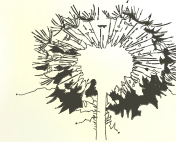


# LCA, FOOTPRINTS & HANDPRINTS

Greg Norris, Chief Scientist



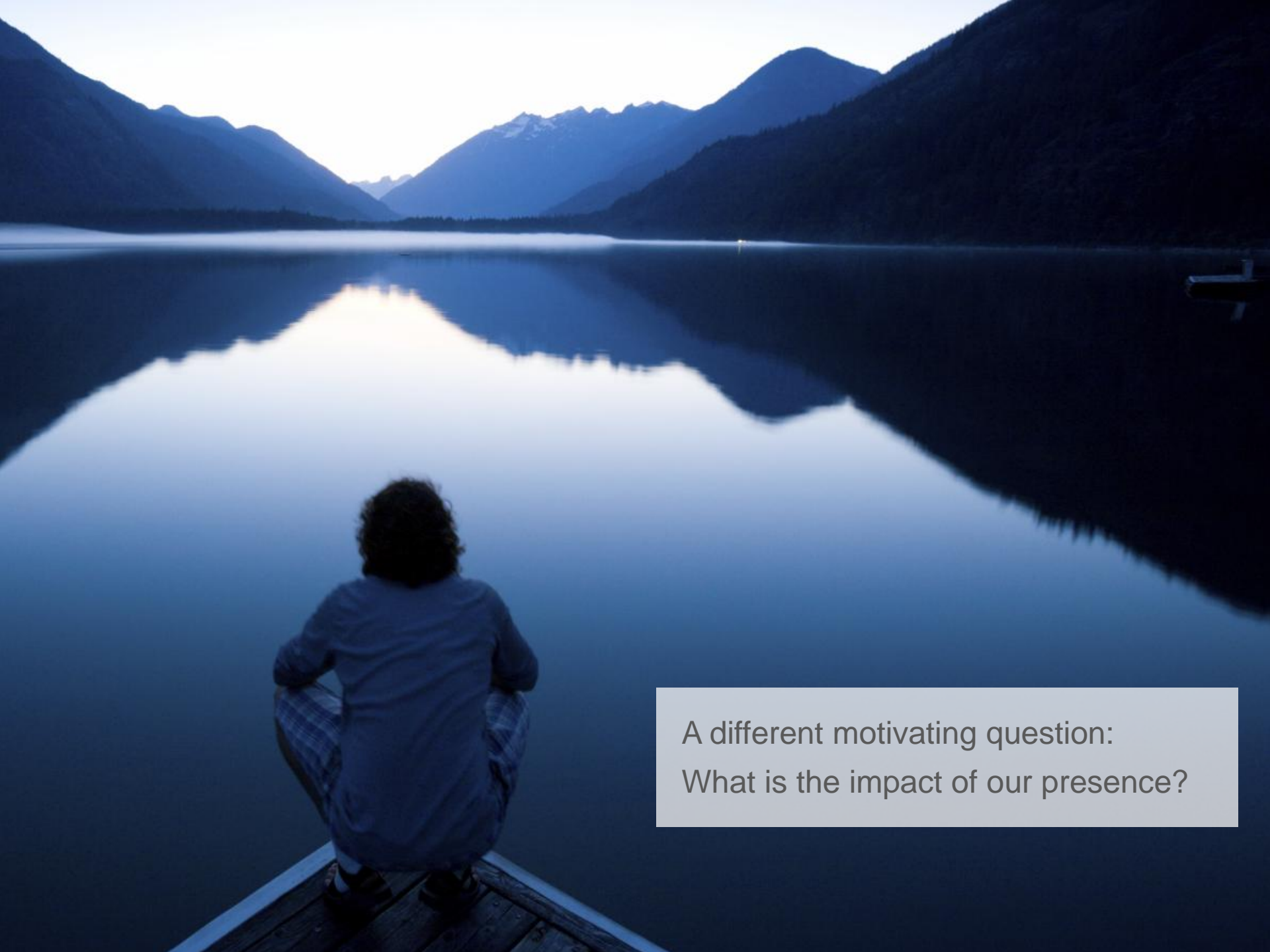
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## How LCA Developed, Part 1

The motivating question: what are the comparative impacts of alternative product systems?

To answer, we ask: how is it made or used, and what are the impacts of those processes?



A different motivating question:  
What is the impact of our presence?

# SUSTAINABILITY

“Meet the needs of the present generation  
without compromising the ability of  
future generations to meet their own needs”

- Brundtland Commission, 1987



# SUSTAINABILITY

Meet our needs (and desires) in ways that don't harm the planet or other people.





# What is a Footprint?

For a product: All the negative impacts of all the processes needed to make something.

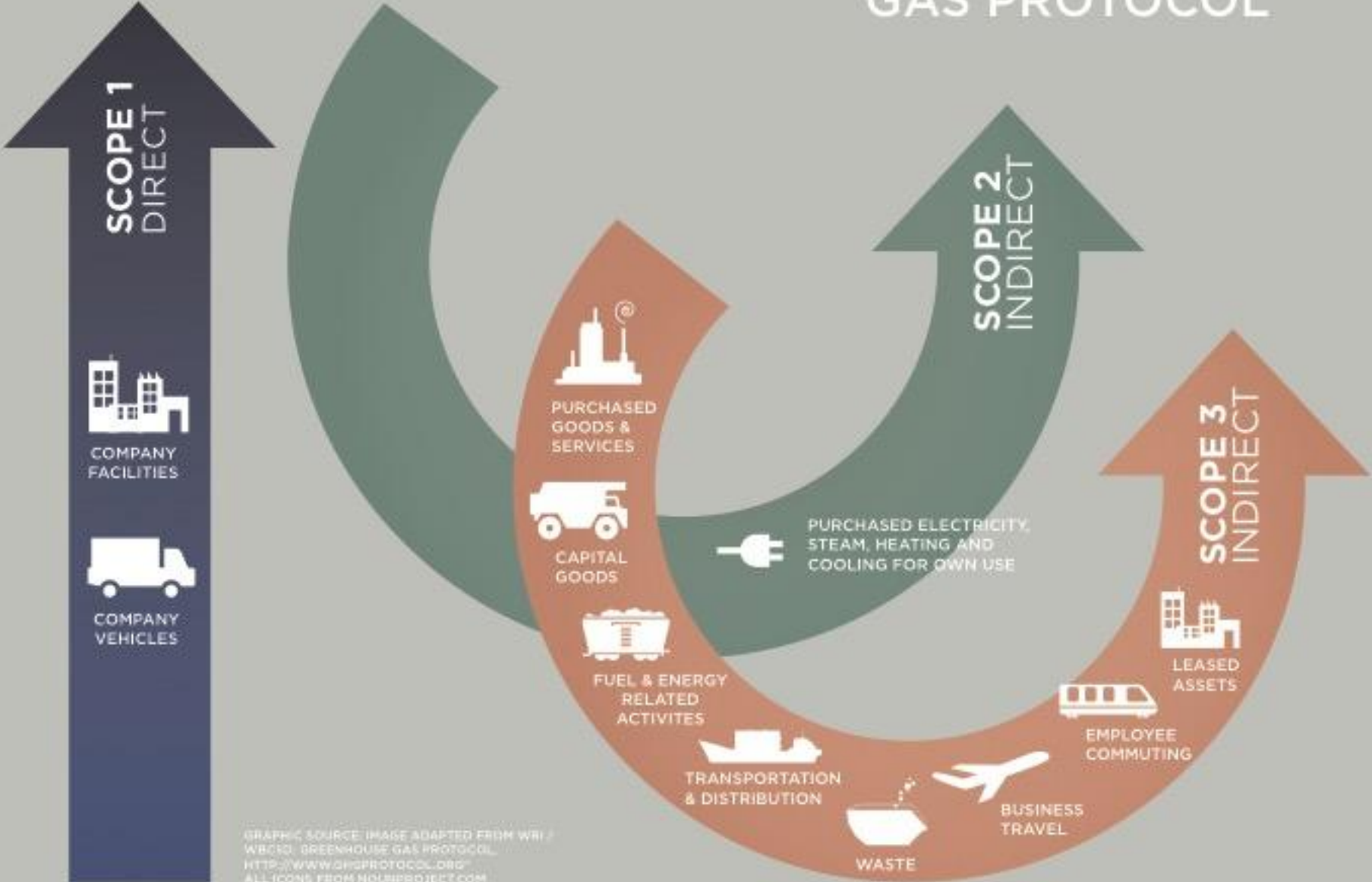
Products have footprints

Services have footprints

People have footprints

Organizations have footprints

# THE GREENHOUSE GAS PROTOCOL



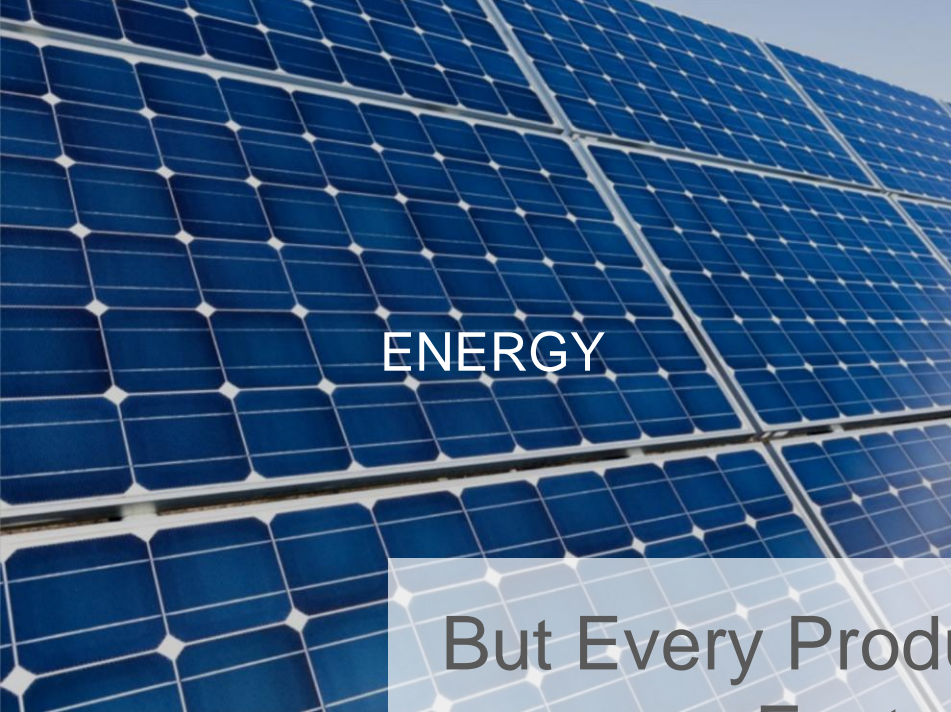
GRAPHIC SOURCE: IMAGE ADAPTED FROM WRI / WBCSD: GREENHOUSE GAS PROTOCOL, [HTTP://WWW.GHGPROTOCOL.ORG](http://www.ghgprotocol.org) ALL ICONS FROM NOUNPROJECT.COM



# SUSTAINABILITY

Shrink your footprint





ENERGY



WATER

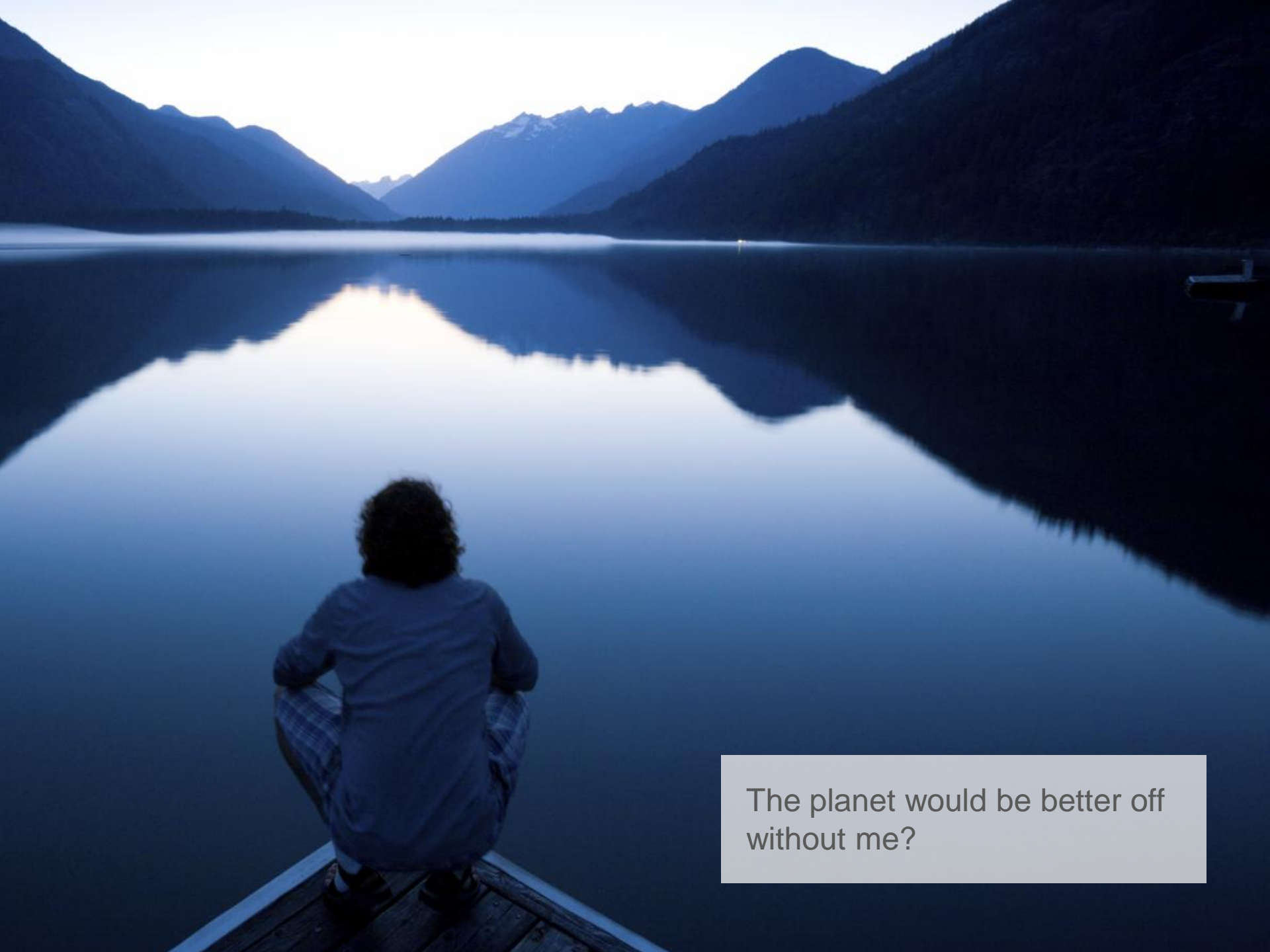
But Every Product Has Many  
Footprints



CLIMATE



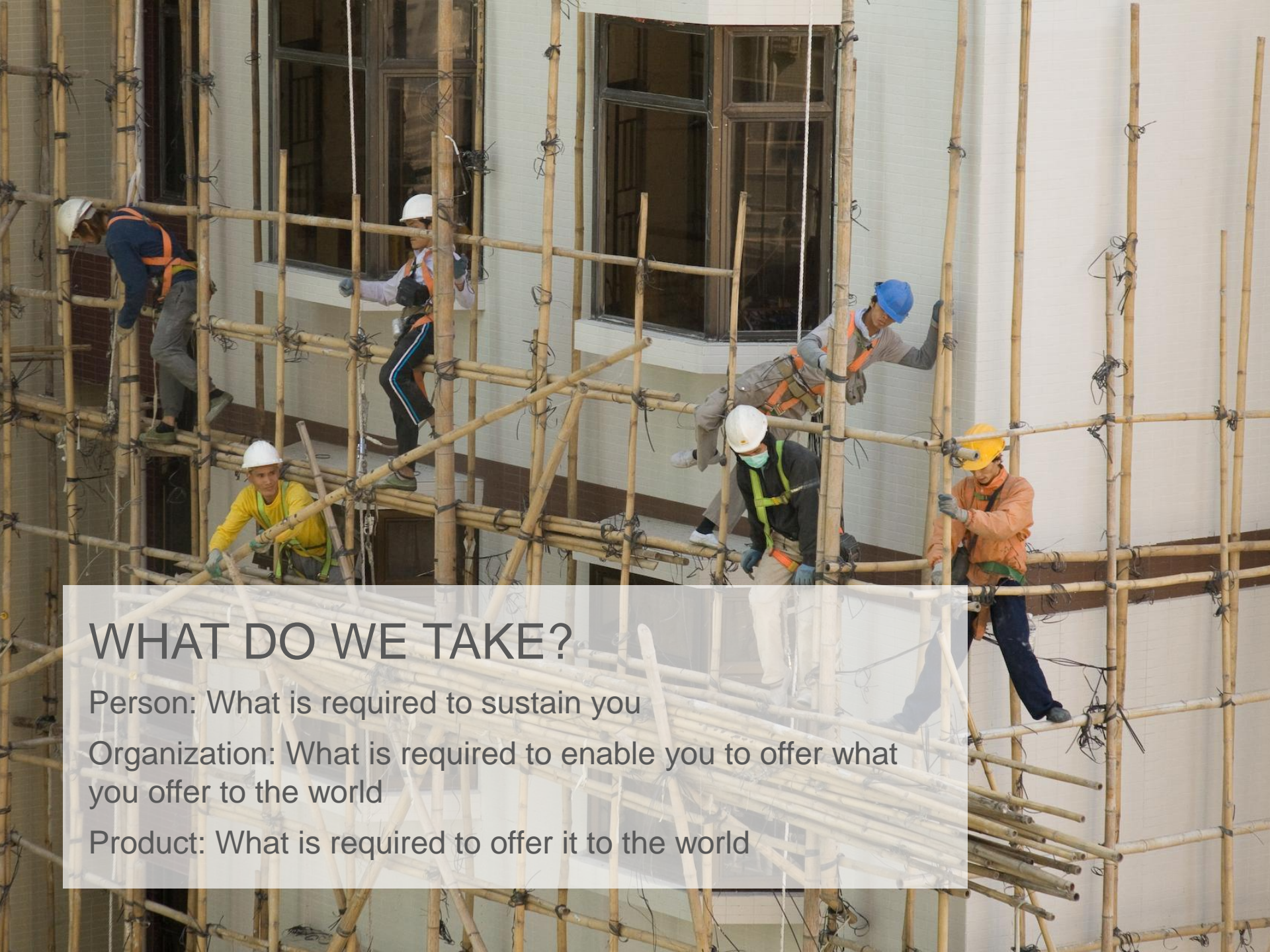
HEALTH



The planet would be better off  
without me?



To be NetPositive, we need  
to Give more than we Take



## WHAT DO WE TAKE?

Person: What is required to sustain you

Organization: What is required to enable you to offer what you offer to the world

Product: What is required to offer it to the world



WHAT DO WE GIVE?

# Handprints Defined

Handprints are positive impacts we cause to happen relative to “business as usual.”



Handprints are defined  
in relation to Footprints, so that:  
[Handprint > Footprint] → NetPositive

- Built on LCA using the same metrics as Footprints
- Same Impact Dimensions: Supply Chains and Life Cycles



# Handprinting in Depth

- How to create handprints
- Relationships between Footprints and Handprints
- Footprints and Shared Responsibility
- Handprints and Shared Credit





# 3 ways to create Handprints



# Step 1: Reduce your own footprint:

Reformulate/redesign your good or service

Switch suppliers, or promote innovation in your supply chain

Green your own production operations

We've constrained  
The good we can do  
by the harm we're now causing



Your footprint





## Step 2: **Help anyone/everyone else reduce their footprint**

Make your product more efficient for others to use

Engage/inform/inspire users to use more wisely

Share innovations or research

Grow demand for NetPositive goods and services

## Step 3: Think outside the foot!

Take generative actions:

Plant a tree

Protect or restore habitat or other ecosystems

Promote healing, health, and human development

# With NetPositive, it's *Not* a Not

Your footprint remains in the limelight and shares it with your handprint

**TIME**  
**Magazine**



## **Handprints, *and* Footprints**

By Daniel Goleman | Monday, Mar. 12, 2012

An aerial photograph of a rugged coastline. The foreground shows dark, jagged rock formations. The middle ground features a large, calm body of water, possibly a bay or fjord, with a small boat visible. The background shows more rocky terrain and a clear blue sky with some light clouds.

# Footprints

## **Consumption as the causal linkage**

Purchased inputs

Other consumption

## **Shared Responsibility**



# Handprints

**All causal linkages matter (not just consumption)**

**Co-causation of change**

**Co-causation** (it happened in part because...)  
(it wouldn't have happened otherwise) )

**Shared Credit among co-causes**



# HANDPRINTING EXAMPLES

Innovating around an Existing Product

Innovating Existing Product (demand unchanged)

Shifting Demand (product performance unchanged)

Innovating in ways that also change demand

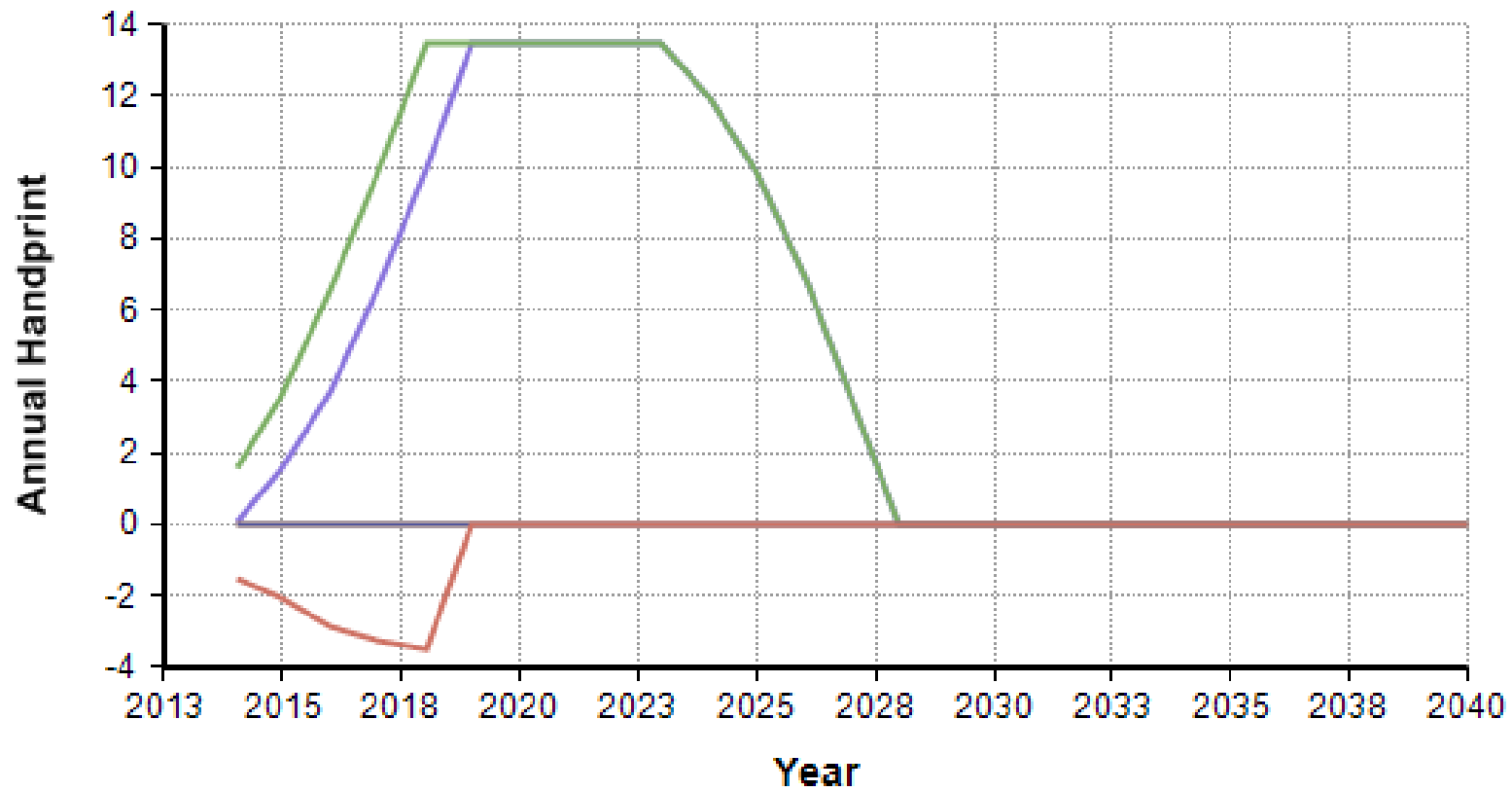


Impact Categories: Human Health - Non-Carcinogens (CTUh)

Innovations: Transmission

Horizontal Axis: Year

Key: Phase



Phase

Upstream Production Use End-of-use TOTAL

# Handprint Calculator

The Handprint Calculator will appear below. Model may take a few moments to load; please be patient.

## Handprint Calculator

## Modeling

### Input Data

Innovations

Edit Table

Add Innovation

Impact Categories

Edit Table

Remove Innovation

Inputs

(various units)

Edit Table

Annual Sales (projected) (product units per year)

Edit Table

Impacts by Data Column

(various units)

Edit Table

Sales year-based results: The impacts of a product across its life cycle (and thus also the handprint-driven changes to these impacts) are assigned to the year of product sale.

Impacts by Sales Year

Calc

Annual Handprint

Calc

Impact year-based results: The impacts of a product during its life cycle (and thus also the handprint-driven changes to these impacts) are assigned to the year during which these impacts occur.

Impacts by Year by Phase

Calc

Annual Handprint

Calc

Welcome to the Handprint Calculator!

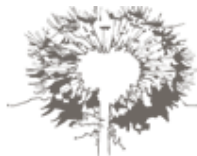
Use this tool to help you organize, evaluate, compare and communicate your handprinting opportunities.

Handprints are positive impacts that we cause to happen, relative to business as usual. They are based on life cycle assessment (LCA), just like footprints. And they can be compared with footprints (the unintentional negative impacts caused by producing a product or sustaining a person or organization) in order to guide the achievement of NetPositive sustainability. When your handprint is bigger than your footprint, you give more than you take, and you are NetPositive.

This tool is currently tailored to assessing the handprints caused by innovations which occur somewhere in the life cycle of a product. It allows you to upload LCA results for the product before and after the handprint-creating innovation or action. And it allows you to assess the impacts of multiple innovations, one at a time – and to compare their impacts. You can set the Impact Categories to match the life cycle impact assessment method you use. If you need support in doing an LCA of your product, please contact us.

The results buttons allow you assess the timing of your handprints in one of two ways. Sales-based results assign the (life cycle) impacts of an innovation to the year in which the innovated product was sold. Impact year-based results take the timing of the actual impacts explicitly into account, so that for example the benefits of energy efficiency occurring in the 10th year of a product's life occur 10 years after it was sold.

<http://www.lumina.com/handprint/>



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**HARVARD**  
T.H. CHAN

**SCHOOL OF PUBLIC HEALTH**

Center for Health and the  
Global Environment

Innovations

List of Inputs

	First Year Sellin...	Product Life...	Innovation-Rel...
Transmission	2014	10	5
Water Heater Blankets	2015	13	10
Toilet	2015	20	5
Pasta Meal	2015	1	4

Sales Year

	2014	2015	2016	2017	2018	2019
Transmission	8741	12.03K	16.53K	18.97K	20.34K	0
Water Heater Blankets	0	900	3600	14.4K	57.6K	230.4K
Toilet	0	10K	10.5K	11K	11.5K	12K
Pasta Meal	0	20K	21K	22K	23K	0

**Innovations**

Transmission

Impact Categories



Data Column

	Pre-innovation Upstream...	Pr...	Pre-innovation Use...
Acidification (kg SO2 eq)	2.97	0	1094
Ecotoxicity (CTUe)	12.42K	0	111.3K
Eutrophication (kg N eq)	2.11	0	159
Global Warming (kg CO2 eq)	528	0	232.2K
Human Health - Carcinogens (...)	518u	0	1.387m
Human Health - Non-Carcinog...	97.4u	0	3.899m
Ozone Depletion (kg CFC-11 eq)	36.7u	0	0.04618
Photochem. Ozone (smog) (kg ...)	34.23	0	31.85K
Resource Depletion (MJ surplus)	481.9	0	441.8K
Respiratory Effects (kg PM2.5 ...)	1.38	0	45.92
Water Consumption (kg)	770	0	89.01K

A microscopic view of plant tissue, likely a cross-section of a stem or root, showing a dense, honeycomb-like structure of cells. The cells are roughly hexagonal or pentagonal in shape, with thick, dark brown cell walls and lighter, yellowish-brown interiors. The overall appearance is that of a highly organized, interconnected network of cells.

# Catalyzing Systemic Handprints

We've come to realize that

“Just doing our own bit” won't cut it.



I can check and properly inflate my tires.  
This will reduce my carbon footprint by 1%.

A man in a light blue button-down shirt is inflating a car tire. He is holding a blue air hose with a brass nozzle that is inserted into the tire's valve. His left hand is resting on the car's body panel. The background is a bright, outdoor parking lot.

## Scale by 100

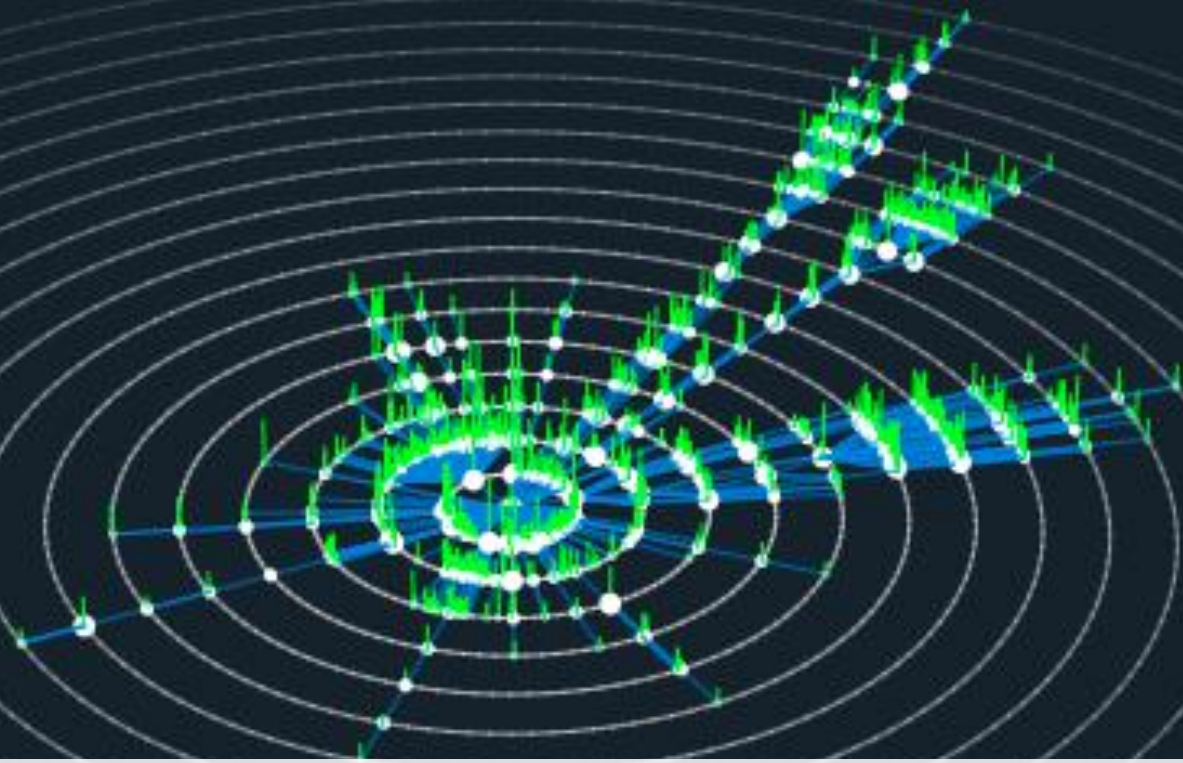
Get 5 friends to join me with gauges and pumps at a supermarket parking lot one afternoon.





Scale by... 1000?

Hand the lucky drivers a card about handprinting, encouraging them to do their own “pump day.”



## Scale by a mind-boggling amount

If Handprinter.org has a crowd-sourced, crowd-assessed database of action ideas, and humanity is striving for NetPositive.

A photograph of a wind farm with a long line of white wind turbines stretching into the distance. The turbines are set in a lush green field under a clear blue sky. A semi-transparent white box is overlaid on the right side of the image, containing the text "Ripple effect example".

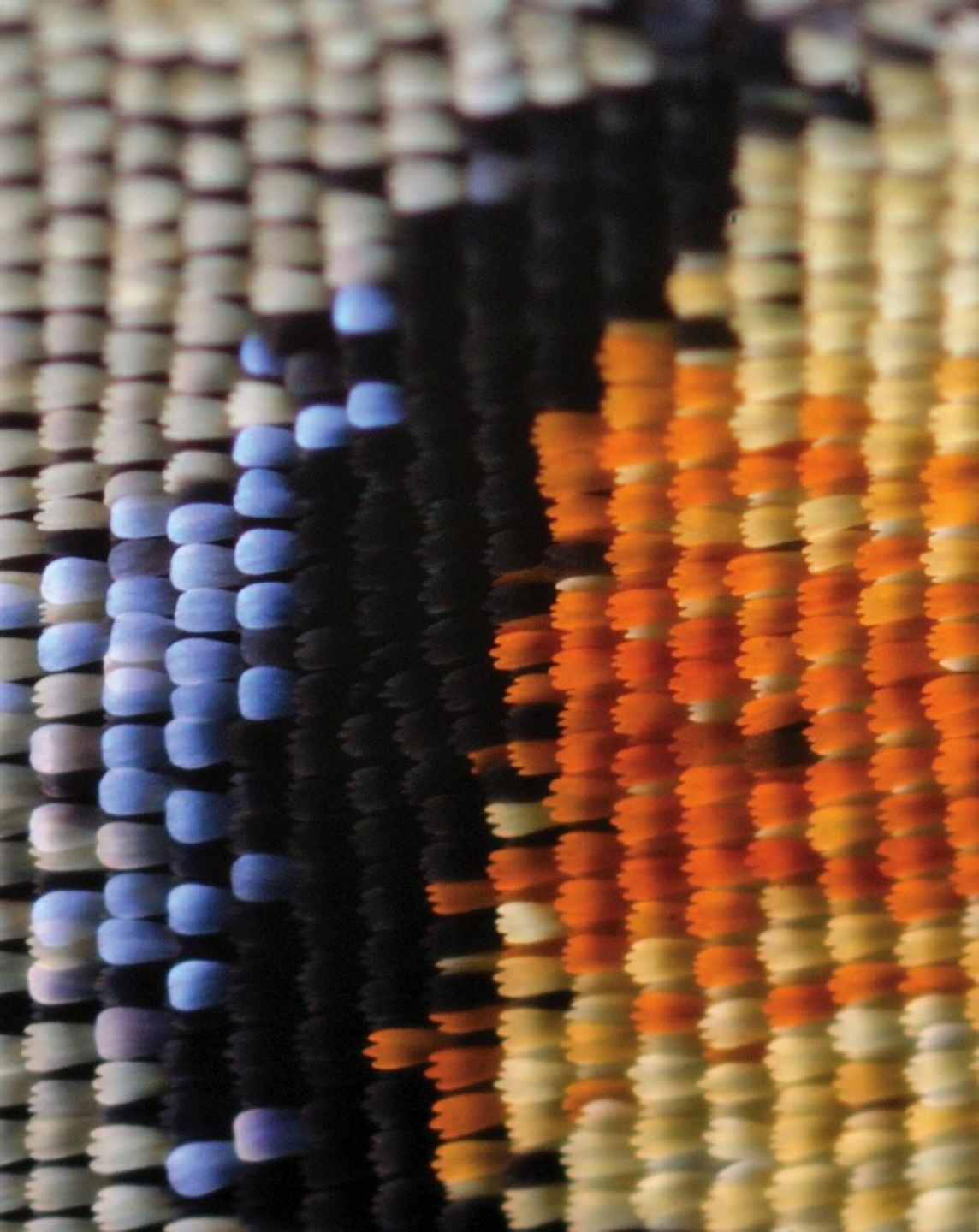
Ripple effect example



# Handprinting for Architects and Engineers

What is the impact of your presence?

- 1) Of course, your footprint
- 2) Now, what do you give to the world?
  - Changing *your* BAU
  - Changing BAU footprints for the occupants of buildings and communities that you design
  - Creating ripple effects in the profession, and in the lives of the people you touch











# LIVING PRODUCT CHALLENGE<sup>SM</sup> 1.0

A Visionary Path to a  
Regenerative Future



INTERNATIONAL  
**LIVING FUTURE**  
INSTITUTE<sup>SM</sup>

## THE 20 IMPERATIVES OF THE LIVING PRODUCT CHALLENGE

PETAL	IMPERATIVE CERTIFICATION*	IMPERATIVE
PLACE		01. RESPONSIBLE PLACE AND HABITAT IMPACTS
		02. HABITAT EXCHANGE
WATER	 CORE IMPERATIVE	03. NET POSITIVE WATER
ENERGY	 CORE IMPERATIVE	04. NET POSITIVE ENERGY
HEALTH & HAPPINESS	 CORE IMPERATIVE	05. NET POSITIVE MATERIAL HEALTH
		06. HUMAN THRIVING
MATERIALS	 CORE IMPERATIVE	07. RED LIST
		08. LIVING ECONOMY SOURCING
	 CORE IMPERATIVE	09. RESPONSIBLE INDUSTRY
		10. NET POSITIVE CLIMATE
		11. NET POSITIVE WASTE
		12. PRODUCT FIT TO USE
		13. USEFUL LIFE DISPOSAL
EQUITY		14. EQUITABLE PRODUCT ACCESS
		15. RESPONSIBLE CO-PRODUCTS
		16. EQUITABLE INVESTMENT
		17. JUST ORGANIZATIONS
BEAUTY		18. POSITIVE HANDPRINTING
		19. BEAUTY + SPIRIT
	 CORE IMPERATIVE	20. INSPIRATION + EDUCATION



**CORE IMPERATIVE**

**REQUIRED FOR PETAL CERTIFICATION**



**HANDPRINTING IMPERATIVE**

\*Petal Certification requires the achievement of at least three of the seven Petals, one of which must be Water, Energy or Materials and the four Core Imperatives.

## PATHWAYS TO CERTIFICATION

### IMPERATIVE CERTIFICATION

7 Imperatives  
Including  
4 Core Imperatives

### PETAL CERTIFICATION

3 Petals, one of  
which must be  
Energy, Water or  
Materials  
  
+ include  
4 Core Imperatives

### FULL CERTIFICATION

All Imperatives are  
Mandatory

WATER

# NET POSITIVE WATER



03

ENERGY

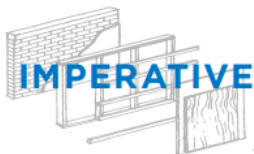
# NET POSITIVE ENERGY



04

MATERIALS

# NET POSITIVE CLIMATE



10

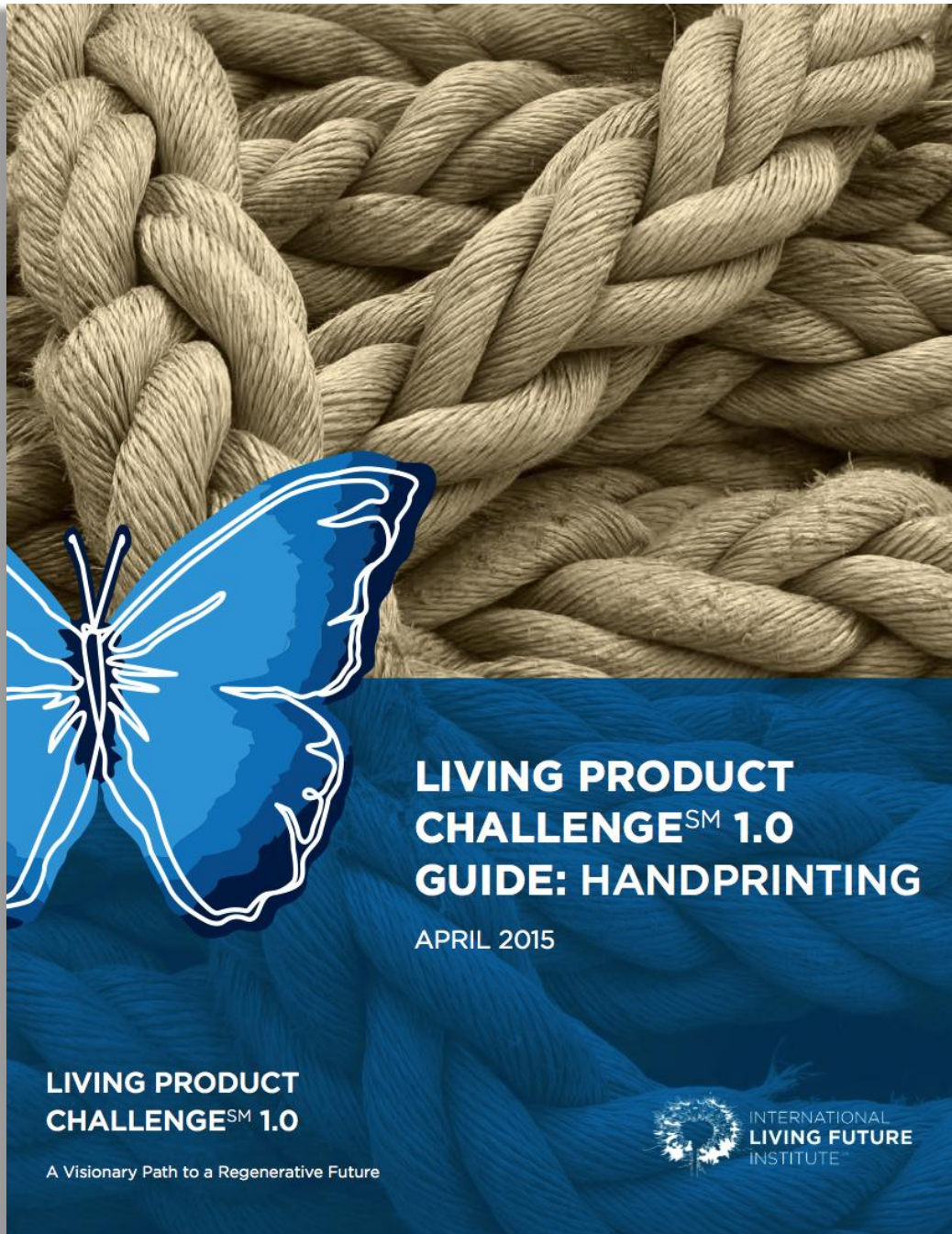
BEAUTY

# POSITIVE HANDPRINTING



18<sup>49</sup>





Free Download on LPC Website

Detailed explanation of Handprinting Imperatives

Case Studies

Updates / expansions

# Handprint: A New Framework for Sustainability

IN: [Corporate Sustainability and Health \(SHINE\)](#)



**shine**

Sustainability and Health  
Initiative for NetPositive Enterprise



**HARVARD**  
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**SCHOOL OF PUBLIC HEALTH**  
Center for Health and the  
Global Environment



**shine**  
Sustainability and Health  
Initiative for NetPositive Enterprise



**SHINE NetPositive Summit:**  
*Determined to Thrive*  
June 15-17, 2016

ENERGY

# NET POSITIVE ENERGY



# 04



105% of the energy used to produce the product in its final form must be generated from on-site renewable energy on a net annual basis.

The manufacturer must use the Institute's footprint calculator to assess and document the energy footprint of producing the product, and identify the five processes that make the largest contributions to the product's cradle-to-gate energy footprint. The footprint assessment can alternatively be based on a Life Cycle Analysis (LCA) for the product, performed by or for the manufacturer; the LCA should follow the ISO 14044 standard for a Life Cycle Assessment being used in a third-party communication.

The manufacturer must develop and publicly share a three-year plan to reduce the product's energy footprint and create an energy handprint greater than the footprint through one or more of the following strategies:

- Innovate to conserve energy or generate renewable energy across the life cycle of the product.
- Innovate within supply chains to conserve energy or generate renewable energy in the supply chain.
- Engage with users to achieve energy conservation through improved use of the product.
- Innovate within supply chains to conserve energy or generate renewable energy in the supply chain.
- Engage with users to achieve energy conservation through improved use of the product.

# HANDPRINTING EXAMPLE

New Product, Start-up



**LIVING  
PRODUCT  
CHALLENGE**

**BUREO SKATEBOARDS | BOARD + SHADES**

LIVING PRODUCT PILOT

A young boy with dark hair, wearing a black t-shirt and colorful shorts, is crouching on a beach. The beach is completely covered in a thick layer of plastic waste, including bottle caps, small pieces of plastic, and larger fragments. The boy is looking down at the trash, and his hands are near the ground. The background shows more of the polluted beach and some sparse vegetation.

Humans dump **8 MILLION** tons of plastic in the ocean each year.

Fishing nets = 10% of that waste

[News.NationalGeographic.com](https://www.nationalgeographic.com/news/2017/06/06-2017-plastic-waste-ocean/)

Photo Courtesy Gridam .com



EVERY  
BOARD ≈  
300 FT OF  
FISH NETS

49,620sf  
recycled so far

# OUR CO NET+POSITIVA

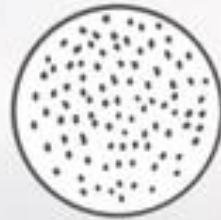
A net positive solution to prevent ocean plastics

## Net Collection



Discarded nets are collected to prevent a harmful form of ocean plastics by working directly with low-income fishing communities to create jobs and improve waste management.

## Efficient Operations



Nets are recycled in Santiago through a zero solid waste process which results in an estimated 70% reduction in greenhouse gas emissions in comparison to virgin plastics.

## Premium Products



Premium products are manufactured to ensure a long life where they can then be returned to be recycled again for a fully closed loop system.

## Community Empowerment



A portion of the funds from the sale of each product are used to support coastal communities that are most affected by these forms of waste for a truly net positive impact.







# bureo 'HOW WE MAKE WAVES'

**NET-POSITIVA**  
bureo's initiative is Chile's **1st** fishnet collection and recycling program

FREE NET COLLECTION BINS

**CLEANER OCEANS**  
discarded fishing gear makes up an estimated **10%** of the oceans' plastic pollution and is extremely harmful to marine mammals

**HAPPY WHALE**

**EFFICIENT OPERATIONS**  
nets are transported to recycling facility in empty returning 'dead-head' trucks  
using recycled fishnets results in more than a **70%** reduction in greenhouse gas emissions compared to virgin plastics


**SUPPORT AND FUNDS**

**PREMIUM RIDE**  
boards are paired with industry leading components, including **30%** veggie oil wheels

**CONFUSED CRAB**

**RIDE YOUR FOOTPRINT**  
each board supports net positiva and prevents over **30 square feet** of harmful fishing net waste from entering our oceans

BE A PART OF THE BUREO STORY AND SUPPORT POSITIVE SOLUTIONS FOR PLASTIC-FREE OCEANS



loureo

## Two Handprinting Actions:

100% Recycled Content

Energy Efficient Manufacturing



More from you