



FUTURE OF SUSTAINABILITY

How research & innovation
are changing the game





GHG emissions management has become critical for all businesses

TOPLINE

70% of consumers surveyed about purchases in the automotive, building, electronics, furniture, and packaging categories said they would **pay an additional 5 percent for a green product**

FINANCING

Nearly **66%** of personal investors see climate risk and sustainability as key factors that will **influence the performance of their portfolios**

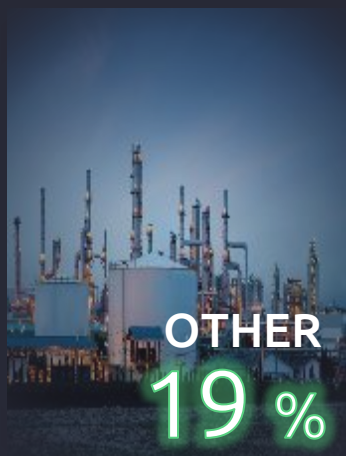
TALENTS

1/3 employees who changed jobs last year accepted an average **pay cut of 28%** to work for sustainable or socially responsible organizations.

COMPLIANCE

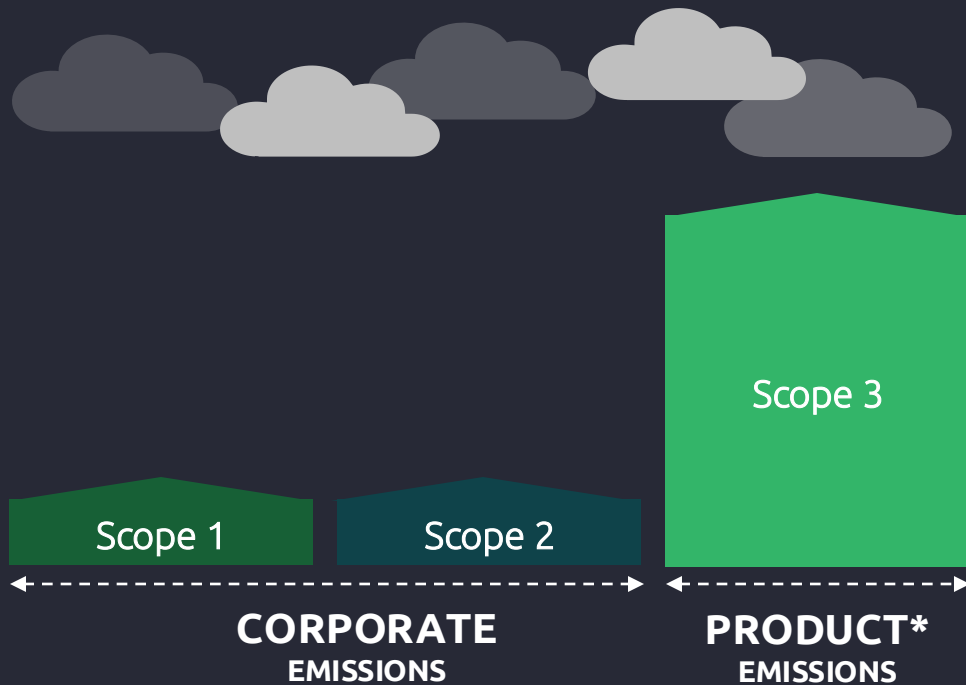
1255 ESG regulations were introduced in the last decade. A +155% increase compared to 2000-2010

ENGINEERING HAS A PIVOTAL ROLE TO PLAY IN EMISSIONS REDUCTION





Environmental emission reduction is strongly connected to manufactured products



THE DIRECT PATH TOWARDS
SUSTAINABILITY EXCELLENCE
LIES IN
SCOPE 3 REDUCTION

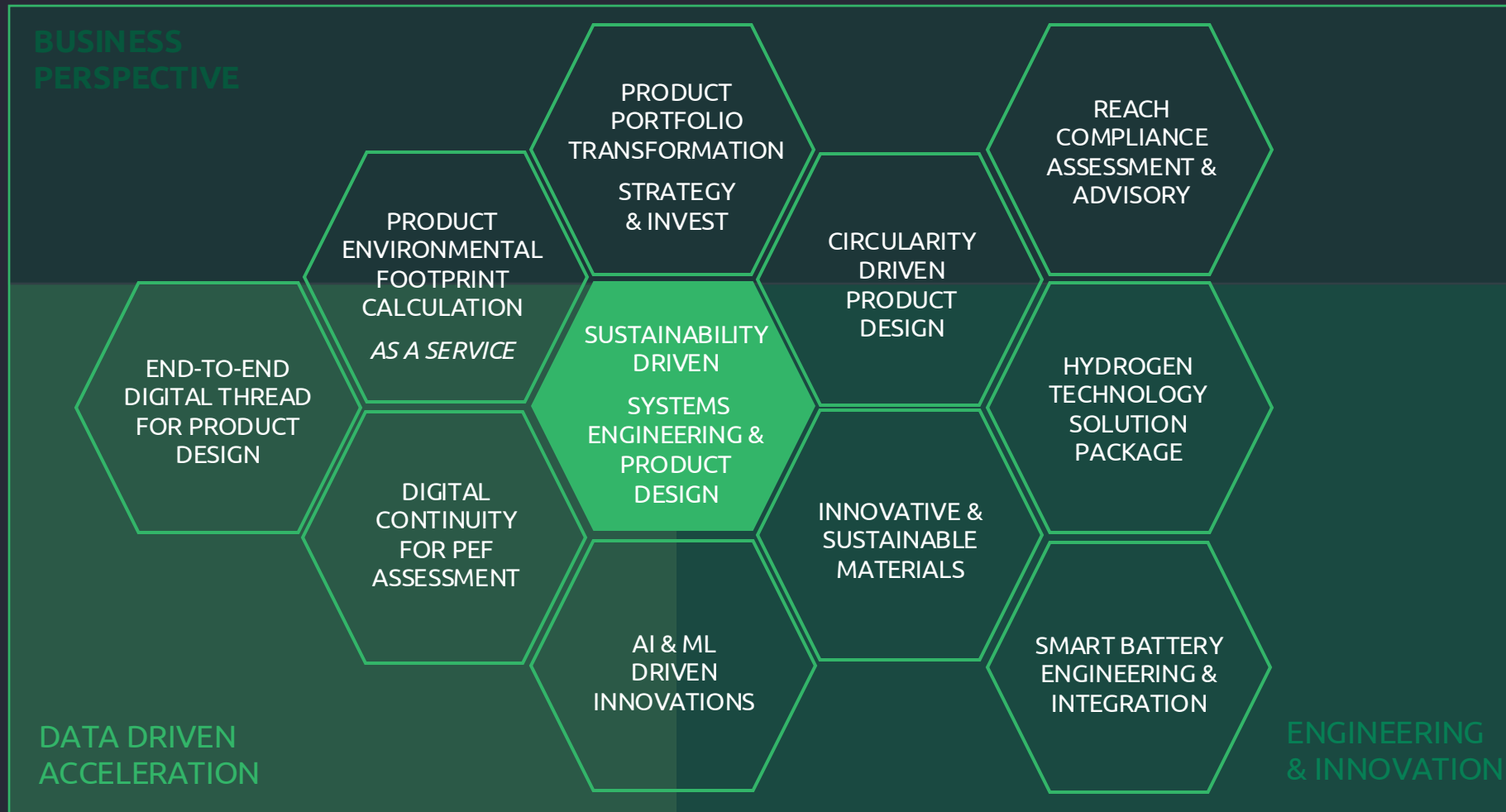
UP TO **99%**

of a company's environmental impact originates from **PRODUCTS** including the **supply chain, manufacturing** and its **use phase**

* Including the product's supply chain



SUSTAINABLE PRODUCT ENGINEERING AND THE USE OF INNOVATIVE TECHNOLOGIES WILL BE KEY TO TRANSFORM



CHALLENGES ALL OF US ARE FACING TO MAKE IT HAPPEN

We face challenges of **unseen complexity & urgency** and thus it is hard to make wise decisions

We will live decades **with legacy assets.** We need to optimize them on all aspects

New technologies need to quickly scale to decarbonate energy, industries and mobility and reach 2°C scenarios

We will continue to **lack of skilled engineers** to design sustainable products and services





A COMBINATION OF 5 MEGATHEMES INFLUENCING THE FUTURE OF ENGINEERING



Organic engineering

Organisations, markets, industry models and supply chains are becoming more dynamic and responsive to external stimuli & disruption, adopting (often bio-inspired) lifecycles.



Beyond intelligence

Technology now enables us to realise ideas beyond the imagination or conceptualisation of individuals or human teams



Resource revolution

Environmental factors place primary resources back at the heart of innovation: Changes in the fundamental use and transformation of materials, the capture, transmission and storage of energy are now disrupting products, systems, and supply chains



Digital fabric

The availability of global computation, communication, and data aggregation at unprecedented scale catalyses disruption in all domains.

Velocity of impact

As technology evolves, is regulatory pressure constructive or restrictive? Does it evolve in the right direction at the right speed?

All types of technology are subject to legal and regulatory constraints: safety, environmental impact, ethical implications, social and psychological impacts.



THE NEXT FRONTIER IN SUSTAINABILITY

ADVANCING RESEARCH & INNOVATION TO SOLVE GLOBAL CHALLENGES

We are convinced that solutions can be engineered on

4 KEY AREAS



to fast track roll out and adoption of sustainable products & services

#1

New tools and models can guide engineers through the complexity of designing sustainable products, services and measure impact & progress

#2

Digital tech & AI can tremendously reduce efforts and accelerate the design of products powered by complex new tech

#3

There is a consequent potential and effort to be done in ramping up emerging sustainable technologies manufacturing

#4

New partnerships and ecosystems need to be organized to integrate new products & services with legacy heritage



PROVIDE ACTIONABLE TOOLBOX FOR DECISION MAKERS & ENGINEERS TO BUILD MORE SUSTAINABLE PRODUCTS, SERVICES & OPERATIONS

1

Build systemic tools to make wiser decisions



Build holistic modelling & simulation

Extend impact assessment

Enable digital continuity for sustainability

2

Reinvent a more sustainable engineering with AI and digital



Co-create design to sustainability methods

Power engineering with AI

Foster green technologies using modelling and simulation

3

Unlock the potential for more sustainable manufacturing & operations with digital



Optimize manufacturing with digital twins

Foster more sustainable supply chain through digital continuity

Explore new technologies for manufacturing and operations

4

Reshape industrial ecosystems to scale new technologies



Build smarter grids for renewable energies

Accelerate decarbonation of industries (Hydrogen, carbon capture)

Scale decarbonated mobility (Electrification, hydrogen, Sustainable fuels)



THE TECHNOLOGY LANDSCAPE IS CONTINUOUSLY EVOLVING, AND ORGANIZATIONS MUST PRIORITIZE INNOVATIONS

Capgemini's **TECHNOLOGY RADAR** assesses technology trends by considering their degree of advancement and their potential to disrupt industry.

It can guide you to shape your organization's trajectory.



- H1** Scaling
- H2** Innovation
- H3** Research



80+ R&I PROJECTS ACT AS TRAILBLAZERS ON THE FUTURE OF SUSTAINABILITY

SUSTAINABLE PRODUCTS & SERVICES

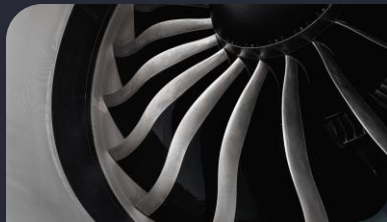
SUSTAINABLE OPERATIONS

AUTOMOTIVE



- Electrification
- New mobility
- Optimized design

AERONAUTICS



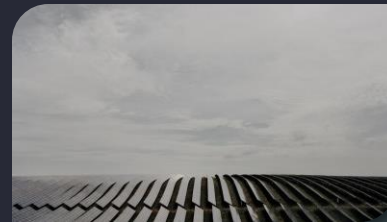
- H2 propulsion
- New air mobility
- Optimized design

SUPPLY CHAIN



- AI & Blockchain
- Transparency
- Optimized supply chain

ENERGY



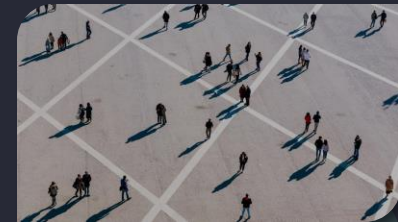
- Renewable & nuclear
- Smart grid
- Optimized operations

MANUFACTURING



- Circular economy
- Energy efficiency
- Optimized operations

SUPPORT



- Sustainable support
- Life cycle assessment
- Human factors



HOW OUR R&I PROJECTS CAN HELP YOU ACHIEVE YOUR NET ZERO COMMITMENTS

Build systemic tools to make wiser decisions



BUSINESS4PLANET

Economic modelling considering climate, population, resources, and policies to help make informed decisions

Reinvent a more sustainable engineering with AI and digital



LIGHT TRAIN

We build a **digital twin** to support the overall development of innovative **light trains** with major railway actors

Sustainable manufacturing and operations with digital



THINK TWICE

We draw a path toward more sustainable industries with **circular economy**

Reshape industrial ecosystems to scale new technologies



SOLAR AIRSHIP

We solve air mobility challenges with by **solutions powering a solar airship** operating with renewable energies



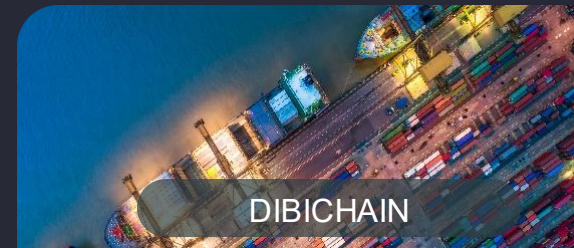
INNOV4GOOD

We constantly extend lifecycle assessment beyond environment impact to **capture human impacts, social impact and more!**



SUSAI

Via LCA we measure and **reduce the environmental impact of AI by up to 90%** in training and production phases



DIBICHAIN

We develop a tool based on **blockchain** to **transparently and securely exchange data** on materials, energy, processes and more.



ENERGY COMMAND CENTER

We use **AI and IoT** to **reduce the energy consumption of facilities by 20%** to meet carbon reduction targets.



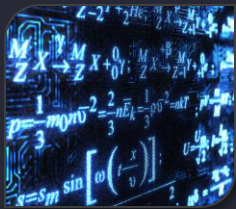
THE POWER OF PARTNERSHIPS TO DRIVE SUSTAINABLE INNOVATION

EXAMPLES OF ONGOING DISCUSSIONS & STREAMS



INDUSTRIAL PARTNERS

- New air mobility powered by renewable energy
- Life cycle analysis & bio-sourced materials
- Industrial symbiosis for bio-production



ACADEMIC PARTNERS

- Sustainable advanced engineering designs based on metamaterials made with ALM
- Next generation of PLM including sustainability



CONSORTIA

- Use of digital twin and design-to-X to design innovative light trains
- HE-ART: Design and sizing of thermal management system for future hybrid propulsion



TECHNOLOGY PARTNERS

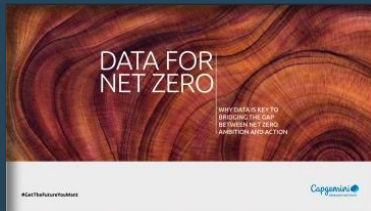
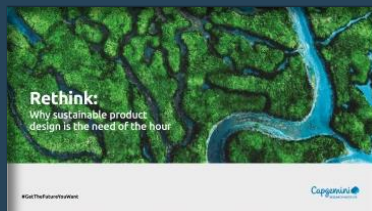
- AI-powered LCA chatbot
- Integrated Eco-design LCA



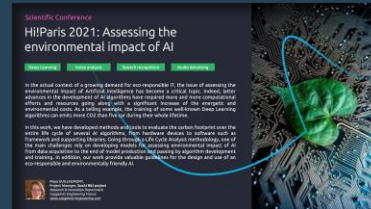


THOUGHT LEADERSHIP AND RELATED OFFER PORTFOLIO

CAPGEMINI RESEARCH INSTITUTE



SCIENTIFIC PAPERS



SUSTAINABILITY OFFER PORTFOLIO

PRODUCTS



MOBILITY



MANUFACTURING & OPERATIONS





**Let's tackle your
sustainability challenges
*together!***