Methodology of Societal Impact Calculations
Methodology of our Societal Impact Calculations

1. Signify societal impact
   Introduction to the Value Creation Model, the advantage of monetization and an overview of our societal impact.

2. Methodology for calculating our societal impact
   Section providing information on the metrics, sources and shadow prices used for our impact calculation.

3. Annexes
   Section providing additional information on calculations for avoided emissions due to our products and services.
I. Signify societal impact

Value Creation Model
At Signify, sustainability is central to our company vision, strategy and purpose. Our aim is to balance economic, social and environmental considerations. We strive to maximize long-term value-creation along these three dimensions.

To guide our efforts and measure our progress, we have made our approach towards long-term value creation more transparent by preparing our annual report in line with key-elements of the International Integrated Reporting Council’s (IIRC) Integrated Reporting framework.

At the core of our reporting approach is the value creation model, included under section 3 of our 2020 annual report. This model shows how our business activities draw on various financial, environmental, and social resources that get converted to outputs. Our activities and its outputs lead to outcomes in terms of the impact made on our stakeholders and society at large.

By expressing these impacts in monetary terms, we can better compare the financial, social, and environmental effects of our business. This enables more effective and efficient decision making and gives a holistic view on our most prominent risks and opportunities. It also provides further transparency to our stakeholders on our company performance.

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*Signify*

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**5 Frontiers strategy**

- Our purpose is to unlock the extraordinary potential of light for brighter lives and a better world.

Input

- Financial
  - EUR 287 million R&D investments with 85.7% sustainable innovation
  - EUR 2.371 million total equity
  - EUR 7.710 million total assets

- Environmental
  - 3.728 terawatt-hour energy with 100% renewable electricity
  - EUR 2.816 million materials
  - 971 thousands of m³ water

- Social
  - 37,926 FTE in 74 countries
  - 44,463 learning modules offered
  - EUR 2.84 million spent on training
  - 75 supplier audits
  - EUR 2.1 million to the Signify Foundation

Output

- Financial
  - EUR 6,602 million sales
  - EUR 677 million free cash flow
  - 63,300 patent rights
  - 41 customer NPS

- Environmental
  - Carbon neutral operations
  - 0 kilotonnes waste to landfill and 99% recycled
  - 2,933 million LED lamps & luminaires, avoiding 72,988 kilotonnes of CO₂

- Social
  - 415,720+ e-learning courses booked
  - 99% supplier sustainability performance
  - 6 million lives III and 9,266 entrepreneurs trained
  - 0.22 total reportable case rate
  - 25% employee NPS
  - 23% women in leadership

Impact

- Brighter Lives: We created EUR 126 million in value for society through total shareholder returns, tax and dividend payments.
- Better World: We created EUR 1,081 million in value for society through employment practices & wages, and our investment in learning & development combined with the costs for a variety of initiatives & interests at work.

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*Audited emissions from signed agreements.*
Impact Valuation

Impact valuation is a way to identify, understand, improve, and demonstrate the value and cost of our business activities on society – such as the cost to society of our carbon emissions and the value to society of our tax payments.

To facilitate comparability, the impacts and external effects of business activities are measured and valued in monetary terms. By nature, financial, social, and environmental impacts are positive or negative. By applying shadow prices to the impacts of activities, societal costs and benefits are determined.

By publishing the results of our analysis and methodology, context and underlying assumptions are made transparent to our stakeholders. We strive to contribute to a global shift from traditional reporting to impact analysis via global standards based on the Impact Valuation Roundtable.1

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1 [IVR_Impact Valuation White Paper.pdf](wbcsd.org)
Signify societal impact trend
In the table below, we provide an overview of our societal impact and the trend over time. Signify is on a journey to measure all its business impacts along the economic, social, and environmental dimensions. Where possible we aim to extend the scope of our analysis on an annual basis as our insights increase further.

<table>
<thead>
<tr>
<th>Financial Impact</th>
<th>Trends 2019 - 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Total shareholder returns</td>
<td>629</td>
</tr>
<tr>
<td>• Tax</td>
<td>289</td>
</tr>
<tr>
<td>• Interest</td>
<td>126</td>
</tr>
<tr>
<td></td>
<td>The decrease of 56% compared to 2019 can be partly explained by the COVID-19 pandemic. The company had to pay lower taxes. Moreover, interest payments decreased by 7 million EUR.</td>
</tr>
</tbody>
</table>

| Social impact                             |  |
|-------------------------------------------|  |
| • Training of employees                   | 1036               |
|   • Salaries & benefits                   | 1000               |
|   • Cost of injuries & fatalities         | 1081               |
|                                           | The increase of 8% compared to 2019 can be explained a growth in salary expenses. The cost of injuries & fatalities halved due to good health & safety results. |

| Environmental impact                      |  |
|-------------------------------------------|  |
| **Avoided Carbon emission**               |  |
|   • Through (solar) LED                   | 1418               |
|     • Reforestation                       | 1339               |
|     • Solar panels                        | 1776               |
|                                           | The increase of 33% avoided carbon emissions can be explained by larger LED sales leading to more avoided carbon emissions. |

| Environmental footprint                   |  |
|-------------------------------------------|  |
|   • Carbon emission                       |  |
|     • Waste disposal                      | -20                |
|     • Water usage                         | -4                 |
|                                           | -3                 |

**All numbers are in million EUR**

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2. Methodology for calculating our societal impact

Scope of impact analysis

The table below shows which metrics were included in our analysis to determine societal impacts.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicator</th>
<th>Summarized consideration</th>
<th>Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Carbon emissions</td>
<td>Impact on climate due to emitted greenhouse gas emissions</td>
<td>Own operations</td>
</tr>
<tr>
<td>impacts</td>
<td></td>
<td>Impact on climate due to avoided greenhouse gas emissions through our energy efficient LED lamps &amp; luminaires, Solar LED.</td>
<td>Products</td>
</tr>
<tr>
<td>Waste disposal</td>
<td></td>
<td>Impact on environment due to waste disposal</td>
<td>Own operations</td>
</tr>
<tr>
<td>Biodiversity</td>
<td></td>
<td>Biodiversity and ecosystem services conserved and restored through carbon offsetting program</td>
<td>Society</td>
</tr>
<tr>
<td>Water usage</td>
<td></td>
<td>Impact on water scarcity due to water consumption</td>
<td>Own operations</td>
</tr>
<tr>
<td>Social impacts</td>
<td>Injuries &amp; fatalities</td>
<td>Impact on workers &amp; communities due to occupational injuries and fatalities</td>
<td>Own operations</td>
</tr>
<tr>
<td>Financial impacts</td>
<td>Training investments</td>
<td>Impact due to training &amp; development of our employees and entrepreneurs trained by the Signify Foundation</td>
<td>Own operations &amp; supply chain</td>
</tr>
<tr>
<td></td>
<td>Salaries &amp; benefits</td>
<td>Impact on economy through remuneration of employees</td>
<td>Own operations</td>
</tr>
<tr>
<td></td>
<td>Interest</td>
<td>Impact on economy through interest payments to suppliers of capital</td>
<td>Own operations</td>
</tr>
<tr>
<td></td>
<td>Taxes</td>
<td>Impact on economy through tax payments in countries where we operate</td>
<td>Own operations</td>
</tr>
<tr>
<td></td>
<td>Shareholder returns</td>
<td>Impact on economy through shareholder returns to shareholders</td>
<td>Own operations</td>
</tr>
</tbody>
</table>
Detailed considerations

The following section highlights per indicator the boundaries to determine shadow prices, references to the academic sources, and the base price that was applied.

Environmental impacts

This section explains the different metrics that were included to determine our environmental impact.

Carbon emissions

Signify reports in line with the Greenhouse Gas Protocol (GHGP). The market-based method of reporting is used as a reference for calculating our carbon footprint.

- **Scope 1** – direct CO₂ emissions – is based on direct emissions from our industrial and non-industrial sites in full.
- **Scope 2** – indirect CO₂ emissions – is based on indirect emissions from our industrial and non-industrial sites in full.
- **Scope 3** – other CO₂ emissions related to activities not owned or controlled by Signify is based on business travel and distribution activities.
- **Scope 4** – avoided CO₂ emissions – is based on use of our LED lamps & luminaires, and the resulting reduced electricity consumption compared to conventional lighting.

When we mention carbon emission, we refer to our carbon equivalent emissions calculations. We convert all Kyoto gases (CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆) into CO₂ emissions while calculating our environmental footprint.

Shadow price considerations: Costs of changes in net agricultural productivity, human health, property, damages from increased flood risk due to climate change.

Shadow price sources:
- EPA’s SC-CO₂
- S. Dietz et al. (2018), LSE

Base price applied:
€100.50 per tonne CO₂

Carbon emission avoided from solar LED

Data for scope 4 – avoided CO₂ emissions is also based on use of our solar LED products and systems.

Shadow price considerations: Signify distinguishes two different categories of solar LED product to calculate our avoided emission. The first one is Solar lanterns replacing kerosene lamps. The methodology used for the calculation is from the GOGLA Report.

The second is streetlighting installed in off-grid areas by calculating the difference between the zero impact of the solar systems compared to what the same system would use on a grid in that specific country.

Shadow price source: EPA’s SC-CO₂

Base price applied:
€100.50 per tonne CO₂

Biodiversity and ecosystem services conserved and restored through carbon offsetting program

Through carbon offsetting projects, Signify contributes to conserving and restoring forests. The ecosystem services which these forests provide are extensive and contribute to enhancing or maintaining the biodiversity in those areas.

Shadow price considerations: Societal value produced by conserving and restoring forests in terms of the following ecosystem services which these forests provide: food, (fresh) water supply, raw materials, genetic resources, medicinal resources, ornamental resources, influence on air quality, climate regulation, moderation of extreme events, regulation of water flows, waste treatment/water purification, erosion prevention, nutrient cycling and maintenance of soil fertility, pollination, gene pool protection, and opportunities for recreation and tourism.

Shadow price sources: TEEB, 2010, adjusted for inflation

Base price applied:
€2,291 per ha of temperate and boreal forests conserved or restored (Kariba REDD+ project in Zimbabwe)
€11,443 per ha of tropical forests conserved or restored (Restoration of degraded areas and reforestation in Cáceres and Cravo Norte, Colombia)

Waste disposal

Data consists of manufacturing waste that is delivered for landfill or incineration. Due to the residual value of recycling, this method of waste disposal is excluded from our calculations.

Shadow price considerations: Amenity costs
Signify

(odor, visual impact, noise) and costs from emissions to air affecting global warming, health, damage to buildings and materials, and loss of agricultural production.

**Shadow price sources:** Rabl et al (2008), adjusted for inflation.

**Base price applied:**
- €15.98 per tonne waste to landfill
- €25.41 per tonne waste to incineration

**Water usage**
Data consists of water usage in our operations, both purchased and extracted from groundwater wells.

**Shadow price considerations:** water scarcity costs, impacting human health, net agricultural productivity, and environmental deterioration.

**Shadow price sources:** To understand water-related risks and quantify risks in financial terms, Signify used the Water Risk Monetizer tool developed by Ecolab in partnership with Trucost and Microsoft. Signify calculated the societal water price per location of its operations for the coming 10 years, taking into account water scarcity levels and societal implications of water usage in those locations.

**Base price applied:**
- €3.87 per m$^3$ water (on average)

**Social impacts**
This section explains the different metrics that were included to determine our social impact.

**Work-related lost-time injuries**
Lost-time injuries are occurrences where the injured employee is unable to work one or more days. These work-related injuries and illnesses predominantly occur in manufacturing operations and Field Services. All lost-time injury cases are reported for Signify staff and contractors working under the supervision of Signify.

**Shadow price considerations:** Costs of loss of current and future income, medical costs, costs for community, incl. lost revenue, social welfare payments, rehabilitation.

**Shadow price sources:** The cost of work-related injury and illness for Australian employers, workers, and the community, 2012–13, adjusted for inflation.

**Base price applied:**
- €60,866 per work-related lost-time injury

**Work-related fatalities**
Fatalsities are reported for contractors working under the supervision of Signify and all Signify staff.

**Shadow price considerations:** Costs of loss of current and future income, costs for community, incl. lost revenue, social welfare payments.

**Shadow price sources:** The cost of work-related injury and illness for Australian employers, workers, and the community, 2012–13, adjusted for inflation

**Base price applied:**
- €1,655,348.25 per work-related fatality

**Learning and development of employees and entrepreneurs**
Data covers all employees, including temporary employees and is based on the learning and development spend within the organization as registered through our center of excellence. The Signify Learning Center of Expertise.

Moreover, we include the investments made by the Signify Foundation for trainings of entrepreneurs which improves human capital outside our organization.

**Shadow price considerations include:** Personal returns for employees: future wage-increase, due to skill development at Signify. Social returns include: increased productivity and spill-over effects of human capital to others in surroundings.

**Shadow price sources:** Venniker (2000)

**Base price applied:**
- €1.14 per €1 spend on learning and development

**Salaries and wages paid to employees**

**Shadow price considerations:** Enhanced purchasing power positively influences economic environment.

**Base price applied:** Cash transfers to employees
(salaries) are reflected at a ratio of 1:1. We assume that every Euro transferred will be spent and therefore contributes to the (local) economy. Even if not all of the money transferred is spent, the assumption of the 1:1 multiplier is justified due to secondary and tertiary socio-economic ripple effects, caused by cash transfers through enhanced purchasing power.

Financial impacts

Economic impacts quantify the positive financial externalities of Signify. This consists of more than our own net profits, as we contribute to GDP in countries where we operate. Considering our Gross Value Add, Signify considers the following categories to be most relevant due to their direct increase in purchasing power: tax revenues for governments, interest payments to providers of capital (including pensions interest), and shareholder returns to Signify's owners (through dividend payments and share buy-back).

Signify has reflected these contributions at a ratio of 1:1. We assume that every Euro transferred will be spent and therefore contributes to the (local) economy. Even if not all of the money that is transferred gets spent, the assumption of the 1:1 multiplier is justified due to secondary and tertiary socio-economic ripple effects, caused by the cash transfers through enhanced purchasing power.

Sources:
Adjusted price to inflation: http://fxtop.com
Currency converter: https://markets.businessinsider.com/currency-converter/united-states-dollar-euro
Annex A: details on avoided emissions from LED lamps & luminaires

To calculate the avoided emissions from LED lamps & luminaires, the following is determined:

- The number of LED lamps & luminaires sold in a period [LED]
- The global average energy usage per socket for conventional lighting technologies [SOCKET A] and LED lighting technologies [SOCKET B]
  - These are determined by Market Intelligence specialists based on:
    - Quantities sold in reporting year per lighting technology
    - Average annual burn hours per technology, broken down per segment
    - Average wattage per technology, broken per segment
  - Combined, the burn hours and wattage determine electricity usage per socket.
- The energy savings per LED sale are calculated (socket conventional – socket LED) and expressed in TWh
- The global carbon emission factor per TWh is taken from the 2020 IEA [CEF]
- The societal cost of 1 tonne carbon emissions is based on a study from the Environmental Protection Agency [CP]

The following formula is applied to determine the avoided carbon emissions:

\[ [\text{LED}] \times ([\text{SOCKET A} - \text{SOCKET B}]) \times [\text{CEF}] \times [\text{CP}] = \text{societal value through avoided carbon emissions.} \]

Annex B: details on avoided emissions from solar LED

1. **Solar lanterns replacing kerosene lamps**

   In this category, solar LED lantern (the lifeLights) replace kerosene lamps. The methodology described in the GOGLA report is used.

   \[ \text{CO}_2 \text{ savings} = S \times (1 - D_1) \times R \times G \]

<table>
<thead>
<tr>
<th>S</th>
<th>Number of units sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>D_1</td>
<td>3% Discount loss for not in use units</td>
</tr>
<tr>
<td>R</td>
<td>replacement ratio; 1 lantern replaces 1 kerosene lamp</td>
</tr>
<tr>
<td>G</td>
<td>g CO₂ savings per lantern</td>
</tr>
</tbody>
</table>

2. **Streetlighting**

   The second category is solar LED streetlighting in off-grid areas. In calculating the carbon emission savings, the difference is calculated between the zero impact of the solar systems compared to what the same system would use on a grid in that specific country. It is calculated according the methodology described below and in the GOGLA report.

   \[ \text{CO}_2 \text{ savings} = S \times (1 - D_1) \times R \times G \times W / 1000 \times H \times 365 \]

<table>
<thead>
<tr>
<th>S</th>
<th>Number of units sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>D_1</td>
<td>3% Discount loss for not in use units</td>
</tr>
<tr>
<td>R</td>
<td>replacement ratio; 1 solar road light replaces 1 regular grid connected road light</td>
</tr>
<tr>
<td>G</td>
<td>country specific grid mix CO₂ emission factor (g/kWh)</td>
</tr>
<tr>
<td>W</td>
<td>product specific wattage (W)</td>
</tr>
<tr>
<td>H</td>
<td>12 operational hours per day</td>
</tr>
</tbody>
</table>