

A photograph of a man with grey hair and a mustache, shirtless, cooling off at a green public fountain. He has a grey t-shirt draped over his shoulders and is holding a metal cup to the fountain's spout. Water is splashing on his face and head. The background shows a park-like setting with a paved path, grass, and palm trees under a clear blue sky. Other people are visible in the distance, including one on a scooter.

August 1, 2023
Buenos Aires
recorded its
hottest-ever day
with **38** degrees

The background of the image shows two industrial smokestacks at the bottom, emitting thick, dark smoke that rises into a sky filled with large, billowing clouds. The lighting suggests a sunset or sunrise, with warm orange and yellow tones on the left and darker, more dramatic blues and greys on the right. The smokestacks are dark and cylindrical, with the smoke appearing as a dense, textured plume.

36.8
billions tons



Regulatory developments value reliable supply chains, renewables and low-carbon aluminium

EU



- RePowerEU
- Critical Raw Materials Act
- Renewable Energy Directive
- Eco-design for Sustainable Products Regulation
- Corporate Due Diligence Directive

The U.S.



- Inflation Reduction Act driving investments in renewable energy, new energy solutions and climate technologies
- Infrastructure and job creation act encouraging investments in road and rail, electrification, EV infrastructure

China



- Lifting national security and self-sufficiency as top priority
- Green/clean technology lifted as future trade opportunity
- More ambitious targets for renewable energy and measures to improve industrial energy efficiency

This will impact you!
And your customers...

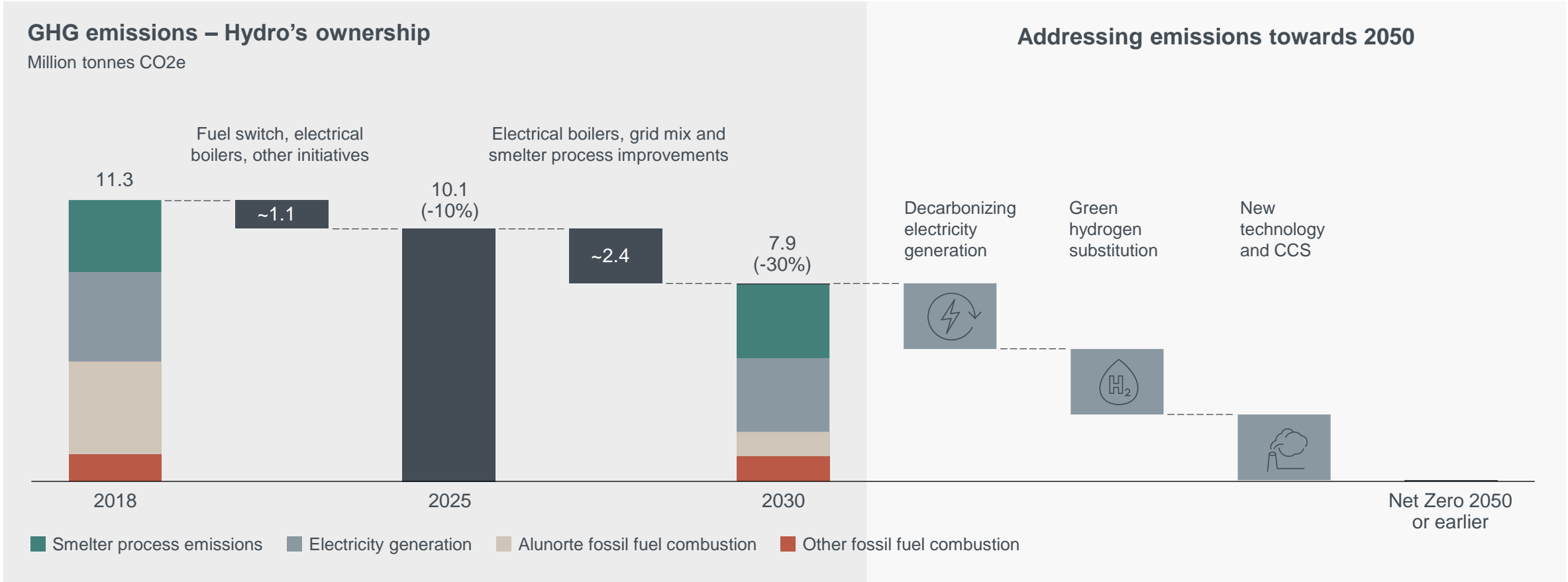


**Net-
Zero 2050
Emissions**

Net-zero Hydro: The roadmap



On track to achieve 30% carbon emissions reduction by 2030 and net zero by 2050 or earlier



1 Aluminium, a sustainable material

2 Design for Circularity

2' What's next

3 Circular designs with aluminium

01

Aluminium,
a sustainable
material

342756 HAC
696024 HD
HYDRO 100R

Why aluminium?

A full potential of strong qualities and versatility



- ✓ Lightness and strength
- ✓ Durability and formability
- ✓ Corrosion resistance
- ✓ Conductivity
- ✓ Recyclability
- ✗ **Energy-intensity**



Performant building
systems, recycling
of buildings

Aluminium enables the green transition

Demand for low-carbon aluminium expected to grow sharply

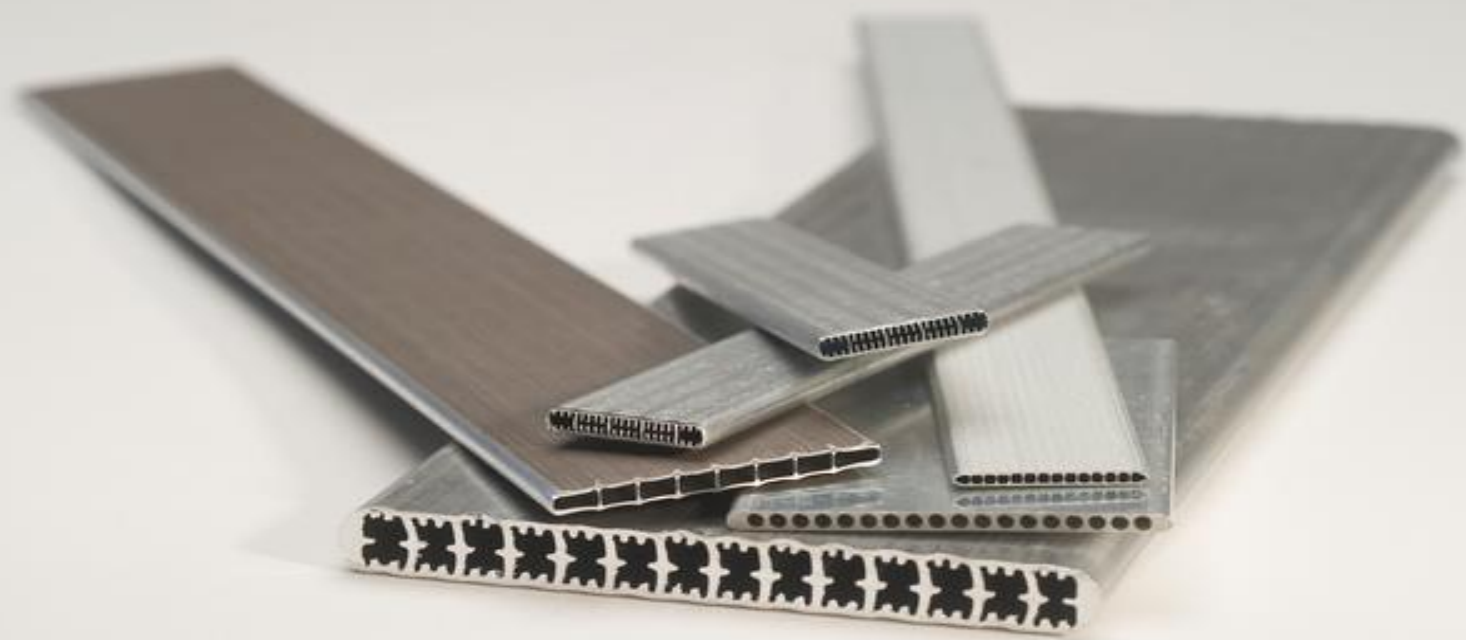
Electrical vehicle
transition

Renewable
power transition

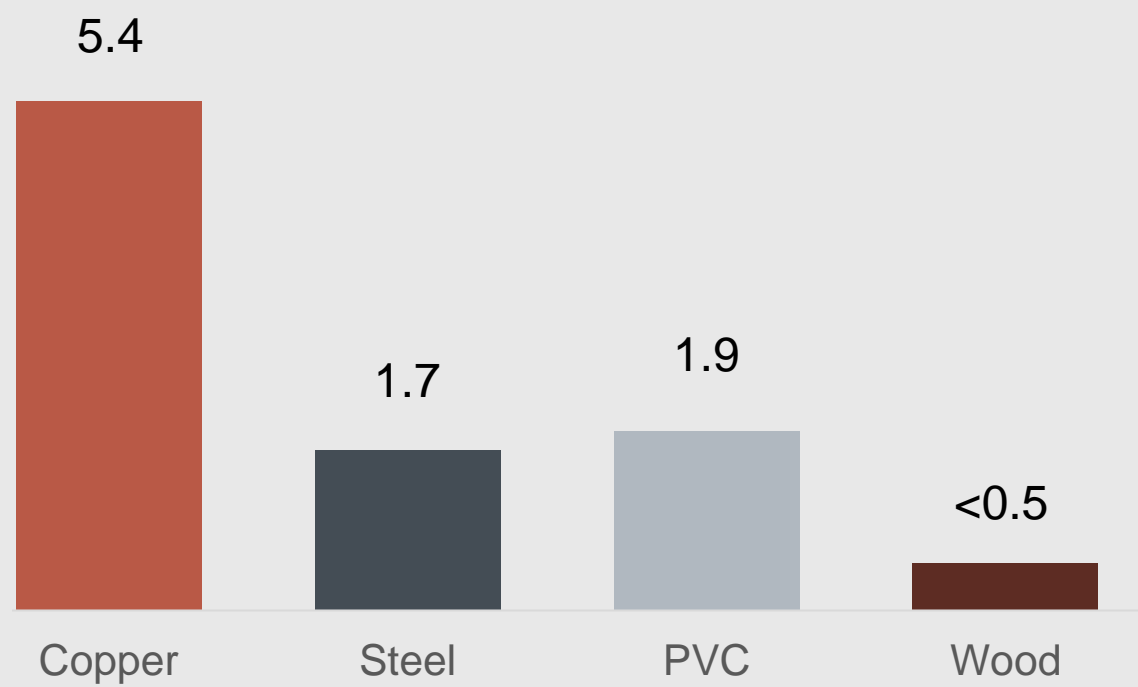
Copper
substitution







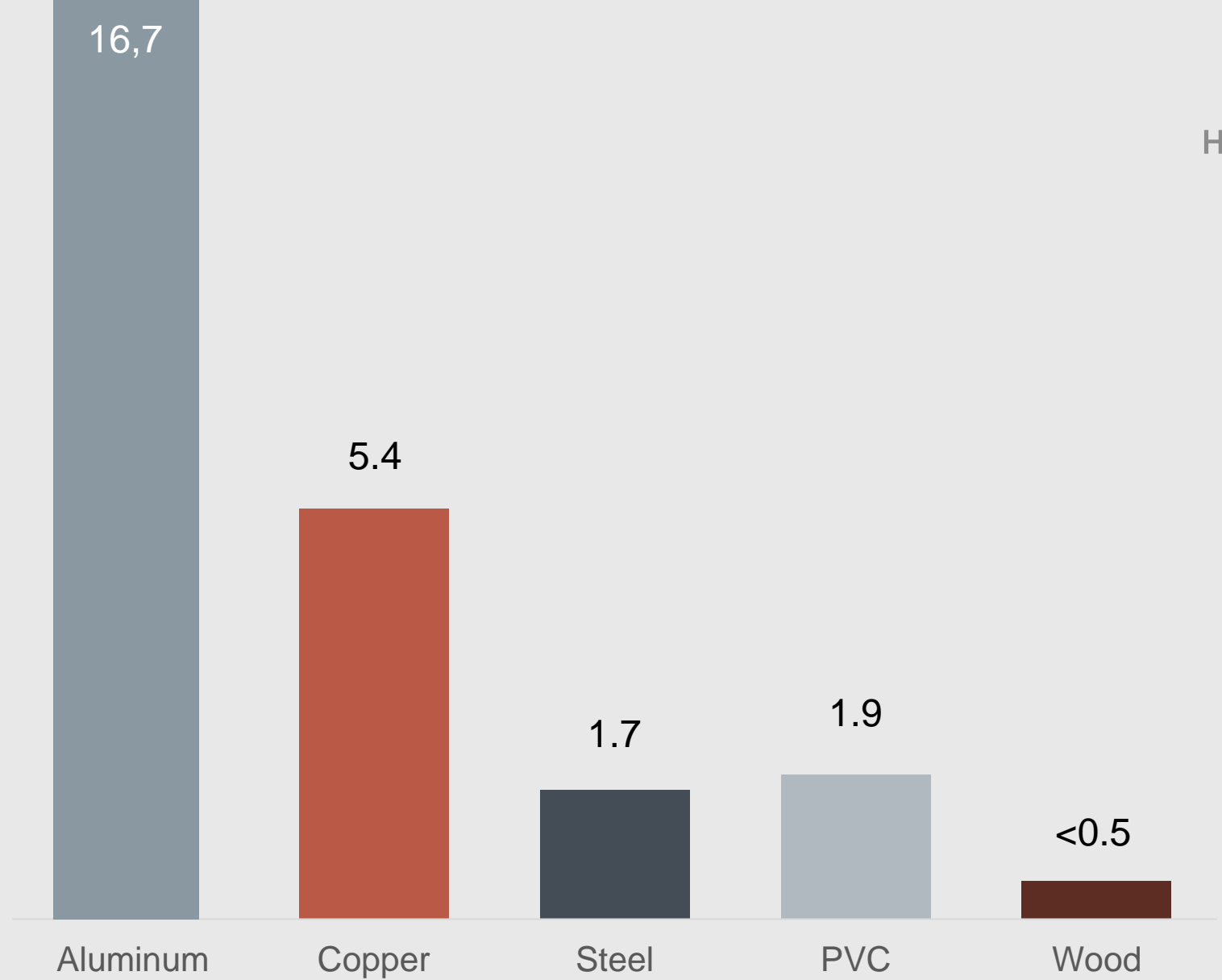




* kg CO₂e/kg – World average excluding China.
Including China = 18kg CO₂e/kg alu

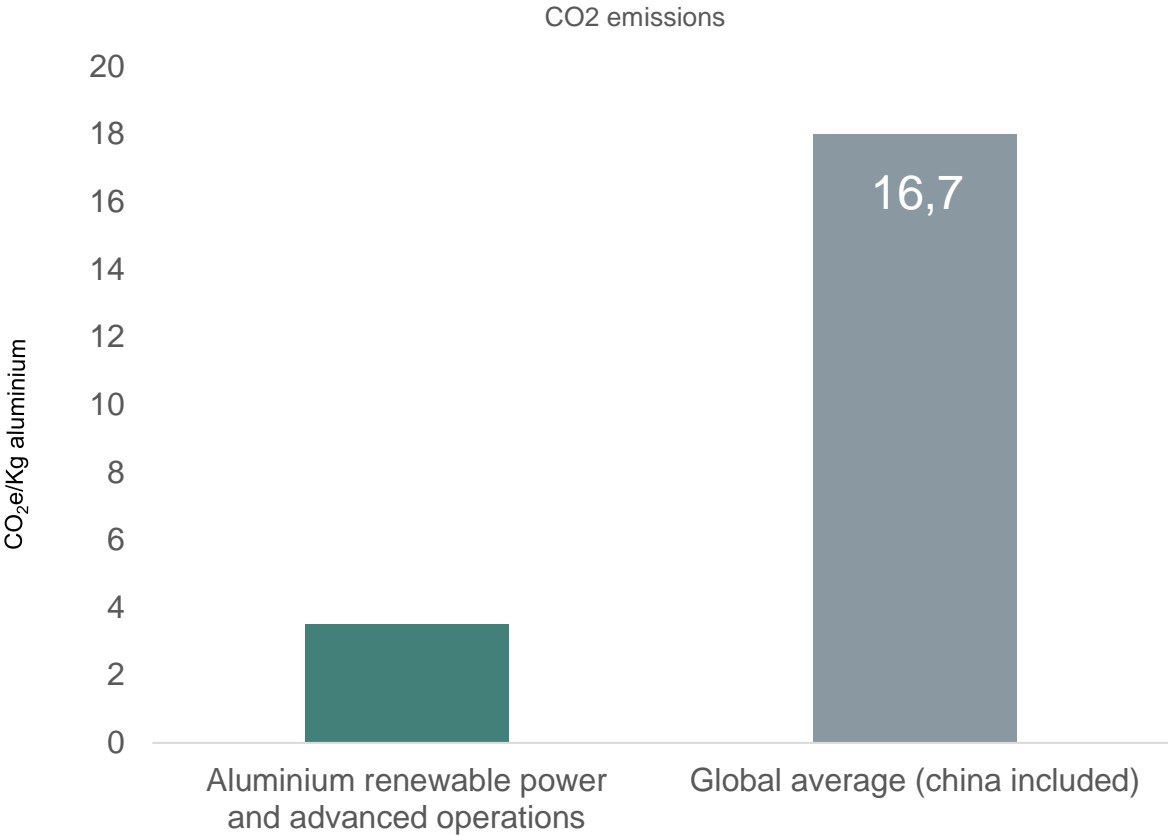
Aluminium is under pressure

The carbon footprint of “global average” aluminium is high”



* 10 kg CO₂e/kg – World average excluding China.
Including China = 16,7kg CO₂e/kg alu

It matters where and how primary aluminium is produced



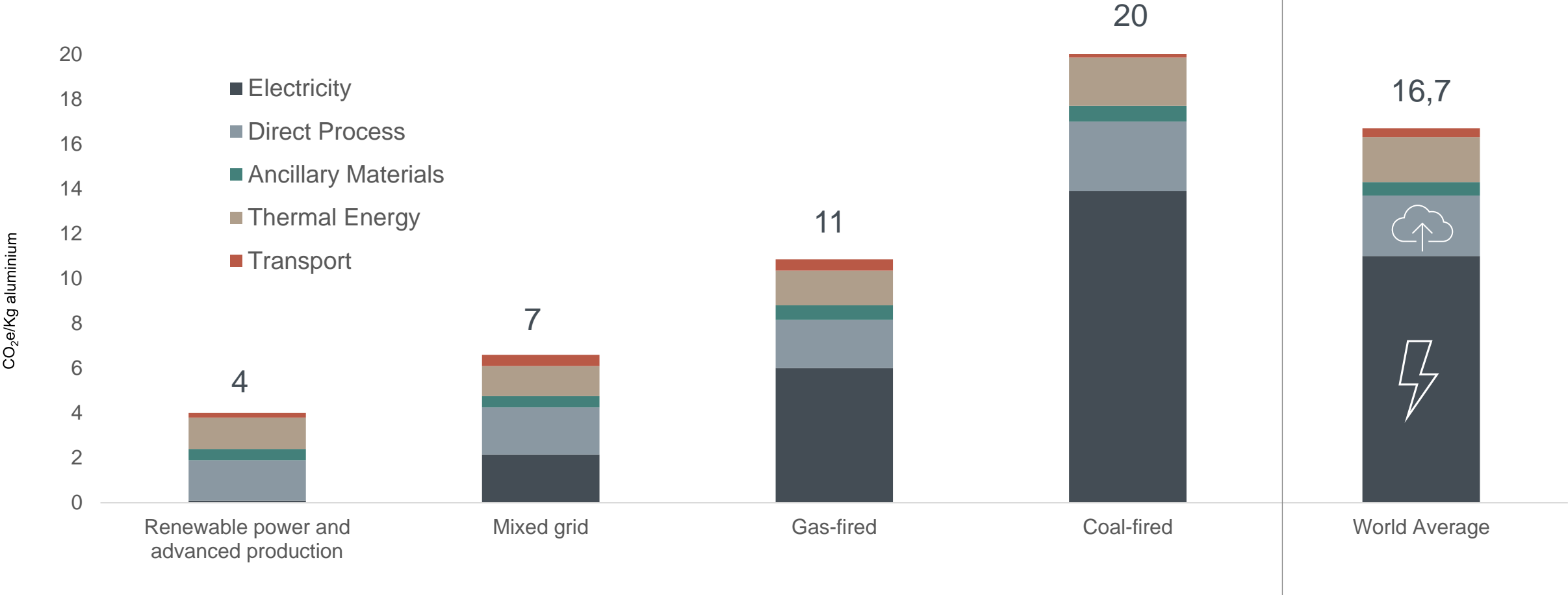
Source: CRU, Hydro Analysis, IAI



It matters where and how primary aluminium is produced



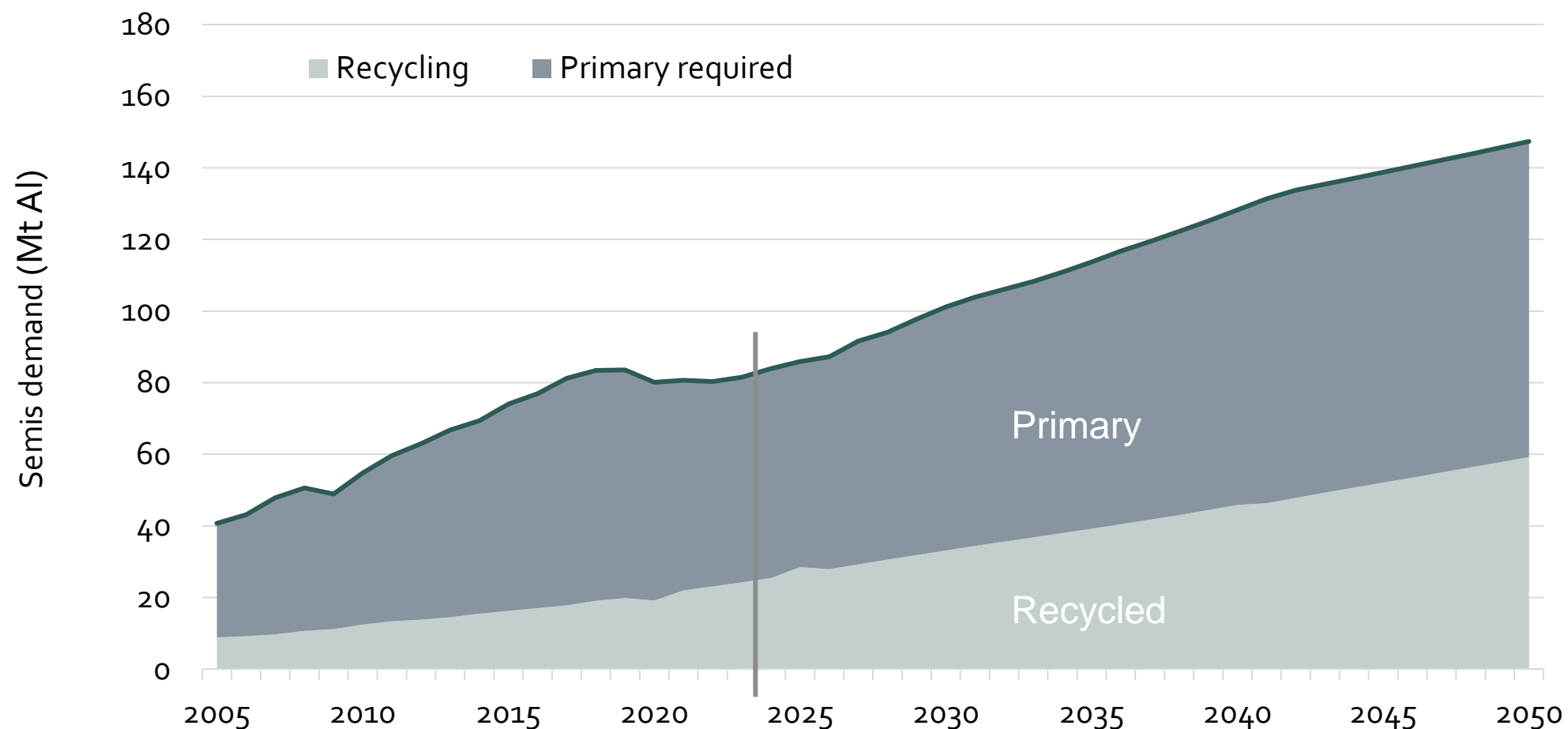
World average 2018 by power mix (IAI data)



Global Aluminium Supply Source

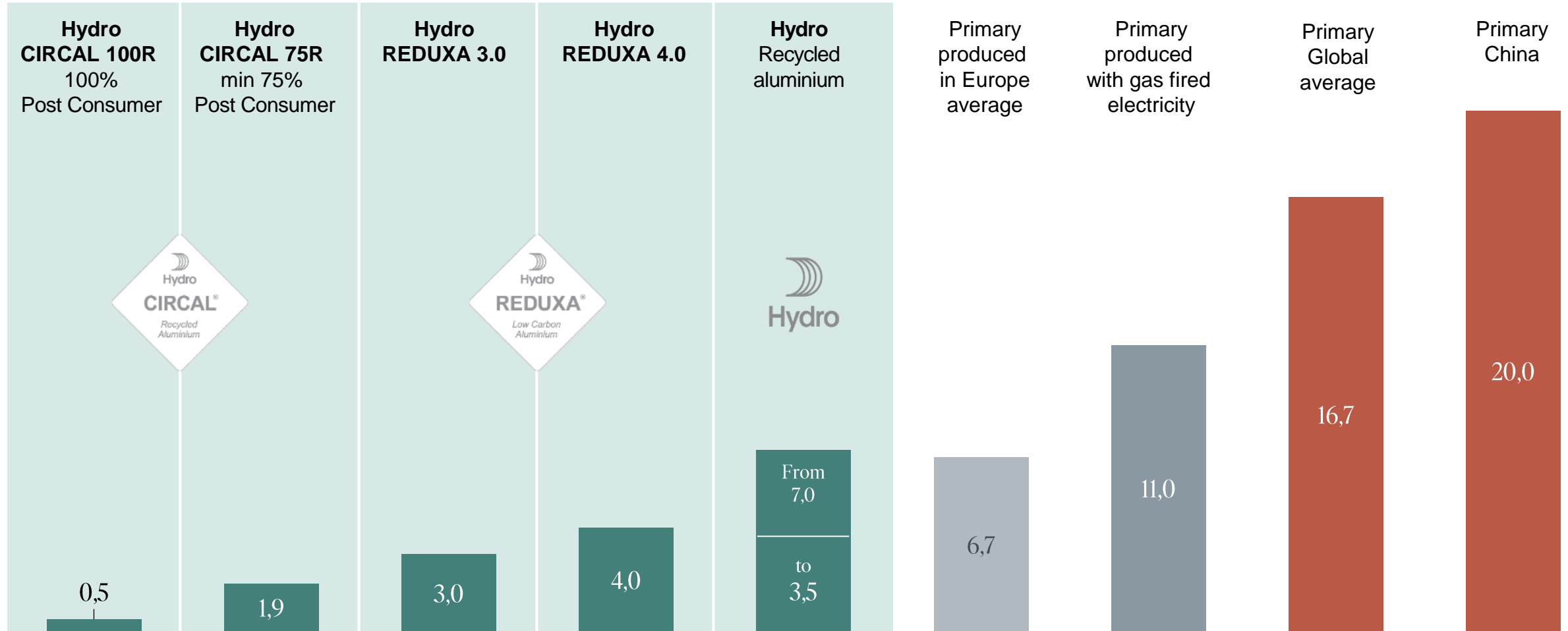


Source: IAI





Aluminium CO₂e footprints by origins



What is the production footprint in CO2 of a Volvo XC40 Recharge EV vehicle?



26.5
tCO2e

What is the production footprint in CO2 of a Volvo XC40 Recharge EV vehicle?

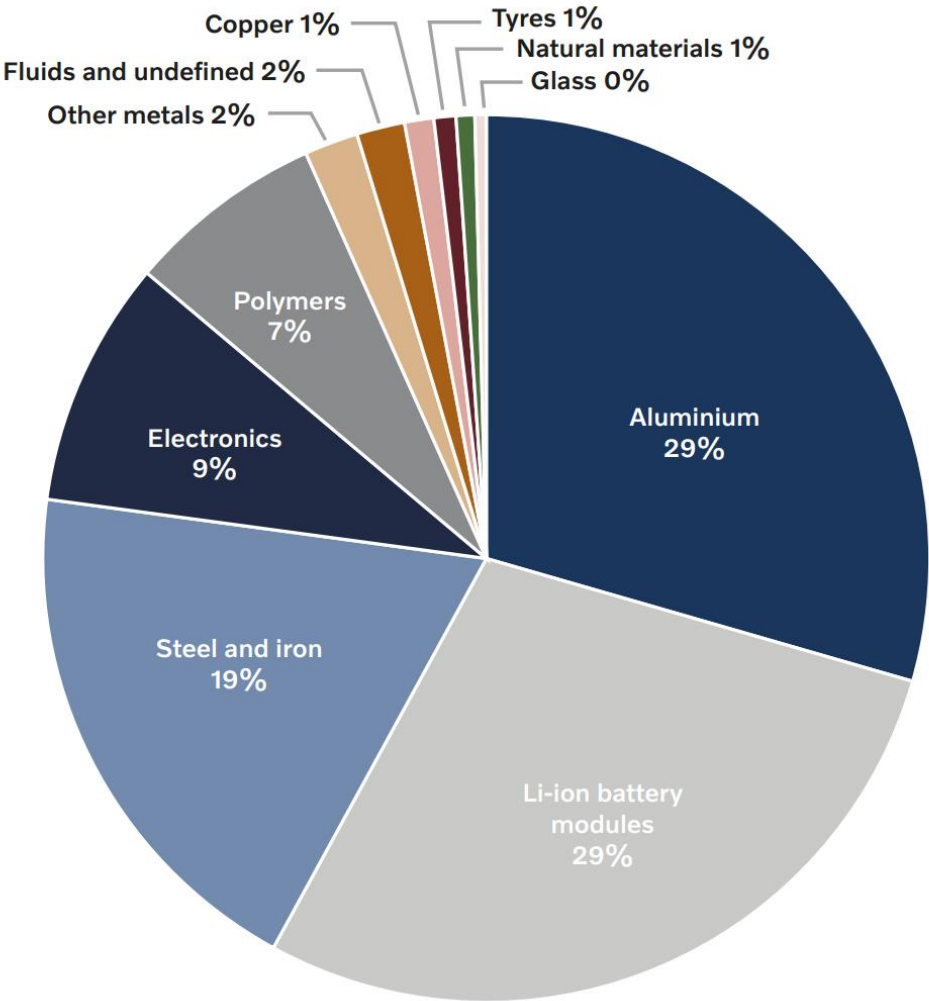


Figure 9. XC40 Recharge.
Contribution to GHG emissions from production of different material types and Li-ion battery modules in the “Materials production and refining” phase.

26.5
tCO2e

What is the construction footprint in CO₂ per m² horizontal surface of offices buildings?

0,6 – 1,5
tCO₂e/m²

facades &
fenestration
±15%



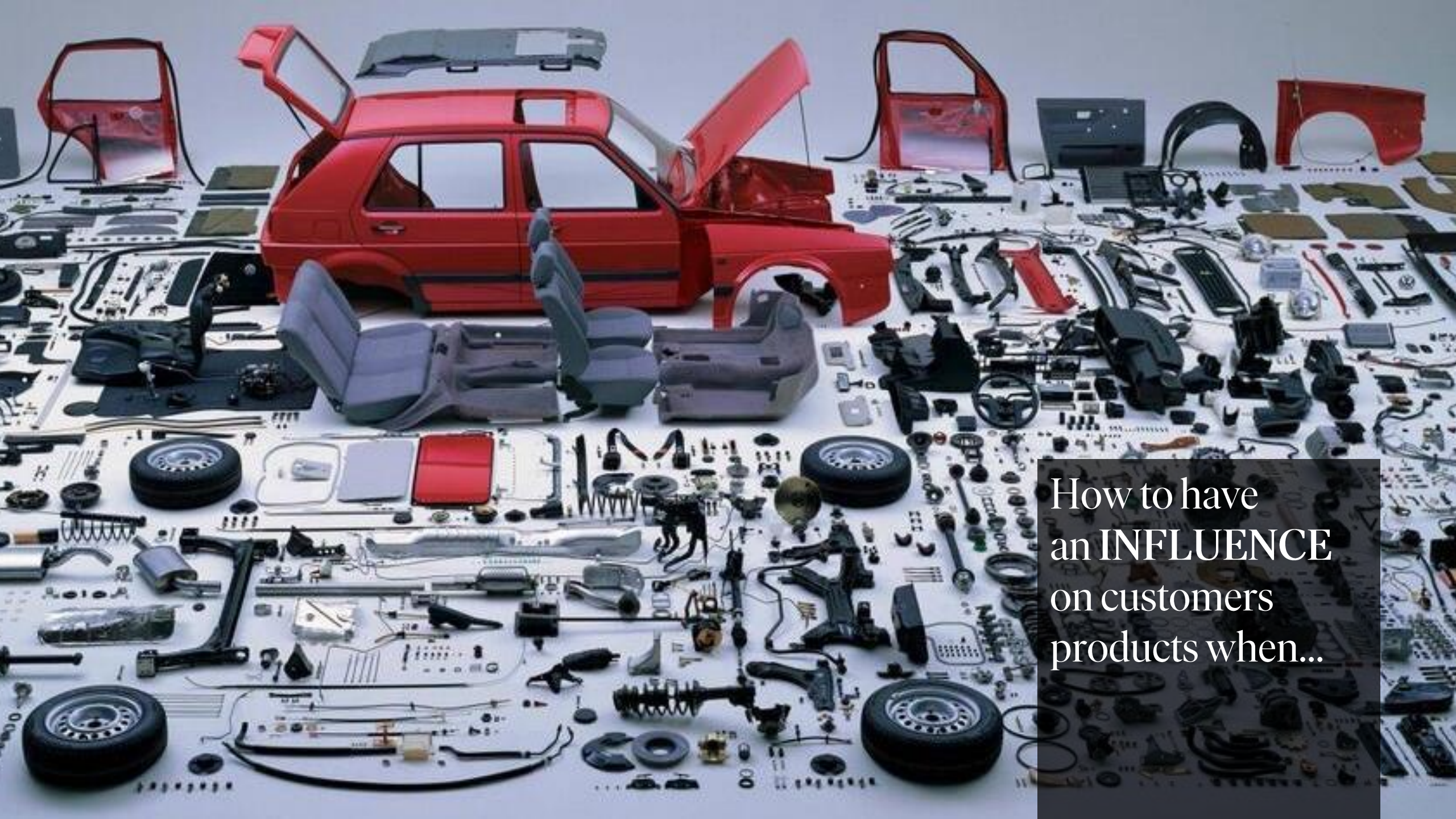
02

Design for Circularity



Which beer cup design has the less impacts on sustainability?





How to have
an **INFLUENCE**
on customers
products when...



Natural
resources are
by definition...
limited.



But virgin
materials
come with a
responsibility
and a footprint



Waste is a
material
without value,
without
identity.

How can you and
Hydro play a part and
succeed in this
context?



That's why we
believe
in aluminium as a
building block in a
low-carbon
society



Collaboration.

We work as partners
internally
and externally to unite
competencies and
create win-win
opportunities.

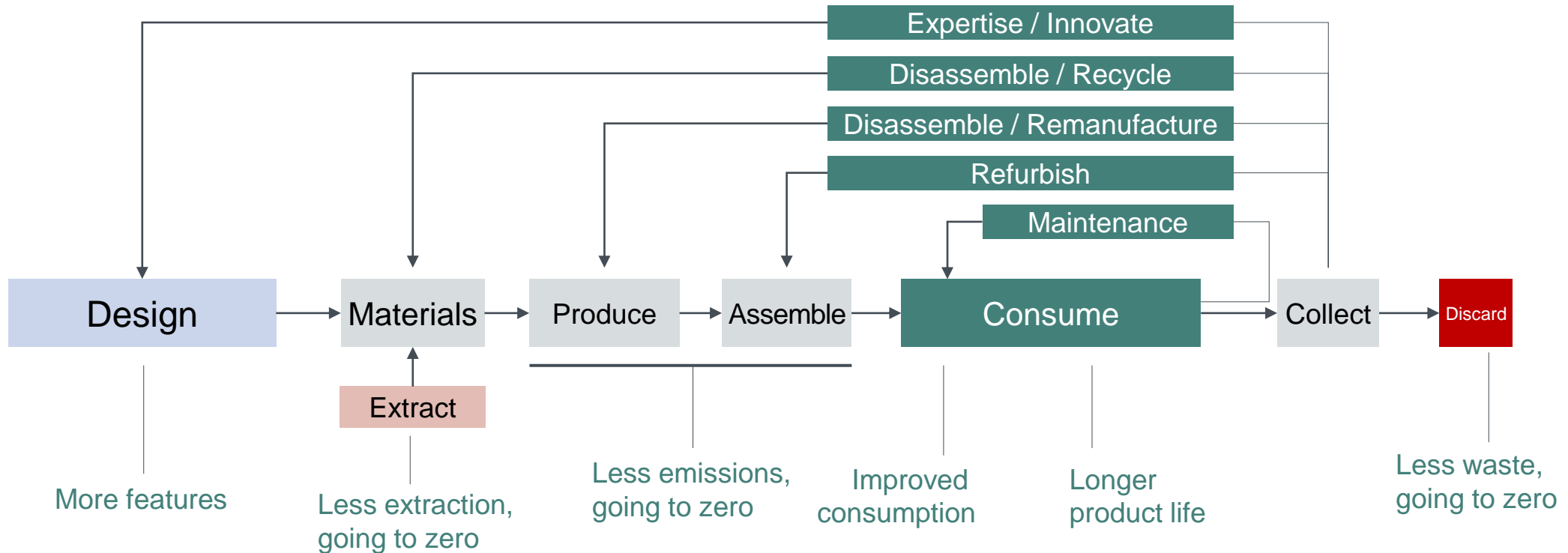




“Linear” Economy flow



Circular Economy flow



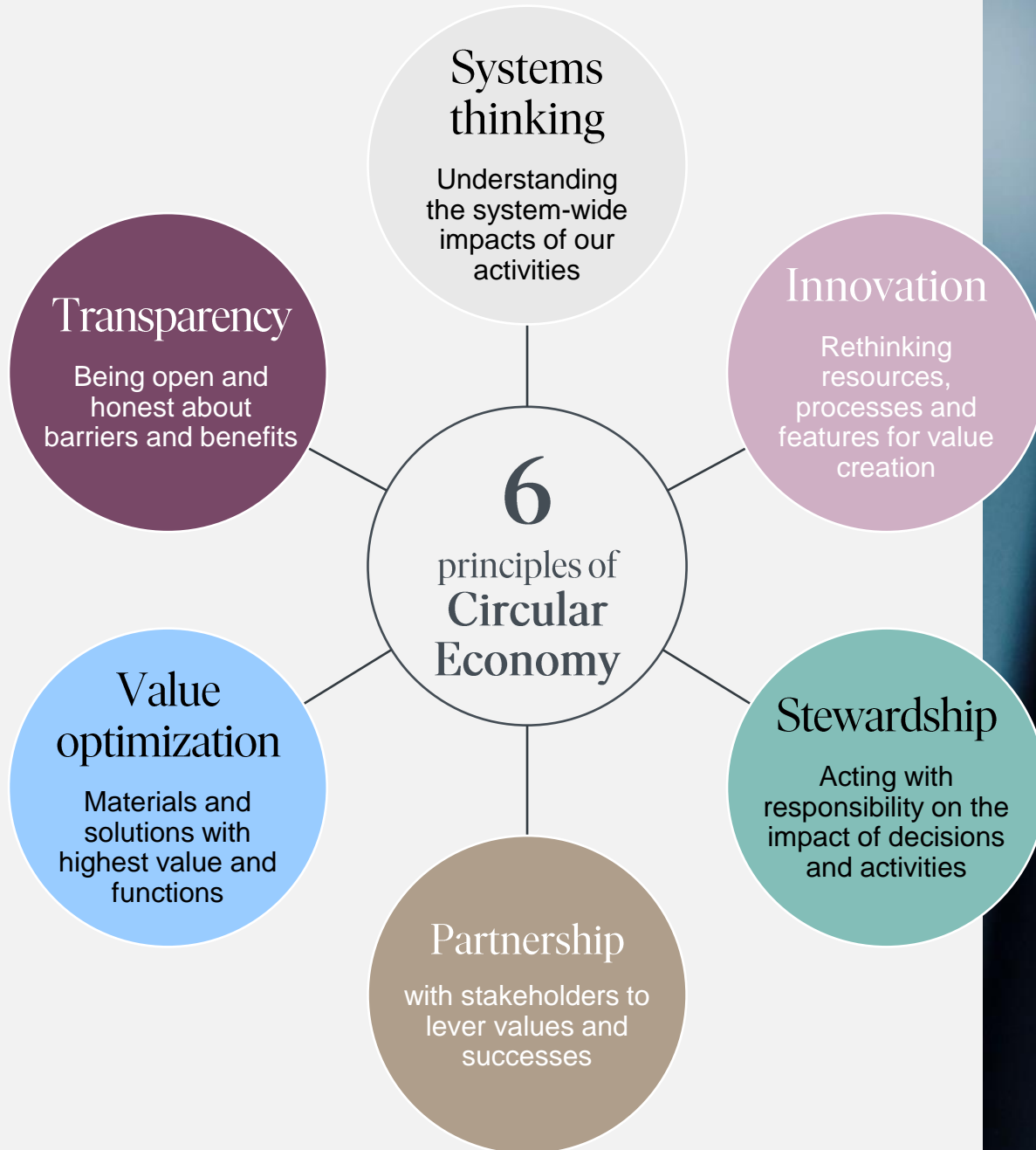
ENVIRONMENT : waste and impacts are reduced



SOCIAL : new activities + jobs ; health = more focus



GOVERNANCE: new business models; value better shared



Good Design

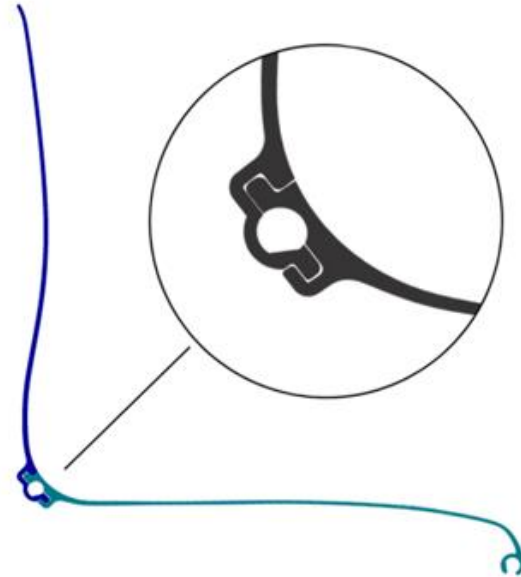
Understanding designers



Twist table from German designer Thomas Schnur

Example of EcoDesign (in aluminium this time ;-)

Blå Station



10 principles for Good Design



Dieter Rams *Ten Principles for Good Design*

1. IS INNOVATIVE.
2. MAKES A PRODUCT USEFULL
3. IS AESTHETIC
4. MAKES A PRODCUT UNDERSTANDABLE
5. IS UNOBTRUSIVE
6. IS HONEST
7. IS LONG_LASTING
8. IS THOROUGH DOWN THE LAST DETAIL
9. **IS ENVIRONMENTAL FRIENDLY**
10. IS A LITTLE DESIGN AS POSSIBLE



BURGER KING



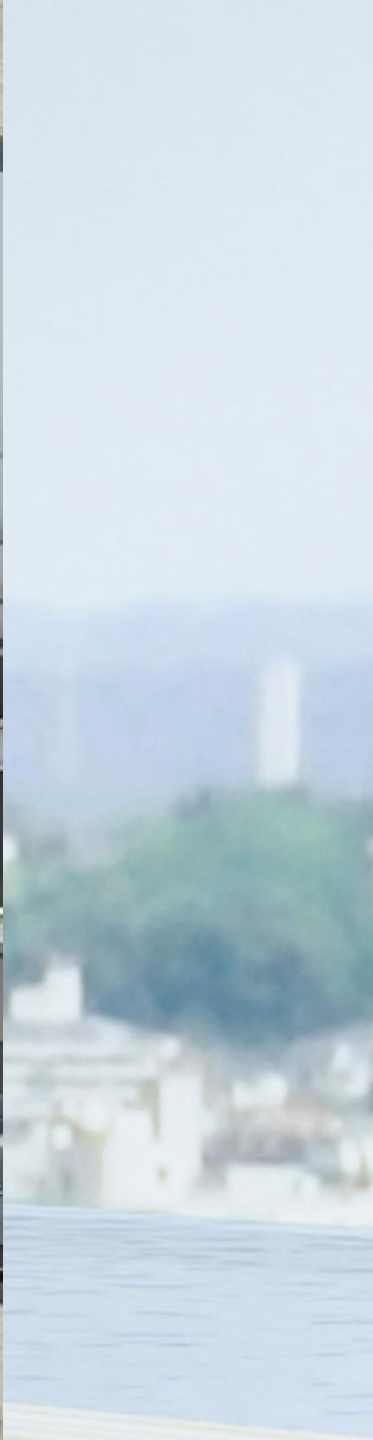


1958



2001





red^{dot} design award
winner 2018



DESIGN
AWARD
2018

Ecodesign: definition

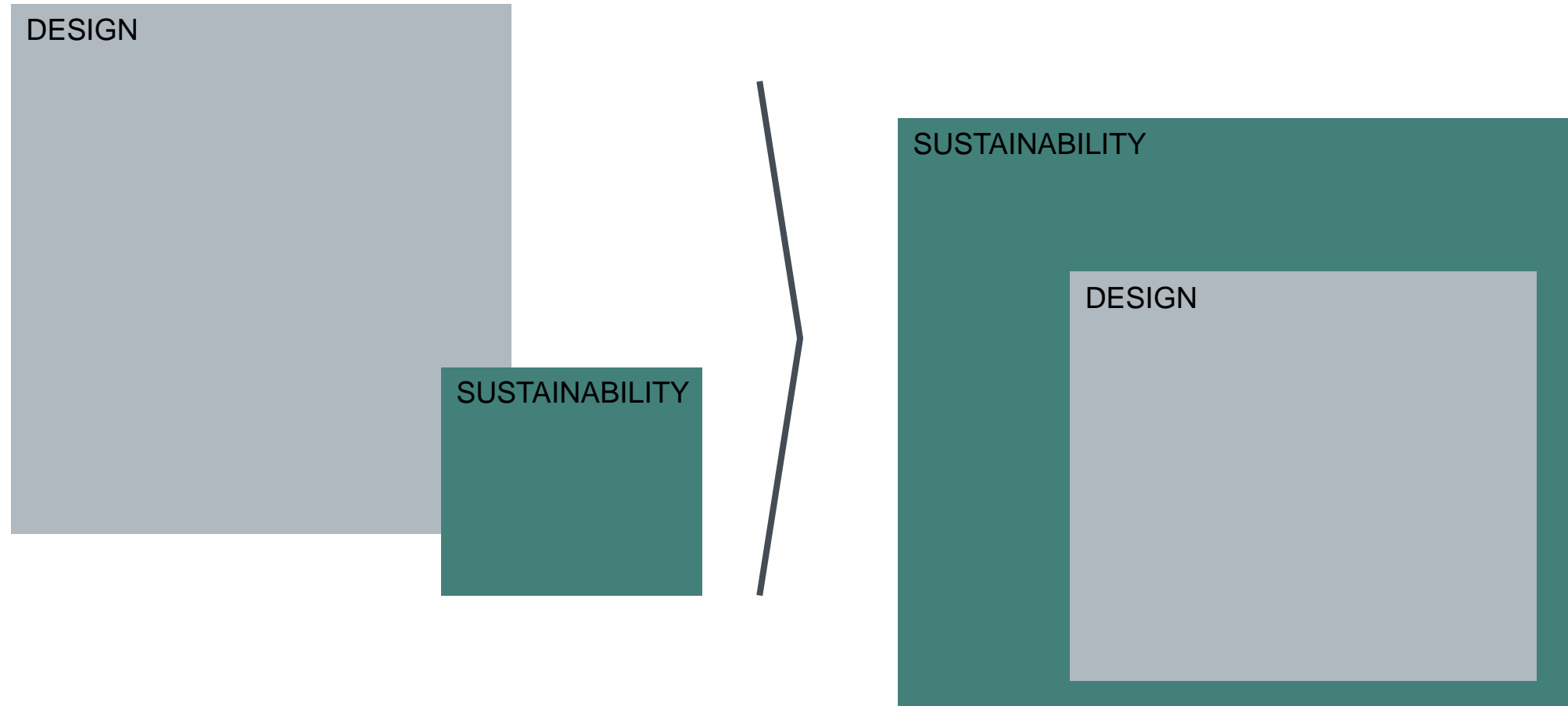
“any form of design that minimizes environmentally destructive impacts by integrating itself with living processes.”


1996,
Sim Van der Ryn and Dr. Stuart Cowan

Ecodesign is an approach to design with special consideration for the **health of people** and **environmental impacts** of the product **during its full lifecycle.**



In Ecodesign, sustainability must be part of design



The image shows two men standing in a modern, brightly lit exhibition space. The man on the left is wearing a dark blue button-down shirt and dark trousers, with his hands behind his back. The man on the right is wearing a blue blazer over a light blue shirt and dark trousers, smiling. In the background, there are several motorcycles on display, including a yellow one and a blue one. The wall behind them is white with a grid pattern and features three framed nature photographs. The floor is highly reflective.

Our modern
Responsibility
as engineers

Integrate ESG criterias
into the product
development process

10 rules for Ecodesign

1. **TOXICITY.** Limit the use of toxic substances and, where such substances are essential, try to arrange closed material loops.
2. **HOUSEKEEPING.** Review your routines to minimize energy and resource consumption in production and transport.
3. **WEIGHT.** Choose materials and designs that minimize the weight of the product.
4. **ENERGY.** Think about how the end product will be used and try to minimize the user's energy and resource consumption.
5. **UPGRADING.** Design the product to allow upgrading and repair, especially for long lifespan and system-dependent products.
6. **LIFETIME.** Optimize the product for its intended working life.
7. **PROTECTION.** Invest in durable materials and surface treatments to protect the product.
8. **INFORMATION.** Prepare for upgrading, repair and recycling through accessibility, labeling, modular construction and manuals.
9. **MIX.** Remember that mixing materials affects recyclability. Try to use as few materials as possible in simple forms.
10. **CONSTRUCTION.** Use as few joining elements as possible, avoid the unnecessary use of screws and bonding, and look for intelligent geometric solutions.



10 golden rules for Ecodesign



10 rules for DfD



Hvdro

10 advices for Design for Disassembly



RICHARD HALLETT

1. **KNOW THE FIELD** by visiting recycling facilities, talking to specialists, strippers, repair companies: this will give valuable insight information
2. **DOCUMENT** create docs on materials, and processes. Prepare your bill of materials and communicate it accordingly, so the “stripper” knows what he will have in hands
3. **DOCUMENT MORE** provide a disassembly (/deconstruction) manual, especially when specific or delicate operations are required. Mention any hazard that could occur during operations
4. **SIMPLE TOOLING** whenever possible, unless security and safety is involved, favor standard tooling, and limit fasteners types and dimensions
5. **LIMIT MATERIALS** limiting materials make a product easier to sort and recycled once disassembled.
6. **LIMIT PERMANENT FIXES** Glues and sealants make separation and recycling more difficult, and some of them increase the ecological risk
7. **CLEVER MARKINGS** labeling and markings of connections and materials contribute to efficient disassembly, reassembly and deconstruction.
8. **EASY ACCESS TO PARTS** will make operations faster and safer, eg by allowing space for tooling insertion and movements
9. **AVOID DANGEROUS STUFF** select materials using the precautionary principle, with consideration for future impacts. Materials that are not harmful for the people & environment, that have high quality and will retain value for recycling or reuse.
10. **MODULARITY** use elements, shapes and materials that endorse interchangeability, modularity and standardization to facilitate product durability, maintenance, reuse, repair.

Hydro Ecodesign



Designing for circularity, durability and recycling

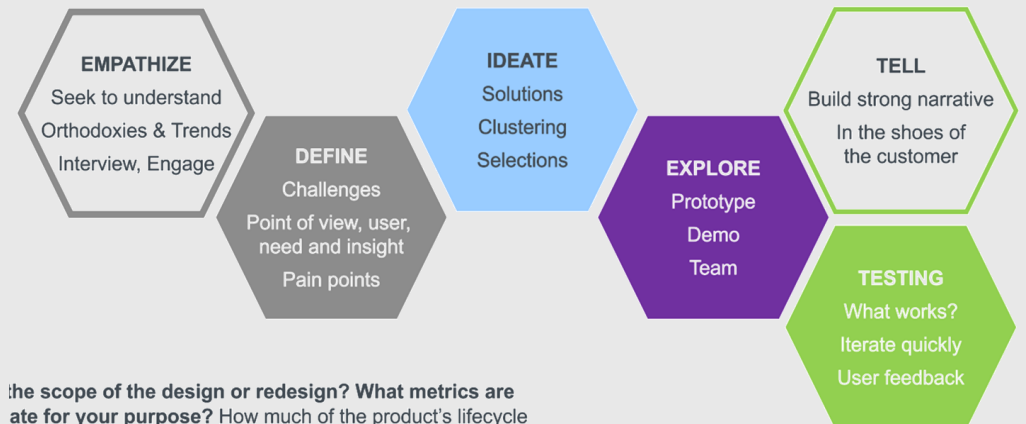


Hydro EcoDesign products
contribute actively to
environmental- and human
well-being, functionality and
circular economy by design



Innovative Design, Safe Materials,
Intelligently Cycled

Workshops with customers



What is the scope of the design or redesign? What metrics are used to measure success? How much of the product's lifecycle does it reflect? Is it for a material, component or complete system? Do

LCA – Life Cycle Assessment
Ecodesignable? Engineering design rules
Alloys catalogue – Selection guide
Ideas and case sharing

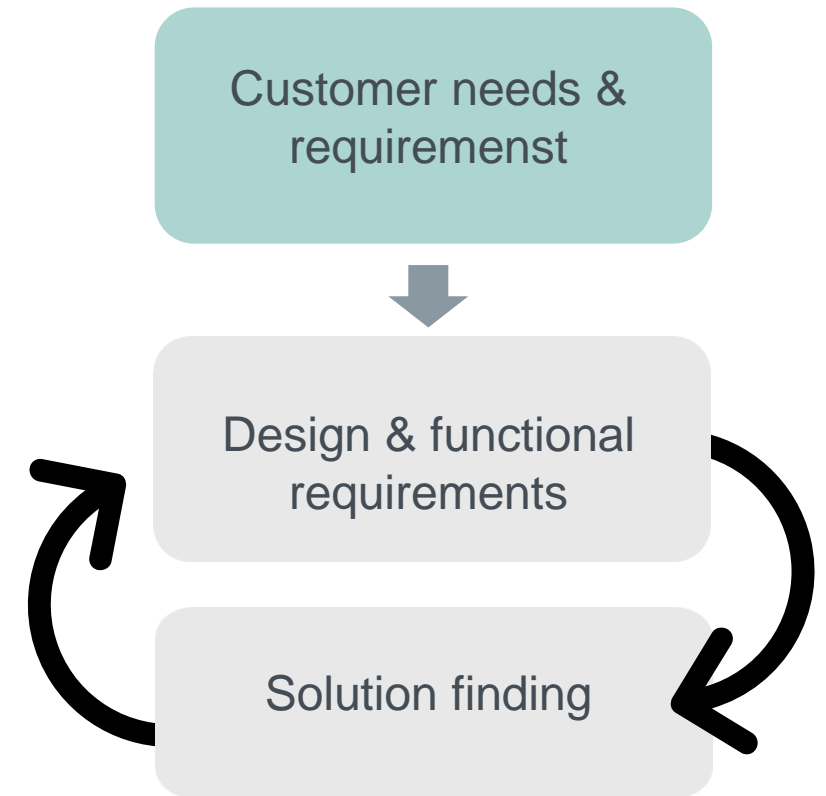
YOUR re-design in focus

New Product Development Process



Environmental requirements

- Saved 30% weight
- Reused packaging material
- Recycled material XX%
- Surface treatment for 10 years extended use phase
- Easy to assemble, fast to disassemble, marked parts
- Product passport with infos and certificates on materials







The fast-food industry shows consumers that a standard product represents on average **600 kCal**



We want to say to our customers that we produce a **better** product with **better** ingredients, **from efficient operations**, and we want our customers to know it is making their products better and helps global sustainability

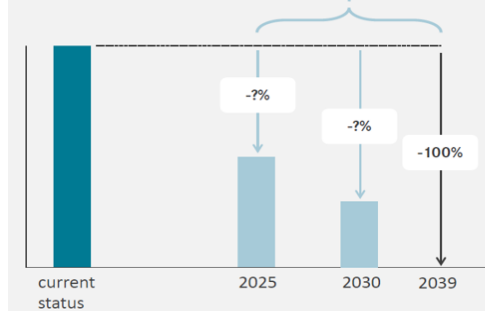




Template: measures for CO₂ reduction (all future Mercedes-Benz parts)

We aim to procure CO₂-neutral products. Therefore we expect from our suppliers to follow our Ambition 2039. Which measures do you plan to implement to deliver CO₂ neutral products latest by 2039 (with regards to all future products delivered to Mercedes-Benz AG)?

Product-specific CO₂ footprint



Mercedes-Benz

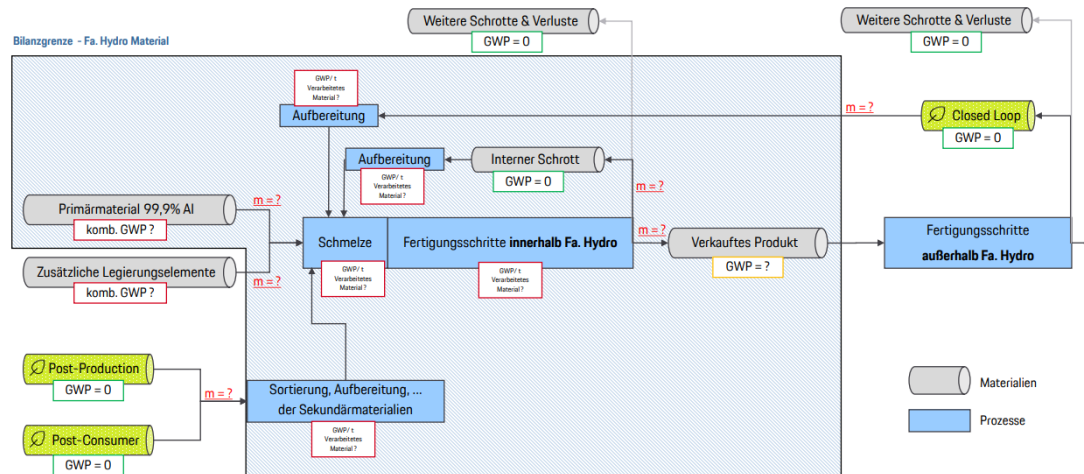
Reduction measures concerning own processes and sites	CO ₂ reductions	2025	2030	2039
	reduction of (%)			
	reduction of (%)			
	reduction of (%)			
Reduction measures concerning energy inputs:				
	reduction of (%)			
	reduction of (%)			
	reduction of (%)			
Reduction measures concerning inputs and purchased goods:				
	reduction of (%)			
	reduction of (%)			
	reduction of (%)			
TOTAL	reduction of (%)			

2

Spezifisches Schaubild für Fa. Hydro

Definitionen auf vorheriger Seite
Berechnungsformel auf nächster Seite

Draft



Philipp Müller, Uwe Wawers, Gilbert Schu, Patrick Haun

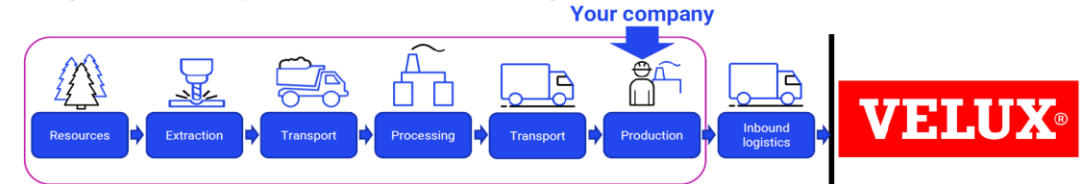
PORSCHE

5

What should the carbon footprint data you provide to VELUX include and exclude?



To align with the SBTi's requirements, VELUX needs the following information:



'Cradle to gate' carbon emissions associated with a unit of product procured by VELUX

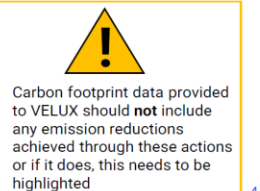
VELUX's climate commitments require decarbonisation of the 'cradle to gate' supply chain emissions related to purchased products and materials.

This CAN be achieved by:

- Reductions through emissions reductions initiatives (e.g. energy efficiency)
- Reductions through procurement and use of renewable energy (in line with relevant emissions accounting guidance¹)

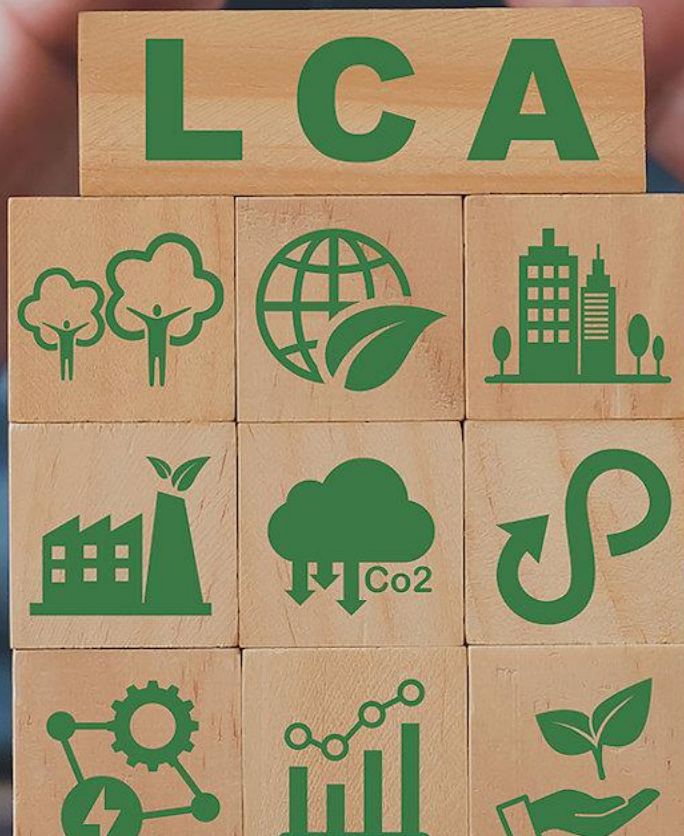
This CANNOT be achieved by: (but still good practice)

- Carbon credits/carbon offsets
- Greenhouse gas removals (including biogenic removals)
- Accounting for avoided emissions

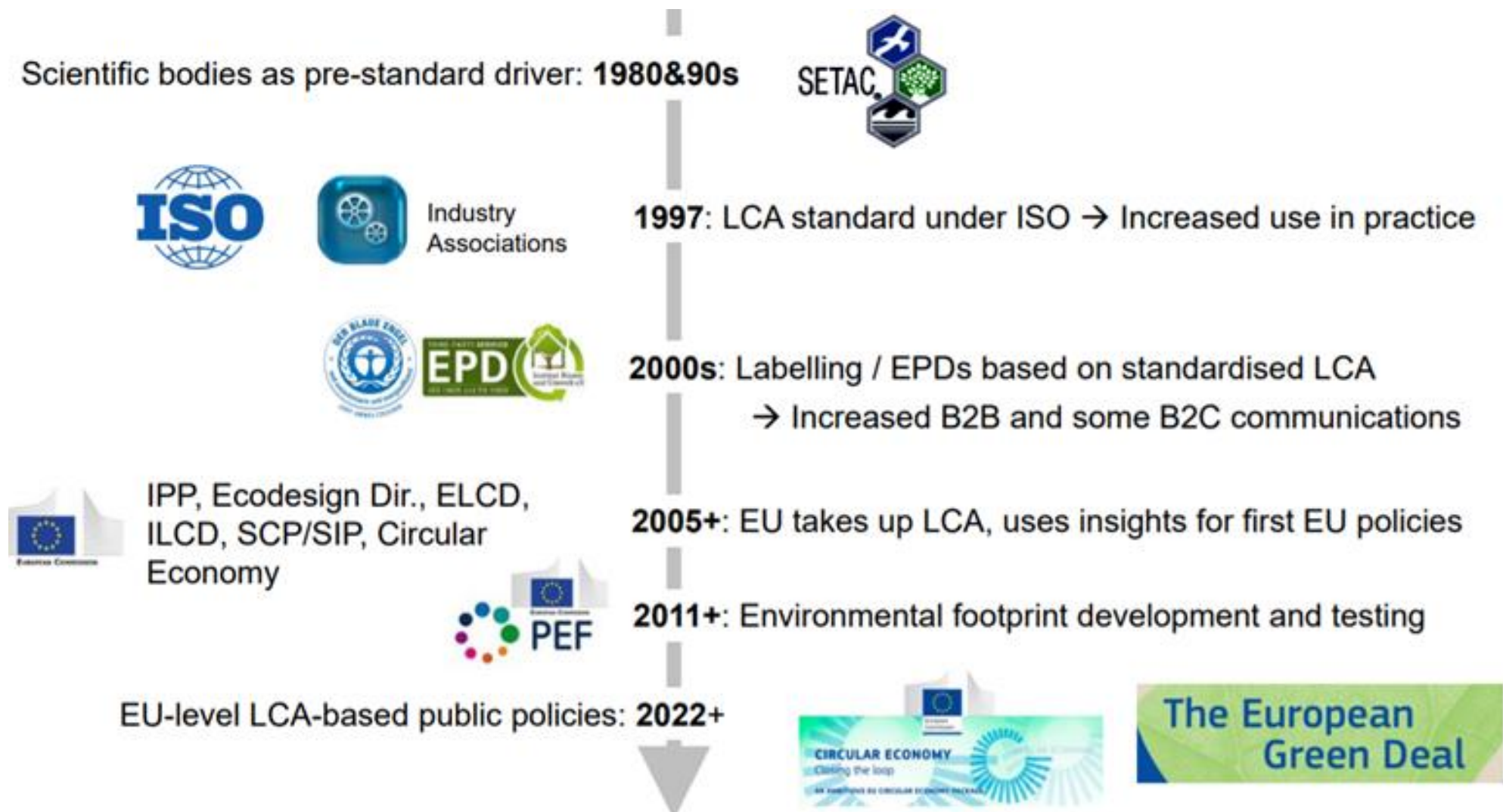


4

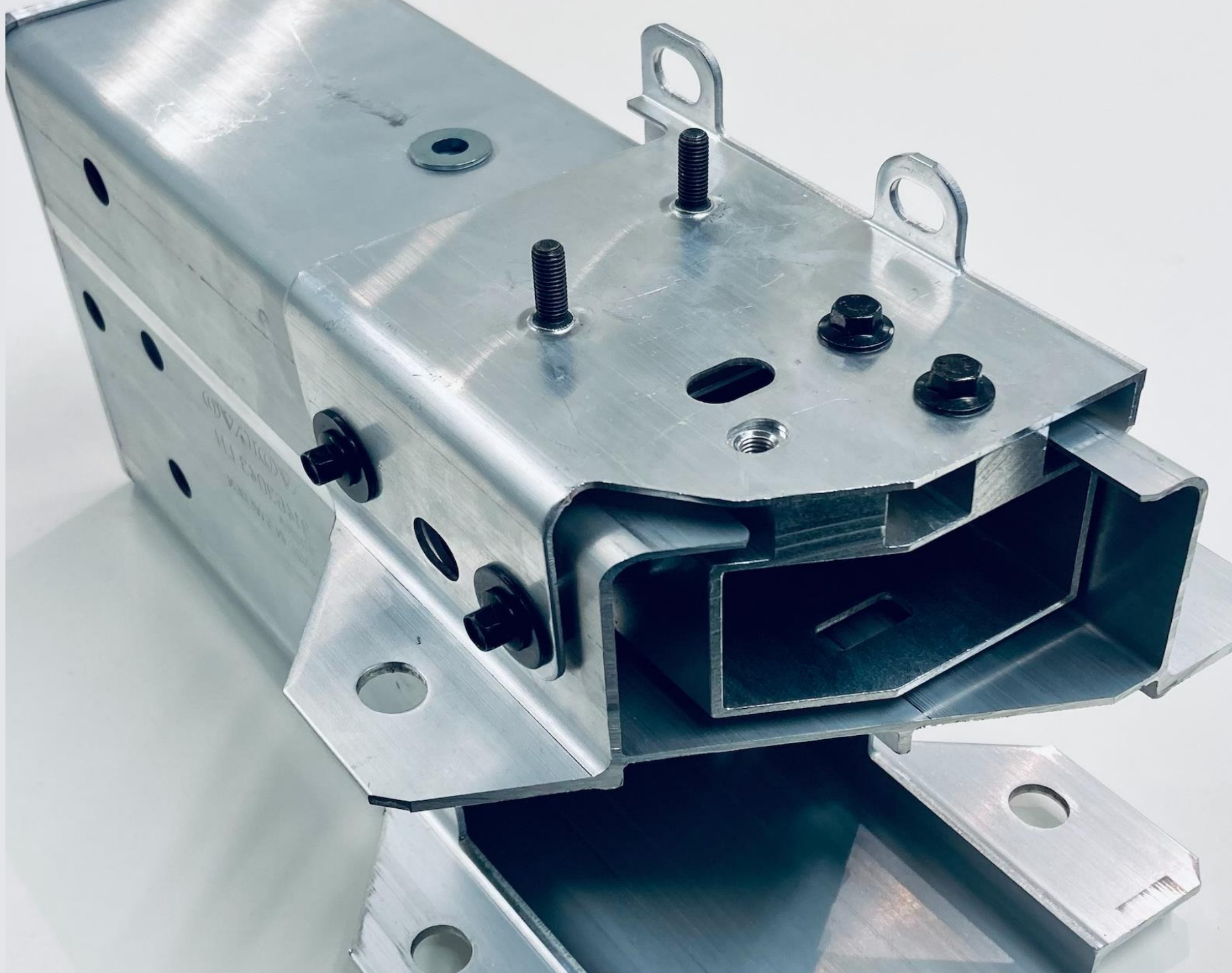
1. Accounting for renewable energy should follow the GHG Protocol's guidance found in ch.7 of the [Corporate Standard - Scope 2 Guidance](#).



What is Life Cycle Assessment (LCA) ?

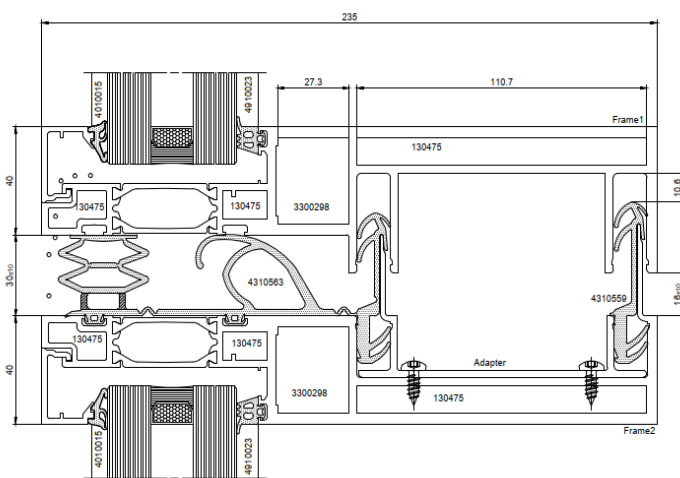
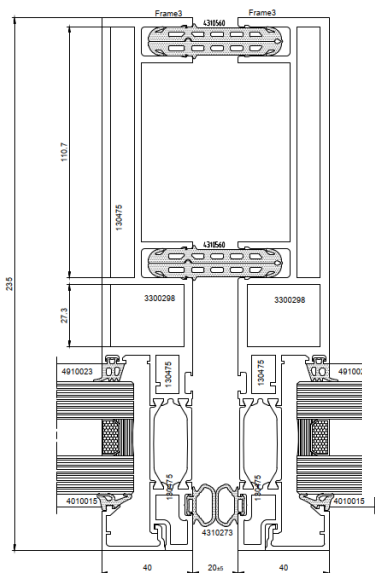




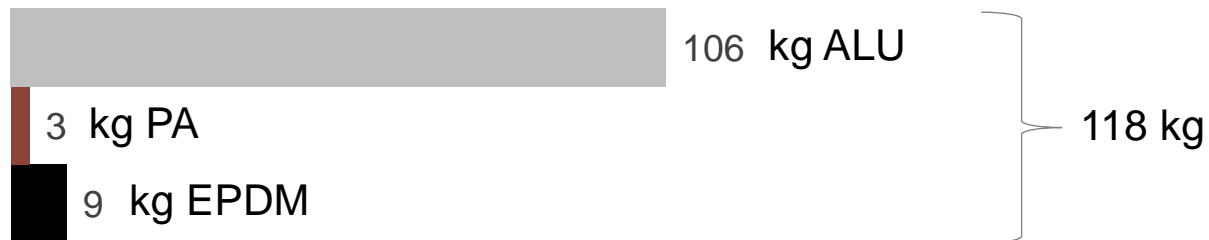








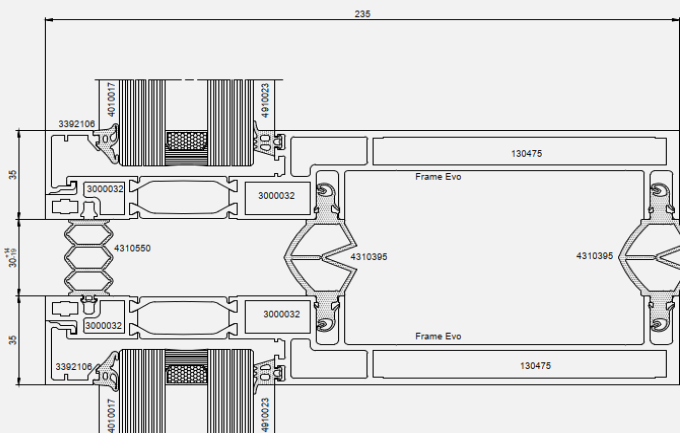
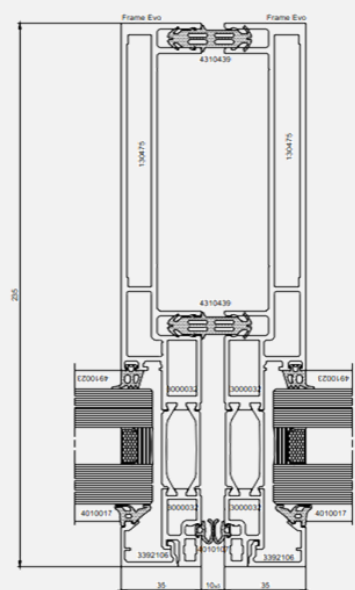
Traditional design



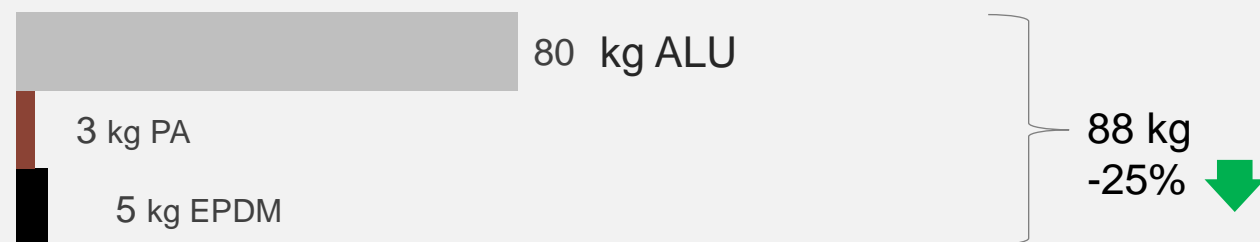
2124 kg CO2 for ALU *produced in China*

1166 kg CO2 for ALU produced with gaz-fired electricity

26 kg CO2 for PA
34 kg CO2 for EPDM



Engineered design
with Hydro teams



Low carbon
CIRCAL 186

319 kg CO2e



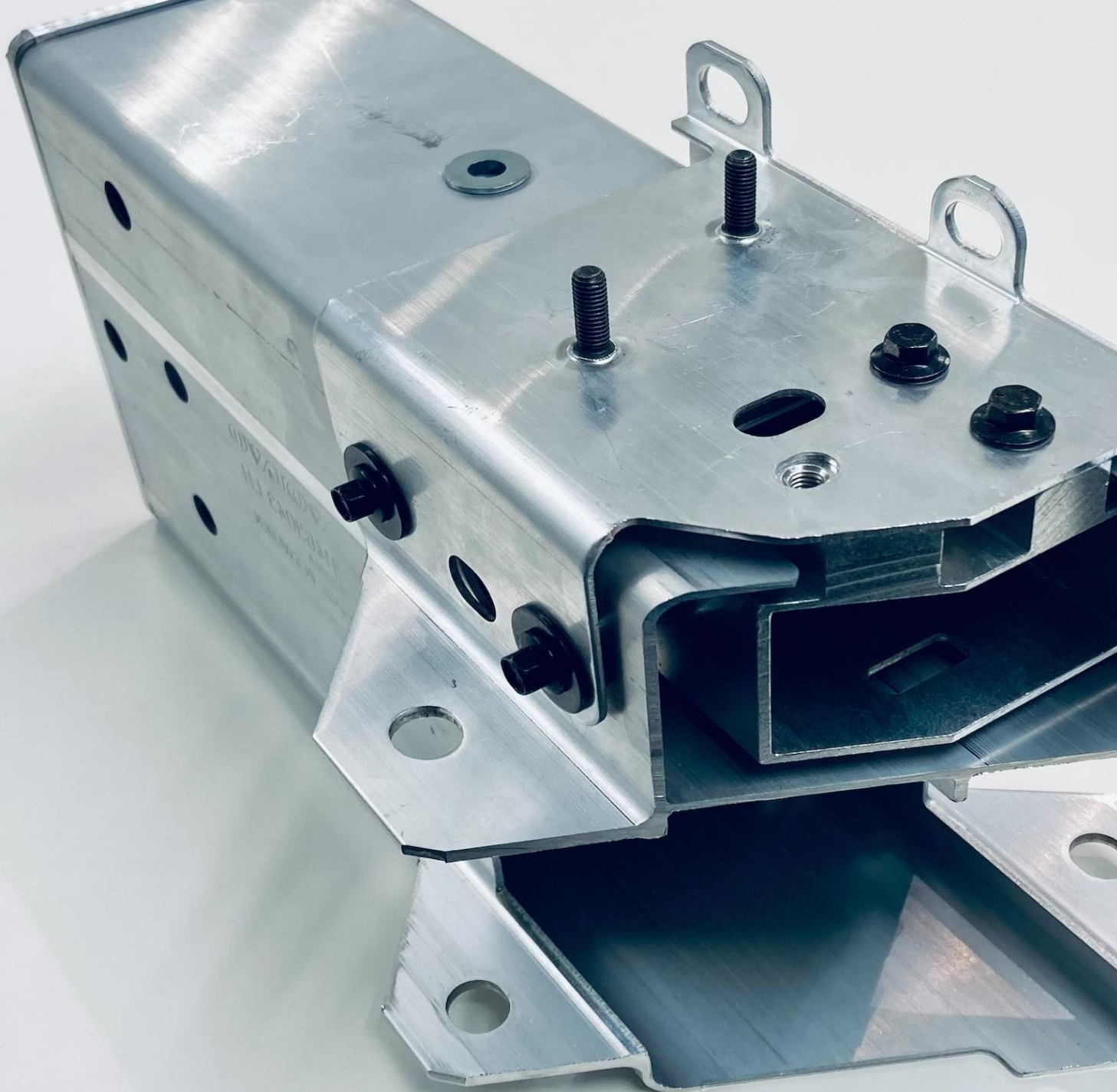
2,5 ↓
19 ↓

LCA

International:
ISO 14040/44, ISO 21930

In Europe:
EN 15804, PEF

- Mass based and cut-off allocation methods
- Transparency on pre + post consumer scraps
- Particular attention for data sensitivity





But virgin
materials
come with a
broader footprint



Sustainably **sourced**
and **produced**
aluminium products?







PTM 2

LECOM









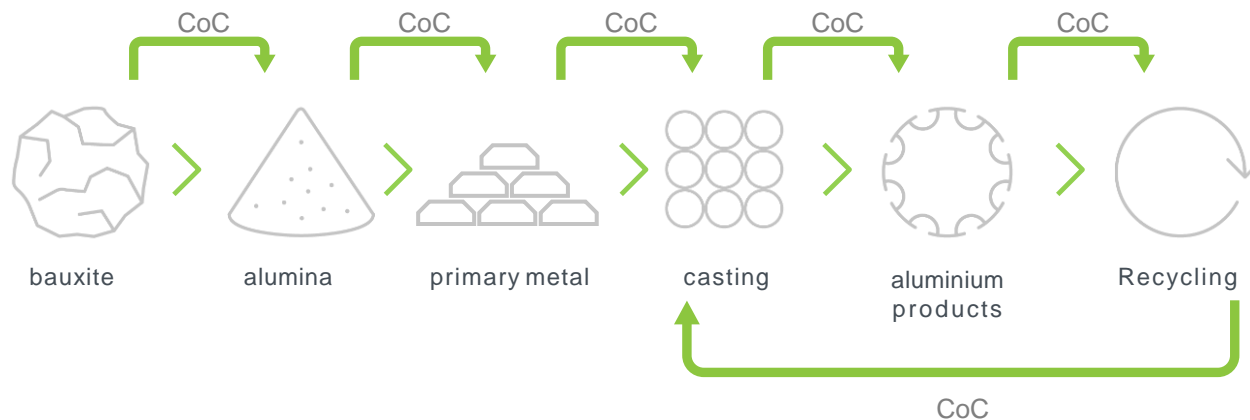
Full value chain
ESG certification
makes a difference

asi  **Aluminium**
Stewardship
Initiative

Aluminum Stewardship Initiative

Independent sustainability certification program

Independent certification scheme that covers the entire value chain of aluminum to address sustainability challenges from an Environment, Social and Governance (ESG) perspective.



asi Aluminium
Stewardship
Initiative

ISO standards define 3 types of ecolabels

ISO 14020 Environmental labels and declarations

Type 1



14024

Seal of Approval

- Demonstrate a superior performance
- Easy identification of products that meet certain, predefined, environmental relevant multiple criteria's
- Third party certified
- Lack of comparability of type 1 labels



Type 2



14021

Self-declared Claim

- Informative environmental self declaration,
- Single/Multiple criteria's
- Flexible, but requires expertise to be solid
- There is no independent examination and no evaluation, it is the responsibility of the manufacturer to say that " $a+b = eco$ "



Type 3



14025

Environmental Product Declaration

- Provides quantified environmental information over the life cycle of a product
- Based on Life Cycle Assessment
- Product category rules
- Third party certified
- Allows comparisons to be made between products that serve the same function





Infinitely recyclable – a high recycling rate



One of the world's largest energy reserves, increasingly utilized through urban mining and recycling



5%

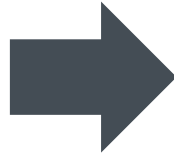
of original energy
use to recycle

90+%

Recycling rates of
aluminium
in **automotive** and
construction

Is everything recyclable?

Many materials
are recyclable,
but it is essential
to make a clear
distinction
between two
categories





A. Recycling that leads to the gradual degradation of the material and its characteristics



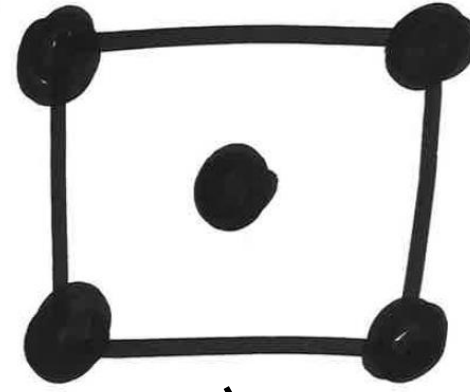
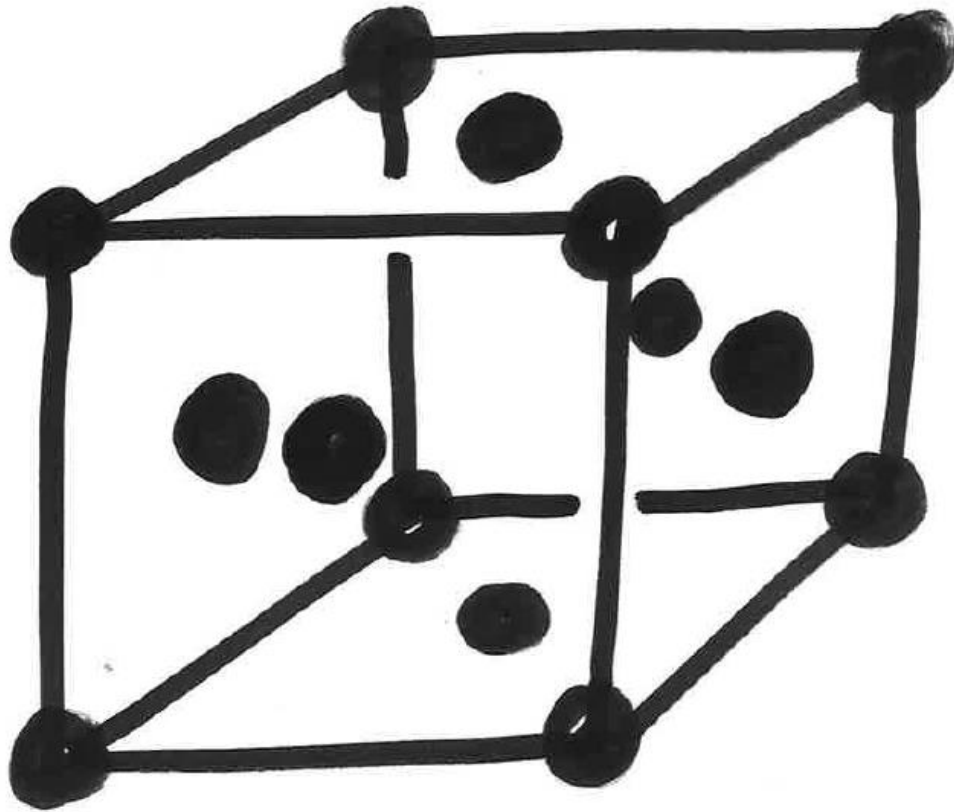
B. Recycling that keeps the material without losing its intrinsic material characteristics = a **permanent material**.



A close-up photograph of an aluminum extrusion profile. The profile is silver-colored and has a series of rectangular fins along its top edge. On the side of the profile, there is a black logo consisting of three curved lines forming a stylized 'H' shape, with the word 'HYDRO' written in small capital letters below it. To the right of the logo, the identification code '50472 A-S7G03Sr' is printed in a large, bold, sans-serif font. The background is a light, neutral color.

 50472 A-S7G03Sr

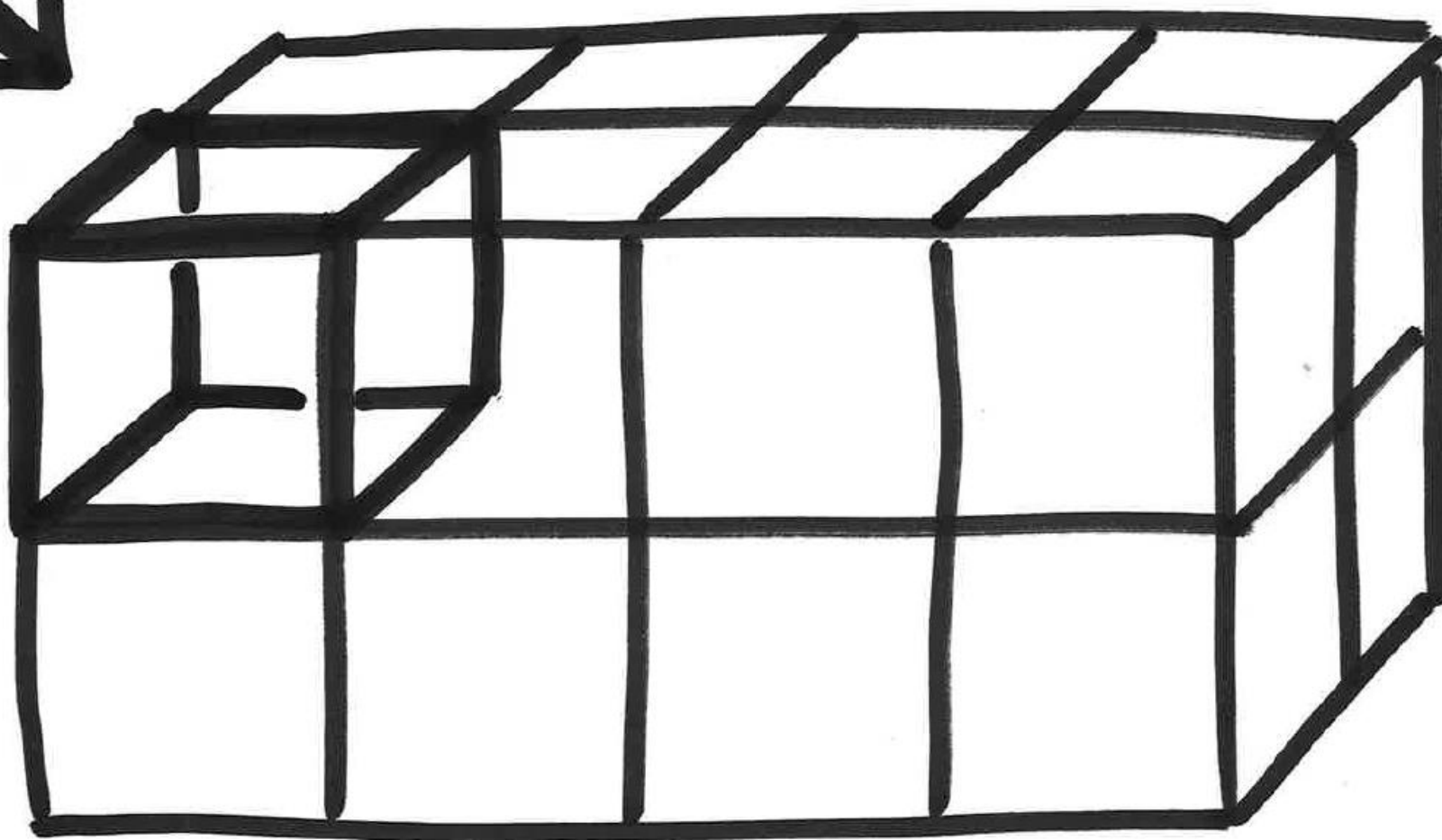
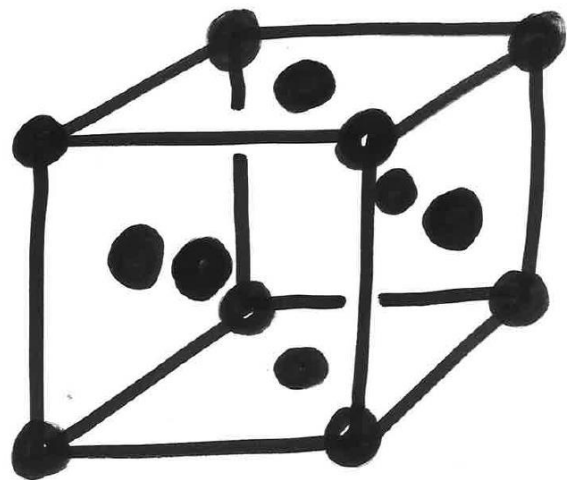
Why is it
so easy
to recycle
aluminium?



metallic bond
strong attractive
force

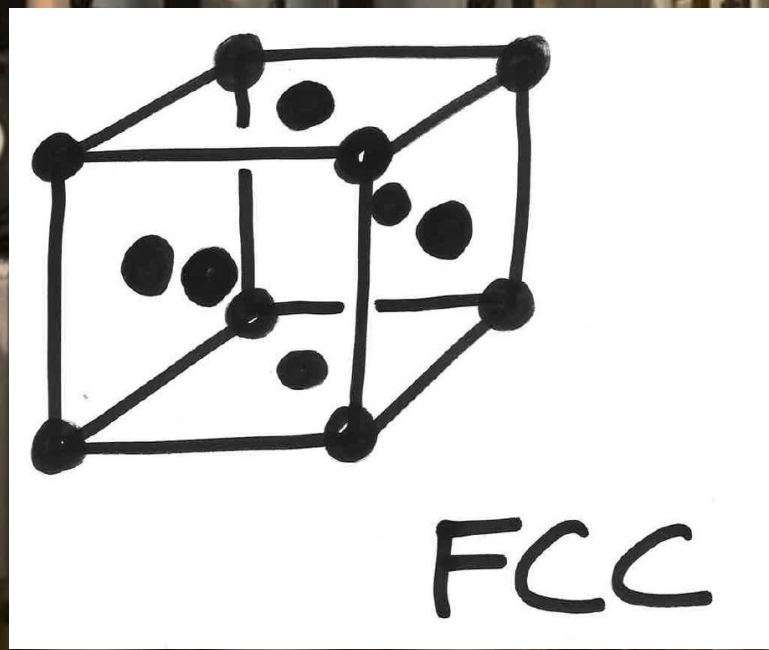
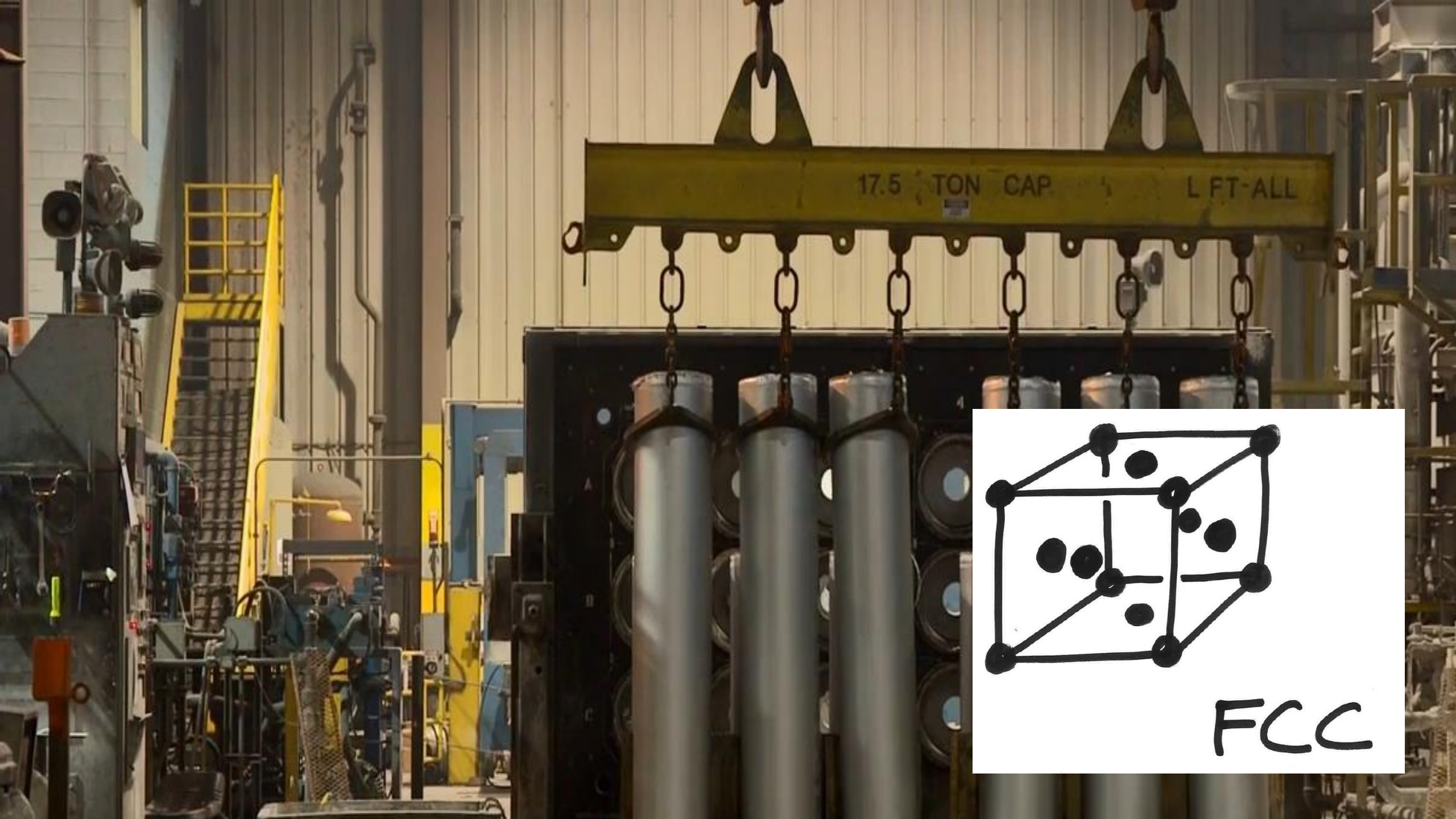
FCC

Face Centered Cubic

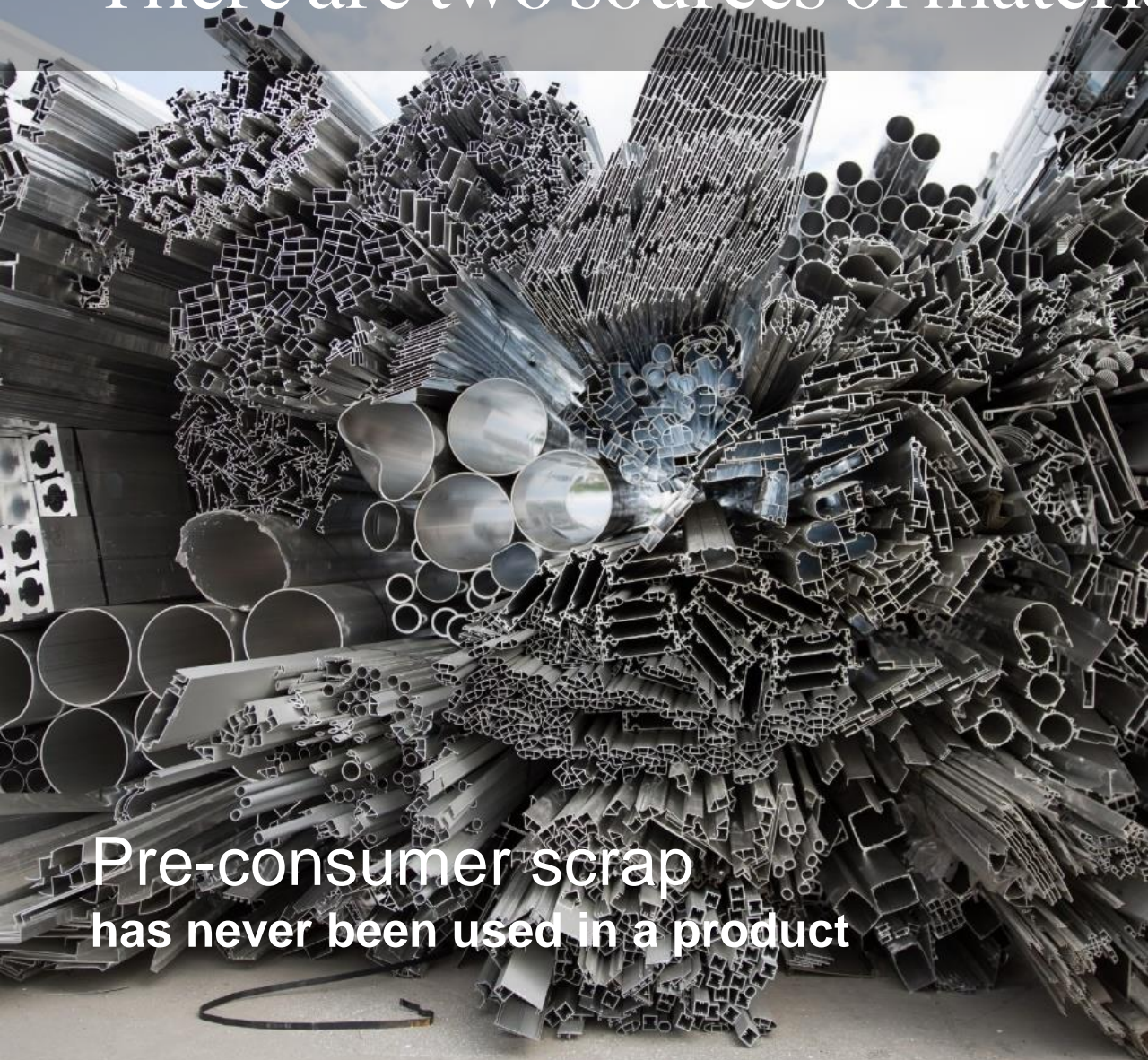


Liquid aluminium:
amorphous state =
disordered atomic-
scale structure.





There are two sources of materials for recycling



Pre-consumer scrap
has never been used in a product



Post-consumer scrap
has been used by consumers before











Aspire Vero -A Green PC
#MakeYourGreenMark



Aspire Vero



Hydro

Industries that matter