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ENHANCE MANUFACTURING SUSTAINABILITY

GETTING PRODUCTS FUTURE-PROOF

Drees & Sommer

Sep. 11th, 2023 / in Beijing

AGENDA

SHUHAO ZHANG

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Drees & Sommer Shanghai
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Professional Career

Since 2021	Head of Building Services Engineering, Drees & Sommer Shanghai
2019-2021	Project Manager, Drees & Sommer Shanghai
2015-2019	Project Engineer & Construction Manager, Drees & Sommer Stuttgart
2012-2015	Master Degree in Energy Technology, University of Stuttgart
2011-2012	Building Services Engineering, University of Applied Sciences Esslingen
2008-2011	Building Services Engineering, Tongji University in Shanghai

Other Functions and Areas of Expertise

- Building services engineering (HVAC + Plumbing)
- Energy design
- Energy management
- Green building certification (LEED, DGNB, WELL)
- Sustainability consulting

Personal Reference Projects (Selected)

- Schaeffler New Campus, Taicang
- item Greenfield project, Qingdao
- Amazon Asia Pacific projects
- ZF Factory, Shenyang
- Novartis R&D Campus, Shanghai
- ICICLE Songjiang Headquarter, Shanghai
- Bildungscampus, Heilbronn, Germany

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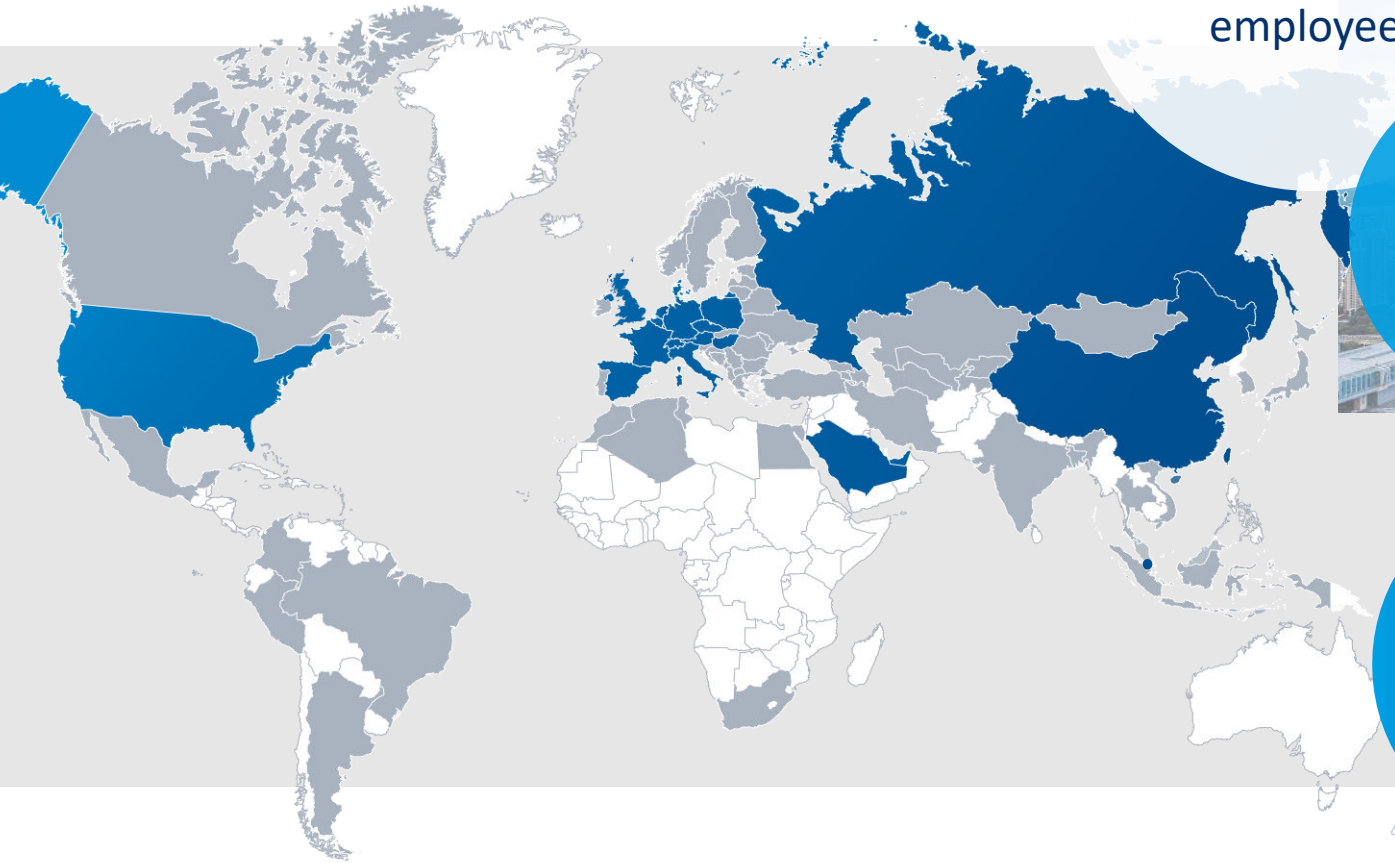
Facts & Figures



5,000+
employees

5,173
Construction projects in 2021

RANKED 4TH
IN TOP 20 NON-US FIRMS
INTERNATIONALLY

Founded in
1970

52
locations worldwide

20 years in APAC

1
Company

120+
Services

100% independent

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LEADER FOR INNOVATION

the blue way

1992
ECO-MANAGEMENT POTSDAMER PLATZ

1999
GREEN BUILDING

2003
ONLINE-PROJECT-COMMUNI-CATION

2007
DGNB-FOUNDING MEMBER

2010
OPTIMIZATION FOR EXISTING BUILDING

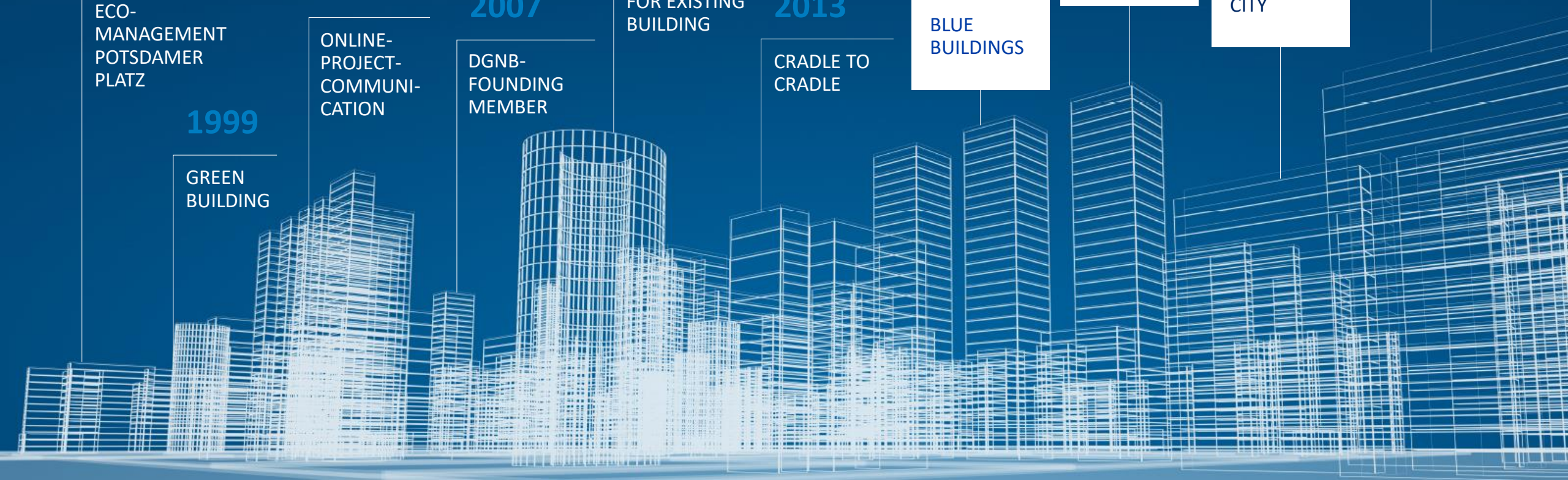
2013
CRADLE TO CRADLE

2014
BLUE BUILDINGS

2015
DIGITAL BLUE

2016
BLUE CITY

2018
BUILDING MATERIAL SCOUT



LANDMARK PROJECTS

AGENDA

01 General Introduction

02 Future-oriented Manufacturing: getting infrastructure ready

03 Future-oriented Manufacturing: getting product ready

EU CLIMATE STRATEGIES AND OBJECTIVES

TARGET FOR REDUCING GREENHOUSE GAS
compared with 1990 level

20%

***EU climate and energy package until* 2020**

TARGET FOR RENEWABLE ENERGY
% renewable energy

20%

TARGET FOR ENERGY EFFICIENCY
% improvement

20%

32,5%

***EU climate and energy tagets until* 2030**

55%

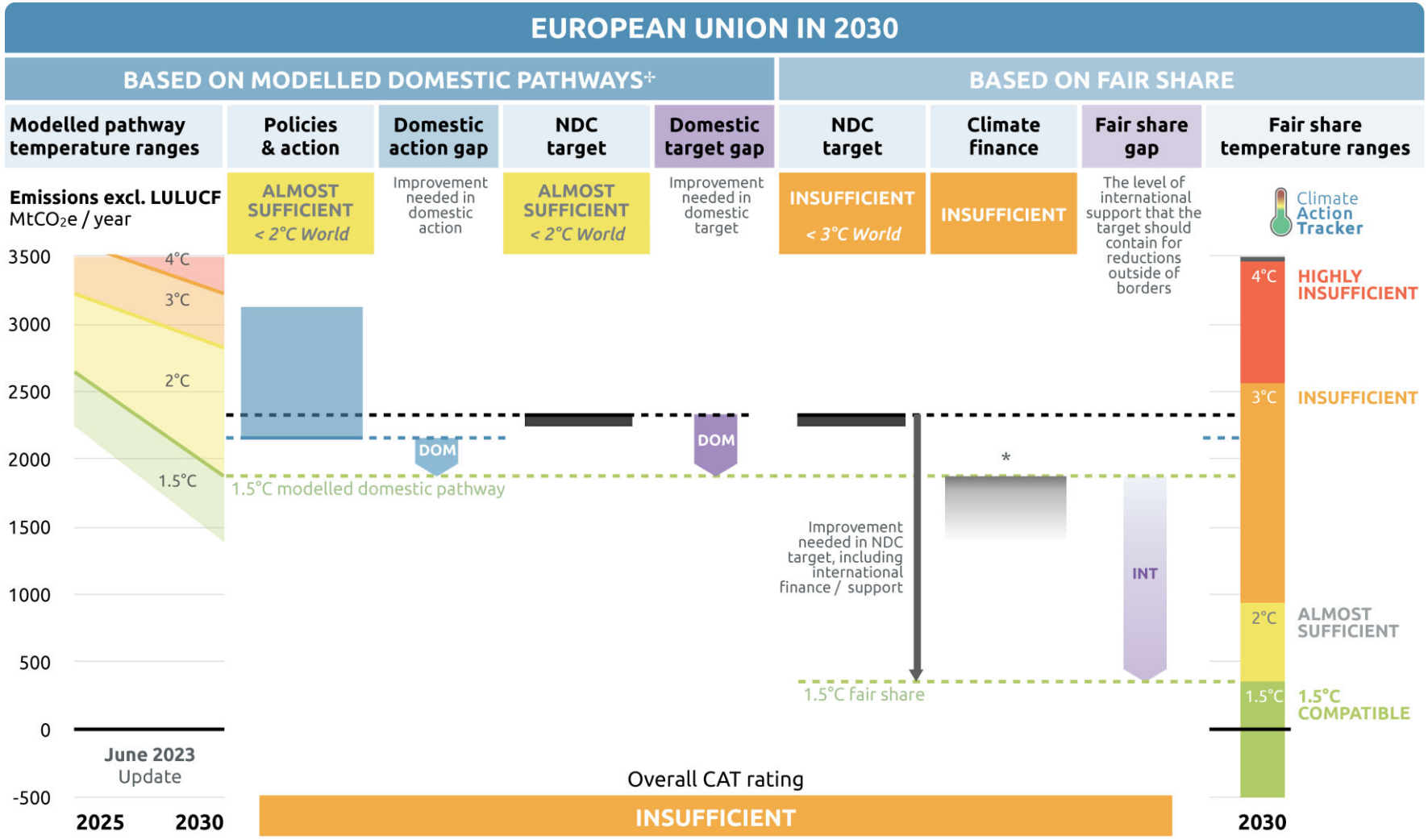
32%

COMMISION OBJECTIVE

a climate-neutral Europe

***EU climate strategy until* 2050**

CLIMATE CHANGE – WHERE ARE WE NOW…



Source: CAT Global Update June 2023

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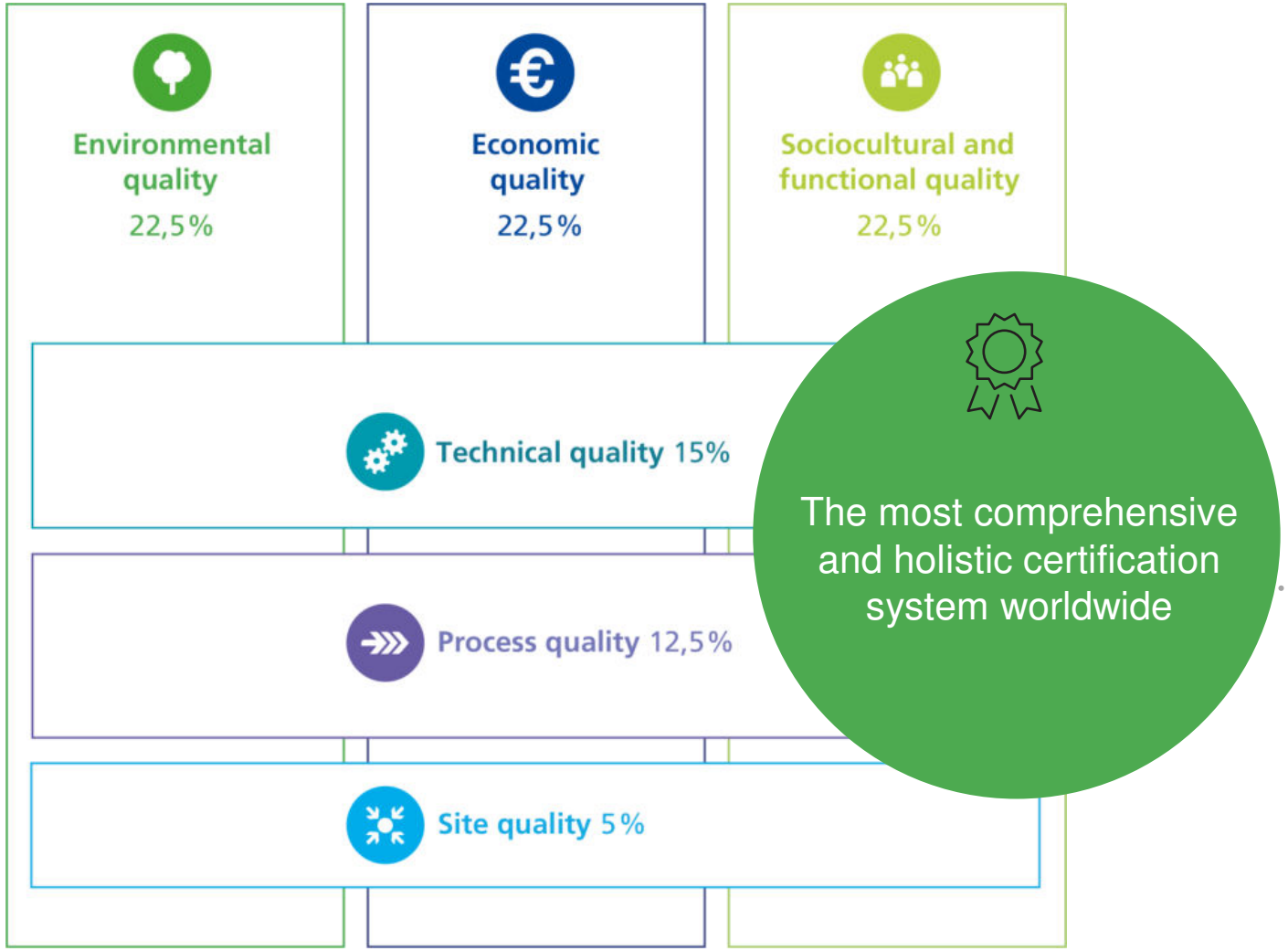
SCHAEFFLER TAICANG NEW CAMPUS PHASE I

DGNB IN A NUTSHELL



- **Optimization tool**: to increase real sustainability in buildings and districts
- Profitability: low life cycle costs, flexibility and usability, commercial viability and long-term value retention
  Investment oriented
- EU standards and legislations are the basis of the DGNB Certification System
  Planning oriented
- Internationally recognized and applied in more than 40 countries
  Quality - Made in Germany

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DGNB IN A NUTSHELL

DGNB Awards
for buidlings, interiors,
buildings in use and districts

	Platinum	Gold	Silver	Bronze*
Total performance index	80% and higher	65% and higher	50% and higher	35% and higher
Minimum performance index	65%	50%	35%	-- %

Diamond

Design quality award
Award for design quality for gold or platinum certified new construction / renovation projects

Climate Positive
An excellence award of the DGNB German Sustainable Building Council

Carbon neutral award
for Buildings In Use (annual)

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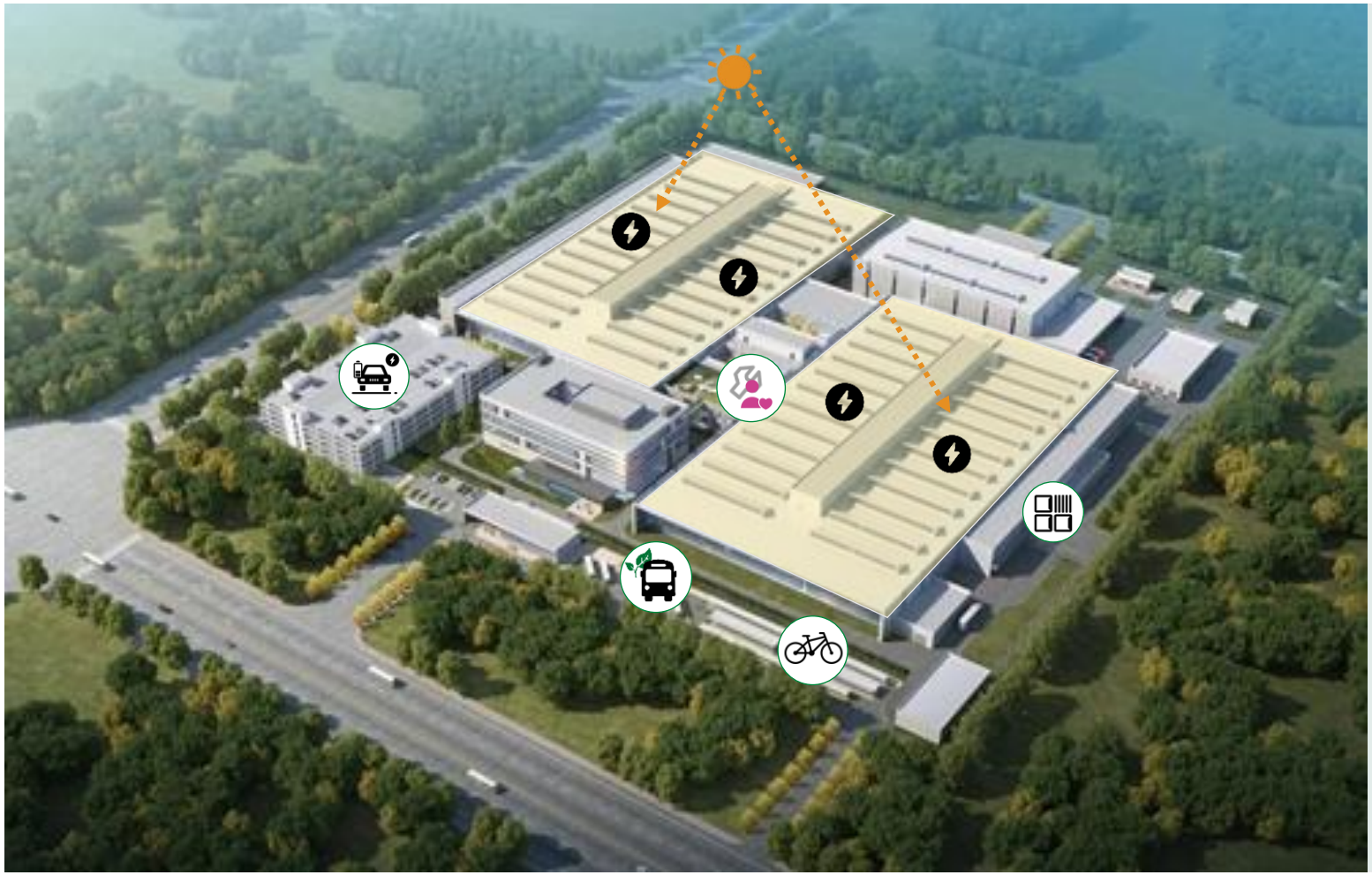
SCHAEFFLER TAICANG NEW CAMPUS PHASE I



High-performance building envelope

Compared to min. country mandatory standard GB51245-2017:

- U-value of external wall: **70% improvement**
- U-value of roof: **50% improvement**
- U-values of windows (8Low-E+12Ar+8): **50% improvement**
- G-value of windows: **40% improvement**

PV system

- **982 tCO2 and 1,462 MWh/yr elec.** avoided by Phase I PV system.

Multi-purpose indoor and outdoor facilities for users

- Canteen, shower facilities, changing room, smoking pavilion, outdoor garden for public communication.

Encourage use of commute system

- Electronic shuttle bus provided by Schaeffler group.
- Easy access to bus stops within 500m.

Encourage use of e-cars

- **50%** of all car parking spaces pre-fitted for and additional **25%** equipped with charging stations.

Encourage use of bicycle & e-bikes

- **50%** spaces equipped with charging stations.
- E-charging connected to EMS system.
- Well infrastructures: easily accessible, lighting available, CCTV system, and canopy for weather protection.

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SCHAEFFLER TAICANG NEW CAMPUS PHASE I

Operation phase gain compared to GB51245

Yearly Carbon Emission Reduction

4,465 Ton CO2eqvl.

(Calculation of Phase I building compared to GB51245 reference building; JiangSu Province average value of 2020: 0.64tCO2 eqvl/MWh)

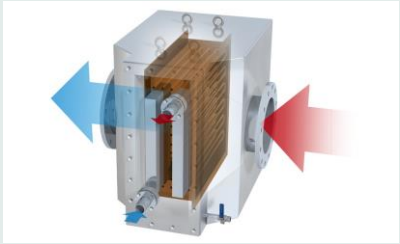
Yearly Operation Cost Reduction

6,925,300 RMB

(Calculation of Phase I building compared to GB51245 reference building; Average electricity cost in Taicang is 1rmb/kwh.)

Waste heat recovery system

- Waste heat recovery of exhaust smoke and compressed air system.
- 1750kW heat capacity available, undertaking **42%** of Heating loads.



No gas boiler

- **Heat pump with COP of 3.6** for heating, instead of traditional gas boiler with efficiency of 90% according to GB51245-2017.

Water-saving sanitary

- **Highest class (Class I)** of Chinese national standards for water-saving sanitary.

Rainwater collection system

- Rainwater for **85%** of total water use.
- **750m3** rainwater reservoir volume.
- **30m3/h** rainwater treatment equipment.

Displacement ventilation

- Less ventilation energy than standard mixed ventilation.

Efficient lighting and visual comfort

- Around **50% improvement** of lighting power density to min. Chinese mandatory standard GB50034-2013.
- Dimming control with motion and daylight sensor.
- Luminaries with UGR < 20, Ra ≥ 80, beam angle ≥ 90° to promise visual comfort.
- External downside lighting to reduce lighting pollution.

Sustainable management

- Involving relevant parties during early design phase for sustainability topics.
- Tracking on project sustainability targets during whole design and construction phase.
- Involvement in tender phase and commissioning phase.

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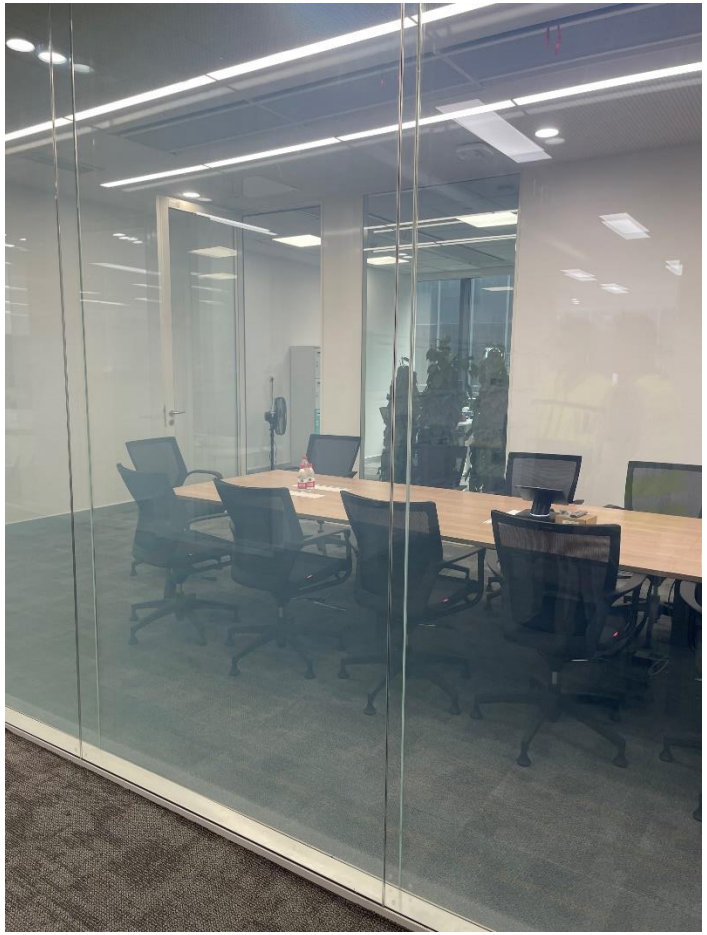
SCHAEFFLER TAICANG NEW CAMPUS PHASE I



Environmentally friendly materials

- Materials with **low TVOC** and with **no damaging or hazardous contaminants** were adopted, and demonstrated by test report or manufactures' clarification, as per DGNB requirements.

Indoor air quality

- Ventilation rate at 58m3/h.p complied with Category II in EN 15251 requirements, twice higher than 30m3/h.p required by Chinese standard.
- Air quality test according to international standard (ISO16000).

Indoor thermal comfort

- The parameters for indoor thermal comfort are adopted as below.

Indicator	DGNB Target
Temperature	25 / 21 °C in office 26 / 19 °C in production hall
Indoor air velocity	Compliant to DIN EN ISO 7730 (validated by simulation)
Humidity in office	≤60% in summer & ≥30% in winter

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SCHAEFFLER TAICANG NEW CAMPUS PHASE I

Sustainability Acknowledgement

Schaeffler Taicang New Factory Campus Project – Phase I

Taicang, China

- **First** Gold certified production building in the new DGNB International System Version 2020 scheme in China.
- **Top 3** DGNB certified production and logistics building in China.
- Only two DGNB certified production/logistics buildings in China by 2022:
  - Suqian Yang River Logistics Hub Building 1 & 2 - New Construction, Version 2014 – Platinum
  - Ardex new material technology (Zhejiang) Co., Ltd. - New factory project - New Construction, Version 2014 – Silver

Suqian Yang River Logistics Hub Building 1 & 2

Suqian, China

Ardex new material technology (Zhejiang) Co., Ltd. - New factory project

Pinghu, China

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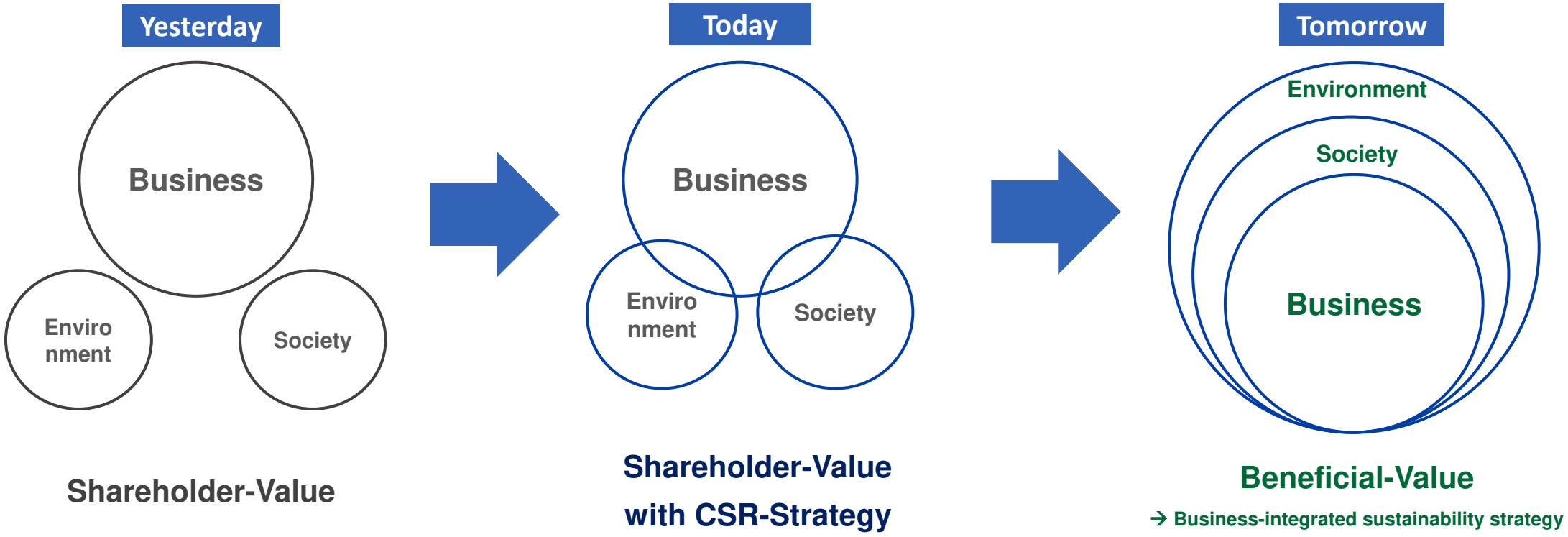
03 Future-oriented Manufacturing: getting product ready

OUR SOLUTION FOR BUSINESSES: PARADIGM SHIFT FOR GROWTH 2.0

Integration of sustainability into the business strategy



Shareholder-Value

Shareholder-Value with CSR-Strategy

Beneficial-Value

→ Business-integrated sustainability strategy

Mission statement of the company	Mission statement of the company with CSR responsibility	Meaning & Impact = Company Purpose

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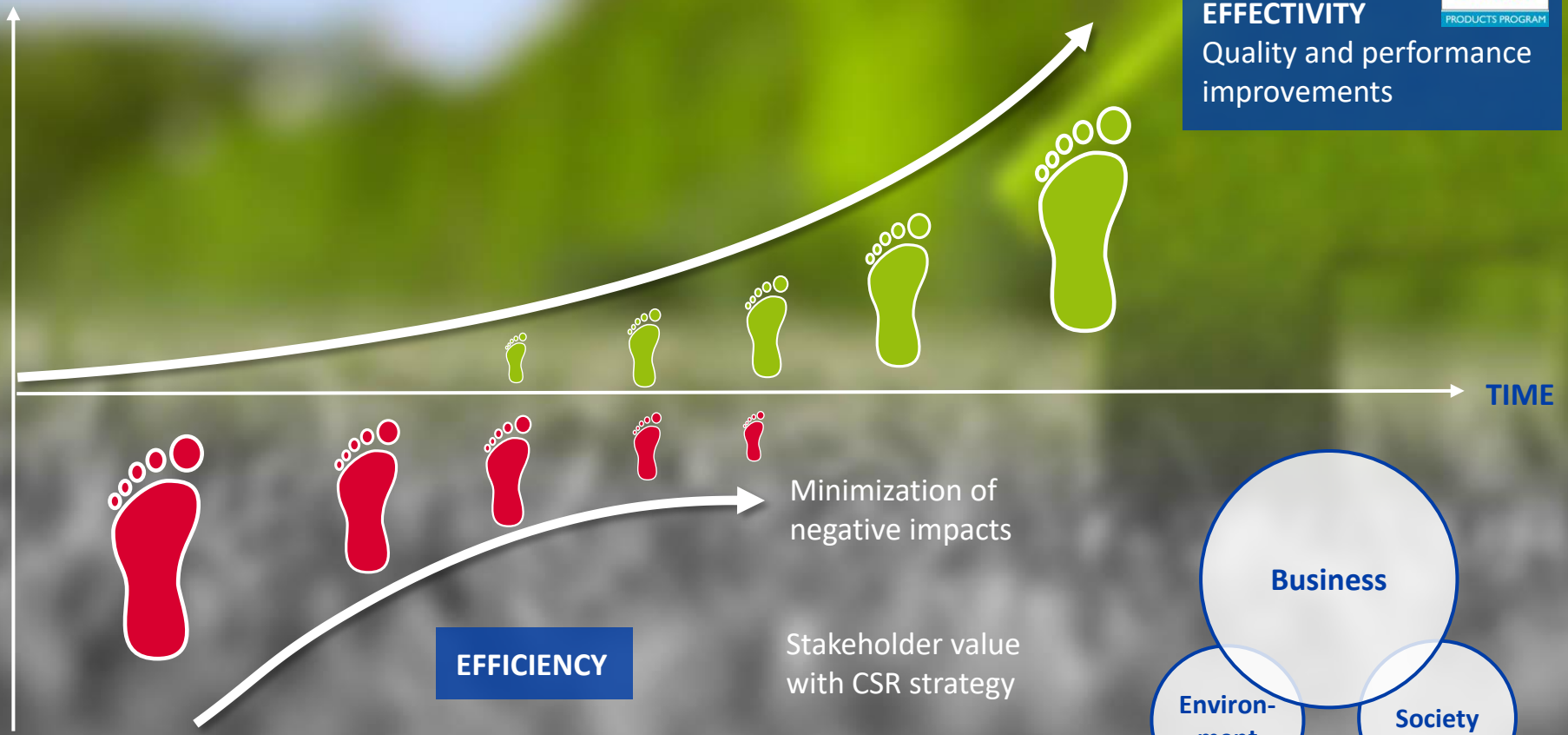
SUSTAINABILITY AS AN OPPORTUNITY FOR BUSINESS INNOVATION

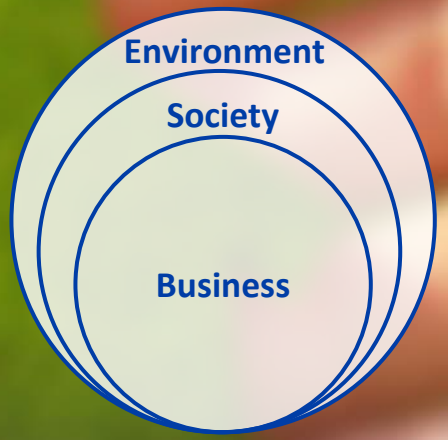


EFFECTIVITY
Quality and performance improvements

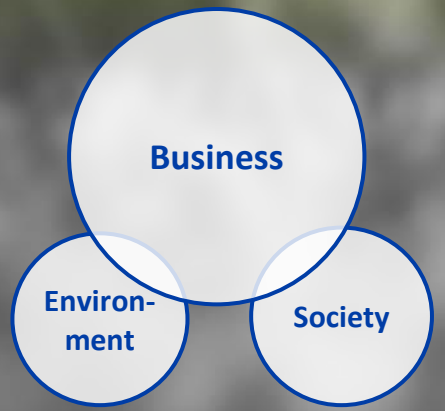
Minimization of negative impacts

EFFICIENCY

Stakeholder value with CSR strategy



Creating positive impact on society and the environment through business

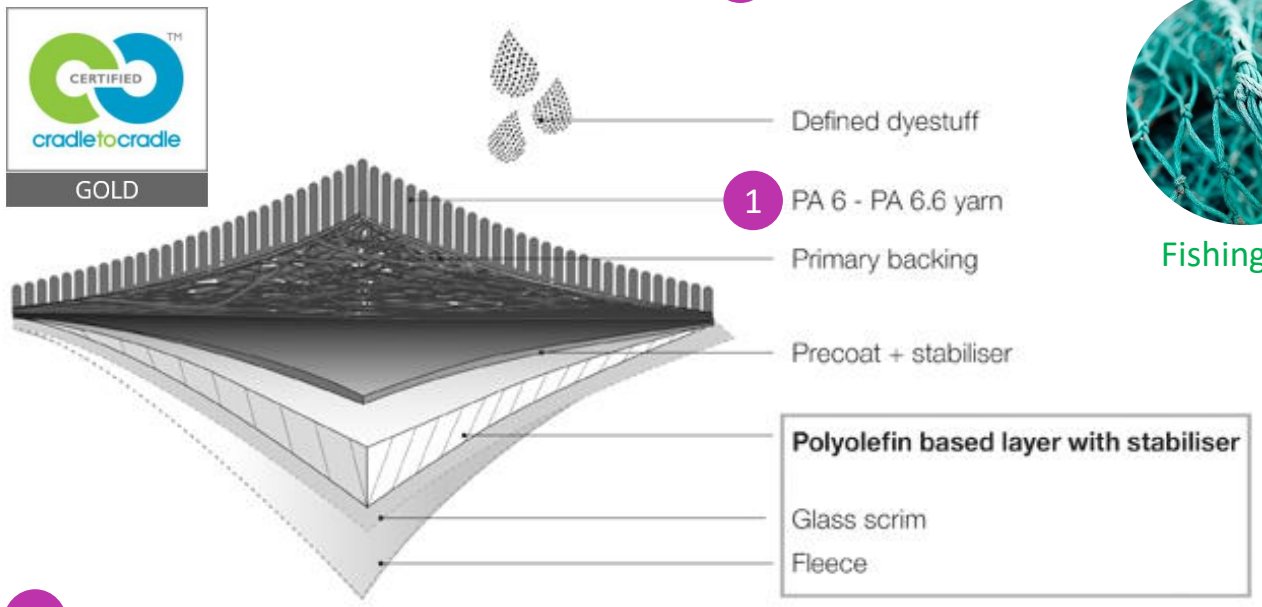


PRODUCT EXAMPLE

DESSO AirMaster® Tarkett

1 100% **regenerated ECONYL®**

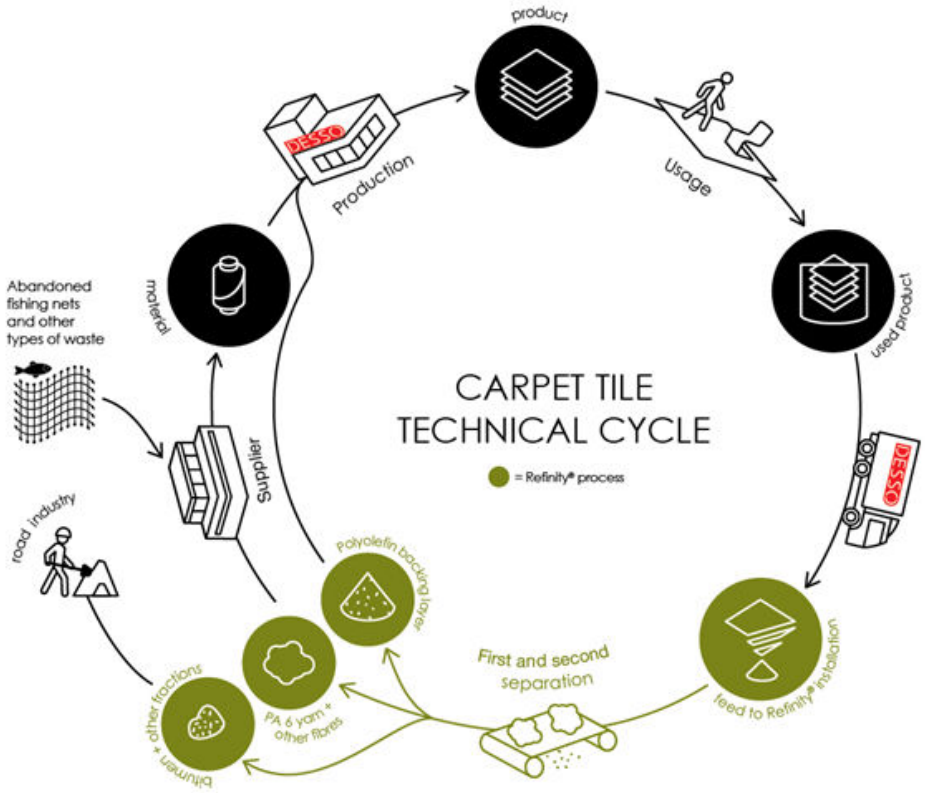
Fishing twine



2

= Desso EcoBase® secondary backing

(The polyolefin based layer with stabiliser accounts for minimum 96% of the total secondary backing and this layer is 100% fully recyclable).



All non-recyclable fractions will be used as secondary fuel in the cement industry.

3 **ReStart®** - Take-back program

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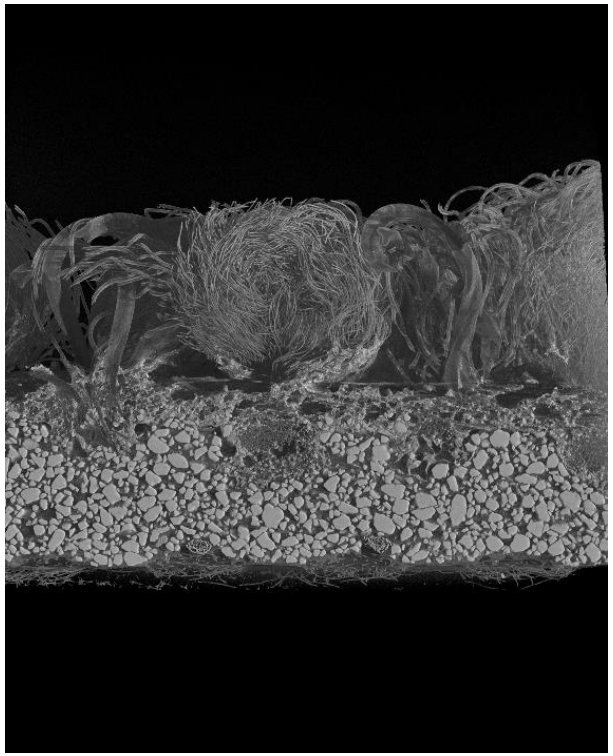
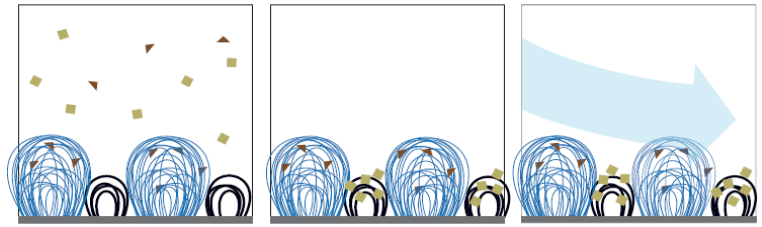
PRODUCT EXAMPLE

DESSO AirMaster® Tarkett





Beneficial Value:

Airmaster collects fine dust and cleans the indoor air!

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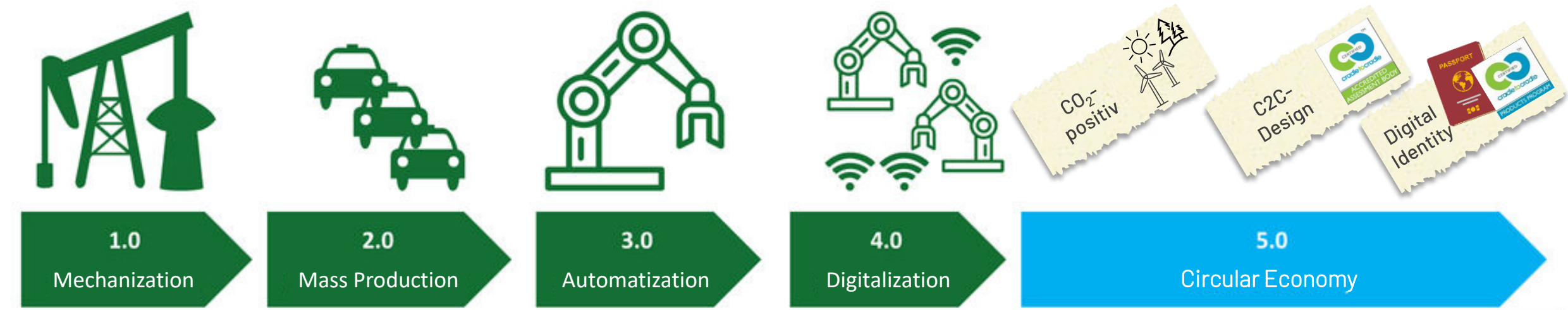
CIRCULAR ECONOMY AS PART OF INDUSTRY 5.0

Circular Economy driven by Cradle to Cradle®



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SUCCESSFUL BUILDINGS

LIVEABLE CITIES

HIGH-YIELD PORTFOLIOS

POWERFUL INFRASTRUCTURE

FUTURE-ORIENTED CONSULTING

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