Carbon handprint guide

V. 2.0
Applicable for environmental handprint

PUBLISHER
VTT Technical Research Centre of Finland Ltd
P.O. Box 1000
FI-02044 VTT, Finland
Tel. +358 20 722 111

AUTHORS:

Tiina Pajula, Saija Vatanen, Katri Behm
VTT Technical Research Centre of Finland Ltd
P.O. Box 1000, FI-02044 VTT
Finland

Kaisa Grönman, Laura Lakanen, Heli Kasurinen, Risto Soukka
LUT University
P.O. Box 20, FI-53851 Lappeenranta
Finland

Layout: Sari Halme

Carbon handprint guide

V. 2.0

Applicable for environmental handprint

Foreword

Climate change is one of the greatest challenges of our time. At the same time, we have multiple other environmental issues at hand, such as the responsible use of resources.

Since the publication of the Carbon Handprint Guide in 2018, the research work has continued to extend the applicability of the framework to incorporate other positive environmental impacts in addition to greenhouse gases. Examples used in the development of the methodology have covered water, nutrient, air quality and resource handprint calculations. Moreover, we have discussed how to address environmental handprints at organization and project levels.

This revised version of the Carbon handprint guide has been developed by a team of researchers at VTT Technical Research Centre of Finland Ltd and LUT University. This would not have been possible without committed partners, professional invited experts and other stakeholders actively attending workshops and providing valuable contributions to the development of the framework. We would like to highly acknowledge all of you!

Contents

Glossary

Baseline	A reference case that best represents the conditions most likely to occur in the absence of an offered solution. A product, a service or a product chain which delivers the same function(s) to the user as the offered solution and is used for the same purpose(s) by the users(s) within a specific time period and region. The offered solution is compared to the baseline with respect to its footprint.
Carbon footprint	The sum of GHG emissions and removals in a product system expressed as CO_2 eq. and based on an LCA using the single impact category for climate change (ISO 14067).
Carbon handprint	An indicator of the climate change mitigation potential. Describes the GHG emission reduction in a user's activities that occurs when the user replaces a baseline solution with the offered solution.
Communication unit	A clearly understandable, informative, and representative unit of reference with which a handprint result can be communicated to the user or the public.
Critical review	A review of an LCA, footprint or handprint study by an independent third party not involved in the study to ensure consistency between the study and the principles and requirements of LCA (ISO 14044), i.e. to verify the calculation and the results.
Environmental handprint	An umbrella concept incorporating various positive environmental impacts. In this guide an environmental handprint refers to positive changes in the carbon footprint, air quality, resource use as well as water and nutrient uses.
Footprint	An LCA-based metric that describes the potential negative environmental impacts of a product system. Limited to a specific environmental theme or impact category. For example, carbon footprint (climate change impacts) (ISO 14067) or water footprint (water-related impacts) (ISO 14046).

Handprint	An LCA-based metric that describes the potential positive environmental impacts of a user's activities achieved by replacing a baseline product or service with the offered solution or improving environmental performance of the existing baseline system.
Handprint contributor	Mechanisms by which the environmental footprint of a user can be reduced and, thereby, generating a handprint.
Offered solution	A product or service with positive environmental impact potential used as an alternative to a baseline product or service or as a provider of improved environmental performance to a baseline.
Life cycle assessment, LCA	A methodology to quantify and assess the inputs, outputs, and potential environmental impacts of a product system throughout its life cycle (ISO 14040; ISO 14067).
Product or service	In this guide, the term product or service is used to broadly mean raw materials, components, fuels, technologies, processes, products or services, product and service portfolios, as well as projects, for example.
Product system	A model of the life cycle of a product; consists of unit processes and their flows and performs (a) specific function(s) (ISO 14040).
Project handprint	The potential environmental benefits of a project, a non-recurrent activity aiming to achieve the preferred outcome in a defined time frame.
Provider (of an offered product or service)	The organization that is providing, producing, or enabling the offered product or service to be used by others and thus potentially reducing their footprint. If the footprint reduction is realized the provider receives an equal size handprint through its offering.
User or beneficiary	User of the offered and baseline product or service. Can be a direct customer of a company or other relevant stakeholder benefitting from the offered solution. Can be a known or a potential user or beneficiary.

1. Introduction

For many companies and organizations the day-to-day challenge of reducing their environmental footprint—using resources more efficiently and minimizing emissions and waste – is already business as usual. Some, though, have gone beyond this and are developing products, services and technologies that also reduce the environmental impacts of their customers. The need to calculate and communicate these positive environmental benefits is clear, yet there has been a lack of effective methods of achieving this.

Environmental impacts are typically assessed by measuring and modelling the negative effects that products, services, and organizations cause to the environment. In practice, this means evaluating the used resources and the energy and emissions caused. To ensure the optimization of overall environmental performance, life-cycle-thinking-based methods are widely implemented. These assessment practices are thoroughly guided by the ISO standards for life cycle assessments (ISO 14040-44: 2006), the carbon footprint (ISO 14067: 2018) and the water footprint (ISO 14046: 2014). However, a life cycle assessment in its current form does not assess positive environmental impacts. Some industries, individual companies, and initiatives have introduced handprints to communicate the environmental benefits of their actions. Yet these approaches differ in their principles making accountability difficult. Moreover, the wider the scope is (including environmental, social, and economic aspects), the more challenging the quantification becomes.

VTT Technical Research Centre of Finland Ltd and LUT University have developed an approach for quantifying the environmental handprint based on standardized methods. Determining a quantification procedure for a carbon handprint was a logic start to aim for a systematic and grounded approach. The carbon handprint work was conducted in cooperation with 10 industrial partners representing different business areas and products and has thus benefitted from insider understanding of the varying requirements that arise from diverse operating environments. In the follow-up process another 16 companies provided insights and case studies representing various sectors. Similarities between different cases have been identified leading to the creation of a framework that helps to define baselines and take the required calculation steps. This step-by-step guide directs you through the process of assessing and communicating the carbon or other environmental handprint of a product or a service in line with life cycle assessment and footprint methods.

To learn more about the environmental handprint approach, please take a look at the final report of the Environmental Handprint project.

2. **What is** a handprint?

A handprint refers to the beneficial environmental impacts that organisations can achieve and communicate by offering products and services that reduce the footprints of others.

A carbon handprint is the reduction of the carbon footprint of others.

In contrast to an environmental footprint, which refers to the negative environmental impacts caused throughout the life cycle of a product or service, the term handprint represents the positive environmental impacts.

Moreover, a footprint is equal to the absolute emissions, whereas the size of a handprint varies based on the context and refers to a difference between two solutions. Thus the handprint approach is built on the principle that reducing one's own footprint is not a handprint. Instead, a handprint is achieved by improving the performance of others – by reducing their footprint. The handprint of a product or service is achieved by comparing the footprint of the baseline with that of the offered solution when used. The rules for defining the baseline against which the positive impact can be assessed create another fundamental basis of the handprint approach.

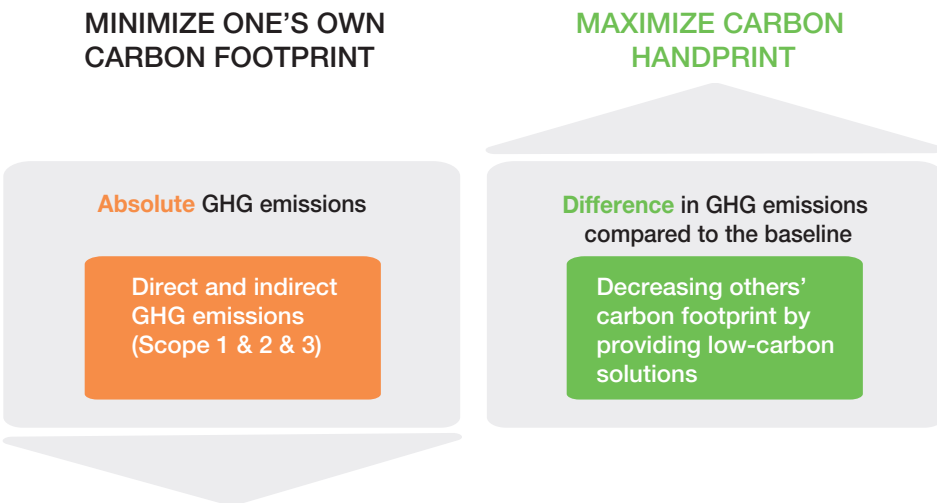

Figure 1. A footprint and handprint are separate measurements. Set targets for both: minimizing the footprint and maximizing the handprint.

A carbon handprint is the reduction of the carbon footprint of others. Similarly, footprints and handprints may address other environmental aspects and impacts related to resource use or environmental emissions.

With the footprint concept the goal is simple – to get the footprint to close to zero; but with handprints there is essentially no limit to the positive impacts that can be achieved. It is important to set targets for both: aiming to enlarge the handprint while minimizing the footprint.

3. **What generates** a handprint?

A number of different mechanisms can contribute to a handprint. For a carbon handprint these contributors are typically more efficient material and energy use, replacing or avoiding unwanted materials, reducing waste, extending service life and reuse – or any combination of these. Carbon capture and storage may also be of growing importance as a carbon handprint contributor.

Less GHG intensive material use

Material use
Replacing non-renewable or GHG intensive materials / Avoiding material use / Increasing material-use efficiency

Less GHG intensive energy use

Energy use
Replacing non-renewable or GHG intensive energy and fuels / Avoiding energy use / Increasing energy efficiency

Increased lifetime and performance

Lifetime and performance
Lengthening the lifetime of a product / Enabling the performance improvement of a product / Efficient use of side streams

Reduced waste and losses

Waste
Reducing waste and losses / Contributing to recycling, reuse, and remanufacture

Increased carbon capture and storage

Carbon capture and storage
Contributing to GHG sinks through land-use change / Removal of carbon into biomass / Storing of carbon into products

A handprint can be created either by offering a solution with a lower footprint than the baseline solution (representing the turquoise bar in the offered solution in Figure 2) or by helping the user to reduce the footprint of their processes (representing the green bar in Figure 2), or both. An example could be a food packaging solution that is produced with low emissions and that additionally helps to extend the food's shelf life compared to the baseline packaging, thus preventing food waste.

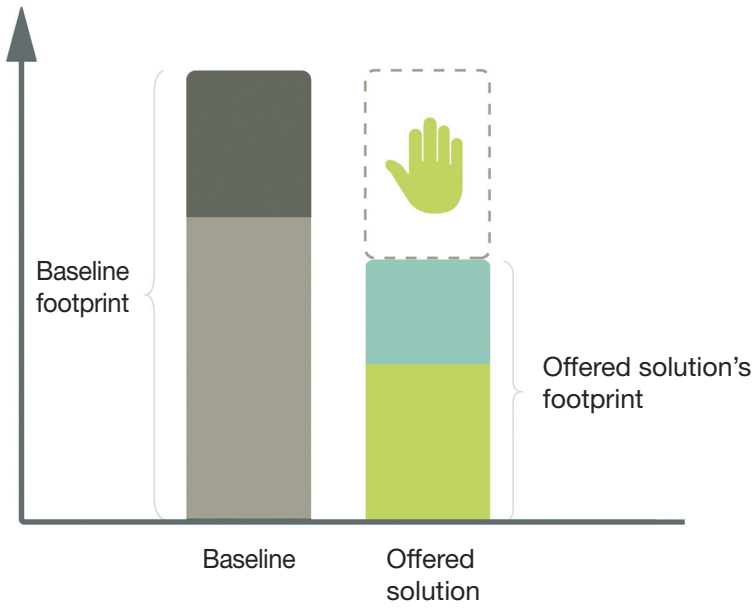

Figure 2. A handprint can be created by offering solutions with a lower footprint in comparison to the solutions used in the baseline or by helping the user to reduce the footprint of their processes.

4. What is a handprint **used for?**

As mentioned above, the goal of handprinting is to assess the positive impacts that would be achieved when an offered product or service is used by a known or potential user. A handprint can be used for

- environmental strategies based on facts and science
- identification of improvement potential
- product and production development
- comparison of alternative raw materials, technologies, and business solutions
- ensuring and planning for compliance with future regulations
- marketing and communication
- supporting political decision-making
- supporting decision-making of customers and other stakeholders.

The intended audience is typically a potential customer (a company (B2B) or consumer (B2C)) but can be any interested party, such as other organizations and industries, political decision makers and communities.

As said, a handprint is not only beneficial for communications; it also enables the identification of potential development needs. The assessment process can even reveal whether no handprint would be created with the current product characteristics when compared to the other parties and options involved in the examined market. This would be valuable information for product developers aiming to meet future sustainability expectations.

5. **Who can calculate** handprints?

Quantification of the handprint is based on footprint calculations complying with a life cycle assessment (LCA) methodology. Expertise in LCA and a thorough knowledge of the relevant ISO standards (14040-44, 14046, 14067, 14026) is therefore a necessity.

Additionally, to understand the context and to set the baseline, experts acquainted with the product or service, the considered application, and the examined market must be involved in the study.

6. **Step-by-step guide** to handprint calculation

Some additional steps have been added to the handprint framework in comparison to the earlier carbon handprint framework in order to cover other environmental aspects as well as organizational and project handprint approaches.

The handprint calculation process consists of four stages and 13 steps and is closely based on the LCA method. In the first stage, which is specific to handprint calculation, the conditions of the examined context are identified in order to set a baseline against which a potential handprint can be created. This stage is followed by typical LCA steps and standard footprint calculations. Finally, the communication part is implemented according to the intended audience.

As with LCA in general, handprint quantification is essentially an iterative process: the findings of a subsequent step may require the updating of prior steps. The comprehensive environmental handprint framework presented in Figures 3 and 4 can be used as a guiding template for handprint quantification process.

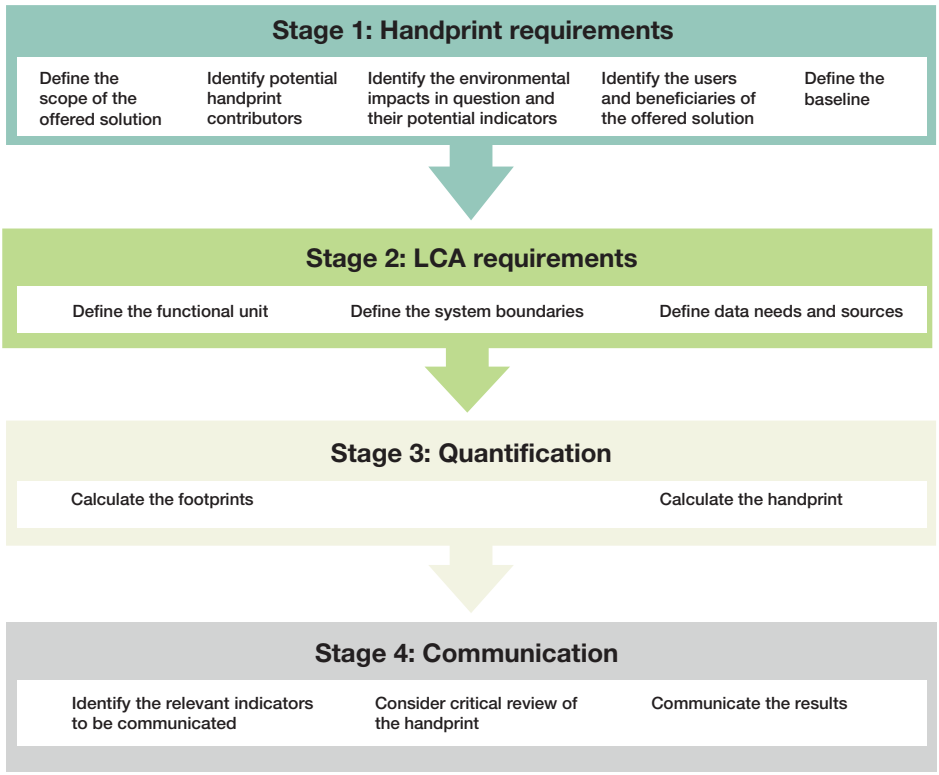

Figure 3. Stages and steps of the handprint approach.

Stage 1	**Define the scope of the offered solution**	**Product** (goods, service, material, component)		**Organization** (product or service portfolio)		**Project** (a non-recurrent activity to reach the preferred outcome in a defined time frame)
	Identify potential handprint contributors	Description, how the offered solution may achieve footprint reductions				
	Identify the environmental impacts in question and their potential indicators	**Climate change** GHG emissions	**Resources** e.g. ADP (elements and fossil fuels), cumulative energy demand	**Water** e.g. scarcity, eutrophication, acidification, toxicity	**Nutrients** N/P/K balance and eutrophication, in addition e.g. toxicity, acidification	**Air quality** e.g. PM_{10}, $PM_{2.5}$, NO_x, SO_2, VOC, health impacts, POCP
	Identify the users and beneficiaries of the offered solution	Identify potential or actual customers or other parties that may benefit from the offered solution				
	Define the baseline	Reference case that best represents the conditions (most likely) to occur in the absence of the offered solution				
Stage 2	**Define the functional unit**	The measure of the function the offered solution delivers in a relevant time frame in use				
	Define the system boundaries	The relevant and similar life cycle stages of the offered and the baseline solution				
	Define data needs and sources	Identifying representative and accessible data of the offered and the baseline solution representing the similar geographical and time-related coverage				
Stage 3	**Calculate the footprints**	Calculate footprints of the offered and the baseline solution based on relevant ISO-standards where applicable				
	Calculate the handprint	Difference of the footprints calculated				
Stage 4	**Identify the relevant indicators to be communicated**	Confirmation of the most relevant indicators that accurately and justly represent the results and should thus be communicated				
	Consider critical review of the handprint	Recommended in B2C communications, and mandatory if the results are intended for comparative assertions to be disclosed to the public as instructed in the ISO standards 14044 and 14026				
	Communicate the results	Communicating the results respecting appropriateness, clarity, credibility, and transparency				

Figure 4. The environmental handprint framework.

Stage 1: Handprint requirements

Step 1: Define the scope of the offered product or service

The offered product or service refers to a raw material, component, fuel, technology, process, product (portfolio), service (portfolio), investment, or project that can replace the baseline solution and may create environmental benefits. While the carbon handprint approach was originally developed for products, the benefits of the life cycle approach may be extended to the broader prospect of organizational assessment as well to cover the benefits of projects. In this step the scope of the offered product or service is defined and described accurately. The provider of the offered solution, whether the solution is

- a product or service,
- a project that can improve the state of the environment,
- or portfolio of offerings in a company,

receives the handprint as an actor enabling a change for the better.

Project handprint can be assessed beforehand or after a project, referred as pre- and post-project perspective. Assessment of the project handprint before implementing a project might be important for example, when evaluating investment decisions. However, sometimes project's environmental benefits can be assessed not until the end of a project. In any case, monitoring of the project is an essential part of the project for verifying results and for seeing, how set goals have been reached.

Step 2: Identify potential handprint contributors

Contrary to the carbon footprint, which represents the absolute sum of GHG emissions and removals in a product system (expressed as CO_2 equivalents), a carbon handprint refers to a change that will result in a beneficial climate impact. The aim of this step is to identify the hypothetical benefits the product or service or project may create. How will the product or service contribute to reducing its users' carbon footprint? Figure 5 introduces various means by which a carbon footprint can be reduced and may help to identify the potential pros and cons of the product.

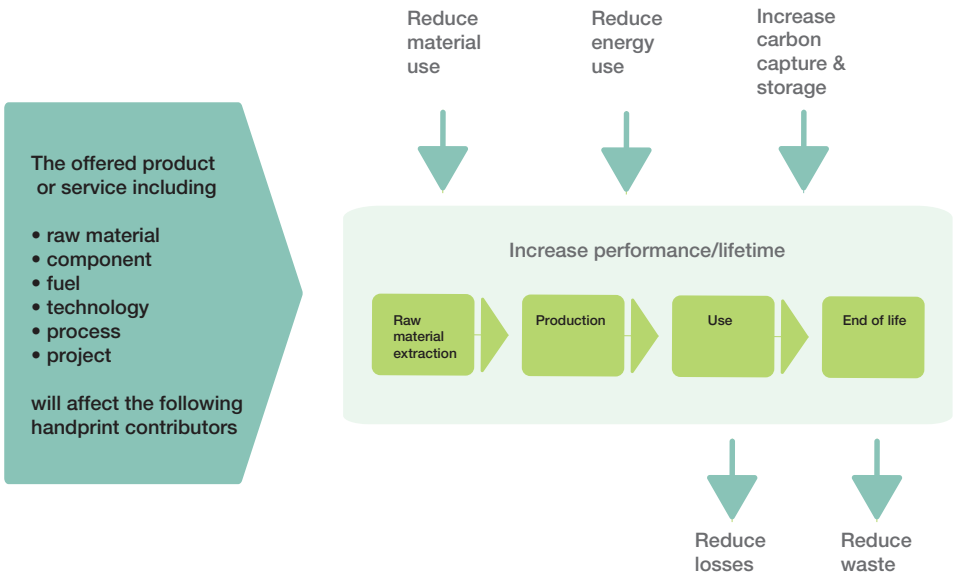

Figure 5. Main carbon handprint contributors.

Similarly, regarding other environmental aspects, the aim of this step is to identify, how the offered product or service will generate environmental benefits by identifying the potential mechanisms that may result in footprint reduction compared to the baseline solution.

A water handprint aims to communicate positive changes related to water scarcity or water quality. If primary water consumption is reduced or fewer discharges are released into water, a handprint may be created. For example, a water purification technology that removes impurities from process water and enables increased water circulation in the process reduces the freshwater intake and creates a water scarcity handprint. If the same technology purifies e.g. nitrogen compounds from the wastewater streams released into the environment, a water quality handprint in the form of a eutrophication handprint may be created.

Mechanisms that improve the efficient use of nutrient resources or change the quality of nutrient inputs or outputs may contribute to creating a nutrient handprint. Contributors can be, for example, an increase in the use of recycled nutrients, a decrease in the use of virgin nutrients, and enhanced nutrient recycling or reduced nutrient losses in the system under consideration. Nutrient cycles can be positively affected, for example, by introducing novel sources of recycled nutrients and novel output nutrient utilization opportunities.

An air quality handprint is related to the reduction of substances such as PM, O_3, NO_x and SO_2. As combustion processes are the main source of air pollutants, efforts to avoid and reduce fuels that release air pollutants are key in creating an air quality handprint. In addition, preventing emissions from occurring by prioritizing renewable energy, energy efficiency, waste prevention, non-motorized transport, etc. can contribute towards an air quality handprint.

The most indicative LCA based measures regarding resource use are the abiotic depletion potential (for elements), abiotic depletion potential (fossil fuels), the cumulative energy demand, and the carbon footprint. Any mechanism that would reduce these will contribute to a resource handprint. Technologies with improved energy efficiency in the use stage, products made from recycled or renewable materials instead of fossil-based ones or the remanufacturing of products might have a resource handprint.

The process of quantifying a handprint is time and resource intensive. It is recommended to do some screening before starting the full process. Often more than one factor will change, making it difficult to estimate the overall effect at a glance. To gain a better understanding of the potential handprint, a preliminary assessment and screening of possible factors contributing to the footprint can be carried out. This can be done using rough data and modelling. Alternatively, an expert panel consisting of industrial and sustainability experts can be called together to discuss and evaluate possible footprint reduction pathways. Only a full handprint quantification will show whether the selected product or service will have a handprint in reality. The hypothesis is important, however, in order to define a properly grounded baseline and product system boundaries, as described in the steps below.

Step 3: Identify the environmental impacts in question and their potential indicators

Environmental impacts relevant for the studied context are identified and related indicators defined. The proposed indicators for some environmental impacts can be found in the environmental handprint framework (Figure 4). For example, when assessing the potential water handprint, aspects such as scarcity, eutrophication, acidification, and toxicity could be evaluated. Not all the impacts and indicators are relevant in every case, and in some cases, there might be several relevant impact categories and indicators. Relevant indicators are chosen based on previously identified handprint contributors in Step 2. As an exception, in the nutrient handprint assessment the proposed indicators can be regarded as obligatory in order to reveal the full picture of the nutrient handprint.

Step 4: Identify users and beneficiaries of the offered solution

A handprint is always quantified for a specific situation and user. Without a user for the examined product or service, no handprint can be created. Therefore, a step to identify potential users of the offered product or service is needed, here referred to as users or beneficiaries. There may be multiple ways of applying the product or service, and the environmental impact will differ also depending on the geographical market. The user or beneficiary may be a company, a consumer, or for example society.

Step 5: Define the baseline

To be able to quantify the amount of reduced resource use or emissions, a baseline must be determined as a point of comparison. The baseline refers to the alternative or current solution in place that delivers the same functions as the product or service being offered. Thus, the baseline can be referred as the reference case that best represents the conditions most likely to occur in the absence of an offered solution (modified from ISO 14064-2). If the product or service is a completely new innovation it may deliver functions not comparable to any currently available outcomes.

Unless the product is new on the market, the baseline and the offered solution should both

- deliver the same function
- be used for the same purpose
- be available on the market and used in a defined time period and geographic region
- be assessed in a consistent manner (in terms of data quality, representativeness, conservativeness, system boundaries, and assumptions).

The selection of the baseline will clearly have a major impact on the handprint result: choosing a “worst possible” baseline with a poor environmental performance will increase the handprint significantly. The baseline definition must, therefore, be well grounded and transparently reported.

Two fundamental questions affect the baseline. The first is whether the product or service that will presumably create a handprint is replacing another product or is new to the market. If the product or service is new, a comparison will need to be made between the current situation with and without the new product or service. If, instead, the product or service replaces another product or service, this leads to the second fundamental question: Is the offered product or service targeted to a specific and identified user or beneficiary?

If the user of the product or service is known, the baseline, i.e. the current product or service to be replaced, can be precisely identified. However, if the product or service is released onto the market with a range of potential users in mind, a number of different baselines will need to be considered. If a particular product or service can be clearly identified as the market leader, this should be used as the baseline product. For example, shopping bags made of a renewable raw material (potentially creating a handprint) offer a clear replacement for the plastic bags currently used in shops and supermarkets (the baseline). However, sometimes it is not possible to single out one type of product or service from the market as the obvious replaceable product. For example, the environmental performance of currently used traffic fuels varies considerably. If a new type of fuel is introduced it is essentially impossible to identify an exact fuel type that it will replace. In such cases, the average should be taken from all options and used as the baseline. A third option is to use the available product specifications, standards or BREF specifications as baselines. This would be justified in cases where the business-as-usual technologies are plentiful and data on competitors is hard to attain. The baseline situation may also be a combination of multiple baseline products to be replaced if the offered solution is a multi-functional product.

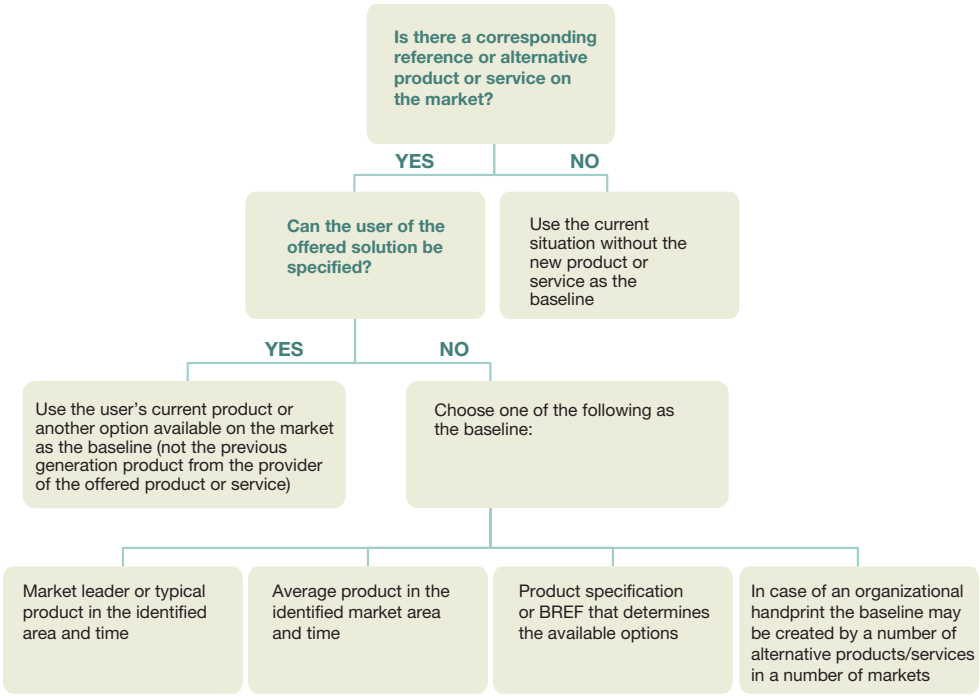

Figure 6. The baseline determination procedure.

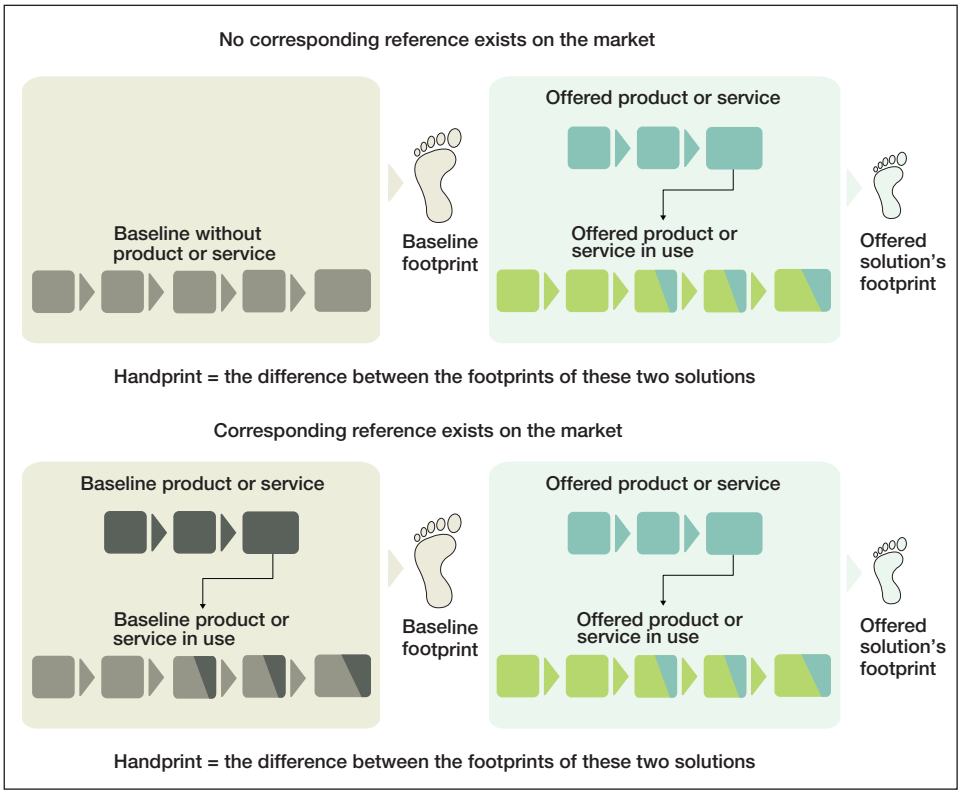

Figure 7. The offered product or service provider receives a handprint equivalent to the achieved footprint reduction. In the upper case no corresponding reference or alternative product or service exist on the market.

Stage 2: LCA requirements

This stage is based on the standard LCA procedure and other relevant requirements like carbon or water footprinting in accordance with ISO 14040-44 and ISO 14046 or 14067.

Step 6: Define the functional unit

The functional unit serves as the basis for quantifying the performance of the studied product system. The primary purpose of a functional unit is to provide a reference to which resource use or emissions are related (e.g. 1 kg of product, annual output, 1kg*km, etc.). This reference is necessary to ensure the comparability of the offered solution to the baseline. A system may have a number of possible functions. The one selected for a study depends on the application and what the product or service is used for. More information about defining the functional unit can be found in ISO 14040-44.

Step 7: Define the system boundaries

The system boundary defines the unit processes to be included in the system. Ideally, the product or service system should be modelled in such a manner that inputs and outputs at its boundaries are elementary flows (drawn from the environment and released into the environment). However, the exclusion of life-cycle stages, processes, inputs, or outputs within the system under study is permitted if they do not significantly change the overall conclusions of the study. The selection of the system boundaries has to be consistent with the goal of the study and equal in baseline and offered solutions. When assessing the handprint of an organization typically the baseline system includes all relevant products or services that the offered solution can replace in its market.

The criteria used in establishing the system boundaries should be explained. In the handprint approach it is a necessity to include the product use stage (intended user application) in the system. Furthermore, in most cases the end-of-life stage has an influence on the overall conclusions and needs to be included. Setting the system boundaries is elaborated in ISO 14040-44, 14046 and 14067.

Step 8: Define data needs and sources

After setting the system boundaries the data needs are identified and data is collected. In handprinting, there are two types of premises: the actual user is known, or the user cannot be determined but potential users or beneficiaries can be identified. If the user can be specified, the most recent primary data should be applied as broadly as possible. If not, statistical or average data must be relied upon.

Data on the main handprint contributors must reflect an actual existing operating environment in both the baseline and offered solution. Furthermore, the data for the baseline and offered solution require the same timeframe. Where the resource use, emissions, and removals associated with specific unit processes vary over time, data must be collected over an appropriate time period to establish the average resource use, emissions, and removals associated with the life cycle of the product.

The data used should be representative in terms of geographical and time-related coverage, as well as being precise and complete, as determined in ISO 14040-44, 14046 and 14067. However, whereas in footprint calculations the time horizon is typically applied retrospectively, in the handprint approach potential near-future implications are assessed prospectively.

Stage 3: Quantification of the handprint

Step 9: Calculate the footprints

Using equal functional units; the indicators or emissions over the life cycle of the two systems are calculated. Each indicator identified relevant earlier, in defining the scope, are counted separately. In case of carbon or water footprints the corresponding ISO standards apply (ISO 14067 or 14046).

The nutrient footprint consists of the nutrient footprint profile, which is a compilation of indicator values that always include the four nutrient balance indicators (virgin and recycled inputs, lost and continuing outputs) and eutrophication potential in the baseline and offered solution. Optionally, a nutrient footprint further includes other environmental impact indicator values if they are relevant to the specific case.

Step 10: Calculate the handprint

Whether the offered product or service will achieve a handprint is revealed by comparing the footprints of the two solutions. The handprint is created if the footprint is smaller when applying the offered solution than it is when using the baseline product or service, as expressed by the following equation:

$$Handprint_{Product,\ service} = Footprint_{Baseline} - Footprint_{Offered\ solution}$$

where

$Handprint_{Product,\ service}$ = Handprint of the offered product or service in use

$Footprint_{Baseline}$ = Footprint of the baseline

$Footprint_{Offered\ solution}$ = Footprint of the offered product or service in use

---

The handprint is equal to the footprint reduction that the user of the offered product or service attains (Figure 2). The product or service that enables the footprint reduction and its producer gets a handprint.

Stage 4: Communication

Step 11: Identify the relevant indicators to be communicated

The aim of this step is to confirm the most relevant indicators that accurately and justly represent the results and should thus be communicated. The indicators should represent the real situation of the assessment and indicators with possibly negative changes should also be transparently communicated.

Step 12: Critical review of the handprint

A handprint communication may be intended for business-to-business or business-to-consumer communication. ISO Standard 14040-44 on LCA requires a critical review if the study is intended to be used for a comparative assertion intended to be disclosed to the public. ISO 14026 on the communication of footprint information has requirements on comparative footprints respectively. To be in line with these requirements, a critical review is strongly recommended when the handprint communications are used for business-to-consumer communication and the handprint quantification is based on a comparative footprint relative to another organization's products.

A critical review is a helpful way to verify the calculation process and results and is recommended to be considered in all situations. To keep the procedure leaner, an independent reviewer may also be internal to the organization that conducted the handprint study, for example in the case of business-to-business communications.

Step 13: Communicate the result

A company has its handprint endorsed once a customer utilizes their product instead of the baseline solution. Thus, among other purposes, the handprint functions as a marketing and communications tool. For a customer, the possibility of reducing their footprint can prove to be a considerable sales argument.

At this point, an appropriate communication unit needs to be selected. For example, the basic measure of a carbon handprint are carbon dioxide equivalents. However, an informative and representative reference unit may be something other than the functional unit used in the calculations. For instance, in the case of calculating the carbon handprint of a fuel, a reasonable functional unit would be based on the fuel properties (e.g. energy content). However, mileage may be a more informative unit of communication for the customers actually using the fuel.

The questions that should be considered when planning and preparing the handprint communication are listed below. They are based on basic principles of environmental communication such as those presented in ISO 14026 and 14063. Information that is necessary to communicate is marked with *****.

Whenever making claims about positive environmental impacts based on a handprint assessment, it is important to make it understandable to the target audience and present it together with the information that is needed for the correct interpretation of the result. Additional information should be provided to interested parties upon request.

Checklist for planning and preparing the handprint communication

Appropriateness

- Is the intended audience familiar with the offered product or service and the value chain in question?
- Is the intended audience familiar with the life cycle assessment method or the footprint concept?
- Is the intended audience familiar with the handprint concept?

Clarity

- **What is the quantity and unit of the calculated handprint? ***
- **What is the baseline scenario? ***
- Who are the users or beneficiaries of the offered solution?
- **What are the main contributors to the handprint (or mechanisms behind emission or resource use reduction)? ***
- **What year does the data and/or most important assumptions apply to? ***
- **What geographical area does the result directly or potentially apply to? ***
- In which parts of the life cycle does the handprint (emission or resource use reduction) take place?
- How significant is the handprint within the offered solution provider's product portfolio?

Credibility

- Which methods, guidelines and standards were used for the assessment?
- Who was responsible for conducting the assessment?
- Has the study been critically reviewed?

Transparency

- Is the original study available to the public?
- Do you have a result report that can be made publicly available or shared with interested stakeholders upon request?
- **How can/will additional information be provided to interested parties? ***

Information that is necessary to communicate is marked with *.

References

ISO 14026:2017 Environmental labels and declarations. Principles, requirements and guidelines for Communication of footprint information.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and framework.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

ISO 14046:2014 Environmental management. Water footprint. Principles, requirements and guidelines.

ISO 14063:2020 Environmental Management. Environmental Communication. Guidelines and examples.

ISO 14064-2: 2019 Greenhouse gases. Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.

ISO 14067:2018 Greenhouse gases. Carbon footprint of products. Requirements and guidelines for quantification and communication.

Climate change is one of the critical challenges of our age and carbon footprint calculation has emerged as a standard method of estimating the global warming potential of products. In addition to climate change, environmental impacts related to resource use and emissions other than greenhouse gases require attention as well. Shifting the thinking from negative to positive – from producers to reducers of emission and resource use – is an additional key to solving these pressing challenges.

The handprint approach offers a new way of quantifying the environmental benefits of products and services. This guidebook presents step-by-step guidance on how to calculate and communicate a handprint – the positive environmental impact that a product or a service can create.

Handprints can be used by organizations to communicate the environmental benefits of their products, services and technologies. Handprints also provide valuable support for product development as well as political and strategic decision making when aiming for environmentally sustainable solutions.

The Carbon handprint guide v. 2.0 is the updated edition of the previous version of the guide published in 2018. Now, the handprint approach is applicable to other environmental impacts than climate change too. Furthermore, environmental handprints can be addressed now at organization and project levels in addition to the product level.