Product Carbon Footprinting, LCA & EPDs: A Practical Introduction

Joe Rouse, Senior Consultant

circularecology.com

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- How do you undertake a product carbon footprint or LCA?
- What data and tools are available to help?
- How do you produce an EPD for your products?
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Speaker

Joe Rouse

Senior Consultant

- *Experienced in conducting and producing Life Cycle Assessments, Product Carbon Footprints and Environmental Product Declarations*

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Circular Ecology – Introduction

Environmental consultancy, founded in 2013

Offer a range environmental services:

- Whole Life Carbon Assessments for Construction Projects
- Organisational Carbon Footprints, Scope 1, 2 & 3
- Product Carbon Footprints
- Environmental Product Declarations
- Life Cycle Assessments (LCA)
- Net Zero Carbon Strategy
- Carbon Footprint Database (library) Development
- Verification and Peer Review
- Online E-Learning Training Courses
- Carbon Offsetting and Tree Planting

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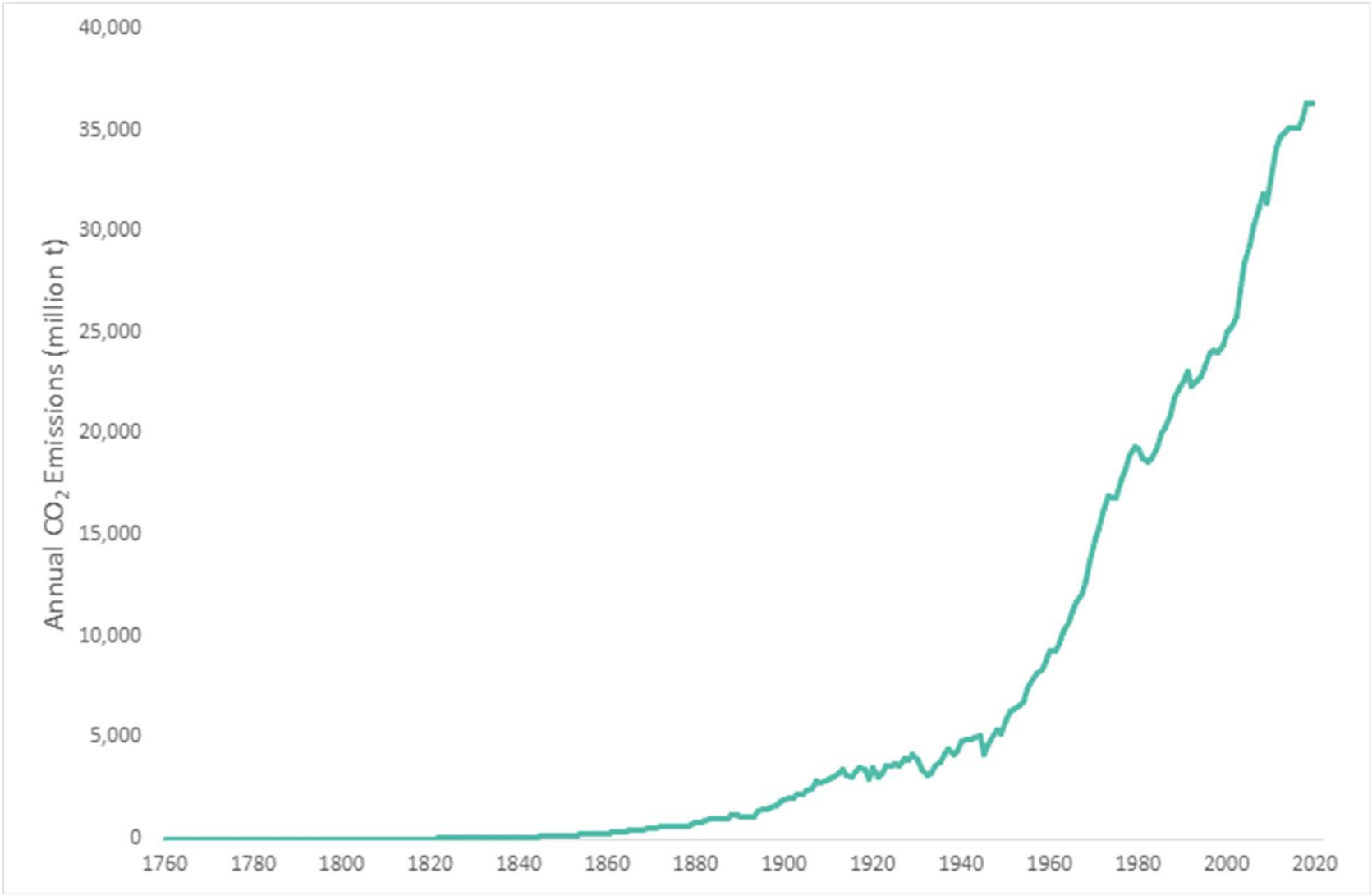
Why do a Product Carbon Footprint?

Why? Escalating Global CO_2 Emissions



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Escalating Carbon Emissions

- We are always talking about taking action on climate change and CO_2 emissions….
- **Global CO_2e emissions have risen over 50% from 1990**
- Carbon footprinting is a tool that can help us to **measure and manage** our carbon emissions

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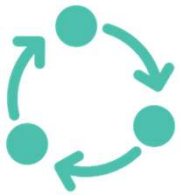
What is a Product Carbon Footprint?

What is a Product Carbon Footprint?

A Product Carbon Footprint (PCF) measures the total greenhouse gas (GHG) emissions associated with a product throughout its life cycle.

- Expressed in kg CO_2-equivalent (CO_2e) per unit of product



- Can cover emissions from raw material extraction, manufacturing, transportation, use, and disposal/recycling of waste

- Helps identify carbon hotspots and opportunities for carbon reduction and efficiency improvement

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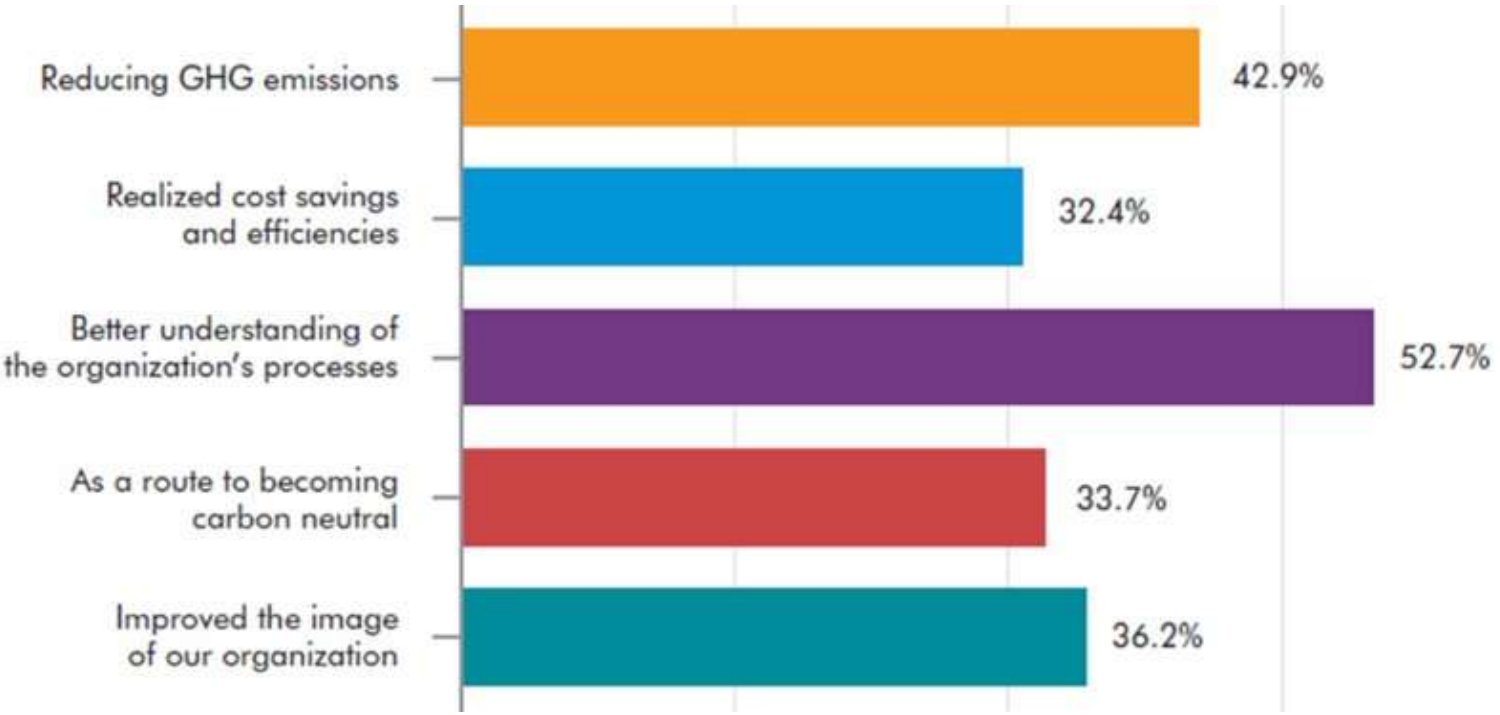
The Benefits of a Product Carbon Footprint

Companies that undertook a **product carbon footprint** to the **PAS 2050** standard were asked what **benefits** they experienced



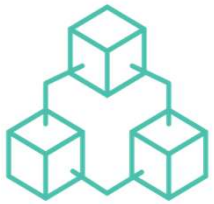
Source: BSI, 2011: PAS 2050 Research Report on Carbon Footprinting

What is a Life Cycle Assessment?

What is a Life Cycle Assessment?

A Life Cycle Assessment (LCA) is a systematic method for evaluating the environmental impacts of a product, process, or service throughout its entire life cycle, from raw material extraction to disposal

- Can cover up to 20 different environmental indicators outside of carbon (water use, resource depletion etc…)



- Can cover different stages of a products life (cradle to gate, cradle to grave)

- Helps inform internal decision making, product design and meet regulatory/customer demands

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Example LCA Impact Categories

- Climate change
- Ozone depletion
- Terrestrial acidification
- Freshwater eutrophication
- Marine eutrophication
- Human toxicity
- Photochemical oxidant formation
- Particulate matter formation
- Terrestrial ecotoxicity
- Freshwater ecotoxicity
- Marine ecotoxicity
- Ionising radiation
- Agricultural land occupation
- Urban land occupation
- Natural land transformation
- Water depletion
- Metal depletion
- Fossil depletion

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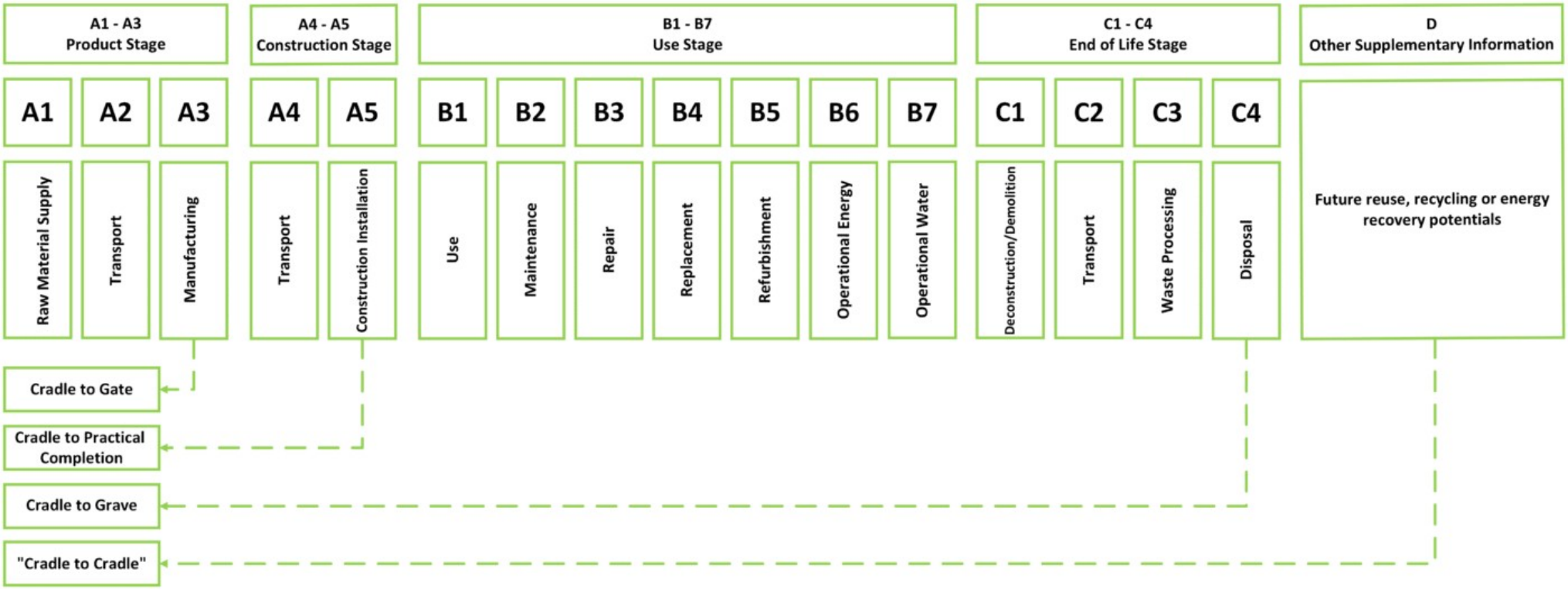
What are Life Cycle Stages?

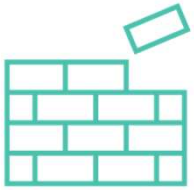
- Modules A, B, C and D define life cycle stages
- Originally defined in European standards EN15804 / EN 15978 series for the building sector
- But these Modules are now used extensively around the world and in wider sectors



What is an Environmental Product Declaration (EPD)?

What is an Environmental Product Declaration?

An Environmental Product Declaration (EPD) is standardised, third-party verified document that communicates the environmental impact of a product.



- Based on a Life Cycle Assessment study following specific **Product Category Rules (PCRs)**

- Includes multiple environmental indicators beyond carbon but follows specific guidance for standardisation

- EPD programs include **mandatory 3rd party verification** for credibility and comparability

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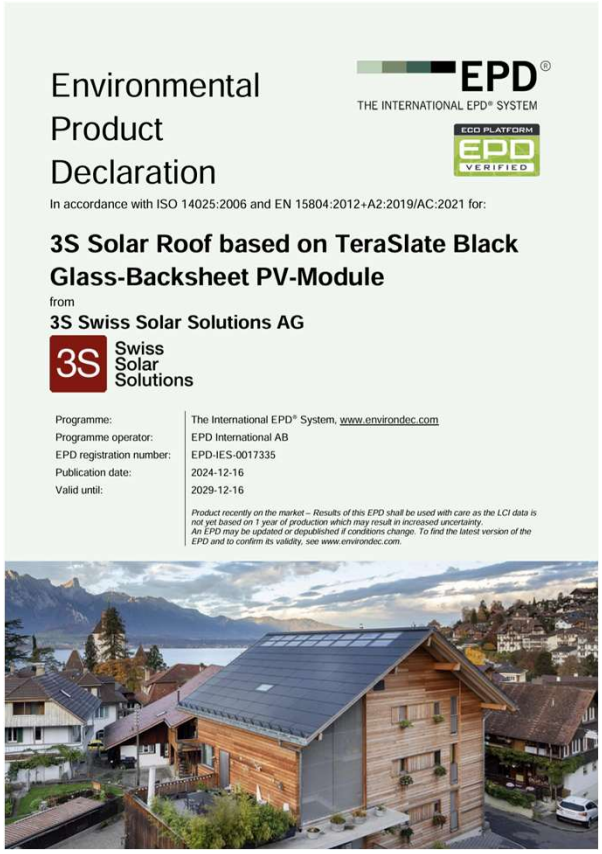
How are Environmental Product Declarations Used?

How are Environmental Product Declarations (EPD) Used?

- **Regulatory Compliance** – Meets requirements in green building certifications (e.g., BREEAM, LEED, DGNB).
- **Procurement & Supply Chain Decisions** – Companies use EPDs to compare and select low-carbon materials.
- **Eco-Labeling & Marketing** – Provides clarity for customers and stakeholders.
- **Carbon Reduction Strategies** – Identifies improvement areas in manufacturing and supply chains.



Environmental Product Declaration

EPD®
THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM EPD VERIFIED

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

3S Solar Roof based on TeraSlate Black Glass-Backsheet PV-Module

from

3S Swiss Solar Solutions AG

3S Swiss Solar Solutions

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	EPD-IES-0017335
Publication date:	2024-12-16
Valid until:	2029-12-16

Product recently on the market – Results of this EPD shall be used with care as the LCI data is not yet based on 1 year of production which may result in increased uncertainty. An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com.

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What Standards & Methods Should be Adhered to?

What Standards & Methods Should be Adhered to?

- **ISO 14067** – Standard for calculating and reporting the **carbon footprint of products**
- **PAS 2050** – A standard for assessing the **life cycle GHG emissions of goods and services**
- **GHG Protocol: Product Life Cycle Accounting and Reporting Standard** –A GHG Protocol standard for product carbon footprinting
- **ISO 14040 & ISO 14044** – Core standards for **conducting an LCA**, covering methodology, inventory analysis, impact assessment, and interpretation
- **ISO 14025** – Governs **Type III environmental declarations** (EPDs), ensuring transparent and comparable environmental data
- **EN 15804** – The key **EPD standard for construction products**, defining impact categories and calculation rules
- **Product Category Rules (PCRs)** – Industry-specific guidelines that dictate how an LCA should be conducted for EPDs, ensuring **comparability within a product category**

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What Standards & Methods Should be Adhered to?

Product Carbon Footprints:

- A Product Carbon Footprint is a **simplified, carbon-focused** assessment derived from Life Cycle Assessments
- Can be 'high-level' or adhere to a standard
- ISO 14067, EN 15804, PAS 2050, GHG Protocol: Products

Life Cycle Assessments:

- A Life Cycle Assessment is a **comprehensive environmental assessment study** covering multiple impact categories
- ISO 14040/ISO 14044, EN 15804

Environmental Product Declarations:

- An Environmental Product Declaration is a **standardised, publicly available report** that communicates LCA results
- EN 15804 (+A2), ISO 14025, Product Category Rules

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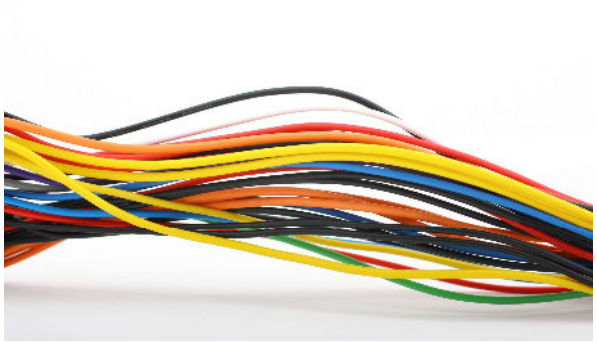
How Do You Undertake a Product Carbon Footprint?

How Do You Undertake a Product Carbon Footprint?

- First you need to set:
  - **Goal: What is the purpose of the study?**
    - Will it be used for internal or external communication?
    - Will it be comparing impacts of products?
    - Will it be used to produce an EPD?
  - **Scope: Define the study…**
    - Specific product / product ranges
    - Carbon only or full LCA impacts?
  - **Boundary: Life cycle boundary**
    - Cradle to gate (A1-3), cradle to grave (A-C)
  - **Method: Adherence to standards**
    - High level or adhere to a standard
    - EN 15804, ISO 14067, GHG Protocol Products…etc



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How Do You Undertake a Product Carbon Footprint?

- Once those are set, we need to collect the data needed for a product LCA:
- **Consumption of Materials**, including:
  - Raw materials in the product
  - Packaging
  - Manufacturing waste
  - Consumables (if significant)
- **Energy and fuels**
  - Electricity, natural gas, diesel, LPG…etc
- **Transport paths and modes** (road, sea, rail…etc)
- **Production volumes**
  - To allocate above data to 1 product

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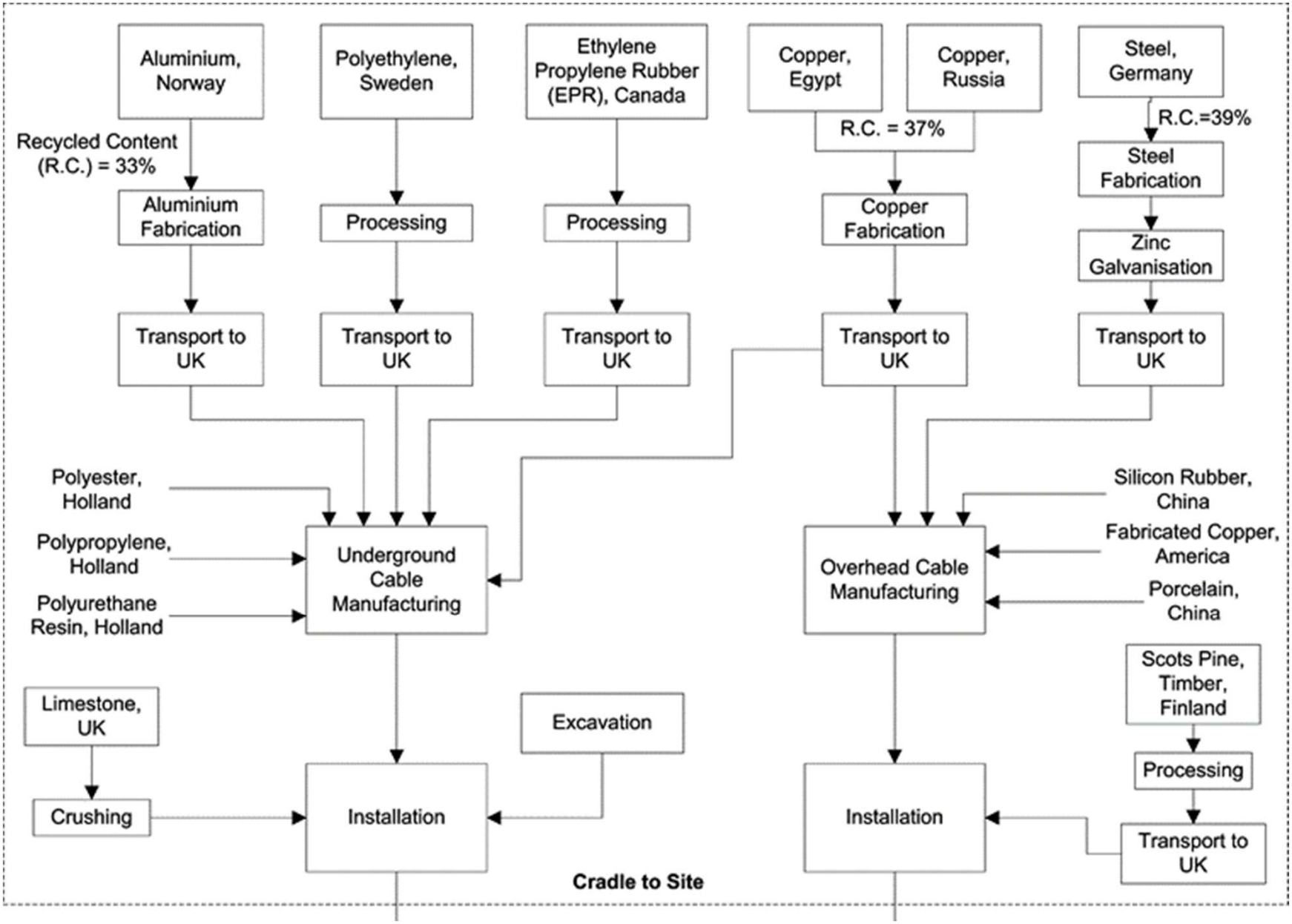
Process Flow Charts Help…



How Do You Undertake a Product Carbon Footprint?

- Bring the data together…
- **Excel calculations if good excel skills**
  - Intermediate excel skills for carbon footprint
  - Advanced excel skills for an LCA with 20+ indicators and cradle to grave
- **Software**
  - openLCA: free LCA software, expert level, we often use this for full LCA
  - SimaPro: Commercial LCA software, well used by experts
  - Various online cloud based software's starting to appear

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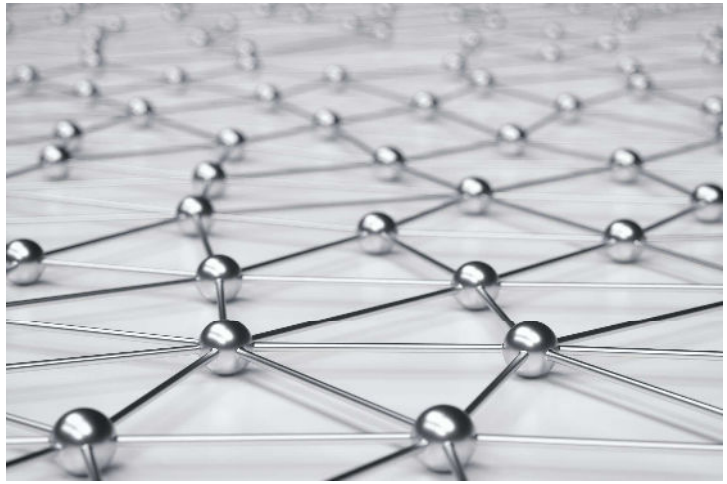
What Data and Tools are Available to Help?

What Data and Tools Are Available to Help?

- **There are two types of data:**
  - **Primary Data:** Actual consumption data from the manufacturer or supply chain.
    - Such as recorded fuel consumption from manufacturing, distribution, …etc
  - **Secondary Data:** Literature based data, often from LCA databases, industry reports, journal papers...etc
- **Most assessments combine primary data with secondary data**
- Ideally **primary data should be obtained from main manufacturing operation**
  - producer or main 1st tier supplier



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What Databases Are Available to Help?

- **There are various carbon footprint databases or LCA databases:**
- **ICE Database:** Embodied carbon database for raw materials
  - Available from our website circularecology.com/ice-database.html
- **DESNZ (Defra) GHG Emissions Factors:** UK Government free carbon factors for fuels, electricity, waste treatment, transport.
  - Despite being UK based factors, applied in studies around the world, particularly for fuels and transport
- **ecoinvent:** Commercial LCA database, with data for thousands of materials, fuels, transport, manufacturing operations
  - If doing a full LCA and EPD, you are likely to need ecoinvent

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What Other Data Is Available to Help?

- **There is now lots of data for specific products and suppliers:**
- **Environmental Product Declarations:** There are well over 100,000 EPDs from specific manufacturers and suppliers
  - Freely available
  - Although reading an EPD can be confusing, there are platforms with EPD data already compiled…
- **BECD Database for Products:** A a free repository of product level embodied carbon data, carbon.becd.co.uk
- **ECO Platform:** Platform for EPDs eco-platform.org
- Other sources, such as industry reports, LCAs, journal papers…etc

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How Do You Produce an EPD for Your Products?

How Do You Produce an EPD?

- A detailed LCA is the basis of an EPD
- However, there are additional steps to producing an EPD
- There are various EPD programme operators – including Circular Ecology

Circular Ecology EPD Programme

- Circular Ecology are now an EPD Programme Operator
  - This means we can **publish EPDs** in adherence with ISO 14025 (Type III environmental declarations)
- Our Objectives:
  - **Improve the transparency** of published EPD information
  - **Improve the use of primary data** in EPDs
  - **Produce higher quality LCAs**
  - **Implement a robust verification process** with increased focus on the review of the LCA results
  - **Comply with relevant international standards**, e.g., ISO 14025, ISO 14040, ISO 14044
  - **Encourage manufacturers and suppliers** to publicise their environmental declarations and reduce the environmental impacts of their products
  - **Encourage clients, buyers, specifiers, and other interested parties** to use environmental declarations

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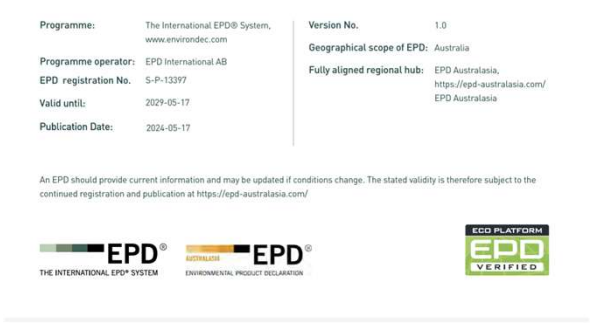
How Do You Produce an EPD?

- **Typical process to produce EPD:**
  1. Complete LCA report
  2. Select EPD programme
  3. Draft EPD
  4. External verification process of EPD (e.g. another LCA expert)
  5. Finalise EPD
  6. EPD Programme fees
  7. EPD published
- Typically EPD **valid for 5 years**
- After which is retired or renewed
- **Full timeline including LCA – 4-6 months**
- **Cost = 5 figure budget needed**



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Summary

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Next Webinars

Next Webinar:

- Making Credible Carbon & Environmental Reduction Claims Using LCAs – Thursday 11th June

Watch our 2026 webinars on-demand on our website:

- Carbon Reduction Plans: PPN 006 & NHS Net Zero Supplier Roadmap
- An Overview of Carbon Neutrality: Measure, Manage, Offset, Improve
- Whole Life Carbon Assessments of Buildings: What You Need to Know
- An Introduction to Bespoke Carbon Datasets

Keep an eye on our networks for more information

- Website - circularecology.com
- LinkedIn - linkedin.com/company/circular-ecology

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Q&A

Please use the Q&A interface to ask any questions…

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