



# How can AI help us accelerate the pace of change the world needs?

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Realizing AI's potential for sustainable value creation requires building confidence, taking a holistic approach and augmenting people potential.

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## In brief

- Stakeholders must have confidence in AI as an exponential technology for good, and not experience it as an accelerator of unsustainable practices.
  - With AI, business leaders can address the pace, scale and complexity of change and take bold steps on sustainability with confidence.
  - GenAI democratizes access to data and insights, giving everyone augmented potential to drive and accelerate sustainable change.
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The central challenge of sustainability is one of time, scale and complexity. Human-caused disruptions in Earth's natural systems are reaching tipping points of exponential change and cascading impacts. Yet, the global response has been incremental, and we are falling behind – collectively, organizationally and individually. How can we close the gap?

Artificial intelligence (AI) can catalyze the acceleration of needed sustainability responses across complex natural, economic and social systems. It can help us act at the necessary pace and scale by augmenting the human ability to learn, analyze, innovate, predict and decide – exponentially.

AI can be interwoven in our approach to problems across the spectrum of our sustainability challenges, not as a singular solution but to complement broader systems change.

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## Artificial intelligence and generative AI +

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But to realize AI's full potential for sustainable value creation requires intention. As we discuss in the EY **foundational point of view on AI**, addressing the risks and opportunities of the technology to ensure AI is a force for good demands responsible leadership from the industry developing it, the businesses deploying it and the policy governing it.

Our intent in sharing this point of view is not to focus on specific elements of AI or deeply explore underlying technologies. Rather, we

suggest and evidence that three key dimensions will allow leaders to make bold moves confidently and responsibly with AI to respond to sustainability value creation opportunities and risks:

1. Building confidence in AI by developing and deploying it sustainably
  2. Creating exponential value through a holistic AI approach to sustainability
  3. Augmenting people potential to democratize action on sustainability
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Why is sustainability acceleration such an urgent need?

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## Chapter 2

# Confidence in AI by developing and deploying it sustainably

AI development and deployment must demonstrate its contribution to environmental sustainability and remain centered on human values.

“AI’s potential to create positive human impacts and accelerate sustainable outcomes can only be fully realized if stakeholders have confidence in AI as an exponential technology for good, rather than experiencing it as an accelerator of unsustainable practices,” says Sheri Hinish, EY Global Consulting Sustainability Technology and Ecosystems Leader. “For that, we will need inclusive representation and design principles that embody a responsible, people-centered approach to build confidence in AI and create value for all.”

Yet, there is a risk that the way in which AI is developed and deployed could reinforce unsustainable systems and economies or result in negative unintended consequences.

Recent survey data reveals public unease. In the US, 52% of adults say they are more concerned than excited about AI's role in daily life, according to a recent study.<sup>7</sup> Another survey of people in 10 European countries and the US finds that 72% of respondents believe AI must be managed carefully. The EY CEO Outlook Pulse shows **65% of chief executives globally see AI is a force for good, but more work is needed** to address risks and potential unintended consequences.

To help address these concerns and build needed confidence, AI development and deployment must demonstrate its contribution to environmental sustainability and remain centered on human values.

## Sustainable AI infrastructure build-out

Addressing the energy, resource and infrastructure dimensions of AI's ramp up will be essential. New GenAI workloads are expected to spur a tripling of hyperscale data center capacity over the next six years.<sup>8</sup>

Data center and data transmission networks account for 2%-3% of global electricity consumption and about 1% of global GHG emissions.<sup>9</sup> These figures have grown only modestly despite exponential growth in workloads due to greening grids and the shift to hyperscale cloud providers, who have invested in renewables and realized high levels of efficiency. Yet, emissions must be halved, not grow, by 2030 to keep on track for net zero.<sup>10</sup>

New efficient semiconductor architectures and cooling methods will be important contributors to bending the energy and emissions curve of AI. Innovations in the lab promise to massively reduce the energy required to regulate chip temperatures to maintain performance. Prototypes of neuromorphic chip architectures, which emulate the neurons and synapses of the human brain, are reported to have yielded a thousand-fold reduction in energy consumption.<sup>11</sup> Data center operators are deploying a variety of strategies to reduce cooling energy, from locating in colder regions or using waste heat to warm residential districts, to using alternative liquids to water. A few companies are even exploring putting data centers in space.

Decarbonizing GenAI will also depend on data efficiency. The bigger the large language model (LLM), the more energy used in training it. An LLM with 110m parameters emitted 0.64 tonnes of CO<sub>2</sub> in the training phase, which is about 80% of the annual energy-related emissions of one US home. In contrast, another LLM, with 75b parameters had a training footprint of 550 tonnes, equivalent to the emissions of 70 US homes in a year.<sup>12</sup>

Still, 60%–90% of emissions are generated by inferencing, running the model on live data (e.g., a GenAI prompt). In response, researchers are creating smaller models and optimizing the trade-offs between training speed and energy consumption.

## How EY can help

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Water, biodiversity, embodied carbon and other environmental challenges will become increasingly important concerns. The largest data centers can reach 90,000 m<sup>2</sup> in size and consume nearly 2ml of water daily for cooling.

## Transparent net impacts and outcomes

Confidence in AI will be built by transparently reporting on the net impacts of the development and deployment of the technology. The differential investments that companies are making today in AI will drive differential sustainability impacts, both negative and positive, which should be assessed in balance against the key global benchmarks: Paris-aligned climate goals, Montreal-aligned biodiversity goals, and the UN Sustainable Development Goals.

As AI becomes infused into the development and delivery of goods and services, robust measures of extended sustainability impact, such as Scope 4 emissions, will become increasingly important. Scope 4 metrics estimate the GHG emissions impact of a good or service relative to the situation where that product does not exist.<sup>13</sup> For example, even though the production of electric vehicles (EVs) causes manufacturers to generate new GHG emissions (e.g., rare earths mining, new factories), EV adoption by consumers will drive down net transportation emissions compared to the status quo.

“AI’s potential to create positive human impacts and accelerate sustainable outcomes can only be fully realized if stakeholders have confidence in AI as an exponential technology for good.”

**Sheri Hinish**

EY Global Consulting Sustainability Technology and Ecosystems Leader

## Inclusive, people-centered AI

Confidence in AI as a sustainable force for good comes from demonstrating broad-based benefits for people. AI will have to live up to its promise of enhancing the human experience and of creating new jobs in a sustainable economy, and not widen existing gaps or replace humans in the workplace.

This was underscored by the recent **G7 agreement on Guiding Principles and a Code of Conduct on Artificial Intelligence**, which emphasized both the need to use AI to address our greatest challenges and mitigate societal, safety and security risks. **US President Biden's executive order** (via EY.com US) also focused on principles to protect human values in AI.

Governments, business leaders and civil society must anticipate the transitions which will be accelerated by AI, understand the human impact, and ensure they're championed in a just transition. From decarbonizing energy to enabling autonomous mobility, creating nature-based climate solutions, and automating low-value hospitality tasks, AI will have wide-ranging impacts for workers and communities dependent on incumbent systems. We must ensure that affected workers and communities have access to the new opportunities created by AI and the skills to secure them.

Concerns about bias are longstanding in AI but become more urgent with the explosion of generative AI, the most quickly adopted technology ever. LLMs generate new content probabilistically based on vast, encyclopedic training data, effectively holding a mirror to culture and society.

AI-generated images frequently expose our biases, accelerating stereotypes anchored in systemic inequities, for example, by creating images of lighter-skin men for the holders of high-paying jobs, and sometimes struggling to illustrate scenarios contrary to stereotypical perceptions even when prompted to do so.<sup>14</sup> As GenAI becomes a growing part of creating and decision-making, we risk

reinforcing existing inequities related to gender, ethnicity, age, income and other factors unless we put safeguards in place.

These challenges are complicated by confidence-sapping issues inherent in probabilistic models, such as hallucinations (returning “made up” results), the near impossibility of linking an output to specific training data, and the potential for emergent qualities (unpredictable new capabilities) in LLMs.

As we look to AI to solve our greatest challenges, we must ensure it is inclusive, not just in terms of access and skills, but also in the knowledge and insight represented in training data. For example, there is increasing recognition that the knowledge of indigenous communities, who protect most of Earth’s remaining biodiversity on their lands, have an important role to play in addressing our sustainability challenges. Yet, that knowledge is often oral or experiential, and not represented in any AI training data.<sup>15</sup> As we continue to develop GenAI, it will be important to incorporate ancestral knowledge and other underrepresented perspectives into the models so that they reflect diverse thinking and sustainability values.

Ultimately, we must guard against a bias for systemic status quo in AI because achieving sustainable outcomes entails shifting mindsets, innovating business models and rethinking our fundamental systems.

## Build confidence

Every organization must build confidence among its stakeholders in its development and deployment of AI.

For most companies who rely on cloud-based providers, AI initiatives will result in Scope 3 emissions and analogous biodiversity impacts. Quantifying and disclosing these environmental impacts, as well social ones, will be important in

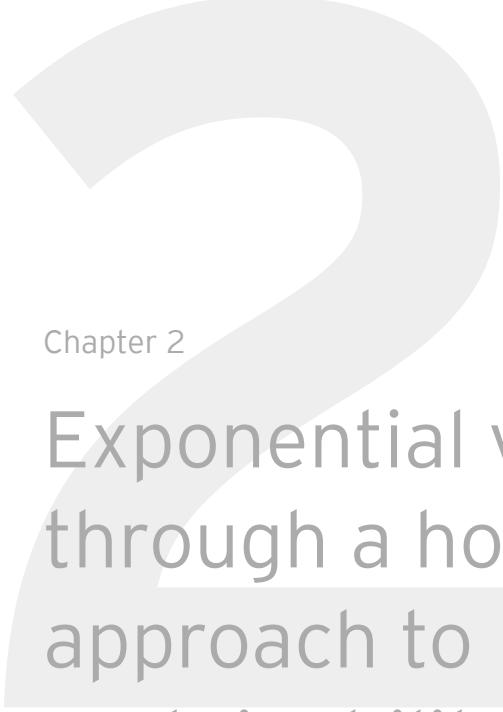
building confidence. Equally important will be measuring and assessing the positive impacts generated by the organization's use of AI so that net positive outcomes (e.g., Scope 4) can be demonstrated.

Confidence also comes from understanding and assessing the organizational risks associated with the design, implementation, training and usage of an AI model. The EY.ai Confidence Index provides business leaders an empirical assessment of the inputs and outputs of the organization's underlying AI model as they consider whether they will successfully deliver their AI program.

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Agenda: building confidence in AI as a sustainable force +  
for good

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## Chapter 2

# Exponential value through a holistic AI approach to sustainability

AI can help leaders create the timely insights needed to unlock exponential natural, social and economic value.

Today is the “slowest” day we will likely ever experience. Accelerating change in natural systems is accompanied by accelerating change in human ones, with ever-increasing data and ever-faster development and deployment of technology. The interplay of natural and human systems creates increasing complexity and brings tremendous new value creation opportunities and risks.

“Sustainability is a non-linear, complex problem. We can’t use linear, traditional methods to understand and solve our sustainability challenges. That’s why

technology and innovation are critical,” says David Rae, EY Global Technology and Innovation Lead, Climate Change & Sustainability Services.

For business leaders facing the increasing pace, scale and complexity of change, the challenge becomes one of data and decision-making: How can teams arrive at insight more quickly (context, content and access) to support faster and more responsible decisions? How can they leverage data to create new sustainability solutions in the timeframe that we need them?

Applying AI to detection, prediction and generation can help leaders create the timely insights needed to take bold steps with confidence on sustainability and unlock exponential natural, social and economic value.

AI’s exponential force comes not from singular breakthroughs but through **the compounding effects of productivity and efficiency gains, and faster innovation over time.** By reducing the time and cost of creating all kinds of content and insight to essentially zero – a text prompt – GenAI allows us to produce more ideas, faster. GenAI models can accelerate the R&D process by automating mundane tasks, allowing researchers to focus on ideation and complex problem-solving, and scaling the work behind researching, testing and iterating hypotheses and new designs.<sup>16</sup> This will result in self-reinforcing acceleration in the development of new products, new services, and new techniques.

## How EY can help

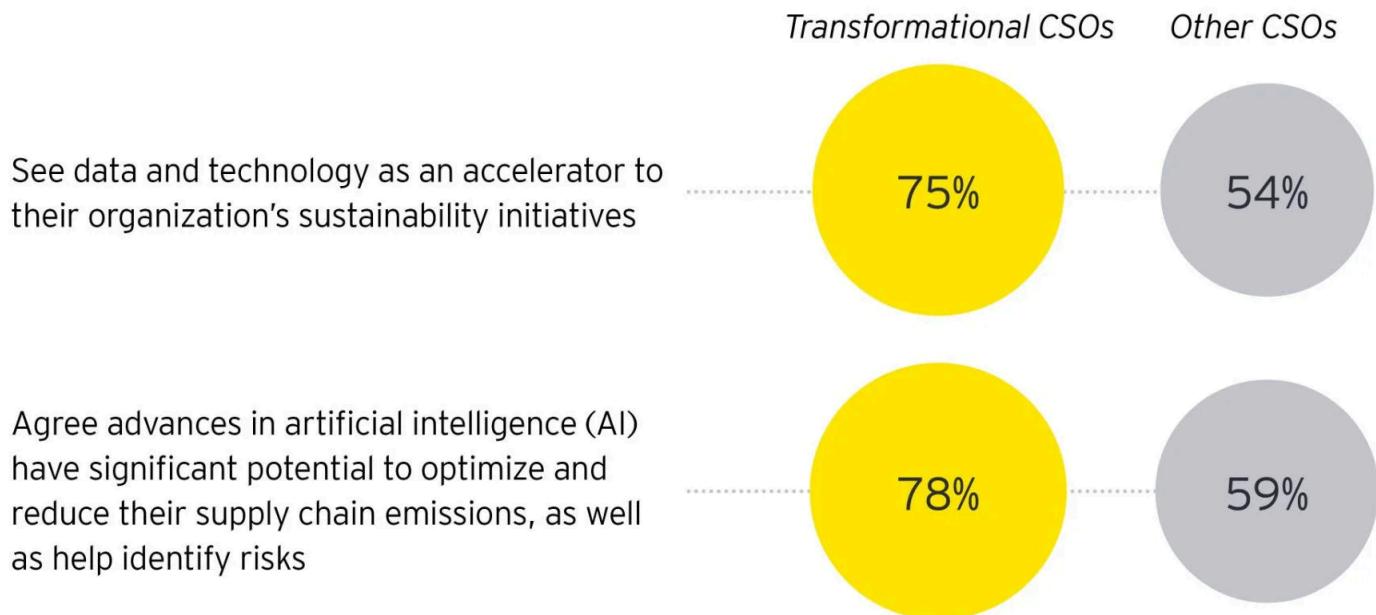
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EY global survey of 520 CSOs or executives with equivalent responsibilities.

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## Resource stewardship: toward a net-zero planet

The transition to a net-zero economy that pulls us back from planetary boundaries depends on the creation of sustainable new products and technologies, the disruption of incumbent business models with sustainable ones, and the formation of a constellation of new business ecosystems.

The gamut of AI technologies has an accelerating role to play in resource stewardship:

- Enabling circular and equitable supply chains
- Reducing resource consumption
- Decarbonizing energy and mobility
- Accelerating sustainable product and service innovation

- Advancing materials science
- Protecting and enhancing biodiversity

For example, AI-driven tools are being used to speed up the discovery of advanced materials for carbon capture, utilization and storage. AI is also helping design concrete blocks for road infrastructure that consume 20% less material and absorb nitrous oxide.<sup>17</sup>

The EY Space Tech Lab applied computer vision to satellite imagery to identify leaks in a utility water system that were resulting in losses of 50ml per day. More broadly, AI and Earth observation data address a wide range of resource stewardship issues and opportunities (via EY.com Australia), such as mapping GHG sources, identifying biodiversity, preventing deforestation and improving confidence in nature-based carbon removals.

AI Copilots can also help us rethink the unsustainable business paradigms that brought us to this point. As we discuss in the *Harvard Business Review*, AI can help people **ask better questions, be more innovative and solve bigger problems.**

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**David Rae**

EY Global Technology and Innovation Lead, Climate Change & Sustainability Services

## Resilience and risk management: adapt and prepare

With significant climate impacts locked in for the near and medium term, enhancing community resilience and ensuring that infrastructure is built for our

climate future will mitigate human costs and the risk of unpredictable cascade effects.

Our linear economic systems, infrastructure, legal agreements and operating assumptions were established for the most part on now far-outdated assumptions about climate and resource availability. As climate impacts continue to disrupt our expectations, AI provides new capabilities to model natural systems and predictively adapt, whether in cities, energy and resources networks, or global supply chains.

Deep learning is generating new insights into the dynamics of complex natural systems and how to identify early signals of tipping into irreversible and potentially catastrophic environmental change, such as desertification of the Amazon, melting of the Greenland ice sheet, or methane released by a thawing Arctic.<sup>18</sup>

In addition to providing insights into these macro risks, AI can enable resilience at local scales. The EY **2024 Open Data Challenge** focuses on using AI to build coastal resilience in geographies with poor data availability. Participants will develop baseline data for these environments with classification models that identify infrastructure and ecosystems using satellite data and machine learning algorithms. These models and GenAI will then be used to build climate risk plans to address coastal vulnerabilities.

“Businesses won’t succeed unless communities where they operate can thrive. With sustainable development as a guiding North Star, these AI and data science innovations advance community resilience, which in turn creates long-term economic resilience,” says Hinish.

## Environmental, social and governance (ESG) reporting: measure and account

As sustainability becomes a growing value driver, the ability to meet stakeholder demands for increased transparency and demonstrable action will take on increasing urgency.

Improving trust and transparency is critical to unlocking investment in sustainable companies and assets necessary to create a new economy.

The **EY Corporate Reporting and Institutional Investor Survey** shows that 99% of investors use ESG disclosures as part of their decision-making, but 76% feel that companies are highly selective in the type of information that they provide.

Growing global alignment in ESG reporting frameworks and regulations (e.g., International Sustainability Standards Board, EU Corporate Sustainability Reporting Directive, Task Force on Climate-related Financial Disclosures) will increase transparency, consistency and comparability, demanding new rigor in reporting and heightening risks of greenwashing accusations.

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## EY.ai EYQ: ESG reporting use cases



This alignment includes a holistic and comprehensive environmental approach which integrates climate risk, biodiversity impacts and resource use. It also includes a growing focus on the supply chain, such as Scope 3 emissions and the supplier effects on local ecosystems and communities.

As a result, companies face a formidable data challenge. They must synthesize large amounts of heterogeneous data, everything from site-specific climate risk estimates to deforestation, water use and traceability claims.

But for all the convergence in content, we remain in a multi-speed world of sustainability regulation, and global organizations contend with reporting to multiple organizations and jurisdictions. Large organizations operating in multiple geographies frequently must publish global and country-level versions of the same report, to meet these differing requirements.

In a volatile, uncertain, complex and ambiguous (VUCA) business environment, GenAI together with other AI technologies can help organizations meet ESG reporting challenges and realize new value. Teams can leverage AI to:

- Process and analyze large volumes of complex and varied data related to ESG factors (e.g., internal sources, public records, social media, news media) providing a comprehensive view of an organization's ESG performance.
- Predict future ESG trends and outcomes using historical data, helping organizations anticipate and mitigate risks, adapt to changing circumstances, and make informed decisions.
- Automate ESG data collection, processing and reporting, which increases efficiency, reduces the likelihood of human error, and allows for more frequent and timely reporting in a rapidly changing world.
- Improve the transparency and accuracy of ESG reports by providing data-driven insights and minimizing subjective interpretations — vital for building trust with stakeholders, including investors, regulators and the public.
- Perform scenario analyses and stress tests to address complexity and ambiguity by assessing how different ESG factors might impact an organization under various conditions.
- Analyze vast volumes of data to help identify new ESG-related risks and opportunities that might not be apparent through traditional analytical

methods.

- Benchmark ESG performance against peers and industry standards, providing a clearer understanding of where an organization stands and where improvements are needed.
- Learn from new data and experiences, continuously improving analysis and reporting capabilities in a VUCA business environment where adaptability is key.

“GenAI enables leaders to easily access and gain insight from large volumes of disparate data and more dynamically fulfill ESG reporting requirements,’ says Rae. “As companies contend with accelerating and changing sustainability challenges in a volatile business environment, manually generated ESG reporting will likely become inadequate for stakeholder needs. AI could enable a shift to dynamic, automated ESG insight and action.”

## Take a holistic AI approach to realizing sustainable value

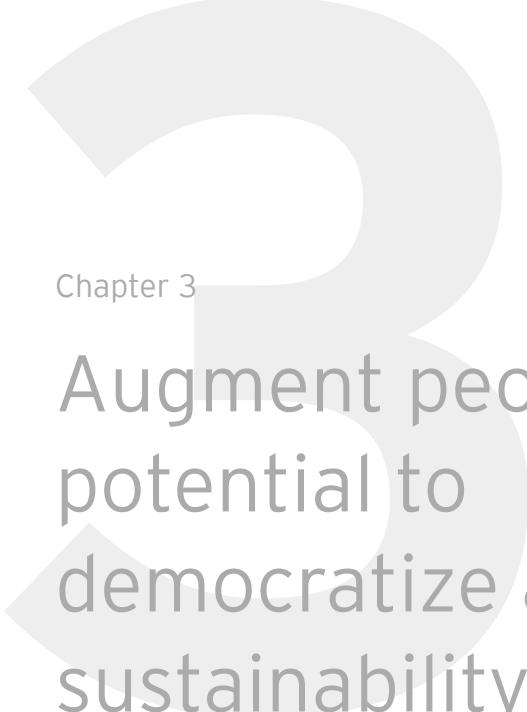
To realize AI’s full value for sustainability it must be part of a broader organizational AI strategy that is integrated and top down. Too often AI initiatives are owned by technical teams focused on improving existing process rather than being driven by the C-suite to initiate a wider business transformation.

Sustainability strategy and business strategy should be aligned. Sustainable value creation opportunities from AI flow from that convergence. Business leaders should ask, what are the value levers and business outcomes? Tools such as the EY.ai Value Accelerator can help set sustainability opportunities in the context of AI’s broader contribution to top line growth and the bottom line of the organization.

While excitement today is rightfully centered on GenAI, it's important to remember that it doesn't replace all other forms of AI. Rather, GenAI is the access point to the "other AI" — from pattern recognition to machine learning and true cognitive. The other kinds of AI continue to have broad-based utility and can provide inputs to GenAI.

As with digital transformation, acquiring the technology will be the easier part. The central challenge will be achieving the wider, people-centered organizational change — behavior, culture, incentives — needed to fully realize the value of the technology.

As business leaders seek to apply AI to sustainability, they will have to consider their organization's end-to-end sustainability challenges and the right AI technology for each, in the context of their overall GenAI strategy and journey. The EY.ai Maturity Model provides a framework for companies to benchmark where they are on their GenAI journey and what capabilities are required to progress.



Chapter 3

## Augment people potential to democratize action on sustainability

GenAI democratizes access to data and insights, giving everyone, individually and collectively, new potential to act on sustainability.

Sustainability is everyone's business, and GenAI gives people new potential to act.

Business leaders have new abilities to ask better questions of their organizational data, giving them the insights they need to make decisions faster and more responsibly. GenAI can also help teams catalyze the creativity and passion of each employee to create sustainability solutions for their organizations and their clients.

Even before the explosion of GenAI, civil society organizations were utilizing increasingly accessible AI tools, such as machine learning, to give them more leverage in relation to business and government. For example, Climate TRACE, a global non-profit coalition, has created a global inventory of the most climate-polluting assets using AI to analyze satellite sensing data and combine them with multiple other data sets. GenAI will give civil society organizations new abilities to create sustainability solutions and hold the public and private sectors to account.

Communities will benefit from new capabilities to assess risks and design place-specific solutions. Queryable Earth gives a sense of the very local sustainability data insight that communities could use to mitigate their climate risks, promote environmental justice, and create regenerative outcomes.

GenAI will give individuals new potential to innovate, collaborate and activate for sustainability. Emerging evidence suggests that GenAI reduces inequality by closing the skills gap. LLMs and Copilot applications democratize access to valuable skills (e.g., software engineering, design, creating art, drafting papers), lowering the barriers to entry by augmenting less-skilled workers.

However, access to foundational models and the training to create AI solutions remains important. Around the world, for example, women lag behind men in AI skills.<sup>19</sup> As GenAI development accelerates, we risk widening existing digital divides, whether between residents of developed and emerging economies, or other social dimensions.

**GenAI democratizes access to sustainability data and insights, enabling business leaders to ask better**

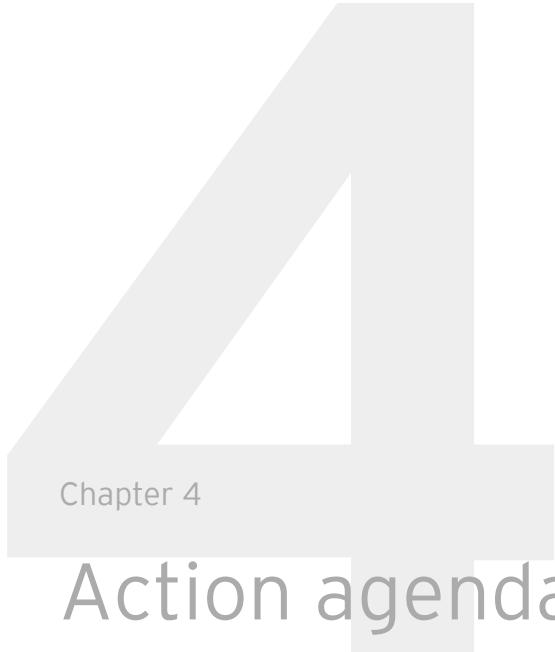
estions of organizational data, communities to design place-specific solutions, and individuals to close skills gaps.

## Upskilling, culture and mindset are key

To unlock the transformative potential of GenAI in their organizations, business leaders must empower their people to access and act on the technology. But this requires more than simply making the technology available.

Research by EY teams and the University of Oxford indicates that a human-centered approach to transformation can increase the likelihood of a successful outcome by 2.6 times. The digital transformation of recent years, which also followed a gradual-then-sudden trajectory, showed us that investments in technology and specialist teams could easily falter without driving a culture and mindset shift among managers and the people at the front lines.

To realize AI's full potential, broad upskilling is needed, not just in the new technology but also in new ways of working. The EY organization is upskilling all our people, more than 400,000, who now have access to EY.ai EYQ, our LLM. We are encouraging our people to treat EY teams as "client zero" for GenAI sustainability use cases, which can then be fully developed and offered to clients.



Chapter 4

## Action agenda for sustainability acceleration

Start the journey of accelerating sustainability with AI.

We are witnessing an inflection point where accelerating change in natural systems must be met with exponential, responsible change in human systems. We won't close our gap in progress toward net-zero people and planet to create the future-fit resiliency we need by doing more of the same," says Hinish. AI can help us close the gap through compounding acceleration of productivity and efficiency gains, and faster innovation. A key part of this will be the ability to

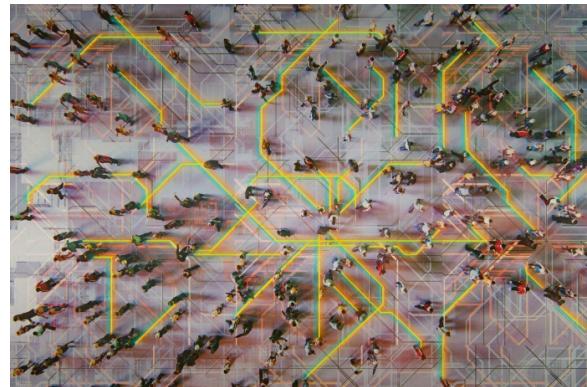
arrive at insight more rapidly, and make faster and more responsible decisions, through GenAI.

Realizing this potential depends on taking a responsible, people-centered approach that builds confidence in AI and creates value for all. This entails building confidence in the sustainable development and deployment of AI, taking a holistic approach to applying AI to sustainability challenges and augmenting people's potential to make sustainable impact by democratizing access to GenAI.

The following actions provide business leaders with an agenda for beginning this journey of accelerating sustainability with AI:

1. Start: GenAI is mature enough to be applied to your sustainability challenges today. Waiting will only cause you to fall behind in your ambitions and your competitors and delay the compounding acceleration AI can bring to your sustainability initiatives.
2. Commit: The digital transformation of the last decade demonstrated the pitfalls of tinkering at the edges or maintaining siloed initiatives. Invest in GenAI, but also the culture change, mindset shift, new talent and upskilling to fully realize its value.
3. Co-create: Achieving change in complex natural, economic and technological systems requires broad-based collaboration with clients, business partners, government, civil society, academia and creatives. But to be effective and just, sustainability solutions must also be developed with the stakeholders most affected by them.
4. Include: Provide access to GenAI throughout the organization to unlock the passion and creativity of your people for sustainability. Work to ensure that LLMs include diverse insights and life experiences.

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5. Experiment: GenAI creates an ability to question and iterate more quickly.  
Leverage this capability to focus on developing better questions, trialing and learning rather than defining outcomes.
6. Innovate: Drive sustainable innovation by applying AI to automate low-value research tasks and leveraging its ability to process large amounts of data, freeing innovation teams to focus on ideation and complex problem-solving.
7. Govern: Center your AI initiatives on human values to build confidence internally and externally and realize sustainable outcomes.
8. Mitigate: Understand the risks inherent with probabilistic LLMs (e.g., bias, hallucinations) and build confidence with a risk management approach that encompasses the full model life cycle.
9. Report: Measure and report on the differential sustainability impact of AI initiatives. Assess your net impact with Scope 4 and other metrics.
10. Share: Be transparent about AI experiments and initiatives, their success or failure, and lessons learned.

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Rouzbeh Amini, Ben Falk, Seth Flory, Mary-Ivy Mbayah, David Rae,  
Swathi Sivaraman and Prianka Srinivasan.*

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## Summary

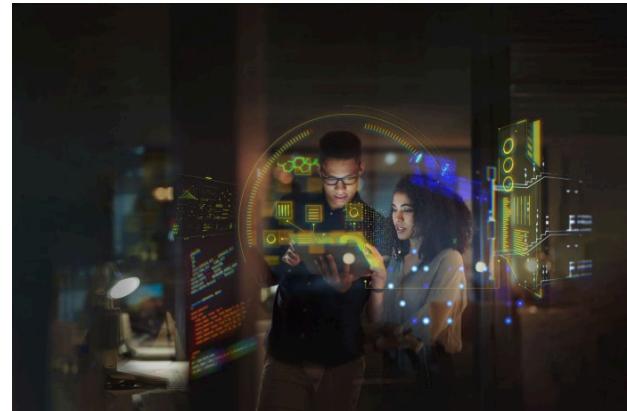
Interrelated climate change and biodiversity impacts are accelerating. Yet, the global response lags and corporate progress has stalled.

AI can help us close the sustainability gap by helping us overcome complexity to arrive at insights more rapidly and make faster, more

responsible decisions. This creates self-reinforcing, positive acceleration.

Realizing this potential depends on building confidence in the sustainable development and deployment of AI, taking a holistic approach to applying AI to sustainability challenges, and augmenting the potential of people to make sustainable impact by democratizing access to GenAI.

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