Exploring the Paths to Net Zero

Survey reveals how sustainability leaders reduce emissions and drive business performance

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Defining the net-zero challenge

Introduction

In response to the **growing threat of climate change,** most large companies around the globe have committed to reaching a **goal of net-zero greenhouse gas emissions by 2050, some by as early as 2030.** Hitting these deadlines is vital to **prevent catastrophic changes** in the world's climate. But these companies know that it will also drive business performance in a sustainability-minded marketplace, enabling them to improve their reputation, cut costs, increase revenue, and boost shareholder value. The firms—ranging in size from $500 million to over $100 billion in revenue—shared their commitments, goals, and progress as part of a **recent study conducted by NTT and ThoughtLab, a global research firm.**

And, while work is underway, more than two-thirds of the 500 companies surveyed report that they are **already behind schedule, just a few years into their net-zero programs.** Companies across industries, regions, and revenue sizes are all lagging according to their self-assessments, some more than others. For example, more than three-quarters of healthcare/life sciences firms report that they are behind their targets. The same percentage of companies based in Asia Pacific are as well. Nearly three-quarters of organizations with revenue under $5 billion are also failing to meet their interim goals.

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Figure 1

Self-reported progress on net-zero plans

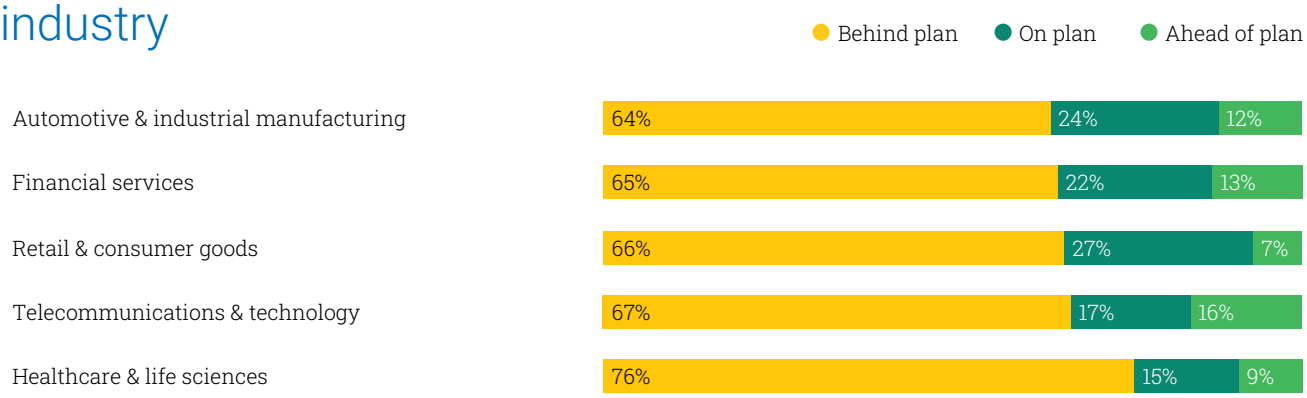
68% Behind plan

21% On plan

11% Ahead of plan

Figure 2

Self-reported progress by industry



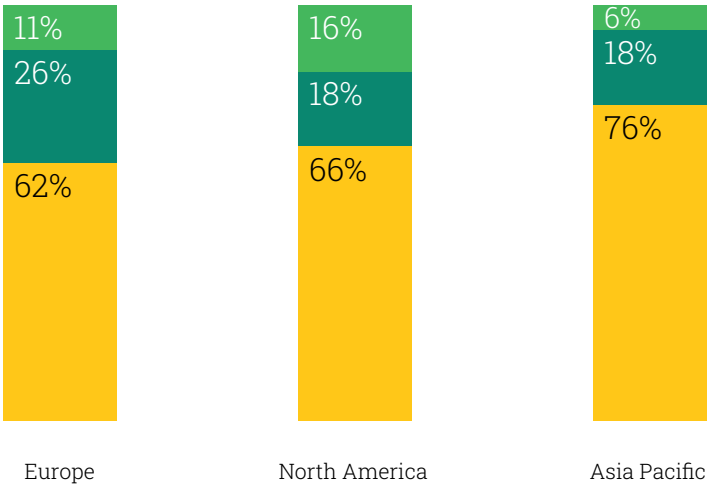


Figure 3

Self-reported progress by region

Behind plan On plan Ahead of plan

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On average, firms surveyed have **reduced their greenhouse gas emissions** at a compound average growth rate (CAGR) of 4.2 percent per year. To determine if they will meet their target-year goals, we compared their achieved CAGR to the CAGR needed to reach their targets on time. We found that companies need to reduce their greenhouse gas emissions by a CAGR of 11.1 percent per year, a significant increase over their rate today.

Based on current performance, we found 95 percent of firms surveyed are not on track to meet their targets, even more than the 68 percent that say they are behind.

Part of the challenge is that emissions reductions typically follow an S-curve[1] rather than happening at a steady pace, according to climate research. Reductions are slow at first as companies put policies and programs in place but, as these programs take effect, emissions reductions increase rapidly. Then as companies make significant advances against their goals, it gets harder for them to reduce their emissions and progress slows.

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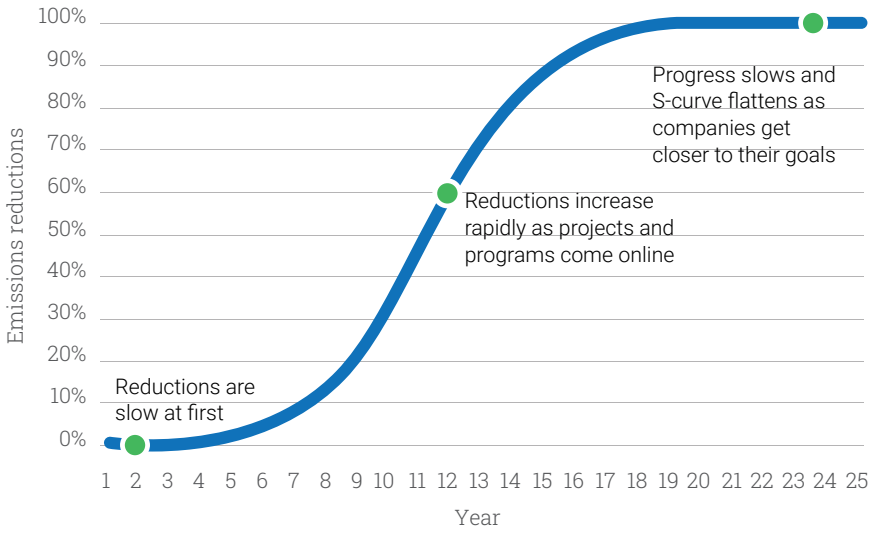
However, for companies in our study, the early ramp-up has generally moved faster than a traditional S-curve would suggest. That is because they were implementing sustainability programs even before they set their net-zero goals—doing such things as investing in alternative energy sources, adopting waste management and recycling solutions, tracking emissions data, and building energy efficiencies.

While firms have moved faster than the initial phase of the S-curve, as they climb the steep trajectory of the curve their current speed of emissions reductions will not be enough to allow them to stay on track to reach their goals by 2050.

Figure 4

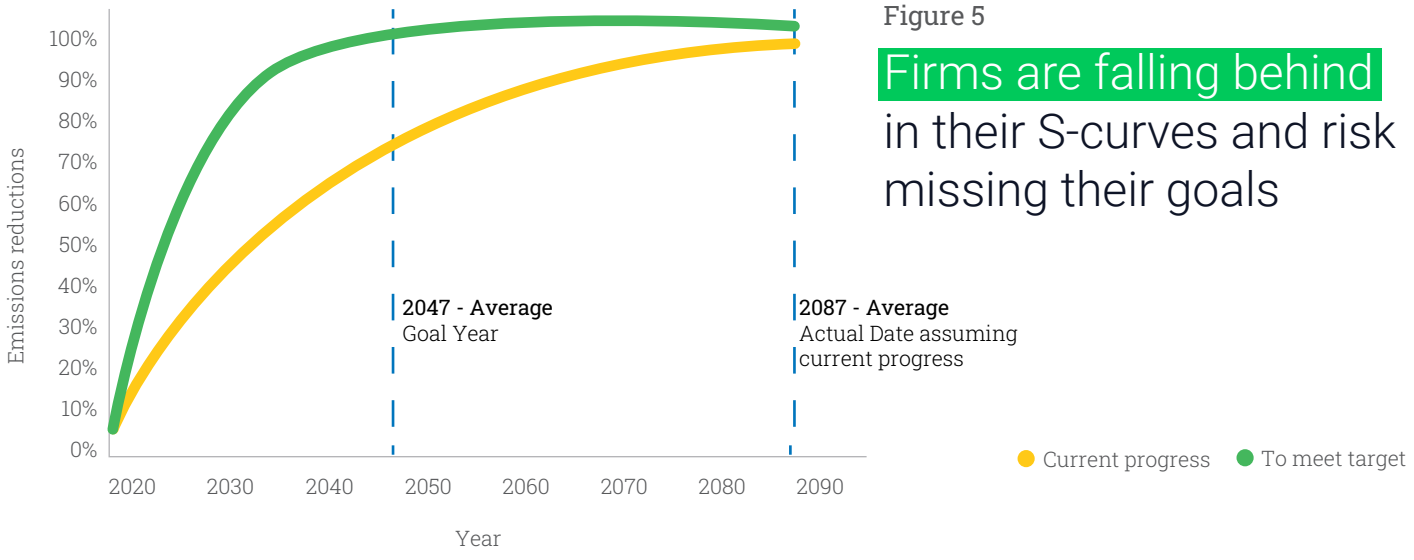
Typical emissions reductions pathway



Note: The S-curve represents the trajectory of progress toward net-zero emissions over time. It resembles an "S" shape, indicating gradual progress initially, followed by accelerated advancements, and finally levelling off as the goal is achieved.

Figure 5

Firms are falling behind in their S-curves and risk missing their goals



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Many plans fail to consider potential shocks

One problem that may be **derailing** companies' net-zero progress is that they **often leave critical assumptions out of their net-zero plans.** Most firms surveyed do not consider factors such as economic and geopolitical disruption, value and supply-chain constraints and disruptions, the fluctuating price of carbon offsets, and, particularly, the **rapid growth in their use of data**—even though these factors can **blow companies off course.**

Only a third or fewer include the **availability of government subsidies**—for example, tax credits offered under the U.S. government's Inflation Reduction Act—as well as **evolving consumer preferences,** or the use of new, unproven technologies in their plans. This can lead to **missed opportunities** to reduce emissions and it can also lead to unforeseen costs.

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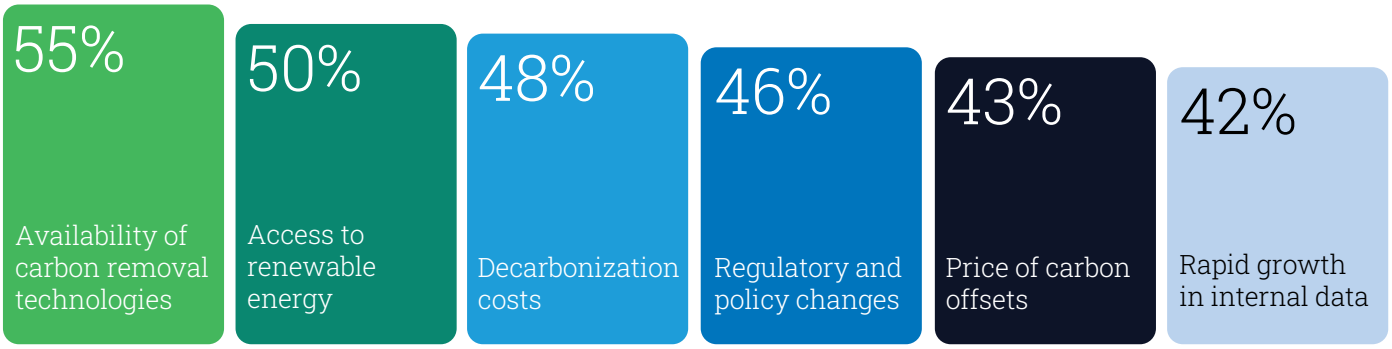
Companies do realize, however, that there are many risks to their emissions-reduction plans if conditions prove more negative than expected. Some of the biggest risks are around the **availability of carbon removal technologies, access to renewable energy, decarbonization costs, and the price of carbon offsets**—all key elements of emission-reduction plans. Indeed, **a third of company executives surveyed say that many of the assumptions they made in their plans are already no longer valid—and another 51 percent are unsure.**

Figure 6

Factors presenting greatest risk to planned assumptions

Q11(a). Which of these factors would pose the greatest risk to your firm's plans if they became more negative than expected?



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The impact of data growth

Unfortunately, more than half of firms (58 percent) have not accounted for the **exponential growth of internal data in their plans.** This can come back to haunt them since the **volume of data around the world doubles every two years,** according to experts. Technology heads in our study—Chief Information, Technology, and Digital Officers—recognize the challenge: 65 percent say that their company's large increase in data usage makes it **difficult to achieve their net-zero goals.**

To manage their **enormous data pools,** the firms surveyed typically have more than three data centers, which can be set up **on-premises, co-located, or on public cloud platforms.**

Companies in the data-rich telecoms and technology industry have even more—an average of 5.8 data centers. On average, corporate data centers account for **20 percent of a company's carbon emissions,** according to our research. For some industries, such as telecoms and technology, it represents even more—at 36 percent. Although 60 percent of technology leaders report that **reducing emissions from their data centers is a top priority,** emissions from data centers continue to rise for most organizations, on average by 1.5 percent over the last two years.

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Data centers and carbon emissions

"The data center industry, which refers to a physical facility designed to store and manage information and communications technology systems, is responsible for two to three percent of global greenhouse gas (GHG) emissions. The volume of data across the world doubles in size every two years. The data center servers that store this ever-expanding sea of information require huge amounts of energy and water (directly for cooling, and indirectly for generating non-renewable electricity) to operate computer servers, equipment, and cooling systems. These systems account for around seven percent of Denmark's and 2.8 percent of the United States' electricity use." [2] - Ajay Kumar and Tom Davenport, Harvard Business Review, July 20, 2023

Table A

Number of data centers and percentage of total carbon emissions generated by use of data centers

Q15. How many data centers does your organization currently use?

	NO. OF DATA CENTERS	% OF TOTAL EMISSIONS
Telecoms and technology	5.8	36%
Financial services	3.6	20%
Retail and consumer goods	2.8	18%
Healthcare and life sciences	2.5	15%
Automotive and industrial manufacturing	2.6	13%

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The bumpy road to net zero

Many of the hurdles companies face on the road to net zero come from **outside the firm**. The largest one is simply **keeping up with regulations,** a worry for more than two-thirds of companies, and even more healthcare and life science firms (75 percent). Such regulations include those on carbon emissions requirements, such as the **Euro 7 standard on vehicle carbon emissions,** and on environmental reporting, like the U.S. Security and Exchange Commission's (SEC) proposed **rules on climate-related disclosures.** Not only are these regulations fast evolving around the world, but they are also placing new burdens on companies doing business across industries. **Inconsistent and complex reporting standards** add to their woes: 86 percent of companies around the world use **multiple standards and frameworks,** according to the International Federation of Accountants (IFC).[3]

Another major obstacle cited by companies is the digital divide. **More than half of respondents in the healthcare industry cited this as a challenge.** Digital connectivity is vital for companies striving to reduce their emissions. **Firms use broadband** to achieve many of their goals, such as enabling **remote working and telemedicine** to decrease the need for travel or improving climate resilience in the face of severe weather events and natural disasters.

Figure 7

Challenges to meeting targets

Q32. Which are the biggest challenges that your firm faces in achieving its net-zero targets?

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Yet some of the **biggest obstacles are internal.** The most formidable is **balancing net-zero and business goals,** cited by almost two-thirds of companies, and more than seven out of 10 financial services firms. The balancing act comes from bearing the **cost of transition to sustainable practices** while meeting the **quarterly profit expectations of shareholders,** which is most challenging for large-scale enterprises with over $50 billion in revenue (cited by 74 percent of them). More than half of companies, **and a full 60 percent of financial services companies, say they have insufficient access to the emissions data they need,** while almost as many lack a roadmap and implementation plan—a testament to just how unprepared many companies are for their net-zero journeys.

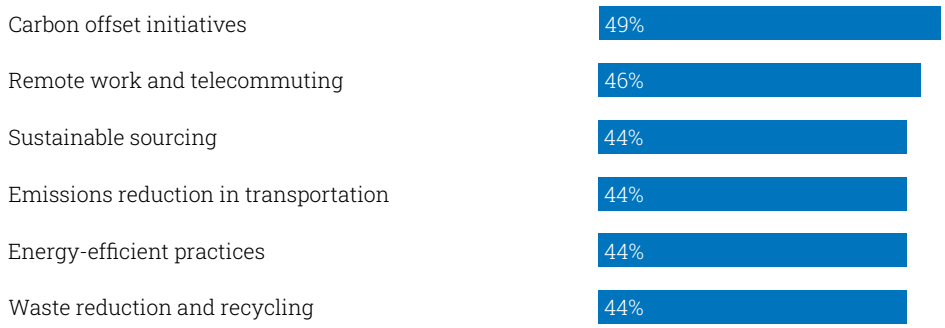
Overuse of carbon offsets

To overcome emissions reductions challenges, firms are going beyond cutting their own emissions. They are investing in carbon offsets to counterbalance their own carbon emissions by supporting third-party initiatives that remove or prevent an equivalent amount of carbon dioxide from entering the atmosphere. However, many experts, such as the Kleinman Center for Energy Policy [4] at the University of Pennsylvania and the Brookings Institute,[5] **question the effectiveness of reaching global climate goals through carbon offsets.** They point to mounting evidence that many carbon offsets overstate the climate benefits and understate the potential downsides—thereby giving the public a distorted picture of corporate climate actions and performance. Yet companies across industries—particularly those in telecommunications, technology, and financial services—are actively investing in carbon offsets to achieve early results. Our study found that **half of all firms are already well ahead in using carbon offsets.** In fact, companies are further ahead in using offsets than they are in all other sustainable practice areas examined in our study.

Figure 8

Process innovation progress (% in mid-implementation or advanced stages)

Q25. What progress has your firm made in the following areas of process innovation to achieve its decarbonization goals?



To achieve their goals, companies plan to dial up their use of carbon offsets. The use of carbon offsets is expected to increase significantly, with the **global carbon offset market projected to grow from $418.8 billion in 2023 to $2.9 trillion by 2030.**[6] That equates to a 31 percent compound average growth rate over the same period.

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How net-zero leaders achieve their goals

The path to net zero is still a work in progress. While the challenges can seem daunting, our study identified a rarefied set of 44 firms—nine percent of the 500 companies in our study—that are on the **fast track to net zero.** These net-zero leaders are now on target or ahead of their net-zero plans, despite setting tougher goals for themselves. This section examines **what makes them successful** and **illuminates the path** for others to take.

"As a firm, we learn from each other—sharing peer experiences, successes, and challenges in reducing carbon emissions."

Chief Operating Officer, Canadian financial services provider

To conduct our leader-follower analysis, we scored respondent companies on three criteria: (1) be on or ahead of plan in meeting their net-zero goals; (2) have plans that include not just Scope 1 and 2, but also Scope 3 emissions *(please see Glossary, page 43, for definitions of Scope 1, 2 and 3)*; and (3) have committed to reach net zero before 2050.

While there are net-zero leaders based in all regions, there are more in North America and Europe. Leaders tend to be slightly **larger in revenue size** than followers ($35.5 billion on average vs. $33.4 billion).

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Nine percent of respondents to our survey are net-zero leaders—companies that are on or ahead of more stringent emission reduction plans.

The **telecoms and technology** sector has the most leaders, largely due to its **technological prowess** and unique access to **emission-cutting digital solutions.** Retail and consumer firms are next in line, racing ahead of other industries to **meet consumer expectations** and **build their brand reputations.** Because of their diverse assets and long-term commitments, **financial services** firms are moving at a **slower pace** than others and therefore have the fewest leaders.

Q13. How on track is your firm in meeting its net-zero plans?

Figure 9

Net-zero maturity by region

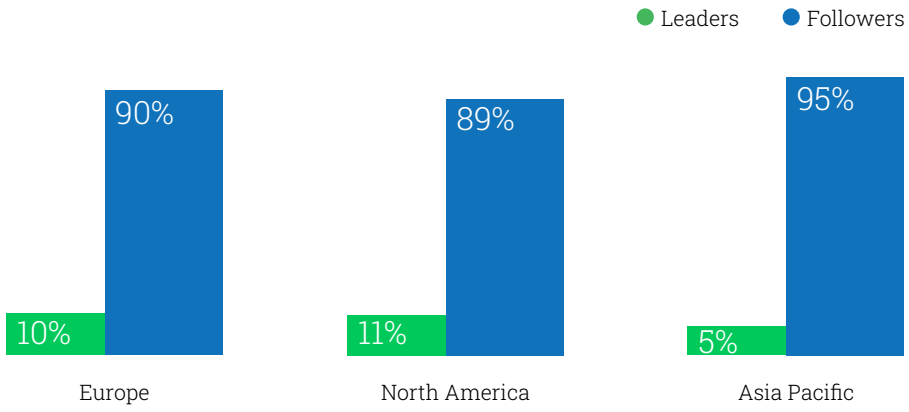
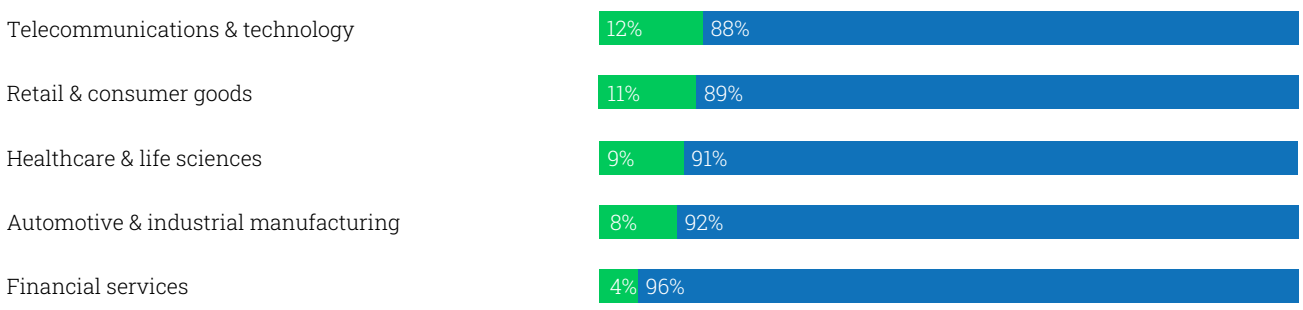


Figure 10

Net-zero maturity by industry



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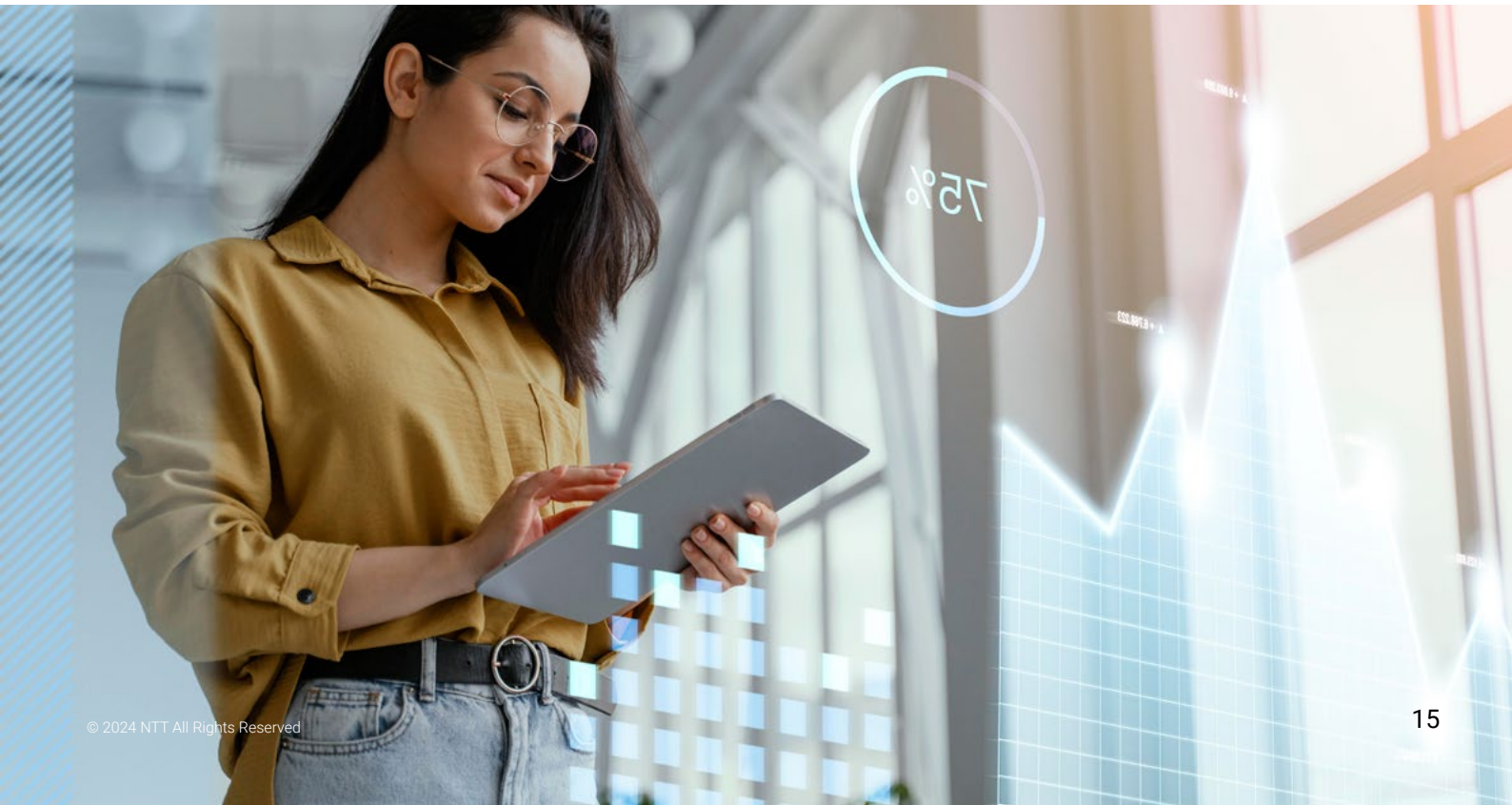
Leaders use AI and achieve mastery in gathering, analyzing, and de-risking data.

Leaders are well ahead of others in **harnessing data** in the battle to reduce carbon emissions—where data can be both a help and a hindrance. On the positive side, gathering, analyzing, and **making optimal use of emissions data is essential** if companies are to reach their net-zero goals. On the negative side, harnessing large volumes of data requires companies to **maintain data centers** that use tremendous amounts of electricity and require heating and cooling. Leaders do better than followers at drawing more on data while minimizing its carbon impact.

One way that leaders **extract greater value** from emissions data is through AI. This technology can take a variety of forms, from **robotic process automation, machine learning,** and **computer vision** to natural language processing, and more recently, **generative AI.** Leaders are well ahead of others in the use of AI for decision support and planning—helping them analyze huge sets of emissions data, predict emission outcomes under different scenarios, and recommend the most effective course of climate action. Leaders also use AI more than other firms to **optimize energy consumption,** drawing on AI's power to analyze data, predict energy demand, and detect inefficiencies in energy systems.



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39 percent of leaders use AI for net-zero decision support and planning, versus 28 percent of other firms

23 percent of leaders use AI for energy optimization, versus 14 percent of other firms

AI allows firms to **gain deeper insights** from emissions data. It helps firms identify patterns, trends, and anomalies in huge sets of emissions data—in real time. Companies also use AI to **integrate their internal emissions data** with other relevant data, such as **weather and environmental trends.** AI's predictive ability enables firms to forecast future emissions levels, critical for decision-making and planning.

Despite the benefits of AI, 48 percent of companies in our survey do not use it to achieve their net-zero goals. This leaves much **upside potential** for companies to draw on AI either alone or in combination with other **powerful digital solutions,** such as digital twins, photonics, and Internet of Things (IoT).

The rise of generative AI will help companies extract even greater value from their emissions data. It will enable companies to track, report, forecast, and visualize carbon emissions data across their enterprises faster and more effectively. It will be particularly valuable in **providing executives with instantaneous answers** to questions around carbon use, such as, "Show me all buildings in my enterprise with air conditioning temperature set below 70°F/21°C" or "Tell me about the most efficient routes for delivering products in my cities of operation."

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Reducing emissions through AI and data

"Using advanced methodologies like AI and advanced data analytics has reduced our paper trail and emission percentage several-fold."

Chief Strategy Officer, Japanese financial services firm

"By using artificial intelligence, we are able to optimize energy usage, improve operational efficiency, and enable data-driven decision-making to reduce waste and emissions."

Chief Risk Officer, Australian healthcare/life sciences firm

"Usage of AI and analytics tech is helping us forecast the future emissions and steps that need to be taken to reduce the same."

Chief Sustainability Officer, French manufacturer

"Computing data with photonics technology and using artificial intelligence can help us reduce wastage, resulting in increased efficiency and lower emissions."

Chief Executive Officer, Mexican manufacturer

"To achieve the most effective decarbonization goals, artificial intelligence simulations help our organization identify and prioritize emission reduction opportunities, optimize energy use, and track progress towards goals."

Chief Operating Officer, Canadian financial services firm

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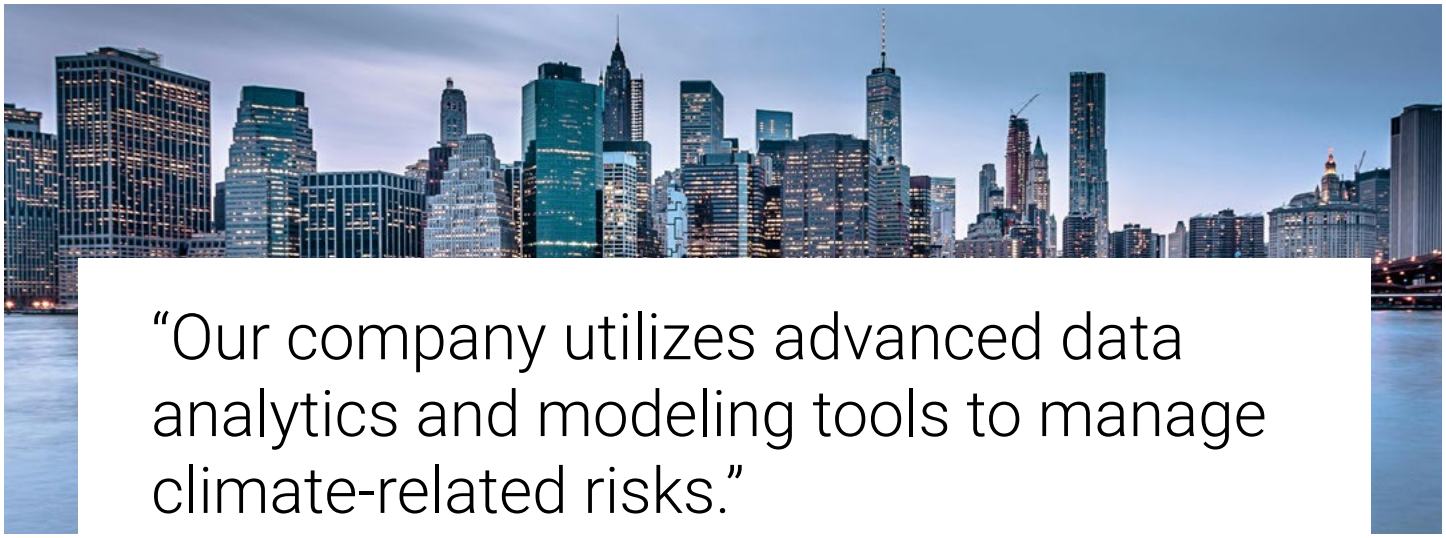
According to our analysis, **leaders do a better job in using emissions data to revamp business processes, particularly data on supply-chain emissions** that other firms fail to capture. They also excel at using emissions data for forecasting trends around energy consumption, waste generation, and carbon emissions, and running scenarios to assess how different strategies and external shocks would impact their achievement of net-zero goals.



"Our company utilizes advanced data analytics and modeling tools to manage climate-related risks."

Chief Operating Officer, U.S. financial services firm

Table B

Uses of data to reduce emissions (% in mid-implementation or advanced stages)

Q20. What progress has your firm made in the following uses of technology and data to achieve its decarbonization goals?

	LEADERS	FOLLOWERS	DIFFERENCE
Use emissions data to drive improvements in business processes	59%	47%	+12ppt
Capture and analyze data on supply-chain emissions	59%	37%	+22ppt
Use emissions data for forecasting and scenario analysis	52%	29%	+23ppt
Speed up collection and analysis of emissions data	50%	41%	+9ppt
Develop an effective data strategy and system for decarbonization	36%	24%	+12ppt

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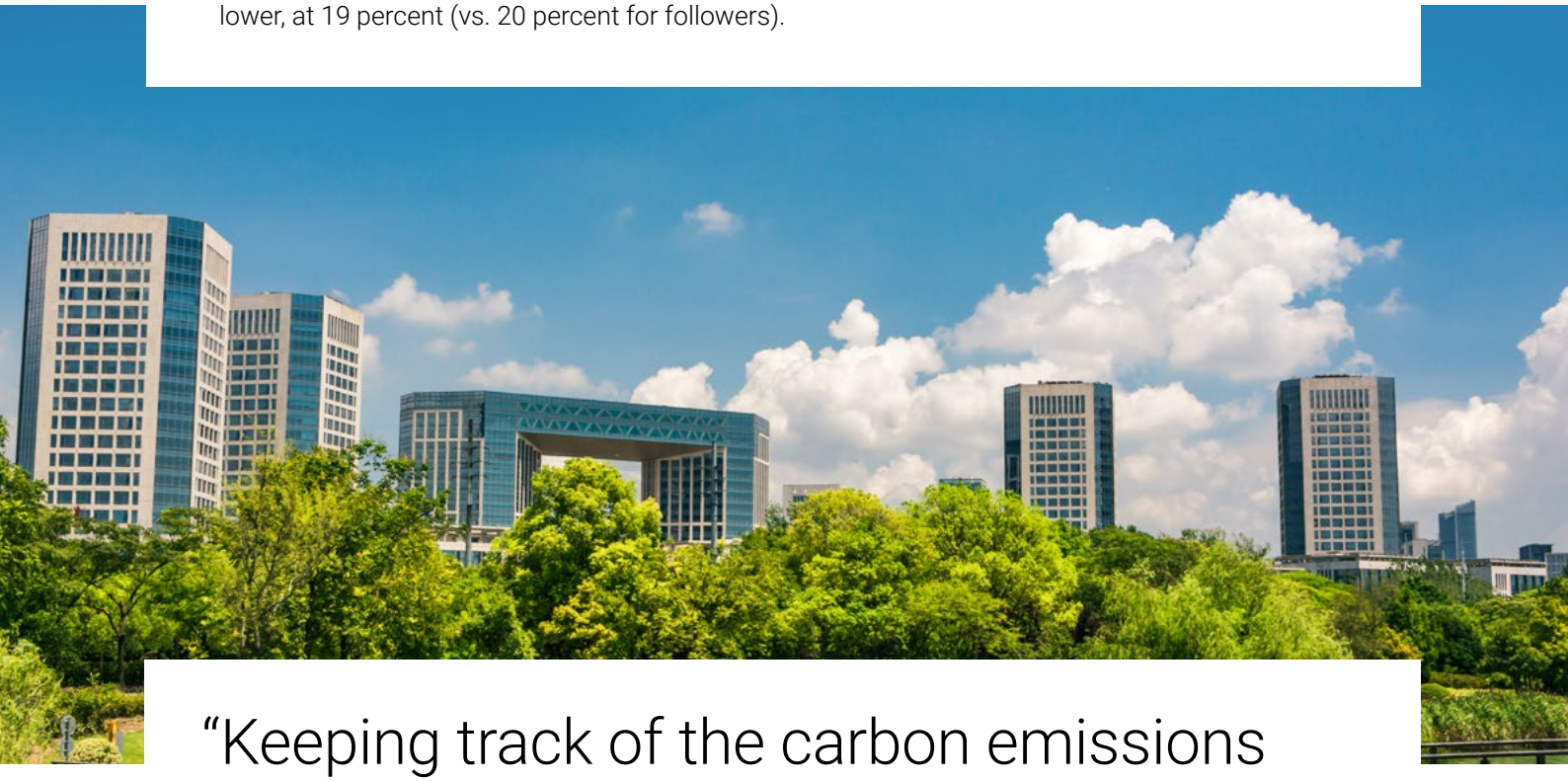
Making data centers more sustainable

In addition to optimizing data, leaders are better at reducing data's carbon footprint, which is increasingly urgent as the rapid expansion of AI users and data centers worldwide **overtaxes national energy grids.** A recent article in *The New York Times* suggests that the rise of AI is likely to accelerate this trend: electricity demand from U.S. data centers could triple by 2030.[7]

More than half of leaders (52 percent) now set **reducing carbon emissions from data centers** as a high priority, compared with 41 percent of followers. Despite their **escalating use of data and AI,** leaders have reduced their data center emissions over the past two years by about one percent, whereas followers have seen their **emissions increase** by more than two percent over that period. As a result, the proportion of leaders' total **emissions coming from their data centers** is slightly lower, at 19 percent (vs. 20 percent for followers).



"Keeping track of the carbon emissions from our processes has been greatly helpful in achieving our firm's goal of carbon reduction. It has helped in maintaining the emission limits of our data centers."

Chief Information Officer, U.S. telecom/technology firm

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Leaders are **achieving these results** by taking a variety of steps to **minimize the carbon footprint** of their data centers. These can include optimizing algorithms to reduce computational requirements; using **energy-efficient equipment** and technologies; ensuring **optimal cooling systems** and air flow; turning to renewable energy sources to power data centers; and working with partners and suppliers with **environmentally sustainable data center expertise.**

Leaders have also kept their number of data centers down to an average of only 2.9 data centers vs. 3.5 for followers. And, to leave a smaller carbon footprint, **leaders use on-premises data centers less** (20 percent vs. 31 percent of others) and **co-located managed services more** (50 percent vs. 42 percent).

> "Since we are prioritizing using managed services, there has been an effective result like reduction in Scope 1 emissions that helps us head towards our decarbonization target."
>
> Chief Financial Officer, Canadian financial services firm

At the same time, leaders are aware that **shifting their data centers to the public cloud** is not necessarily the answer. While it will reduce their Scope 2 emissions, they will still be accountable for the indirect impact through their Scope 3 reporting.

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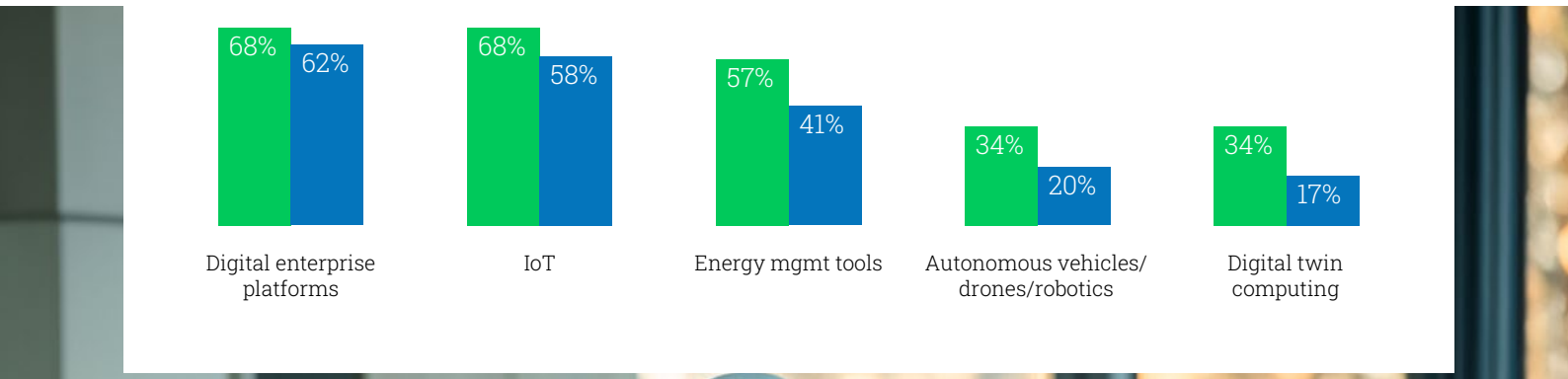
Leaders leverage advanced technologies to reduce emissions

Leaders understand the **vital role that technology plays** in achieving their net-zero goals. They make use of technology to **drive energy efficiency, reduce emissions, monitor energy consumption;** and **scale decarbonization solutions.** To do this, leaders use advanced technologies at a greater rate than followers. One technology they use more often is a **digital enterprise platform.** These platforms integrate digital solutions, processes and data, enabling leaders to streamline operations and make data-driven decisions.

Figure 11

Technologies used to achieve goals

Q21. Which of the following technologies is your firm using to achieve its net-zero goals?



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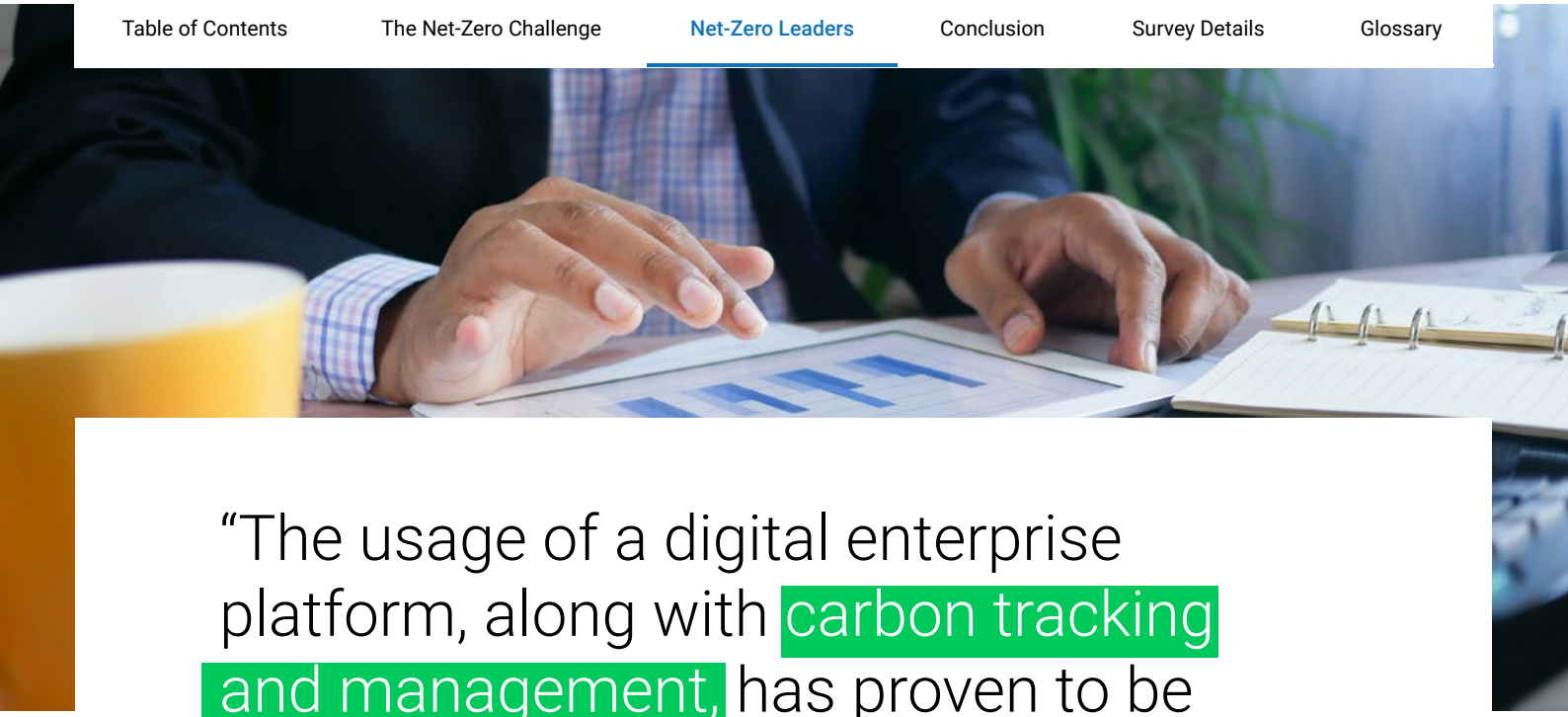

"The usage of a digital enterprise platform, along with carbon tracking and management, has proven to be very effective. It allows us to track and monitor our performance and alter our strategies accordingly."

Chief Operating Officer, large U.S. manufacturer

Another common technology is Internet of Things (IoT). Leaders harness IoT to **monitor emissions, conserve water and energy, and create smarter buildings.** For example, one U.S. technology company in our study reduces its carbon footprint by using **self-sufficient electric sensors** for monitoring normal day-to-day electrical appliances across its enterprise.

Twice as many leaders as followers **use digital twins** to facilitate sustainability planning and analysis. These **virtual models** of physical assets provide **real-time insights and simulations** that can help leaders optimize energy usage, reduce waste, and finetune their net-zero strategies. Twice as many leaders also employ **autonomous vehicles, drones, and robots** to improve emission monitoring, enhance waste management practices, and enable more sustainable transportation methods.

57 percent of leaders say that technology is key to achieving decarbonization goals, versus 38 percent of others.

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Leaders not only use advanced technologies more than others, but they also use these technologies more effectively. They particularly stand out in their use of **energy management tools, advanced data management and analytics, robotic process automation, quantum computing, and emissions data visualization.**

"Investing in effective technologies like advanced data analytics and robotic process automation has been really helpful for tracking emissions and sharing data with the customers."

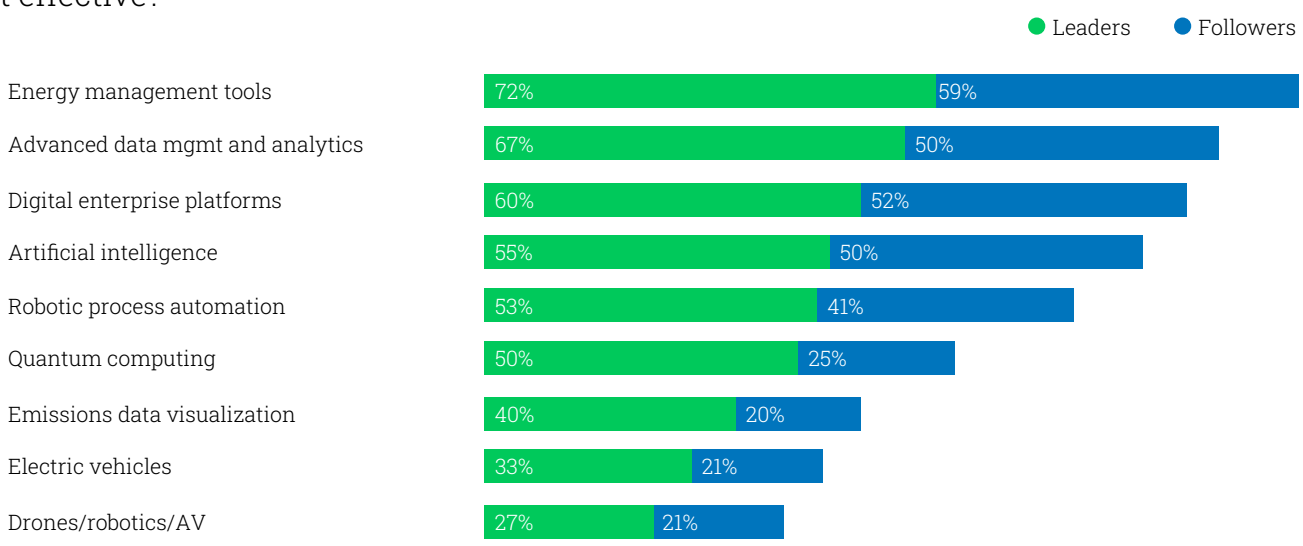
Chief Risk Officer, German manufacturer

While **technology is essential** for achieving net-zero goals, it can **generate greater carbon emissions** if not managed carefully. When deploying new digital technologies, companies need to be aware that they are likely to leave a carbon footprint. Leaders understand this, which is why 48 percent **gauge the carbon impact** of a technology before using it, and 50 percent take steps to mitigate it. To do this, over half of sustainability teams at leader organizations **collaborate closely with the IT teams** when developing plans to use technology for decarbonization.

Figure 12

Technologies used most effectively

Of those technologies used to achieve your net-zero goals, which have been the most effective?



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One emergent technology that net-zero leaders embrace more often than others is **photonic networks.** Leaders are **more than twice as likely** as followers to use photonic networks for meeting their net-zero goals—and nearly twice as many find them effective. Instead of **traditional electrical signals,** these communication networks use **light photons** to transmit data quickly, efficiently, and more sustainably over long distances. Given the **energy efficiency of light-enabled networks** over electronic ones, these photonic solutions could provide a step-change in emission reductions, helping to fill the net-zero gap.

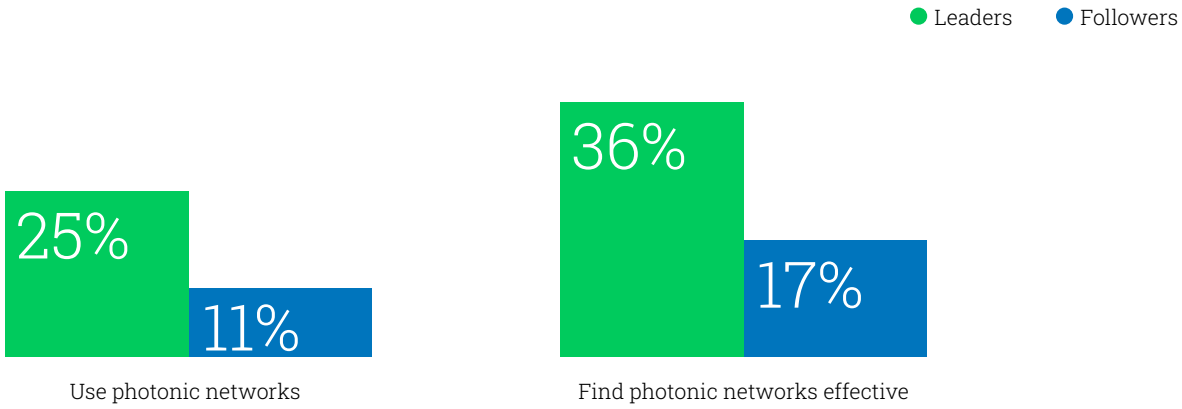
52 percent of leaders believe that photonics-based infrastructure would be moderately to very valuable for reaching their net-zero goals.

Our research uncovered multiple examples of how **firms are now using photonic networks,** or planning to use them, to **reduce emissions.** These include using photonic networks to **increase bandwidth capacity,** drive **faster and more energy efficient data transmission,** and **create more energy efficient data networks,** lighting, sensors, lasers, and components. Survey respondents also cited efficiencies in **inventory and supply-chain management, engine design, power generation and transmission,** and **manufacturing.** Indeed, the Chief Executive Officer of a Japanese manufacturer who participated in our study reports that using photonics resulted in **energy savings of as much as 30 percent.**

Figure 13

Use of photonics to achieve goals

Q21. Which of the following technologies is your firm using to achieve its net-zero goals?



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How companies can use photonics to achieve their net-zero goals

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"The use of photonics-based technology has resulted in energy savings of around 30%. After contributing more to photonics, we are achieving our net-zero goals successfully."

Chief Executive Officer, Japanese manufacturer

"By leveraging photonics technology, we can enhance energy efficiency, reduce carbon emissions, and optimize the overall sustainability of vehicles."

Chief Compliance Officer, Canadian automaker

"The light-based transmission of information provides unique security features to photonic frameworks, potentially minimizing vulnerability to cyberattacks."

Direct report to Chief Sustainability Officer, Australian/New Zealand financial services firm

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"Photonics-based infrastructure is quite useful in quick data transmissions while providing substantial energy savings."

Direct report to Chief Sustainability Officer, U.K. healthcare/life sciences firm

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"Our photonic-based 3D printers have helped us to increase product quality as well as reduce our energy usage."

Direct report to Chief Compliance Officer, German manufacturer

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"Photonics-based sensors that can be implemented in our stores may help us to achieve our net-zero goals as they consume less power and are more sustainable."

General Counsel, French consumer markets firm

Leaders build the management structure, skills, and processes to drive decarbonization

Developing and implementing an **effective plan for reaching net zero** is complex. It requires companies to **rethink the fundamentals** of their business through a **sustainability lens** and build the management commitment, governance, budget, and skills needed to deliver results. For example, the Chief Executive Officer of a large U.S. financial firm says that his company now "includes integrating **environmental, social and governance factors,** such as carbon emissions, into investment decisions."

Building a **sustainable business** culture is critical for success, according to companies participating in our study. The Chief Strategy Officer of a healthcare provider in Australia/New Zealand states that, **"Educating staff** on sustainable practices, promoting **environmentally aware behaviors** in the workplace, and encouraging **employee engagement in environmental initiatives** can foster a culture of sustainability within healthcare institutions."

However, achieving net zero can be **expensive.** Our survey of companies found that the average budget for achieving net zero in 2023 was **$62.4 million,** with some industries at the lower end of the spectrum, such as automotive and manufacturing at $42.7 million, and others at the higher end, such as telecoms and technology at $100 million. In 2023, **leaders set larger net-zero budgets, at $81.4 million on average.**

On average, leaders spent $81.4 million in 2023 to achieve their net-zero goals, compared to $60.7 million for followers.

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Fortunately, for most leaders (52 percent) these **costs are offset** by the benefits of emission reduction programs. The Chief Compliance Officer of a Polish financial institution says investing in renewable energy throughout its premises "has given back by **saving huge sums** on the budget." Most leaders start their net-zero journeys by building **in-depth business plans** and clear policies to enforce them, under a mandate of the board of directors. But they **don't stop there.** They develop the skills and capabilities needed to **drive decarbonization** and appoint an **executive with a dedicated team** to make it happen. To ensure their plans are working, they conduct regular **independent emissions audits.**

Table C

Decarbonization budgets by industry for last fiscal year

Q27. What do you estimate was the total budget for decarbonization across your enterprise (both held centrally at headquarters and distributed across business units) in the past financial year?

	AVERAGE SPENDING ($M)	AVERAGE SPENDING AS % OF REVENUE
Automotive & industrial manufact.	$42.7	0.097%
Financial services	$58.3	0.132%
Healthcare & life sciences	$58.4	0.137%
Retail & consumer goods	$53.4	0.113%
Telecoms & technology	$100.0	0.154%
All	$62.4	0.126%

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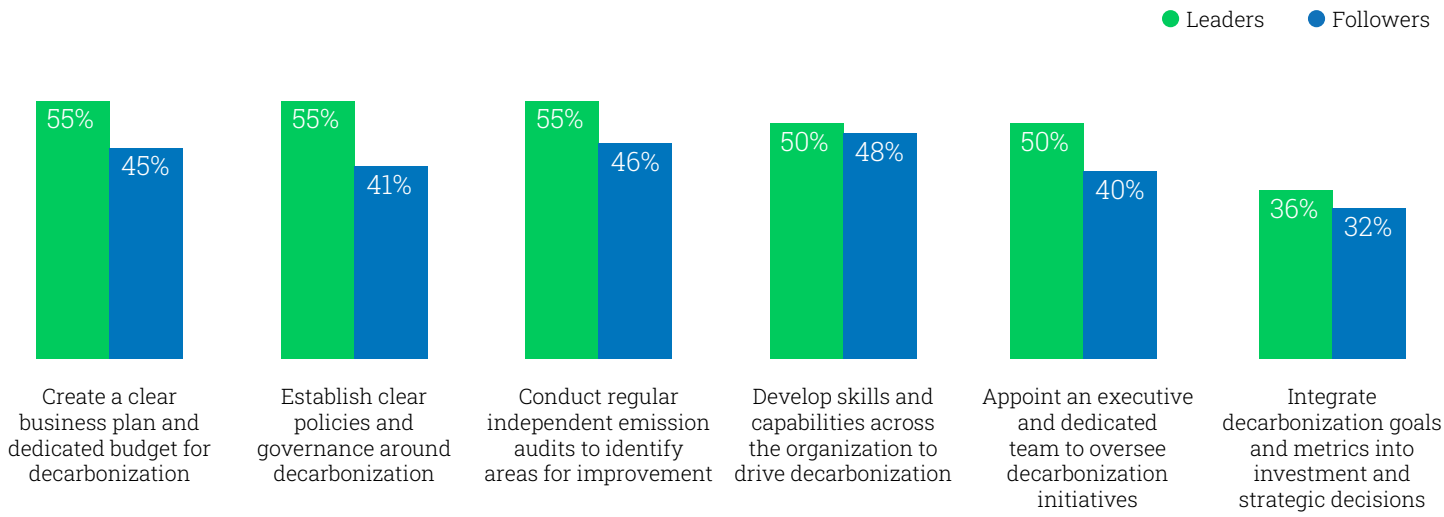
Figure 14

Organizational and management initiatives to achieve goals

(% in mid-implementation or advanced stages)

Q24. What progress has your firm made on the following organizational and management initiatives to achieve its decarbonization goals?



Rethinking process

Without process optimization and innovation, companies will be **unable to meet their net-zero goals.** Given its enormous impact on greenhouse gas emissions, transportation is a priority for most leaders. They take a variety of steps to reduce transportation **emissions,** from the use of electric vehicles in **logistics** to efficient **route planning** and the use of **public transportation.** They also have gone further with the use of remote working to reduce the need for commuting.

Leaders are also further ahead in **waste reduction and recycling.** The study uncovered many examples: a U.K. retailer using **circular economy** principles to minimize waste and maximize resource efficiency; a Canadian manufacturer optimizing its **material usage process** to cut emissions and related costs; and a French healthcare provider that has reduced its use of plastic waste to reduce carbon emissions.

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“We have modernized our energy consumption, transportation, production processes, and waste generation towards more sustainable platforms in order to reduce emissions.”

Chief Executive Officer of a Polish telecoms/technology firm

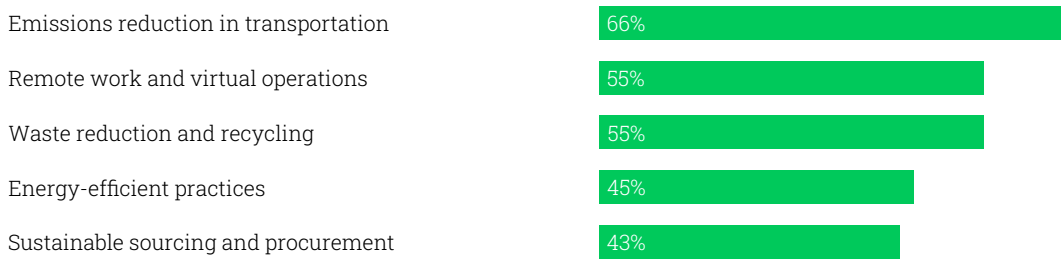
Leaders have progressed in other **vital areas of process innovation.** Just under half have implemented **energy-efficient practices** that decrease energy consumption and associated carbon emissions. Others are including sustainability considerations in their **sourcing and procurement practices** and are moving to sustainable manufacturing practices to produce goods.

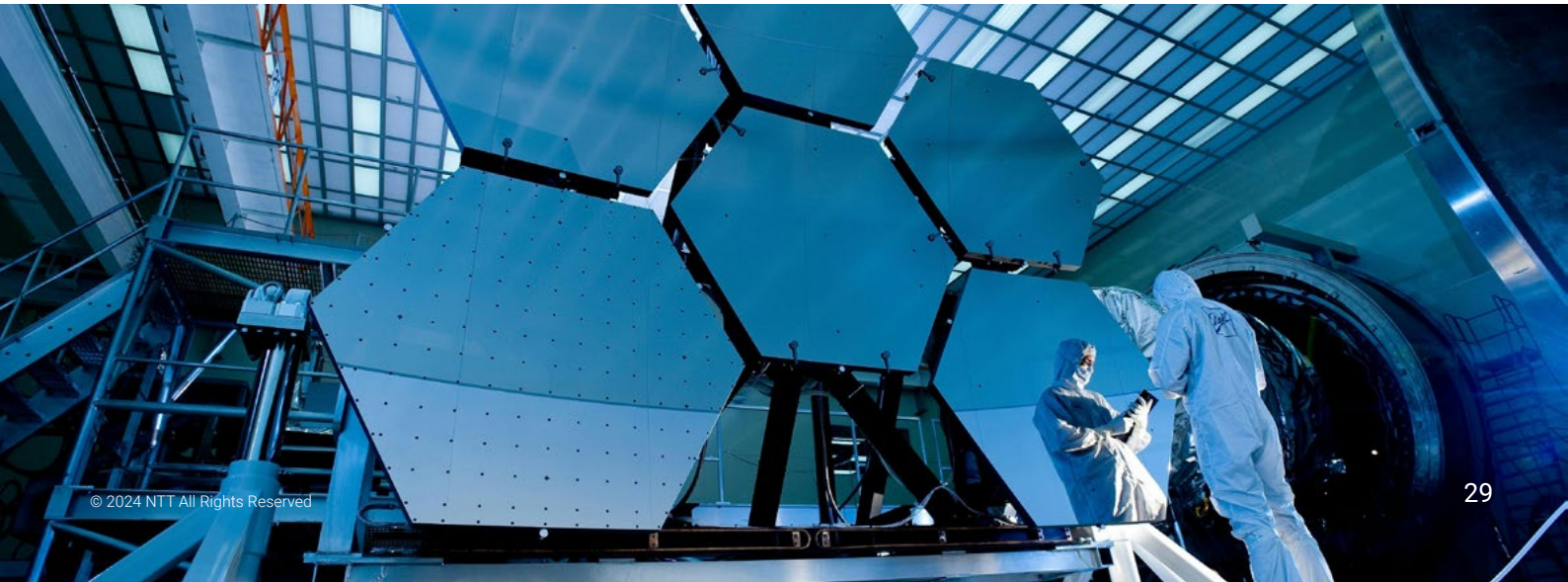
Figure 15

Top areas of process innovation progress, among leaders

(% in mid-implementation and advanced stages)

Q25. What progress has your firm made in the following areas of process innovation to achieve its decarbonization goals?





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How firms are changing their processes to achieve net-zero goals

"Enhancing the energy efficiency of processes and products like heating systems helps to reduce emissions and operating costs."

Direct report to Chief ESG Officer, Japanese manufacturer

"Emissions reduction in transportation helps us to achieve our goals in decarbonization. Without tackling transportation emissions, achieving net-zero goals becomes significantly more challenging."

Chief Operating Officer, German financial services provider

"Utilization of recycled goods and bio-based materials has been an effective measure to deliver on our decarbonization goals. It has helped us in the reduction of emissions within our operations."

Chief Sustainability Officer, U.K. consumer markets firm

"We are working to change traditional travel habits to sustainable travel models so as to decrease emissions."

Chief Compliance Officer, U.K. financial services provider

"Reducing waste and using more renewable resources has been helpful in improving costs, as we have cut down our procurement needs."

Chief Strategy Officer, U.S. telecoms/technology firm

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Building sustainable supply chains

With their sharper focus on Scope 3 outcomes, it is not surprising that 86 percent of leaders have implemented **processes to ensure sustainable sourcing and procurement,** such as identifying and working with suppliers that prioritize sustainability, reducing packaging waste, and providing more sustainable materials.

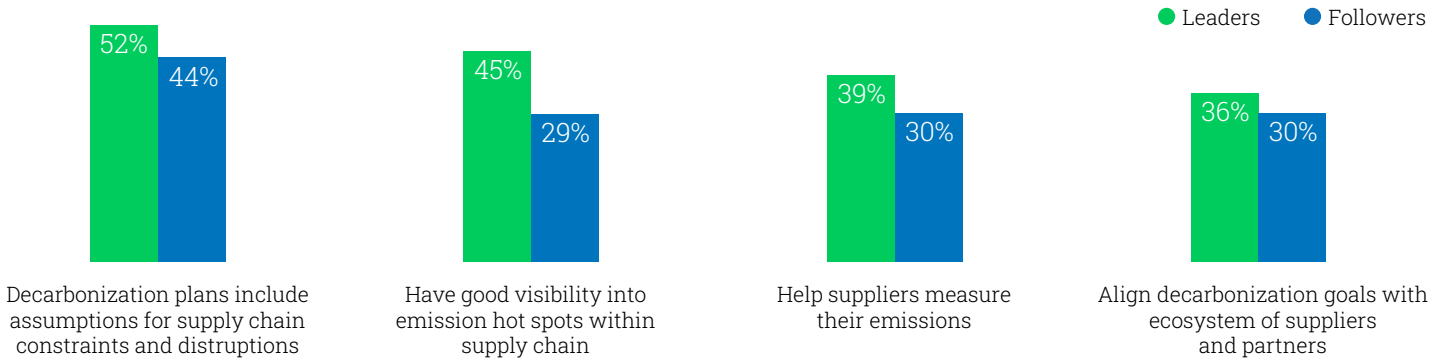
Leaders are more advanced than others in many sustainable supply-chain practices, which gives them a leg up in reducing their overall emissions. One critical step, highlighted by the pandemic, is building resilience into sourcing plans. Most leaders include assumptions for **supply-chain constraints** and disruptions in their net-zero plans. These disruptions not only undermine Scope 3 emission plans, but also Scope 1 and 2 plans that may require, for instance, delivery of key components or materials for direct decarbonization initiatives.

Leaders also ensure that their decarbonization goals are aligned with those of their supply chains. Often this involves running **net-zero awareness campaigns** that encourage suppliers and partners to adopt more sustainable business practices. **"Collaboration with suppliers** across various stages of development to expedite our progress toward sustainability has helped to achieve decarbonization goals," says a senior strategy executive at an Australian healthcare/life sciences firm.

Leaders also are more apt to have **visibility into their supply chains** and take steps to help their suppliers measure emissions. Leaders can employ a variety of methods, from emissions reporting requirements and **third-party verification** to specialized digital solutions, such as **supply-chain mapping software, carbon footprint assessment tools,** and **emission tracking programs.** "We have made commitments with our suppliers for sustainable procurement, which combined with our efforts has decreased supply-chain emissions," says the Chief Risk Officer of a German auto/industrial manufacturer.

Figure 16

Sustainability in supply-chain practices - leaders vs followers analysis



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How net-zero leadership drives business performance

Reducing emissions is not just about compliance. Companies can see a range of **strategic, financial, and operational benefits** from their net-zero initiatives. Better **ESG** ratings, stronger r**eputations** and regulatory **compliance are common benefits.** And reducing emissions yields many other business dividends. It enables firms to **optimize their investments and assets,** bolster revenue growth, cut costs, and even **improve shareholder value.**

Calculating cost-benefits is a hallmark of net-zero leadership. **More than two-thirds of leaders**—but less than half of followers—**calculate not only the cost-benefits** of their investments in emissions reduction but also the cost of inaction. Crucially, leaders see almost **twice the level of return on investment** than followers do from their decarbonization efforts: 3.1 percent on average vs.versus 1.7 percent for others. **Five percent of leaders achieve even greater returns of seven percent or more.**

Table D

Leaders see many business benefits

Q31. Which business benefits is your firm now seeing from its decarbonization initiatives?

Better environmental, social, governance ratings	86%
Investment and asset optimization	57%
Increased revenue growth	55%
Better product and service quality	55%
Increased customer satisfaction and retention	55%
Decreased costs	52%
Greater innovation and resilience	52%
Greater shareholder value/attracting investors	50%
Improved profitability	48%
Stronger reputation/enhanced brand image	45%

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Leaders take concrete steps to deliver cost-benefits

68 percent typically estimate cost-benefits before making decarbonization investment decisions.

66 percent set up internal carbon pricing systems to enable business teams to evaluate the carbon costs of their decisions.

66 percent calculate the cost of inaction when making decarbonization investment decisions.

59 percent tend to start with a pilot or small-scale initiative to demonstrate potential benefits.

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How doing good helps firms do well

"Using advanced tech to improve operational efficiency is beneficial in reducing emissions. This impacts our business model, thereby enhancing profits."

Chief Risk Officer, U.S. consumer markets firm

"Implementing carbon capturing mechanisms and participating in emissions trading schemes created new revenue streams for us."

Direct report to Chief Information Officer, U.K. financial services firm

"Implementing a price on carbon internally encourages employees to make more sustainable choices while also generating revenue that can fund further decarbonization efforts."

Direct report to Chief Sustainability Officer, Australian/New Zealand consumer goods firm

"We are optimizing our material usage process to lower carbon footprint and save costs, thereby having better profits at our end."

Direct report to Chief Financial Officer, Canadian manufacturer

"Developing and implementing low-carbon products contributes to meeting decarbonization goals and potentially attracting eco-conscious customers."

Direct report to Chief ESG Officer, Polish healthcare and life sciences firm

"Our company has taken several steps to reduce carbon emissions, resulting in cost savings. For instance, energy conservation not only reduces the carbon footprint but also lowers utility bills."

Chief Sustainability Officer, Canadian financial services firm

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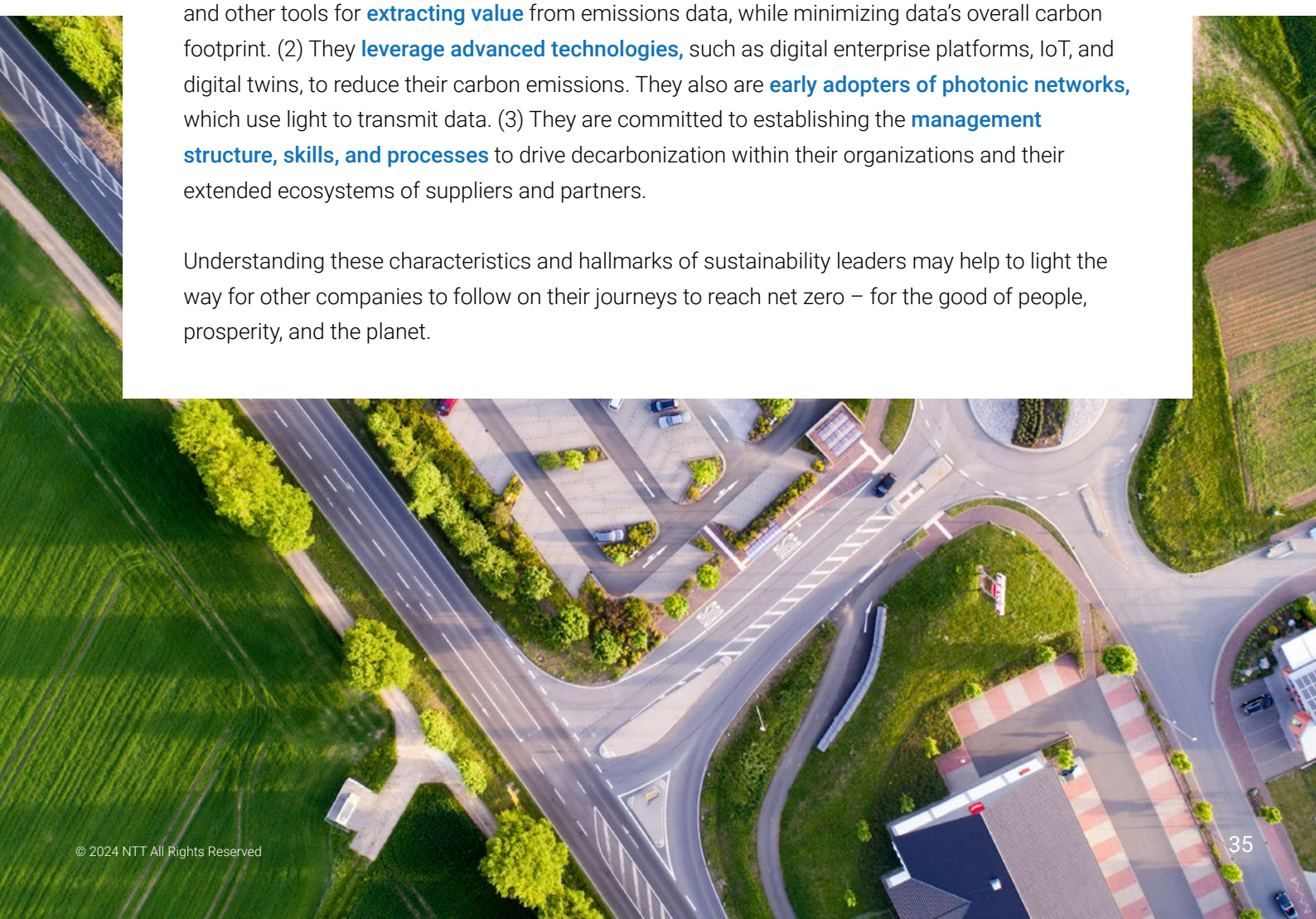
Conclusion

In the face of the ever-increasing threat of climate change, companies around the world have committed to **reducing their carbon emissions to net zero by 2050.** Yet only a few years into their net-zero programs, 68 percent of those in our study self-reported **already** having **fallen behind** their targets. A deeper analysis suggests the actual figure to be closer to 95 percent. And that **gap is likely to continue worsening,** as future targets become more challenging in an era of AI data growth and environmental disruption.

However, a small group of companies is defying **this worrying trend**—achieving or exceeding their net-zero goals. And, crucially, these leaders show that decreasing emissions is much more than a compliance issue. They report a wide range of benefits, from better environmental ratings and stronger reputations to greater growth, profits, and shareholder value. For net-zero leaders, the business outcomes from emissions-cutting initiatives more than offset their costs.

This study reveals three areas that set these net-zero leaders apart: (1) They are skilled at using AI and other tools for **extracting value** from emissions data, while minimizing data's overall carbon footprint. (2) They **leverage advanced technologies,** such as digital enterprise platforms, IoT, and digital twins, to reduce their carbon emissions. They also are **early adopters of photonic networks,** which use light to transmit data. (3) They are committed to establishing the **management structure, skills, and processes** to drive decarbonization within their organizations and their extended ecosystems of suppliers and partners.

Understanding these characteristics and hallmarks of sustainability leaders may help to light the way for other companies to follow on their journeys to reach net zero – for the good of people, prosperity, and the planet.



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Survey details

Table E

Research methodology and sample breakdown

Survey of 500 executives, C-level and direct reports, across different revenue sizes, industries, and regions in Q1 2024. Respondents were screened to ensure they had knowledge of and responsibility for their company's net-zero plans. The sample breakdown was as follows.

By Revenue

REVENUE SIZE	% OF RESPONDENTS
Less than $5 billion	29%
$5 billion to $9.9 billion	16%
$10 billion to $49.9 billion	32%
Over $50 billion	23%

By Industry

INDUSTRY	% OF RESPONDENTS
Automotive & industrial manufacturing	20%
Financial services	20%
Healthcare & life sciences	20%
Retail & consumer goods	20%
Telecommunications & technology	20%

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By Region

ASIA PACIFIC - 150	% OF RESPONDENTS
Australia/New Zealand	10%
Japan	10%
Singapore	10%

EUROPE - 175	% OF RESPONDENTS
France	10%
Germany	10%
Poland	5%
UK	10%

NORTH AMERICA - 175	% OF RESPONDENTS
Canada	10%
Mexico	5%
US	20%

Figure 17

Self reported progress on net-zero plans by size

Q13. How on track is your firm in meeting its net-zero plans?

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Table F

Use of technology and data to achieve goals

(% in mid-implementation or advanced stages)

Q20. What progress has your firm made in the following uses of technology and data to achieve its decarbonization goals?

	Automotive & industrial	Financial services	Healthcare & life sciences	Retail & consumer goods	Telecoms & technology	All
Use emissions data to drive improvements in business processes	46%	56%	46%	41%	50%	48%
Monitor energy consumption	39%	56%	46%	36%	48%	45%
Gather the full set of emissions data needed to monitor and measure performance	37%	47%	40%	43%	54%	44%
Speed up collection and analysis of emissions data	37%	50%	41%	39%	44%	42%
Use the latest digital technologies and tools to drive efficiency and reduce emissions	36%	42%	41%	39%	49%	41%
Automate collection and analysis of emissions data	33%	45%	39%	36%	42%	39%
Capture and analyze data on supply-chain emissions	26%	41%	41%	37%	49%	39%
Develop decarbonization solutions at scale	32%	48%	40%	35%	37%	38%
Use emissions data for forecasting and scenario analysis	32%	29%	25%	31%	37%	31%
Develop an effective data strategy and system for decarbonization	26%	28%	24%	24%	25%	25%

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Table G

Use of AI to achieve goals

(% in mid-implementation of advanced stages)

Q22. What progress has your firm made in using AI in the following areas to achieve your decarbonization goals?

	Automotive & industrial	Financial services	Healthcare & life sciences	Retail & consumer goods	Telecoms & technology	All
Building energy management	33%	36%	37%	25%	40%	34%
Climate modeling and prediction	34%	35%	32%	15%	38%	31%
Transportation optimization	31%	34%	27%	25%	32%	30%
Decision support and strategic planning	33%	26%	35%	23%	29%	29%
Predictive maintenance	30%	22%	27%	19%	28%	25%
Supply-chain management	26%	25%	21%	18%	26%	23%
Smart grid management	12%	21%	22%	10%	22%	17%
Energy optimization	17%	12%	20%	8%	16%	15%

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Table H

Organizational and management initiatives to achieve goals

(% in mid-implementation or advanced stages)

Q24. What progress has your firm made on the following organizational and management initiatives to achieve its decarbonization goals?

	Automotive & industrial	Financial services	Healthcare & life sciences	Retail & consumer goods	Telecoms & technology	All
Ensure accountability for decarbonization across the organization	49%	53%	57%	40%	59%	52%
Develop skills and capabilities across the organization to drive decarbonization	44%	45%	49%	47%	54%	48%
Set, track, and report metrics for decarbonization performance	47%	53%	39%	49%	51%	48%
Conduct regular independent emission audits to identify areas for improvement	44%	50%	51%	41%	49%	47%
Create a clear business plan and dedicated budget for decarbonization	42%	55%	39%	46%	49%	46%
Establish clear policies and governance around decarbonization	42%	55%	39%	32%	41%	42%
Appoint an executive, dedicated team to oversee decarbonization initiatives	29%	48%	43%	38%	48%	41%
Integrate decarbonization goals and metrics into investment and strategic decisions	31%	40%	32%	29%	28%	32%
Align decarbonization goals with those of our ecosystem of suppliers and partners	24%	44%	28%	24%	34%	31%

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Table I

Process innovation to achieve goals

(% in mid-implementation of advanced stages)

Q25. What progress has your firm made in the following areas of process innovation to achieve its decarbonization goals?

	Automotive & industrial	Financial services	Healthcare & life sciences	Retail & consumer goods	Telecoms & technology	All
Carbon offset initiatives	45%	58%	40%	42%	60%	49%
Remote work and virtual operations	42%	56%	35%	42%	56%	46%
Waste reduction and recycling	39%	53%	41%	41%	48%	44%
Energy-efficient practices	39%	52%	46%	37%	46%	44%
Emissions reduction in transportation	42%	44%	35%	40%	57%	44%
Sustainable sourcing and procurement	32%	47%	44%	45%	50%	44%

Table J

Average AI budget change

Q28. How has your firm's budget for AI changed over the last year, and how do you estimate it will change next year?

	Auto & industrial mfg.	Financial services	Healthcare & life sciences	Retail & consumer goods	Telecoms & technology	All	Leaders	Followers
Last Year	1.50%	1.30%	1.30%	1.70%	0.60%	1.30%	1.70%	1.20%
Next year	3.80%	5.00%	4.00%	3.70%	5.30%	4.40%	4.30%	4.40%

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Glossary of terms

Carbon offsets

Investments by business in project that counterbalance their own carbon emissions by supporting third-party initiatives that remove or prevent an equivalent amount of carbon dioxide from entering the atmosphere.

Compound average growth rate (CAGR)

The rate at which a firm needs to reduce its emissions each year in order to achieve its target. We calculated each firm's actual CAGR using total greenhouse gas emissions data at the time the firm set its target compared with its current emissions.

Emissions reductions

The minimization of the greenhouse gas (GHG) emissions generated by a company, such as by changing to renewable energy or by creating more energy-efficent process.

Emissions removals

The removal of CO2 from the atmosphere and durably storing it in geological, terrestrial or ocean reservoirs, or in product.

Greenhouse gas (GHG) emissions

Gases in the Earth's atmosphere that trap heat. The most common greenhouse gases include carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O).

Net zero

The reduction of GHG emissions to as close to zero as possible, and removing or absorbing any remaining emissions from the atmosphere, to achieve a balance between emissions and absorption.

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Scope 1

Emissions from sources that an organization owns or controls directly, such as from the burning of fuel in the company's fleet of vehicles.

Scope 2

Indirect emissions associated with the generation of electricity, heating / cooling, or steam purchased for the company's own consumption.

Scope 3

All emissions not covered in scopes 1 or 2, created by a company's value chain, such as when a company buys, uses, and disposes of products from suppliers.

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