



# **BioLite Environmental Sustainability Report**

## **2019**

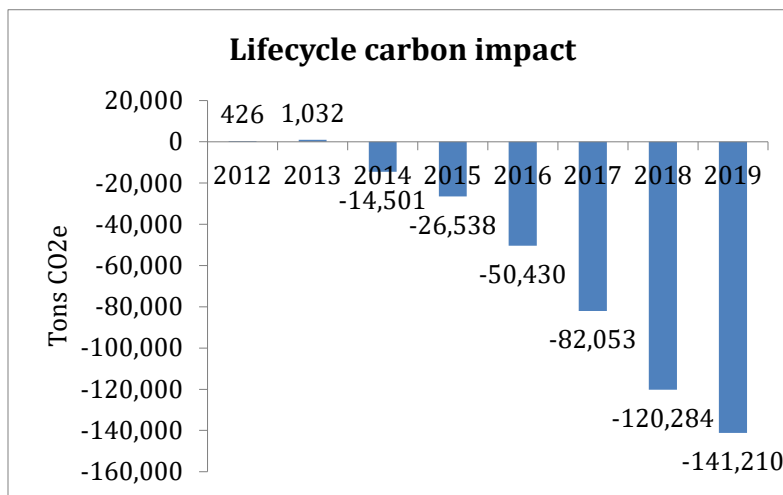
March 2020

# Contents

- Contents ..... 2**
- Executive Summary ..... 3**
- Introduction ..... 6**
- Summary..... 7**
  - Historical Performance .....7*
  - Breakdown of Emissions by Function ..... 9*
- Methods, Approach, and Function-Specific Results ..... 9**
  - Scope 1 Emissions ..... 9*
  - Scope 2 Emissions ..... 9*
    - Building Emissions ..... 9
  - Scope 3 Emissions ..... 10*
    - Corporate Travel ..... 10
    - Commuting ..... 11
    - Product Manufacturing..... 11
    - Shipping ..... 12
    - Lifecycle Analysis..... 13
- Emissions Mitigation ..... 14**
- References..... 15**

## Executive Summary

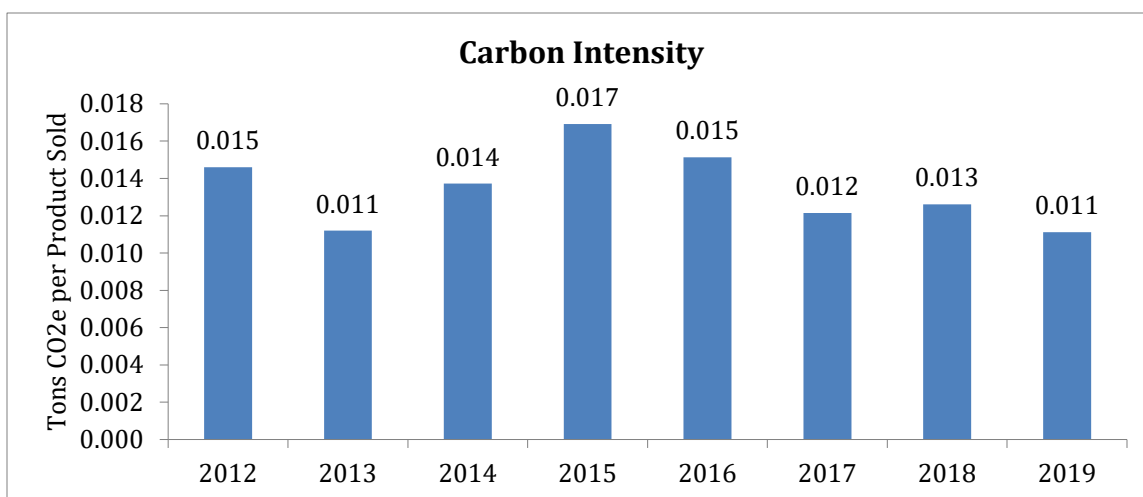
BioLite’s 2019 carbon footprint analysis reveals some key conclusions and trends. First, use of BioLite’s products result in a significant reduction in greenhouse gas emissions compared to emissions produced from BioLite operations. This fact is evident from the graph above, which is further explained in the “Lifecycle analysis” section. In



fact, each ton of CO<sub>2</sub>e released into the atmosphere from BioLite operations during 2012-2019 results in a reduction of approximately 25 tons CO<sub>2</sub>e in emissions through 2019 from the use of cookstoves sold in emerging markets.

In 2019, BioLite emitted a total of 3,782 tCO<sub>2</sub>e as per our internal model calculations. This represents an 8% drop year-on-year, driven primarily by a slight drop in sales of higher emitting products coupled with increased sales of low-volume (smaller) and low carbon-intensive products. This led to lower raw material demand, greater container utilization and lower inbound shipping requirements. BioLite continues to implement and explore new means of greenhouse gas mitigation within its operations, however, as outlined in the Emissions Mitigation section. In addition to greenhouse gas mitigation, BioLite will continue to offset its entire carbon footprint, including scopes 1, 2 and 3.

Consistent with the assertion above, BioLite’s 2019 carbon intensity, as defined by emissions per product manufactured, reduced to a low not seen since 2013 as the company saw increased sales volume of low emission products and a slight drop in sales of the higher-emitting products. This caps a consistent downward trend in emissions intensity from 2015 to the present:



Overall, BioLite continued to drive impact across a number of metrics in 2019. We saw major increases in terms of number of people impacted, watt hours generated, and installed energy capacity, primarily driven by the continued success of our SolarHome 620 product. We also continued to expand our cookstove business with the addition of efficient charcoal stoves to our product offering in Kenya, resulting in a significant gain in fuelwood savings and tonnes of wood avoided. A comprehensive overview of impact metrics is detailed below:

	2014	2015	2016	2017	2018	2019
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
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
Tons of CO <sub>2</sub> e Offset by BioLite Cookstoves	8,316	30,583	75,253	137,300	206,285	307,053
Installed Energy Capacity (SolarHome 620 + HomeStove)	n/a	n/a	n/a	32.68KW	433.55KW	650.44KW
Staff members on Emerging Markets teams	10	25	55	30	47	46

Fuelwood Savings by BioLite Customers (\$)	\$1.72M	\$4.86M	\$12.72M	\$25.53M	\$41.38M	\$59.13M
Tonnes of Wood Avoided	3,539	11,262	31,895	65,792	99,992	151,547

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 2019, 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,"<sup>i</sup> 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.

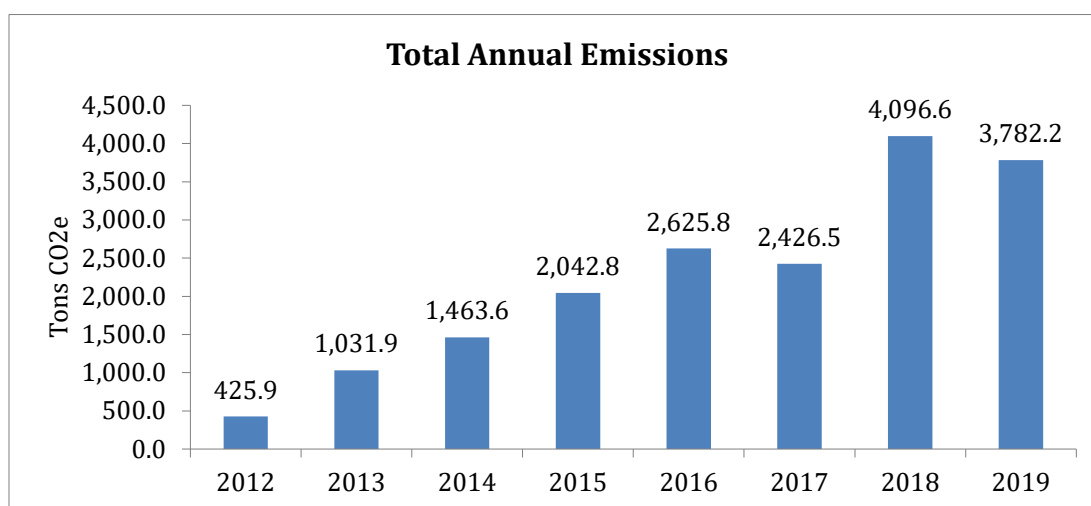
BioLite generates a carbon credit for every metric ton of greenhouse gas (measured in carbon dioxide equivalent) reduced through the use of its products in emerging markets. For instance, when a household in Kenya cooks on the BioLite HomeStove, they emit fewer greenhouse gases compared to the smoky, open fire which they would otherwise use. These savings are independently verified by Gold Standard Foundation, the leading carbon accreditation body.<sup>ii</sup> 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 17,895 metric tons of carbon dioxide equivalent (tCO<sub>2</sub>e) since 2012. During the seven-year period from 2012 to 2019, every ton of CO<sub>2</sub>e emitted by BioLite has generated a savings of about 25 tons of CO<sub>2</sub>e.

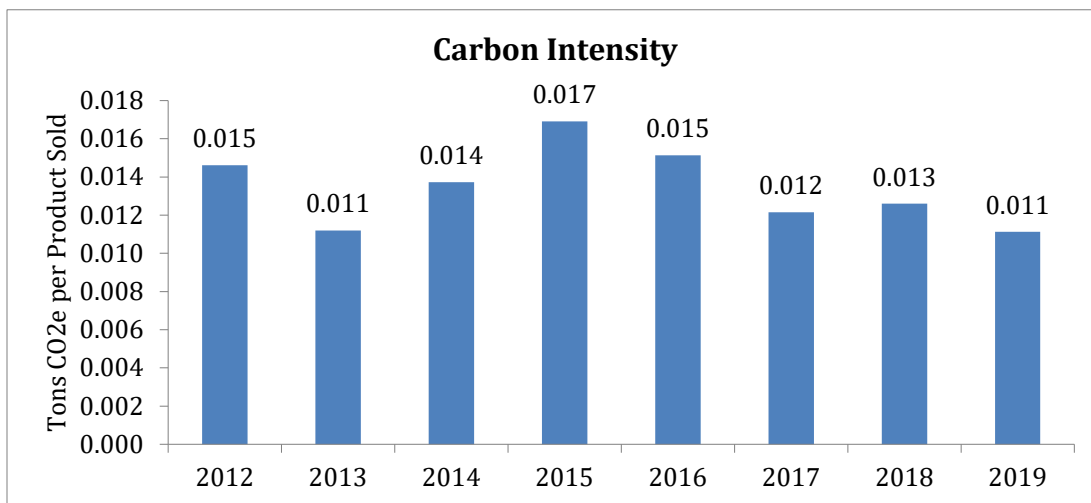
In 2019, BioLite emitted a total of 3,782 tCO<sub>2</sub>e, and has offset these emissions with third-party-verified credits purchased from trusted partners.



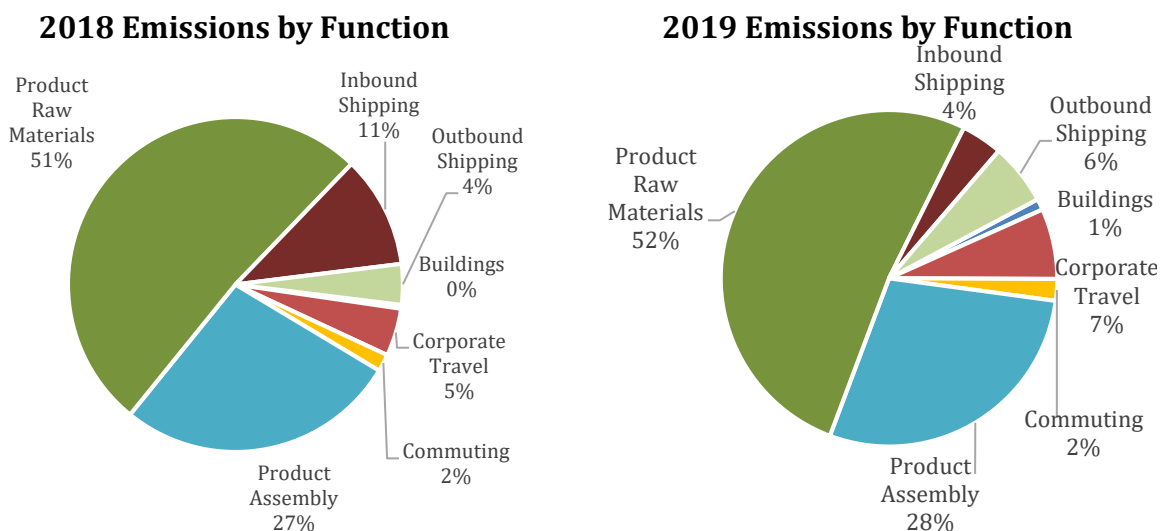
Across the 2012-2016 timeframe, we observed a steady increase in emissions that is roughly proportional to the growth of BioLite’s operational scale. This trend continued until 2017, when we observed a slight decrease in carbon footprint, due to a shift towards less-carbon intensive products, in a pattern similar to the one we observed for 2019. In 2018, the release of the Firepit resulted in high demand for this shipping-intensive product, which in addition to increased sales in the SolarHome 620, impacted the carbon footprint for the year. Over the course of 2019, while SolarHome 620 sales continued to grow, Firepit demand stabilized and we observed sales of the Headlight- a physically small, low raw material product- increase more than eight-fold. The combination of these factors led to more efficient container utilization, resulting in lower shipping requirements and therefore a drop in the company’s carbon footprint for the year.

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 tCO<sub>2</sub>e. In 2019, BioLite’s efforts on sustainable growth in addition to sales trend resulted in a drop in Carbon intensity from 2018 to 0.011 tCO<sub>2</sub>e, a low not seen since 2013.



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 2018 was observed in inbound shipping, which accounted for 4% of the company’s emissions for 2019 vs. 11% in 2018.





## 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,<sup>iii</sup> 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.<sup>iv</sup>

This report was compiled by BioLite staff and an extern from January 2020 to March 2020. 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

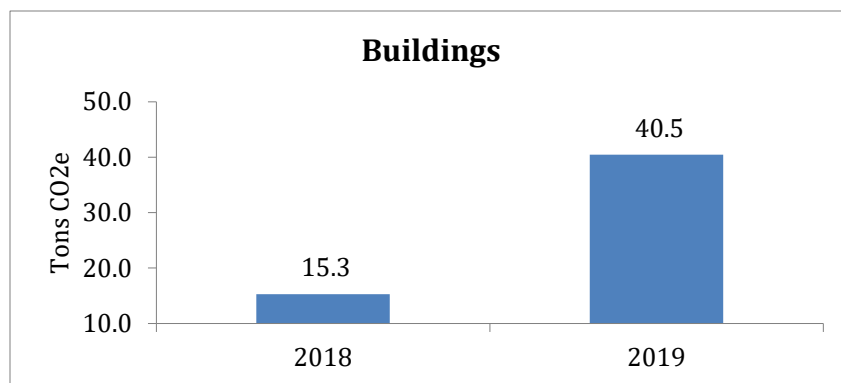
Scope 1 emissions are defined as those originating from emissions sources directly controlled and owned by BioLite. Since BioLite uses an external manufacturing facility to fulfill our manufacturing needs, there are no sources of emissions within operations over which we have direct control. For that 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, even if this year they are materially higher than in 2018. 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 2019, BioLite expanded its Brooklyn headquarters, doubling the office space from 2018, resulting in higher emissions. Standard conversion factors were applied to calculate total emissions from the consumption of electricity and natural gas to arrive at the final values.



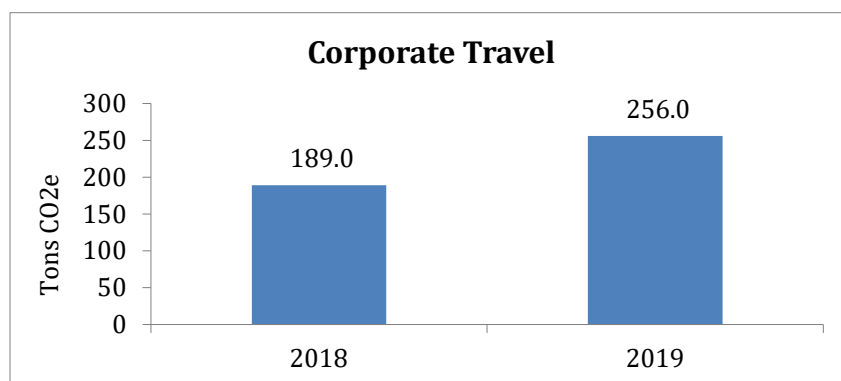
### Scope 3 Emissions

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.

#### *Corporate Travel*

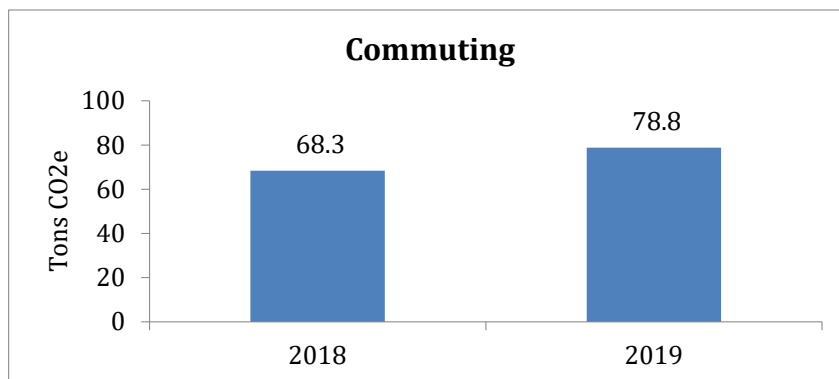
The majority of miles traveled and greenhouse gas emissions originated from commercial aircraft. Corporate travel accounted for a moderate increase in emissions from 2018 to 2019. This increase is primary due to an increase in air travel, including employees traveling to and from emerging markets.

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

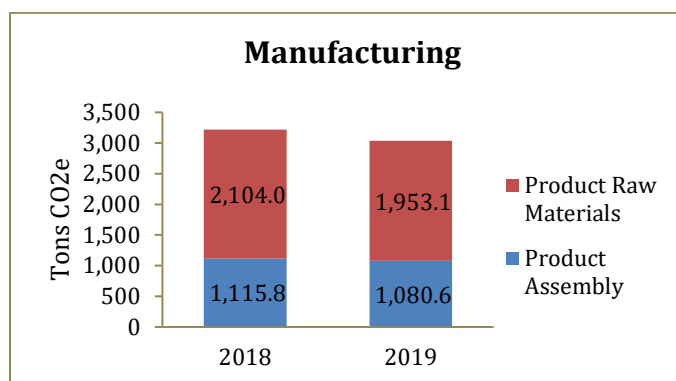
Company employees completed a survey in late 2016 in which they self-reported their commuting patterns, revealing the frequency with which employees commute via public transportation, bicycle, car or by walking.



The results of this survey were then scaled to correspond with the average number of BioLite employees in 2019. 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 did not exceed 10 tCO<sub>2</sub>e for either of the two years. 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. The increase in emissions relative to 2018 can be explained by a larger headcount in both offices as the company continues to grow. BioLite also increased its number of in-field salespeople in Emerging Markets in 2019, whose emissions are calculated separately as part of corporate travel.

### Product Manufacturing

Emissions from raw materials and product assembly dropped marginally year-on-year due a higher proportion of our sales in 2019 were of less carbon-intensive products, even as overall sales volume increased significantly. A large portion of our sales came from the Headlight, which have relatively low embodied emissions and are also quite light in terms of weight, which results in lower emissions during product assembly.

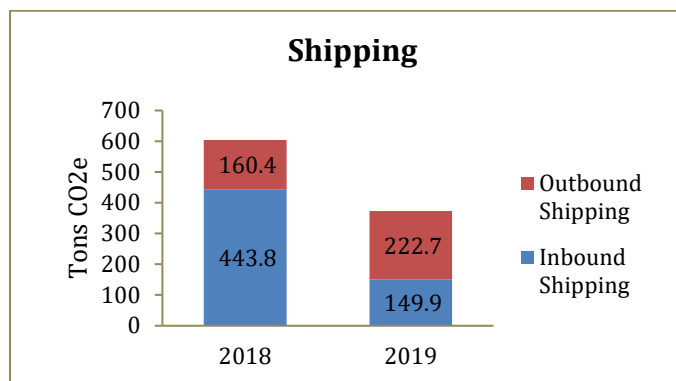


Each BioLite product was catalogued by its component parts, their material type and respective masses. Widely accepted embodied energy conversion factors for each material were then applied to calculate a per-unit embodied energy value for each product.<sup>v</sup> This was then multiplied by the total number of products sold in 2019 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.

### 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 2019. As mentioned previously, this is explained by a change in the product mix, with an increase in lighter and smaller products *vis-à-vis* larger products in 2018, particularly for inbound shipping. The increase of overall sales however, explains the higher emissions related to outbound shipping.

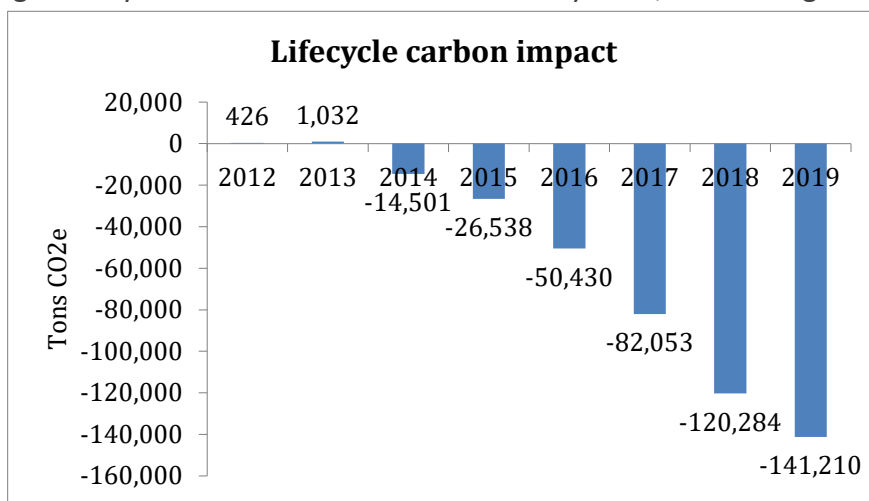
BioLite calculated the distance between the distribution hub and the final destination for each product or product lot. Air distances were calculated using an online calculator for the great-circle distances between two airport codes, sea and ground distances were calculated using Google Maps data. Every 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 CO<sub>2</sub>e 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.<sup>1</sup> The above chart plots emissions released from all BioLite manufacturing during 2012-2019, combined with emissions savings resulting from the use of cookstoves during 2014 through 2019 that were sold in 2012-2019. As you can see from this chart, the results are overwhelmingly positive in terms of saving greenhouse gas emissions on a net basis.

<sup>1</sup> BioLite applied the most accurate and up-to-date information available this year to calculate the lifecycle analysis numbers based on recent developments. This changed both this year’s carbon reductions as well as previous years, in order to bring calculations in line with the most recently available data.

Put another way, for each ton of CO<sub>2</sub>e released into the atmosphere from BioLite operations during the 2012-2019 period, we have measured an approximately 25 tons CO<sub>2</sub>e reduction in emissions through 2019 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 plan to conduct a review of raw materials used in new products to ensure that low-emission materials are used whenever possible. Like all Climate Neutral certified brands, BioLite commits to two reduction measures:

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

## References

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

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

<sup>iii</sup> *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>.

<sup>iv</sup> *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](http://www.ghgprotocol.org/sites/default/files/ghgp/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf).

<sup>v</sup> 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<sup>v</sup>, an independent non-profit organization working to accelerate the transition to a low-carbon economy. The organization grew quickly to include more than 130 companies in the 2019 “freshman class”. These brands have committed to measure their 2019 emissions, 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)<sup>v</sup> calculated BioLite’s 2019 carbon footprint to be 4,874 tons CO<sub>2</sub>e. 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. The BEE calculator is still in its first phases of development, and we expect to have a better idea of the differences in methodologies, and how to reconcile the two, in time for BioLite’s 2020 carbon footprint analysis.

BioLite will therefore report this figure as its carbon footprint for purposes of its membership in Climate Neutral, and has offset its 2019 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 3,782 tCO<sub>2</sub>e.