



SUSTAINABILITY THROUGH COLLABORATION

Koen Lauwers , President Semiconductors



An introduction



Koen Lauwers, President Semiconductor Division

A Belgian citizen, joined Atlas Copco in 1997, joining as a Calculation Engineer.

He has since then built a successful career in the Atlas Copco Group, including international assignments in the United States and Germany.

Koen joined Edwards in 2014 following the acquisition by Atlas Copco, taking the role of Vice President Marketing and focusing on the industry segment and implementation of synergies.

In 2017 he was appointed President of the Industrial Vacuum division, before being announced as the new President of the Semiconductor division on the 30th March 2023.

Delivering growth and enabling opportunity

- **Unprecedented growth** and investment predicted in semiconductors and in particular power semiconductors
- Edwards has a **long, successful tradition** in the semiconductor industry and we are deeply integrated into the semiconductor process – we feel part of the eco system.
- **Edwards global expertise** drives sustainable local environments to ensure your success now and into the future.
- **Future proofing** your success
 - Reducing the subfab footprint within the shadow of the OEM tool
 - Reducing our CO₂e of our products
 - Reducing the supply chain CO₂e.
- We don't just want to resolve your challenges of today. We want to work with you **to look beyond** what happens “next.”
- We can do that through creating a sustainable environment for **collaboration.**



Sustainability means a lot of things

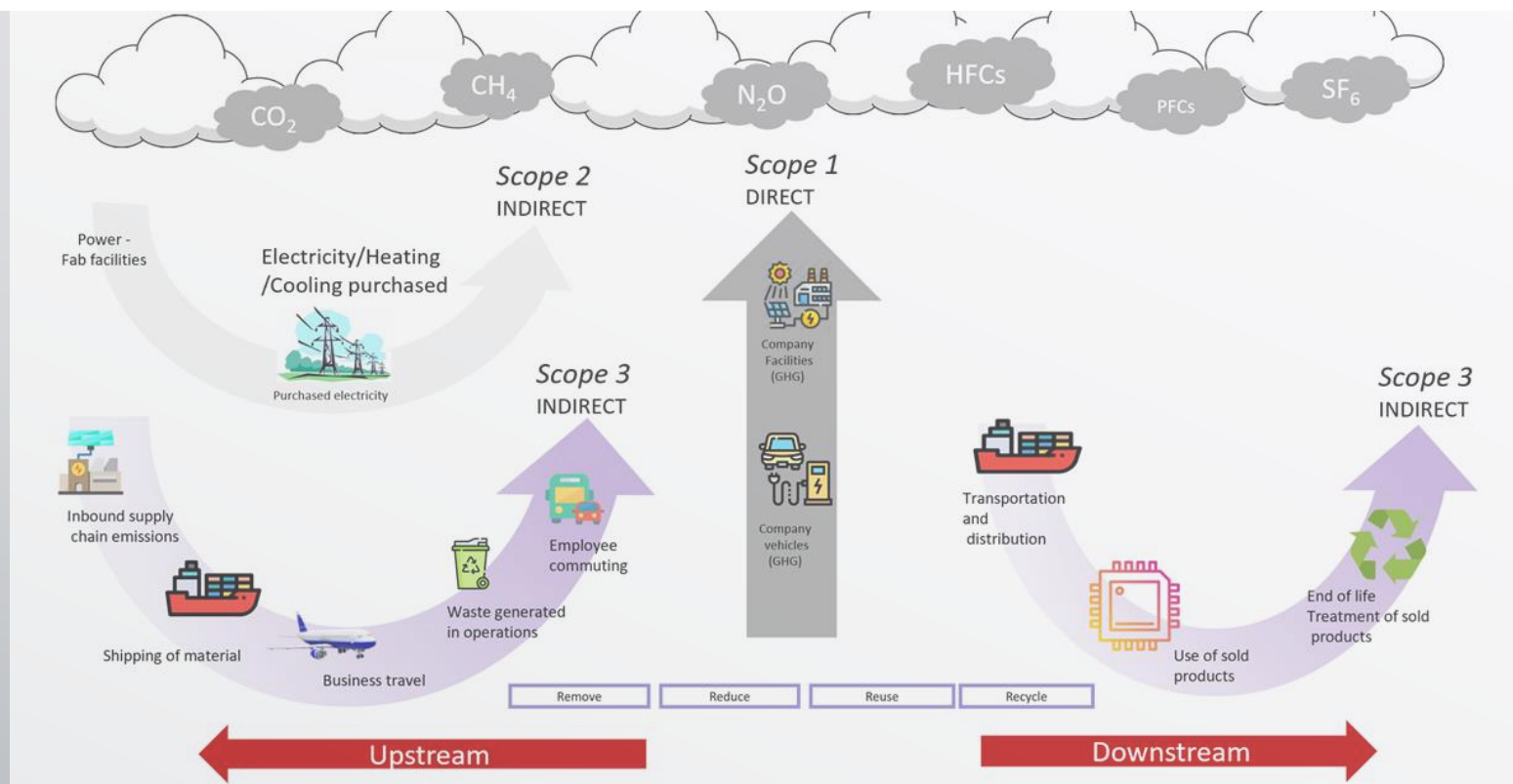


- Climate & environment
- Responsible & sustainable supply chain
- Partnerships
- People
- Innovation

What environmental sustainability means to us

Setting goals –
Science-Based Target initiative (SBTi), and supporting our customers to deliver on their SBTi goals.

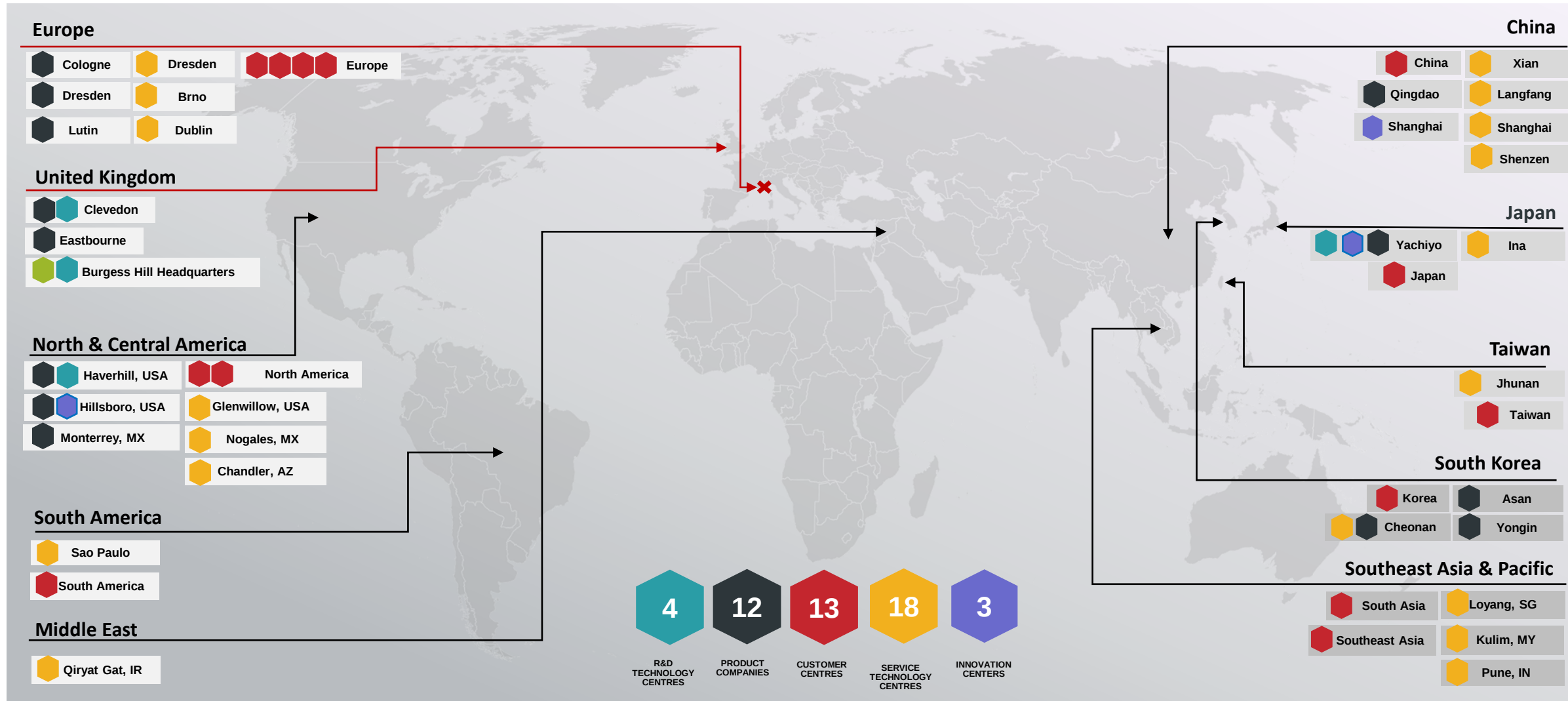
A strategy of development and innovation needs strong partnerships to meet our industry sustainability goals.



Influencing government and energy providers policies on renewables and on new infrastructure projects.



Edwards' global presence



Villard Bonnot



Example of a problem statement

Semiconductor Fab

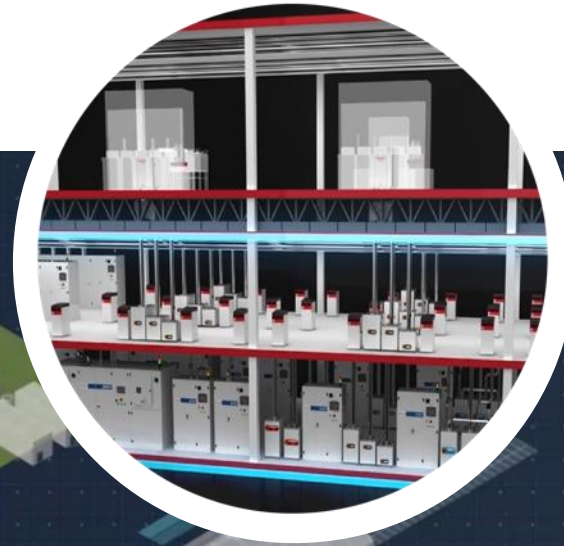
- 1,000 process tool
- 1,200 turbo pumps
- 3,500 vacuum pumps
- 650 pump exhaust gas treatment units

~300 Major Fabs Globally.

†Customer emissions.

*Global CO₂e total society ~50 G-tonnes.

**Global estimate for semiconductor fabs



†Direct Emissions

**34.7M-tonnes CO₂e

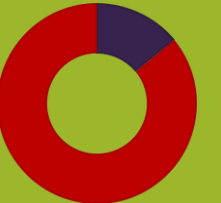
9%, France, 2020



Indirect Emissions

**75 M-tonnes CO₂e

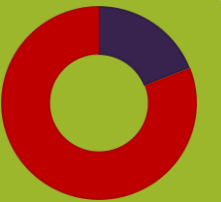
16%, Netherlands, 2018



Water Withdrawals

**920M-m³

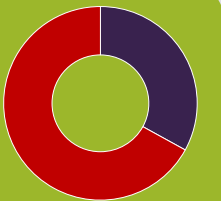
21%, Belgium, 2019



Electricity Usage

**160TWh

33%, Germany, 2022



Case Study 1: Working with the customer to reduce energy, emissions, cost

Vacuum in a fab

- Vacuum pumps are a significant use of electrical energy in a fab (~10%).
- Each upgrade saves 1kW.
- 250 completed so far.
- Total fleet of ~1200 to be completed by 2025.

*Extrapolated to total fleet.



Electricity Usage
Reduced GWh/y

11GWh

Indirect Emissions
Reduced tonnes CO₂e/y

5k-T

*Projected Savings
Energy cost saving

\$0.9M

Direct Emissions
No Change

0%

Case study 2: Working with the customer to reduce energy, emissions, cost

Process gas by-product treatment in a fab

- Some potent greenhouse gases are hard to treat.
- CFD for improved design.
- Reduce energy or improve destruction?
- Direct Emissions reduction is greater than Indirect.

*High destruction - excludes carbon tax savings.

§Total electricity includes support utilities.

Direct Emissions
Up to 450 tonnes CO₂e/y

***5-53%**

Indirect Emissions
Up to 31 tonnes CO₂e/y

***0-51%**

§T-Electricity Usage
Reduced T-E Energy.

***0-17%**

Projected Savings
Reduced Cost

***0-33%**

Case study 3: Working with the customer to reduce energy, emissions, cost

Hydrogen in a fab

- Some tools use $\sim 0.4\text{M-m}^3/\text{y}$ per tool of high-purity H_2 .
- $>99\%$ H_2 is C-intensive.
- Price H_2 \$1-2/kg.
Green H_2 $\sim$ \$3-15/kg.
- Recovery reduces system emissions and costs even for the current H_2 .

*Projected combined hydrogen and utility costs.



Direct Emissions
Reduced CO_2e

50% ↓

Indirect Emissions
Reduced CO_2e

26% ↓

Total Emissions
Reduced CO_2e

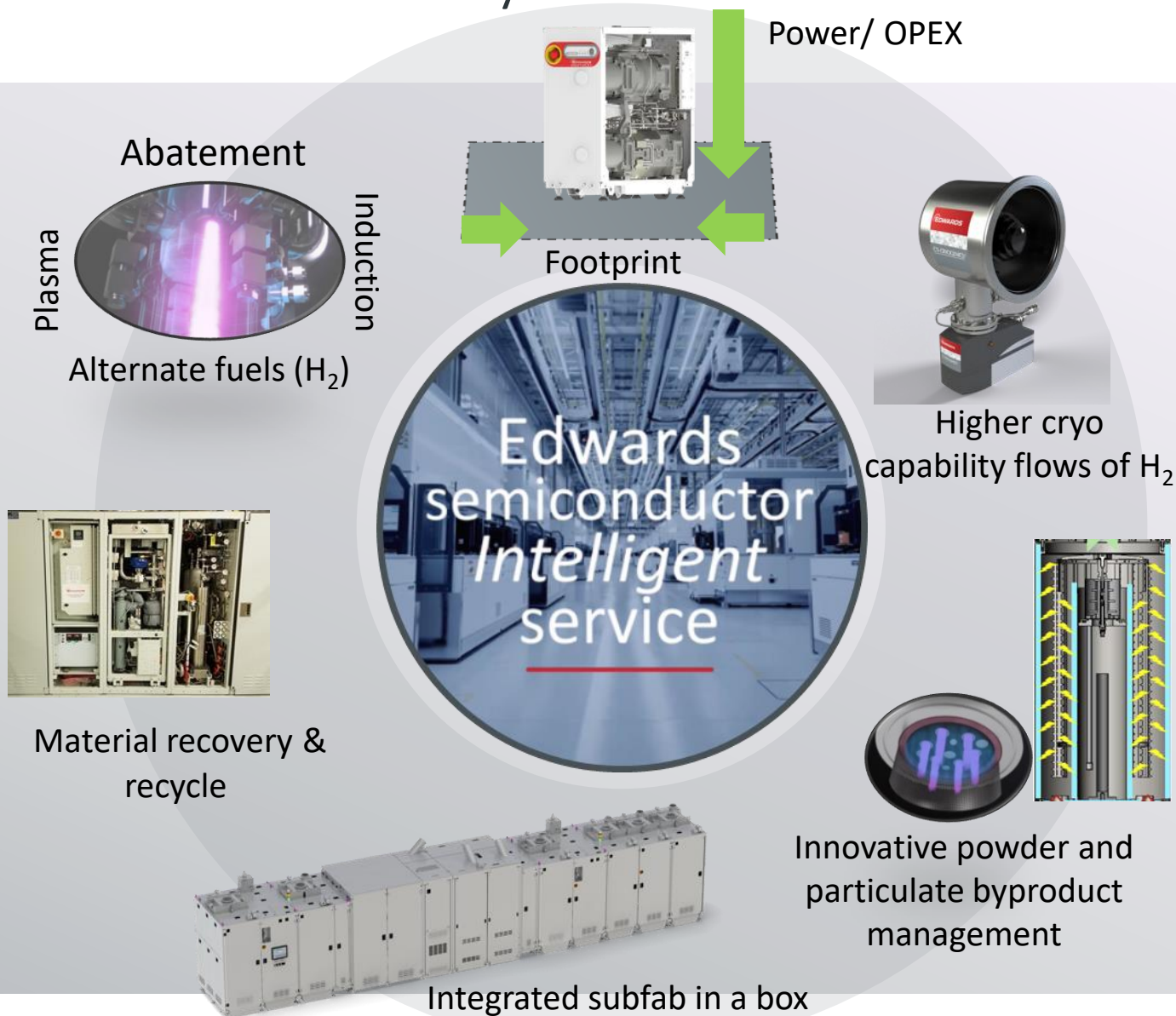
29% ↓

*Projected Savings
Reduced Costs

~40% ↓

Technology is an enabler – this is our innovation sustainability focus:

- Next-generation (Genesis) Dry Pumps
- Non-fossil fuel point of use abatement – reduction CO₂e, PFC and NOx
- Management of higher H₂ flows with our Cryo solutions
- Recycling, recovery technology for noble and rare earth materials
- Innovative vacuum and abatement particulate management. (PM2.5)
- Subfab in a box- Integrated vacuum abatement solutions.
- Brought together by our global knowledge and install base to create a unique Edwards Intelligent Service™ that helps protect your productivity goals and environmental target.



Environmental supply chain: Science-Based Target initiatives set, committed

Advantest Corporation	Targets Set
Agilent Technologies, Inc	Targets Set
Analog Devices, Inc.	Targets Set
Applied Materials	Committed
AstraZeneca	Targets Set
Atlas Copco AB	Targets Set
Bayer AG	Targets Set
BMW Group	Targets Set
Bose	Committed
CASIO COMPUTER CO., LTD.	Targets Set
Deutsche Telekom AG	Targets Set
Ford Motor Company	Targets Set
GE Healthcare	Committed
General Motors	Targets Set
GlaxoSmithKline	Targets Set
KYOCERA Corporation	Targets Set
Lam Research Corporation	Targets Set
Nissan Motor Co., Ltd.	Targets Set
Nordic Semiconductor ASA	Committed
Schneider Electric	Targets Set
STMicroelectronics NV	Targets Set
Tesla Inc.	Committed
Tokyo Electron Limited	Committed
Vodafone Group Plc	Targets Set
Volkswagen AG	Targets Set
Volvo Car Group	Targets Set



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NORDIC
SEMICONDUCTOR



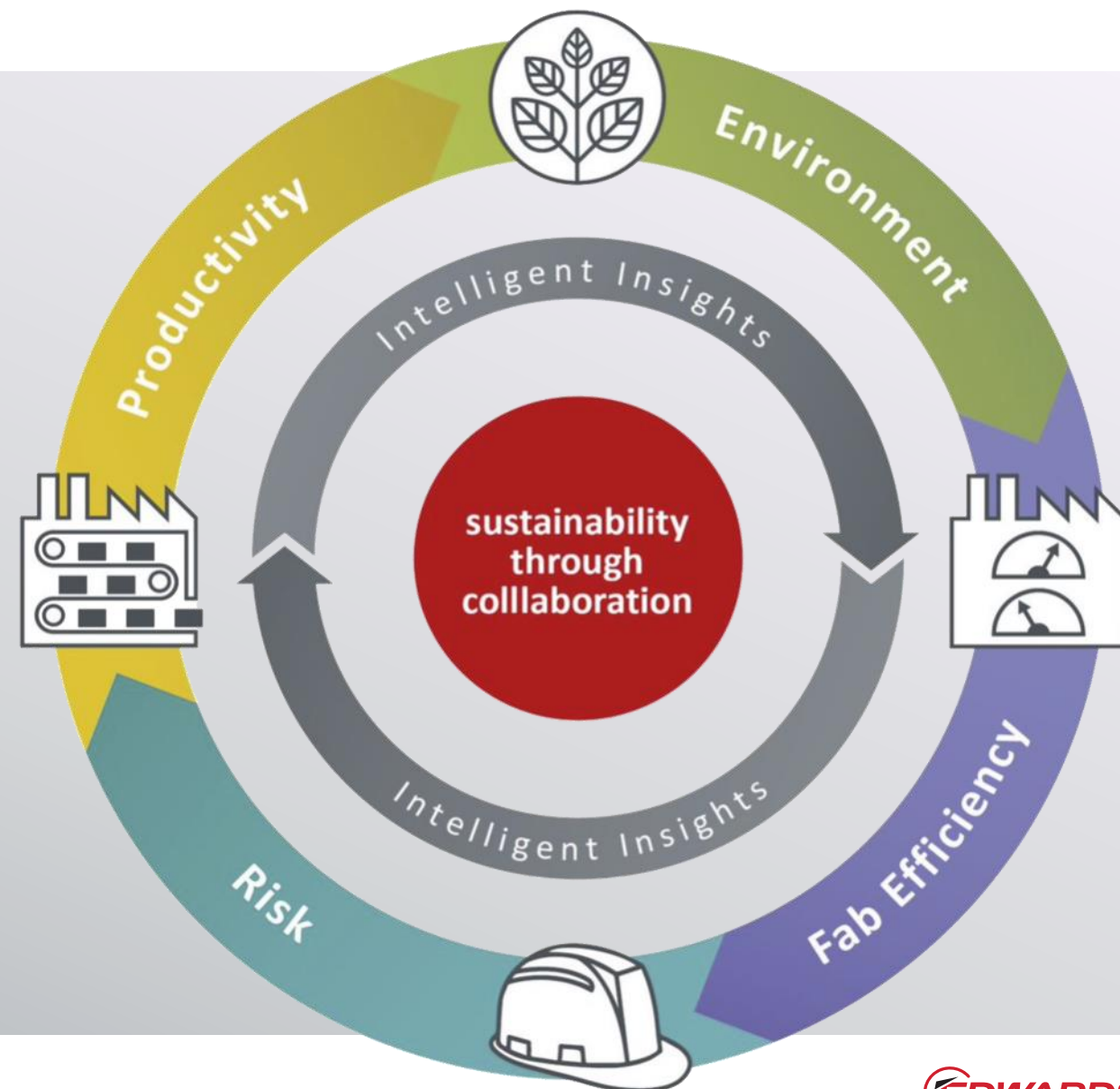
GSK

ThermoFisher
SCIENTIFIC



What next? We need a sustainable supply chain developed through strong partnerships

- We aim to develop **the next generation of sustainable solutions** that help enable your chamber productivity and support fab efficiency demands.
- We aim to support you in helping you deliver on your **environmental targets**.
- We aim to play our part in **alleviating your risk** whether in investment, safety or time to market with your innovation.
- To do this we need to **work together**.
- A partnership with you, for **sustainable profitable growth**.





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