Think:Act

Roland Berger

Accelerating decarbonization

Six action areas for speeding up your emission reduction plans

#THINK green ACT clean COP27

Roland Berger

THE BIG 3

43%

reduction in greenhouse gas emissions compared to 2019 is needed by 2030 to meet the Paris target

→ P. 4

20%

is the emission reduction by 2030 targeted by the biggest public companies

→ P. 6

15%

is the share of large public companies targeting a 50% emission reduction by 2030

→ P. 6

Contents

Cover illustration: Mathis Burmeister/2agenten

1 – The corporate world has begun taking action on climate change. But current targets for reducing emissions show a lack of ambition.

THE WORLD IS FACING A STARK REALITY. If we continue along our current trajectory, we will singularly fail to meet the goal set by the Paris Agreement of limiting global warming to 1.5°C compared to pre-industrial levels. Continuing with business as usual will lead to an increase of 2.6°C by the end of the century. Even implementing the strategies that governments have already announced will only help slightly, cutting the level of increase to between 1.8°C and 2.4°C.

Clearly, current government targets and the existing level of regulation are insufficient. According to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), meeting the Paris target requires a 43 percent reduction in greenhouse gas emissions by 2030 and an 84 percent reduction by 2040 compared to 2019 levels. What we actually see is that global greenhouse gas emissions recovered quickly from the COVID-19 pandemic and now already exceed their 2019 levels. With the number of extreme weather events increasing, sea levels rising and wildfires becoming increasingly commonplace, politicians will likely impose stricter regulation – which will have a major impact on companies and their supply chains.

The role of companies in mitigating climate change is indisputable. The CO_2 emissions of large industrial conglomerates are in some cases comparable to those of entire countries. For example, one of the world's largest chemicals companies generated 17 million tons of CO_2 in 2020, equivalent to the carbon footprint of Croatia. Similarly, the world's leading steel producers emitted almost 150 million tons of CO_2 in 2020 – more than the Philippines' 136 million tons, for a population of more than 100 million people.

How are governments reacting? The European Union has already adopted a Corporate Sustainability Reporting Directive (CSRD), details of which it will finalize by the end of 2022. The United States Securities Exchange Commission (SEC) has also published a proposed rulemaking package at federal level detailing climate-related disclosures. At a state level, California is discussing the adoption of the Climate Corporate Accountability Act, which would require certain companies to report their direct and indirect greenhouse gas emissions annually.

Adding to the pressure on companies will be increases in the price of CO_2 over the coming decades. The price is expected to rise from below USD 100/t CO_2e today to up to USD 200/t CO_2e in developed economies and some developing countries. Moreover, the European Union's Carbon Border Adjustment Mechanism, expected to be enforced by 2026, will impose a carbon tariff on carbon-intensive products imported by the European Union, forcing producers from

other regions to align with EU standards or incur higher costs. Two similar initiatives in the United States are the California Cap-and-Trade Program and the Regional Greenhouse Gas Initiative (RGGI), covering 11 northern states.

Companies face further pressure from stakeholders, such as employees and customers, to reduce harmful emissions. Climate action increasingly plays a role in recruiting and retaining staff. Customers, too, are more and more aware of the impact that businesses have on the environment – and expect them to do something about it.

The targets currently set by corporates are insufficient to meet the short-term emission reduction needed.

On top of all of this, the recent political turmoil sparked by the Russian invasion of Ukraine is putting energy security high on corporate leaders' agendas. Achieving energy security and changing current supply arrangements is clearly a priority – however, it could represent a threat to decarbonization plans. Instead, we believe that the two can go hand in hand: The desire to become more energy independent could speed up the shift to new technologies, low-carbon electricity and gases, thereby driving decarbonization. The limited availability of fossil fuels and high volatility of their prices may further drive this shift to zero-emission energy sources by both governments and companies.

COMPANIES ARE BEGINNING TO TAKE ACTION, BUT THERE IS STILL A WAY TO GO

As pressure on companies grows, many businesses have taken initial steps on climate action, setting themselves emission reduction targets. Around 58 percent of the 4,700 largest listed companies in major economies reporting their greenhouse gas emissions have already done so – although a slightly smaller percentage have set themselves both a quantified emission reduction target and a target horizon for achieving it. The trend is positive, however, with the share of the biggest CO_2 emitters setting climate targets growing by around 19 percent between January and December 2021.

Companies setting themselves climate targets are also doing so in an increasingly professional manner. Some 3,250 companies have signed up to the Science Based Targets initiative (SBTi), of which 46 percent have had their targets validated by the organization, thereby avoiding accusations of greenwashing. Many businesses are also engaged in dialogue with industry peers and policymakers over climate action. Their presence in the Green and Blue Zones at 26th Conference of the Parties (COP) was noticeable, for instance. Increasing numbers of companies are also joining the Race To Zero campaign led by the United Nations Framework Convention on Climate Change (UNFCCC), under which they pledge to halve their CO_2 emissions by 2030 and reach net zero by 2050 at the latest. → A

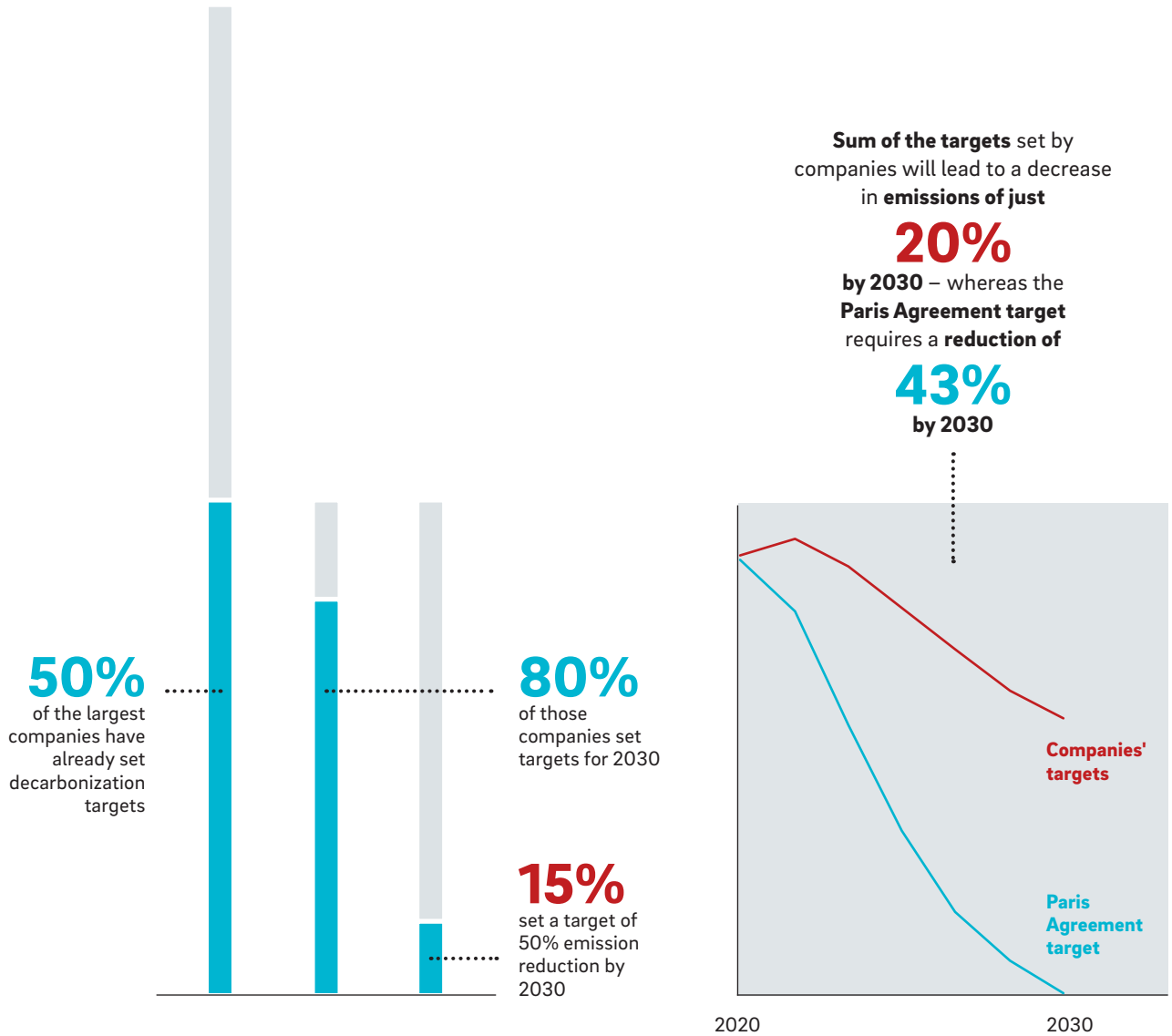
Despite these actions, the targets currently set by corporates are insufficient to meet the short-term emission reduction needed. Based on figures from Net Zero Tracker, Thomson Reuters and The Climate Action 100+ Net Zero Company Benchmark, only around ten to 15 percent of large corporates have set themselves a target of reducing emissions by 50 percent by 2030. What is more, the sum of the targets set by the biggest public companies in major economies will lead to an estimated decrease in these corporates' emissions of just 20 percent by 2030, according to Thomson Reuters. Given that global greenhouse gas emissions need to fall by 43 percent by 2030 in order to reach the Paris target, it is evident that companies have not yet grasped the order of magnitude of the problem.

Even if companies were to universally set themselves sufficiently ambitious targets for reducing harmful emissions, a number of challenges would remain in the area of implementation. In the following chapter we turn our attention to these hurdles and try to figure out why, for many, the race to net zero is only just beginning.

A

Companies' current targets fall short

SHARE OF COMPANIES SETTING EMISSION REDUCTION TARGETS



Note: Based on the 4,700 listed companies with the biggest market capitalization in the major economies (Thomson Reuters), the 166 largest CO_2 emitters (Climate Action 100+), and the 2,000 largest publicly traded companies in the world by revenue (Net Zero tracker); all figures approximate

Source: Thomson Reuters; Climate Action 100+, Net Zero Company Benchmark; Net Zero tracker; Roland Berger

2 – What is slowing companies down? Hurdles and challenges for corporate emission reduction plans.

TO MEET THE PARIS TARGET, companies need to urgently speed up their carbon reduction plans. What they do in the next five years will be critical. The technological challenges that they face vary from industry to industry. However, some hurdles are common to all stakeholders, from dealing with limited availability of low-carbon energy to ensuring a corporate culture focused on sustainability. We discuss some of these universal challenges below.

LIMITED AVAILABILITY OF LOW-CARBON ENERGY

Companies rely on energy to run their operations, whether it is to power engines, generate heat or transform materials. Most of the energy they use today is of fossil origin with a high carbon footprint. Companies can access low-carbon energy either through electrification with low-carbon electricity (wind, solar, hydro-electric or nuclear power) or by switching to low-carbon gases (such as biofuels or hydrogen). However, availability of low-carbon energy is limited and differs across geographies. According to the International Energy Agency (IEA), only 17 percent of the world's total energy was low-carbon in 2020.

Moreover, global demand for low-carbon energy is expected to increase, putting even greater pressure on low-carbon sources. Thus, demand for electricity is forecast to grow by 27 percent between 2020 and 2030 in a net-zero scenario, driven by the electrification of industrial processes, heating systems and mobility/transportation. This would require an unprecedented mobilization of industry stakeholders and massive investment: Installed capacity for renewable energy would need to quadruple in order to stick to the 1.5°C trajectory (IRENA). In total, annual investment in electricity generation, transmission and distribution would need to be two to five times higher than pre-COVID-19 levels, according to the IPCC WG 3 report *Climate Change 2022: Mitigation of Climate Change.*

The potential for generating renewable energy is unevenly distributed around the world. Put simply, some countries have more sun and wind than others. Where generating renewable energy is possible, it also requires a significant amount of land. For example, assuming the complete electrification of current energy consumption in Germany, nearly 15,000 km^2 of land would be needed for generation purely by solar farms, or almost 26,000 km^2 for wind farms – more than the entire landmass of countries such as Slovenia, for example. Building zero-emission energy facilities can also take time, especially in the case of nuclear and large hydroelectric plants.

In a net-zero scenario, demand for biofuels and hydrogen would increase sixfold in the decade from 2020. Great uncertainty exists regarding the potential ramp-up of production capacities, however. Some 90 percent of the biofuels consumed in 2050 are expected to be advanced biofuels produced from non-food-based feedstock (residues of agricultural production), compared with just one percent today. Today, this brings with it the risk of competition with food production. For its part, hydrogen is expected to see demand of around 210 million tons by 2030, up from

90 million tons in 2020. The current share of green hydrogen is below one percent.

MANY CLEAN TECHNOLOGIES ARE AVAILABLE BUT HAVE NOT ACHIEVED SCALE

The latest IPCC report highlights the importance of "clean tech" in reducing greenhouse gas emissions. However, many of the technologies that will be needed between 2030 and 2070 are not yet commercially available. Data from the IEA suggests that over one-third of cumulative CO_2 emission reductions by 2070 will come from technologies that are currently still at the prototype or demonstration phase, which will not become available at scale without massive further investment in research and development.[1] → B

Until these clean technologies reach sufficient scale, the corporate world will perceive them as risky. This situation will continue as long as companies are unsure which technology will be implemented in the future by their suppliers, clients and competitors – and until they see that customers are prepared to pay a premium for them. In the context of limited regulation and an absence of targeted subsidies, companies tend to wait for the business case to be proven positive before initiating a switch, preferring to wait for a single, ready-to-use solution to emerge.

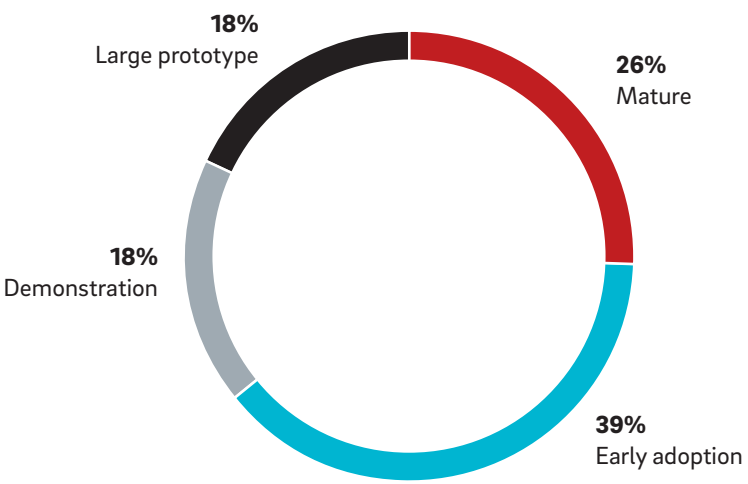
Green hydrogen is a good example. The necessary technology needs to be scaled up in order to reach commercial viability. The ramp-up of the hydrogen value chain, from production to end use, including transportation and distribution infrastructure, will require major investment. Thus, global CAPEX on hydrogen is expected to reach a cumulative total of EUR 10 trillion by 2050, of which EUR 2.2 trillion will be in Europe. Increasing the total installed capacity of electrolyzers will be key for commercial readiness: For specific components of electrolyzers, technological gains translate into five to 18 percent cost

[1] FIEA, Energy Technology Perspectives 2020 [https://www.iea.org/reports/energy-technology-perspectives-2020/clean-energy-innovation#abstract]

B

Many technologies are not yet commercially available

CO_2 EMISSION REDUCTIONS IN 2070 BY CURRENT LEVEL OF MATURITY OF TECHNOLOGY



Note: Percentages relate to share of all CO_2 emission reductions expected from clean technologies

Source: IEA Sustainable Development Scenario (2070); Roland Berger

reductions for every doubling of installed capacity. This means that the cost for electrolyzers would need to come down considerably to enable the widespread build out of hydrogen production capacities.

Notably, green hydrogen production capacity is expected to grow exponentially in this decade. Still, it will take a few more years until more and larger-scale projects reach a final investment decision, get built and start operations. For now, developers still struggle to successfully de-risk their projects (among others due to regulatory uncertainty), secure firm off-take agreements and mitigate remaining technology risks. As first-of their-kind-projects come on stream, the sector at large will follow. For projects to multiply, sustained public funding support will be needed. → C

That governmental support can make a major difference is evident from the figures for solar photovoltaic, solar thermal and wind power generation. These technologies have reached sufficient scale to be viable thanks to large investments by companies driven by subsidies. Thus, generation costs have fallen since 2009 by around 90 percent for solar photovoltaic power and 16 percent for solar thermal power, supported by government subsidies. This has resulted in a high level of maturity for the technologies and the establishment of a large-scale ecosystem.

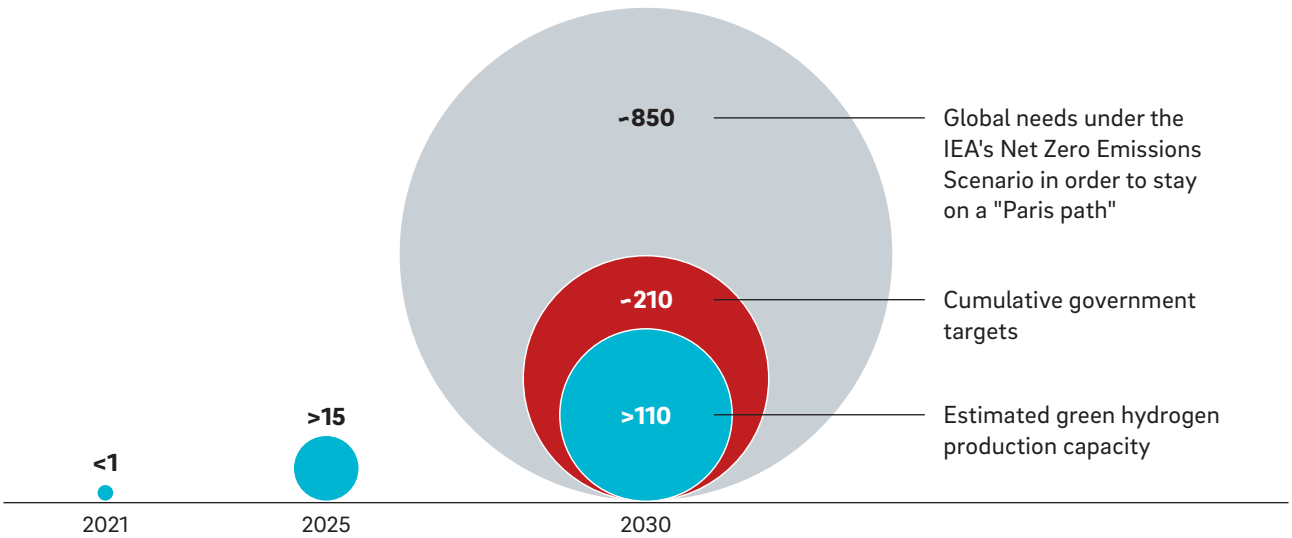
Scaling up and rolling out the next green technologies will require major investment. The required global CAPEX on clean tech and infrastructure to limit the increase in global temperatures to 1.5°C gradually rises from below USD 1 trillion in 2019 to almost USD 2 trillion a year in the 2020s, further increasing to almost USD 3 trillion in the 2030s. That means a cumulative total of USD 56 trillion by 2050, including investments in hydrogen and other clean tech, low-carbon power generation and grid and e-mobility infrastructure.[2]

[2] Goldman Sachs, Carbonomics: Security of Supply and the Return of Energy Capex, p. 14, 2022

C

Green hydrogen production capacity is on an unprecedented growth trajectory

GLOBAL ELECTROLYZER BUILD-OUT [GW]



Source: IEA; Roland Berger

SUPPLY CHAINS ARE HIGHLY COMPLEX – AND ALREADY UNDER STRESS

While Scope 1 emissions (direct emissions from sources owned or controlled by companies) and Scope 2 emissions (indirect emissions from electricity, heat or steam purchased by companies) are largely within the control of companies, Scope 3 emissions (indirect emissions that occur in companies' upstream or downstream value chain) are more difficult to control. Reducing Scope 3 emissions can be challenging due to the length and complexity of supply chains, for example, which often span various countries with differing regulations. Companies cannot ignore them as they represent an estimated average of 85 percent of CO_2 emissions.[3] Nevertheless, many companies do not calculate or disclose their Scope 3 emissions – and even fewer set targets for them at present.

For large corporations, the task of calculating Scope 3 emissions is complicated by the large numbers of Tier-1 suppliers they use. Multinational automotive OEMs (original equipment manufacturers) may have as many as 60,000 such suppliers. But, in fact, this problem affects companies of all sizes: The average figures for aerospace and auto OEMs is around 200 to 250 Tier-1 suppliers and up to 15,000 suppliers across all tiers. Material influx may also be non-linear along the supply chain, with stakeholders intervening at various stages or raw materials being sourced by the final client but transformed by a number of different suppliers before delivery. These complex supply chain structures limit product traceability and the transparency of the carbon footprint.

Nor is data reliability across the supply chain a given. It is not uncommon for different suppliers to answer the same question about their carbon footprint in many different ways, depending on the data they themselves have available. Moreover, that data is often incomplete or outdated, and may cover different scopes or use different methodologies.

With increased globalization and international trade, today's supply chains often cover a large number of countries. Each country may have different standards with regard to environmental and carbon emissions tracking, reporting and disclosing. Consequently, suppliers may show different levels of maturity when it comes to tracking and reporting greenhouse gas emissions. Some products are sourced from suppliers that operate in multiple locations, sometimes in joint ventures with local stakeholders, making carbon footprint traceability even more complex. The **Roland Berger Climate Change Combat Radar** provides more detail on the levels of regulation, carbon pricing and carbon tracking in different geographies.

With supply chains already under stress due to COVID-19, some companies might be hesitant to add another level of requirement related to decarbonization. Taking action on Scope 3 emissions can prove especially challenging for companies. The further the supplier from the customers, the more difficult for companies to push for action. A company's negotiating power or ability to force a supplier to make changes is usually proportional to its share of the supplier's sales, but can also be limited by the supplier's maturity or ability to act. → D

BUSINESS MODELS FOCUS ON PRODUCING AND SELLING MORE

Current business models are focused on growing production and sales. This necessarily leads to an increase in energy consumption and greenhouse gas emissions.

A direct correlation exists between revenue increases and energy consumption, with 45 percent of total greenhouse gas emissions relating to goods production (including land use). In many industries, competition on price has led to decreasing quality and lifespan of products, driving increases in production and thus CO_2 emissions. For example, the average lifetime of major household appliances in Germany fell from 14.1 to 13 years between 2004 and 2013.

Long-life products have lower CO_2 emissions when the entire value chain is considered, as the CO_2 emissions generated by the production of a second item greatly exceed the energy savings achieved by increased efficiency of new products. The cumulative energy expenditure of a washing machine with a service life of five years is approximately 40 percent higher than that of one with a service life of 20 years – a difference of around 1,100 kg of CO_2e over a 20-year period. Similarly, having one long-life television set over a ten-year period causes around 500 kg less CO_2e emissions over the period than having two short-life sets one after the other, each with a lifetime of 5.6 years.[4]

It should also be remembered that the linear economy business model espoused by most companies does not cover the product's end of life. This leads to significant volumes of waste and a continuous increase in resource consumption.

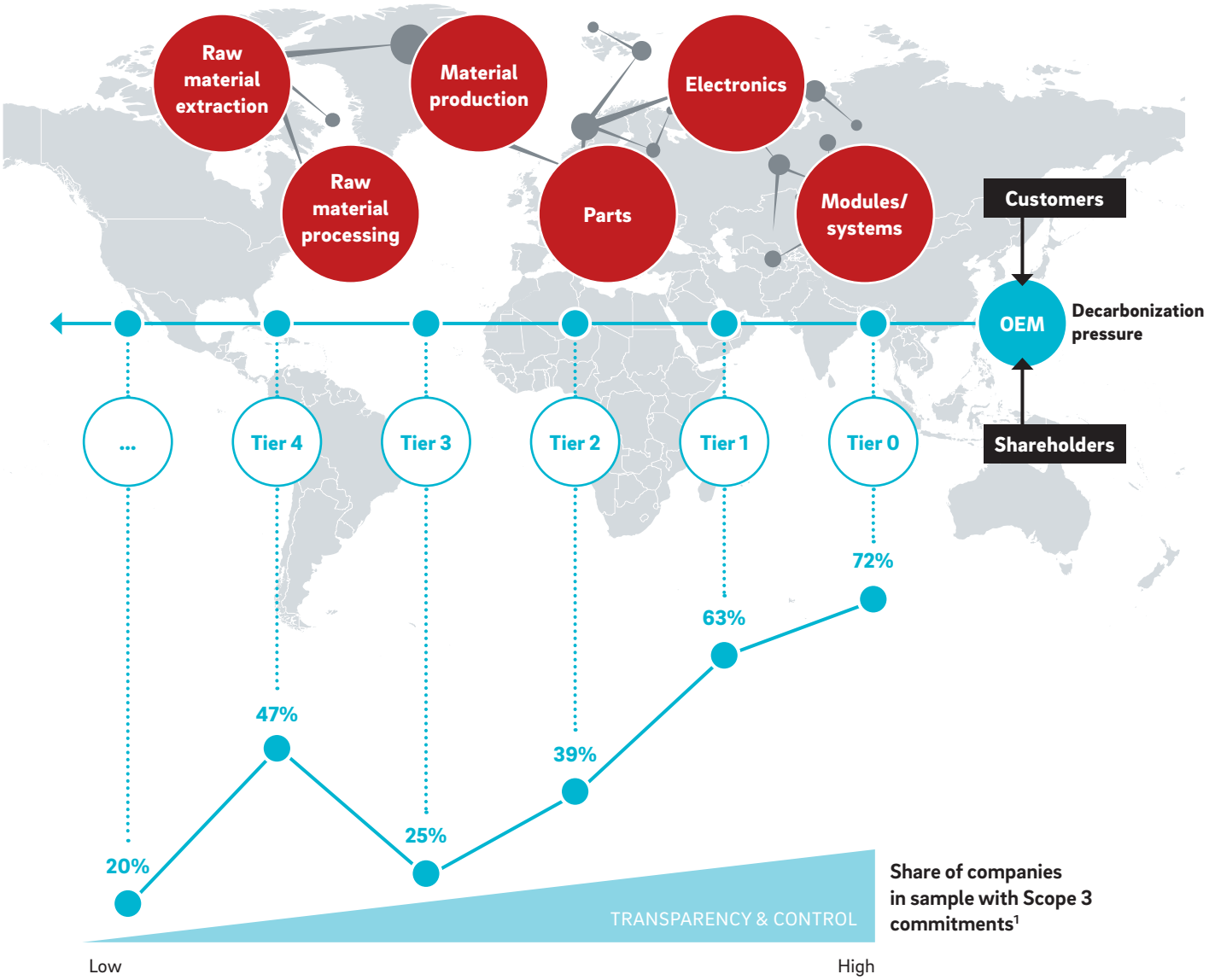
[3] Deutsche Bank Research, What are Scope 3 emissions and why are they important, 2021

[4] Umweltbundesamt, Einfluss der Nutzungsdauer von Produkten auf ihre Umweltwirkung: Schaffung einer Informationsgrundlage und Entwicklung von Strategien gegen "Obsoleszenz", 2016

D

Scope 3 emissions are particularly challenging

SHARE OF COMPANIES WITH SCOPE 3 COMMITMENTS BY TIER



1 Tier 0 – selected auto OEMs from "Automobile Manufacturing" and "Heavy Duty Truck Manufacturing" companies in NAICS Industry Group categorization; Tier 1 – auto electronics; Tier 2 – auto parts; Tier 3 – selected production companies from SBTi sectors "Automobiles and Components" cross-referenced with Reuters "Industrials"; Tier 4 – raw materials; Tier >4 – selected mining companies from EBTi "Mining" & Reuters "Materials"

Source: Reuters; SBTi; desk research; Roland Berger

The result is large volumes of municipal solid waste landfilled and potentially unsustainable levels of resource use.

The latter is already a pressing issue as the stock of easily accessible resources diminishes. The IEA forecasts that primary demand for copper will exceed global available production by mines by 2024, for example. What is more, only around eight percent of the global resources used re-enter the economy via recycling.

The pressure on companies to change their business models will stem from both governments and consumers. Thus, the EU Commission's Ecodesign for Sustainable Products Regulation (ESPR) proposal of 2022 sets out a framework for future ecodesign requirements for all physical products in the EU market, ranging from energy efficiency to carbon footprint and recyclability. To ensure competitiveness, companies need to be proactive: Circular economy business models reduce CO_2 emissions and waste generation, as well as opening up new areas for innovation and competitive advantage. But such models can also lead to a complete rethink of the company's operating and business models, requiring deep and complex transformations.

BUSINESS CULTURE FOCUSES ON SHORT-TERM FINANCIAL TARGETS

Today's businesses are generally guided by financial targets and financial reporting, their indicators and dashboards focusing on financial performance. Few companies officially formulate their purpose or their mid to long-term values, integrating them into their day-to-day business. As a result, many top managers do not have sustainability issues high on their agenda.

This lack of prioritization of climate action in fact means that companies are missing out on some important potential benefits. Certain decarbonization levers can directly generate cost savings in the short term: Installing solar panels can reduce both Scope 2 emissions and energy spending, for instance. Climate action and increasing sustainability also ensure competitiveness and can generate profits in the longer term.

Many companies struggle to align their purpose (whether explicitly formulated or not), strategy and organizational setup. Allocating resources to new strategic priorities can be challenging. Where an overall purpose or mission statement is lacking, employees – even senior managers – can suffer from a lack of orientation. Not infrequently, responsibility for climate action and driving sustainability is assigned to a single department. This can lead to missed opportunities for decarbonization, as many levers for reducing emissions relate to operations and are difficult to identify or activate from a centralized position. It can also result in operational teams viewing climate action as an external constraint, rather than an opportunity. To avoid this, it is advisable for companies to locate their decision-making on climate action close to operations, using it as an opportunity to foster innovative thinking.

Some companies have set up dedicated environmental functions reporting to departments such as marketing. However, this approach tends to dilute the environmental function's mission, and support is often only forthcoming for environmental action that has a clear marketing impact. In other cases, environmental topics are seen as an issue for the corporate social responsibility (CSR) function. The problem here is that such departments tend to lack decision-making power and have limited room for maneuver, limited capacity to impose change on other departments and limited space for experimentation. Occasionally, the CEO or Board itself takes on direct responsibility for climate action – often leading to micro-management of micro-indicators rather than a strategic roadmap and indicators.

Companies are well advised to locate their decision-making on climate action close to operations, using it as an opportunity to foster innovative thinking.

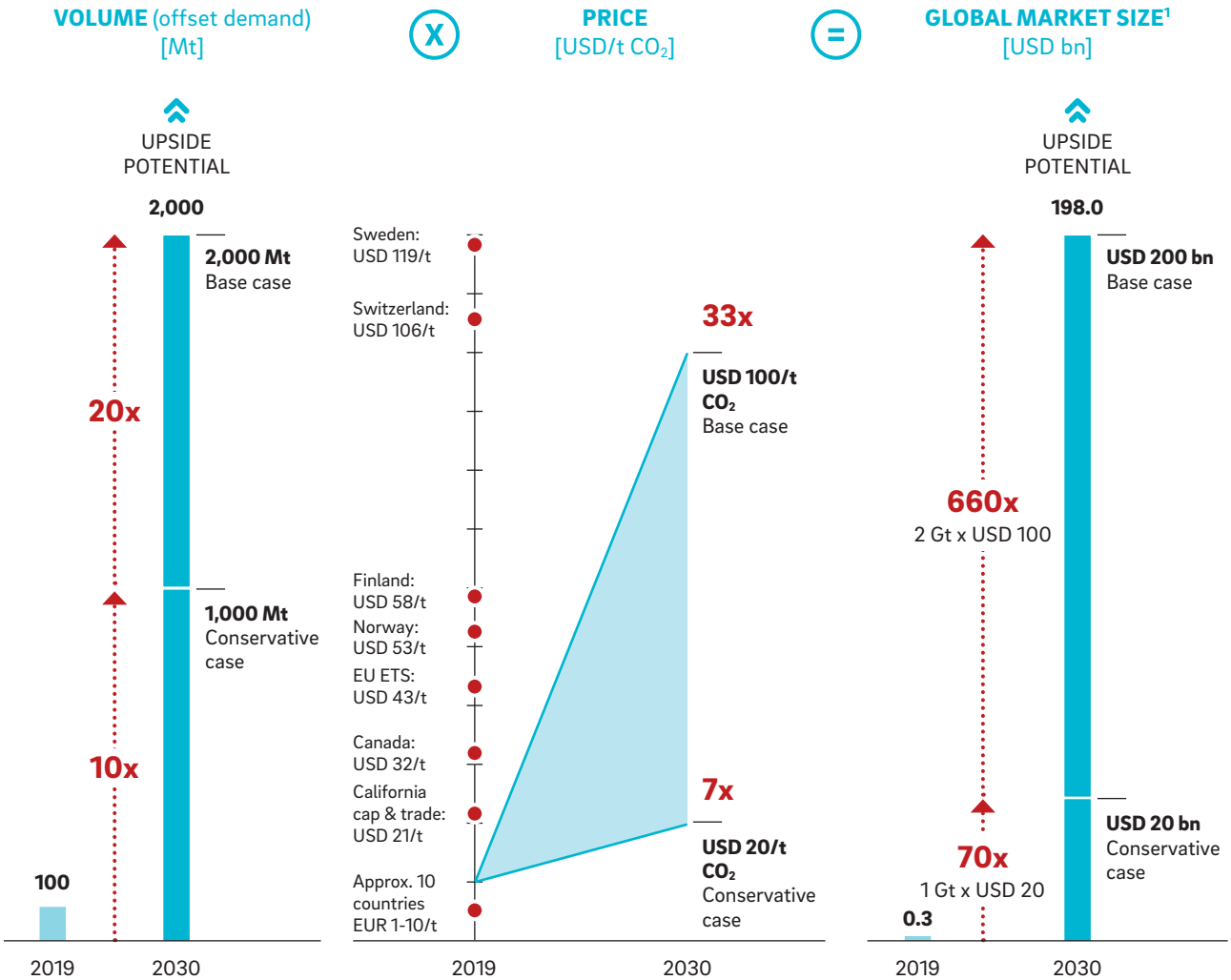
E

Carbon offsets are set to skyrocket

ESTIMATED GLOBAL VOLUME, PRICE AND MARKET SIZE FOR CARBON OFFSETS, 2019 VS. 2030 [MTCO$_2$, USD BN]

To achieve pledges and targets, carbon offset volumes and prices are expected to grow significantly ...

... leading to the development of a sizeable market within this decade



1 All figures are rough estimates and depend greatly on policy, regulation and technological advancement. The focus is on primary credits (price x volume calculation) and vision, dependent on the evolution of the market structure and go-to-market

Source: World Bank; I4CE; Carbon Market Watch; TSVCM Report 2021; Roland Berger

One of the reasons greenhouse gas emissions have not historically been a priority for companies is that little data was available on them in the past. Real-time data on emissions that could be used for managing the day-to-day business and optimizing strategic business decisions did not exist, for example. What was abundantly available, on the other hand, was data on sales, costs, financial performance and so on. Inevitably, these then became the topics that monopolized managers' attention. With today's reporting practices, combined with factors such as carbon taxes and carbon prices, greenhouse gas emissions have become much more visible.

OFFSETTING IS NOT A SOLUTION

Many companies today still rely mainly on offsetting when it comes to climate action. Of the more than 800 companies with emission reduction targets in the MSCI Net-Zero Tracker database, just five percent declare that offsets are not part of their climate action strategy. The reason offsetting is so popular is that implementing it is relatively easy, as it just means buying certificates rather than devising and implementing an end-to-end corporate decarbonization action plan. Accordingly, offset markets are forecast to grow significantly, from 100 megatons of CO_2e in 2019 to between one and two gigatons in 2030, and up to five gigatons in 2050. Prices are expected to follow the same trend, reaching between USD 20 and USD 100 per ton of CO_2e in 2030. That means a seventyfold increase in the value of the offsetting market by 2030 in a conservative case, and an increase to more than 660 times its previous size in a base case. → E

A consensus is emerging, however, that offsetting cannot replace actions to reduce emissions. The SBTi has taken a clear stance on this: Companies should base their targets on emission reductions through direct action within their own business or value chains. Offsets are only considered an option for companies wanting to finance additional emission reductions beyond their science-based or net-zero target.

Offsetting still has a role to play, but it is a secondary one. It can function as a transitional measure to compensate or neutralize emissions that are still being released by companies on track for net zero. Alternatively, companies that have residual emissions after implementing all viable measures can use offsetting to achieve net zero.

To make offsets more effective, market standardization is required. For example, COP26 set initial cornerstones for the global trading of credits, as a way to solve the issue of double-counting of emissions. Additional steps are needed in areas such as additionality (ensuring the carbon reduction would not have happened anyway, without the offset), permanence (the reduction must continue for the entire certification period of the offset), absence of leakage (implementing an offset policy in one place should not lead to emissions being shifted elsewhere) and verification (all these areas should be certified by a third party).

3 – A wide range of tools and solutions are available for companies. Six action areas for accelerating emission reduction plans.

IN THE PREVIOUS CHAPTER we examined some of the common hurdles standing in companies' way in the race to net zero. These obstacles are not insurmountable. Below, we look at six key areas where companies can act to accelerate decarbonization within the next five years – a critical timeframe, as the global carbon budget could be used up in the next four to eight years. Again, different stakeholders working in different industries and regions will face different challenges. The degree to which they must focus on Scopes 1, 2 or 3 differs accordingly – as do the tools and solutions available to them. → F

1

ENERGY DECARBONIZATION

Reduce energy consumption and secure access to clean energy (Scopes 1 & 2)

Companies differ widely in their energy profiles, depending on their industry and location. Large variations also exist between different companies within the same sector. This action area involves exploring low-carbon alternatives for energy use, taking into account the company's profile and the context in which it operates. True, this context became more complex for all corporates following the Russian invasion of Ukraine, which has made security of the energy supply a top priority for firms, especially in Europe. Yet, rather than an additional hurdle to decarbonization, this crisis should be viewed as an opportunity for accelerating the energy transition.

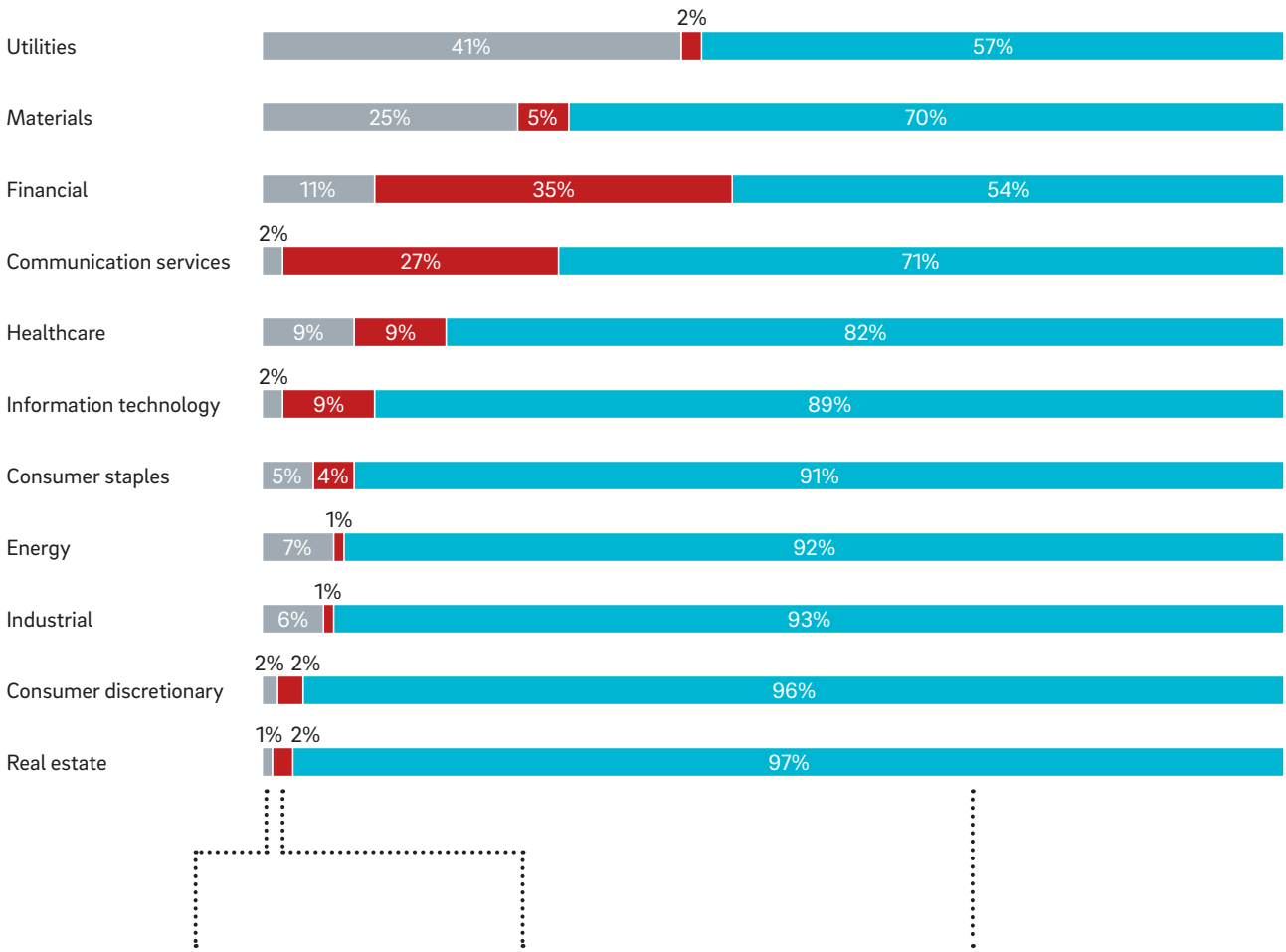
More often than not, low-carbon energy capacity is limited on the market. Most companies – energy-intensive ones in particular – rely on the decarbonization of the energy system of the country in which they are located. Theoretically, options such as electrification and the use of low-carbon electricity, switching to biofuels or moving over to hydrogen may exist, but accessing them at the scale needed in practice is often unfeasible.

Companies can take a number of actions today that will have an impact on their energy-related emissions when it is needed the most – over the next five years. We group these actions under three main headings: reduce consumption, produce your own low-carbon electricity, and switch to low-carbon electricity. → G

F

Different industries, different challenges

INDUSTRY FOCUS BY SCOPE – WITH POTENTIAL TOOLS AND APPROACHES



FOCUS ON SCOPE 1

- Energy Decarbonizer
- Smart de-risking

FOCUS ON SCOPE 2

- Energy Decarbonizer
- Circular economy business model
- Product design and material mix adaptation

FOCUS ON SCOPE 3

- Supply Chain Decarbonizer
- Circular economy business model
- Product design and material mix adaptation
- Digital tool for end-to-end emissions tracking

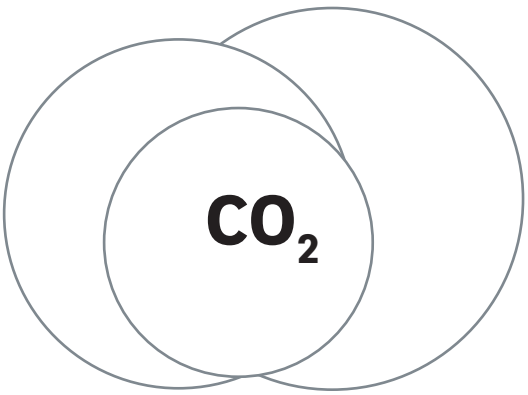
Source: Roland Berger

Share of Scope 1 Share of Scope 2 Share of Scope 3

G

Reduce, produce, buy

IDENTIFYING SOLUTIONS FOR NET-ZERO ENERGY CONSUMPTION



What levers should I include in my portfolio for net-zero energy consumption?

A

How much CO_2 can I cut by...

reducing the carbon intensity of my energy consumption?

1. Increased energy efficiency
2. Redesigning process
3. Rethinking product
4. De-investment

B

How much CO_2 can I cut by...

producing my own emission-free energy?

5. Photovoltaics
6. Own wind park
7. Own dispatchable asset

C

How much CO_2 can I cut by...

buying emission-free energy?

8. Direct green procurement
9. Green PPA
10. Environmental Attribute Certificate (EAC) procurement

Source: Roland Berger

The **Roland Berger Energy Decarbonizer** toolbox is a five-step approach to reducing and decarbonizing energy consumption. Companies follow each step in turn:

- **Step 1:** Build an energy consumption dossier, assessing electricity and other energy usage per site
- **Step 2:** Build an energy consumption reduction dossier, identifying main energy consumption reduction options and making recommendations at both a general and site level, taking into account technology maturity, local context, costs and other limitations
- **Step 3:** Build a low-carbon electricity production dossier, exploring options for generating clean energy (for example, via solar panels, windfarms, geothermal installations), taking into account the local regulatory environment and potential costs and consequences of all options
- **Step 4:** Build a low-carbon electricity purchase dossier, analyzing local regulations and the market structure to identify reliable suppliers of low-carbon electricity, taking into account the local environment and costs
- **Step 5:** Build a detailed pathway based on the previous analyses and defined at both a general and site level

Companies may also consider engaging in ecosystem building. Signaling offtake at a certain price helps de-risk investments in energy generation and production infrastructure and so helps speed up the overall process. Companies that buy energy can join consortia and build captive business cases across the value chain with partners in generation or production and storage to jointly develop investment projects. This is especially necessary in the field of green gases, where large-scale production projects are only now being developed.

CASE STUDY

A Chinese aluminum and textiles manufacturer

A leading Chinese private enterprise operating in the aluminum and textile industries, with more than 15 production sites overseas and a presence in Europe, set out to design a carbon peak and carbon neutral strategy focused on energy supply decarbonization. Based on their detailed decarbonization strategy, they defined various tasks for the decarbonization campaign and then prioritized them, with the first steps taken in 2022. The company calculated that by moving part of their production to areas with better access to hydroelectric and wind power, they could reduce CO_2 emissions by 40-50 million t CO_2 a year as early as 2025. They now expect to see a further reduction of 85-95 million tCO_2 a year by 2040 thanks to the development of solar and wind power generation capacity, optimization and innovations in production processes, and product portfolio optimization. From 2040 they will also employ carbon capture, utilization and storage (CCUS) for the remaining CO_2 emissions of seven to 14 million t CO_2 a year.

A global hotel and resorts network

A large global hospitality group set itself the aim of reducing its Scope 1 and 2 emissions by 45 percent by 2030. With this goal in mind they first analyzed their current status and ambition levels, outlining an initial high-level decarbonization action plan. They then built a roadmap for reaching their 2030 emissions target of reducing CO_2e by approximately 0.25 million tons a year. This roadmap was based on three main areas: identifying energy consumption reduction options, assessing the on-premise solar energy generation potential and business case, and mapping the potential for purchasing zero-emissions energy. They carried out analyses at site level, assessing each situation in detail, including mapping the site equipment, evaluating local photovoltaic potential and analyzing the local low-carbon energy market. Besides significant reduction of emissions, the roadmap identified potential cost savings of close to EUR 10 million a year and a total of around EUR 85 million cumulative CAPEX. All critical information for the roadmap was displayed on a central dashboard. To speed up implementation of the roadmap, they gathered additional insights and mobilized tools and resources, including developing a tracking and reporting system, and involving key stakeholders in upskilling and training.

2

CLEAN TECH DE-RISKING

Accelerate the ramp-up of clean tech with smart de-risking (Scopes 1 & 2)

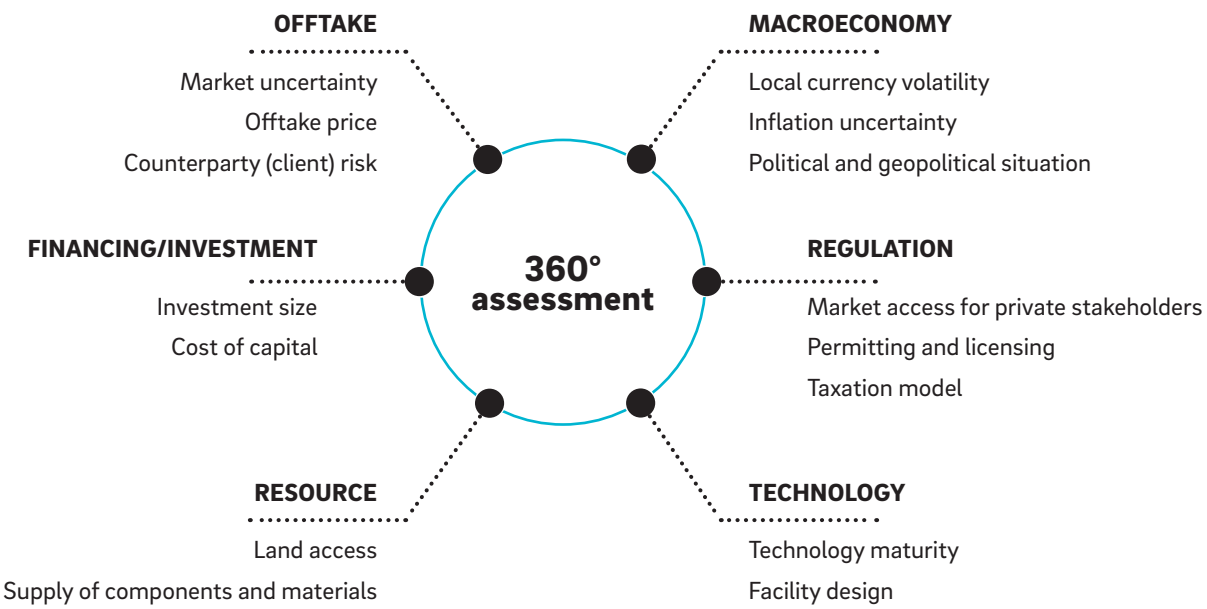
Many processes in the manufacturing industry require clean tech to reduce their energy-related emissions. Often, however, such technologies fail to reach the scale that would make them competitive in terms of pricing. The situation with electrolyzers for hydrogen production exemplifies this conundrum: Due to regulatory uncertainty, a lack of firm off-take commitments, remaining technology risks and immature supply chains, hydrogen project developers still face substantial challenges. As of today, projects cannot be sufficiently de-risked and therefore real investment decisions are few. Yet, investments are required in order to increase the installed capacity and enable improvements in efficiency, which would then bring down the cost of electrolyzers. With the right regulatory framework and sustained public funding however, the industry – both project developers and technology players – can take the necessary steps to scale up the hydrogen sector.

Given the urgency of reducing emissions, it would be wrong for companies to wait for cost reductions to occur or a perfect centralized support mechanism to be deployed. De-risking overcomes this hurdle by supporting private investment with contributions from the public sector, until such time as the technology reaches commercial feasibility. The objective of de-risking is to make an investment case bankable, for example by guaranteeing sufficient revenues for a pilot or by making a new technology or application economically sustainable. It involves identifying and

H

De-risking, Step 1: 360° project assessment

EXAMINE POTENTIAL BARRIERS AND RISKS ACROSS 6 CATEGORIES



Source: Roland Berger

exploring support mechanisms from various sources, which are then combined to form a tailored solution for the project in question, taking into account the business case, region and associated risks.

The **Roland Berger de-risking approach** consists of four steps:

- **Step 1:** Conduct a 360-degree project assessment across key risk categories: macroeconomic, regulatory, technological, resource, financing and offtake. This helps identify key project-specific risks and hurdles
- **Step 2:** Draw up a longlist of potential de-risking instruments. The list should include support measures drawn from similar projects in the past, plus innovative solutions tailored to the project. We also recommend mapping options for tapping into financing. For example, the European Union has allocated more than EUR 0.6 billion to fighting climate change in the period to 2027, and the United States has allocated USD 45 billion for the fiscal year 2023
- **Step 3:** Evaluate a list of de-risking instruments based on four criteria: risk mitigation, feasibility, attractiveness for private stakeholders, and attractiveness for public stakeholders. The most effective instruments should be combined in a solution tailored to the project
- **Step 4:** Implement a tailored solution by engaging with relevant public-sector stakeholders and ecosystem partners. To do so, we advise companies to focus their efforts on making clear the benefits of the demonstration projects for the entire ecosystem

Smart de-risking can substantially improve the feasibility of clean tech lighthouse projects and bring them into operation over the coming five years. Companies do not need to wait until costs fall – they can take action now and have an impact in the short term. Such de-risking measures have a lasting effect, too, progressively creating connections between mechanisms and stakeholders, streamlining project development processes and speeding up the ecosystem development. → H

CASE STUDY

A major steel producer

One of the world's biggest steel producers – a major industrial emitter of CO_2 – wished to assess potential pathways to climate-neutral steel production. The company conducted a comprehensive analysis of two approaches: Equip conventional blast furnaces with CCUS prior to using direct reduced iron (DRI) technology, or take a direct-to-DRI route. The technical, economic and regulatory implications of both pathways were studied in detail, as neither solution had previously been widely applied in a commercial context. However, both were considered crucial for future decarbonization efforts and required broad stakeholder cooperation for de-risking.

After an in-depth assessment, which included evaluating feasibility, supplier mapping and public-opinion testing, the company selected the direct-to-DRI route. A key factor in their decision was that this solution offered a rapid reduction of emissions (including non-greenhouse gas emissions) by switching to natural gas, and full decarbonization potential once the supply of green hydrogen was secured. In addition, DRI technology is flexible and could be integrated into existing steel mills, while maintaining the high quality of the steel.

The company shared its preliminary findings with local authorities as a key input for debate by the government, and secured the support of local authorities and communities. The feasibility assessment showed that cooperation with a broad set of stakeholders, including governmental bodies, was required to bring the project to life due to its level of complexity and uncertainty. Key enablers from the government included developing the supporting infrastructure, creating the right market conditions, speeding up the permitting process and introducing stimulus measures. De-risking measures included identifying funding mechanisms on a national and European level, in addition to establishing clarity on the current regulatory landscape.

3

SUPPLY CHAIN ENGAGEMENT

Reduce purchased emissions by identifying critical suppliers and engaging with them in a targeted manner (Scope 3)

Companies "import" a large part of their emissions through the purchase of intermediate products and "export" emissions through the use of final products by consumers. This means that they cannot achieve net zero without ensuring the decarbonization of their suppliers and offtakers: Corporate decarbonization must involve the supply chain.

For OEMs, in particular, Scope 3 emissions account for the largest share of their emissions – usually between 90 and 99 percent in the case of automotive and machinery OEMs. This is driven mostly by use of the products sold by the OEMs, which can be tackled via product design and circularity (see #4 below). At the same time, up to 40 percent of the total emissions are due to goods and services bought by OEMs. Clearly, working with suppliers to reduce emissions is a matter of urgency for OEMs.

As discussed above, supply chains are increasingly complex, involving large numbers of suppliers. They show limited correlation between component criticality from a business point of view, component criticality from a climate strategy point of view, and the maturity of the suppliers.

The **Roland Berger Supply Chain Decarbonizer** is a toolbox that can help companies reduce their upstream Scope 3 emissions. Creating a roadmap for immediate actions will help achieve tangible results within the critical timeframe of the next five years, putting companies ahead of the competition in terms of their carbon footprint. The toolbox comprises four steps:

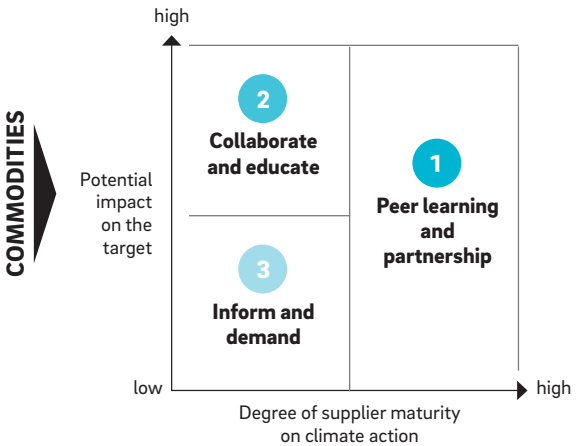
- **Step 1:** Analyze suppliers' profiles, emission drivers and levers. This includes segmenting and prioritizing suppliers on the basis of their impact on emissions, analyzing emission drivers for key suppliers, and developing a dossier on decarbonization levers, including technology and material alternatives
- **Step 2:** Define an ambition level, targets and a supplier decarbonization curve. Suppliers should be matched with decarbonization levers from Step 1 and emission targets derived on this basis. It is also advisable to identify options for switching to more ambitious or mature suppliers

!

Supply Chain Decarbonizer, Step 3: Engage with suppliers

ADJUST STRATEGY IN LINE WITH SUPPLIER IMPACT AND MATURITY

SUPPLIER SEGMENTATION



POTENTIAL STRATEGIES

1 **Peer learning and partnership**

Jointly establish a collaborative platform for sustainability in the industry

2 **Collaborate and educate**

Run supplier conferences/workshops to engage with supplier base and share best practices

Employ a train-the-trainer approach to educate supply chain community on systems and tools

3 **Inform and demand**

Simply issue supplier notifications/letters stating that they should comply with set targets to support supply chain sustainability priorities

Renegotiate suppliers' contractual commitments (volume, contract duration)

Source: Roland Berger

- **Step 3:** Engage and align with suppliers to build commitment. In this step the company discusses and validates the identified emission reduction targets with top suppliers, and provides them with a toolbox for decarbonization. Other suppliers can be engaged with via webinars or workshops, providing training on cutting emissions and informing them about targets and reporting mechanisms
- **Step 4:** Draw up and implement a procurement action plan. This should include a reviewed handbook for supplier management. Supplier commitment can be enforced via contracts, and ongoing support provided

Manufacturers' approaches to engaging with suppliers (Step 3) should depend on how critical the supplier in question is in the supply chain, and how ambitious the supplier is with regard to climate action. For important suppliers with low climate action ambitions, a "collaborate and educate" approach is needed, aimed at improving the supplier's climate action performance. For non-critical suppliers with low climate action ambitions, the approach should be more direct: The manufacturer can ask the supplier to comply with targets, or renegotiate their contracts. Manufacturers can support suppliers with high climate action ambitions by establishing a collaborative platform. If the engagement with existing suppliers is ineffective, manufacturers can also look for alternative suppliers with more efficient production processes or located in a country with better access to low-carbon energy, or simply closer to the manufacturer. →

CASE STUDY

A major fast-moving consumer goods company

A major fast-moving consumer goods (FMCG) company wished to identify relevant partners and alternative suppliers to help decarbonize their road freight logistics in Europe. Based on a country-by-country review of infrastructure and a comparison of different technology options, the company drew up four different scenarios. The costs for each scenario were compared to a full-fledged total cost of ownership (TCO) model, including financing, depreciation, fuel, and margins for different use cases.

Having chosen one of the options, the company then drew up a detailed roadmap for the rollout, comprising three phases: a proof of concept and ecosystem building, a procurement ramp-up and scaling of projects, and a large-scale rollout aimed at achieving a 90-percent reduction in carbon emissions by 2030. For the first of these phases, four possible partnership models were developed: (i) outsourcing, which would allow current projects to continue with slight adjustments but limit control by the company; (ii) ecosystem development, which would give the company an opportunity to shape the industry but have an impact on human resources; (iii) asset ownership, in which the company would buy its own vehicles, infrastructure or low-carbon fuels and then lease them out to operators, giving the company a strong sense of control but directly impacting the balance sheet and resource allocation; and (iv) insourcing, in which the company would become a logistics operator itself, even to the extent of offering its services to third parties – a potential business opportunity but one that involves building an entirely new business, with all the associated risks.

A large aerospace and defense OEM

A major aerospace and defense manufacturer ran a project to develop a sustainability roadmap focused on supply-chain decarbonization. The company employed a two-phase approach. First, they carried out an "as-is" assessment focused on segmenting and prioritizing suppliers to assess their impact and maturity in terms of ESG. Prioritized suppliers received a tailored engagement concept with the objective of jointly defining emission reduction targets that were aligned with those of the OEM. The OEM was also involved in developing a strategy and processes to achieve these targets. A key implementation measure for the OEM was continuous engagement with suppliers, while gradually integrating climate action requirements into the procurement process.

4

PRODUCT DESIGN AND CIRCULARITY

Limit products' carbon footprints by rethinking their design and material mix (Scopes 1, 2 & 3) or leveraging circularity

Decarbonizing specific inputs or components can be difficult for some companies. Instead, they may decide to rethink their product's design – changing the material mix to include materials with similar features but a smaller carbon footprint, adjusting the product's dimensions (especially its weight), or extending the component lifecycle through reuse and recycling.

Old-fashioned business models that follow the "sell more" mantra are a potential brake on bold innovation. Switching to a circular economy often requires a complete rethink of the company's business model, operations and product portfolio. Such changes cannot be implemented instantly, making the need for action urgent. In order to be able to scale and industrialize new product designs within a few years, companies would be well advised to start now. They have a range of levers at their disposal:

- **Rethinking product design** (see above): Introduce renewable, recycled or highly recyclable inputs into production processes, limiting waste and related pollution. This can include recovering resources from previous products (asking customers to return them when used), substituting current components with recycled components collected by an external partner, or establishing a symbiotic relationship with another company (using one company's waste as the other company's inputs)
- **Product sharing:** Maximize the use of idle assets across a community, while providing affordable, convenient access to higher-quality products and services
- **Product-as-a-service:** Shift the focus from sales volumes to product performance and lifetime. This creates an incentive for manufacturers to maximize product resilience and repairability
- **Product life extension:** Design products for repairability, upgradability, reusability and ease of disassembly (enabling easy reconditioning and reselling). The higher prices of such products are offset by almost guaranteed resales

5

ORGANIZATION

Unleash employees' creativity with a corporate culture focused on sustainability (Scopes 1, 2 & 3)

Accelerating climate action requires a change in corporate culture. The company's decision-making process needs to be grounded in a purpose and vision in which sustainability and making the business climate change proof in the long term is an overarching target. The company's decision-making should give non-financial dimensions a significant level of priority. Alternatively, sustainability targets can be given a financial impact so that they are better integrated into business steering. At best, decision-making is decentralized so that sustainability percolates through to day-to-day decisions without the need for approval from a special department.

Transforming corporate culture involves more than introducing new indicators and reporting processes – it involves a change of mindset. The new culture should be built around the whole organization being engaged in a purpose that balances long-term competitiveness, sustainability and performance with short-term profits. We recommend that top management develop a purpose, vision and mission that reflect a holistic approach to environmental, social and governance (ESG) factors, and live out these values in their day-to-day activities. The vision and mission should be translated into a strategy, including targets for management. Ideally, the company draws up a clear roadmap with key milestones for each of the targets and KPIs (key performance indicators). It then communicates its strategy to the organization, and managers allocate their time accordingly.

Transforming a company's culture requires a dedicated process, combining mobilizing employees to design innovative approaches with defining centralized standards and targets. First, the top management should provide guidance and input. Employees need to be encouraged to propose new ideas and innovative approaches. Next, a cross-department taskforce gathers the proposed ideas centrally to ensure efforts are aligned with the main goal. The role of this taskforce decreases over time as employees are progressively empowered and the sustainability vision and roadmap are integrated into the company.

When building a new culture, it is crucial that the day-to-day business is consistent with the company's goals.

Firms can achieve this by integrating sustainability indicators into their performance assessments and decision-making processes (including HR processes such as compensation and promotions). Employees need to be clear that taking climate action into account in their day-to-day decisions will have a positive impact on their careers, and vice versa. This will also boost employees' willingness to try out innovative ideas.

A new culture also requires adjustments to employees' skills and the tools that they use. Staff at all levels need a knowledge of climate action: Top managers must understand the challenges and be willing to drive and reward change; department leaders need to understand their mission and identify ways to tackle the challenges; and lower-level employees need a broad understanding of climate topics and specific knowledge of matters affecting their area of work directly. All staff should show conviction and a willingness to tackle climate change – something that can take time for a firm to build internally.

Building a new culture and adjusting employees' skills and tools leads to a sharp increase in a company's climate action potential. Moreover, the quicker a company refocuses its corporate culture, the more it will benefit from the lasting effects of fostering employees' creativity in the field of climate action.

The sooner a company refocuses its corporate culture, the more it will benefit from employees' creativity in the field of climate action.

CASE STUDY

A major North American pension fund

A large North American pension fund conducted a project to build a strategic vision for 2025. To inspire the new vision, the firm conducted a benchmark study and performed an analysis of the market environment and macro-trends. Involving employees in joint action requires a special approach to ensure buy-in and a personal desire to contribute on the part of everyone in the organization. For this reason, the company set up a number of working groups whose task it was to shape strategic initiatives supporting the new vision, while at the same time ensuring constant stakeholder engagement. The working groups jointly developed eight strategic initiatives, motivating employees on all levels to support the company's strategic vision for 2025.

In addition, the firm analyzed and subsequently adjusted its sustainability procedures at both Board and operational level. For instance, the Board's priorities and dashboard were aligned with the operational roadmap. This enabled the company to identify and start addressing previously hidden issues, such as the limited understanding and recognition of joint efforts in reaching specific objectives, limited visibility on the activities of subsidiaries, and non-systematic communication between subsidiaries.

6

CLIMATE ACTION DIGITALIZATION

Track progress and optimize the decarbonization pathway using digital tools and artificial intelligence (Scopes 1, 2 & 3)

To build an effective emission reduction plan, companies not only need to understand what the sources of their emissions are, they also need to track progress on targets and optimize the emission reduction plan accordingly. To do this, they must collect data and track components along the entire product cycle, analyzing emissions related to their own production (Scopes 1 and 2) and establishing the precise carbon footprint of any purchased goods and services (Scope 3). They also need to understand what levers they have at their disposal, and what their impact could be in terms of costs and CO_2 reduction.

Understanding current emissions, modeling future emissions and forecasting the impact of reduction levers all rely on access to reliable, end-to-end data. Often, however, problems arise with regard to data availability and quality – particularly where the data in question, be it internal or external, was not previously collected. It is advisable for companies to ensure the compatibility of different systems used for storing data, both internally and externally: Often, such systems were not originally designed to work effectively together.

A useful approach for companies is to build a climate action digitalization strategy. This involves carefully evaluating the various tools than can be integrated with existing systems to enable footprinting, action tracking, forecasting, optimization and supplier engagement. Such tools are increasingly available on the market, although many remain in the development or prototype phase. Achieving greater transparency over their emission profile and the effectiveness of reduction levers helps companies speed up their climate action plans and should be prioritized in the short term.

CASE STUDY

A leading international consumer goods producer

A leading international producer of consumer goods wished to establish processes and IT tools for product lifecycle assessment and environmental footprint reduction. It drew up a list of 16 different impact categories – from greenhouse gas emissions and water use to impact on biodiversity. The project began with an analysis of the various environmental lifecycle assessment methodologies along the whole value chain available on the market, including their technical requirements. The tools and processes currently in use by the company were then scrutinized and a gap analysis performed.

A benchmarking exercise and an extensive tool screening process identified solutions that enabled the company to both track the environmental footprint and model the impact of reduction levers. Finally, appropriate IT architecture and processes were developed.

Conclusion

The onus is on companies to take urgent action to speed up their emission reduction plans. Many businesses have started out on their climate action journey, but their current targets are insufficient. What they do in the next five years will be crucial both for the planet and for their own competitiveness. It's time for companies to take decarbonization to the next level.

Credits and copyright

AUTHORS

YVONNE RUF
Senior Partner, Member of Supervisory Board
+49 69 29924 6334
yvonne.ruf@rolandberger.com

DAVID FRANS
Senior Partner
+31 20 7960 621
david.frans@rolandberger.com

JAN RABE
Senior Partner
+49 89 9230 8126
jan.rabe@rolandberger.com

DARIA KOROLEVA
Partner
+49 89 9230 8126
daria.koroleva@rolandberger.com

SIMON ELSEN
Project Manager
+49 30 399 27 3591
simon.elsen@rolandberger.com

GREGOR GEISLER
Project Manager
+49 89 9230 8407
gregor.geisler@rolandberger.com

ANTOINE VERVANDIER
Senior Consultant
+33 1 70 92 89 35
antoine.vervandier@rolandberger.com

USTYM MYTSAK
Consultant
+49 30 39927 3528
ustym.mytsak@rolandberger.com

OKSANA POLISHCHUK
Consultant
+49 30 39927 3334
oksana.polishchuk@rolandberger.com

We welcome your questions,
comments and suggestions

WWW.ROLANDBERGER.COM

September 2022

ROLAND BERGER is the only management consultancy of European heritage with a strong international footprint. As an independent firm, solely owned by our Partners, we operate 51 offices in all major markets. Our 2700 employees offer a unique combination of an analytical approach and an empathic attitude. Driven by our values of entrepreneurship, excellence and empathy, we at Roland Berger are convinced that the world needs a new sustainable paradigm that takes the entire value cycle into account. Working in cross-competence teams across all relevant industries and business functions, we provide the best expertise to meet the profound challenges of today and tomorrow.

PUBLISHER:
ROLAND BERGER GMBH
Sederanger 1
80538 Munich
Germany
+49 89 9230-0

22_2078_TAB