BCG

Executive Perspectives

BCG is proud to be the exclusive consultancy partner to COP26

Inside COP26: Kickstarting a decade of delivery

November 2021

BCG Executive Perspectives

AGENDA

OVERVIEW

- Context
- Key wins and remaining challenges
- Implications for business leaders

DEEP DIVES

Outcomes in each area and specific implications

Overarching global initiatives

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Going into COP26, the science called for a step-change in approach

~50% Reduction in emissions required by 2030 to limit warming by 1.5°C by 2100, in line with Paris Agreement aim to limit average global temperature increase to "well below 2° C" and "pursue efforts for 1.5° C" above preindustrial levels

Warming well underway

1.2°C

Current increase in global average temperatures above preindustrial levels

2.7°C

Warming projected by 2100 with pre-COP26 policies

Significant risk to human life

800M

People at risk from rising sea levels on pre-COP26 trajectory

~1.7Bn

People experiencing severe heatwaves on pre-COP26 2.7°C trajectory

High economic cost

-25%

Loss in GDP by 2100 on current climate trajectory

Source: IPCC Assessment report 2021; Climate Action Tracker; UNEP Emissions Gap Report 2021; Guardian; National Bureau of Economic Research; Climate Action Tracker; BCG

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COP26 faced headwinds: hopes were high but expectations low

We witnessed major climate disasters in 2021

Catastrophic flooding across Germany and neighboring countries left **more than 160 people dead**

'Nothing left': A catastrophe in Madagascar's **famine-hit south**

Yet skepticism remained around achieving progress at COP26

Glasgow Climate Summit Faces **'High Risk of Failure,'** U.N. Leader Says

Pivotal **climate summit dogged** by COVID and equity concerns

High hope and demand for change

World's youth take to the streets again to battle climate change

Global warming will hit 1.5C by 2040, warns IPCC report

With Time Ticking Down, **Hope Is Waning** for a Climate Deal

Cop26 talks **will not fulfil aims of Paris agreement**, key players warn

Sources: Press releases

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Progress made in key areas, but essential to keep up momentum

COP26 MADE PROGRESS IN KEY AREAS AGAINST SIGNIFICANT HEADWINDS

1. **90% of world now committed to net zero** after pledges from India and others
2. **"Paris Rulebook" completed**: creation of international carbon market and stricter emissions disclosures
3. **"Phasing down" of coal and fossil fuels highlighted** for the first time in a COP final agreement
4. **Joint policy commitments** on **deforestation, methane,** and **international coal financing**
5. **Reinvigorated international collaboration**: joint US-China declaration on climate collaboration, $8.5 billion Just Energy Transition Partnership for South Africa, etc.
6. **Private sector mobilization**: 5,200+ businesses and approximately 450 financial institutions (40% of financial assets) committing to science-based net-zero targets
7. **Growing private-public collaboration** including global initiatives to develop, scale, and deploy the technologies required to address hard-to-abate sectors
8. Steps toward robust and **transparent disclosure and reporting** of private sector plans
9. Agreement for developed countries to **double collective funds for adaptation by 2025**[1]

IMPORTANT TO BUILD MOMENTUM POST-COP 26, INCLUDING:

1. **Revisiting national ambitions** on mitigation more frequently in the 2020s, accelerating the 'ratchet'
2. Rapidly developing and implementing **just and effective policies** to deliver on ambition
3. Developing robust and transparent **private-sector abatement plans** and making short-term progress
4. Formulating effective **adaptation plans** – which, together with **'loss and damage'** likely to dominate COP27

1. Based on 2019 pledges; Sources: COP26 announcements, BCG

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Deforestation pledge

Launch of the First Movers Coalition

Guinea delegate on behalf of G77

Loss & Damage rising up the agenda, with more to do

~40,000 delegates

"You are deciding whether my generation will get to live in a habitable world; you are deciding whether we are worth fighting for...." - *Vinisha Umashankar, 15 from India*

Civil society & youth participation

India's Net Zero pledge

Disappointment felt by much of society

Methane pledge launch

Paris Rulebook complete

100+ world leaders

US's John Kerry and China's Xie Zhenhua

Re-invigorated international collaboration

Finance mobilization

Public-private collaboration

End of coal accelerated, but not definitively

Key takeaways for business from COP26: make bold moves, embed the climate transition, and accelerate change through ecosystems

Engage quickly and set direction

1. **Quickly move beyond pledges to action:** Start with **baselining and 'de-averaging' your emissions** across the value chain and by country[1], **understand what it takes in each stage** to align to 1.5°C
2. **Adapt your assets and operations for a warmer world:** Build adaptation and resilience into your business plans and operations. Prepare for impacts relating to loss and damage
3. Prepare for **deviations in local transitions**, but do not wait to take action
   If you pursue consistent global climate ambition, prepare for and navigate challenges locally
4. Explore unique opportunities to **compete for market share in a low-carbon economy.**
   Drive innovation, leverage new government programs and public-private initiatives

Collaborate with your ecosystem

5. **Work with policy makers** and local governments to set a **'level playing field',** align advocacy agenda with climate commitments
6. **Collaborate with, co-invest in, and promote incentives for players across the value chain** to adopt climate-friendly practices and support early demand signals for clean technologies[2]
7. **Raise awareness and educate the end consumer** – to capture value over time (e.g., price premiums)
   Engage with and listen to youth actors – to create open and constructive dialogue and secure "social licence" to operate

Wire the whole organization

8. **Bring employees on the journey early on:** embed climate culture in behaviors, L&D, incentives, and workforce planning
9. **Don't treat climate in 'siloes':** (i) set an operating model with consistent sustainability initiatives and targets across divisions, (ii) drive strong climate accountability and progress tracking; (iii) embed in capital planning practices, financial assumptions, and ROI assessment

1. Consider the depth of Scope 1 and 2 emissions, and the breadth of Scope 3 emissions; 2. Especially where there is no current solution at scale or where infrastructure is critical
Source: COP26 discussions and announcements; BCG experience and analyses

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Looking ahead | Monitor developments in climate tracking and reporting, carbon markets, voice of civil society, and adaptation

Four main areas with direct business impact

Consistent climate transparency requirements

Expect more stringent monitoring

IFRS International Sustainability Standards Board – work on minimum ESG disclosures

UK corporate requirements to report **net-zero transition plans**[1] – potential to set precedent

Tightening of SBTi framework[2]**:** Increased minimum ambition in corporate target setting to '1.5°C'[3]

Climate policy commitments

Likely to incentivize curbing emissions, and speed up innovation and deployment

EU's Fit for 55 (proposed actions to reach EU's 2030 goal) – including EU Carbon Border Tax proposal

US upcoming legislation (e.g., Build Back Better Act: $500 billion to combat climate change in draft)

Voice of civil society

Expect higher demand for sustainable products, climate transparency and circularity

Civil society increasingly leading calls for more ambitious climate action such as YOUNGO

Consumer demand: 23% of consumers say they are buying more sustainable products today (vs 2019)[4]

Increasing focus on adaptation

Likely closer scrutiny by stakeholders on resilience of business operations

COP27 Egypt likely to focus on adaptation, resilience, and 'loss and damage' funding

Launch of new frameworks for transparency on country, corporate, and supply chain resilience (such as UN Global Resilience Index, Race to Resilience metrics framework)

1. From 2023; 2. Science Based Targets initiative (SBTi), the global body enabling businesses to set emissions reduction targets in line with climate science; 3. Previously was 'well below 2°C. 4. **Question text: "Which of the following best describes how much you are doing each of the following activities today compared with before the COVID-19 pandemic (i.e., 2019)?"**; BCG COVID-19 Consumer Sentiment Survey, May 2021. (N = 4,558, unweighted, representative within ~3% of the US census)

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Context | Paris Agreement set the goal and framework for mitigation and adaptation, and was ratified by 196 countries

COP26 is the 26th conference of the parties to UNFCCC[1] through which the international community seeks to **address climate change**

OUTCOME

At COP21 in Paris, parties agreed to **hold the average global temperature increase** to **"well below 2°C","pursue efforts for 1.5°C"** (mitigation) and establish a global goal on adaptation. Given developed countries were responsible for **approximately 80%**[2] of historical emissions, parties agreed on **"common but differentiated responsibilities"** for developed and developing countries.

MITIGATION

Agreed efforts to reduce emissions globally, in line with best available science—approximately 45% by 2030 and net zero by mid-century

ADAPTATION

Strategies to enhance adaptive capacity, strengthen resilience, and reduce vulnerability to climate change

TRACKING

Each party needs to plan and report on its intent through **NDCs and LTS to the Secretariat** on a five-year cycle. No mechanism forces a country to set specific targets, but **each target should go beyond previous targets**. Parties agreed to progressively revise NDCs every five years

- **Nationally Determined Contributions (NDCs):** 2030 emissions reduction targets and post-2020 climate actions
- **Long Term Strategies (LTS):** Articulate mid-century climate and development goals

COP26 in Glasgow is the first Conference of the Parties since the first five-year deadline for revisions

1. UN's Framework Convention on Climate Change; 2. Center for Global Development

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Priorities going into COP26 | Keep 1.5°C within reach via a combination of policy and private action, with four areas of focus accounting for 50%+ of emissions

Ambition & acceleration

Update NDCs to **narrow the emission reduction gap to 2030**

Complete "Paris Rulebook," deliver $100 billion financing to developing countries, accelerate "ratchet"

Policy support

Nature

6%[1]

Deforestation |
Avoid and reverse deforestation

Energy

~20%[1]

Methane |
Reduce methane emissions

20%[1]

Coal |
Phase out coal

Transport

7%[1]

Automotive |
Phase out internal combustion engine

Private action

Finance |
Mobilize private finance via Glasgow Financial Alliance for Net Zero (GFANZ)

Corporate |
Commit to Net Zero, including via Race to Zero

1. Based on ~53 Gt global GHG emissions, 2019; For methane: estimated Co2 equivalent based on: 342 mton/yr and x28 more powerful than CO2 on a 100 year view and 86x in the 20 year view (taking into account their natural degradation in the atmosphere);
Note : Does not represent the position of the UK Presidency; Source: CAIT; IEA; World Energy Outlook; GHG Protocol; BCG analysis

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Outcomes | Overdelivered given the politics and underdelivered given the science

Major progress on multiple fronts. Governments increased commitments in some critical areas but fell short in others. Strong optimism from private sector mobilization and stronger public-private links.

Quick action, transparency, and tangible results are key next steps

1. **Ambition and acceleration** | Glasgow deal overdelivered on expectations. Paris Rulebook complete including global carbon market. 90% of world now committed to net zero (vs 30% in 2019); US-China issued joint declaration on climate collaboration
   But limited progress on loss and damage, failure to deliver $100 billion pledge, and still insufficient 2030 commitments
2. **Deforestation** | 141 governments pledged to reverse deforestation by 2030 - critical to building coalitions and transparency
3. **Methane** | Strong pledge from 105 governments can facilitate 'quick win' on abatement – important to deploy existing tech
4. **Coal** | Coal phase-out pledge not signed by major coal emitters, but halting coal funding by 2022 is a positive sign
5. **Auto** | Industry commitments in 2021 accelerated shift to EVs[2]; but major governments did not sign ZEV[3] pledge
6. **Finance** | ~450 financial institutions ($130tn AUM[4]) committed to net zero; step toward standard ESG reporting
7. **Corporate** | 5,200+ firms joined Race-to-Zero campaign, now need to shift from commitment to tangible action
8. **Collaboration** | A number of global initiatives aim to bridge early demand gap and accelerate tech across high emission sectors (including Glasgow Breakthroughs, First Mover Coalition, Breakthrough Energy Catalyst, Green Public Procurement)

Early COP26 reflections

Rich Lesser, BCG Global Chair:

Michel Frédeau, BCG Center for Climate & Sustainability:

1. NDCs = Nationally Determined Contributions (2030 emissions reduction targets and post-2020 climate actions); 2. Electric Vehicles; 3. ZEV = Zero Emission Vehicles 4. AUM = assets under management
Source: COP26 announcements, BCG analysis and experience

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1

Progress made, by large emission reduction gap remains

Business implications

Governments | ~90% of world now committed to net zero and Paris rulebook now completed, but still a large abatement gap and unmet $100bn pledge

~ 90% of world GDP now covered by net zero[1]

India pledged NZ by 2070, 1Gt GHGe[2] reduction by 2030[3]

US-China joint declaration to cooperate on methane, decarbonization, deforestation and energy transition[4]

Completed Paris Rulebook, Article 6's rules on international carbon markets and emission disclosures

Request for countries to review and strengthen **NDCs[5] in 2022; phase down** of coal and **phase out of** inefficient fossil fuel subsidies

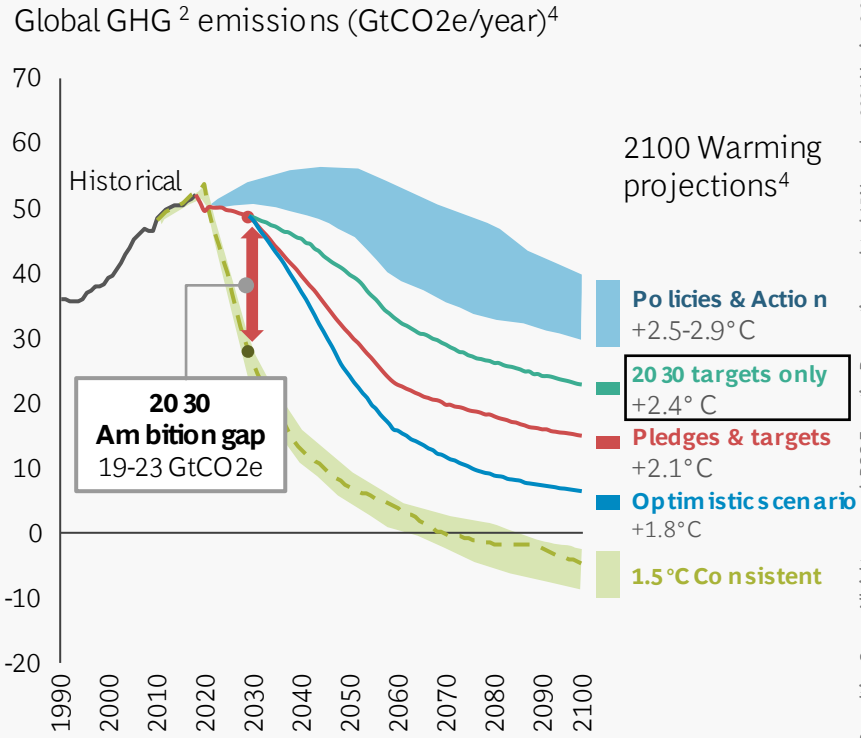
Developed countries agree to double collective adaptation finance by 2025[6]

But two areas fell short

Loss and damage: Standalone fund rejected by developed nations (including US, EU, Australia) – but loss and damage now firmly on COP agenda

$100 billion funding commitment was still not delivered – yet the importance of this was reiterated in the decision text

Mid-COP26 analysis showed latest 2030 commitments could deliver 2.4°C trajectory



Action is critical to realize this and further potential

1 Investments

Focus on **targeted investments** alongside MDBs[8] or public funding (e.g., SA transition)

Factor in climate becoming part **of trade negotiations**

2 Right initiatives

Choose initiatives (among vast number) **that can truly drive change in local regions and sectors**

3 Focus on nature

Determine potential implications for your business and **identify source of advantage**

4 Just transition

Deploy reskilling programs for workforce in sectors most impacted (like coal)

1. Versus 30% in 2019, 2. Green house gas emissions, 3. Along with 50% of 2030 energy from renewables and 45% reduction in CO2 intensity by 2030, 4. Encouraging decarbonization, mitigating methane emissions, maximizing benefits of clean energy transition and eliminating global illegal deforestation, 5. Nationally Determined Contributions (NDCs): 2030 emissions reduction, 6. From 2019 levels by 2025 targets; 7. Climate Action Tracker November 2021 update; 8. MDB = Multi-development banks;
Source: COP26 announcements, Climate Action Tracker, press releases

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1

Some progress, but still insufficient funding

Business implications

Governments | Despite some progress and commitments at COP26, adaptation efforts remain underfunded – driving an urgent need to act

COP26: Positive signs from measurement launches and funding pledge

UN Race to Resilience metrics framework launched – to measure resilience work progress

Global Resilience Index launched to offer transparency on country, corporate, supply resilience

Developed countries agree to double collective adaptation finance from 2019 levels by 2025

New funding by some developed countries: **£290m** from the UK; **about $15m** funding for NAP[1]

Non-state actors lead the way on loss and damage, Scotland: first subnational fund

But adaptation still underfunded

Only about $50bn deployed in 2020 (**only 8%** of total climate financing[2])

Much **lower than required about $180bn** pa by 2030

Low private-sector funding for adaptation (**$2bn**)[3]

Yet some multilateral vehicles of concessional finance set up –Adaptation Fund, ADF[4, etc.]

1 Across industries

Build into **your business operations**

Invest in early warning signs to avert and minimize damage

Work with governments and industry to **codevelop investable adaptation projects** considering investor returns

2 Investors

Assess and factor-in vulnerability and climate impact on operations and supply chains into business decisions

Leverage emerging frameworks[2]

3 Food

Innovate, such as drought-resistant seeds

Diversify and insure crops and stock

Encourage judicious fertilizer use, nutrient management, and soil testing to improve fertility

4 Energy

Investigate how climate might change energy demand

Build **resilient infrastructure** and **back up electricity capacity**

Adaptation and 'loss & damage' expected to be the focus of COP27 in Egypt

1. National Adaptation Plan Global Network – from Canada, US, Germany, UK, Ireland, 2. e.g., Global Resilience Index, Green Climate Fund's Adaptation impact indicator; 2. For both mitigation and adaptation, 3. In 2020 – from: Climate Policy Initiative - Global Landscape of Climate Finance 2021 report; 4. African Development Fund; Sources: 'Delivering on the $100 billion climate finance commitment and transforming climate finance' – UN; COP26 announcements, National Adaptation Plan Global Network, press releases, UNFCCC; Global Landscape of Climate Finance 2021 – CPI; BCG analyses

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2

Protecting forests critical to maintain natural sink

Business implications

Deforestation | 141 governments pledge to reverse deforestation – use momentum to build coalitions, transparency, support suppliers

6% of 2019 global emissions – due to loss of natural sink

7% lower forest cover quality (vs 2000)

Rainforests (including Amazon) at risk of **becoming net carbon source**

75% of deforestation due to agriculture[1]

COP26: Strong commitment by states and private sector, but critical to focus on gross deforestation, action and control next

Public support

141 countries (91% of forests[2]**)** committed to reversing forest loss by 2030 ($19 bn) – but no agreement on gross (preferred) vs net deforestation[3]

FACT[4]: 28 states (75% of trade) to stop forest loss from ten main commodities by 2030

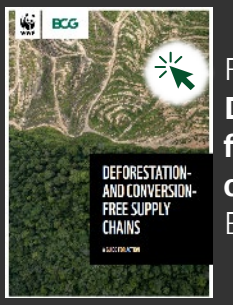
AIM4C[5] ($4 bn) to accelerate agri-innovation

Private action

33 FIs (AuM ~9tn) commit to deforestation-free portfolios by 2025

AFR100: commitment to restore 127m ha land by 2030

> Forests have **potential to reduce carbon globally** by more than 1/3 – we need to approach this issue with same seriousness as decarbonization.
> *Joe Biden, US President*



Read more on: **Deforestation-free supply chains**, in WWF-BCG's report 2021

> It is very important to not only be carbon neutral, but also to be **nature positive**. We must act now.
> *Ivan Duque, President of Colombia*

1 Own supply chain

Ensure full transparency between suppliers and customers

Conduct rigorous **due diligence and implement certifications** (RSPO[6])

2 Innovate

Develop **plant-based and cultivated meat** products

Identify **alternatives to palm oil**

Expand **consumer awareness and marketing**

3 Engage governments

Strengthen regulations with governments (e.g. mandatory **due diligence obligations**)

Engage in **collective action through coalitions,** build system response, to mitigate 'leakage' issues[7]

4 Invest

Invest in **lighthouse projects** (including REDD+[8] such as LEAF[9])

Invest in **restoration projects**

Ensure both carbon integrity and co-benefits (biodiversity and community)

1. Inability to improve operations in very segmented supply chains with small farmers such as palm oil, beef, soy and timber companies; 2. Incl. major forest countries: Brazil, Indonesia, Russia, China, Congo, US, UK; 3. Importance of gross deforestation commitment as net deforestation targets equate the value of protecting native forests with that of planting new ones; 4. FACT = Forest, Agriculture and Commodity; 5. Agricultural Innovation Mission for Climate - joint US-UAE initiative, uniting participants to accelerate investment and other support for agriculture and food systems innovation; 6. Roundtable of sustainable palm oil 7. Others continuing to engage in these practices; 8. REDD = Reducing emissions from deforestation and forest degradation, 9. LEAF = Lowering emissions by accelerating forest finance . Sources: FAO, CAIT; IEA; World Energy Outlook; GHG Protocol; Global Forest Watch; WWF; Forest500, Supply Change, COP26 discussions and announcements; BCG analyses

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3

Methane reduction can present a quick win

Business implications

Methane | Strong pledge from 105 governments can facilitate 'quick wins' on abatement - where tech solution already exists

10+ **years of atmospheric lifetime** (vs CO2: 100+ years)

28x more powerful than CO2; second-most abundant human–caused GHG[1]

Readily available solutions could reduce emissions by **45%** by 2030

Most measures can be implemented at **low cost**, or even confer savings

COP26: 105 governments (50%+ of methane emissions) commit to collectively reduce emissions by 30%+ by 2030[2]

Fulfilling the pledge could deliver approx. 1.5Gt GHG[1] reduction by 2050

Risk exists not as individually binding pledge – **collective only**

EU: establishing **enforcement framework** to measure and report[2]

US: continued efforts to **introduce methane fee** in spending bill

Canada: 75% oil and gas methane reduction by 2030[3]

… but some of the largest methane emitters **China (15% of emissions), Russia (10%), India (8%)** did not sign the pledge – yet China and US joint declaration highlighted methane reduction in 2020s[4]

> The pledge makes cutting methane emissions a **collective undertaking** that must be supported by sound scientific basis and a **capacity to monitor emissions,** because **only what is measured gets done.**
>
> *Ursula von der Leyen, President of the European Commission*

> The world now **stands together in stronger solidarity** towards the goal of cutting methane emissions by 30% by 2030. (…) We now need to action.
>
> *Moon Jae-in, President of South Korea*

1 Energy

Identify and deploy available tech for elimination of venting emissions and reduction of fugitives

Deploy tech to **capture and monetize "waste" methane**

2 Food

Improve **efficiency** of agri-practices

Explore **product portfolio shifts**

Given no existing solution, **engage cross-industry on enteric fermentation**

3 Waste

Optimize upstream processes to reduce/ avoid waste

Deploy tech to **capture landfill gas and wastewater** to generate energy

Across sectors: align with independent monitoring and verification bodies alongside investing in monitoring of own operations

1. Greenhouse gases; 2. US also increasingly stringent regulation; 3. Vs 2012 levels; 4. In the U.S.-China Joint Glasgow Declaration on Enhancing Climate Action in the 2020s, China highlighted it intends to develop a comprehensive and ambitious National Action Plan on methane, aiming to achieve a significant effect on methane emissions control and reductions in the 2020s, will cooperate with the US to enhance measurement and jointly research methane emission reduction solutions.
5. Especially away from beef; Source: Methane tracker 2020; WRI: How methane emissions contribute to climate change, IPCC 2021; UNEP Global Methane Assessment 2021; Bloomberg; 'BCG

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4

Positive signs but large players missing

Business implications

Coal | Coal phase-out pledge not signed by major coal emitters, but recognition and commitment to halt coal funding by 2022 are positive signs

Halt of international fossil fuel financing and cross-country collaboration projects launched…

34 governments (including US, UK, Canada, Italy) to end **international public financing** (around $24 bn) for fossil fuels by 2022 (following G20 and OECD pledges)

"Accelerate efforts toward phasing down of unabated coal power" and "call for" ending of inefficient fossil fuel subsidies included for the first time in final COP decision - yet statement 'watered down' in final hours ('phase down' vs 'phase out')

UK-India: Green Grids initiative[1] to trade renewable energy across borders

Just Energy Transition Partnership: **$8.5 bn for South Africa** coal phase-out[2]

… but countries emitting 85%+ coal GHG did not sign coal phase-out pledge

Only 5 out of top 20 power generating countries committed to phase-out by 2040s (Korea, Indonesia, Vietnam, Poland, Ukraine)

Largest coal users (China[3], India, US, Japan, South Africa, Australia) **did not sign pledge**

Investors/Owners

Coal owner/operators

1

Identify commercially viable solutions (such as repurposing) to **support early decommissioning**

2

Explore technologies and seek regulatory support: conversion to biomass, deploy CCS[4], ammonia co-firing

3

Strengthen focus on reskilling and redeployment programs for displaced workers

Industrials

4

Invest in **process design and tech transition** away from coal-reliant operations

Power purchasers

5

Adapt decarbonization plans to regulatory regimes

Push boundaries in less supportive regimes

1. UK-India led Green Grids Initiative – One Sun One World One Grid, endorsed by over 80 countries, to mobilise political will, finance and technical assistance needed to interconnect continents, countries and communities to the very best renewable sources of power globally to ensure no one is left without access to clean energy. 2. France, Germany, UK, US and EU supporting South Africa coal phaseout Just transition; 3. However, China highlighted it will "phase down coal consumption during the 15th Five Year Plan and make best efforts to accelerate this work" in the U.S.-China Joint Glasgow Declaration on Enhancing Climate Action in the 2020s. 4. Carbon capture and storage. Sources: COP26 announcements, World Energy Outlook; GHG Protocol; Global Carbon atlas; Price of Oil, BCG analyses

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4 Coal | Climate Pathways study by BCG and NBI played a role in shaping South Africa's revised NDCs and discussions about $8.5 billion deal

Securing $8.5 bn for South Africa required an ambitious NDC

South Africa improved its NDC (and target range of 2030 emissions) from 398-614Mt to 350-420Mt Co2e before COP26

The study by BCG and NBI was **one of three key fact bases** used in informing the NDC decision

"Decarbonising South Africa's power system" is a study developed by BCG, National Business Initiative (NBI), Business Unity South Africa (BUSA), and businesses showcasing the **pathways to decarbonisation** by 2050, building **resilience** to the impacts of climate change and **ensuring just transition**

Six-step approach taken (power sector)

1. Assess the power sector starting point
2. Identify the supply gap
3. Identify optimal 2050 power system archetype
4. Assess last-mile decarbonization options
5. Define potential net-zero pathways
6. Identify key tradeoffs and enablers[3]

Two phases covered all major sectors

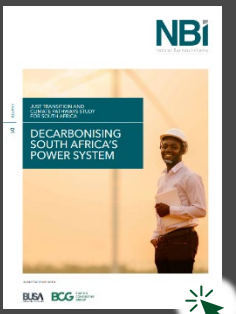
High-level blueprint	Detailed pathways
Priority sectors[1] • Power/electricity • Chemicals • Mining	All main sectors Green finance Adaptation impact

Strong stakeholder engagement

- 100+ industry and policy experts
- 30+ South Africa's CEOs as champions

1. 55% of greenhouse emissions; 2. Previous ones + Transport, Metals, Refining, Materials Manufacturing, Agriculture, Forestry and Other Land Use; 3. Techno-economic (cost emissions, new-build CAPEX, abatement cost) and socio economic (jobs, GDP, etc.); 4. Renewable energy ; Source: BCG

Read summary of findings here:



"The results demonstrate that **even a country with an economy that is structurally embedded** in an energy intensive production system **can shift**.

- BCG, NBI and BUSA study

"This deal (South Africa's Just Transition $8.5 billion deal) is the model for **how the EU will support countries to phase out coal.**"

- Frans Timmermans, EU Commission

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5

Industry moving forward outside of COP26

Business implications

Auto | Industry commitments in 2021 have accelerated shift to EVs[1], with many large OEMs[2] signing ZEV[3] pledge - despite major governments missing

A lot of progress is made pre-COP26 – with EV[2] adoption tipping point in reach (~40m EV sales[1,9] by 2030)

EV[1] sales expected to overtake ICE[4] sales by 2030

OEMs with ICE [4] phase-out commitments represent ~27% of global market[5]

Many players investing 30% - 60% R&D and capex in EV (VW, GM, Ford, Daimler)

Total cost of ownership parity expected by end of 2022 driven by innovation[6]

Countries with phase-out targets account for ~20% of passenger vehicle market

Yet holistic transition needed (regulation, infrastructure, etc.): e.g.: 7M charging points now, +100M needed by 2030[7]; risk of battery materials shortage[8]

At COP26, some large OEMs signed ZEV[3] pledge, but other OEMs and major governments missing

Many major OEMs signed the pledge (Ford, GM, Mercedes-Benz, Jaguar, Volvo, etc.) - others not likely as they **see e-fuel opportunity** as a viable alternative

~30 governments (including UK, Canada) committed to 100% ZEV[3] sales by 2040 (2035 for leading markets)

But largest auto markets missing (China, US, Japan, Germany), likely due to focus on ZEV and not wider alternatives

1 OEMs[2]

Challenge everything: reimagine how to design, build, sell, and use vehicles to significantly lower purchase price and operating costs

Consider **backward integrating** to secure supply (such as battery production)

Invest in **R&D** (batteries' cell chemistry, pack assembly) to lower costs

Cooperate with **public sector on charging infrastructure** for EVs

Develop solutions for **battery usage/recycling** at vehicle's end-of-life

Educate the end consumer (on technology, cost of ownership, etc.)

2 Components/battery

Invest in R&D to develop novel chemistries and cell components to maximize energy safely

Focus on **building scale and flexibility** via partnerships

Consider software-related services and other business model innovation

1. Electric Vehicles - Includes Battery electric vehicle, full electrical car, hybrid EV, plug-hybrid EV and fuel cell EV; 2. OEM=Original equipment manufacturer, 3. ZEV = Zero emission vehicle; 4. ICE = internal combustion engine, 5.Including Audi, Fiat, Volvo – by 2030, GM- by 2035, Mercedes-Benz & Honda – 2040. Other automakers like Ford, Hyundai and Volkswagen have announced regional ICE phase-outs for Europe specifically. 6. Given falling battery prices (90% since 2010) and lower use cost/km offsetting higher purchase cost; 7. IHS; Transport Environment; International Council on Clean Transportation; Expert interviews; 8. Cairn Energy Research Advisors: Supply of key metals for battery production is ~30% of 2030 demand; Includes lithium, graphite based on their 2018 supply vs 2030 projected demand in EV space; 9. Based on OEMs plans and commitments – BloombergNEF; Sources: COP26 discussions and announcements; BCG analyses and experience; CAIT; IEA; BloombergNEF, World Energy Outlook; GHG Protocol

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6

Finance | ~450 financial institutions with $130 trillion AUM committed to NZ; major progress on standardized ESG reporting

Big commitments from the financial community

Financial institutions holding 40% of global financial assets (~$130tn) committed to net zero (vs $5tn in 2019)

Commitment to net zero **not the same as investing in climate initiatives - major funding gap remains**

Ten Multilateral Development Banks[3] pledge to join in to mobilize finance –funds critical to de-risk private sector investment

No full sector alignment: risk of grey assets **falling into the wrong hands**

Initial steps toward standard ESG disclosure

IFRS's new **International Sustainability Standards Board** will develop minimum disclosure standards to meet investors' information needs[2]

UK will require companies to report **net-zero transition plans from 2023**

Business implications

1 Financial institutions (e.g., banks, asset managers)

Prepare portfolio companies for **broader climate and ESG disclosures**

Catalyze decarbonization of operations by engaging with management

Factor price of carbon into large capital project planning

Support clients through new lending avenues, like transition finance (oil decarbonization), low-carbon technology (EV[4] development financing)

Actively seek 'investable projects', collaborate with wider industry partners to reduce information gap and transaction costs on smaller-scale projects

2 Across industries

Expect **better cost of capital** for firms that are on a path to decarbonization

Seek **blended finance** from **development banks** to de-risk

Pool projects to de-risk and tackle smaller scale financing issues

COP26: Next steps for Financial sector
Vinay Shandal, Managing Partner, COP26 Delegate

COP26: Investing for clean growth
Wendy Woods (BCG) , Dolika Banda (ARC), David Auerbach (Sanergy), Bill Winters (SC)

COP26: Which approach has most impact: Divesting or Engaging?
Vinay Shandal (BCG) , Chris James (Engine No. 1)

1. CPI, Global Landscape of Climate Finance 2021. 2. Initially requirements will apply to companies headquartered in Frankfurt, Montreal, London and San Francisco; 3. African Development Bank, Asian Development Bank, Asian Infra-structure Investment Bank, Europe Development Bank, EBRD, European Investment Bank, Inter-American Development Bank Group, Islamic Development Bank, New Development Bank and World Bank; 4. Electric Vehicle; Source: COP26 discussions and announcements; BCG analyses

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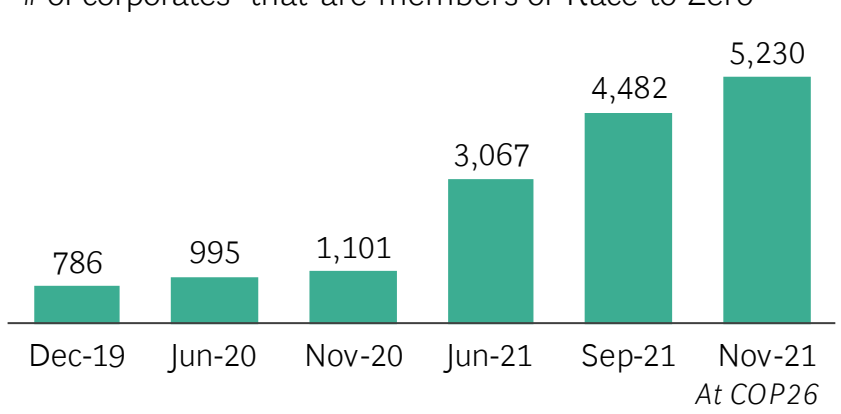
Corporates | Corporates mobilize on climate action with 5,200+ joining Race to Zero ahead of COP26

Significant momentum in lead-up to COP26 – commitment to set 1.5°C-aligned science-based targets



Strong corporate involvement across sectors, especially customer-facing sectors

18 **Sectors have reached Breakthrough Ambition** (20% of major companies by revenue within sector committing to NZ[1])

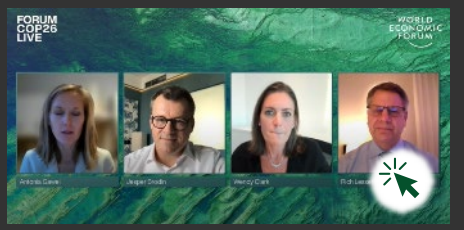
Robust criteria and external validation aims to ensures credibility and delivers practical change

4 P's framework[2]: aims to ensure consistency

Pledge	Plan	Proceed	Publish
Expert peer review group			

COP26-WEF: Business Ambition for 1.5C - A Call to Action

Speakers: Rich Lesser (BCG), Jesper Brodin (IKEA), Wendy Clark (Dentsu), Antonia Gawel (WEF)



> A lot of leaders are hesitant to act without knowing all facts, but in this case, **the world needs us to take a leap of faith.**
>
> *Jesper Brodin, CEO IKEA*

> The largest risk is to not transform. The customer demand will change so much faster than industrial processes. **To be early will be challenging, but to be late will be devastating.**
>
> *Anna Borg, CEO Vattenfall*

1 Build a **granular emissions baseline**

Develop (AI-powered) **simulation tools** to identify emissions reduction levers

2 **Integrate sustainability KPIs and develop** clear emissions reporting mechanism

3 **Embed climate targets** across the business and link to incentives

4 **Modify roles, responsibilities, and team structure** to ensure climate plan permeates whole organization

5 **Develop new climate champion roles within high-impact teams** (such as supply chain); reflect in existing roles

1. Net Zero; 2. Pledge: Set an interim target to achieve in the next decade, which reflects maximum effort toward or beyond a fair share of the 50% global reduction in CO2 by 2030 identified in the IPCC Special Report on Global Warming of 1.5 °C. The interim target must be set within 12 months from the point of joining the Race to Zero, if not shared already at the time of the pledge. Plan: Within 12 months of joining, explain what actions will be taken toward achieving both interim and longer-term pledges, especially in the short- to medium-term; Proceed: Take immediate action toward achieving (net) zero, consistent with delivering interim targets specified; Publish: Commit to report publicly both progress against interim and long-term targets, as well as the actions being taken, at least annually. To the extent possible, report via platforms that feed into the UNFCCC Global Climate Action Portal to ensure consistency; Source: UNFCCC Race to Zero; COP26 discussions and announcements; BCG analyses and experience

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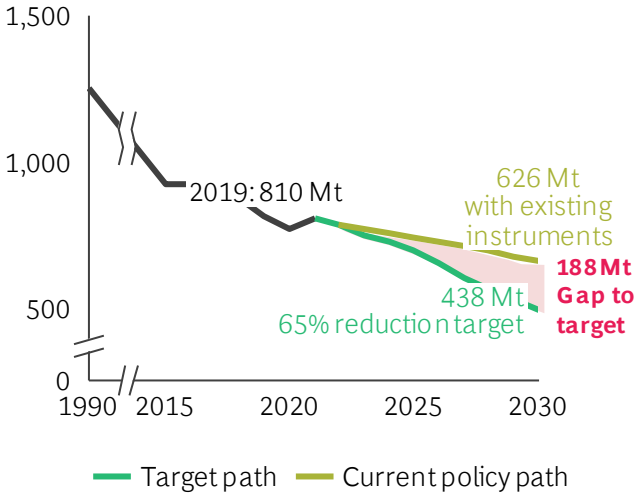
8 Collaboration | Strong public-private coordination in a BCG x BDI-developed proposal on reaching Germany's 2045 GHG neutrality

"Climate Paths 2.0" co-developed by BCG, with the Federation of German Industries (BDI) and around 80 companies and associations. Represents a **program proposal of ~20 instruments to enable sectors** to achieve climate targets in 2030 and **set a course toward GHG[1] neutrality in 2045[2]**

188 Mt CO2e gap (30% of projected 2030 emissions with existing instruments)

GHG[1] emissions in Germany 1990-2030 (Mt CO_2e)



Climate Pathways 2.0 proposal offers multidimensional view on levers, financing, and support needed to bridge gap

	ENERGY	INDUSTRY	TRANSPORT	BUILDINGS
Overarching measures	make fossil fuels less attractive, rapid infrastructure development			
Industry-specific levers	renewables attractiveness	carbon contracts	purchase incentives EVs	mandatory renovation schedules
Government support	Levers needed (and fiscal burden estimation) to: • Enable the transformation and promote CO2 measures • Limit additional financial burden for private households • Maintain industrial competitiveness for the most heavily affected sectors			

1.GHG=Greenhouse gas; 2. While maintaining growth and employment, protecting the industries economic strength, and fairly balancing the share of costs—without disproportionately burdening the state budget.

Read summary of findings 'Germany: Climate Paths 2.0' here:

COP26: BCG-WWF Report Net Zero Pathways for Malaysia'
Overview of Report recommendations

COP26: "Delivering to NZ: Moving from Commitments to Action"
Speakers: Emma Walmsley (GSK), Noel Quinn (HSBC), J. Goldman (Breakthrough Energy), Michel Fredeau (BCG)

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8 Collaboration | Four main overarching global initiatives highlighted to accelerate technological developments across highest emission sectors

Initiative	Goal and focus	Power (Coal, Gas, Oil)	Industrials (Steel, Cement, Chemicals, etc)	Transport (Road, Shipping, Rail, Air)	Agriculture (incl Land use, Forestry, etc.)	Other (incl. Buildings, Waste, Fugitive)
	% of total GHG emissions, 2019[1]	30%	18%	17%	17%	18%
Glasgow Breakthroughs	**Framework** for international public-private coordination, **collaboration, and focus to accelerate innovation** (focus: power, road transport, steel, hydrogen, agriculture)	✓	✓	✓	✓	
First Movers Coalition	Private sector platform to pool collective buying to send a **demand signal for emerging tech** in decarbonization of high-emitting sectors[2]		✓	✓		
Breakthrough Energy Catalyst	Public-private partnership to **boost investment in critical technologies** for net-zero economy, (tech scale-up in green hydrogen, SAF, etc.[3])	✓	✓	✓		
Green Public Procurement	Governmental pledge to leverage **public procurement and large construction projects** to stimulate demand for low-carbon materials such as steel and concrete		✓			✓
Sector-specific initiatives	**Many initiatives launched** to support across COP26 outcomes *(non-exhaustive list)*	• GEA[4] • Green Grids Initiative – One Sun One World One Grid	• Concrete Zero buyers club • Responsible Steel	• EV Transition Council plan • Aviation Net Zero coalition	• FACT roadmap • Regen10 • AIM4C • Africa Green Finance	

1. Split based on 2019 emissions (total ~53Gt CO_2); 2. E.g. heavy industry, long-distance transportation, CO_2 removals; 3. Direct air capture and long duration energy storage; 4. Global Energy Alliance for People and Planet;
Source: CAIT; IEA; World Energy Outlook; GHG Protocol; COP26 announcements; BCG analyses

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8.1 Glasgow Breakthroughs offers framework for global public-private commitments to deliver affordable clean technology by 2030

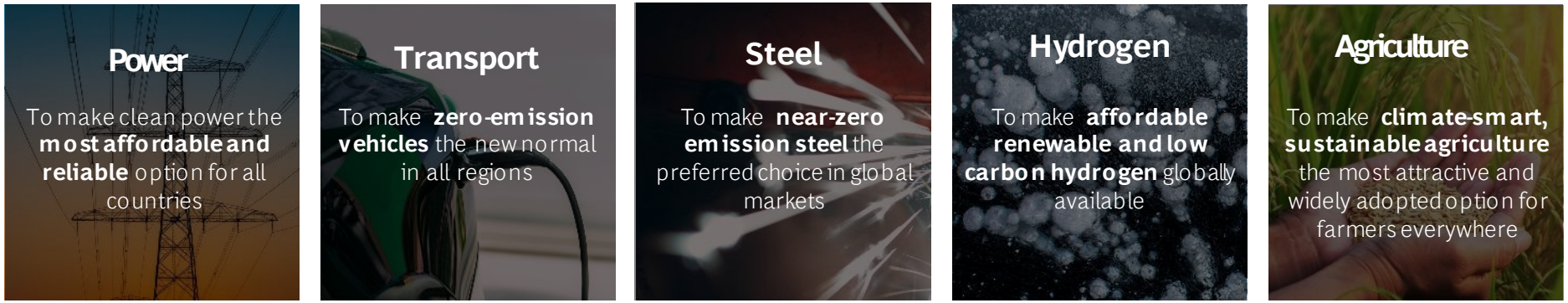
Breakthrough Agenda aims to drive faster innovation, scale, and deployment of clean solutions

42 **Governments (70% of global GDP) signed up** to coordinate introduction of clean tech to rapidly reduce cost

Goal: Make clean technologies the **most affordable and accessible option** in emitting sectors globally **before 2030**

Progress assessed globally by ministers via an annual **IEA report in collaboration with IRENA & UN HLCs[1] – based on:** capacity increase, R&D, deployment investment, efficiency improvement, cost and affordability, infrastructure availability

Glasgow Breakthroughs are the first set of global 2030 goals - anchored in hard-to-abate sectors[2]



1. IEA: International Energy Agency, IRENA: International Renewable Energy Agency, UN High Level Climate Champions
2. Additional sectors expected to be added at each COP; Source: Glasgow Breakthrough announcement; COP26 discussions and announcements; BCG analyses

> We urgently need targeted **breakthrough innovations in agriculture** to support farmers' families and contribute to sustainable resilient food systems.
> *Bill Gates, Bill & Melinda Gates Foundation*

> This is what the future of COP is all about - **catalysing an innovative ambition loop** between political leadership and private sector to drive a resilient zero-carbon future.
> *Nigel Topping, HLC COP26*

> Private sector is struggling to find places to invest – we need **projects of a certain scale** that are missing in places that need them most.
> *Wendy Woods, BCG at COP26: Investing for Clean & Inclusive Growth*

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8.2 First Movers Coalition (FMC) launched to build and pool early demand for zero-emission goods and services – supporting hard-to-abate industries

Hard-to-abate sectors face early deployment headwinds for NZ[1] tech

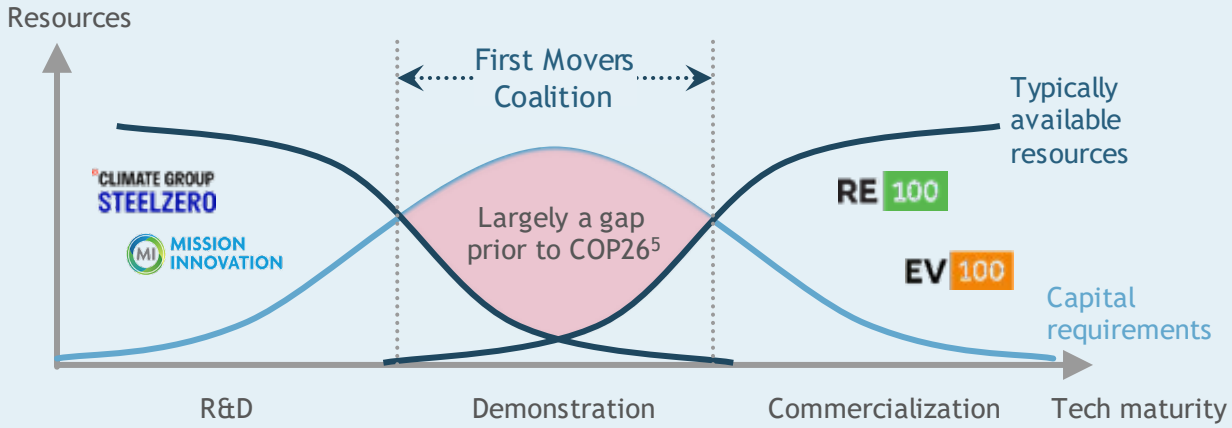
Sectors such as industrials, transport face **economic barriers on investment**:

- High CAPEX cost of new tech[2]
- Uncertain demand
- Not capitalized financial incentive
- Inherent high emissions in operations

Around 80% of emissions can be abated by existing tech – **with half of them needing deployment and scaling**[3]

Critical to **coordinate along the value chain, create downstream demand**[4] and willingness to redesign processes

FMC will facilitate offtake agreements, assemble sectoral 'buyers' clubs, and pool purchase commitments[6] to bridge early-demand gap



1 Hard-to-abate goods suppliers

Gain **better understanding** of market needs across your downstream value chain and willingness to pay

Partner across your value chain to **jointly remove roadblocks** and achieve zero-emission tech at scale

2 Buyers

Gain a competitive edge through your supply chain by securing early access to supply of truly net-zero tech

Leverage "**FMC-Certified**" to raise awareness and gain premium

Shape FMC design as early members

1. Net zero, 2. CCUS to decarbonize cement cost +80%, ~$1 trillion CAPEX by 2040; Green hydrogen to decarbonize steel: cost +70% & x100-200 more supply needed; 3. Final 20% requires innovation 4. Upstream producers face high abatement cost but have low EBITDA per tonne CO2; Situation reverse for upstream consumer facing companies; 5. Some players started operating in the space – e.g. The Climate Group's SteelZero buyers' club; 6. The commitments will be technology-neutral, but they will be stringent enough to target solutions with the potential to completely decarbonize these sectors rather than only partially reducing emissions through incremental approaches such as efficiency gains. Source: COP26 announcements; WEF; BCG analysis; IEA World Energy Investment Outlook 2018; HBR 2021, The Green Economy has a resource Scarcity Problem

COP26: First Movers Coalition Launch

Speakers: John Kerry, Rich Lesser, Børge Brende, Sumant Sinha, Kara Hurst, Anna Borg, Brian Moynihan, Melissa Schoeb

> We tackle challenges at both ends: Investing in R&D to innovating - **sending demand signal loud and clear.**
>
> *Joe Biden, US President*

> As a coalition of purchasers we will be ready to sign up and purchase technology at a premium, and to **help you have the confidence to make bold investments.**
>
> *Rich Lesser, BCG Global Chair*

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8.3 Breakthrough Energy Catalyst has attracted public sector and corporate involvement and investment for scaling up of critical Net Zero technologies

Catalyst aims to find, finance, scale and buy new zero-carbon economy solutions

1. Bring together public and private funds to **address early deployment gap**
2. Accelerate **commercial viability and scalability** for decarbonization tech
3. Help **reduce the costs** to compete with & replace GHG-emitting counterparts

Aim to **deploy $3bn+** in concessional capital in the next 4 years to **catalyse up to $30bn** of investments in bringing down clean tech costs and creating markets for green products in:

Long duration energy storage[1]	Direct air capture[3]
Sustainable aviation fuel[2]	Green hydrogen[4]

Strong traction after launching in 2021 – large public sector commitments and strong corporate anchor partners across industries

US DoE[5]: **$1.5bn**

EU: **$1bn**

UK: **$0.55bn**

Started process of **identifying first set of projects** for investment

Private actors can participate across the value chain:

- **Identify opportunities** & submit projects
- **Make investments** in decarbonisation technologies
- **Commitments to purchase** the outputs of these projects
- Offer perspectives on continued private sector engagement
- **Provide insights** on investment and **offtake strategies**
- Help to encourage more companies to join Catalyst

COP26: Bill Gates, Rich Lesser & Judith Wallenstein interview

> This **new partnership will be critical** to unlocking the potential to find, fund, and scale innovative technology solutions.
> *Christoph Schweizer, BCG CEO*

> To **scale climate innovations** we need to reduce the cost difference between the current and the green products - **the green premium.**
> *Bill Gates, BE Catalyst Founder*

1. Long Duration Energy Storage – the storage of energy in a system that can discharge electricity over time for a duration greater than 8 hours, with a focus on storage of renewable energy resources 2. Sustainable Aviation Fuel (the production of low carbon jet fuel (e.g., using sustainable feedstocks, power-to-liquids); 3. Direct Air Capture (the process of capturing CO2 directly from the ambient air with the end result of reducing overall CO2; 4. Green Hydrogen – the creation of hydrogen using methods that limit carbon emissions (e.g., electrolysis using renewable energy); 5. Department of Energy

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8.4 Green Public Procurement initiative will leverage public procurement to stimulate demand for low carbon materials, such as steel and concrete

Public procurement is key emission reduction lever

$11tn Global public procurement **spend** (13% of global GDP)

~15% **Of global GHG emissions** ($7.5\ GtCO_2e$)

~35% Public procurement **share in hard-to-abate sectors**

IDDI[1] launched Green Public Procurement (GPP) government pledge to send a demand signal for low carbon initiatives via public procurement

3-level government pledges (initial members: UK, Germany, India, Canada, UAE)

1. **Disclosure** of embodied carbon emissions[2] in major public construction projects by 2025
2. **Pledge to achieve net zero** embodied carbon emissions[2] in all public construction by 2050
3. Pledge to set baseline and **1.5° C aligned reduction targets** for 2030

Businesses can become first-movers to define standards & benefit

Monitor federal and local government activity around priority GPP categories and targets, abatement paths and laws

Work with governments to **agree a common set of standards** for accurate and compatible data, building on what exists

Become a **first mover to secure and benefit** from early contracts

Consider emission targets within **tenders** to ensure competitiveness

COP26: Kick-start Construction Decarbonisation panel

Speakers: Stefan Sicars (UNIDO), Magali Anderson (Holcim), Tor Burrows (Grosvenor), Steve Adler (Mayor, Austin), Pamela Liu (BCG).

> Need to **tackle three bottlenecks**: standards, disclosure framework for carbon and green public procurements.
> *Stefan Sicars, UNIDO*

> We are ready as a company, **we are ready as a sector** and we want to go this way.
> *Magali Anderson, Holcim*

1. Launched by IDDI: Industrial Deep Decarbonization Initiative; 2. Embodied carbon means all the CO2 emitted in producing materials. It's estimated from the energy used to extract and transport raw materials as well as emissions from manufacturing processes.

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Glossary | Inside COP26: The unexpected wins and remaining challenges

AIM4C	Agricultural Innovation Mission for Climate
AUM	Assets under management
COP	Conference of the Parties
ESG	Environment, social and governance
EV	Electric vehicles
FACT	Forest, agriculture and commodity
GEA	Global Energy Alliance for People and Planet
GFANZ	Glasgow Financial Alliance for Net Zero
GHG	Green house gas
GPP	Green Public Procurement
HLC	High level climate
ICE	Internal combustion engine
IEA	International Energy Agency
IFRS	International financial reporting standards
IRENA	International Renewable Energy Agency
LEAF	Lowering emissions by accelerating forest finance
LTS	Long Term Strategies
NDC	Nationally Determined Contributions
NZ	Net zero
OEM	Original equipment manufacturer
R&D	Research and development
REDD	Reducing Emissions from Deforestation and forest Degradation
RSPO	Roundtable of sustainable palm oil
RtZ	Race to Zero
SAF	Sustainable aviation fuel
UNFCC	UN's Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development
ZEV	Zero emission vehicle

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