in others, only the state or country was provided. Distances were multiplied by standard conversion factors for truck, sea, and airfreight as appropriate.

Lifecycle Analysis

Another approach to analyzing BioLite’s carbon footprint is to take a lifecycle analysis and compare the total amount of emissions that result from producing BioLite’s products vs. the

total emissions saved by using these products. In order to do this, we first assume a baseline scenario in which BioLite customers did not purchase BioLite's energy saving devices and continued with business as usual. In calculating the emissions saved by using BioLite products, we include only the usage of BioLite's cooking products in emerging markets, since these are the product that are being used by low-income households on a daily basis, thus saving significant quantities of greenhouse gas emissions. We conservatively calculate that each stove saves on average 3 tons CO₂e per year and that the stoves gradually break due to normal wear and tear. These results are consistent with a series of rigorous efficiency, usage and durability tests we have conducted that comply with Gold Standard and United Nations requirements to calculate carbon credits. The above chart plots emissions released from all BioLite manufacturing during 2012-2020, combined with emissions savings resulting from the use of cookstoves during 2014 through 2020 that were sold in 2012-2020. As you can see from this chart, the results are overwhelmingly positive in terms of saving greenhouse gas emissions on a net basis.

Put another way, for each ton of CO₂e released into the atmosphere from BioLite operations during the 2012-2020 period, we have measured an approximately 20 tons CO₂e reduction in emissions through 2020 from the use of cookstoves sold in emerging markets.

Emissions Mitigation

Given the steadily increasing amount of absolute emissions driven by BioLite's growth, we remain committed to exploring ways to mitigate our impact. To date, we work to minimize our shipping emissions by choosing sea or truck freight whenever possible over more emission-heavy air freight. We also promote green forms of commuting by offering tax incentives for public transportation use and providing a bike rack in our Brooklyn office to accommodate bike commuters.

As part of BioLite's commitment to Climate Neutral standards (see annex I), we committed to several action items to pursue during the course of 2020. Last year BioLite committed to the following reduction measures, with corresponding progress reports included below each measure:

1. Investigate the feasibility of replacing virgin feedstock with recycled feedstock for some of the company's more resource intensive raw materials.

Progress: BioLite evaluated the feasibility of using recycled feedstock among our most widely used raw materials, such as stainless steel. We found that sourcing recycled versions of these materials is challenging, and would require us to potentially switch factories in China and / or switch materials altogether. These changes require product re-design and retooling the manufacturing line to accommodate a new factory, among other significant and costly changes.

All of these costs are prohibitive for products that are already launched, though we concluded that it could be more feasible to incorporate recycled materials for new products that are yet to launch.

2. Revisit our supply chain to evaluate opportunities to reduce shipping and manufacturing emissions. Strategies to investigate will include using natural gas-powered shipping carriers rather than oil-powered carriers, as well as optimizing container use by more effectively consolidating shipments prior to departure from China.

Progress: BioLite researched use of natural gas-powered shipping carriers. Two issues were identified. First, it is challenging to be sure which shipping lines are using natural-gas powered ships. Even when we identify a specific shipping line, ships within the fleet vary by fuel type, and last-minute changes in shipping logistics could result in our containers ending up on ships that are not powered by natural gas. Since lower carbon intensive shipping is not an “off the shelf” offering in the shipping industry, it becomes challenging to realize without diverting BioLite from its core competency of delivering clean energy products around the world on time. Perhaps more importantly, research revealed that most natural-gas powered shipping lines leak natural gas into the atmosphere. Most natural gas-powered ships do not have the retrofit equipment and sensors required to avoid gas leaks. Since natural gas is composed mostly of methane, and methane is a much more potent greenhouse gas than carbon dioxide (about 21 times more effective at trapping heat), even small leaks in natural gas equipment onboard a ship can result in a net increase in greenhouse gas emissions compared to a ship powered by typical marine fuel oil. For these reasons, this solution will not be pursued further.

BioLite also investigated container optimization as a way to reduce shipping emissions. BioLite found this to be feasible, and is planning to implement this as soon as possible. Things BioLite could do in order to implement this include: i) build a freight optimization tool to help consolidate shipments ii) plan shipments further in advance to allow for better container utilization and iii) use storage space at our factories to avoid intermediate product movement and only move products out of the factory in full containers and when they are needed. In many cases this would replace storage in our Hong Kong facility, which is an intermediate stop that is not always needed, depending on the final product destination.

3. Complete a packaging re-design of the BioLite portfolio with a specific lens towards reduction of plastic and non-recyclable materials in structural sourcing.

Progress: This was completed successfully. The following changes have been implemented:

- Removed outer and inner polyethylene bags from all products except for one, which will be phased out soon.
- Replaced all plastic hangtags with cotton except for two of our 30+ products.

- Redesigned nine products that previously used plastic blisters, the translucent window that allows one to see the product when inside the packaging, to be paper only. In the two products that still use a blister since no other option could be identified, we reduced the amount of plastic used.
- Our “premium” packaging now uses greyboard made from 100% recycled material and water-based coating that can be recycled anywhere. Paper sleeves are coated in a plastic lamination that can be recycled in most municipalities.
- BioLite’s “standard” packaging uses standard corrugated cardboard, with a mix of water-based and plastic coating depending on the application. We are currently stress testing the water-based coating in an effort to eliminate more of the plastic coating in the future.
- We reduced the usage of plastic in our packaging by 93%. By doing this, we expect to avoid about 2.9 tons of plastic from entering the waste stream in 2021.
- While the total weight of our packaging material increased, we also increased our usage of recycled packaging material from 0% in 2020, to 22% of our total packaging weight in 2021. The increase in weight was mostly driven by replacing single use plastics (such as polybags and blister packs) with paper.

2021 Emission Reduction Goals

As part of BioLite’s commitment to Climate Neutral standards, BioLite is committing to two greenhouse gas reduction actions to pursue during the course of 2021 in order to reduce our carbon footprint:

- **Renewable electricity** - Purchase electricity from 100% renewable sources in our headquarters office, in Brooklyn, NY
- **Optimize container utilization** – This is a continuation of our second commitment from last year. In short, we aim to fit more BioLite products in each shipping container, thus reducing the number of containers shipped and reducing greenhouse gas emissions from shipping. Things BioLite could do in order to implement this include: i) build a freight optimization tool to help consolidate shipments ii) plan shipments further in advance to allow for better container utilization and iii) use storage space at our factories to avoid intermediate product movement and only move products out of the factory in full containers and when they are needed.

References

ⁱ Hu, Ray. “BioLite Shares the Case for Parallel Innovation.” *Impact Design Hub*. August 5, 2015. <https://impactdesignhub.org/2015/08/05/biolite-parallel-innovation/>.

ⁱⁱ “Our Purpose.” *Gold Standard*. <https://www.goldstandard.org/our-story/who-we-are>.

ⁱⁱⁱ *Corporate Accounting and Reporting Standard*, Greenhouse Gas Protocol, World Resources Institute and World Business Council for Sustainable Development, March 2004. <http://www.ghgprotocol.org/sites/default/files/ghgp/standards/ghg-protocol-revised.pdf>.

^{iv} *Corporate Value Chain (Scope 3) Accounting and Reporting Standard*, Greenhouse Gas Protocol, World Resources Institute and World Business Council for Sustainable Development, September 2011. http://www.ghgprotocol.org/sites/default/files/ghgp/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf.

^v Inventory of Carbon & Energy by Sustainable Research Team, University of Bath, United Kingdom, 2011. <http://www.organicexplorer.co.nz/site/organicexplore/files/ICE%20Version%201.6a.pdf>.

Annex I: Climate Neutral

In 2019, BioLite and a second company called Peak Design co-founded Climate Neutral^v, an independent non-profit organization working to accelerate the transition to a low-carbon economy. The organization grew quickly from around 130 companies in 2019 to over 280 currently measuring their 2020 emissions to offset 100% of that footprint, and take measures to reduce moving forward. Climate Neutral has developed a sophisticated carbon calculator that estimates scope I, II and III emissions. As part of BioLite’s commitment to adhering to Climate Neutral’s approach, BioLite calculated our footprint using Climate Neutral’s calculator in addition to our typical, more manual internal calculations that we have conducted each year since 2012.

Based on the same raw data BioLite used to manually calculate our carbon footprint, the Climate Neutral Brand Emissions Estimator (BEE)^v calculated BioLite’s 2020 carbon footprint to be 7,868 tons CO₂e. We believe the difference between this figure and our internally calculated figure could be due to several factors, including a difference in conversion factors being applied to raw materials and manufacturing.

BioLite will therefore report this figure as its carbon footprint for purposes of its membership in Climate Neutral, and has offset its 2020 emissions from the higher number in order to be conservative. For purposes of analysis in this report, however, we refer in all previous sections to the internal calculations conducted by BioLite, totaling 7,568.63 tCO₂e.