Fordonsstrategisk Forskning och Innovation

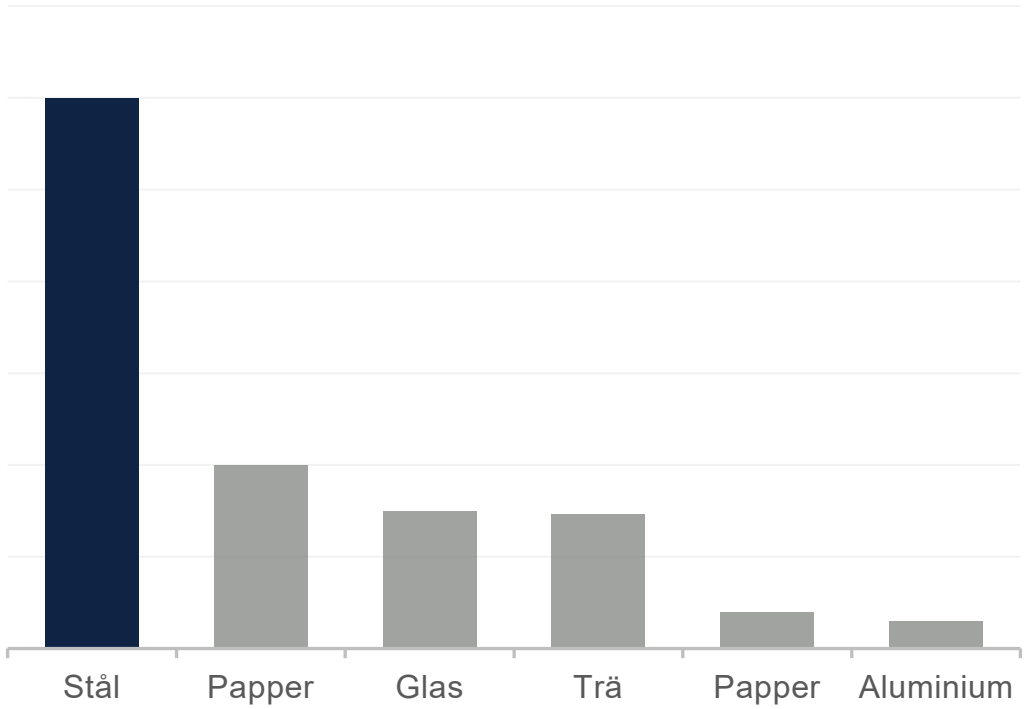
FFI Cirkularitet den 28 maj 2024

The Circular Car – vägen till klimatneutrala transporter?


Mot en fossilfri framtid
Där masugn byts mot ljusbågsugn och råvaran finns i cirkulerat material samt fossilfri direktreducerad malm

Stål är världens mest cirkulära material

100% återvinningsbart



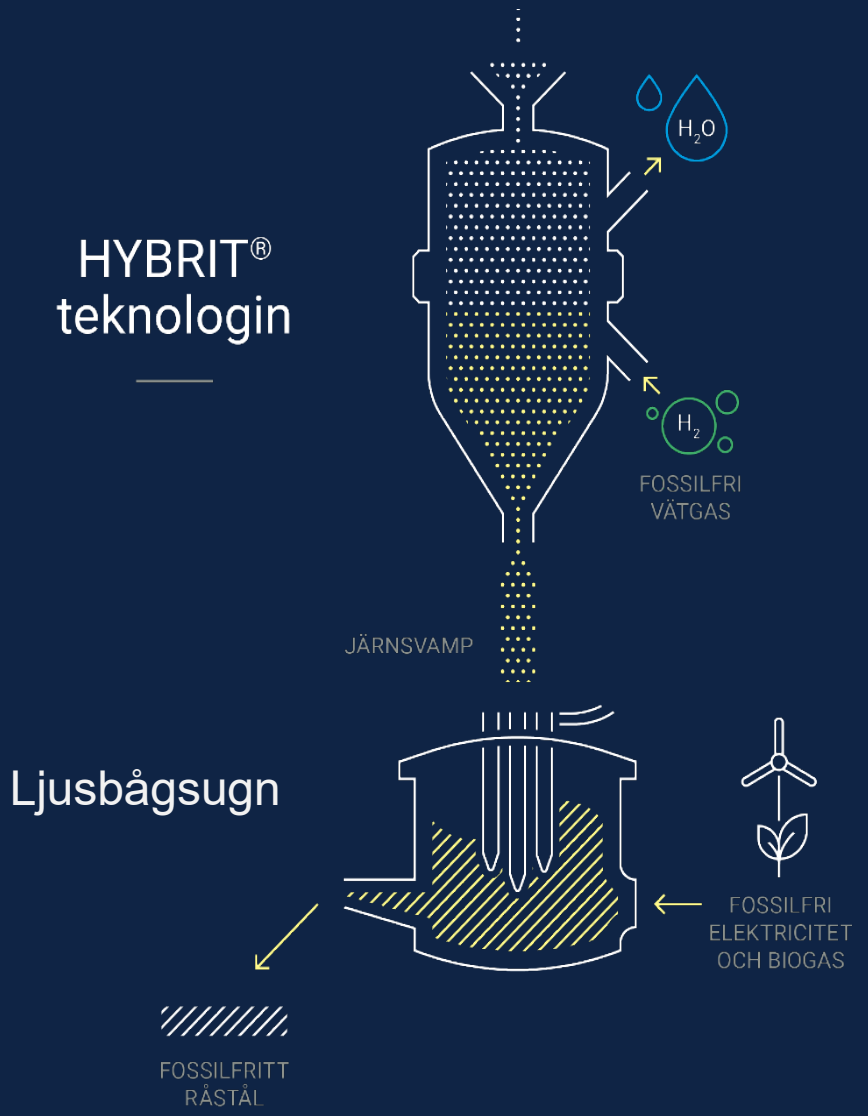
Mängd material som återvinns globalt (indikativt)

Både järnmalm och återvunnet stål behövs som råvara

Under en överskådlig framtid måste vi kunna tillverka stål av järnmalm på ett hållbart sätt

Källa: Svenska järn- och stålproducentföreningen, Jernkontoret

HYBRIT®-tekniken ger fossilfri råvara, DRI

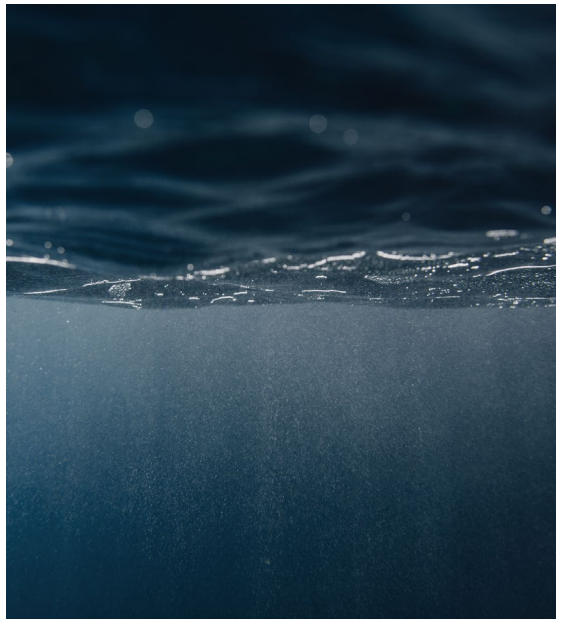


SSAB

HYBRIT®-tekniken i en fossilfri värdekedja

El från Vattenfall

Sveriges elproduktion ska fördubblas på mindre än 25 år – med enbart fossilfria energislag

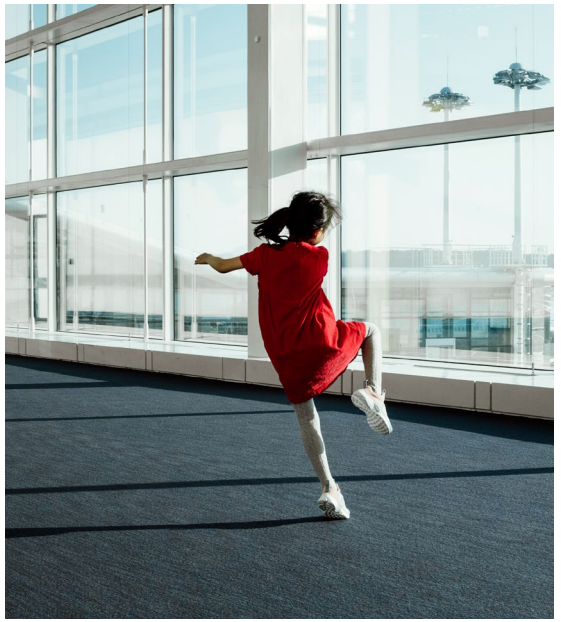


Järnmalm och pellets från LKAB

Helt fossilfri produktion från gruva till järn; fossilfri järnsvamp för svensk och internationell stålproduktion

Stål från SSAB

Produktion av fossilfritt stål genom ljusbågsugnar och nya moderna mini mills som försörjer den nordiska och internationella tillverkningsindustrin



Slutprodukter

SSAB

Stålkretsloppet

SSAB

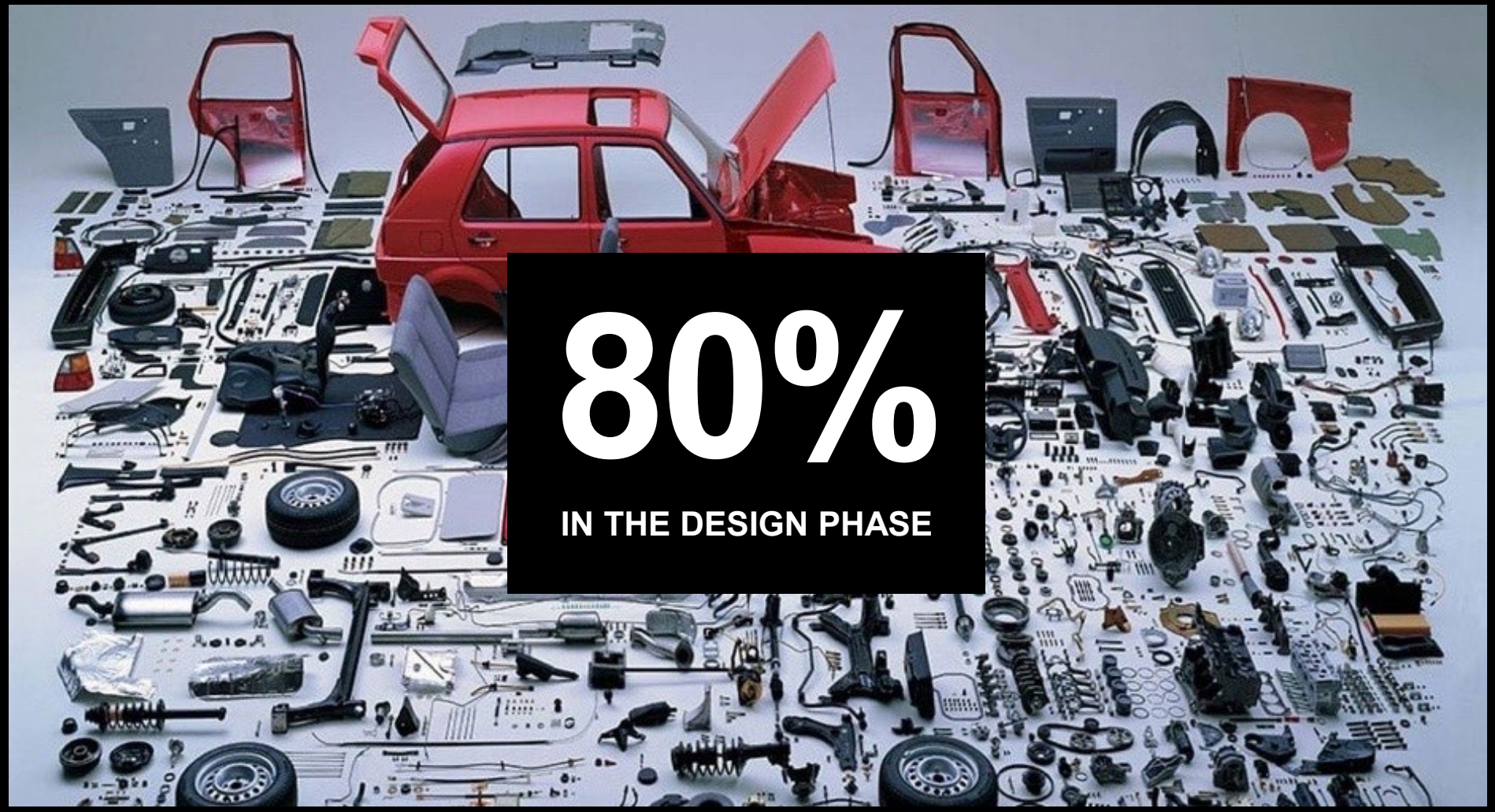
STILFOLD

THE CIRCULAR VEHICLE

OUR PROBLEM

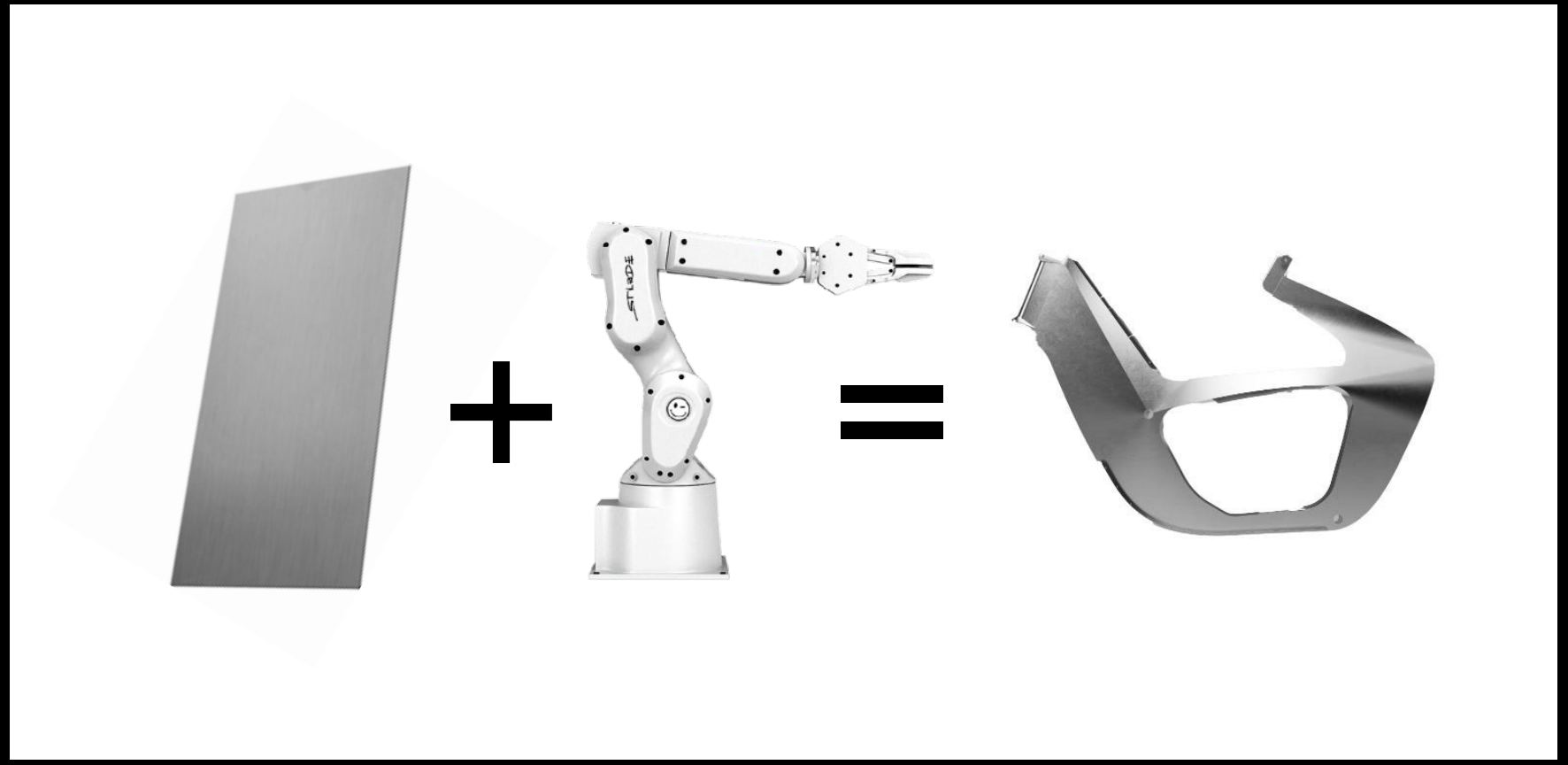
23%

INDUSTRIAL EMISSIONS


80%
IN THE DESIGN PHASE

NATURE AS A BLUEPRINT

INDUSTRIAL ORIGAMI




CREATED BY
PASSION


75% LESS C02 EMISSIONS

IND. STANDARD vs STILFOLD

CHASSI
159 parts

WEIGHT
55 kg

MATERIAL
20+

CHASSI
8 parts

WEIGHT
9 kg

MATERIAL
1

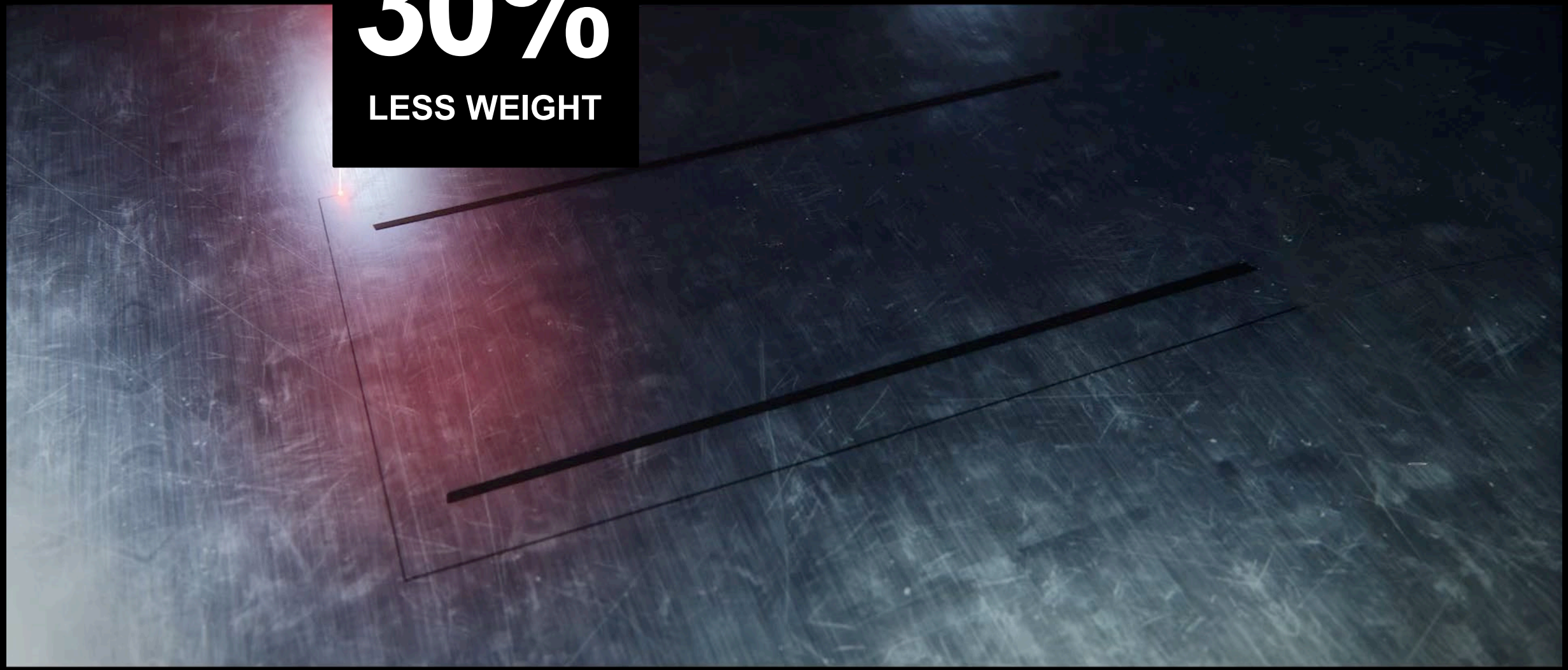
STILFOLD

USE CASE #2

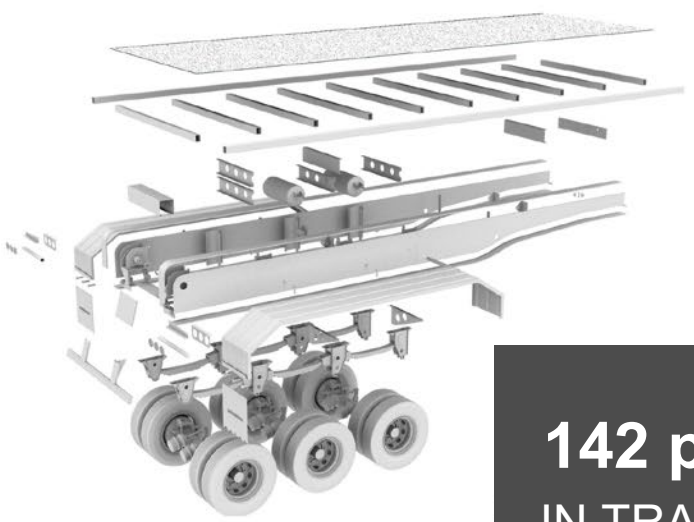
CARGO TRAILER

FROM COMPLEXITY TO

SIMPLICITY


30%
LESS WEIGHT

IND. STANDARD vs STILFOLD



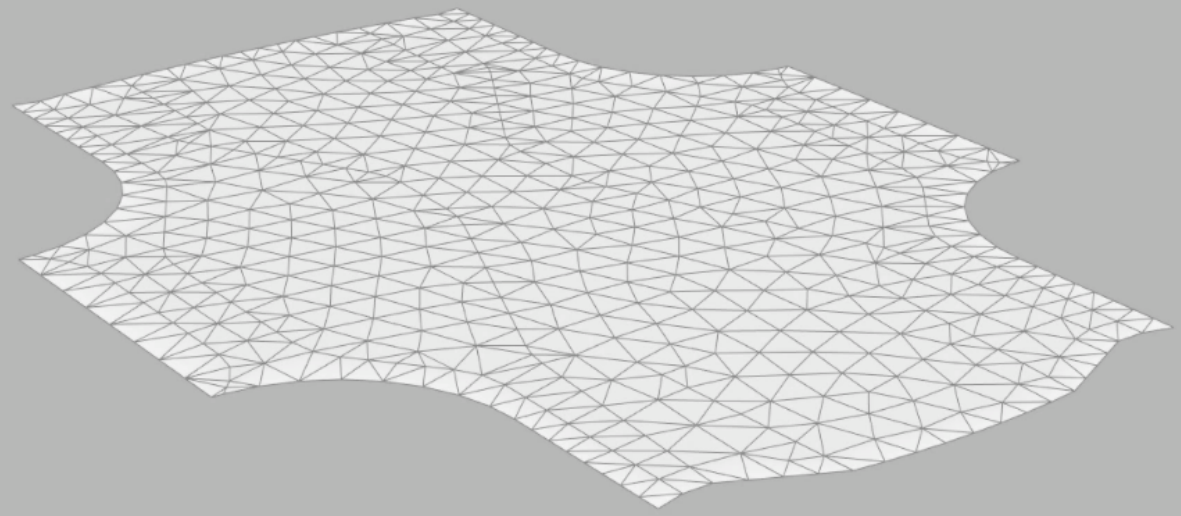
142 parts
IN TRAILER CHASSI

8 parts
IN TRAILER CHASSI

AI DRIVEN DESIGN SOFTWARE

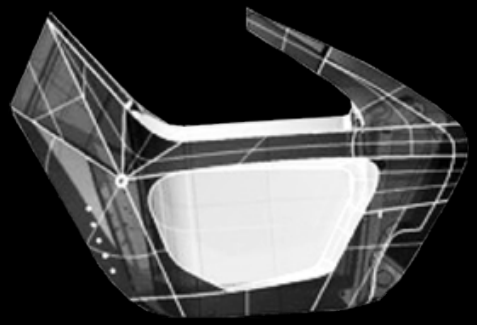
30%
LESS MATERIAL

25%
LESS COSTS



STILFOLD SYSTEM SOLUTION

RETHINK
Design and
manufacturing
CAD



+

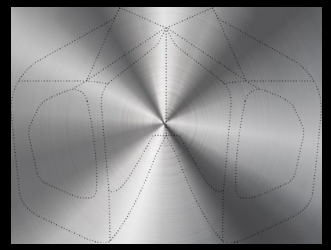
REDUCE
Costs and
CO2 emission
CAM

SOFTWARE

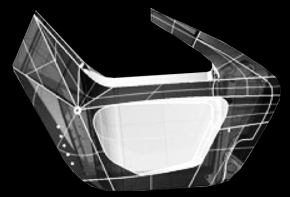
HARDWARE

CPP

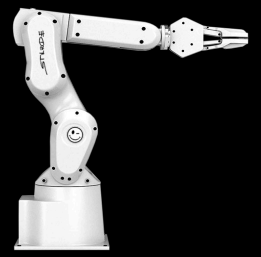
CLIMATE PERFORMANCE POTENTIAL



STEEL SHEET

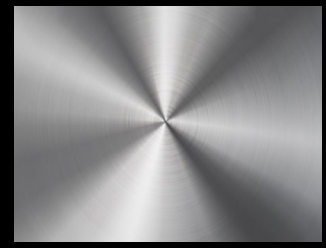


SOFTWARE

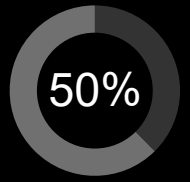


HARDWARE

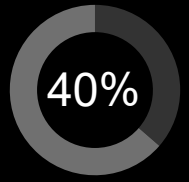
OUTPUT



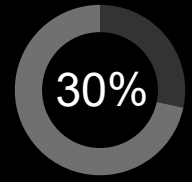
END OF LIFE



Transition to Climate-friendly low carbon metallic materials



Waste reduction and energy reduced in refinement of product



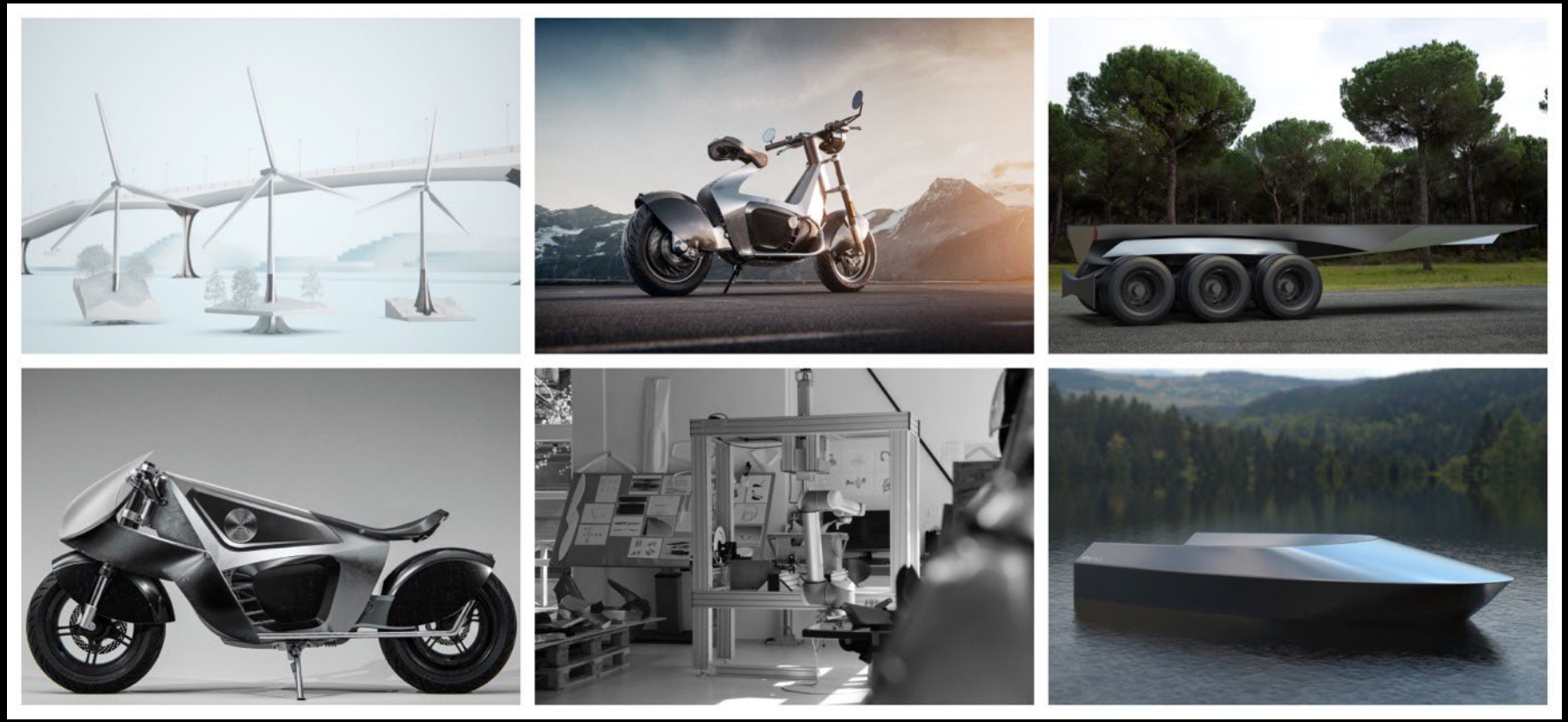
Circularity reduces C02 emissions (rTake back/recycling)

Comparative study benchmarked towards business as usual asian production, transportation and material impact.
Stilride CPP calculated based on local production, transportation and use of Outocumpu Modo low emission ferrochrome alloy

PARTNERS

TO REALIZE THE FULL POTENTIAL

RETHINK & REDUCE = STILFOLD



Circularity Gap Report Sweden

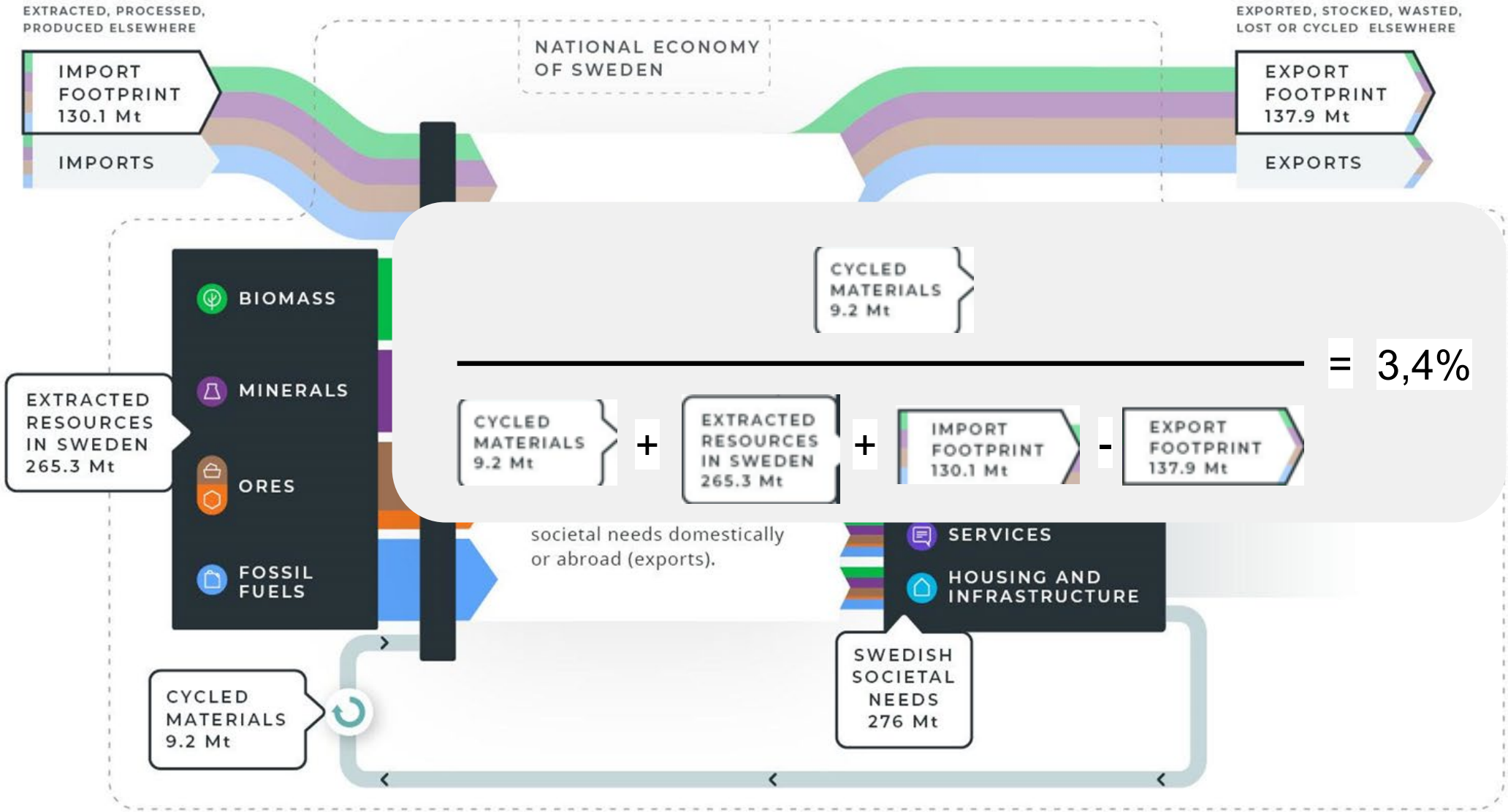
“The Circularity Gap Report Sweden” är en djupanalys av hur Sverige konsumerar material, alltifrån livsmedel och konsumtionsvaror till bostäder och mobilitet

Mäter hur cirkulärt Sverige är. Identifierar de största glappen och förbättringsmöjligheterna

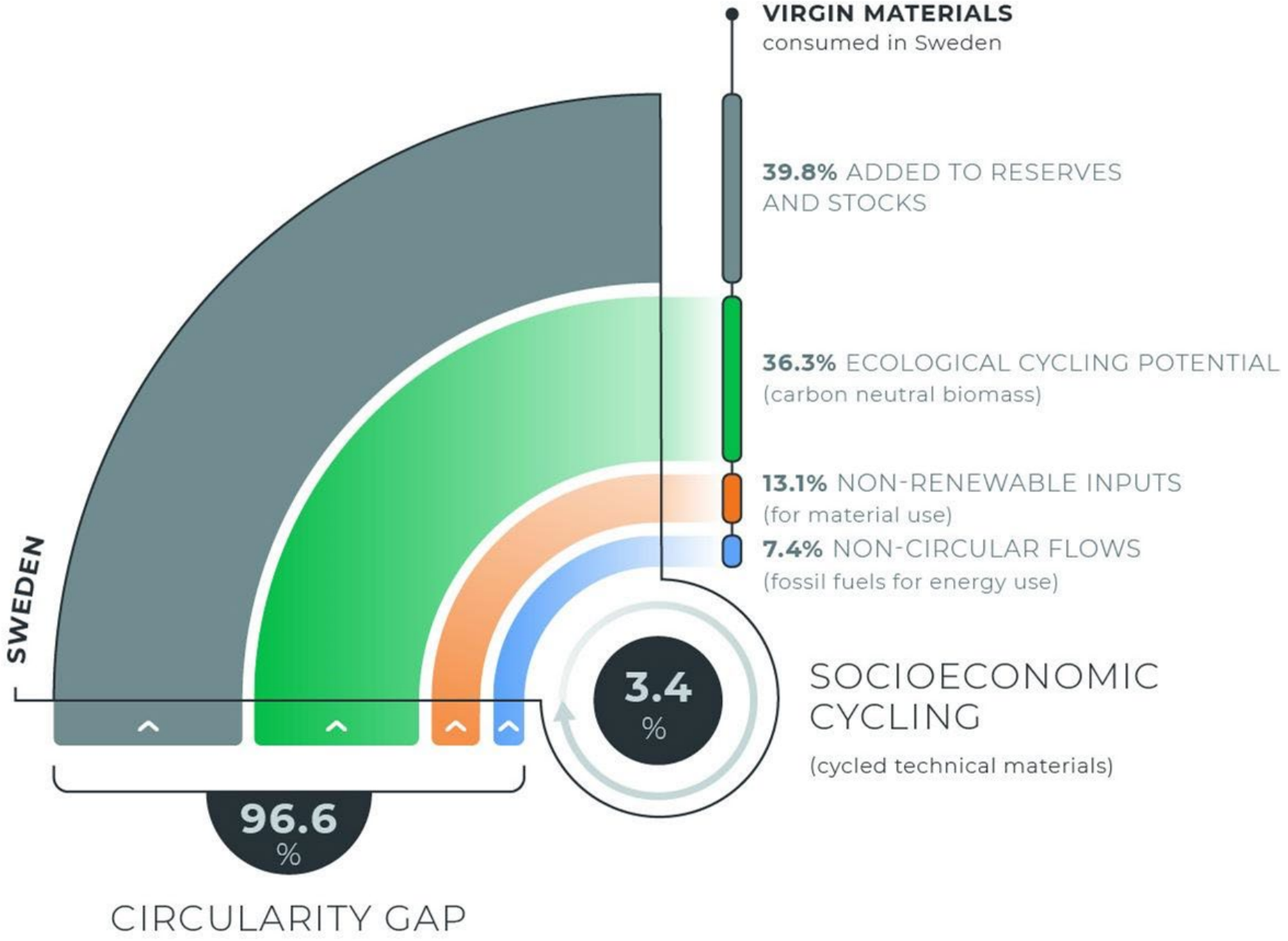
Sverige är 3,4% cirkulärt. Jämförelse: globalt genomsnitt 8,6%, Österrike 9,7%, Nederländerna 24,5%.

266 miljoner ton resurser tillförs den svenska ekonomin årligen. 25 ton per person.

RE:SOURCE


EXTRACTED, PROCESSED, PRODUCED ELSEWHERE
IMPORT FOOTPRINT 130.1 Mt
IMPORTS
NATIONAL ECONOMY OF SWEDEN
EXPORTED, STOCKED, WASTED, LOST OR CYCLED ELSEWHERE
EXPORT FOOTPRINT 137.9 Mt
EXPORTS
CYCLED MATERIALS 9.2 Mt
= 3,4%
CYCLED MATERIALS 9.2 Mt + EXTRACTED RESOURCES IN SWEDEN 265.3 Mt + IMPORT FOOTPRINT 130.1 Mt - EXPORT FOOTPRINT 137.9 Mt
EXTRACTED RESOURCES IN SWEDEN 265.3 Mt
BIOMASS
MINERALS
ORES
FOSSIL FUELS
societal needs domestically or abroad (exports).
SERVICES
HOUSING AND INFRASTRUCTURE
SWEDISH SOCIETAL NEEDS 276 Mt
CYCLED MATERIALS 9.2 Mt

RE:
SOURCE

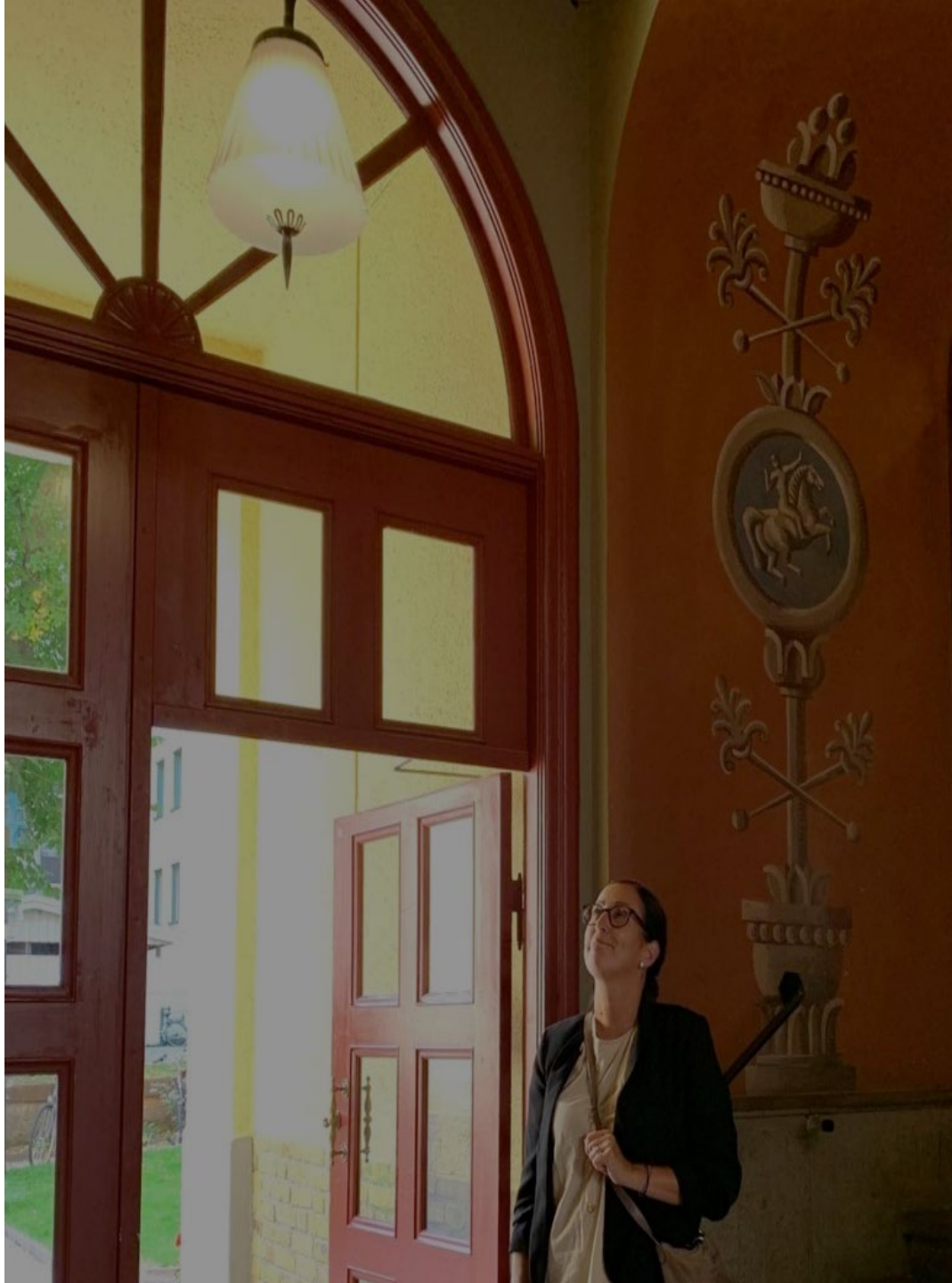

VIRGIN MATERIALS
consumed in Sweden
39.8% ADDED TO RESERVES AND STOCKS
36.3% ECOLOGICAL CYCLING POTENTIAL
(carbon neutral biomass)
13.1% NON-RENEWABLE INPUTS
(for material use)
7.4% NON-CIRCULAR FLOWS
(fossil fuels for energy use)
SWEDEN
3.4 %
SOCIOECONOMIC CYCLING
(cycled technical materials)
96.6 %
CIRCULARITY GAP

RE: SOURCE

Fyra huvudstrategier för en cirkulär ekonomi

- **Använd mindre:** Delnings- och uthyrningsmodeller, materiallättvikt, multifunktionella produkter eller byggnader, energieffektivitet, digitalisering
- **Använd längre:** Hållbar materialanvändning, modulär design, design för demontering, reparation, återtillverkning, renovering, renovering och ombyggnad jämfört med att bygga nya strukturer
- **Regenerera flöden:** Regenerativ och giftfri materialanvändning, förnybar energi, regenerativt jordbruk och vattenbruk.
- **Cirkulera – använd igen:** återvinning och/eller återanvändning av produkter och material

RE:
SOURCE



THE POWER OF COMBINED SCENARIOS

MATERIAL FOOTPRINT

En minskning med 42,6 % från 266,7 till 186,9 miljoner ton.

CIRCULARITY METRIC

En ökning med 232 % från 3,4 % till 7,9 % (eller 4,3 % till 9,9 %, inkl. utvinningsavfall)

RE:
SOURCE

The Circular Car

The Circular Car project, funded by FFI, aims to support new and established actors in the work of jointly accelerating the circular transition of the automotive industry.

The project provides opportunities to develop concepts for a future passenger car fleet that is adapted for high utilisation rates, long-term use and where recirculation of products and materials is standard practice.

Scan the QR-code to learn more about the project.

The project team includes: RISE (project lead), Atlantiska Byrån, Autocirc, Axkid, Bilia, Borås bildemontering, CAB Group, Elmo Sweden, Göteborgs Stads Leasing AB, If Skadeförsäkring, KG Knutsson, Lynk & Co, Mobility Sweden, Sveriges Bilåtervinnares Riksförbund (SBR), Södertälje Science Park, Twist Solutions, ZEEKR och Volvo Cars

Funded by FFI, Strategic Vehicle Research and Innovation

FFI

RI. SE

FUTURE SCENARIOS FOR THE SWEDISH CAR FLEET IN 2045

What will the car fleet look like in 2045? The Circular Car project, in cocreation with its partners, explored four future scenarios to ignite curiosity and inspire decision-making in the ever-evolving mobility landscape. The scenarios will be used together with partners to explore solutions and future proof action plans.

Green Wheels, Divided Paths

In 2045, Sweden is at a crossroads of sustainable development and social equity. Efforts to electrify the car fleet has failed and innovations like synthetic fuels emerge, shifting focus to retrofitting existing cars, enhancing service solutions, and promoting shared transport options.

On-demand Mobility

In 2045, Sweden's car industry thrives on innovation and rapid changes, leading to a fragmented market with constant updates. AI-assisted, on-demand transport options dominate, yet sustainability lags as technological optimism overshadows environmental concerns, raising fears as climate effects worsen.

Communal and Equitable Transport

In 2045, policy changes have shifted the car industry's focus from individual ownership to communal use. Cars have adapted to be more durable and made for shared usage, and regulations and incentives have promoted a rise in shared mobility options, aligning well with long-term environmental and societal goals.

On-demand Mobility

In 2045, the car fleet is data driven and tech-company dominated, with analytics optimising an autonomous fleet to meet fluctuating regional demands. Manufacturers face regulatory pressure to maintain circular value chains that emphasise sustainability through recycling and reuse, though data integrity concerns remain.