

a world in balance

Why sustainability ambition
is not translating to action

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Executive Summary

In 2009, a group of 28 internationally renowned scientists identified the nine processes that regulate the stability and resilience of the Earth system. They also estimated a limit of just how much human activities could alter each of the nine processes before reaching a tipping point. As of April 2022, humanity crossed out of the safe space for six of these nine planetary boundaries, which increases the risk of generating large-scale abrupt or irreversible environmental changes.¹ The boundaries that have been crossed include: climate change, biogeochemical flows (e.g., excessive phosphorus and nitrogen pollution from fertilizer use), biosphere integrity (e.g., extinction rate and loss of insect pollination), land-system change (e.g., deforestation), novel entities (e.g., pollution from plastics, heavy metals, and what are commonly referred to as “forever chemicals”), and freshwater use.²

In this context, while organizations across industries have acknowledged the urgency of climate change and have set long-term targets for achieving environmental sustainability, limited action is visible on the ground. Conceptually, there is progress: the sustainability vision is being integrated into remodeled business strategies. However, organizations need to build up a series of achievable short-term goals in order to

realize the long-term objective of sustainability. Our research reveals that many executives are unclear as to the business case for sustainability and still view it as an unwelcome cost driver, rather than an investment. Around half of respondents believe sustainability is a non-viable option, with the costs involved in pursuing it outweighing the benefits. Our research also shows that people and talent challenges limit enterprise-wide collaboration; implementation is still being attempted in silos, without broader oversight and coordination. For example, recruitment and upskilling on sustainability skills are still not a priority for the majority of HR teams, and sustainable design and circularity are not a focus for most product or manufacturing teams.

Our research and analysis, however, reveal that sustainability and financial metrics can go hand in hand. We found that “frontrunners” – those organizations that have progressed to a greater degree than their peers in implementing sustainable practices, have witnessed 83% higher revenue per employee from 2020 to 2021 compared to the average. In the same time period, “sustainability beginners” realized a revenue per employee 13% below the average. While it may run counter to what many companies might think, the

Executive Summary

continued investment in sustainability is even more critical as we potentially face an economic downturn as companies with a strong sustainability focus recover more quickly.³

There are pockets of tangible progress. Some organizations are starting to invest in technologies such as artificial intelligence (AI), automation, and the Internet of Things (IoT) to limit environmental impact; 55% are aware of the size of their carbon footprint and are working to reduce it. The adoption of digital technologies at scale can accelerate the transformation toward sustainability. But to become a sustainable business requires an enterprise-level transformation and a redesign of operating models and business processes. Combined action from the board and all C-suite executives and the support of functional leaders is critical.

This report shares recommendations for eight C-suite positions to accelerate their companies' sustainability ambitions, which must be implemented in a combined, collaborative view:

- The CEO must make sustainability a business priority
- The CFO must articulate the business case for sustainability and ensure it is understood throughout the organization
- The CMO must implement protocols to avoid greenwashing sustainability credentials
- The chief design/product officer needs to embed sustainability as a core design principle
- The chief procurement/supply chain officer needs to work with suppliers to ensure they achieve sustainability goals
- The CTO/CIO must strengthen sustainable IT initiatives
- The COO needs to build the foundation of the sustainable organization
- And, of critical importance, the CHRO needs to staff for sustainability, which requires new skill sets and a new leadership model.

Introduction

For companies, sustainability – the need to address environmental issues such as climate change and biodiversity loss, as well as societal issues such as human rights and gender equality – has never been a more urgent imperative. Investors, customers, employees, policymakers, and society as a whole are scrutinizing the actions of businesses and their leaders in unprecedented detail. Against this backdrop, companies must operate sustainably, and bake sustainability principles into product and service design, while striving to create a positive impact on their ecosystems and workforces.

To understand whether companies are taking this urgent mandate sufficiently seriously, and to assess their progress in becoming sustainable, we conducted a global research study covering large organizations across 12 countries. These organizations operate across key industries, including aerospace and defense, automotive, consumer products and

retail, energy, financial services, healthcare and life sciences, industrial manufacturing, telecom, utilities, and the public sector/government. The scope of the research focused on practices and initiatives within environmental sustainability and did not include the social aspects of sustainability. The research structure includes a survey of 2,004 respondents from 668 organizations with annual revenues in excess of \$1 billion, comprising the following profiles:

- 50% are executives from corporate functions including strategy, sustainability, sales and marketing, finance and accounting, IT, and operations
- 50% are executives from value-chain functions including innovation/R&D, product design and development, sourcing and procurement, supply chain and logistics, and manufacturing and production

We surveyed three executives from every company included in the research. We also conducted in-depth interviews with sustainability executives (more details on the research methodology are available at the end of the report).

This report explores five broad themes:

- 1. Organizations' ambitions do not translate to their actions on sustainability**
- 2. Organizations view sustainability as a cost driver, rather than an investment**
- 3. People and talent challenges limit enterprise-wide collaboration and adoption**
- 4. Some organizations are investing in technologies to limit environmental impact**
- 5. Ways in which organizations can accelerate their transformations toward sustainability**

An aerial photograph of a landscape. On the left, a light-colored dirt road or path winds through a field of dry, brownish vegetation. To the right, there is a large area of vibrant green, possibly a field or a forest. In the bottom right corner, a dark blue body of water is visible, likely a lake or a reservoir. The overall scene is a mix of natural and possibly agricultural or industrial land use.

**Sustainability is now
a corporate imperative
across sectors.**

01

ORGANIZATIONS' AMBITIONS
DO NOT TRANSLATE TO THEIR
ACTIONS ON SUSTAINABILITY

In this section, we examine the importance of environmental sustainability for organizations and indicate where their actions are falling short of their ambitions across the following five dimensions:



1. **Sustainability strategy and business model**
2. **Sustainable products and services**
3. **Sustainable operations**
4. **Sustainable IT**
5. **Data for sustainability**

Sustainability strategy and business model

Organizations recognize the sustainability imperative

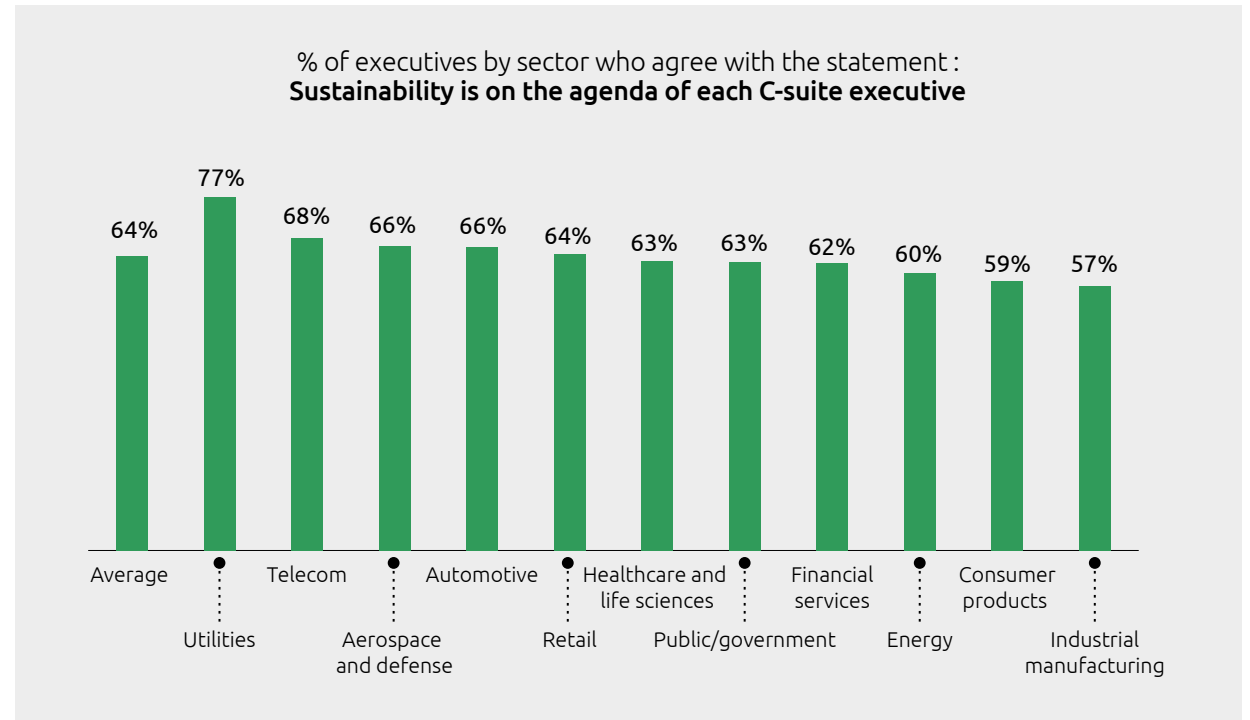
Sustainability is now a corporate imperative across sectors. Magdalena Gerger, Volkswagen Group Sustainability Council Advisory Board to the Management Board, says: *“Volkswagen’s transformation toward sustainability was initially driven by survival. If Volkswagen Group did not undertake this*

fundamental change, the company would most likely become irrelevant and disappear, over time. Sustainability was expected by Volkswagen’s customers, investors, and from society.”

Our research reveals over half (64%) of respondents say that sustainability is on the agenda of each C-suite executive. This percentage is highest in utilities (77%) and lowest in industrial manufacturing (57%) (see Figure 1). There appears to be a gap between ambition – and the large share of companies that say sustainability is on their agenda – and action. For example, in 2021, 13,114 companies globally disclosed their environmental impacts through the global disclosure system CDP. Just under one third (31%) of those companies are developing a low-carbon transition plan – an outline of how an organization will pivot its existing business model toward a 1.5°C aligned trajectory based on the latest climate science recommendations.⁴

Fig.1

The majority (64%) of executives globally say sustainability is part of their leadership’s agenda



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,003 executives in corporate functions.

Laurence Pessez, Global Head of CSR at BNP Paribas, comments: *“Boards are realizing the importance of sustainability, especially with growing regulations, and are taking bold action, such as linking sustainability targets to compensation.”*⁵

Current investment levels are insufficient

All the companies in our survey have an annual revenue above \$1 billion. Average annual investment in environmental sustainability initiatives and practices across industries represents 0.91% of total revenue. While total spending on sustainability trends upward with company size, larger companies are investing less as a percentage of total revenue – on average, only 0.41% of total revenue compared to

2.81% among smaller companies (see Figure 2). In comparison, in 2020, companies in the S&P 500 spent on average 4% of their total revenue on research and development, with technology being the leading sector for R&D spend (10.2%).⁶

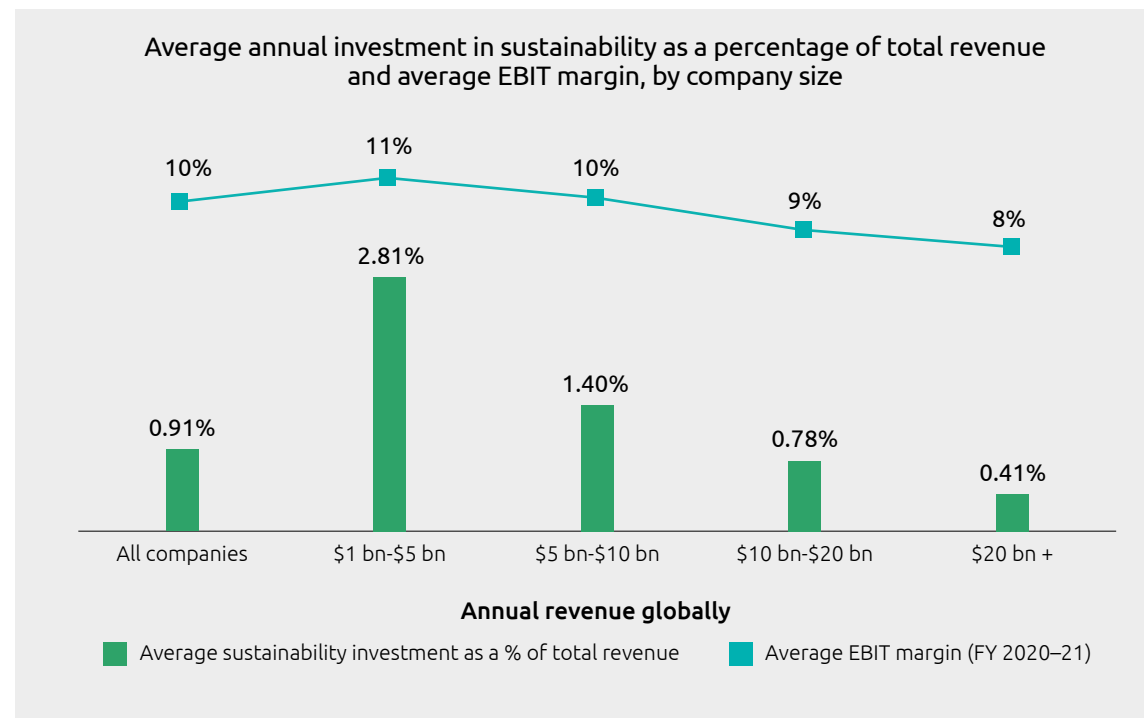
Companies with less than \$10 billion in revenue invest on average 2% of total revenue in sustainability while companies with more than \$10 billion in revenue invest 0.5% of their revenue in sustainability. Among the countries we surveyed, there is not large variation across different geographies in the percentage of total revenue allocated to sustainability investments.

+64%

of respondents say that sustainability is on the agenda of each C-suite executive

Fig.2

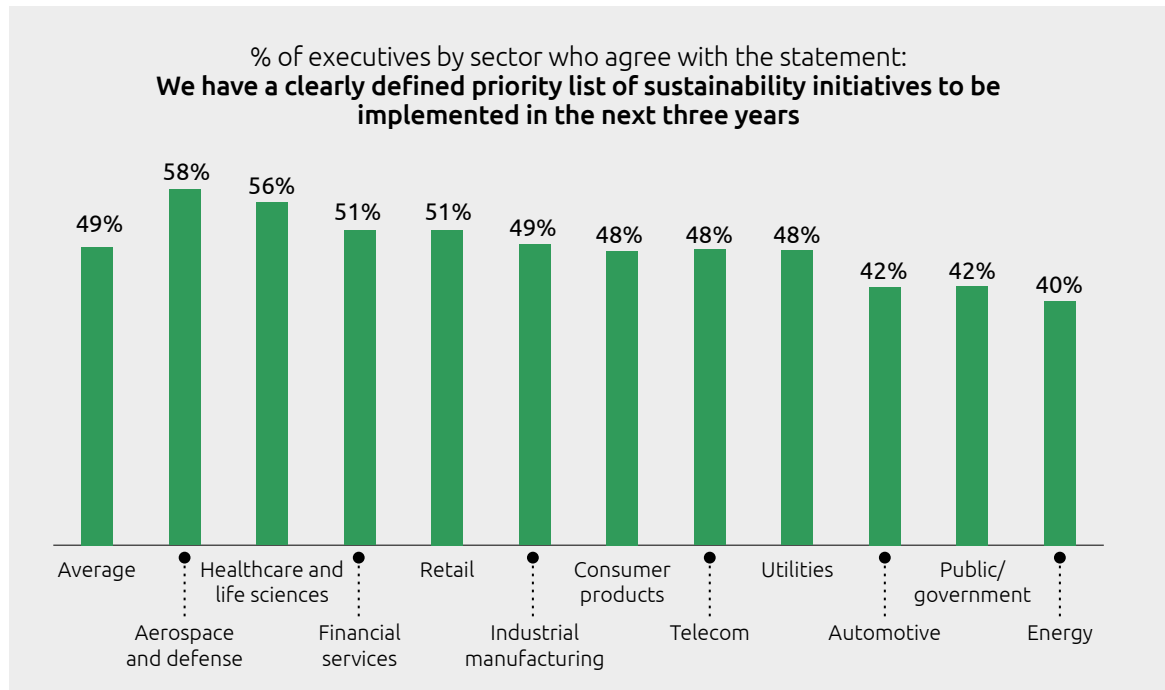
Larger companies are investing a smaller share of revenue in environmental sustainability



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 668 organizations.

Fig.3

Less than half of executives globally say their company has a priority list of sustainability projects



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,003 executives in corporate functions.

Organizations are not defining short-term sustainability goals

Although a majority of companies include sustainability as a key agenda item for top leadership, this is not necessarily translating into action. For example, there has been a lot of traction around net zero commitments in the past couple of years. In 2019, net zero pledges covered 16% of the global economy; by 2021, this figure had risen to 68%.⁷ While organizations may have long-term objectives for 2040 or 2050, we found that organizations are failing to define clearly and prioritize sufficiently their sustainability initiatives in the short-term, with less than half (49%) of executives saying their company has defined a priority list of sustainability initiatives (see Figure 3). Karen Ermel,

Director of Responsible Investing at private bank Coutts, says: *“Your long-term target is great – but who’s still going to be around to check that you’re actually doing that in 2050?”*⁸ By sector, aerospace and defense leads, with 58% of respondents saying their company has a priority list; energy lags the most, with only 40% of respondents saying the same.

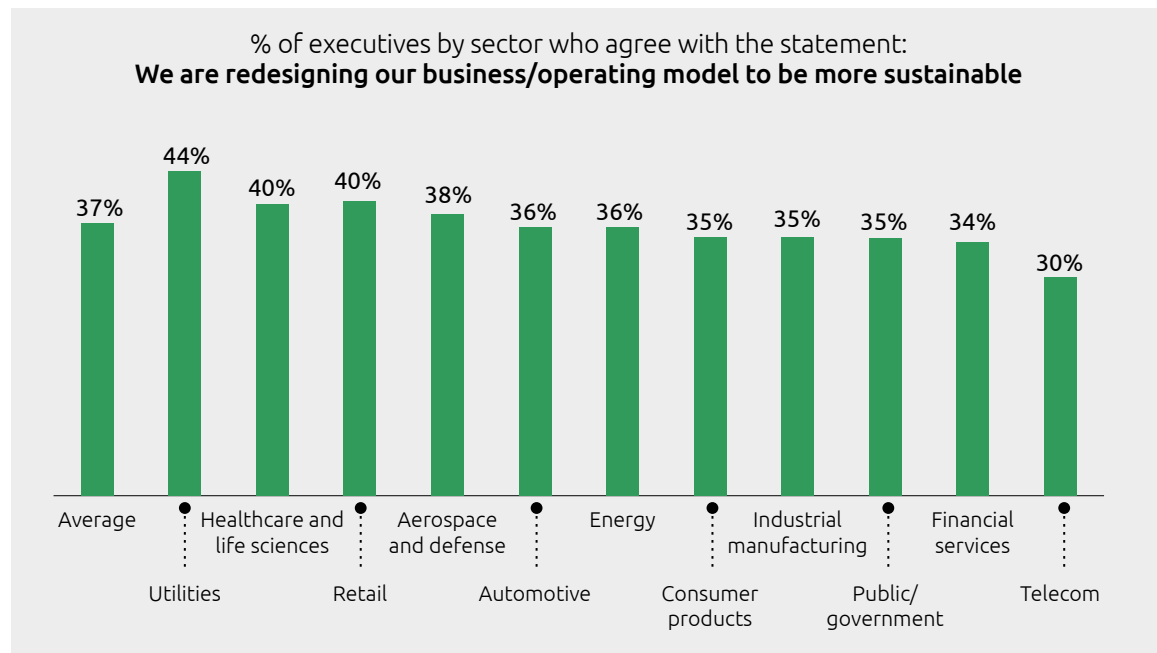
Organizations are failing to design more sustainable operating models

While many companies are strategizing for greater sustainability, redesign of operating models lags, with only a little over one-third (37%) of respondents in our research agreeing that their company has done this (see Figure 4). Companies in the utilities sector are faring slightly better, with 44% of respondents saying they are redesigning their business model, but only 30% of telecom respondents say the same. This is not a situation to ignore, as Tom Schalenbourg, Sustainability Development Director at Toyota, confirms: *"Integrating sustainability into the business strategy has become an imperative in every sector for attracting investment, customers, and talent."*⁹

Operating model redesign is required for companies to truly become sustainable businesses. The failure to act could have significant consequences for the relevance and ultimately survival of the company. The Intergovernmental Panel on Climate Change (IPCC) has indicated that to meet the 1.5°C temperature goal, emissions should be reduced by around 45% by 2030 relative to 2010.¹⁰ Patricia Espinosa, Executive Secretary of UN Climate Change, says: *"If we want to stand any chance of reducing emissions by 45% by 2030 and embark on the road towards carbon neutrality around mid-century, transformative decisions need to be taken now."*¹¹

Fig.4

About one-third of executives globally say their company is designing a more sustainable business model



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,003 executives in corporate functions.

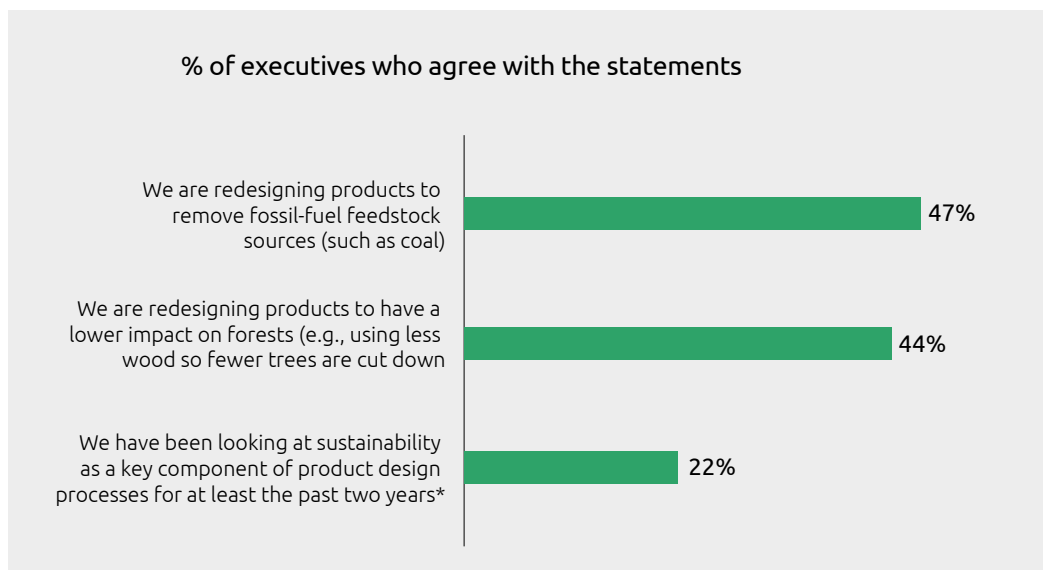


**“Your long-term target is great –
but who’s still going to be around
to check that you’re actually doing
that in 2050?”**

— Karen Ermel, Director of Responsible
Investing, Coutts⁸

Fig.5 Sustainable products and services

Product or process redesigning for sustainability is not a focus for most organizations



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,001 executives in value-chain functions. *Source for the last statement: Capgemini Research Institute, Sustainable Product Design Survey, April–May 2022, N=900 organizations.

Less than half of organizations are redesigning products and design processes

In our previous research on sustainable design, of the companies that have successfully implemented at least one sustainable design strategy, the majority (67%) have seen a reduction in emissions due to sustainable product-design initiatives.¹² For example, through innovations in silicon design, Cisco's 8201 range of routers consumes 26x less power than earlier models.¹³ Further, our sustainable design research also found that only 22% of organizations have been looking at sustainability as a key component of product design processes for at least the past two years.¹⁴

However, in our current research, less than half of respondents say their company is focusing on product redesign (see Figure 5); many companies are therefore unable to capture this emissions reduction benefit. Oliver Zipse, Chairman of the Board of Management at BMW AG, says: *"We must design our vehicles for sustainability from the very first day of development: reducing the amount of material used and, above all, planning for reuse and recycling. In the face of rising raw-material prices, this is not just an environmental, but also a business, imperative."*¹⁵

Sustainable operations

Only half of organizations are reducing packaging, redesigning processes, and focusing on logistics

The circular economy, including remanufacturing and recycling, is a key component of sustainability. However, for more than 40% of organizations, this is still not a priority. Only 50% of respondents says they are redesigning processes to consume less energy, while 49% say they focus on reducing the use of packaging material (see Figure 6). In 2015, for example, packaging contributed to nearly 50% of global plastic waste.¹⁶ Beyond the emissions caused by manufacturing operations, transportation-related emissions also add to the overall carbon footprint. However, our research found that only 48% of organizations are using analytics to optimize their logistics thereby reducing emissions.

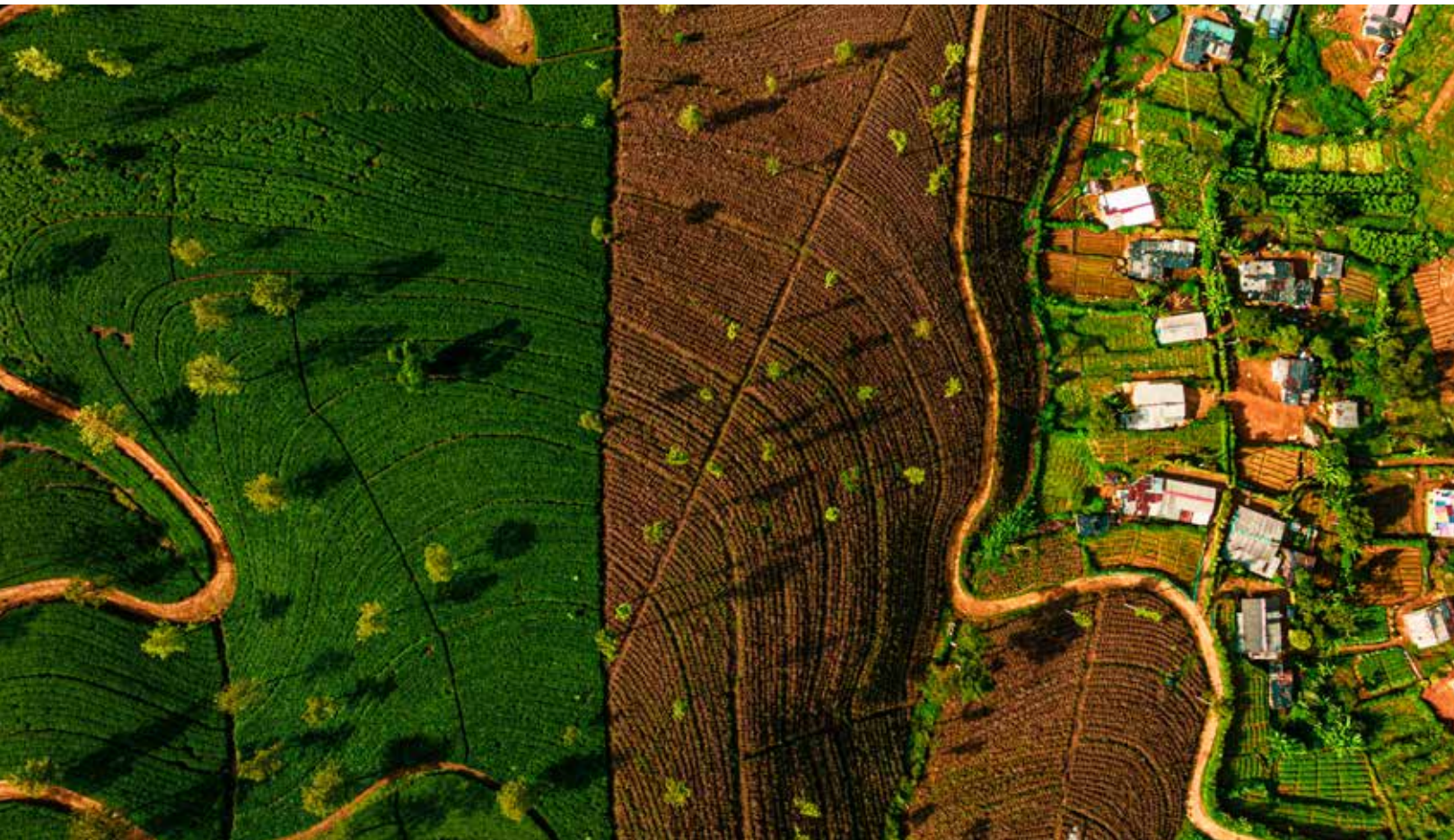
The automotive industry is ahead with end-of-life reuse and recycling. In the EU, 95% of parts and materials from scrapped passenger cars, vans, and other light goods vehicles in 2019 were reused and recovered, while 89.6% were reused and recycled.¹⁷ Renault cars

Fig.6

Recycling is not a focus for more than 40% of organizations



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,001 executives in value-chain functions.



currently sold in Europe contain on average 36% recycled materials and 10–20% recycled plastics; moreover, Groupe Renault is planning to increase the use of recycled plastics by 50 percent in 2022.¹⁸

Biodiversity loss is not a focal point for organizations

Biodiversity refers to all the variety of life on Earth, or in a particular habitat or ecosystem. Climate change and biodiversity loss are interconnected. According to the European Commission, “Climate change is one of the main drivers of biodiversity loss, but destruction of ecosystems undermines nature’s ability to regulate greenhouse gas (GHG) emissions and protect against extreme weather, accelerating climate change and increasing vulnerability to it.”¹⁹ Sustainable land management, defined by the UN as: “The use of land resources, including soils, water, animals, and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions,”²⁰ is one way to protect against biodiversity loss. However, only 47% of executives say that their organization monitors the conversion of natural ecosystems (i.e., changes owing to

deforestation) on their owned or managed lands. In addition, only 43% say their organization invests in conserving natural habitats, such as rainforests (see Figure 7). Industrial manufacturing leads in monitoring natural ecosystems, and telecom leads in conserving natural habitats, with 56% and 53%, respectively.

Sustainable IT

Many organizations have not transitioned to green cloud architecture

Our previous research on sustainable IT found that while 50% of organizations have an enterprise-wide sustainability strategy, only 18% have a comprehensive sustainable IT strategy with well-defined goals and target timelines.²¹ This highlights the challenging job that CIOs/CTOs have in making their IT operations more sustainable. Sustainable IT covers many domains, such as networks and communications systems, applications and data, user hardware and devices, and cloud computing. For example, a mass migration to a cloud architecture that uses renewable energy sources could prevent 629 million metric tons of CO2 emissions by 2024.²² In our research, only 48% of executives say their organization uses low-energy-consumption green cloud architecture for its data centers. By sector, 57% of respondents in automotive

say the same, compared with only 43% of respondents in telecom.

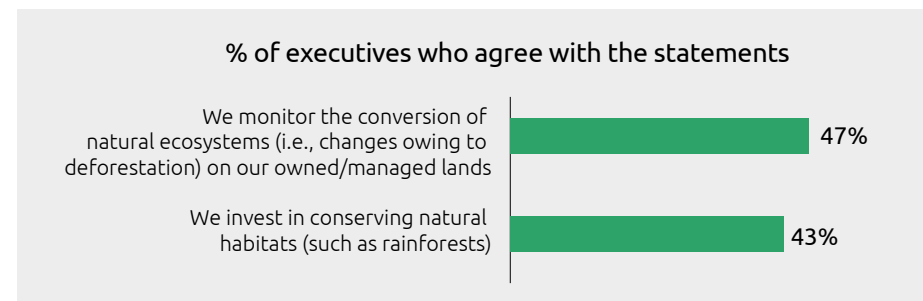
Data for sustainability

Data is not commonly shared across the organization nor used in decision-making

There is a lack of cohesive purpose in sustainability efforts that suggests the ongoing presence of functional silos that dilute these efforts. For example, only 43% of respondents say that sustainability-related data is available and shared across the entire organization (see Figure 8). The head of sustainability at a global alternative energy manufacturer comments: *“For organizations to define meaningful sustainability targets and measures for all functions, constant exchange of sustainability-related information and data is a must.”* Further, our previous research on data for net zero found that, of the organizations that have set net zero targets, 45% only use emissions data for mandatory reporting and do not embed it in decision-making.²³ The research also found that only 13% of organizations have set up a governing body or steering committee to oversee a data strategy and progress on net zero.²⁴

Fig.7

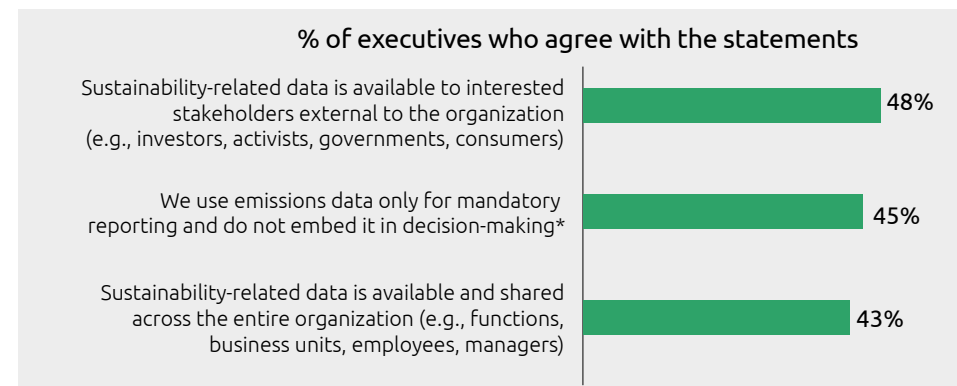
Combating biodiversity loss is not a focus for over half of organizations



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,001 executives in value-chain functions.

Fig.8

Less than half of organizations share sustainability data internally and embed it into decision-making



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,001 executives in value-chain functions. *Source for second statement: Data for net zero survey, May–June 2022, N=900 organizations that have set net zero targets.

“Integrating sustainability into the business strategy has become an imperative in every sector for attracting investment, customers, and talent.”

— Tom Schalenbourg, Sustainability Development Director, Toyota⁹

Who are the sustainability leaders?

As seen in our research over the past two years, many companies work on sustainability initiatives and discrete projects in silos, with no overarching strategy or governance mechanisms. Becoming a sustainable business is a long and complex process, and requires a transformation of operating models, technology, and attitudes.

To gain a sense of where organizations are in their sustainability journeys and identify the leading organizations, we mapped the sustainability maturity of organizations across three dimensions.

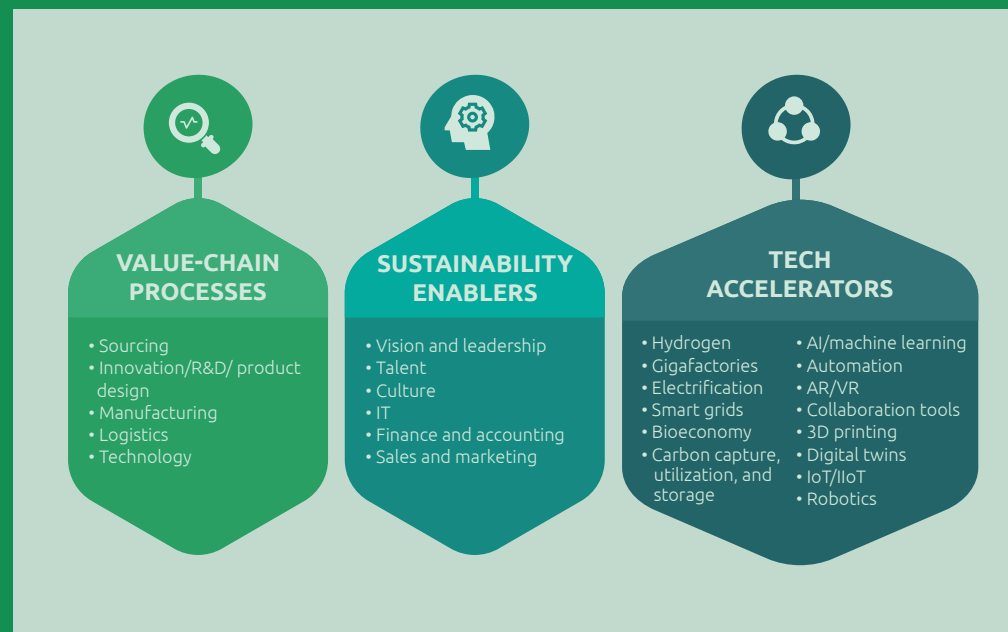
+ Value-chain processes: We assessed the sustainability initiatives and activities of organizations across the value chain, including sourcing, R&D/product design/innovation, manufacturing, and logistics, as well as the use of technology for sustainability.

+ Sustainability enablers: This dimension relates to organizations' getting their people to buy into their sustainability visions culturally, supported by corporate functions such as IT, finance and accounting, and sales and marketing.

+ Tech accelerators: This dimension refers to the adoption of digital technologies and pathways that help in accelerating the sustainability transformation. These include investments in AI, automation, digital twins, IOT, among others as well as hydrogen infrastructure, gigafactories, electrification, bioeconomy, industrial scale carbon capture, utilization, and storage (CCUS), and the transformation of grids to enable decarbonization and integration of new clean energies.

Fig.9

The building blocks of sustainability transformation



Source: Capgemini Research Institute analysis.

Based on these building blocks, we identified three cohorts by their sustainability maturity:

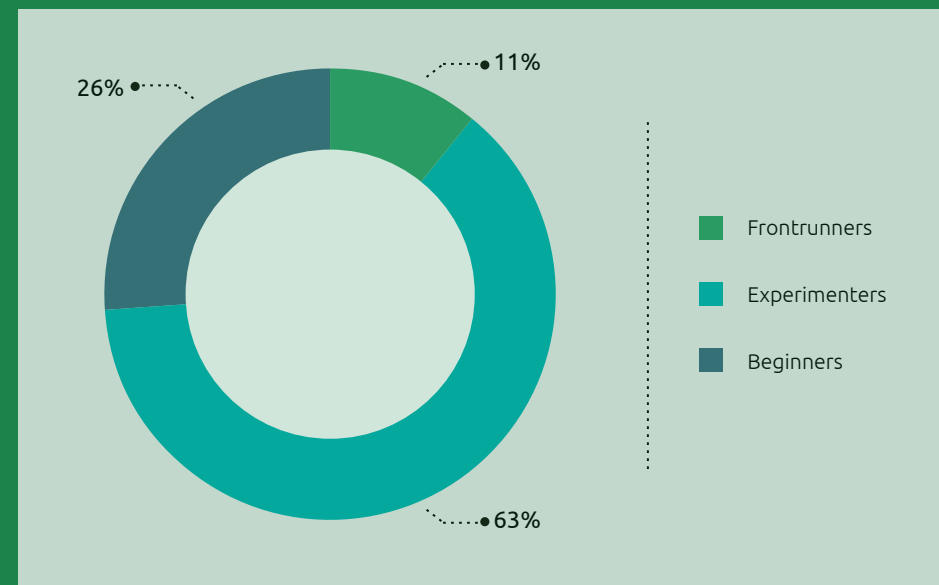
1. Beginners – low maturity along the three dimensions
2. Experimenters – low maturity in either one or two of the above three dimensions
3. Frontrunners – better progression along the three dimensions

Frontrunners are organizations that are working toward reaching the sustainability objectives by ensuring progress on all three building blocks. Our framework included nearly eighty statements to assess the maturity of the organizations across the three building blocks. Please refer to the full list of statements in the appendix.

The progress along all three dimensions is what makes these organizations frontrunners. These organizations are not completely sustainable yet, but they are progressing better than the rest of the companies we surveyed. Only about one in ten organizations (11%) in our survey are categorized as a sustainability frontrunner.

Fig.10

Distribution of organizations along the sustainability maturity framework



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 2,004 executives, 668 organizations.

02

ORGANIZATIONS VIEW
SUSTAINABILITY AS A COST
DRIVER, NOT AN INVESTMENT

Many businesses are failing to commit fully to the sustainability strategies they have laid out for fear of the cost implications. Sustainability is frequently seen as a cost center, rather than a value center, particularly in light of budgets imperiled by the COVID-19 pandemic, geopolitical tensions, and the consequent cost-of-living crisis. Over half of the executives in our survey (57%) shared that the principal reason for their organization's focus on improved environmental sustainability is to preempt stricter future regulation, which can be interpreted as spending now to avoid much more costly potential outlay down the line. This is an exercise in unprofitable risk avoidance that feeds a desire to do the minimum required. This mindset makes it difficult to unlock the internal financing and support required to scale sustainability initiatives.

The business case for sustainability remains unclear

The business case for sustainability is currently largely underestimated or misunderstood (i.e., executives fail to perceive it as a source of strategic value creation). Only one in five (21%) respondents believe that the business case for sustainability is clear (see Figure 11). Interestingly, the proportion of executives surveyed within sustainability functions who agree with this is only marginally higher, at 23%. This could illustrate the lack of transversal collaboration and coordination when it comes to sustainability initiatives. Overall, companies do not regard sustainability as a long-term investment. This shift

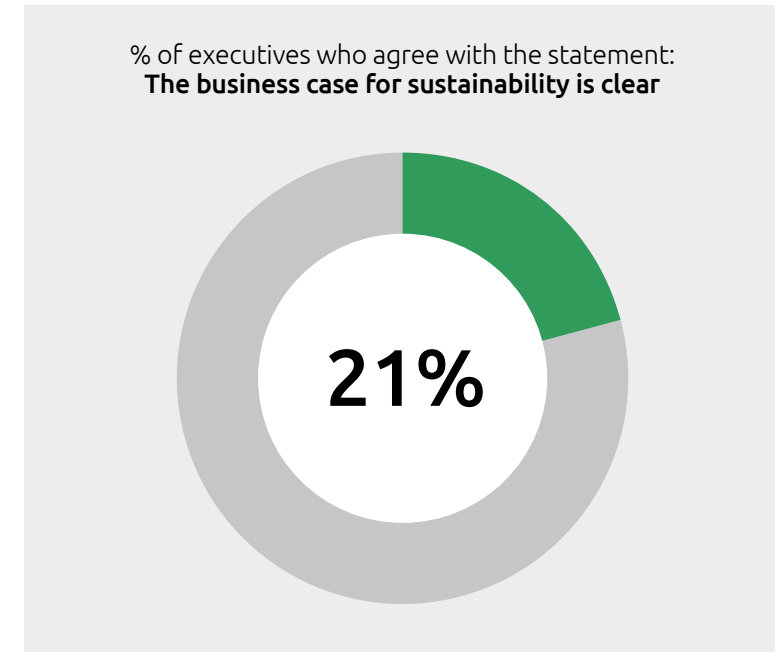
requires change management, as Pia Heidenmark Cook, former Chief Sales Officer at Ingka Group, explains: *"A perception many organizations have is that sustainability is more expensive. However, they do not realize that initiatives such as waste reduction or energy efficiency will reduce your operational costs. The key challenge to sustainability is change management – showing the business case, why it makes sense, and influencing and inspiring people to understand why it makes a difference."*²⁵

Sustainability is considered a financial obligation

Over half (53%) of respondents believe that the cost of pursuing sustainability initiatives outweighs the potential benefits (see Figure 12). By country, the highest percentage of respondents believing costs outweigh benefits is in the US (61%) and in the Netherlands (43%). By sector, 65% of respondents in retail, and only 37% of respondents in healthcare and life sciences, say the same. Our research suggests that organizations often see sustainability initiatives as obligatory and unprofitable. They also fail to view it as a chance to influence real change while safeguarding their bottom lines. Eelco Smit, Senior Director of Sustainability at Philips, says: *"There's no reason why you cannot be sustainable and profitable. Look at the sustainable brand index, as well as the niche players – consumers are starting to reward sustainable brands, meaning organizations can invest more in sustainability."*²⁶ The majority of respondents (64%) from the US believe that sustainability is a financial burden that their company

Fig.11

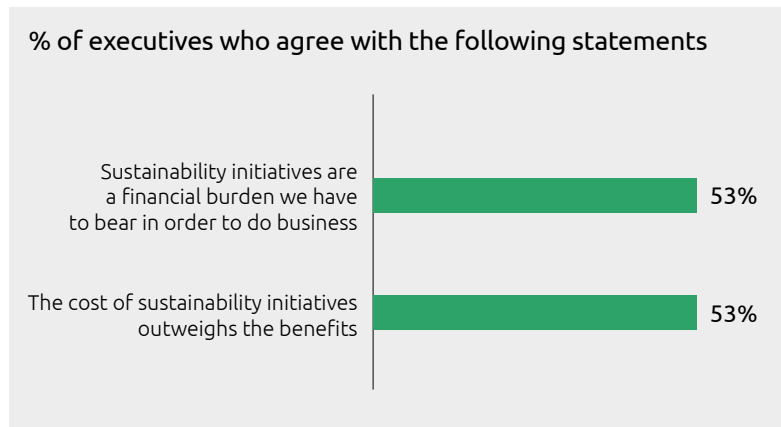
Only one in five executives agree that the business case for sustainability is clear



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 2,004 executives, 668 organizations.

Fig.12

Over half of executives regard sustainability as an obligation and believe costs outweigh potential benefits



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 2,004 executives, 668 organizations.

must bear. Less than half of respondents believe this to be the case in India, Spain, Italy, and the Netherlands (see Figure 13).

However, organizations who consider sustainability an obligation fail to realize that sustainability is fast becoming the “license to operate.” Governments across the

Fig.13

The view of sustainability as a financial obligation is most pronounced in the US and least in Italy and the Netherlands



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 2,004 executives, 668 organizations.

world have drafted regulations that call for reduced emissions, started green taxation, and are enforcing stricter regulations and allowing grants and subsidies for meeting environmental standards. For example, the EU is overhauling its Energy Taxation Directive, which taxes energy products such as motor fuel and electricity to ensure that the directive reflects its climate-neutral ambitions.²⁷ Plastic pollution is another area that many governments are cracking down on.

Environmental sustainability is financially viable

Contrary to common industry beliefs, many companies are already reaping the benefits of adopting sustainable practices. Alex Cho, President of Personal Systems at Hewlett-Packard, says: *“When we first started sustainable impact investments, it definitely felt like an either-or [situation] ... but now, sustainability is the innovation that drives sales, that shows you demand.”*²⁸

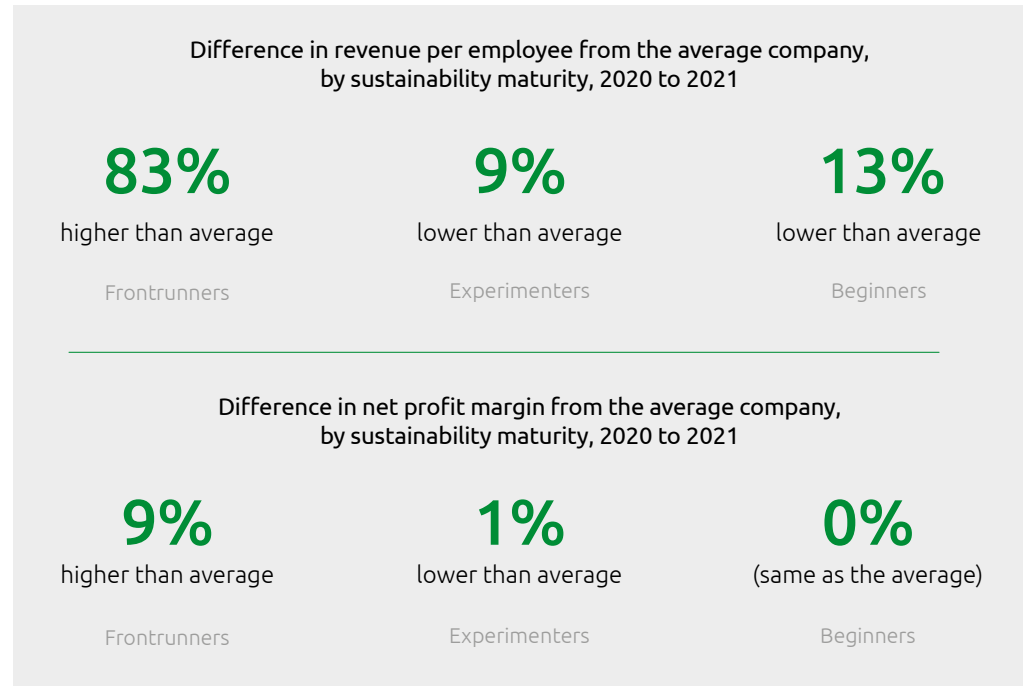
We analyzed the financials of the 668 organizations in our research to understand whether sustainability consistently equates to financial advantage. As Figure 14 shows, frontrunners are outperforming on total revenue per employee and net profit margin.

- Frontrunners realized 83% higher revenue per employee compared to the average from 2020 to 2021. During the same period, revenue per employee among beginners was 13% lower compared to the average.
- Frontrunners realized a 9% higher net profit margin compared to the average from 2020 to 2021.

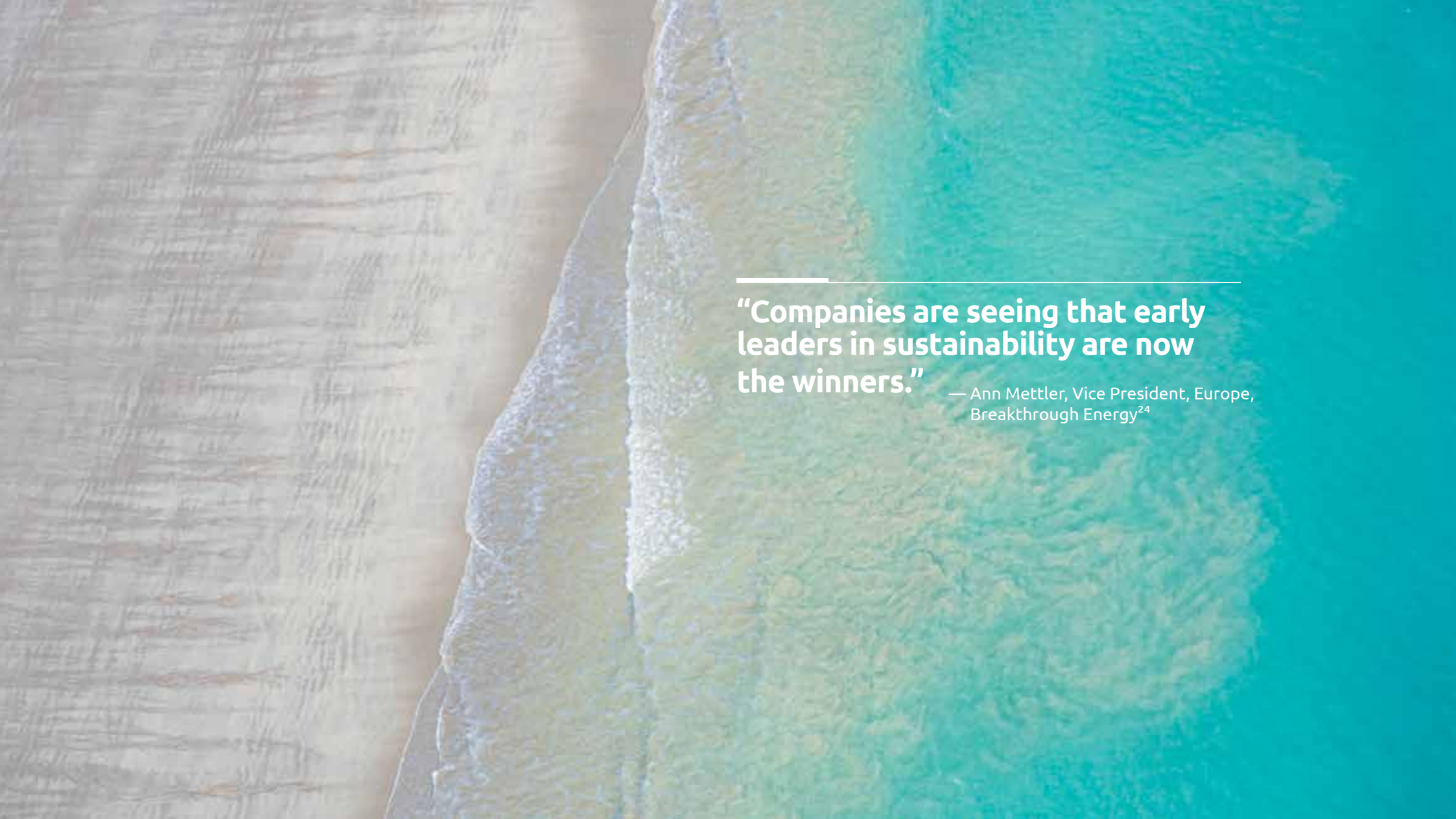
This analysis does not imply that sustainability directly leads to profitability. Rather, it highlights that sustainability need not be a financial drain and that organizations can be financially ahead and be sustainable at the same time.

Fig.14

Frontrunners realized higher revenue per employee and net profit margin



Source: Capgemini Research Institute financial analysis of 664 organizations (N=74 frontrunners, 415 experimenters, and 175 beginners) for FY 2020–21. Note: The percentages indicate the difference in performance for each particular cohort compared with the average for all organizations.

An aerial photograph of a beach and ocean. The left side shows a sandy beach with some vegetation, and the right side shows clear, turquoise water. A white line of surf separates the beach from the water.

**“Companies are seeing that early
leaders in sustainability are now
the winners.”**

— Ann Mettler, Vice President, Europe,
Breakthrough Energy²⁴

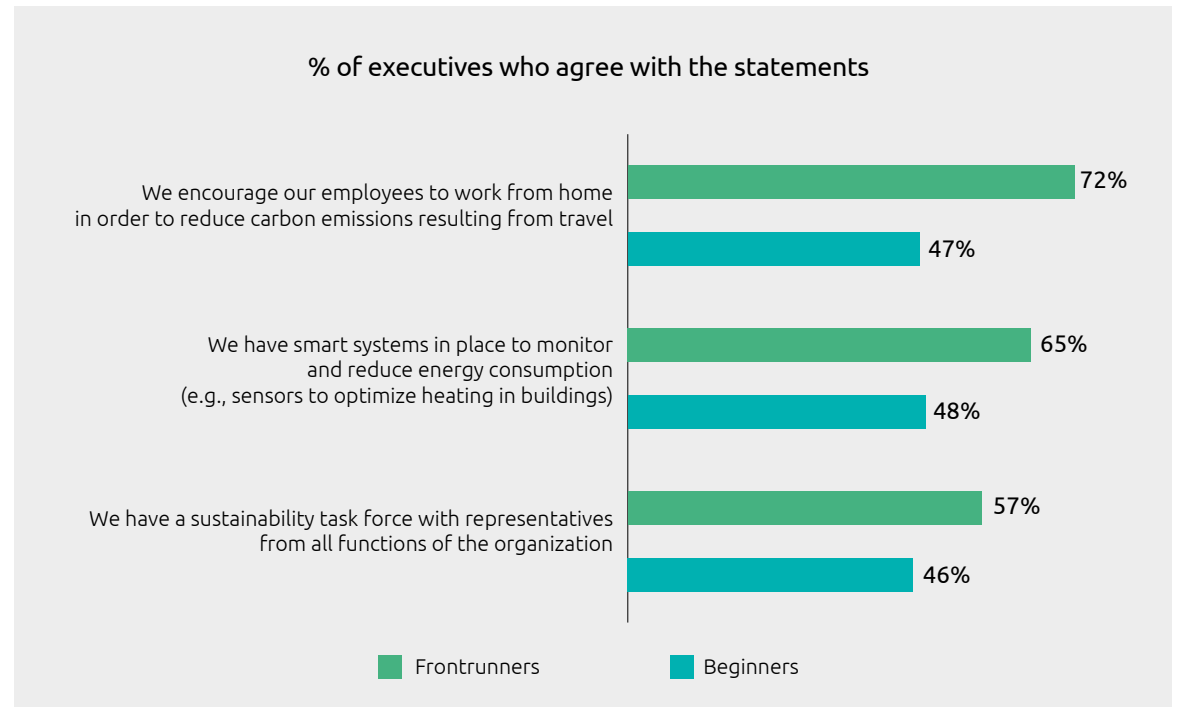
The higher financial benefits realized by frontrunners result from numerous sustainability-related efficiencies. For example, 65% of frontrunners have smart systems in place to monitor and reduce energy consumption; similarly, 72% encourage their employees to work from home to reduce emissions (see Figure 15). Higher benefits may also be driven indirectly by more ambitious targets that incentivize greater transformative effort.

Ann Mettler, Vice President, Europe at Breakthrough Energy, an organization that aims to accelerate innovation in sustainable energy and other technologies to reduce GHG emissions, says: *“Companies are seeing that early leaders in sustainability are now the winners. This is a global trend. Getting to net zero is becoming part and parcel of the business model. This is a systemic change in the business community from a decade ago.”*²⁹

Eelco Smit of Philips adds: *“We see the rewards of sustainability coming from different stakeholders. Investors are rewarding us by buying more shares or sticking with the shares for a longer period of time. Retailers are rewarding us by giving us more shelf space or more presence in online stores. Gen Z consumers are increasingly buying from sustainable brands.”*³⁰

Fig.15

Frontrunners employ a variety of practices that result in operational efficiencies and sustainable benefits



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 668 organizations, 149 frontrunners, 366 beginners.



Sustainability reporting is not the same as sustainability progress

The number of companies filing corporate social responsibility (CSR) reports that use the Global Reporting Initiative (GRI) standards – the most extensive available – has increased a hundredfold in the past two decades.³¹ Yet, carbon emissions have risen steadily over this period, and environmental harm has intensified.³²

Reporting would seem to be an indicator of progress, but, as it is currently not widely audited, it could also be a vehicle for exaggeration or greenwashing. In our survey, only half of respondents say their company has sustainability data audited by a third party or uses sustainability indices to benchmark their progress (see Figure 16).

Establishing a more stringent and strictly monitored reporting framework, where reporting is a mandatory rather than voluntary exercise, could mitigate such

Fig.16

Few organizations have their sustainability reporting validated by a third party



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,003 executives in corporate functions.

harmful practices, according to Devina Rankin, CFO at Waste Management, a US provider of environmental solutions:

“Some of the proposed regulatory frameworks create disincentives for those that are earlier in their journeys, creating a challenge in measuring progress effectively.”³³

The following sector trends on measuring and validating sustainability efforts emerged from our research:

- The majority of respondents from both utilities (68%) and industrial manufacturing (64%) say that their company uses an external third party to help disclose its environmental impact. About a third (35%) of healthcare and life sciences respondents say the same.
- With regard to auditing sustainability data by a third party, 59% of respondents

from industrial manufacturing and 58% from telecom say their company does this, compared to only 43% from retail.

- Over half (62%) of industrial manufacturing respondents say their company uses third-party sustainability indices to benchmark progress, while only 39% of respondents from financial services say the same.

Laurence Pessez of BNP Paribas comments: *“Sustainability is going to be increasingly regulated instead of only being a voluntary action on the part of firms. Sustainability is going mainstream, gaining in importance, and therefore must be seriously managed.”³⁴*



+62%

of industrial manufacturing respondents say their company uses third-party sustainability indices to benchmark progress

03

PEOPLE AND CULTURE CHALLENGES LIMIT ENTERPRISE-WIDE COLLABORATION AND ADOPTION

“Sustaining the planet for future generations” ranks highest (63%) among motivating factors for adopting environmental sustainability initiatives and “to align with the demands of employees and potential employees” ranks second (60%) (see Figure 17). There could be some bias or desire to be perceived as altruistic among the respondents selecting “sustaining the planet” as the top motivator.

However, despite these strong motivating elements, particularly when it comes to meeting the demands of employees, intent and ambition is falling short of action.

Recruitment and upskilling is not a priority for the majority of companies

While organizations should strive to instill a sustainability mindset in all employees, they need to recruit and train employees with hard sustainability skills, such as carbon accounting, environmental science/engineering, renewable energy, or data analysis/visualization to give input when setting targets to align with Paris Agreement goals. Our research reveals only 47% of respondents say their company is actively

Fig.17

“Sustaining the planet” is the top motivator for companies to adopt sustainability



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 2,004 executives, 668 organizations.



recruiting for sustainability skills, while just 41% of respondents mention that upskilling/reskilling their employees on hard sustainability skills is a top priority for their organization (see Figure 18). Magdalena Gerger of Volkswagen Group, says: *“Ensuring that sustainability is considered in all decision-making is critical. Volkswagen’s innovation culture and purpose-driven approach, which prioritizes inclusivity and up- and re-skilling, helps all leaders and employees embed sustainability in their decision-making and, ultimately, drive the transformation together.”*

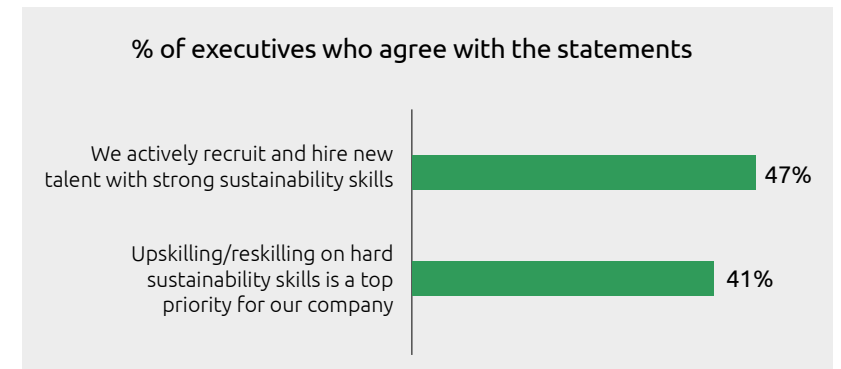
Employees are not fully supported in their sustainability journeys

Another important aspect of the sustainability transformation is the inclusion of employees. Only when employees are fully involved and enabled will organizations be able to see the benefits. However, only 50% of respondents say that their organization

provides autonomy to employees to develop solutions to sustainability challenges; the proportion of organizations that equip their employees adequately to support low-carbon transition is even lower, at 41% (see Figure 19). Examples of how employees could be supported include giving out reusable water bottles and using a utilities tracker to monitor their carbon footprint. Como Perpere, Chief Sustainability Officer at Microsoft France, says: *“Our management engages with employees on sustainability in various ways. We have a dedicated employee group taking small but meaningful actions to reduce energy consumption in the office, and we have created progressive upskilling paths (i.e., 4–6 training hours one week, which increases to 8–10 with more advanced content another week) for employees to gain deeper knowledge of sustainability.”*

Fig.18

Less than half of organizations are focusing on sustainability recruitment/upskilling



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,003 executives in corporate functions.

Many organizations are not collaborating with key internal and external stakeholders

To identify innovative solutions to big problems, an approach that considers a multitude of viewpoints, perspectives, and experiences is critical. An open innovation culture encourages collaboration across all types of stakeholders to find new ideas and approaches, but our research found only about half of organizations are doing the same when it comes to sustainability (see Figure 20). Vinicius Cataldi,

Head of Sustainability LATAM at SIKA, a Swiss multinational specialty chemicals company, says: *“As sustainability executives, we are responsible not only for creating the sustainability roadmap, but also for communicating this clearly to everyone in the organization – and then getting them involved. We make sure everyone knows the sustainability plans, which activities are supposed to take place, and that everyone is engaged in working towards sustainability.”*³⁵

“Ensuring that sustainability is considered in all decision-making is critical.” — Magdalena Gerger, Volkswagen Group

Fig.19

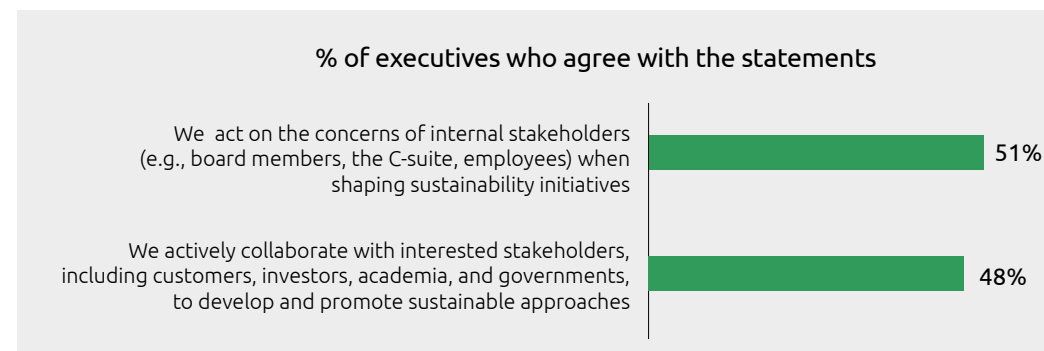
Less than half of organizations are focused on supporting employees in their sustainability journey



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,003 executives in corporate functions.

Fig.20

Many organizations fail to collaborate with a range of stakeholders to identify sustainability solutions



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,003 executives in corporate functions.

04

SOME ORGANIZATIONS ARE
INVESTING IN TECHNOLOGIES TO
LIMIT ENVIRONMENTAL IMPACT

Over the past decade, technologies such as artificial intelligence (AI), Internet of Things (IoT), and robotic process automation (RPA) have dramatically changed how businesses function and take products and services to market. We found that some organizations are harnessing new technologies to achieve their sustainability objectives.

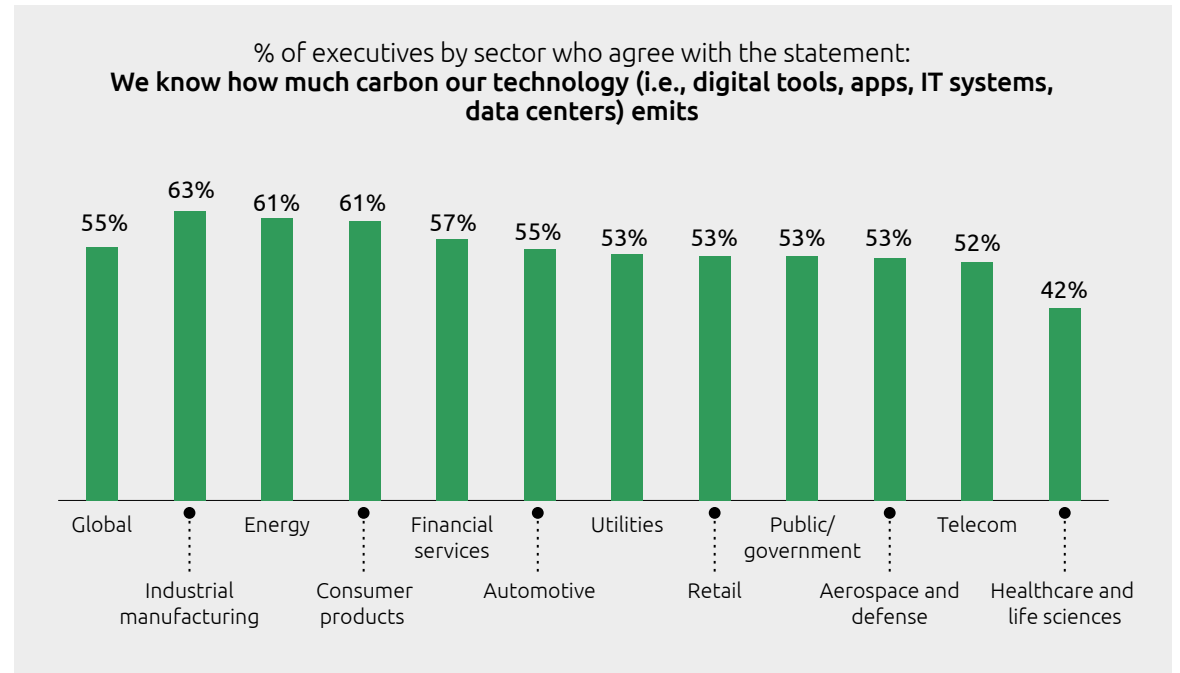
Organizations are more conscious of their digital carbon footprints

As companies employ a wider range of digital technologies, they have naturally seen a rise in emissions associated with these technologies. Our research reveals that organizations are collecting, measuring, and analyzing the data from their use of digital tools.

In our survey, over half (55%) of respondents say that their company knows how much carbon its technology emits across digital tools, apps, IT systems, and data centers. Certain sectors are faring better. For example, 63% of respondents in industrial manufacturing say they are doing this, as do 61% of respondents in consumer products and energy (see Figure 21).

Fig.21

Over half of organizations know how much carbon their technology emits



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,003 executives in corporate functions.



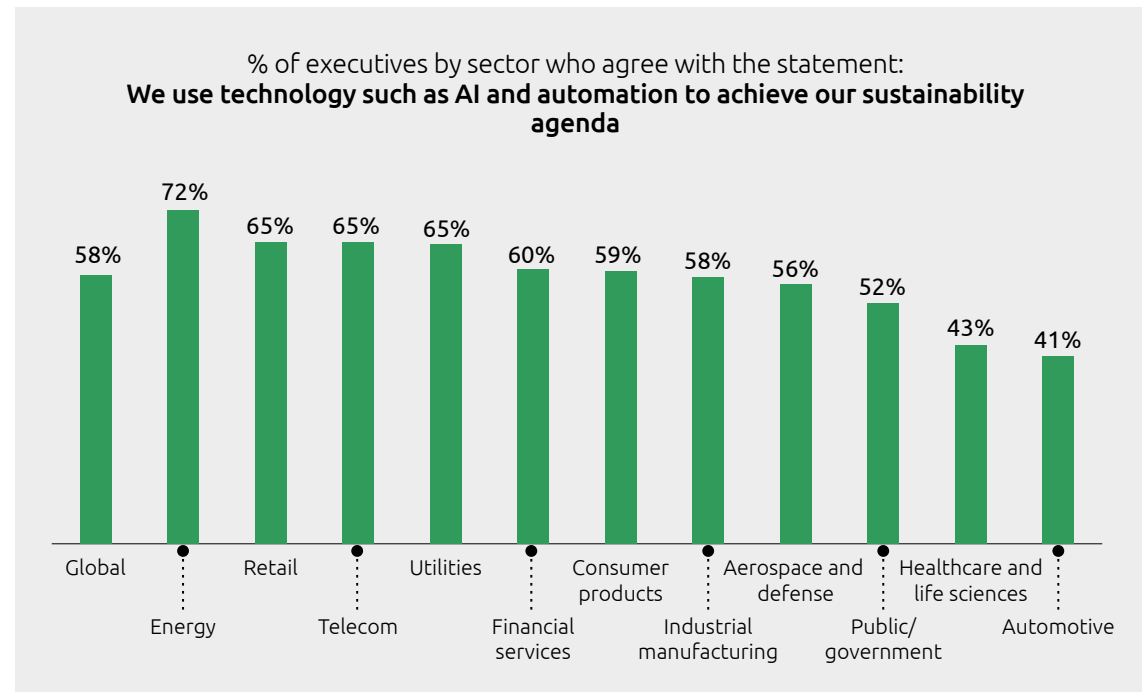
Organizations are investing in AI and automation to support the sustainability agenda

Our research reveals that organizations are deploying AI and automation in tandem, not only to obtain granular insights into their operations but also to measure impact on the environment across functions. In our survey, nearly 60% of organizations say they were using AI and automation to achieve their sustainability objectives (see Figure 22). In the energy (72%), retail, telecom, and utilities sectors (65% each), it is even higher.

Tokyo Hilton Bay in Japan adopted Winnow Vision, a technology that allows kitchens to track food waste using AI-based computer vision. This resulted in a 30% decline in food waste, equivalent to more than 17,000 meals

Fig.22

Nearly 60% of organizations globally are investing in AI and automation for sustainability



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,001 executives in value-chain functions.

and a saving of over \$31,000 annually.³⁶ Japanese automobile manufacturer Subaru has categorized all its manufacturing materials and, using AI, identified alternate uses for them. This produced patterns that led to the implementation of closed-system circular processes that eliminate waste and encourage recycling. By reducing, reusing, and recycling the waste it produces, Subaru has achieved zero-landfill status.³⁷

Organizations are using IOT technologies to reduce energy consumption

IoT technologies allow organizations to collect and analyze large amounts of data in real time to optimize operations.

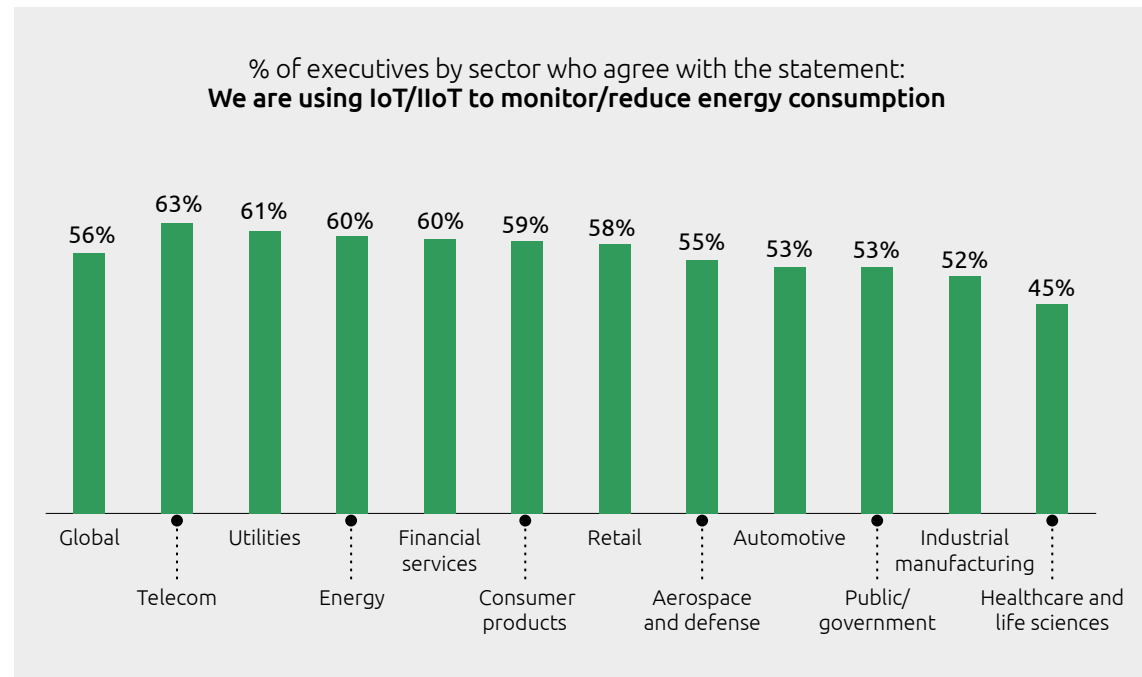
Smart sensors can monitor energy consumption at all stages, as well as break it down by function, asset, and unit of machinery. Through this level of tracking, organizations are better placed to ascertain wastage levels and identify potential efficiencies and can streamline operations by predicting energy demands and usage patterns to reduce energy consumption. We found that 56% of organizations globally are investing in IoT or Industrial Internet of Things (IIoT) to monitor and reduce energy consumption. Telecom (63%) and utilities (61%) are the two sectors with the largest proportion of organizations engaged in this (see Figure 23).

+56%

of organizations globally are investing in IoT or IIoT to monitor and reduce energy consumptions

Fig.23

Over half of organizations globally are investing in IoT to monitor or reduce energy consumption



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,001 executives in value-chain functions.

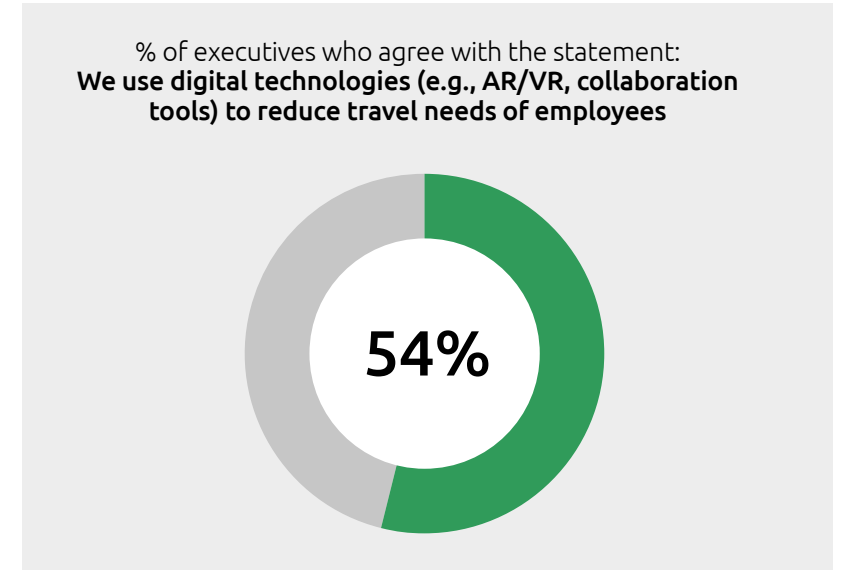
With investments in AR/VR and collaboration tools, organizations aim to reduce travel carbon footprints

As remote and hybrid working are now the norm at many companies across many sectors globally, organizations are in a better position to reduce non-essential travel. Digital technologies can make virtual interaction much more engaging and immersive and reduce the need for in-person meetings. In our survey, we found that over half (54%) of organizations globally are investing in digital technologies such as AR/VR or collaboration tools to reduce employee travel and, ultimately, carbon footprints (see Figure 24). By sector, healthcare and life sciences have the largest proportion of organizations adopting tools to reduce employee travel (59%), followed by utilities (58%).

Dirk Messner, President of international non-profit Stockholm Energy Institute, says: “Our assessment shows that, with digitalization, AI, big-data analysis, and deep learning, we can realize a green economy much more easily. However, during the past two decades, these technologies have not been used enough to really solve the climate and environmental and Earth system challenges. We still have non-sustainable growth patterns in most economies and organizations around the world. We need to make the link proactively between climate politics and Earth system-stabilization strategies on the one hand and these modern technologies on the other.”³⁸

Fig.24

A majority of organizations use digital technologies to reduce travel and carbon footprints



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 1,001 executives in value-chain functions.

An aerial photograph of a dam. The left side shows a large body of greenish water with some birds flying. The right side shows a dry, rocky riverbed with a narrow strip of grass and a person walking. A thick black horizontal bar is at the top left.

05

HOW ORGANIZATIONS CAN ACCELERATE TOWARD SUSTAINABILITY

Fig.25

Commit, Act, Monitor and Report framework for sustainability transformation



Source: Capgemini Research Institute analysis.

Through our research, discussions with sustainability experts, and experience of working on sustainability initiatives at leading companies across sectors, we believe that, with combined action from the board, all C-suite executives, and functional departments, it is possible to accelerate the transformation to becoming a sustainable business. To transform effectively requires enterprise-level coordination, functional involvement, and a redesign of the operating model and business processes to allow sustainability to permeate the organization and not just at top-level strategy. Organizations need to accelerate and manage an organization-wide transformation, as highlighted in Figure 25.

Importantly, sustainability must not be managed as a compliance project. Instead, it requires an overall enterprise transformation, similar to organizations launching digital transformation programs across all their businesses and functions. This transformation affects all parts of the business – from business model and product design to operations and IT – and needs a proper governance headed by a C-suite leader who has a seat at the executive committee.

A key success factor for sustainability transformation will be board member support. **Sustainability must become a boardroom priority.** In contrast to the typically shorter-term perspective of the executive committee/CEO, the board must take decisions with a longer-term view. For sustainability to be a true transformation of the business, disruptive and consequential decisions must be taken by the board. For example, how the company should transition or whether it should close a carbon-intensive business. These challenging decisions can potentially have significant impact on revenue and margin, and are a determination board members must make. Harmit Singh, executive vice president and chief financial officer at American clothing company Levi Strauss & Co, says: *“We talk about sustainability and ESG strategy with the board as part of the overall discussion. We just recently did an investor outreach. ESG was one of the three or four topics that was discussed with long-term institutional shareholders. This meeting was led by the board chair without the CEO and the CFO.”*³⁹

We share recommendations for eight C-suite positions on how they can accelerate their companies' sustainability ambitions. It is important that these recommendations are not taken independently but are implemented in a collaborative manner across functions.

THE CHIEF EXECUTIVE OFFICER MUST MAKE SUSTAINABILITY A BUSINESS PRIORITY

Responsibility for a sustainable organization does not lie solely with procurement or operations, or even the design function. The CEO must be accountable for their organization's sustainability practices. But, if sustainability is still viewed as the "cost of doing business," progress will be slow. The CEO can take several actions to champion sustainability:

- **Set and implement sustainability strategy with a holistic view of the entire organization** – It is important that the CEO brings all the different parts of the organization together, removes silos, and encourages functions and teams to work closely together toward their sustainability goals.

- **Build the sustainability roadmap collaboratively with all key stakeholders from the very start** – The roadmap to achieve sustainability goals and objectives needs to be built collaboratively with stakeholders. Importantly, this includes stakeholders external to the organization, such as experts from non-governmental organizations, academics, and thought leaders. Some organizations have set up advisory groups as part of their sustainability management to evaluate, test, and refine sustainability strategy. In 2013, chemical company BASF established the Stakeholder Advisory Council to consult on its sustainability strategies. BASF brings together thinkers and leaders with extensive knowledge on material sustainability to bring external perspectives to the table in discussions with the Board of Executive Directors.⁴⁰ In 2016, Volkswagen Group appointed an international Sustainability Council that has experts from business, politics, science, and society convene to regularly advise the Group Management Board and employee representatives on strategic topics of sustainability and societal responsibility.⁴¹

- **Ensure a comprehensive understanding of the business impact on environmental sustainability** – Organizations must work through a number of sustainability challenges, including reducing carbon emissions, managing water conservation, preserving biodiversity, and reducing waste. While each of these goals is worthy, setting clear priority guidelines to the rest of the organization and thoroughly understanding the impact of the business on each of these challenges is critical to alignment.
- **Develop a sustainability strategy that goes beyond net zero and encompasses all the planetary boundaries** – Given that humanity has crossed out of the safe space for six of the nine planetary boundaries, increasing the risk of abrupt or irreversible environmental changes, it is crucial that the CEO and the board include these broader elements into the sustainability strategy and action plan.⁴² Climate change is just one planetary boundary that has been crossed so in addition to having a net zero plan, companies should address other crossed boundaries, such as those relating to biodiversity. For example, to address land

use change, companies can incorporate deforestation and land use management strategies. Including biodiversity within the broader sustainability strategy is critical given its overall importance. According to the OECD, biodiversity underpins all economic activities and human well-being. It provides critical life-supporting ecosystem services, including the provision of food and clean water, but also largely invisible services such as flood protection, nutrient cycling, water filtration and pollination.⁴³

- **Prepare a sustainability taskforce and designate a C-suite role for risk accountability** – Sustainability is not just the remit of the chief sustainability officer. All business leaders must engage with how the organization governs and manages sustainability. This could be accomplished through establishing a sustainability taskforce with representatives from all functions within the governance structure. In addition, a C-suite leader should be responsible and accountable for environmental risk, whether that becomes the mandate of the CFO directly, or the head of compliance or risk, or a new role (e.g., chief environmental risk officer) is formed will depend on the company. This person could work across the business to fully understand the legal, reputational,

and operational risks associated with climate change.

- **Finally, pivot the business model** – While far from easy, implementing a new or refined business or operating model is the most effective way to ensure the organization is on the path to sustainability. However, a CEO cannot accomplish this on his or her own and will need the support of the board of directors in order to implement drastic changes if they are necessary, especially in cases where revenue or margins are impacted.

Ultimately, the CEO must ensure that both environmental and social and governance goals are in focus.

THE CHIEF FINANCIAL OFFICER MUST ARTICULATE THE BUSINESS CASE FOR SUSTAINABILITY AND ENSURE IT IS UNDERSTOOD THROUGHOUT THE ORGANIZATION

The most important function of the CFO is to protect the bottom line. Environmental sustainability is now a key aspect of that role, both in response to the demands of stakeholders and wider society, but also as a means of securing market advantage. To become more prominent in sustainability, the CFO must:

- **Consider evolving metrics for the business case** – The metrics that are needed in the transformation toward sustainability are evolving and the CFO must understand these changes to clearly build the business case. For example, the cost of waste as an indicator to support the case for building a circular economy.
- **Establish sustainability reporting and prepare for evolving requirements** – While reporting is not the mark of

progress, it certainly helps monitor progress. Setting up rigorous standards of sustainability reporting and ensuring your data can be audited is a significant step toward sustainability transformation.

- **Assume a leadership position in establishing and financing sustainability and financial initiatives** – Finance teams already have risk-management, cost-optimization, and control capacity to create, measure, and report on sustainable targets. This makes the CFO role extremely significant. Nevertheless, only 42% of respondents in our survey say the CFO is the lead on setting environmental sustainability strategy. Anthony Coletta, CFO for SAP North America, comments: *“For CFOs, now is the time to explicitly link finance and sustainability – to take advantage of the burgeoning moral and economic opportunity. We must factor climate change into the decision-making process in the same way we would interest rates or cash flow.”*⁴⁴
- **Conduct double materiality assessment** – While financial materiality considers the issues that internally impact financial performance of an organization and its ability to create economic value for investors and shareholders, impact materiality considers the external impacts of the company’s activities, including



*Data shown is for the top two trends ranked number one

the impact on the environment and its communities.⁴⁵ Double materiality combines both these perspectives and looks at their interconnectedness. Conducting a double materiality assessment will help answer questions such as how the financial performance of the organization is impacted by external climate risks and how the company's operations are contributing to environmental issues. Such an assessment will help the organization prioritize sustainability initiatives.

- **Set up an appropriate internal carbon pricing** – An internal carbon pricing ties CO2 emissions to their sources, i.e., the various functions or business units, by setting up a fee for these emissions. A carbon tax is an explicit tax rate for each tonne of CO2e (CO2 equivalent) emissions. Research shows that nearly half of the world's 500 biggest companies have factored some sort of carbon accounting into their business plans,⁴⁶ with a median internal carbon price of US\$25 per metric ton of CO2e. However, organizations do need to increase their internal pricing as carbon prices soar to new peaks (over \$90) in the EU emissions trading scheme this year.⁴⁷

- **Consider how to leverage sustainable financing** – Creating an environmentally sustainable organization requires an all-hands-on-deck approach, including finance. The CFO and his/her team have a critical role to play in ensuring all business functions adopt sustainability practices in their operations, as well as leading engagement and collaboration with outside firms on sustainability. At the same time, they are responsible for funding green initiatives in alignment with Paris Agreement targets and low-carbon and climate-resilient development of the organization. In our survey, we found that 50% of all respondents (and 55% of automotive respondents) believe sustainable supply-chain financing will be the most disruptive trend for their industry in the finance and accounting area in the next three years.
- **Incorporate green investing** – Alongside sustainable supply-chain financing, 19% of respondents (and 26% of public-sector/government respondents) believe green investing is going to be most disruptive in the finance and accounting area. This could take the form of green investments such as green bonds, green exchange-traded funds, index funds, or holding

a stake in companies to support green initiatives, such as conservation of natural resources, pollution reduction, and other environmentally conscious business practices.

THE CHIEF MARKETING OFFICER MUST IMPLEMENT PROTOCOLS TO AVOID GREENWASHING SUSTAINABILITY CREDENTIALS

The main responsibilities of the CMO in their organization's transformation toward sustainability are as follows:

- **Actively work to avoid greenwashing sustainability credentials** – Greenwashing has been around for a while in different guises, often positive-sounding slogans or labels that ultimately prove to be empty. However, consumers today are increasingly aware of the greenwashing tricks organizations use and are shifting their loyalties to organizations whose sustainability claims are backed by data. Organizations are realizing that greenwashing can degrade customer satisfaction, erode brand loyalty, and even lead organizations into existential crisis. In our survey, 47% of respondents believe that implementing protocols



*Data shown is for the top trend ranked number one

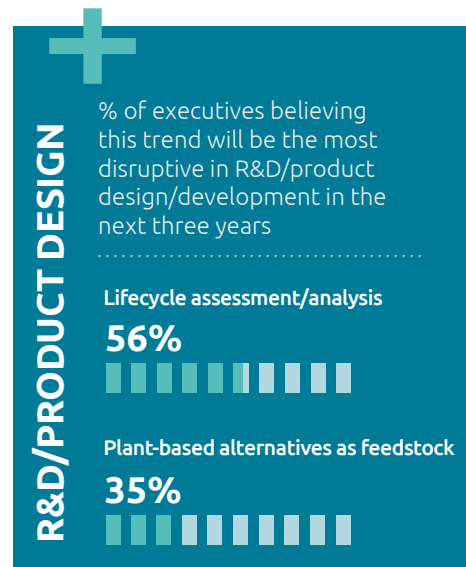
and guidelines to mitigate greenwashing practices will be the most disruptive trend for their industry in the sales and marketing area in the next three years, particularly in consumer products, with 54% of respondents agreeing. The CMO should aim to increase awareness and educate employees about greenwashing and how to resist stretching the truth about sustainability achievements.

- **Educate consumers** – Downstream emissions resulting from consumer usage are part of an organization’s scope 3 emissions. While lifecycle assessments help organizations understand the magnitude of these, marketing and external communications teams can play a role in reducing emissions by educating consumers to make sustainable choices.
- **Manage the sustainability brand presence externally** – A critical aspect of the CMO role is to manage the brand presence as a sustainable organization (while avoiding greenwashing). While an organization’s reputation will be based on its initiatives, the CMO’s responsibility lies in presenting the correct narrative to external stakeholders.

THE CHIEF DESIGN/PRODUCT OFFICER NEEDS TO EMBED SUSTAINABILITY AS A CORE DESIGN PRINCIPLE

To benefit sustainability efforts, the CDO must embed sustainability thinking into the design process. Our recent research on sustainable product design suggests some steps toward achieving this:⁴⁸

- **Build sustainable products and solutions** – There are many ways in which products and even processes can be made sustainable – be it by using sustainable materials, reducing packaging, or by selecting raw materials with a lesser environmental impact. Organizations can use multi-criteria assessment to evaluate options and prioritize changes to make in the design process based on the impact to sustainability. Using digital twins and machine learning, Rolls-Royce was able to extend the time between maintenance for some airplane engines by up to 50% and improve the efficiency of the engines, saving 22 million tons of carbon to date.⁴⁹
- **Define clear sustainability goals and objectives for product-design teams** – This means translating organizational sustainability goals (such as reducing waste



*Data shown is for the top two trends ranked number one



going to landfill) to design objectives (such as reducing the environmental impact of packaging by N% or increasing the use of sustainable materials by N%) and metrics (such as percentage of packaging content from recycled materials or percentage of product content from recycled materials).

- **Establish accountability for sustainable product design** – Once objectives and metrics are established, there must be clear accountability for the product teams backed by management support and performance incentives.
- **Adopt a data-driven approach to measuring impacts across the product lifecycle and identify priorities** – Lifecycle assessment (LCA) deals with approaches to product design that consider environmental impacts across the entire product lifecycle. LCA analyzes the effects on the environment of both the use of resources (inputs) and the emissions created by the manufacturing process. By integrating eco-design into product and service development, organizations will introduce sustainability into their value chains and drive toward a circular economy. Our research found that 56% of respondents believe LCA is going to be the most disruptive trend for their industry in the R&D and product design space in the next three years. LCA is necessary to

understanding the holistic impact of a product and to making informed design decisions. For these assessments to be robust, accurate impact data should be available and technologies such as digital twins and blockchain will be of great assistance. Dr. Gunter Beitinger, Senior Vice President Manufacturing and Head of Product Carbon Footprint at Siemens AG, says: *“A verifiable primary-data-based product carbon footprint [PCF] connected along the supply chain enables partners to act where it’s most efficient. This requires cross-company collaboration and exchange that protects all partners’ full data sovereignty.”*⁵⁰

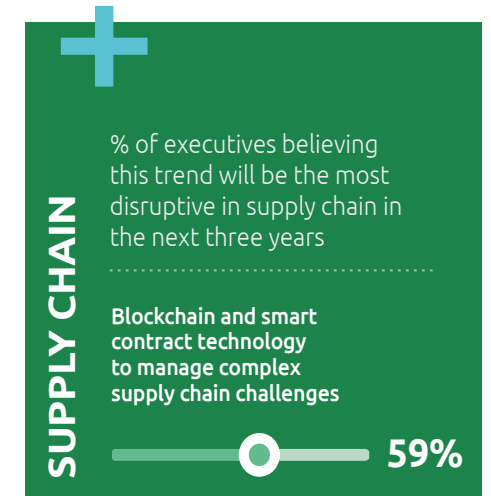
- **Establish guidelines and provide tools to help product-design teams evaluate trade-offs and alternatives** – Design choices often involve trade-offs across a variety of parameters, such as sustainability, cost, and performance. Organizations should equip design teams with the necessary tools and guidelines to evaluate these trade-offs and navigate decisions.
- **Invest in upskilling product-design teams to enable a mindset shift toward systems thinking and circular design** – Sustainable product design requires systems thinking and a circular approach. Teams should also be proficient in the use of LCA tools, among others. This means

investing in training and upskilling. Cisco, for example, began training its design community on its own Circular Design Principles in 2020. These principles were also integrated into design tools and required standards.⁵¹

- **Consider plant-based alternatives as feedstock** – Use of plant-based alternatives as feedstock is increasingly attractive due to the renewable source of carbon (plants remove CO₂ from the atmosphere during growth) and offers useful end-of-life options. In addition to the benefits for organizations, they help to address multiple environmental sustainability imperatives, such as municipal waste, degrading soil health, GHG emissions, and water quality. In our survey, 35% of all respondents (and 39% of consumer products respondents) believe that plant-based alternatives to traditional feedstock will be the most disruptive trend in their industry in the R&D and product design space in the next three years.

THE CHIEF PROCUREMENT/SUPPLY CHAIN OFFICER NEEDS TO WORK WITH SUPPLIERS

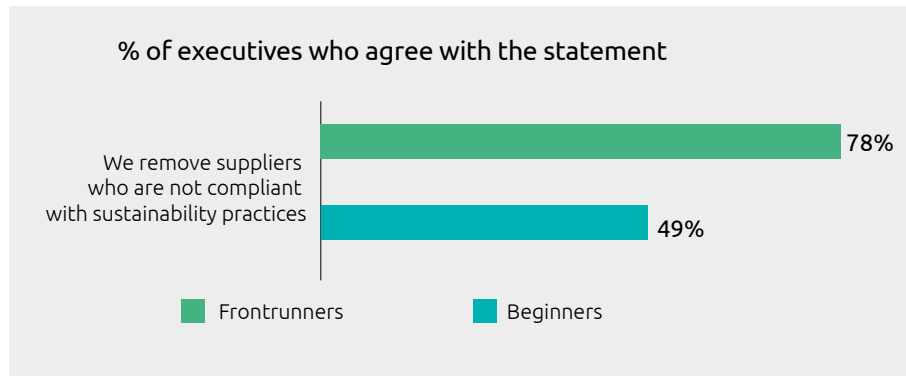
While organizations are certainly taking steps to measure and reduce their scope 1 and scope 2 emissions, with today’s global



*Data shown is for the top trend ranked number one

Fig.26

Nearly eight in ten frontrunners take stringent action against non-compliant suppliers



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 668 organizations, 149 Frontrunners, 366 beginners.

supply chains, measuring and reducing scope 3 emissions is a huge problem. Scope 3 accounts for an estimated 65%-95% of a company's carbon footprint.⁵² Yet, our net zero research found that on average, only 22% of organizations measure scope 3 emissions.⁵³ This is where the CPO/chief supply chain officer can play a critical role:

- Assess scope 3 emissions** – Assessing and measuring scope 3 emissions is very complex. The CPO should guide the organization in identifying those scope 3 activities that are expected to have the most significant GHG emissions and thereby offer significant emission reduction opportunities. Some of the criteria to consider while assessing relevant activities include size (i.e., the activities contribute significantly to the company's total anticipated scope 3 emissions), risk (i.e., they contribute to the company's risk exposure), and influence (i.e., these are potential reductions which the company can influence).⁵⁴
- Set sustainability criteria during supplier selection** – These could include ESG ratings or environmental pledges of suppliers. While this can be straightforward for tier 1 suppliers, for tier 2 suppliers it can be more challenging (indeed, many organizations rely on tier 1 suppliers to keep tier 2 suppliers in line).
- Set sustainability goals for suppliers, with clearly defined KPIs** – Fast-fashion company H&M, for example, has set the goal of reducing water used in production by 25% by 2022. This includes reduction by water-intensive tier 1 and tier 2 suppliers.⁵⁵ Similarly, they aim to have 100% of their supplier factories compliant with the ZDHC Manufacturing Restricted Substances List.
- Collaborate with suppliers in their sustainability journeys** – Organizations can collaborate with suppliers, for example in implementing renewable-electricity projects, both to ensure environmental sustainability and fair labor practices.
- Take stringent action in cases of non-compliance** – As a part of its long-term goal to phase out coal from its supply chain, H&M decided to reject any potential new supplier if their factories use on-site coal boilers.⁵⁶ In our research, 78% of frontrunners say that they remove suppliers that are not compliant with their sustainability practices (see Figure 26).
- Monitor progress continuously and act as required** – While it may be impossible to revamp the supply chain completely, organizations can start working toward their goals, monitoring progress and taking corrective action as required.

Often, a small set of suppliers will generate the majority of emissions. Once organizations can identify this group, the CPO can focus on these suppliers to achieve maximum impact. The head of sustainability at a global alternative energy manufacturer says: *“Establishing processes and performing due diligence for suppliers needs to involve all responsible departments. Conducting random audits to ensure sustainability should be a priority, too.”*

The CPO can also leverage technology such as blockchain to reduce emissions in the supply chain and to build a transparent supply chain. Blockchain technology facilitates the collection, integration, and sharing of data from many sources. This also creates traceability and transparency in the system for carbon emissions. Blockchain is already proving effective for certain use cases, such as creating transparent supply chains (i.e., knowing what is happening at every stage of the supply chain); monitoring, reporting, and verification of energy consumption and waste across the enterprise; enabling green financing; and tracking sustainability claims. Moreover, there is further significant potential for blockchain to help organizations reduce environmental impact. Despite the criticism that blockchain is very

computing-intensive, in our survey, nearly three in five respondents (59%) believe blockchain and smart contract technology will be the most disruptive trend for their industry in the supply chain area in the next three years. In respondents’ minds, the applications of blockchain and their benefits (e.g., sustainable supply chain, sustainable financing) likely outweigh the costs.

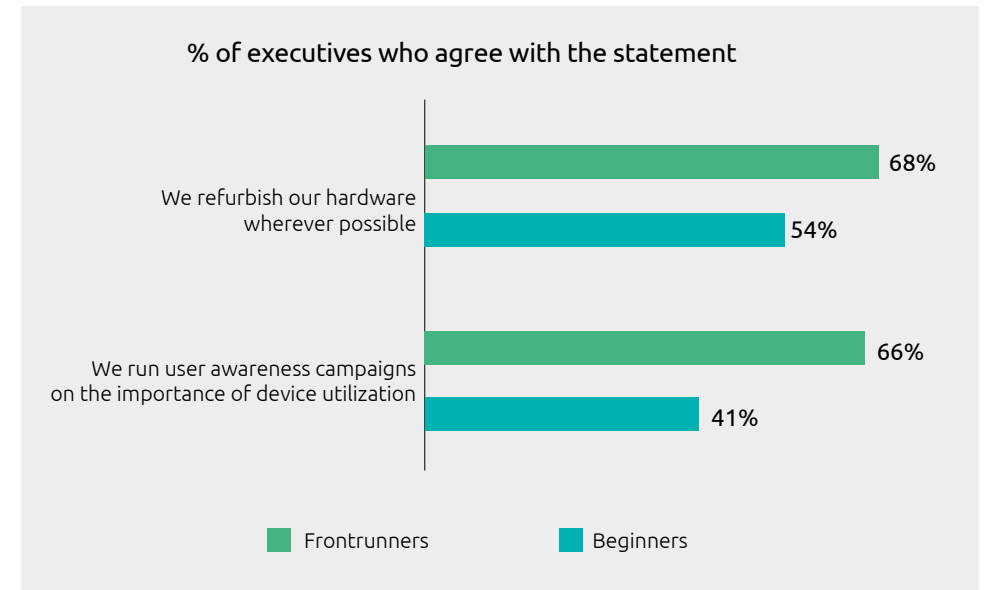
THE CHIEF INFORMATION/TECHNOLOGY OFFICER NEEDS TO STRENGTHEN SUSTAINABLE IT INITIATIVES

Be it the footprint of data centers, e-waste, or emissions resulting from various software programs, the environmental footprint of IT initiatives must be reduced. Frontrunners follow practices such as running user-awareness campaigns and refurbishing hardware as a part of their sustainable IT practices (see Figure 27).

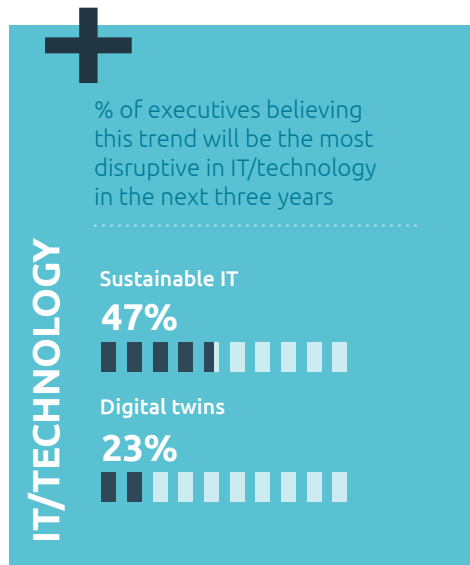
The CIO/CTO should guide the organization in strengthening sustainable IT practices. Given the size and scale of enterprise IT and how much carbon traditional IT emits, as well as the rapid adoption of digital technologies following COVID-19, organizations are realizing that IT must be sustainable. In our survey, 47% of all respondents (and 52% of

Fig.27

Two in three frontrunners educate users about device utilization as part of their sustainable IT practices



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 668 organizations, 149 frontrunners, 366 beginners.



*Data shown is for the top two trends ranked number one

utilities respondents) believe sustainable IT practices will be the most disruptive trend for their industry in IT in the next three years. Many CTOs/CIOs are focusing on reducing e-waste from servers, laptops, and other equipment; optimizing on-premises infrastructure; and transitioning to the green cloud. Based on our research on sustainable IT, we advocate the following actions:⁵⁷

- **Conduct diagnostic assessment to understand the environmental impact of IT** – Determine the carbon footprint of the organization's data centers and application portfolio to determine where emissions savings could be made; for example, through decommissioning applications and moving them to the cloud. Using diagnostic tools to set up a baseline will enable the organization to assess the overall environmental impact of IT.
- **Create a comprehensive sustainable IT strategy aligned with the organization's global sustainability strategy** – A sustainable IT strategy should include the use cases that the organization is going to implement and scale for sustainable IT, as well as clearly defined goals and timelines.
- **Ensure the transformation toward sustainability relies on trusted data processes** – Data is a significant lever in accelerating the transformation toward

- sustainability. For example, for a company with a net zero ambition, the use of emissions data can enhance organizational decision-making in three ways: increasing visibility of baseline emissions levels and identifying emissions hot spots; improving existing business processes by streamlining carbon-intensive activities; and predicting and prescribing business outcomes to identify further emissions reduction opportunities.⁵⁸ Building trust in sustainability data will be critical for embedding sustainability into decision-making and for the adoption of insights. To instill trust in data, there must be a robust data governance structure and the data should be transparent and accessible across the organization.
- **Set a carbon cost for IT operations** – Setting a carbon cost can help functions understand the carbon footprint of their various operations. Microsoft, for example, introduced internal carbon fees in 2012 and levies these fees on internal business units to hold them financially responsible for reducing their carbon emissions. In 2019, the company nearly doubled this fee to \$15 per metric ton.⁵⁹
 - **Ensure sustainability is a pillar of software architecture** – Software architecture can be designed to improve sustainable IT capabilities. This includes

- setting environmental guidelines on software deployment and creating a balance between value for money, agility, compliance, and sustainability. A critical aspect of green IT practices is deploying efficient and sustainable AI applications.
- **Make environmental impact a criterion for IT vendor selection** – As with setting a carbon cost on operations or setting a carbon price for purchase decisions, even setting criteria for IT vendors will help in reducing IT-related emissions.
 - **Leverage digital twins for design and operational efficiencies** – Digital twins capture, organize, and interpret data intuitively to produce an accurate working model of a facility in the physical world or a new product under design. This enables organizations to set certain variables, combine multiple data sources, and see the likely impact of decisions without real-world repercussions. This approach helps in optimal design, allocation of resources, balancing energy needs, optimizing supply-chain networks, and building resilience. Nearly one in four (23%) of respondents (and 30% of automotive respondents) believe digital twins will be the most disruptive trend for their industry in IT in the next three years.
 - **Harness technology to achieve sustainability goals** – Beyond digital

twins, several technologies, such as AI, automation, IoT, 3D printing, collaboration tools can result in design and operational efficiencies, leading to reduced emissions.

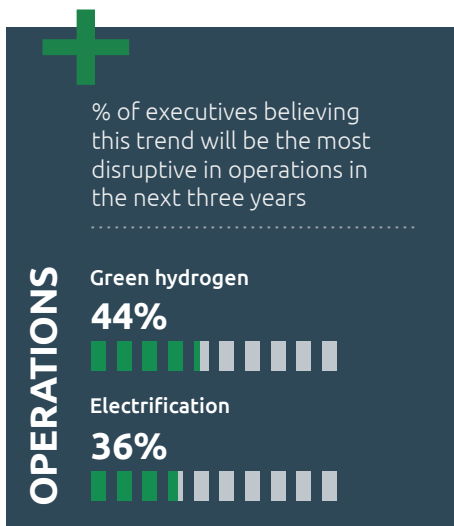
THE CHIEF OPERATING OFFICER NEEDS TO BUILD THE FOUNDATION OF THE SUSTAINABLE ORGANIZATION

The chief operating officer has a huge role to play in sustainability transformation, especially if manufacturing/production is also under the purview of the COO (as opposed to say, a chief manufacturing officer). Some actions that the COO can take include:

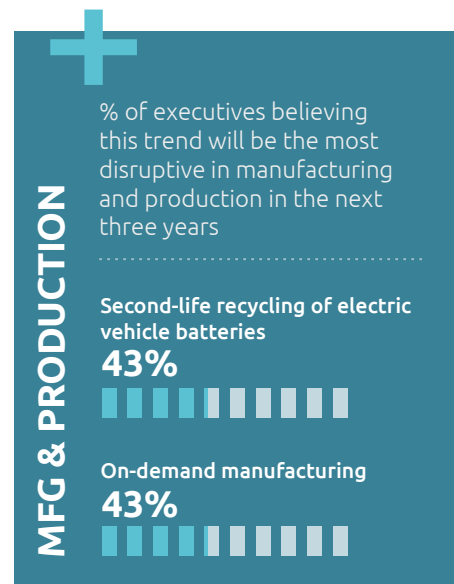
- **Safeguard against the operational risks of climate change** – As physical calamities, be it floods, wildfires, or storms continue to worsen, the COO must take necessary steps to safeguard

the lives and well-being of employees and build resilience into processes to handle such risks.

- **Strengthen on-demand manufacturing** – Many manufacturers are already benefiting in terms of reduced costs and minimizing environmental impact by moving to on-demand manufacturing. With ever-changing consumer preferences and a shift in demand toward sustainable products, a “just-in-time” strategy can meet immediate demand instead of anticipating future demand, thereby reducing waste in the manufacturing process. At the same time, there is growing demand for customization. With production moving closer to consumers in many markets, the shift from mass to on-demand production is even more important. In our survey, 43% of all respondents believe



*Data shown is for the top two trends ranked number one



*Data shown is for the top two trends ranked number one

on-demand manufacturing will be the most disruptive trend for their industry in the manufacturing and production space in the next three years.

- **Optimize logistics**– The COO can cut down on freight-related emissions in a variety of ways. The majority (73%) of frontrunners from our research are using analytics to optimize logistics to reduce emissions. Further, switching to low-carbon fuel or investing in an EV fleet will also help in cutting down transportation emissions.
- **Electrify systems and processes** – With many organizations committed to carbon-neutral operations, the move away from fossil fuels toward renewable energy sources is central. However, organizations also need to transition machinery, transportation, and other industrial processes that use fossil fuels as inputs to using electricity generated from renewable sources. Honda, for instance, moves 80% of vehicles from its plants to dealerships by train, reducing CO2 emissions by more than 60%. Similarly, at its Ohio plant, the company uses wind turbines to produce of 10,000 megawatt hours of electricity annually.⁶⁰ In our survey, one-third of respondents (36%) believe electrification will be the most disruptive trend for their

industry in the operations area in the next three years.

- **Reduce manufacturing waste** – It is estimated that total manufacturing waste adds up to nearly \$8 trillion annually.⁶¹ In order to successfully achieve the zero waste goals that many organizations are aspiring to, the first step should be reducing manufacturing waste. The COO can achieve this by cutting down overproduction, conducting audits to find processes that generate the most waste, empowering and entrusting employees with waste reduction goals, and removing inefficiencies and defects in production processes.
- **Focus on second-life recycling of EV batteries** – While there are relatively few electric vehicles (EVs) on the road today, the batteries they use have a limited lifespan and will require replacing. As the market grows, this could become a severe issue, where exponential waste from EV batteries and demand for new ones puts even more pressure on lithium supplies. While recycling the batteries can help recover critical metals, it is also a costly and complex process. Therefore, reusing the batteries again for secondary applications for another 8–10 years is a good example of

a circular economy. It will also reduce the cost of EV ownership by creating improved residual value and a means by which to mitigate demand–supply tensions. In our survey, 43% of all respondents believe second-life recycling of EV batteries will be the most disruptive trend for their industry in the manufacturing and production space in the next three years.

- **Foster a circular economy** –The COO can help the organization along the sustainability journey by fostering circular economy principles such as eliminating waste by design, investing in infrastructure to manage returns and recovery of products and waste, and reorganizing the supply chain to ensure a steady supply of recycled materials.
- **Incorporate green hydrogen into strategy** – Hydrogen is used as a feedstock in chemicals production and is not carbon-friendly. To produce green hydrogen, large amounts of water, an uninterrupted renewable energy supply, and electrolyzers are required. With the rise in renewable-energy use and the decline in the pricing of electrolyzers, it is becoming possible for organizations, particularly in heavy industries (energy, chemicals, steel, mining)

and transportation (rail, aircraft, maritime), to use green hydrogen as a feedstock.⁶² In our survey, 44% of all respondents (and 48% of energy sector respondents) believe green hydrogen will be the most disruptive trend for their industry in operations in the next three years.

THE CHIEF HUMAN RESOURCES OFFICER SHOULD STAFF FOR SUSTAINABILITY AND DRIVE CULTURE CHANGE

While organizations can set environmental targets and milestones, organizations must have a workforce that can support this transformation. The CHRO has five main responsibilities in this regard:

- **Educate managers about the need to integrate sustainability into decision-making** – As this research reveals, sustainability transformation cannot be achieved without every function being engaged. Therefore, it is important for business leaders to make sustainability a part of their daily routine. Linking remuneration of functional leaders to sustainability goals can also push the agenda.

- **Disseminate the sustainability vision internally** – Organizations often prioritize certain sustainability goals, and the whole workforce should be aware of and aligned on these. This includes frequent communication to employees on sustainability initiatives, targets, and milestones.
- **Foster a culture that celebrates and promotes sustainability across the organization** – This includes providing autonomy to employees to undertake projects that can result in greater sustainability benefits, providing them with the training and tools to succeed in this transformation and regularly communicating to the entire organization about the organization's sustainability goals and initiatives.
- **Drive change management** – Sustainability initiatives can often mean changes in how processes are run; here, CHROs can make the transition easier for affected employees through internal communications, trainings, and other initiatives.
- **Recruit and upskill employees with the necessary hard sustainability skills, such as carbon accounting and**

environmental engineering

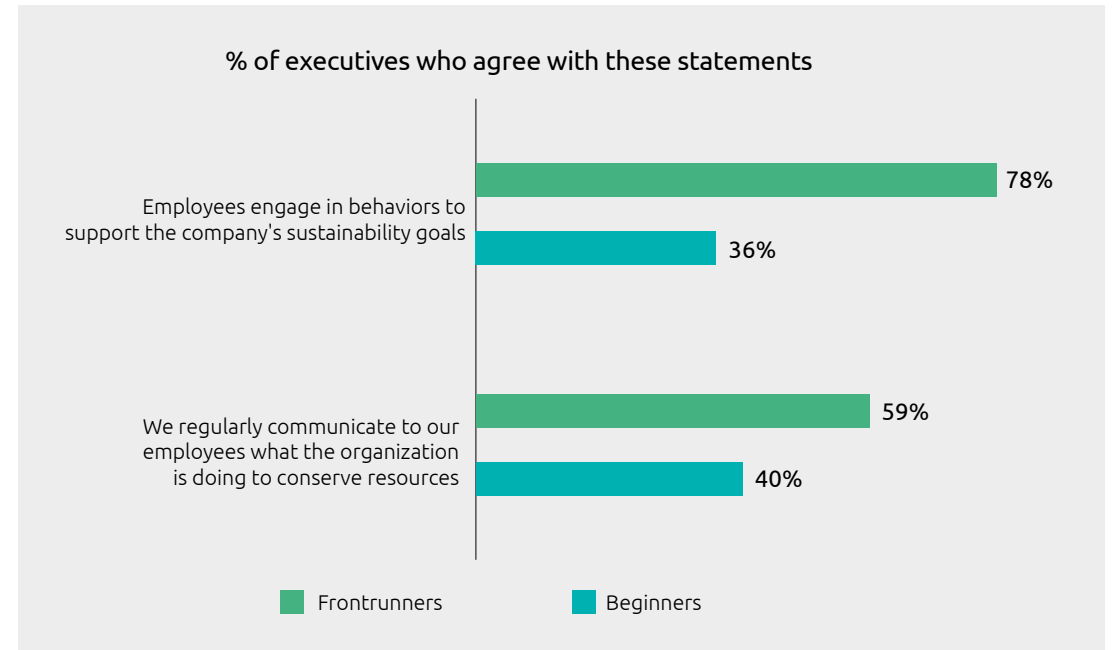
– Enabling business functions with the right skillset to support the sustainability transition is an important part of the CHRO's agenda.

regularly communicate to their employees on their initiatives. Forty percent of beginners say the same (see Figure 28).

Such a culture not only encourages sustainable thinking among employees but also promotes sustainability in their daily lives. The vast majority (78%) of frontrunners say that their employees engage in behaviors that support sustainability goals, compared to just 36% of beginners. For example, employees recycle, use green transport like bikes to reduce car travel, and plant trees. Nearly 60% of frontrunners also say they

Fig.28

A large majority of employees at frontrunners engage in behaviors that support the company's goals



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 668 organizations, 149 frontrunners, 366 beginners

Conclusion

Corporations across sectors are poised to enter a crucial decade in the fight against climate change, resource criticality, and biodiversity loss. They have a pivotal role to play in mitigating the harmful impacts that industrial operations can have on our world. Many companies realize this urgency and have designed strategies for sustainability; however, greater, bolder efforts are required in implementation. Sustainability requires enterprise-wide transformation and organizations must assess their whole value chain through a sustainability lens. They must transition to low-carbon business models and work toward a regenerative economy, integrate stakeholders' perspectives early via external advisory groups, and take the planetary boundaries into account within their sustainability strategy since biodiversity and the economy are deeply interconnected. Investing in sustainability now is ever more critical as the threat of an economic downturn looms large. Frontrunners have the advantage, but other organizations can follow their lead to accelerate toward sustainability and away from the dangers of stagnation in a changing market.



+ Research Methodology

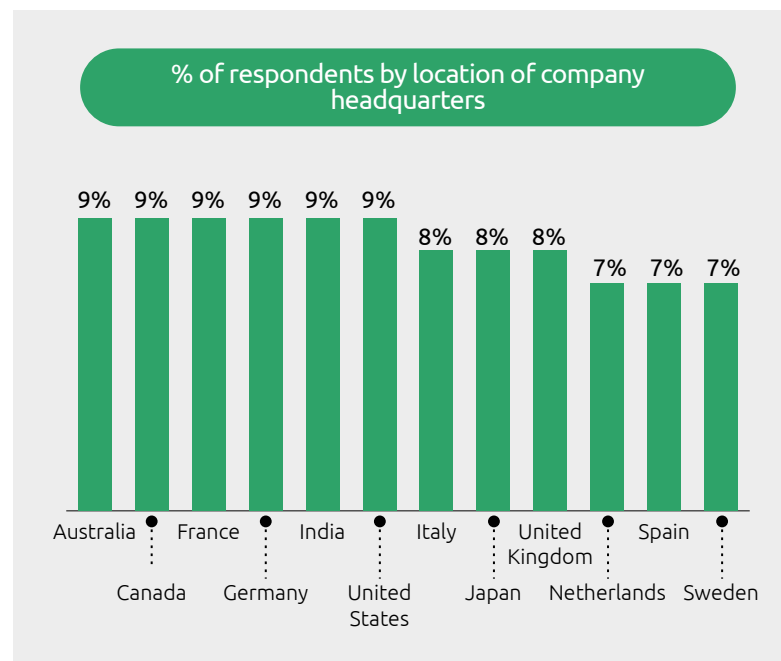
To understand where companies are in their sustainability transformations, we conducted a global quantitative research study.

Executive survey

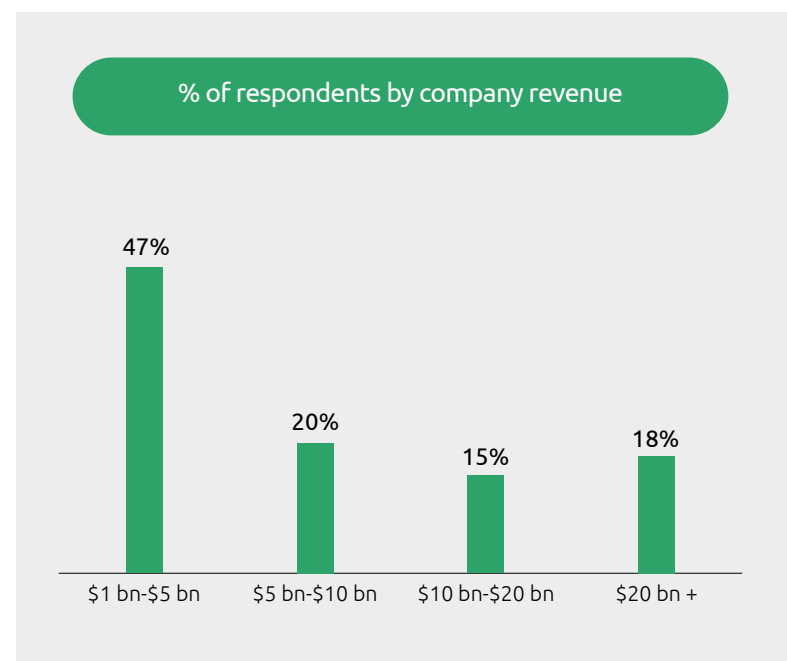
We surveyed 2,004 respondents at 668 organizations across 12 countries, each with more than \$1 billion in annual revenue. We surveyed three executives from every organization. The distribution of respondents and their organizations is provided in the following figures.

The study findings reflect the views of the respondents to our online questionnaire for this research and are aimed at providing directional guidance. Please contact one of the Capgemini experts listed at the end of the report to discuss specific implications.

Note: The question asked of respondents on disruptive trends was "Of the following sustainability trends, what do you believe to be the most disruptive trend for your industry

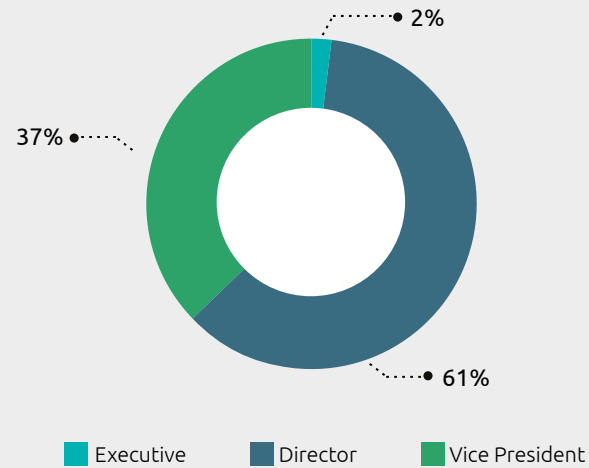


Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 2,004 executives, 668 organizations.



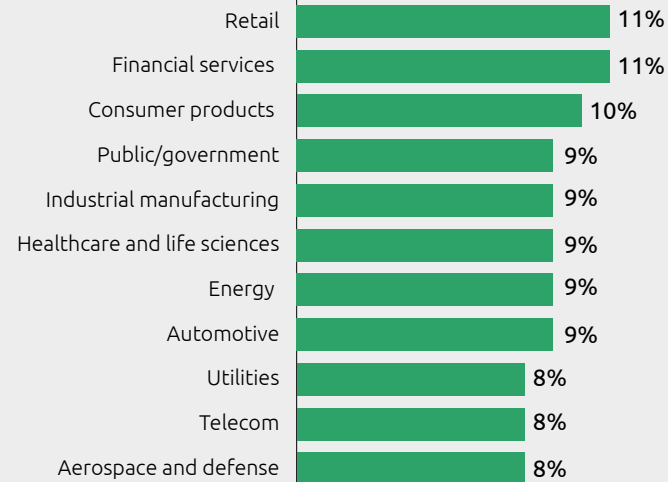
Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 2,004 executives, 668 organizations.

% of respondents by designation



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 2,004 executives, 668 organizations.

% of respondents by company industry*



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 2,004 executives, 668 organizations.

*Utilities includes electric utilities, gas utilities, water utilities, and waste management; Energy includes oil and gas, alternative/renewable energy, and energy service; Consumer products includes apparel, footwear, household, and personal care; and Financial services includes retail banking and insurance.

in the next 3 years? Please rank the two most disruptive trends for each of the functional categories for the next 3 years.”

In-depth interviews

We conducted in-depth interviews with sustainability executives from various organizations. Interviewees included CSOs and heads of sustainability.

Research methodology

% of respondents by department/function



Source: Capgemini Research Institute, Sustainability Transformation Trends Survey, August–September 2022, N = 2,004 executives, 668 organizations.

*Utilities includes electric utilities, gas utilities, water utilities, and waste management; Energy includes oil and gas, alternative/renewable energy, and energy service; Consumer products includes apparel, footwear, household, and personal care; and Financial services includes retail banking and insurance.

Research methodology

+ Appendix

Statements used to evaluate the sustainability maturity of organizations in our survey.

Axis	Pillar	Statement
Corporate functions	Vision and leadership	Top leadership share a common vision of how the business needs to change to become sustainable
		The sustainability vision is well integrated into the core strategy of the organization
		We have defined a corporate purpose that extends to the environment (i.e., purpose meaning a reason for being beyond profit)
		Sustainability aspects are considered in corporate decisions across the company
		We have a clearly defined priority list of sustainability initiatives to be implemented in the next three years
		Sustainability is part of each of our C-suite executives' agenda
		We are redesigning our business/operating model so they are more sustainable
		We have a strategy to transition to renewable energy for all sources (i.e., a switch from conventional to renewable energy for electricity, fuel, heating)
		Circularity (i.e., a product is created with its own end-of-life considered; once the user is finished with the product, it goes back into the supply chain instead of the landfill) is a key component of our sustainability strategy
		We have internal governance policies and procedures relating to environmental sustainability
Corporate functions	Talent	Upskilling/reskilling on hard sustainability skills (e.g., renewable energy, carbon accounting, environmental science/engineering, data analysis/visualization) is a top priority for our company
		Upskilling/reskilling on soft sustainability skills (e.g., leadership, innovation, communications, design thinking) is a top priority for our company
		We actively recruit and hire new talent with strong sustainability skills
		We train our employees to adopt sustainable practices in-office
		We equip our employees with tools to support their low-carbon transition (e.g., giving reusable water bottles to reduce single-use plastic, utilities tracker for carbon footprint)
		We train employees on the importance of sustaining the environment
		Employees have sustainability KPIs that they are evaluated against as part of performance management
		Leaders have sustainability KPIs that they are evaluated against as part of performance management
		We have employees with eco-design and sustainable design skills

Axis	Pillar	Statement
Corporate functions	Culture	We encourage research and experimentation to develop new initiatives for sustainability
		We provide autonomy to employees to develop new solutions to sustainability challenges
		We actively collaborate with interested stakeholders, including customers, investors, academia and governments, to develop and promote sustainable approaches
		Our leaders are focused on profit at the expense of our environmental footprint
		All our sustainability reporting and claims are backed by robust audited data
Corporate functions	IT	We use a green cloud architecture for our data centers (which reduces the data center power consumption)
		We eco-design our IT applications (i.e., designing for the lowest environmental impact such as using “sleep modes” on laptops)
		We identify energy-intensive applications and take steps to improve their energy performance
		We have green policies for IT hardware and services procurement (e.g., environmental disclosure for IT vendors)
		We include a carbon emissions assessment when allocating IT spend
		Our organization has a sustainable IT strategy and roadmap
Corporate functions	Finance and accounting	We include an assessment of environmental externalities when evaluating projects to fund (e.g., pollution that might be caused by the project that diminishes property values or health of people in the surrounding area)
		We report our sustainability impacts (e.g., water usage, GHG emissions, hazardous waste produced) along with our financial performance, on a quarterly/annual basis
		We have assets invested in ESG portfolios (i.e., funds that incorporate screening criteria for environmental, social and governance issues, or invest in socially responsible companies)
		We have made fossil fuel divestment pledges (i.e., accelerating the adoption of the renewable energy transition through the stigmatization of fossil fuel companies)
		We invest in carbon offsets (such as purchase of credits or increase in carbon storage through tree planting, land restoration etc.) to balance out our carbon emissions

Appendix

Axis	Pillar	Statement
Corporate functions	Sales and marketing	We educate customers about the importance of adopting sustainable practices
		We offer competitive pricing to encourage more people to consume/purchase sustainable products/services
		We communicate a carbon footprint for every product/service we sell
		We consider environmental sustainability when designing our branding and marketing campaigns (e.g., fewer physical events)
Corporate functions	Technology	We measure the environmental impact of technologies before using them
		We use technology to minimize landfill usage efficiently (e.g., smart waste management for tracking, sorting using robots for recycling, using AI/ML to reduce waste)
		We use technology such as AI, automation, or digital twins to achieve our sustainability agenda
		We are using IoT/IIoT to monitor/reduce energy consumption
		We use 3D printing to produce less waste and save fuel required for transport
		We use digital technologies (e.g., AR/VR, collaboration tools) to reduce travel needs of employees
		We use blockchain/smart contracts to make our supply chain more sustainable
		We use tools such as supply chain control tower for monitoring and measuring our ESG metrics
		We use AI/ML to optimize data center utilization
		Sustainability-related data is available and shared across the entire organization (e.g., functions, business units, employees, managers)
Sustainability-related data is available to interested stakeholders external to the organization (e.g., investors, activists, governments, consumers)		
Corporate functions	Sourcing	We consider the ESG ratings and environmental pledges taken by suppliers during supplier selection We are working with our tier -1 suppliers to identify measures for reducing their carbon emissions
		We are working with our tier -1 suppliers to identify measures for reducing their carbon emissions
		We are working with our tier-2 and tier-3 suppliers to identify measures for reducing their carbon emissions
		We use suppliers who have validated SBTI targets to procure raw materials
		We are working towards reducing deforestation in our supply chain

Appendix

Axis	Pillar	Statement
Corporate functions	Innovation/ R&D/ product design	We are designing products so they can serve their originally intended functions longer
		We use AI/data analytics to aid in the discovery of optimal raw materials
		We follow sustainable prototyping and testing processes (e.g., use of additive manufacturing or 3D printing)
		We are redesigning products to remove fossil fuel feedstock sources (such as coal)
		We are redesigning products to have a lower impact on forests (e.g., using less wood so fewer trees are cut down)
		We are building solutions to reduce the environmental footprint of our end users/customers
Corporate functions	Manufacturing	We perform LCA (life cycle assessment) on all of our products/services
		We are minimizing over-production and wastage in production
		We are shifting our manufacturing footprint to places/locales with low carbon alternatives
		We are redesigning processes so they consume less energy (e.g., improving process heating in the production process, powering down equipment at the end of the day)
		We measure the energy consumption of our industrial processes
		We use responsible recyclers who do not export our e-waste to developing countries or improperly dispose of it
		We are reducing food waste in our operations (e.g., by improving accuracy of forecasting, clearer expiration dates)
		We have implemented a water stewardship program (i.e., using water in a way that is socially equitable, environmentally sustainable and economically beneficial)
		We actively work to recover waste (i.e., using wastes as an input material to create useful products as new outputs)
		We take back end-of-life products from customers to use them in the remanufacturing process/upcycle
		Recycling products is a core aspect of our manufacturing strategy
		We monitor the conversion of natural ecosystems (i.e., changes owing to deforestation) on our owned/managed lands
		We invest in conserving natural habitats (such as rainforests)
We are adopting plant-based food in our operations (e.g., offering only vegetarian meals/snacks in office, promoting plant-based diets to employees/customers)		

Appendix

Axis	Pillar	Statement
Corporate functions	Logistics	We use analytics for optimizing logistics to reduce travel and associated emissions
		We have adopted eco-friendly transportation strategies to reduce emissions (e.g., use of low-carbon fuels, electric vehicles, replacing old fleets with more energy-efficient ones)
		We have dedicated reporting from our transportation suppliers on the carbon impact of their services
Tech accelerators		<p>The extent to which organizations have implemented the following in its sustainability strategy and practices:</p> <ul style="list-style-type: none"> • AI/machine learning • Automation • AR/VR • Collaboration tools • 3D printing • Digital twins • IoT/IIoT • Robotics • Hydrogen • Gigafactories • Electrification • Smart grids • Bioeconomy • Carbon capture, utilization, and storage

Source: Capgemini Research Institute analysis.

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+ Authors

**Benjamin Alleau**

Global Head of the Sustainability Business Accelerator and Head of Group Sustainability Portfolio, Capgemini
benjamin.alleau@capgemini.com

**Florent Andrillon**

Global Head of Sustainability Services, Capgemini Invent
florent.andrillon@capgemini.com

**Arthur Arrighi de Casanova**

Vice President, Sustainability and Energy Transition, Capgemini Invent
arthur.arrighi-de-casanova@capgemini.com

**Marie-Neige Couriaut**

Deputy Head of Sustainability Business Accelerator, Capgemini
marie-neige.couriaut@capgemini.com

**Courtney Holm**

Vice President, Sustainability Solutions, Capgemini Invent
courtney.holm@capgemini.com

**James Robey**

EVP Global Head of Environmental Sustainability, UK Architects of Positive Futures Lead
james.robey@capgemini.com

**Sol Salinas**

Executive Vice President, Sustainability Lead for the Americas, Capgemini
salomon.salinas@capgemini.com

**Alain Chardon**

Vice President, Sustainable Platforms and Innovation, Capgemini
alain.chardon@capgemini.com

**Jerome Buvat**

Head of the Capgemini Research Institute
jerome.buvat@capgemini.com

+ Authors



Marisa Slatter

Director, Capgemini Research Institute
marisa.slatter@capgemini.com



Prateek Samtani

Manager, Capgemini Invent -
Strategic Research Group
prateek.samtani@capgemini.com



Ramya Krishna Puttur

Assistant Director, Capgemini Research
Institute
ramya.puttur@capgemini.com

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For more information, please contact:

Global contact

Benjamin Alleau
benjamin.alleau@capgemini.com

Marie-Neige Couriaut
marie-neige.couriaut@capgemini.com

Financial Services

Satish Weber
satish.weber@capgemini.com

Capgemini Invent

Florent Andrillon
florent.andrillon@capgemini.com

Capgemini Engineering

Corinne Jouanny
corinne.jouanny@capgemini.com

Southern and Central Europe

Stéphane Lefranc
stephane.lefranc@capgemini.com

North America

Salomon Salinas
salomon.salinas@capgemini.com

Northern and Central Europe

Karl Thomas Reinertsen
karl.reinertsen@capgemini.com

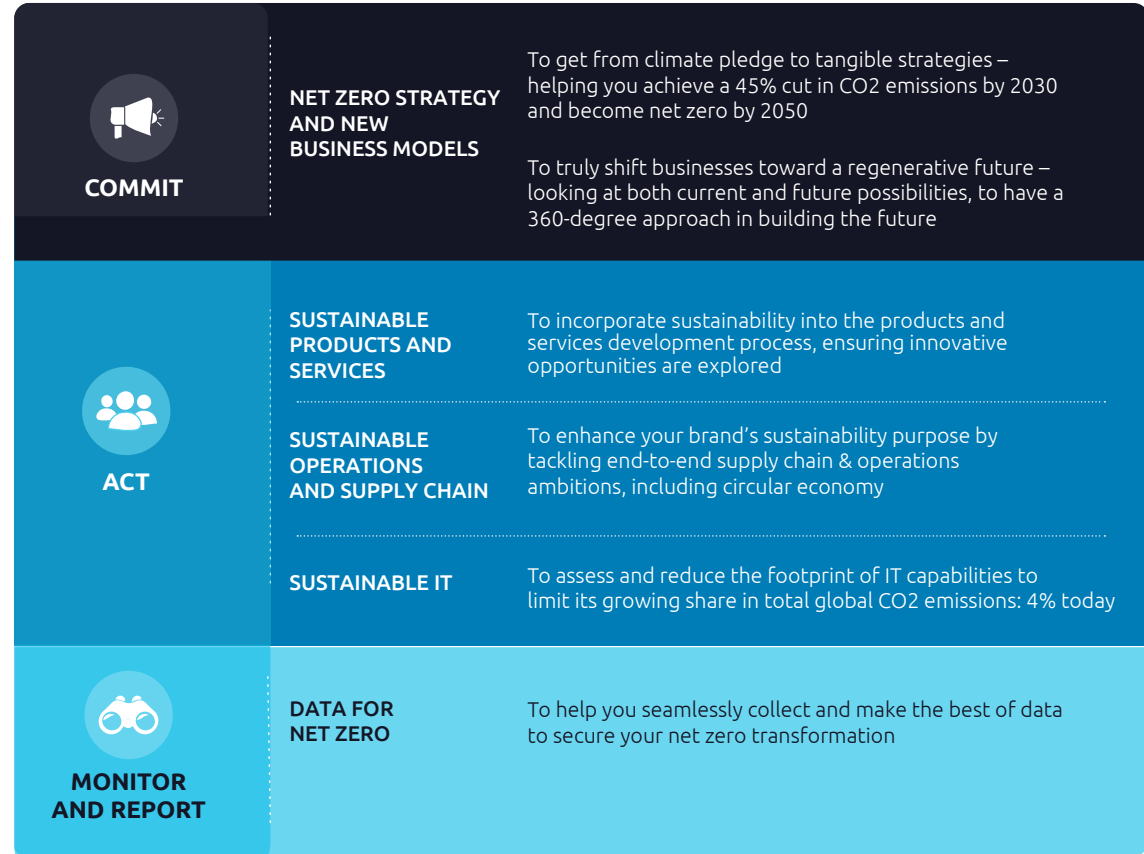
Asia Pacific

Olaf Pietschner
olaf.pietschner@capgemini.com

Barbara-Anne Bensted
barbara-anne.bensted@capgemini.com

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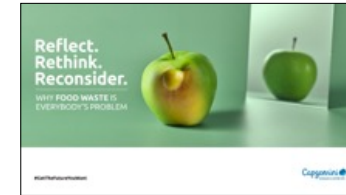
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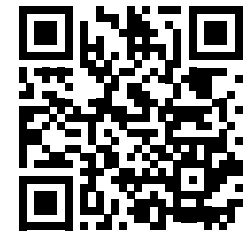
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