



Environmental  
**HANDPRINT**

**VTT**

 **LUT**  
University

# **HANDPRINT**

## **Method and guide**

*Heli Kasurinen*  
*LUT University*

# HANDPRINT indicates *positive* impacts



Sustainability as usual



Cleantech: method for the good we do for others



### Carbon handprint



### Environmental handprint





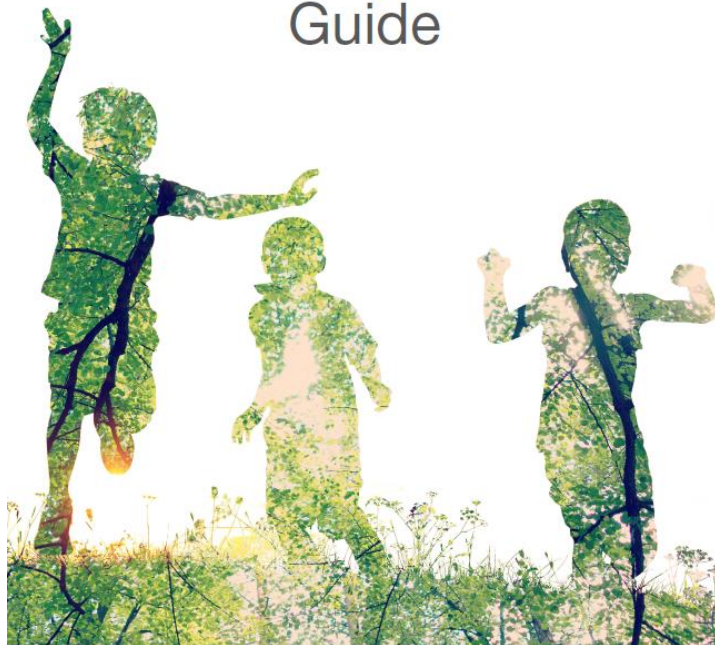
**A handprint** refers to the beneficial environmental impacts that organizations can achieve and communicate by providing products that reduce the footprints of customers.

**A carbon handprint** is the reduction of the carbon footprint of a customer or customers.





# Carbon Handprint Guide



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P.O. Box 1000  
FI-02044 VTT, Finland  
Tel. +358 20 722 111

**AUTHORS:**

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

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

LAYOUT: Sari Halme





## Identification of the operating environment

Identify customers  
of the product

Identify potential carbon  
handprint contributors

Define the  
baseline



Environmental  
**HANDPRINT**

# Carbon handprint contributors

20/10/2020



Less GHG intensive  
material use

## Material use:

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



Less GHG intensive  
energy use

## Energy use:

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



Increased lifetime  
and performance

## Lifetime and performance:

Lengthening the lifetime of a product / Enabling the  
performance improvement of a product



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



## Identification of the operating environment

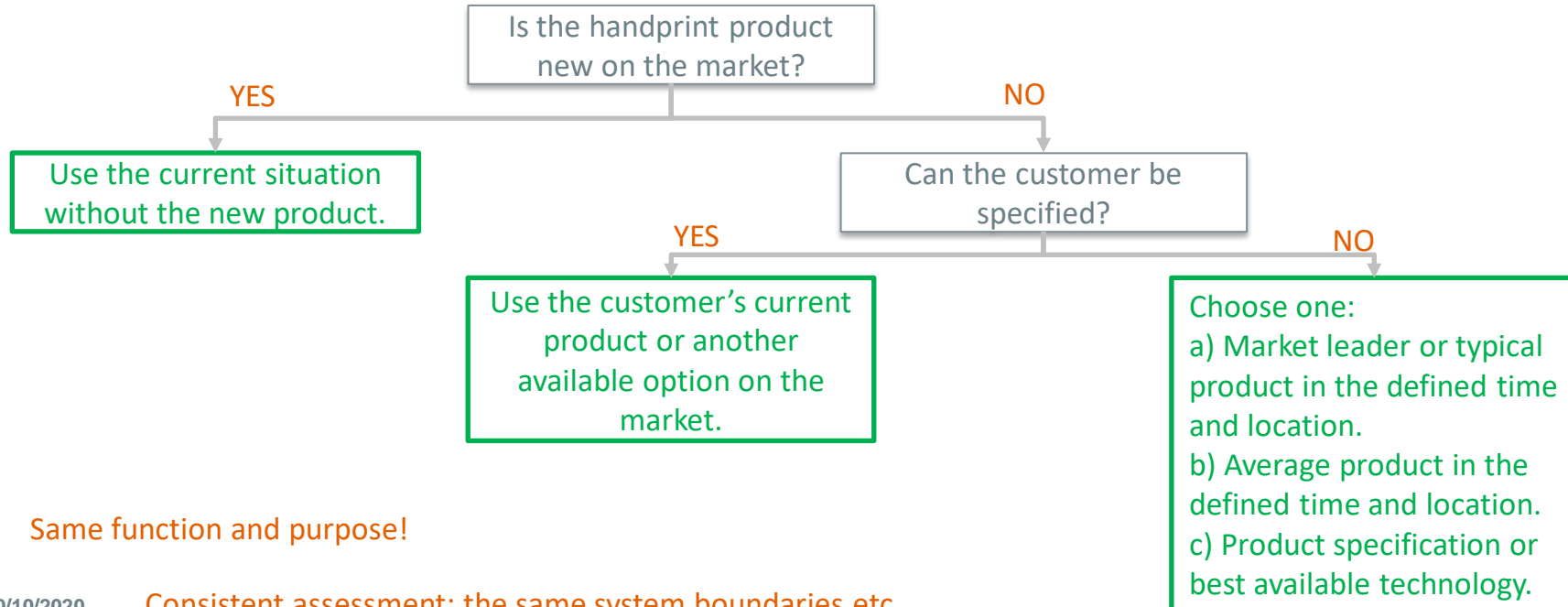
Identify customers  
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Identify potential carbon  
handprint contributors

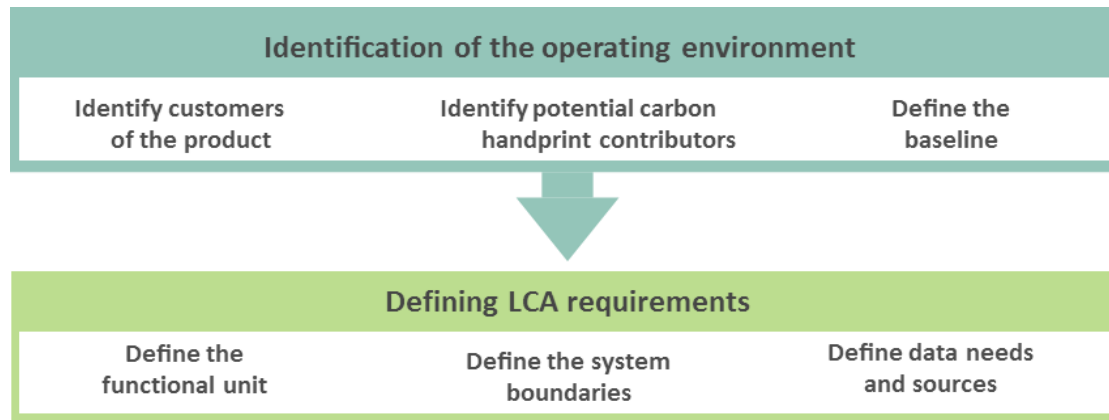
Define the  
baseline

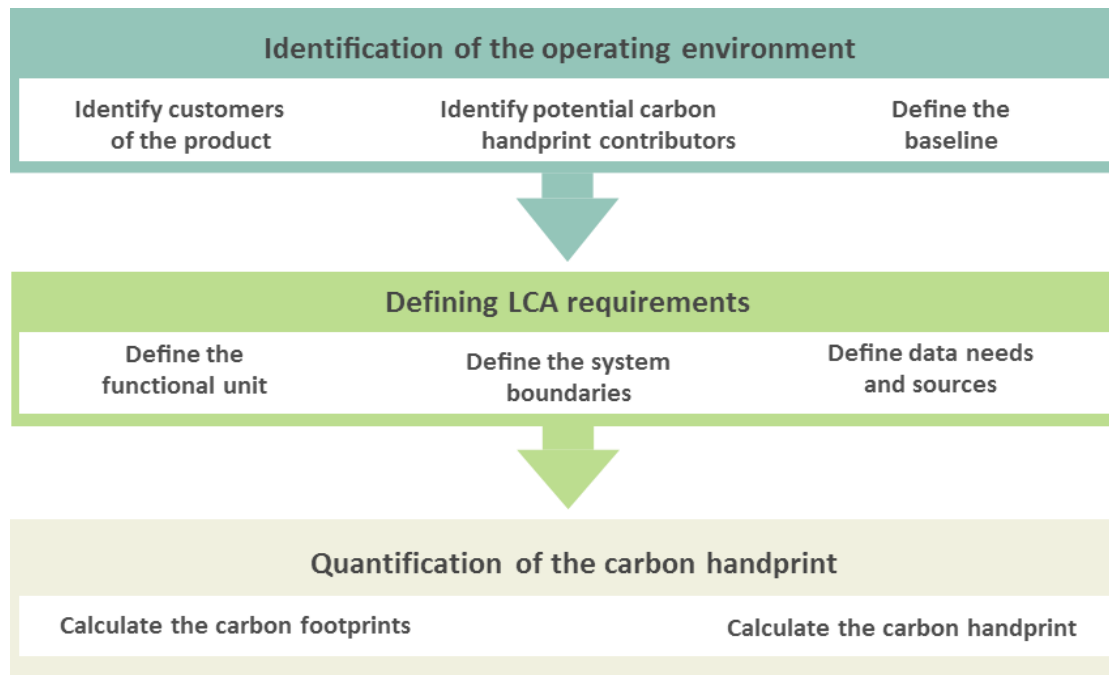


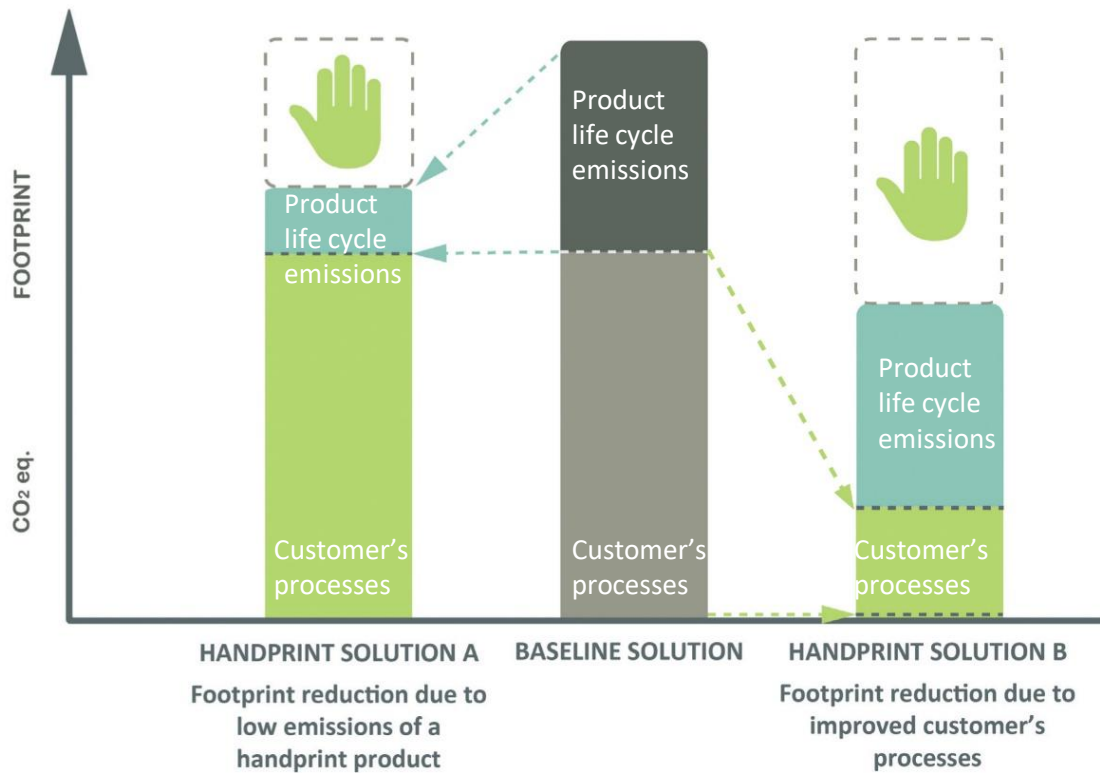
# Baseline product significantly affects the results - how to define baseline?

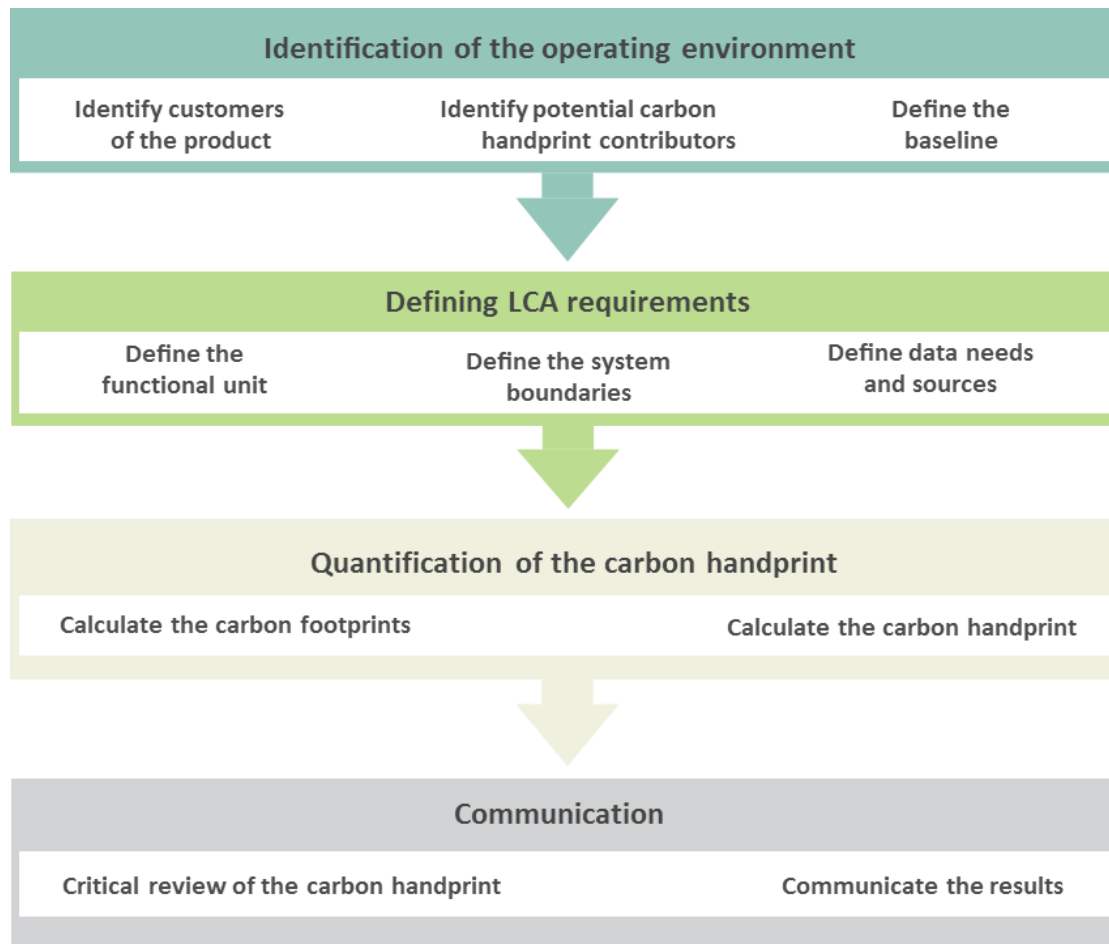


Same function and purpose!

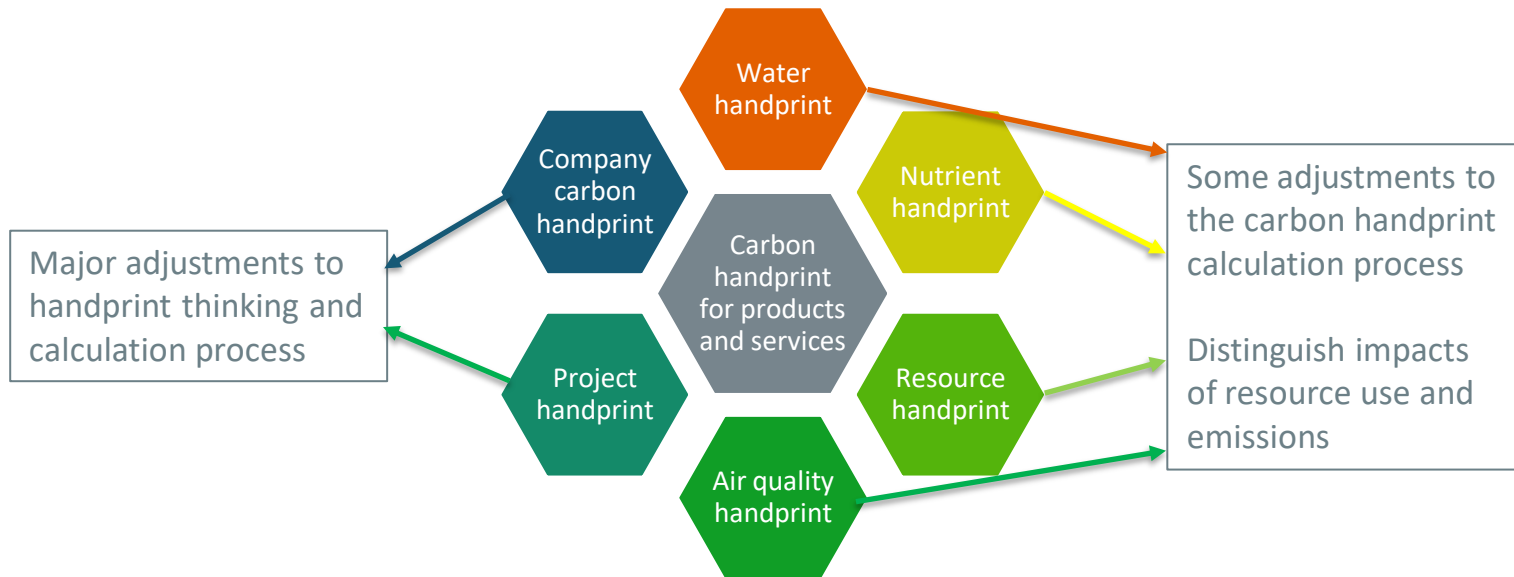








# From carbon handprint to other environmental handprints



## How to use handprint?

- Market, communicate
- Develop, customize, rethink
- Strategic decisions for environmentally friendly solutions

→ *Positive mindset:  
all the good we can do for the environment*





**Thank you!**

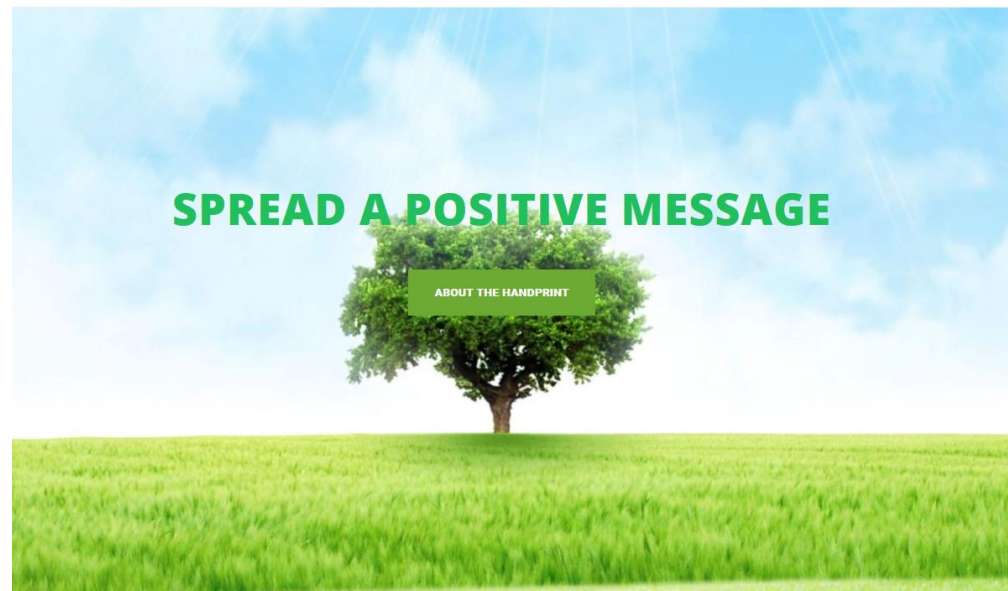


**Further reading**

# Project website **Handprint**

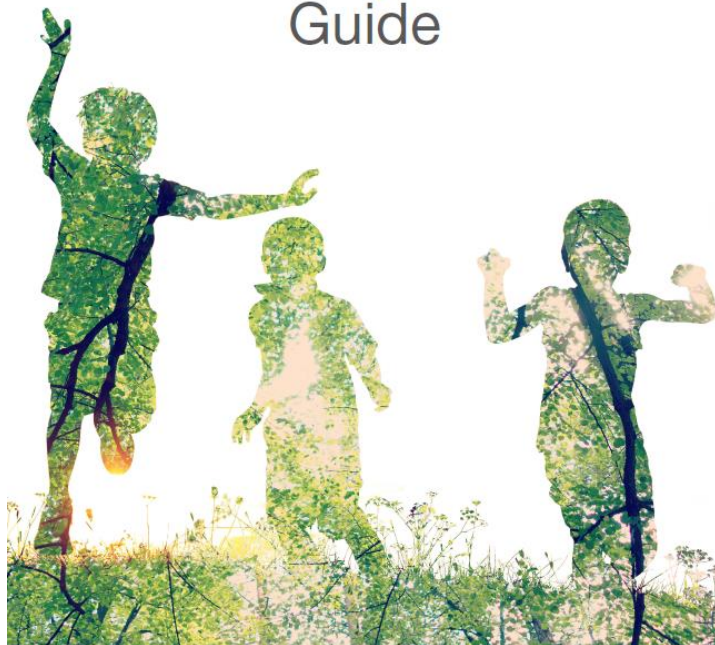
<https://www.handprint.fi/>

HOME CARBON HANDPRINT ENVIRONMENTAL HANDPRINT





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

LAYOUT: Sari Halme



# Carbon handprint Final report

<https://www.vtt.fi/inf/pdf/technology/2018/T346.pdf>



## The Carbon Handprint approach to assessing and communicating the positive climate impact of products

Saija Vatanen | Kaisa Grönman | Tiina Pajula  
Hanna Pihkola | Risto Soukka | Heli Kasurinen  
Katri Behm | Catharina Hohenthal  
Jani Sillman | Maija Leino



# Scientific article 1

## Carbon handprint method and application

Journal version:

<https://doi.org/10.1016/j.jclepro.2018.09.233>

Open access version:

<http://urn.fi/URN:NBN:fi-fe2018101738395>



Carbon handprint – An approach to assess the positive climate impacts of products demonstrated via renewable diesel case

Kaisa Grönman<sup>a,\*</sup>, Tiina Pajula<sup>b</sup>, Jani Sillman<sup>a</sup>, Maija Leino<sup>a</sup>, Saja Vatanen<sup>b</sup>, Heli Kasurinen<sup>a</sup>, Asta Soininen<sup>c</sup>, Risto Soukka<sup>a</sup>

<sup>a</sup> Lappeenranta University of Technology, P.O. Box 20, FI-53851 Lappeenranta, Finland

<sup>b</sup> VTT Technical Research Centre of Finland Ltd, P.O. Box 1000, FI-02044 VTT, Finland

<sup>c</sup> Neste Corporation, P.O. Box 310, FI-00031 Porvoo, Finland

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Life cycle assessment

#### ABSTRACT

The capacity to calculate and communicate the beneficial environmental impact of products and services is lacking in scientific guidelines. To fill this gap, this article presents a new approach for calculating the carbon handprint of products. The core of the suggested approach involves comparing the carbon footprint of an improved product with the carbon footprint of the baseline product, and subsequently calculating the reduction in greenhouse gas emission that can be achieved by utilizing the improved product. The proposed approach is founded on the standardized life cycle assessment methodology for footprints until the use stage, and it provides a framework to recognize the effects of the remaining life cycle stages in the actual operational environment. This calculation is meant to be used by manufacturers that wish to show potential customers the positive climate impacts offered by the manufacturer's product. The carbon handprint approach complements the existing methodologies by introducing new definitions and consistent guidelines for comparing the baseline product and the improved product.

This article presents the developed calculation approach and demonstrates the approach with one case study about renewable diesel. Results of the diesel handprint calculation indicate that a driver can reduce greenhouse gas emissions by choosing renewable diesel over baseline fuel. Thus, the producer of the renewable diesel will create a handprint.

Organizations can use carbon handprints for quantifying the greenhouse gas reductions their customers can achieve by utilizing the product. Thus, the carbon handprint can be a powerful tool in communications and marketing. By conducting carbon handprint assessments, a company can also find out how their product qualifies in comparison to baseline products. Therefore, carbon handprints can also support decision-making and lifelong product design.

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#### 1. Introduction

Assessing environmental impacts has traditionally focused on measuring and modeling the negative effects that products, services, and companies cause to the environment. In many organizations, it is already common to assess resource use or emissions caused as a result of their activities. These assessment practices are thoroughly guided with standards established for life cycle

assessment (LCA) (ISO 14040, 2006; ISO 14044, 2006), carbon footprint (ISO 14067, 2018) and water footprint (ISO 14046, 2014).

Many companies, especially in developed countries, already have a depth of environmental know-how and so succeed in conducting their operations with efficient resource use and producing a minimum amount of emissions and waste. Indeed, these companies might even pursue a business concept that is based on providing products, services or technologies that reduce the environmental impacts of their customers. However, these cleantech or frontrunner companies are lacking a recognized method of calculating and communicating the environmental benefits of their actions.

Scientists have suggested methods for measuring the positive environmental impacts of product systems, Čuček et al. (2012)

\* Corresponding author.  
E-mail addresses: [kaisa.gronman@lut.fi](mailto:kaisa.gronman@lut.fi) (K. Grönman), [tiina.pajula@vtt.fi](mailto:tiina.pajula@vtt.fi) (T. Pajula), [janisillman@lut.fi](mailto:janisillman@lut.fi) (J. Sillman), [maija.leino@lut.fi](mailto:maija.leino@lut.fi) (M. Leino), [saja.vatanen@vtt.fi](mailto:saja.vatanen@vtt.fi) (S. Vatanen), [heli.kasurinen@lut.fi](mailto:heli.kasurinen@lut.fi) (H. Kasurinen), [asta.soininen@neste.com](mailto:asta.soininen@neste.com) (A. Soininen), [risto.soukka@lut.fi](mailto:risto.soukka@lut.fi) (R. Soukka).

# Scientific article 2



## Carbon handprint application

Journal version, open access:

<https://doi.org/10.3390/en12234452>

Article

## Carbon Handprint: Potential Climate Benefits of a Novel Liquid-Cooled Base Station with Waste Heat Reuse

Heli Kasurinen <sup>1,\*</sup>, Saija Vatanen <sup>2</sup>, Kaisa Grönman <sup>1</sup> , Tiina Pajula <sup>2</sup>, Laura Lakanen <sup>1</sup>, Olli Salmela <sup>3</sup> and Risto Soukka <sup>1</sup> 

<sup>1</sup> Lappeenranta-Lahti University of Technology LUT, P.O. Box 20, FI-53851 Lappeenranta, Finland;

kaisa.gronman@lut.fi (K.G.); laura.lakanen@lut.fi (L.L.); risto.soukka@lut.fi (R.S.)

<sup>2</sup> VTT Technical Research Centre of Finland Ltd, P.O. Box 1000, FI-02044 VTT, Finland;

saija.vatanen@tt.fi (S.V.); tiina.pajula@vtt.fi (T.P.)

<sup>3</sup> Nokia Bell Labs, Karakaari 13, 02610 Espoo, Finland; olli.salmela@nokia-bell-labs.com

\* Correspondence: heli.kasurinen@lut.fi

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**Abstract:** The novel life cycle assessment (LCA)-based carbon handprint indicator represents a potential carbon footprint reduction that producers/products create for customers who use the (ir) product instead of a baseline product. The research question is how to consider a situation in which multiple customers use a product for different purposes to provide a carbon handprint quantification and the associated communication. The study further provides new insight into the greenhouse gas (GHG) emissions reduction potential within the mobile telecommunications and energy sectors. The carbon handprint of a novel Finnish liquid-cooled base station technology is quantified. The liquid-cooled base station provides a telecommunications service and waste heat that is recoverable through the cooling liquid for heating purposes. The baseline solutions are an air-cooled base station, and district and electrical heating. The liquid-cooled base station creates a carbon handprint, both through energy savings in telecommunications and additional waste heat reuse, replacing other energy production methods. A large-scale climate change mitigation potential through a liquid-cooled base station expansion could be significant. Different supply chain operators' contributions to the total carbon handprint could be terminologically distinguished in communications to emphasize their roles in a shared handprint. The handprint should be transparently communicated for each customer and function.

**Keywords:** handprint; carbon handprint; carbon footprint; life cycle assessment; LCA; base station; liquid cooling; waste heat reuse

### 1. Introduction

The consequences of climate change are increasingly concerning scientists and lay people alike. The Intergovernmental Panel on Climate Change (IPCC) highlights the drastic consequences of limiting global warming merely to the common 2 °C target in comparison to pre-industrial levels, as opposed to 1.5 °C [1]. Regional and industrial greenhouse gas (GHG) emission reduction targets are exerting pressure on nations and companies to rethink production technologies and efficiency without compromising modern lifestyles. Industries have, for example, adopted science-based targets for reducing their GHG emissions to battle climate change [2].

A constructive mindset focusing on the environmental benefits of products has emerged to challenge a conventional mindset focusing on increasing efficiency by minimizing the negative

# Scientific book chapter

## Carbon handprint

Grönman K., Kasurinen H., Uusitalo V., Väisänen S., Soukka R. 2020. Carbon Handprint. *Encyclopedia of Sustainable Management*. Springer, Cham.

Book version:

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Open access version (available from 14 May 2022 onwards):

<http://urn.fi/URN:NBN:fi-fe2020060440595>

## Other websites

- Carbon handprint project website:  
<https://projectsites.vtt.fi/sites/handprint/www.vtt.fi/sites/handprint.html>
- Business Finland (our project funder):  
<https://www.businessfinland.fi/en/do-business-with-finland/explore-key-industries/carbon-handprint/>
  - Carbon handprint case examples by Finnish companies
  - Webinar presentations



## Other expected publications

- Final report of the Environmental handprint project
- Scientific articles about environmental handprints