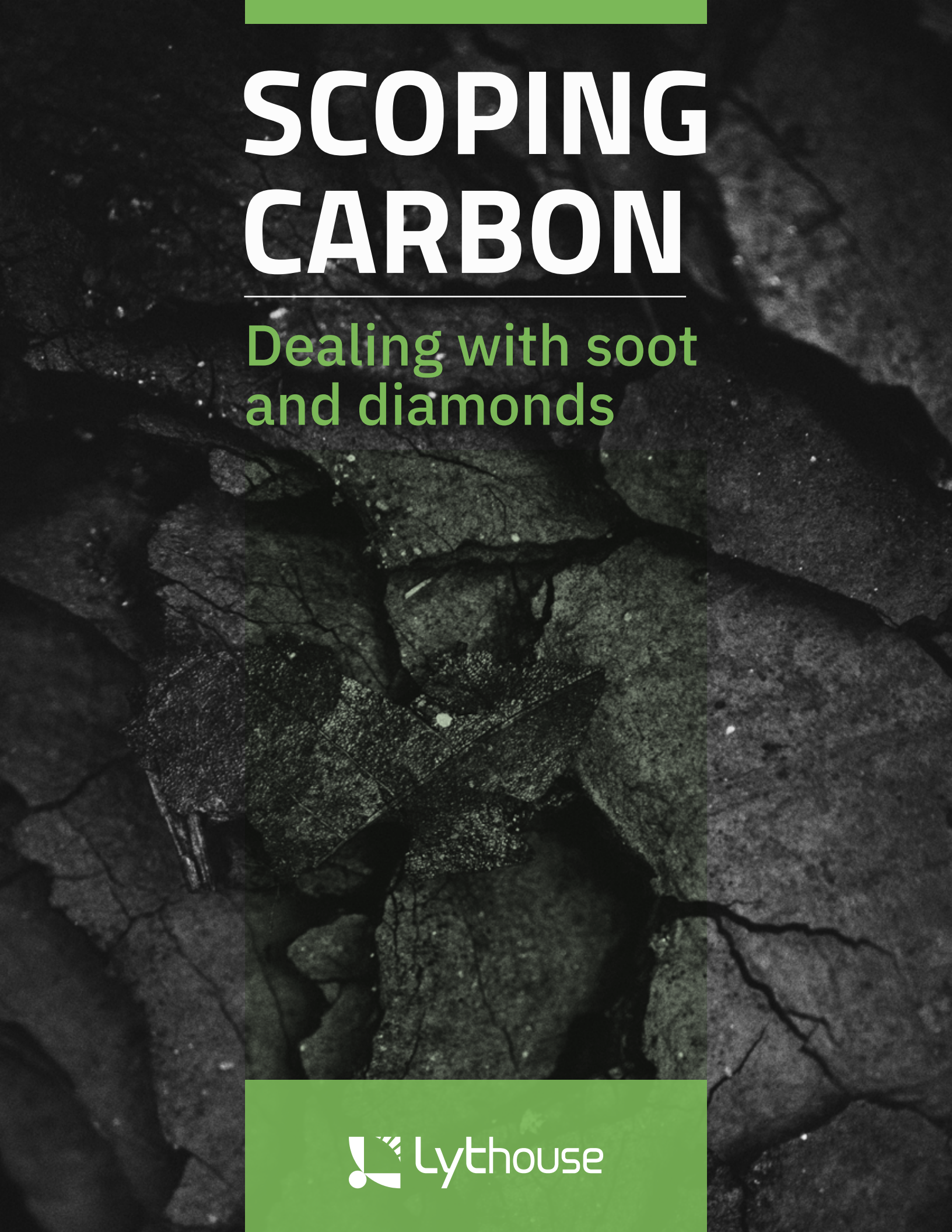
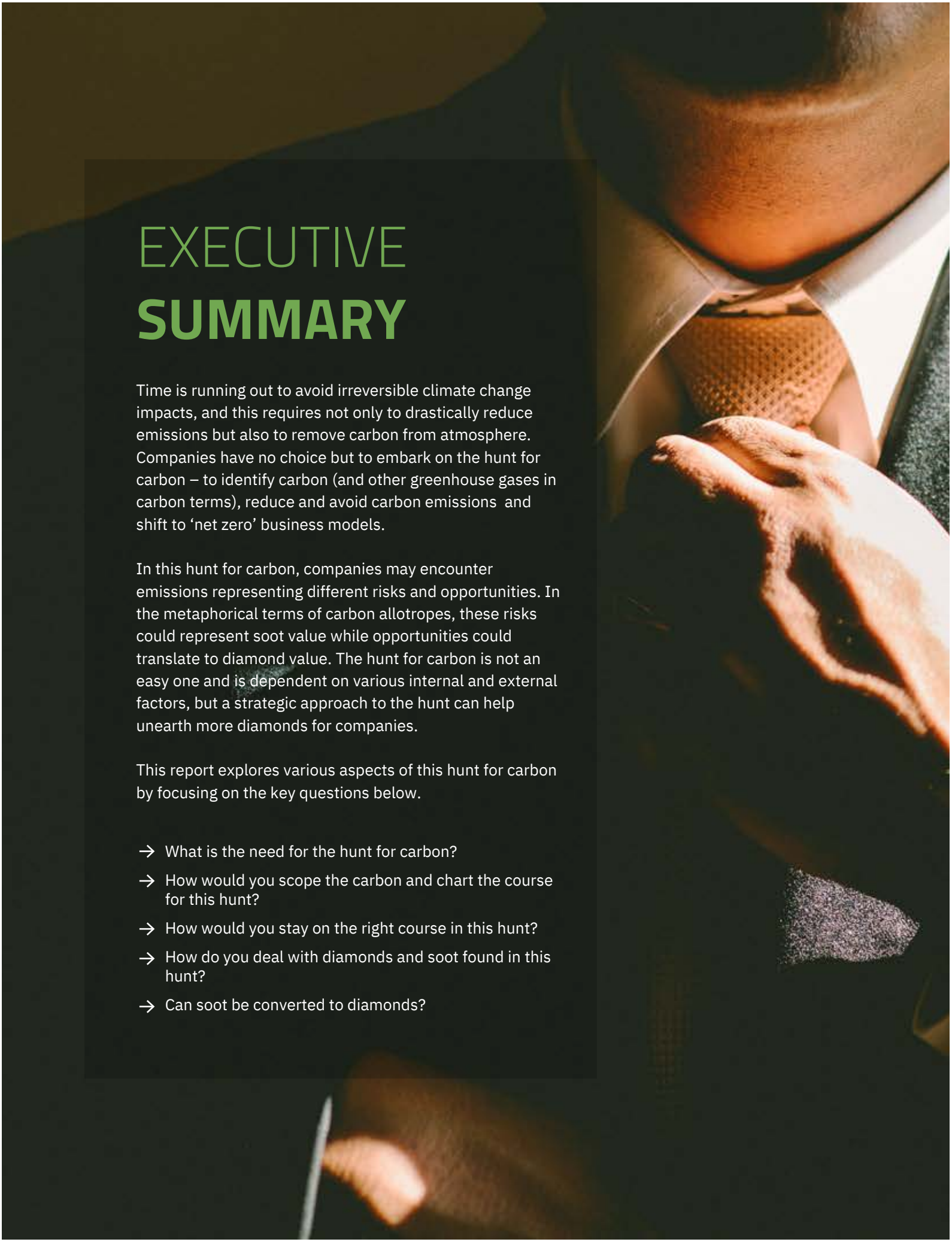


SCOPING CARBON

Dealing with soot and diamonds

Lythouse

CONTENT



EXECUTIVE **SUMMARY**

Time is running out to avoid irreversible climate change impacts, and this requires not only to drastically reduce emissions but also to remove carbon from atmosphere. Companies have no choice but to embark on the hunt for carbon – to identify carbon (and other greenhouse gases in carbon terms), reduce and avoid carbon emissions and shift to 'net zero' business models.

In this hunt for carbon, companies may encounter emissions representing different risks and opportunities. In the metaphorical terms of carbon allotropes, these risks could represent soot value while opportunities could translate to diamond value. The hunt for carbon is not an easy one and is dependent on various internal and external factors, but a strategic approach to the hunt can help unearth more diamonds for companies.

This report explores various aspects of this hunt for carbon by focusing on the key questions below.

- → What is the need for the hunt for carbon?
- → How would you scope the carbon and chart the course for this hunt?
- → How would you stay on the right course in this hunt?
- → How do you deal with diamonds and soot found in this hunt?
- → Can soot be converted to diamonds?

THE **HUNT** FOR CARBON

The world as-is is highly susceptible to increasing global temperatures. The high levels of carbon gases in the atmosphere alter the natural greenhouse effect, raising the temperatures and leading to climate change. Unchecked climate change is causing irreversible damage to climate systems, the repercussions of which we are already witnessing with each year setting new records for extreme weather events. The ramifications also bear significant socio-economic impacts on humanity.

Avoiding catastrophic climate change impacts requires the global temperature rise to be within 1.5°C . This means that not only do carbon emissions have to be reduced but also must be removed from the atmosphere. On the other hand, the increasing population requires more resources to meet their requirements. Balancing these two is no easy task. Decarbonization of current and future growth is no longer a choice for governments, businesses, and society at large.

Accounting for carbon emissions is the first step in this arduous journey to decarbonization. Industrial activity is a key contributor to carbon emissions and companies need a comprehensive understanding of carbon emissions across their value chain to start the decarbonization journey. A strategic and focused hunt for carbon emissions within their own operations and across the value chain will help companies to fully account for carbon emissions and explore decarbonization pathways. Carbon emissions are intrinsically linked to resource and energy use and present both risks and opportunities. In the hunt for carbon emissions, companies may find emissions from soot to diamond value - soot relating to higher risks and diamond representing strategic transformational opportunities. Companies that find ways to extract diamond value from emissions are those that would succeed in this journey

CHARTING THE **HUNT** FOR CARBON

Carbon is omnipresent across the value chain of companies. Within the known territory of own operations are emissions related to fuel usage and process and known as Scope 1 emissions. Purchased electricity, steam, heat and cooling form the Scope 2 emissions. Both the Scope 1 & 2 emissions are relatively easy to establish the baseline. With higher levels of control over sources of emissions, companies generally find low-hanging diamond opportunities through energy and process efficiency measures that result in both emissions reduction and cost savings. Some sectors like cement and steel have a higher proportion of Scope 1 & 2 emissions contributing to overall emissions, up to 85% .

Value chain emissions referred to as Scope 3 emissions are unchartered and complicated territory for many companies. Establishing a carbon baseline in the value chain is complex given the vast global supply chains and multiple sub-tiers. Other limiting factors include lower supplier capabilities, complex methodologies, limited visibility and influence on the supply chain, and inadequate digital capabilities. Scope 3 emissions could be as high as 95% of overall emissions for certain sectors like retail, automotive, financial services etc. The hunt for carbon in the value chain becomes very critical for companies in such sectors and it is not surprising that companies find a mixed bag of carbon emissions risks and opportunities. Risks of soot value could be present in a fragmented supply chain leading to higher carbon costs and increased supply chain disruptions. Diamond opportunities can propel innovative business models and value chain collaborations, technology advancements, and more resilient supply chains.

STAYING ON THE RIGHT COURSE FOR THE HUNT

The hunt for carbon starts with establishing a baseline. Given the multiple complexities involved, this start itself could be overwhelming and staying on the right course throughout the journey even more challenging. How does one overcome these challenges?

The hunt for carbon is not a one-time exercise but is an evolving strategic activity. It is important to recognize the limitations in carbon accounting and approach this with a phased roadmap and strategic decarbonization goals.

The key components to staying on the right course are:

- Identifying the boundary conditions and limitations of such conditions, especially in the value chain.
- Mapping appropriate methodologies, with a focus on primary data as much as possible.
- Establishing carbon inventory and enhancing visibility to improve accuracy. Start with Scope 1 & 2 emissions and expand the Scope 3 emissions progressively.
- Identifying the emissions hotspots and related risks and opportunities.
- Developing the business case for emissions reductions and ‘net-zero’ pathways.
- Defining decarbonization targets.
- Embedding the targets across the business processes and the value chain.
- Building the necessary skillsets and knowledge within the organization and across the value chain for decarbonization.
- Leveraging technology to power decision-making.
- Expanding and investing in collaboration with value chain partners for emissions management.
- Utilizing carbon as active input for investment decisions.

The above activities are iterative in nature and companies should learn and refine their approach as they start to mature. There are also other factors that impact this journey. Some of the factors that need attention are:sector in general and a company in specific progress towards lowering emissions.

Sector – Each sector has its unique opportunities and risks relating to decarbonization. Some sectors inherently contribute to a low carbon economy while few sectors are hard-to-abate sectors. When taking a life cycle approach, most sectors are dependent on other sectors in the value chain to achieve 'net zero' emissions.

Ease of switch –Each sector has its unique opportunities and risks relating to decarbonization. Some sectors inherently contribute to a low carbon economy while few sectors are hard-to-abate sectors. When taking a life cycle approach, most sectors are dependent on other sectors in the value chain to achieve 'net zero' emissions.

Market conditions –There is increasing consumer interest in sustainable products, especially among millennials and Gen Z consumers. However, the cost, quality, and service levels continue to shape purchasing decisions. Reaching the balance between carbon neutrality and affordability will hugely impact the decarbonization strategy. The differing levels of climate maturity in different geographies further impact the market conditions in those geographies.

Regulatory landscape –Regulations are increasingly pushing companies to integrate climate agenda in the company strategy and publicly disclose the climate-related risks and opportunities for investors and other stakeholders to make informed decisions. Regulatory push can accelerate the adoption of low-carbon technologies while creating a level playing field in their jurisdictions. But sometimes this could also lead to a shift of emissions to jurisdictions with no or fewer regulations, and at the life-cycle level have little emissions impact.

Value chain –The size of the company and its relative position and leverage in the value chain could be a significant limiting factor for decarbonization. Companies of smaller sizes may lack the influence over bigger suppliers to enable the 'net zero' transition. Bigger companies with complex supply chains may have very fragmented upstream and downstream supply chains with multiple tiers, making it a herculean task to map the supply chain and influence them.

Organizational and technological capabilities –Companies with a tactical view of carbon emissions tend to underinvest in their organizational and technological capabilities to manage emissions and derive value. Technology in particular can play a quintessential enabler role in overcoming many challenges in this hunt by enhancing visibility, improving accuracy, and leveraging analytics for informed decision-making.

DEALING WITH DIAMONDS AND SOOT

In the hunt for carbon, companies unearth risks and opportunities related to decarbonization. The risks with low ease of measuring emissions and high costs of emissions abatement or avoidance can be equated to soot value while opportunities with high ease of measuring emissions and low costs represent diamond value.

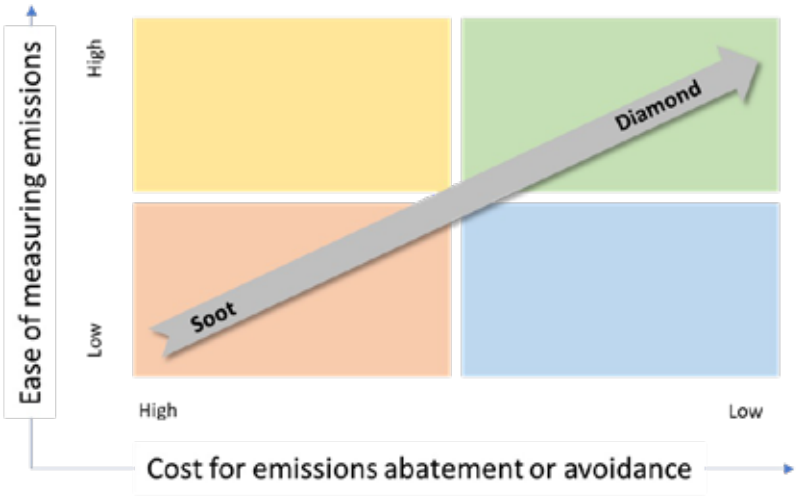
Companies hope to discover more diamond opportunities than soot risks. However, it is a mixed bag of diamonds and soot for many companies. This is also dependent on various factors impacting the hunt as elaborated in the previous section.

Scope 1 emissions relate to companies' own or controlled facilities and fleets through fuel usage. The low-hanging diamond opportunities can be explored through process and energy efficiency measures. These measures can yield a certain proportion of emissions reductions and translate to cost savings. Beyond that, emissions abatement or avoidance might require higher capex and technological advancements leading to soot risks. Switching to low-carbon or zero-carbon fuels can help transform soot into diamonds in the long term.

Key strategies to reduce Scope 1 emissions.

Demand-side energy management by energy and process efficiency measures. Supply-side energy management through a shift to alternate and low-carbon energy sources.

Efficient transport planning and a shift to low-carbon transport for owned fleets. Invest in carbon offset programs or purchase of market-traded carbon credits.



Case study:

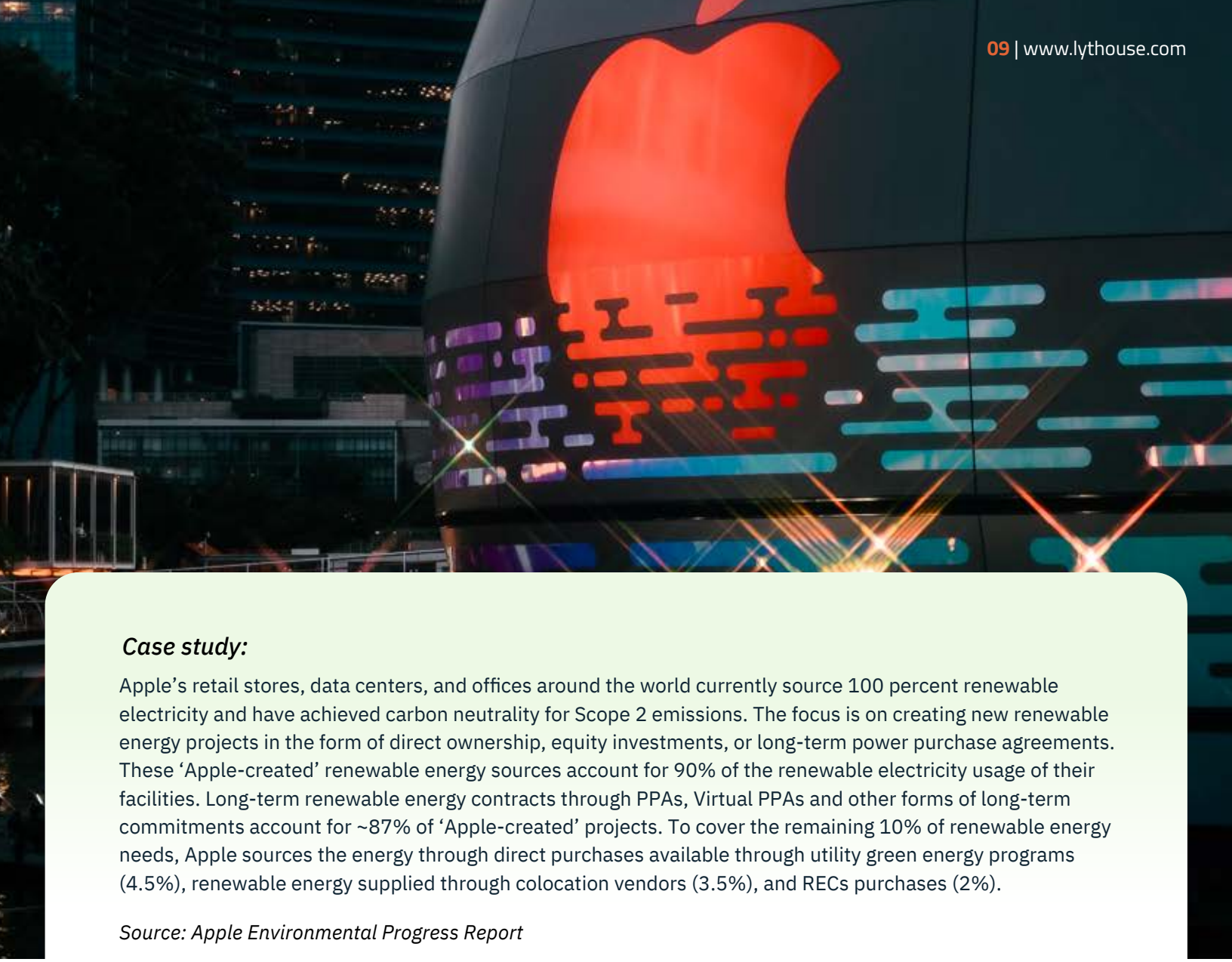
Bosch has achieved carbon neutrality for Scope 1 & 2 emissions since 2020. The climate agenda focuses on four key levers for climate neutrality – energy efficiency, new clean power, green electricity, and carbon offsets. Through energy efficiency measures, Bosch aims to significantly reduce energy consumption with a target of achieving 1.7 terawatt-hours (TWh) of energy savings until 2030. One of the key initiatives to generate savings is through connected energy management system – the Bosch Energy Platform. Other examples include heat recovery measures which at their Shanghai location have reduced 95% of electricity consumption for pre-aging tests of an on-board charger. The New Clean Energy lever is focused on switching to green energy to reduce emissions. Bosch has a target to generate 400 GWh of the annual energy demand in-house at their company locations from renewable sources, with particular emphasis on photovoltaics.

Source: Bosch Sustainability Report 2022

Scope 2 emissions emanate from purchased electricity, steam, heating, or cooling. Like Scope 1 emissions, diamond opportunities of efficiency measures can reduce emissions to a certain proportion. However, soot risks are high for Scope 2 emissions owing to a high dependency on the utilities sector to transition to low-carbon or zero-carbon electricity, steam, heating, or cooling for decarbonization. The sector still heavily relies on fossil fuels for energy generation and the transition requires more technological advancements and affordable and scalable zero-carbon fuels. The proportion of alternate energy in the global energy mix is steadily increasing. Companies are increasingly using Power Purchasing Agreements (PPAs), Green Tariffs (GTs) and Renewable Energy Certificates (RECs) to increase the share of renewable energy mix in the purchased electricity, thereby converting soot risks into diamond opportunities. PPAs are used in renewable energy space to finance renewable energy projects, as they provide a guaranteed revenue stream for the power producer and help the purchaser meet their renewable energy targets and reduce carbon emissions. GTs are offered by utilities to their customers as an alternative to PPAs with independent power producers. Customers can choose to purchase green electricity from specific renewable energy projects (GT1) or purchase renewable energy that has been generated by a utility or third party and added to the grid (GT2). RECs are market-based tradable instruments in the units of 1 MWh of renewable energy generated.

Key strategies to reduce Scope 2 emissions.

- Demand-side energy and process efficiency measures to reduce electricity, heat and steam consumption.
- Invest in renewable energy projects for green electricity generation, including PPAs.
- Purchase RECs and other market-based instruments for green electricity credit.
- Offset carbon emissions through offset programs.



Case study:

Apple's retail stores, data centers, and offices around the world currently source 100 percent renewable electricity and have achieved carbon neutrality for Scope 2 emissions. The focus is on creating new renewable energy projects in the form of direct ownership, equity investments, or long-term power purchase agreements. These 'Apple-created' renewable energy sources account for 90% of the renewable electricity usage of their facilities. Long-term renewable energy contracts through PPAs, Virtual PPAs and other forms of long-term commitments account for ~87% of 'Apple-created' projects. To cover the remaining 10% of renewable energy needs, Apple sources the energy through direct purchases available through utility green energy programs (4.5%), renewable energy supplied through colocation vendors (3.5%), and RECs purchases (2%).

Source: Apple Environmental Progress Report

Scope 3 emissions are the most complex emissions to address. With 15 categories across upstream and downstream, decarbonization requires innovation and business model changes across the value chain impacting product design, manufacturing, logistics & distribution, and customer service. Given the vast breadth and depth of the value chains, the primary challenge is to establish visibility. Scope 3 emissions are mostly viewed as soot value. However, a targeted strategic approach at the category level can help companies convert risks into opportunities. The potential for diamond opportunities is also very high for Scope 3 emissions. Product and service innovations can not only lower emissions but also generate new revenue streams through novel business models. Similarly, logistics and distribution redesign including reverse logistics can enable circular models with lower footprint. Embedding carbon into procurement decisions can potentially lead to cost savings. Carbon-focused demand and supply planning can reduce inventory costs. However, building data transparency and tracking emissions across the value chain are prerequisites to addressing Scope 3 emissions. This requires a concerted and collaborative effort across the value chain. Companies should explore strategic stakeholder partnerships toward this endeavor which might require upfront investments in their own and the value chain capabilities.

Key strategies to reduce Scope 3 emissions:

Active integration of carbon as a key dimension for customer and supplier selection and engagement. Procuring low-emission inputs and addressing demand-side emissions reduction through customer collaborations can significantly lower Scope 3 emissions. Carbon pricing models can also help in strengthening the business case for Scope 3 emissions reduction.

Product redesign and use of alternate low-carbon materials. By investing in product R&D and exploring alternate low-carbon/bio-based materials, companies can reduce Scope 3 emissions not only at the manufacturing stage but also at the product use phase, which could be significant for certain industries.

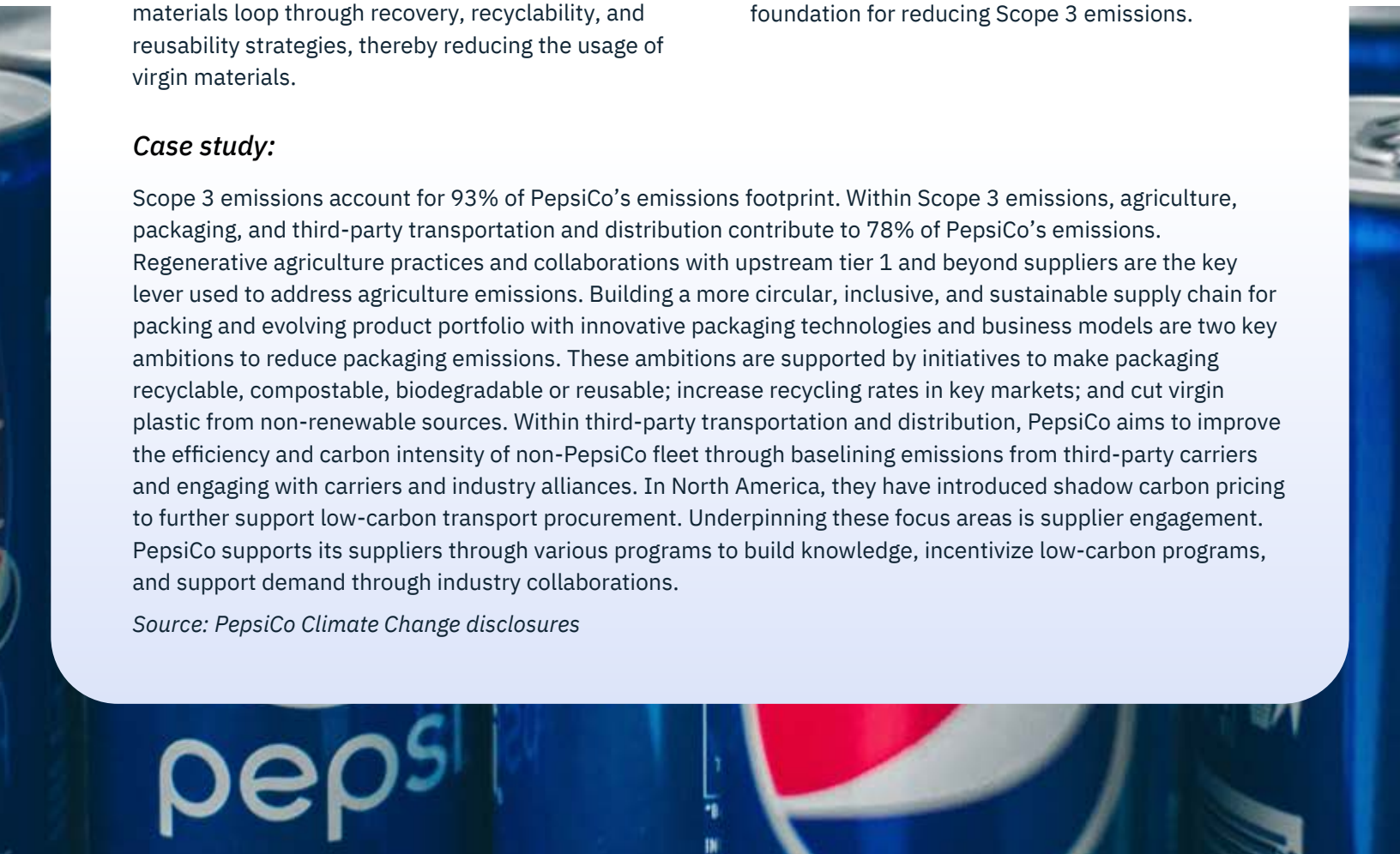
Pivot business models to focus on lower emissions. Innovative business models such as realigning focus from product-based to service-based can not only lower the Scope 3 emissions but also unearth new revenue streams.

Circular business models enabling end-of-life solutions. Circular business models place emphasis on closing the materials loop through recovery, recyclability, and reusability strategies, thereby reducing the usage of virgin materials.

Value chain partnerships to leverage new technologies and enable supplier action. Value chain partnerships are crucial, especially for leveraging technology and new product developments to reduce emissions both upstream and downstream. Enabling supply chain capabilities through knowledge, resources, and investments is vital to galvanize supplier action. This may even need cross-industry collaboration to promote the demand for low-carbon products and services.

Value chain integration for better control of emissions. Upstream and downstream business integration can help gain more control over emission sources. This may essentially shift the Scope 3 emissions to Scope 1 & 2 emissions but also empower companies to tap more emission reduction opportunities.

Digital capabilities to seamlessly measure and manage emissions. Measurement and tracking of emissions across a vast value chain is quintessential to pursuing emission reduction opportunities. Investing in smart digital capabilities to accurately measure, monitor, and collaborate with value chain partners forms the foundation for reducing Scope 3 emissions.



Case study:

Scope 3 emissions account for 93% of PepsiCo's emissions footprint. Within Scope 3 emissions, agriculture, packaging, and third-party transportation and distribution contribute to 78% of PepsiCo's emissions. Regenerative agriculture practices and collaborations with upstream tier 1 and beyond suppliers are the key lever used to address agriculture emissions. Building a more circular, inclusive, and sustainable supply chain for packing and evolving product portfolio with innovative packaging technologies and business models are two key ambitions to reduce packaging emissions. These ambitions are supported by initiatives to make packaging recyclable, compostable, biodegradable or reusable; increase recycling rates in key markets; and cut virgin plastic from non-renewable sources. Within third-party transportation and distribution, PepsiCo aims to improve the efficiency and carbon intensity of non-PepsiCo fleet through baselining emissions from third-party carriers and engaging with carriers and industry alliances. In North America, they have introduced shadow carbon pricing to further support low-carbon transport procurement. Underpinning these focus areas is supplier engagement. PepsiCo supports its suppliers through various programs to build knowledge, incentivize low-carbon programs, and support demand through industry collaborations.

Source: PepsiCo Climate Change disclosures

CONCLUSION

– the hunt for carbon is inevitable, but a strategic mindset can extract more diamonds

'Net-Zero' future is not an option anymore. Companies have little choice but to embark on the hunt for carbon. The strategic mindset and approach make all the difference. Companies viewing carbon emissions at a tactical level only focus on low-hanging efficiency gains and try to avoid compliance costs. Companies with strategic approaches can discover and extract more diamond value in this journey. There are both internal and external factors that influence decarbonization strategies for companies. By being aware of the limitations and equipped with the right skills and tools, companies can establish the carbon baseline and devise 'net-zero' strategies. Exploring stakeholder collaborations and investments in innovative partnerships can help identify market-defining opportunities early on and can also lead to early-mover differentiation. The market and regulatory landscapes are evolving at a very rapid pace and companies need to stay strategically invested in the hunt for carbon to seize the diamonds.

Source: IPCC | Source: CDP Report | Source: CDP Report

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