



## **BioLite Environmental Sustainability Report 2015 - 2016**

January 2017

# Table of Contents

- 1. Introduction ..... 4**
- 2. Methods, Approach and Function-Specific Results ..... 5**
  - 2.1 Scope 1 ..... 5
  - 2.2 Scope 2 ..... 5
  - 2.3 Scope 3 ..... 6
- 3. Result Summary and Analysis ..... 9**



## 1. 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 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,” BioLite incubates core technologies for both markets. BioLite reinvests near-term revenue from our outdoor recreation business to support the emerging markets business until it is commercially self-sufficient.

Since BioLite’s inception we have sought to minimize our resource consumption and create products that have a net benefit to humanity and to the planet. BioLite has been measuring and offsetting its carbon footprint since 2012. This process has been particularly important recently since BioLite has been experiencing significant growth, which we aim to achieve not only in a financially but also in an environmentally sustainable way. Monitoring our carbon footprint is the first step in understanding whether we are achieving this goal. This report covers BioLite’s carbon footprint during the calendar years 2015 and 2016, while also citing results from previous years in order to identify trends over time.

Unlike most organizations who purchase offsets from clean energy projects implemented by others, BioLite produces its own carbon offsets from our projects implemented by BioLite in emerging markets.

We achieve this by retiring (instead of selling) independently verified carbon credits produced from the use of BioLite products in Uganda and India. When a household in Uganda, for instance, cooks on the BioLite HomeStove, they reduce the amount of greenhouse gas emissions compared to the smoky, open fire with which they previously cooked. This savings is independently verified by Gold Standard Foundation, the leading carbon accreditation body. For every ton of greenhouse gas emissions saved (measured in tons of carbon dioxide equivalent), BioLite generates a carbon credit, which we either retire to cover our corporate footprint or we sell to a government or company that wants to offset their carbon footprint. We reinvest this revenue into our emerging markets business, to enable poorer and more remote households to purchase BioLite clean energy products.

BioLite has experienced a significant increase in its carbon footprint since our last report, a fact that is due to a significant uptick in operational scale. BioLite is employing many more people and manufacturing significantly more products than in previous years. For this reason, carbon intensity per product manufactured is the most instructive indicator of whether BioLite is succeeding in its pursuit of environmentally sustainable growth.

## 2. 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>1</sup> taking into consideration resource and data constraints and where applicable, using best efforts to arrive at reasonable and conservative conclusions (overestimating emissions where uncertainty exists). In this analysis, we considered all material sources of greenhouse gas emissions throughout the value chain, as defined in the Greenhouse Gas Protocol. The analysis was conducted from November, 2016 to January, 2017 and was conducted by BioLite staff. 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 excel model and references to authoritative third party documentation for all conversation factors and calculations. Business functions falling into scope 1, 2 and 3 emissions were quantified, as outlined in the sections below.

### 2.1 Scope 1

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.

### 2.2 Scope 2

Scope 2 emissions include those from purchased electricity, steam, natural gas, etc. BioLite has only one office for which electricity and natural gas is purchased. These

---

<sup>1</sup> <http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf>

emissions fall under building emissions. While we have offices in emerging markets, they are small and face frequent interruptions in power supply, thus we have assumed that their carbon footprints are negligible.

### Building Emissions

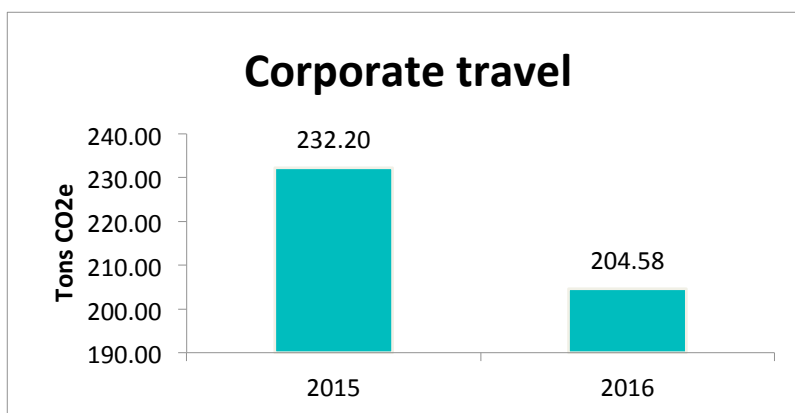
BioLite purchases electricity as well as gas for heating to power our headquarters office. Standard and universally accepted conversion factors were applied to calculate total emissions from the consumption of electricity and natural gas to arrive at the final values. Building emissions were minimal, as they never exceeded 15 tons CO<sub>2</sub>e for any year of operations.

## 2.3 Scope 3

Scope 3 intends to capture all other sources of emissions, which for BioLite encompasses the overwhelming majority of our emissions, since we do not have direct control over most of the emissions in our value chain.

### Corporate Travel

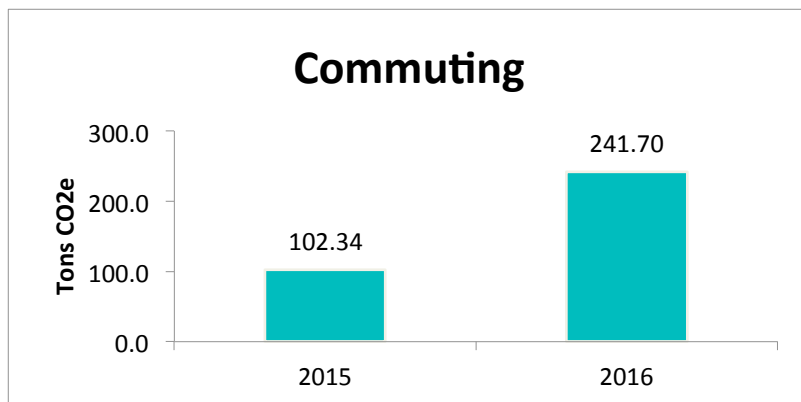
Corporate travel emissions were quantified by examining records of all company travel for the periods in question and calculating the distance traveled for each trip. These distances were then multiplied by industry



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. The majority of corporate travel occurred by commercial aircraft.

### Commuting

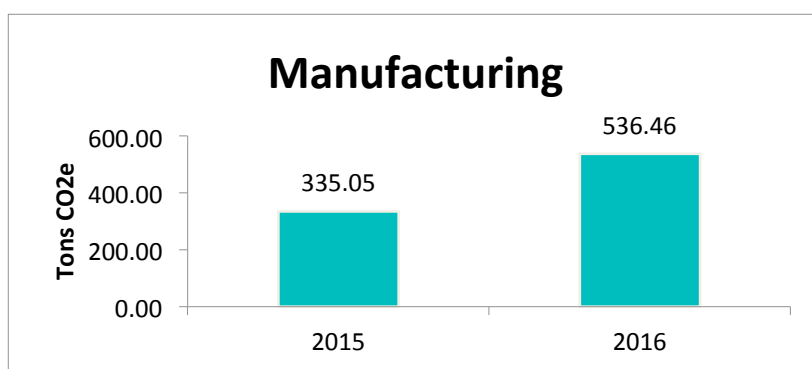
Company employees completed a survey in late 2016 in which they self-reported their commuting patterns, revealing the frequency with which employees commute via public transportation, bicycle, car or by walking.



The results of this survey were then scaled up or down between different years to correspond with the number of BioLite employees in a given calendar year. Approximately 60% of BioLite employees that work in its Brooklyn headquarters either walk, bike or work from home the majority of the week. Only 6% 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 didn't exceed 10 tons CO<sub>2</sub>e for either of the two years. The majority of carbon emissions from commuting are made up of BioLite's Emerging Markets team because staff members have to travel a substantial distance by motorcycle or car to reach customers in rural areas.

### Manufacturing

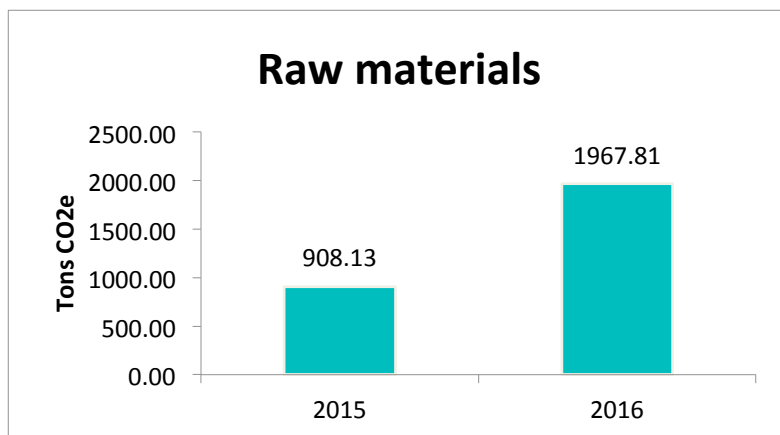
Since BioLite was unable to attain direct energy consumption data from our third party factory in China, we used publicly available benchmarks from the automotive industry and then adjusted them to be



more applicable to BioLite's products. We accounted for all manufacturing processes involved in manufacturing each BioLite product to arrive at the values in the graph above.

### Raw Materials

Although some manufacturing companies choose not to include raw materials in their scope 3 analysis, BioLite elected to include these values since they are so integral to manufacturing and using BioLite products. Raw materials represent the majority of BioLite's total carbon footprint and were calculated using the following methodology.



Each BioLite product was catalogued by its component parts, their material type and respective masses. Widely accepted embodied energy conversion factors<sup>2</sup> for each material were then applied to calculate a per unit embodied energy value for each product. This was then multiplied by the total number of products sold in each calendar year to arrive at a total figure for raw materials as the graph above shows.

### Shipping

Shipping emissions within BioLite are broken into two categories. The first is comprised of sea or air freight from BioLite's manufacturing facility in China to one of several BioLite warehouse and distribution hubs throughout the world (inbound), or through sea, air, or ground transportation between BioLite's distribution hubs. The second consists of truck, sea or air freight from those hubs to either resellers or directly to customers (outbound).

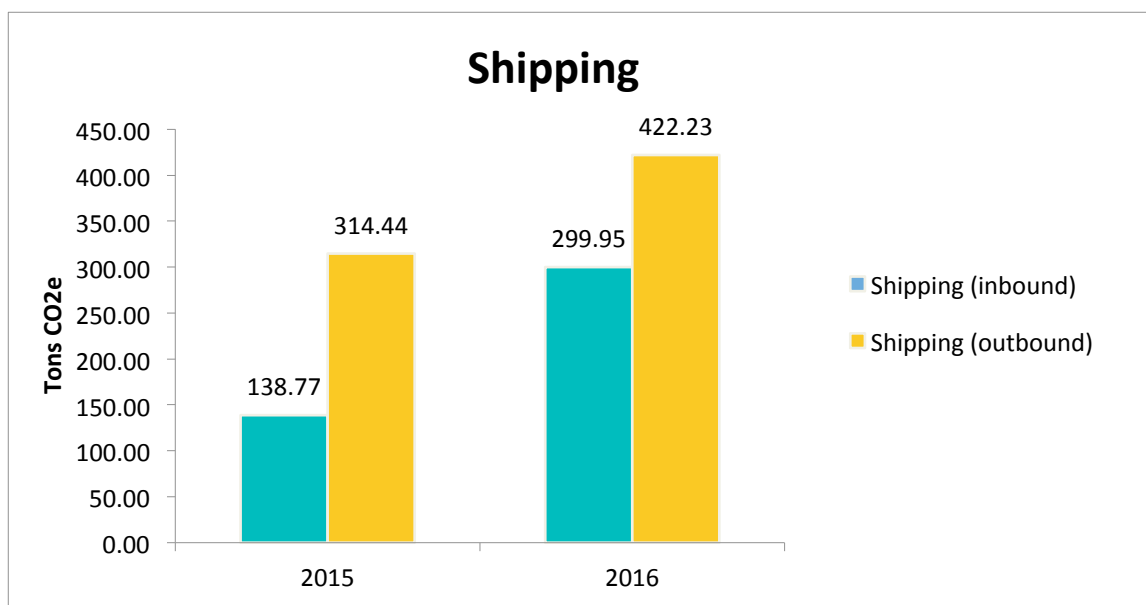
#### i. Inbound

All containers shipped via sea freight were examined for the period in question and were multiplied by standard conversion factors for sea freight to arrive at the following figure.

---

<sup>2</sup> Inventory of Carbon & Energy by Sustainable Research Team, University of Bath, United Kingdom, 2011



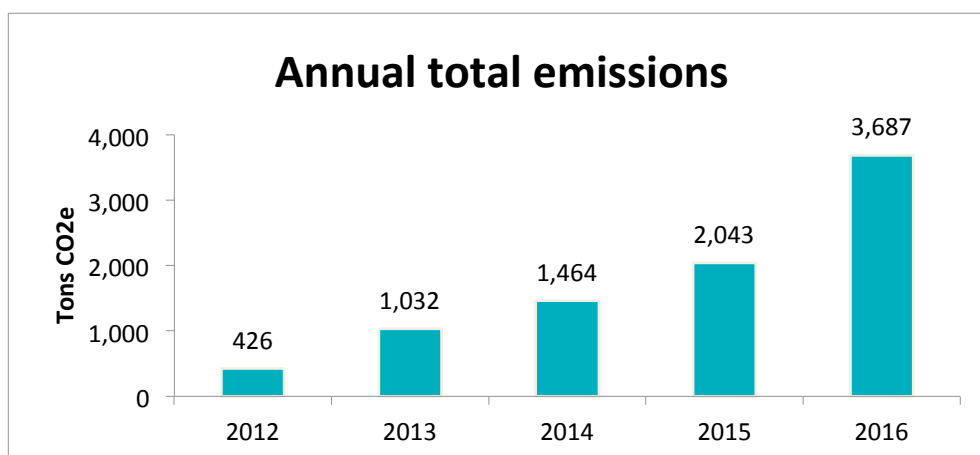


ii. Outbound

BioLite used origin and destination zip codes to calculate the distance between the distribution hub and the final destination for each product or product lot. This distance was multiplied by standard conversion factors for truck, sea, and airfreight as appropriate.

### 3. Result Summary and Analysis

Across the five-year period we observe a steady increase in emissions that is roughly proportional to the growth of BioLite as a company and an increase in company sales as is shown in the figure below.

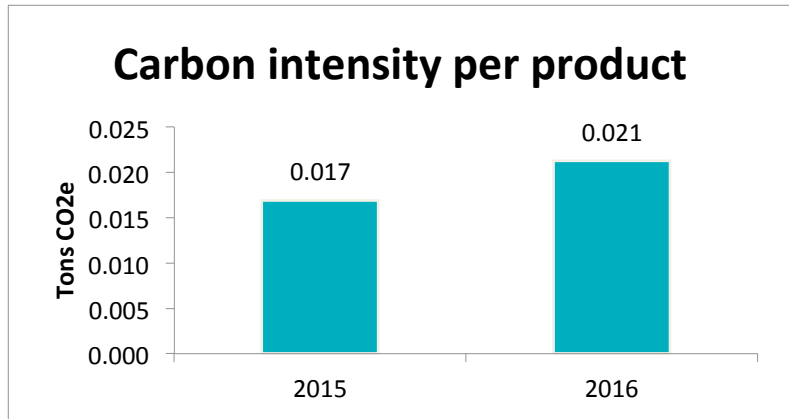


Between 2012-2014 BioLite emitted 2,921 and has offset this carbon footprint by retiring the same number of carbon credits generated from the reduction in carbon from HomeStove usage in India and East Africa.

Between 2015-2016, BioLite emitted in aggregate 5,730 tons of CO<sub>2</sub>e and it will continue to offset these emissions.

When we normalize for total annual sales figures to

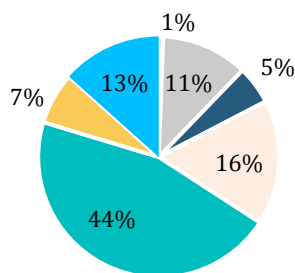
calculate carbon intensity per product, a different picture emerges. We observe carbon intensity on a per product basis holding relatively steady, ranging from about 0.017 to 0.021 tons CO<sub>2</sub>e per product.



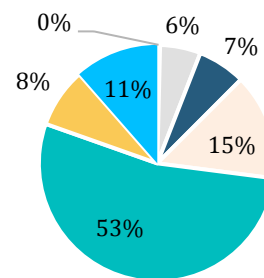
The increase in the carbon intensity goes hand in hand with the fact that more raw materials are used in our highest selling products because our products have become more complex. Since raw materials constitute 44%-53% (see graph below) of BioLite's carbon footprint, this directly leads to an increase in the carbon intensity per product.

Breakdown of BioLite's Carbon Emissions by Type

2015 BioLite Emissions by Type (%)



2016 BioLite Emissions by Type (%)

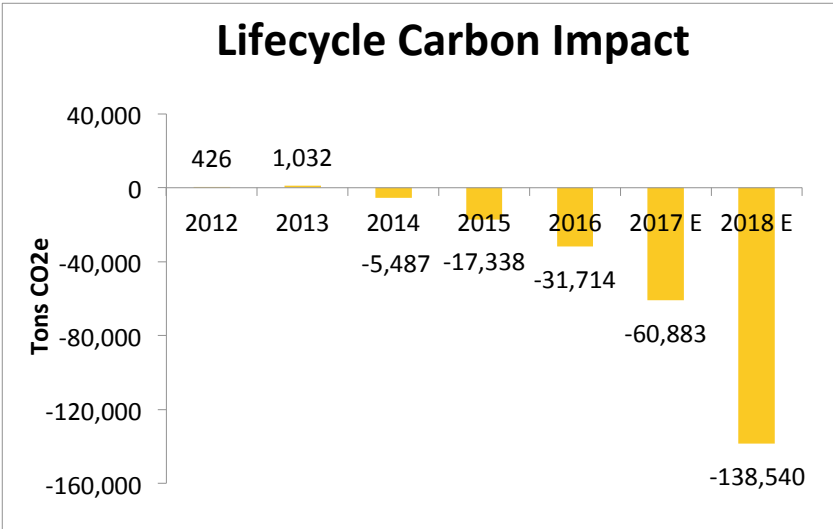


- Building Emissions
- Commuting
- Product Raw Materials
- Outbound Product Transportation
- Corporate Travel
- Product Assembly
- Inbound Product Transportation

The majority of BioLite’s carbon emissions can be attributed to product raw materials and product assembly. Product transportation from BioLite’s factories to its warehouses and then to final customers comprised approximately 20%. Commuting ranged from 5-7% from 2015 to 2016 and increased due to growth in our emerging markets staff, who have to use motorcycles or cars to reach customers in villages and other remote areas. The percentage of BioLite’s emissions constituted by corporate travel decreased from 11% to 6% from 2015 to 2016.

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 the HomeStove in emerging markets, since this is the product that is being used by low-income households on a daily basis, thus saving material quantities of greenhouse gas emissions. We conservatively calculate that each HomeStove saves on average 2.61 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 requirements to calculate carbon credits. The above chart plots emissions released from all BioLite manufacturing during 2012-2018(E)<sup>3</sup>, combined with emissions

<sup>3</sup> The impact for 2017 and 2018 has been calculated by combining sales projections with historical greenhouse gas emissions and other production-related assumptions, each of which may change in the future.

savings resulting from the use of HomeStoves during 2014 through 2018(E), sold in 2012-2018(E). 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 CO<sub>2</sub>e released into the atmosphere from BioLite operations during the 2012-2018 period, we anticipate saving approximately 11.08 tons CO<sub>2</sub>e by 2018 from the use of HomeStoves.**