REPLY

SUSTAINABILITY TRENDS

A data-driven overview

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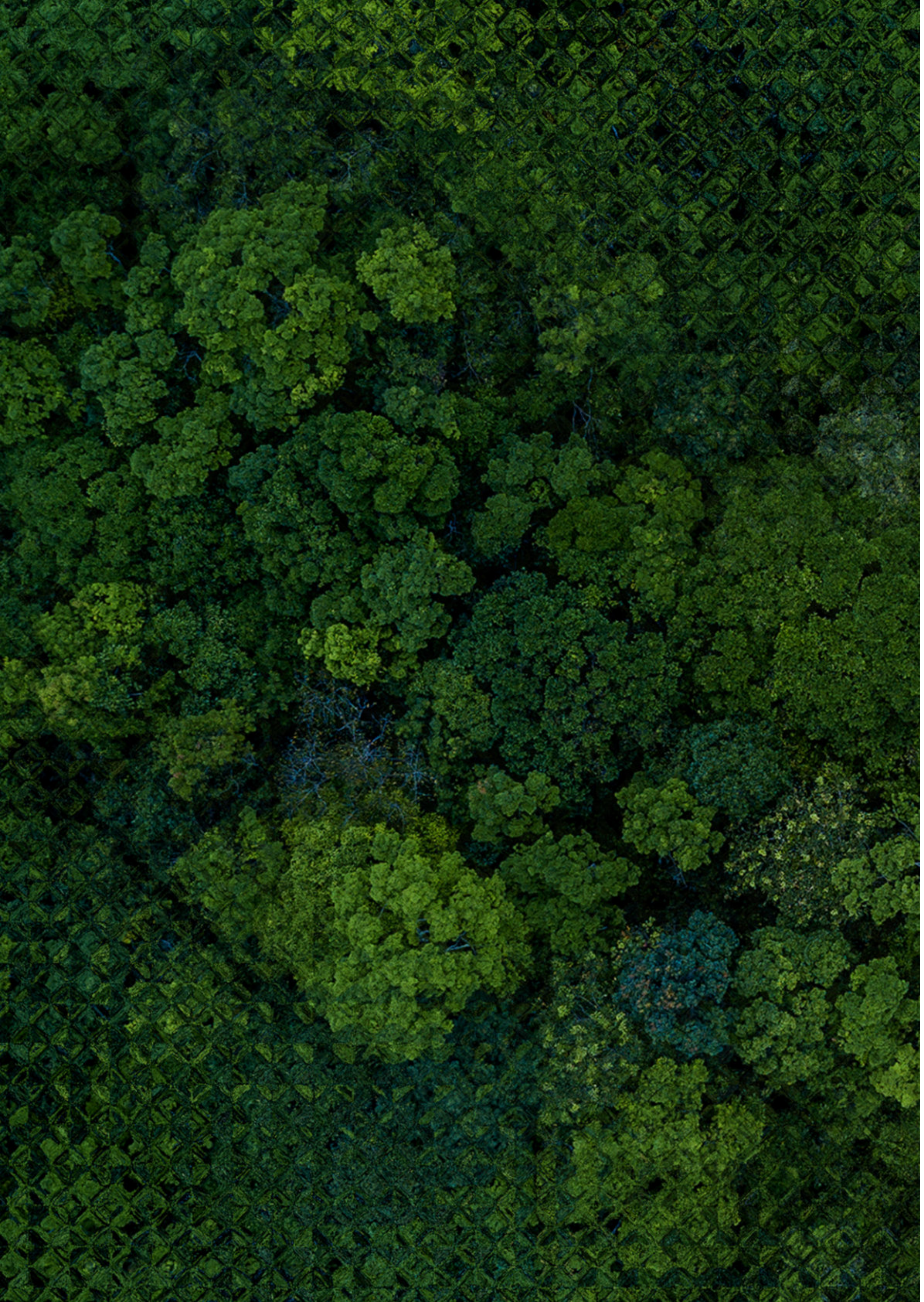

SUSTAINABILITY TRENDS

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INTRODUCTION

The transition towards a sustainable economy has reached an inflection point. Business-as-usual and inactivity are becoming an undeniable risk for the long-term existence of humans, organizations, and the planet. Sustainability is evolving as a field for transformative business and industry growth, creating multiple win-win situations for businesses following the path of becoming nature positive.

It is time for immediate change and action - in a compelling, rather than incremental way. Innovation leaders and change agents are already reinventing industries for the sake of a better future ahead.

Exponential technological development will be playing a crucial role in the transition, merging sustainability and digital transformation of businesses. Businesses driving corporate sustainability at scale have the opportunity to be part of a better tomorrow.

By using the AI-powered Reply Sonar platform we created an overview and mapping of relevant trends related to sustainability based on their occurrence within expert media articles, mass media, patents and scientific publications.

Stakeholder actions are shaping a new reality, with sustainability at its core

CONSUMER

63% of executives at organizations with sustainability programs believe the customer to be their most important catalyst for action

Gartner

The big eco-wakening of consumers is under way, translating into daily purchase actions, with an increasing number of consumers expecting to see eco-friendly, organic and sustainable product alternatives.

INVESTORS

Global ESG assets may surpass $41 trillion by 2022 and $50 trillion by 2025, one-third of the projected total assets under management globally

Bloomberg

The investment and financial sector is increasingly factoring in sustainability as an important metric for assessing risk due to unsustainable practices and as an indicator of long-term business health and resilience.

REGULATORS

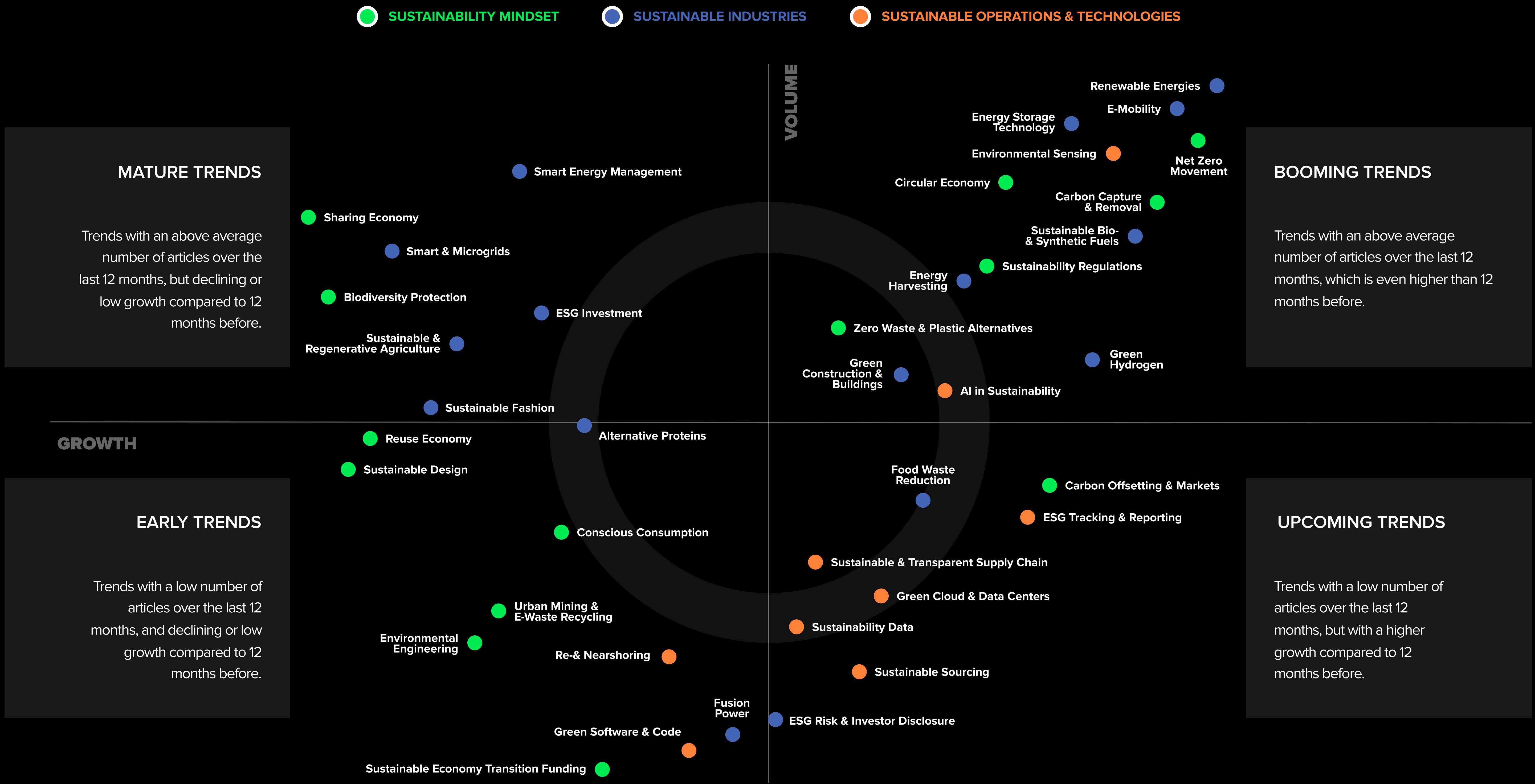
30% of the €2 trillion EU budget 2021-2027 is being spent to fight climate change

European Commission

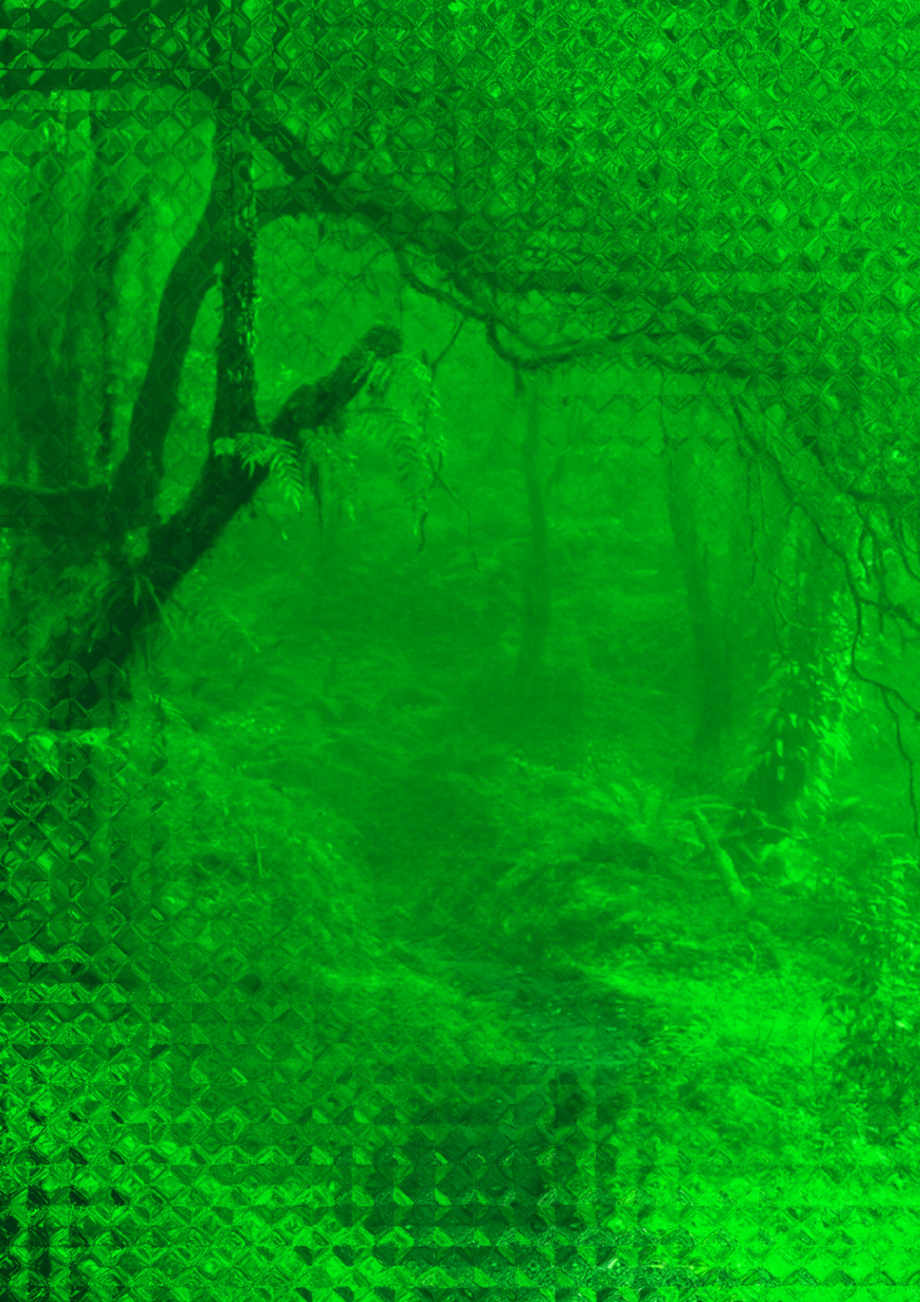
Governments around the globe are aiming for long-term sustainability, secured by standards and legislation to adhere to the United Nations Sustainability Development Goals and reach CO2 reduction goals.

SUSTAINABILITY TRENDS HYPE-CYCLE

By using the SONAR Platform, we created an overview and mapping of relevant trends related to sustainability based on their occurrence within expert media articles, mass media, patents and scientific publications.



Timeframe: June 2021 / May 2022



SUSTAINABILITY MINDSET

Changing mindset and culture: this chapter focuses on how the sustainability narrative has changed over time and turned into a core element of business resilience.

Driven by regulations, investors, societal expectations and stakeholder activism, businesses are faced with a growing scope of responsibility, factoring in accountability that goes beyond profit and shareholders to include environmental and societal implications.

1. The **environment has become a key stakeholder**, as more businesses are adapting to climate change, committing to a climate-positive economy, and adopting sustainability strategies.
2. Businesses are also shifting focus towards circular product design and value chains, creating **regenerative economies that turn waste into value**.
3. Money is pouring into active decarbonization through carbon capture and removal, an effort to reverse engineer climate change by **building up a low- / zero-carbon industry**.

NET ZERO MOVEMENT

As green pressure from stakeholders grows, the number of businesses pledging to reach carbon-neutrality in the close future has been on a steady rise. Even oil and gas companies have started joining the ranks towards net-zero. Lately the trend has extended to aim for carbon-negative or climate positive.

CLIMATE CHANGE ADAPTATION

With rising severe consequences of climate change, countries, cities and communities are pressured to adjust their development plans and systems to minimize climate risk and strengthen resilience as well as adaptive capacities. Climate change is increasingly factored into development and investment plans.

BIODIVERSITY ACTION

Around the globe, governments and organizations are broadening the strategic and regulative focus of environmental actions beyond climate to include biodiversity protection and the fight of nature-related risks. Promising solutions to tackle the biodiversity crisis include technologies like AI, bio-engineering or robotics aiming for environmental restoration.

ZERO WASTE & PLASTIC ALTERNATIVES

Businesses are increasingly ramping up their efforts towards zero waste operations, from cutting the use of disposables like single-use plastics to reusable products and packaging. Plastic alternatives, like bio-based solutions created from compostable materials, a circular plastics economybased on synthetic biology and material science are promising ways towards a waste-free future.

ENVIRONMENTAL ENGINEERING

Geoengineering, also called climate engineering, refers to technologies by which humans can intervene in the earth's bio- or geochemical cycles to effectively combat the effects of climate change. There are several approaches, ranging from the aforementioned carbon capturing, to filtering CO2 from the atmosphere, to solar geoengineering or solar radiation management (SRM) technologies aiming to cool down the planet. Most of the approaches are still in the research phase and some face criticism due to unclear consequences that could be just as devastating as climate change.

CIRCULAR AND REUSE ECONOMY

With resource extraction and depletion (e.g. rare earth metals) at an all time high, companies have to shift from linear thinking towards the implementation of circular economic and material models. The leading principles are related to the avoidance and reduction of resources by efficient and smart use of materials, as well as recycling and reusing of materials and products in a closed loop along the entire value chain. This starts with designing products to be reusable from the beginning, using a zero-to-zero manufacturing approach that makes them easier to repair and utilizing packaging (if used at all) that is reusable or biodegradable.

Growing awareness of resource depletion and waste-filled landfills is also shifting consumer behavior away from excessive purchasing of new products and instead towards reusing, repairing, and reselling. Online platforms selling used or refurbished goods have gained considerable popularity, turning into mainstream ways of sustainably purchasing products.

CARBON OFFSETTING, CAPTURE, & REMOVAL

To quickly reduce carbon footprints to reach promised carbon emission reductions, governments, businesses and organizations purchase large amounts of carbon offset credits. However, the trading of carbon certificates remains controversial, representing an easy way to clear emissions from business records while making no eco-friendly changes to operations. Further shortcomings of offsets are related to their counting of avoided future carbon releases, lack of strict certification, or selling of already protected forests, lands or activities that would happen anyway.

Being past the point where reducing emissions would be enough to combat climate change anyway, technologies aiming for negative emissions like carbon dioxide capture and removal technology are on the agenda again. They are seeing an upsurge in interest, with governmental and private investment pushes and plans for new large-scale CCSU facilities being announced. Scientists, researchers and companies are working on developing the technology further to gain additional benefits from carbon collection.

SUSTAINABLE INDUSTRIES

Transforming the product and business model: this chapter will dive into shifting industry dynamics embracing future sustainability as a value generating opportunity.

Fundamental change is about to happen, in regard to how value is generated, starting by embracing a regenerative and adaptive mindset for business actions. Leading businesses and innovators in the field of sustainability are on the verge of transforming whole industries with new products, services, platforms and business models.

1. A marked shift from “responsibility as compliance” to “responsibility as a **source of value generation**” will cause ESG incorporation in investment practices to accelerate as stakeholders realize that unsustainable business practices are turning into risk factors.
2. This will **drive change in energy-intensive industries**. Concrete innovations are enabling the next generation of low-carbon architecture and green buildings, and green mobility and transportation are beginning to phase out fossil fuel vehicles.
3. **Consumption practices will change due to resource depletion**: we expect to see a rise in more sustainable production and fashion, alternative proteins and food waste reduction, and regenerative agriculture.

ESG INVESTMENTS

ESG is gaining traction amongst investors who factor in sustainability-related criteria as indicators of corporate long-term health. To adhere to this development, more and more companies integrate ESG into their business, process and disclosure strategies. However, a significant share of ESG investments flows into companies strong on the “E” but neglecting the “S” and the “G” part of the equation (social and governance), like big tech companies with high returns and low carbon footprints, but shortcomings related to issues like labor rights or data security.

E-MOBILITY

An increasing number of governments have set effective bans for the sale of internal combustion engine cars, paving the way for electric road mobility from all-electric, to hybrid, to solar-powered vehicles. Synthetic or bio-fuels from various sources are being considered as potential means for achieving low-impact mobility. Moreover, AI and clean tech are playing an increasing role in sustainability within transportation, providing solutions for higher fuel efficiency, route optimization, traffic management, and autonomous driving.

SUSTAINABLE AND REGENERATIVE AGRICULTURE

Sustainable and regenerative agriculture is aiming for the provision of food for a growing global population by utilizing sustainable farming methods that retain or restore soil health, animal welfare, and biodiversity, while improving the water cycle, reducing the use of fertilizers, pesticides as well as food losses and cultivate practices to bind carbon in the land rather than releasing it.

To tackle these challenges, a growing ag-tech sector as well as farming innovations draw from cultured beef, vertical and indoor farming, automated farming robots and drones, use of aerial imaging, smart irrigation and water management, precise application of fertilizers, yield predictions and more, leveraging data and technology to produce more food while being less resource-intensive.

SUSTAINABLE FOODS

For reaching climate goals while being able to feed a growing world population, the food industry must transform as well. The food industry is setting its focus on sustainable sourcing of foods by regenerative agriculture, as well as the reduction of organic food waste by means of emerging technologies. The resource-intensive beef industry is leaning into an alternative meat and protein sector with plant-based, lab-grown or synthetic meats.

SUSTAINABLE CONSTRUCTION

Being one of the world’s biggest consumers of energy and materials, the construction industry has a massive environmental footprint – with the biggest share being due to building materials.

Attempts to lower the environmental impact of the industry include zero energy and regenerative buildings, carbon capture technology, material innovation in the fields of novel and alternative cements, alternative fuels and energy efficiency (e.g., digital technologies improving heating and cooling systems, smart metering and smart grid integration).

SUSTAINABLE ENERGY

As the global energy consumption is forecasted to grow further on a year-to-year basis, the clean energy transition is vital in the fight for climate change and poses an attractive option for recovery plans after Covid-19.

The shift is supported by falling prices of renewables, outcompeting fossil fuels in many countries, electrification, smart and micro-grid technology, energy management systems and enhanced storage technology. Furthermore, green hydrogen momentum is further accelerating, being considered an essential technology to achieve decarbonization goals – especially concerning the industrial and heavy transportation sector.

SUSTAINABLE OPERATIONS & TECHNOLOGIES

Redesigning the system along the entire value chain: this chapter is about how advancements in exponential technology and data can help to scale sustainability action in a smart way.

Within this new era of sustainability and accountability, businesses are in continuous search of innovative solutions to be able to live up to their pledges. The new tech-efficiency paradigm is going beyond cost efficiencies, helping businesses to improve operations while leading to green growth. Sustainability and digital transformation are moving forward in tandem, exponentially balancing tech adoption with environmental impact.

1. Thanks to a new transparency imperative the ESG disclosure ecosystem will evolve and remain dynamic. Tech is helping to measure the vital signs of the planet's health and prove data-driven transparency from bottom up.
2. As sustainability meets digital tech it will transform the way we do business, strengthening efforts toward increasing supply chain transparency, accounting for sustainability performance and risks in business decisions, and leveraging AI and smart algorithms for sustainable efficiency.
3. As "green" turns into a new IT standard, green software and low-carbon coding support the beginnings of the age of a new frontier within IT.

ESG TRACING & REPORTING

Regulators and investors are pushing towards a future enforcing a more widespread and mandatory disclosure as well as standardization of sustainability reporting by businesses and organizations. However, various reporting frameworks (e.g., GRI, SASB, IIRC, IFRS), a current lack of standardization, and issues related to quality and quantity of data remain a challenge to date, making it hard to collect and compare sustainability data.

ENVIRONMENTAL SENSING

Data is an essential for a business's sustainability evaluation. Smart sensors, remote environmental sensing and geospatial technologies (e.g. geospatial information sensing, remote sensing, photogrammetry, global positioning systems) for earth observation are becoming essential means to gather data at a very granular level, to understand and track planetary health and environmental impact – across land, air and sea.

SUSTAINABLE & TRANSPARENT SUPPLY CHAIN

The interplay of IoT, blockchain, virtual twin and artificial intelligence technology, allows companies to digitalize and virtualize their entire supply chain infrastructure to provide transparency and traceability at an unprecedented level and create trust through adherence to standards that can be reliably measured, not only shifting operations to being more sustainable but also unlocking value for business. The old supply chain model is shifting the priority from efficiency to resilience.

RE- AND NEAR-SHORING

Last year's disruption of supply chains led to shortages of critical products, which has propelled the rethinking of global manufacturing and supply chain structures. An ongoing discussion is centered around re-shoring, nearshoring, local and decentralized production by smaller, more agile and eco-friendly production sites and micro-factories.

AI IN SUSTAINABILITY

AI and machine learning technologies can be net positive contributors, reducing the carbon footprint of operations, developing better environmental models, and increasing operational efficiency: automating, forecasting demand, predicting maintenance, and synchronizing and optimizing processes can result in less pollution, fewer errors and optimized resource usage and business processes.

GREEN CODE & SOFTWARE

Sustainable software development is increasingly becoming the next frontier of green IT, shrinking the environmental footprint of businesses by optimizing every line of code as well as the architecture of the software. Based on the principles of clean, lean software, it can also account for shutting down when not in use and dynamic code analysis, without quickly becoming outdated.

GREEN CLOUD & DATA CENTER

With the increasing use of digital technologies comes an increase in the environmental impact of energy consumption. As data centers account for a major share of carbon emissions within the digital ecosystem, attempts to lower the footprint are related to optimizing the hardware and including more renewables and renewable energy credits (RECs).

The latest attempts at tackling the software and processing component as a new way to save energy attempt to eliminate data duplication or use edge processing. Moreover, virtual server architectures, containerization, serverless computing, and simulation are additional means of energy-efficient computing.

THE KEY TAKEAWAYS

Sustainability is evolving as a field for transformative business and industry growth, creating multiple win-win situations for businesses following the path of becoming nature positive. The pressure for change combined with incentive systems and the ability to leverage exponential technological evolution and a corresponding data economy allows to scale environmental impact while generating profit.

Dynamic game changes on the agenda

Sustainability and green pressure is at an all time high, with stakeholders engaging in activities to push regulations and compliance and benefit from this growing momentum and reality.

Data & analytics fuel ESG intelligence

A sound data strategy and an accurate data inflow, paired with AI & analytics, will unleash sustainability insights for real-time decision making, transparency & value generation potential.

Sustainability = long-term value & resilience

Holistic sustainability strategies and climate change adaption translate into long-term business resilience, outperforming competitors, generating value from green business opportunities.

Digital & virtual tech transform at scale

Digital transformation strategies will embrace sustainability, integrating smart technology innovations to transform business operations for sustainability at scale and reduce ESG impact.