Methodology for calculating our societal impact

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 is the value creation model. 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.

This document explains the methodology, variables, and assumptions made to determine the impacts of our business activities as depicted in the value creation model that is included under section 3 of our 2018 annual report.

Methodology

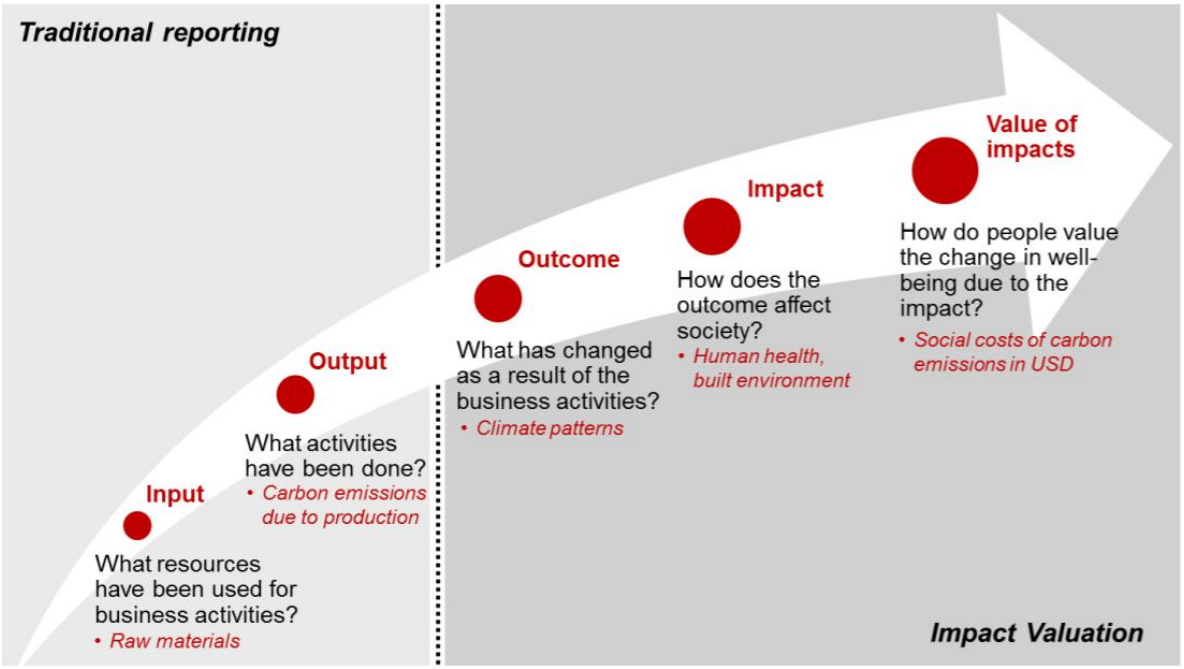
Impact valuation is a way to identify, understand, improve, and demonstrate the value and cost of our business activities on society - such as the *cost to society* of our carbon emissions and the *value to society* of our tax payments.

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.

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.

By publishing the results of our analysis and methodology, context and underlying assumptions are made transparent to our stakeholders. With this document we strive to contribute to developing a global standard for impact analysis, as well as through our active participation in the Impact Valuation Roundtable.



Scope of impact analysis

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

Dimension	Indicator	Summarized consideration	Boundary
Environmental impacts	Carbon emissions	Impact on climate due to emitted greenhouse gas emissions	Own operations
		Impact on climate due to avoided greenhouse gas emissions through our energy efficient LED lamps & luminaires, Solar LED.	Products
	Waste disposal	Impact on environment due to waste disposal	Own operations
	Ecosystem services	Biodiversity and ecosystem services conserved and restored through carbon offsetting program	Own operations
	Water usage	Impact on water scarcity due to water consumption	Own operations
Social impacts	Injuries & fatalities	Impact on workers & communities due to occupational injuries and fatalities	Own operations
	Training of employees	Impact on human capital due to training & development	Own operations
	Salaries & benefits	Impact on economy through remuneration of employees	Own operations
Financial impacts	Interest	Impact on economy through interest payments to suppliers of capital	Own operations
	Taxes	Impact on economy through tax payments in countries where we operate	Own operations
	Shareholder returns	Impact on economy through shareholder returns to shareholders	Own operations

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 CO_2 emissions – is based on direct emissions from our industrial and non-industrial sites in full.
- Scope 2 – indirect CO_2 emissions – is based on indirect emissions from our industrial and non-industrial sites in full.
- Scope 3 – other CO_2 emissions related to activities not owned or controlled by Signify is based on business travel and distribution activities.
- Scope 4 – avoided CO_2 emissions – is based on use of our LED lamps & luminaires, and the resulting reduced electricity consumption compared to conventional lighting.

The CO_2 emissions calculation includes all six Kyoto gasses (CO_2, CH4, N_2O, HFCs, PFCs, and SF_6).

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 (2017)

Base price applied:
€100 per tonne CO_2

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 (2017)

Base price applied:
€100 per tonne CO_2

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:
€2,468 per ha of temperate and boreal forests conserved or restored (Kariba REDD+ project in Zimbabwe)
€12,325 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 (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:
€16 per tonne waste to landfill
€25.45 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:
€4.17 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:
€50,957 per work-related lost-time injury

Work-related fatalities

Fatalities 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:
€1,658,310 per work-related fatality

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

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:
€1.15 per €1 spend on learning & development

Salaries & 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://www.oanda.com

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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 2018 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:

[LED] * ([SOCKET A – SOCKET B]) * [CEF] * [CP] = 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.

CO_2 savings = S x (1 – D_L) x R x G

S		Number of units sold
D_L	3%	Discount loss for not in use units
R	1	replacement ration; 1 lantern replaces 1 kerosene lamp
G	370	g CO_2 savings per lantern

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.

CO_2 savings = S x (1 – D_L) x R x G x W / 1000 x H x 365

S		Number of units sold
D_L	3%	Discount loss for not in use units
R	1	replacement ratio; 1 solar road light replaces 1 regular grid connected road light
G		country specific grid mix CO_2 emission factor (g/kWh)
W		product specific wattage (W)
H	12	operational hours per day