Climate change, energy transition and implications on construction & rental

Presentation for ERA Convention, Riga June 15th 2022 – Jacopo Brunelli

BCG BOSTON CONSULTING GROUP

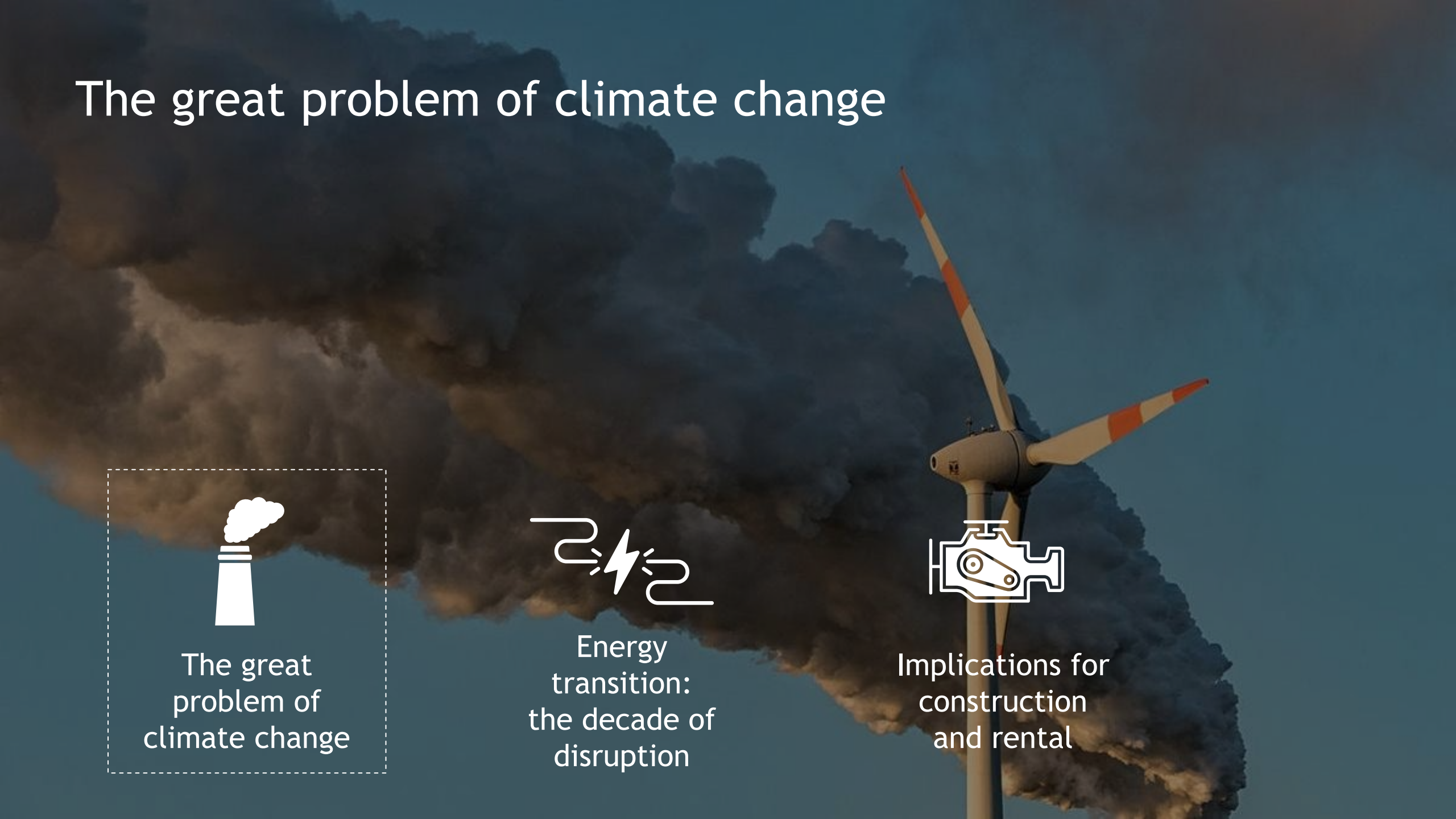
Agenda for today

The great problem of climate change

Energy transition: the decade of disruption

Implications for construction and rental

The great problem of climate change



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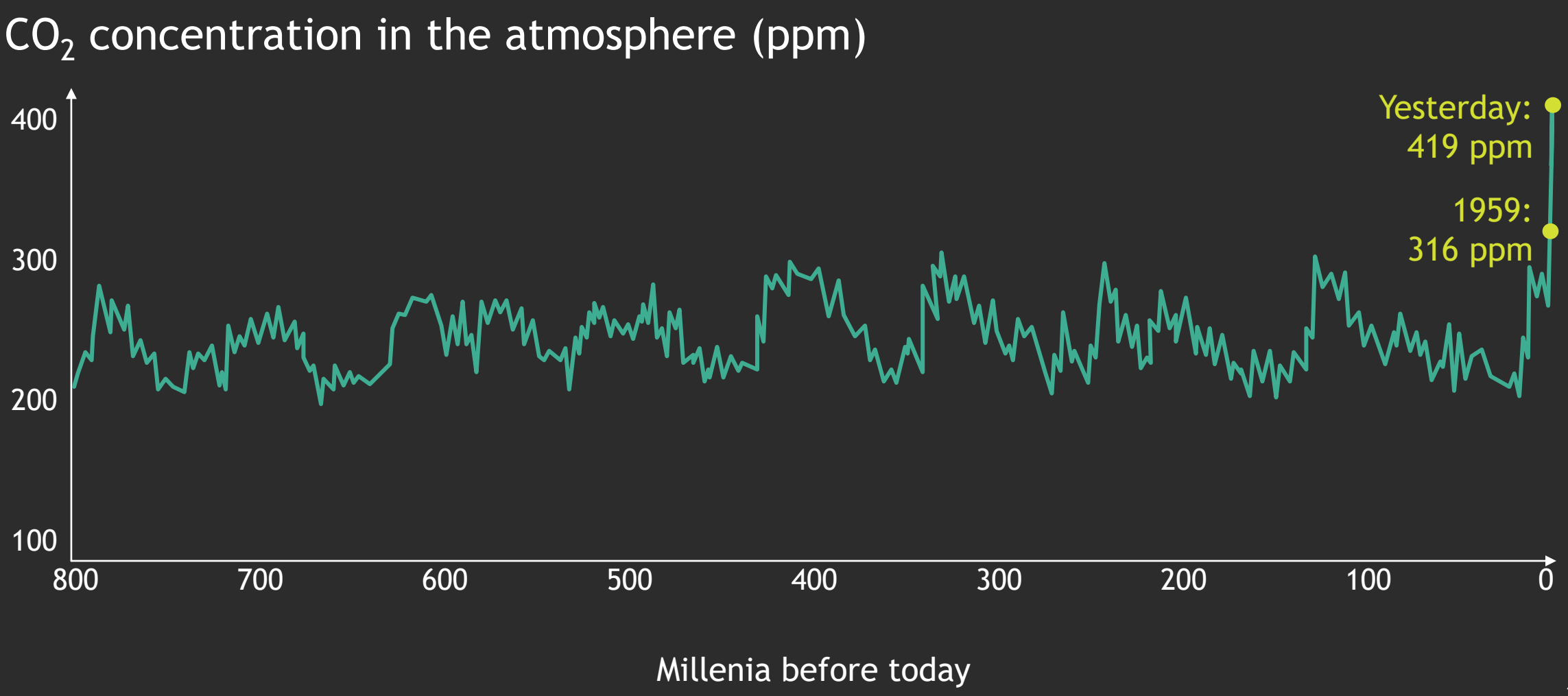
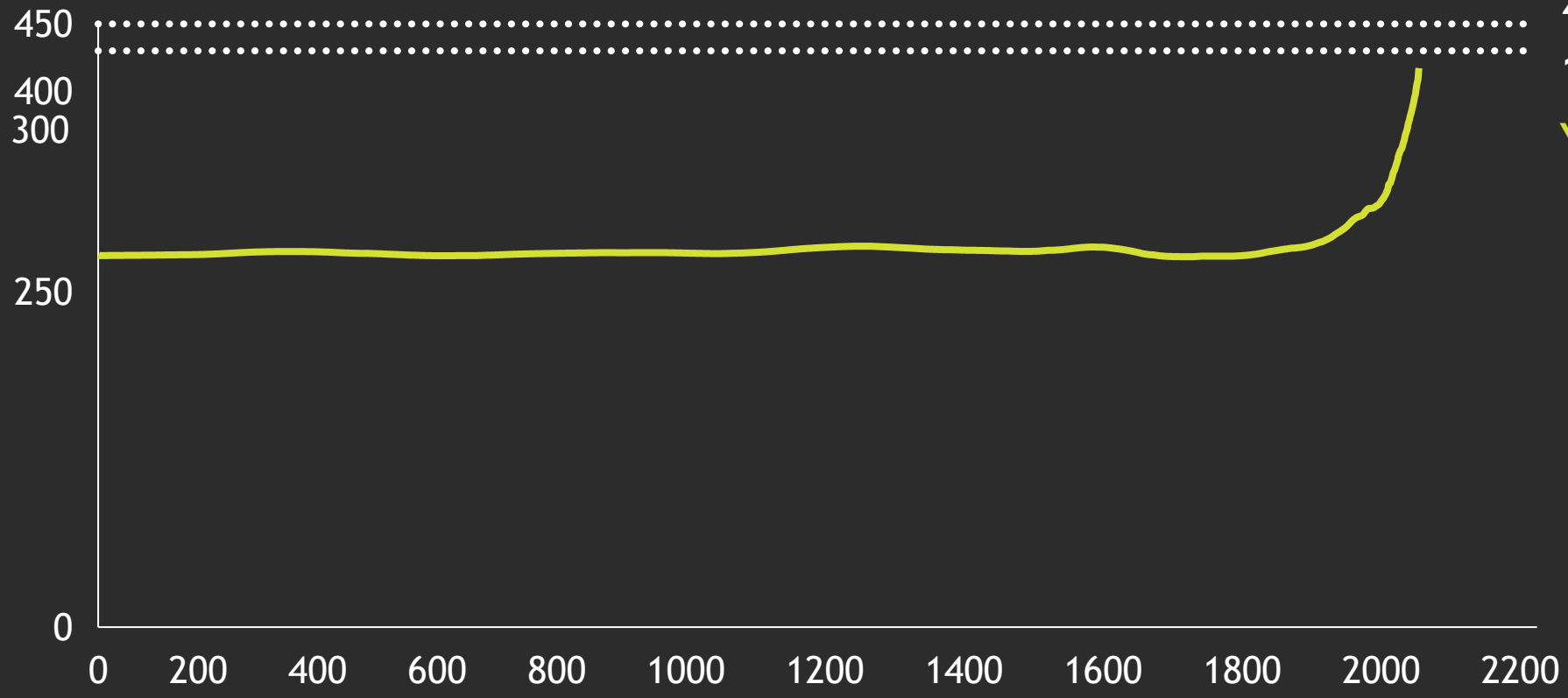
Highest CO_2 concentration in a million years



1.5-2°C range is getting close

CO_2 concentration in the atmosphere (ppm)



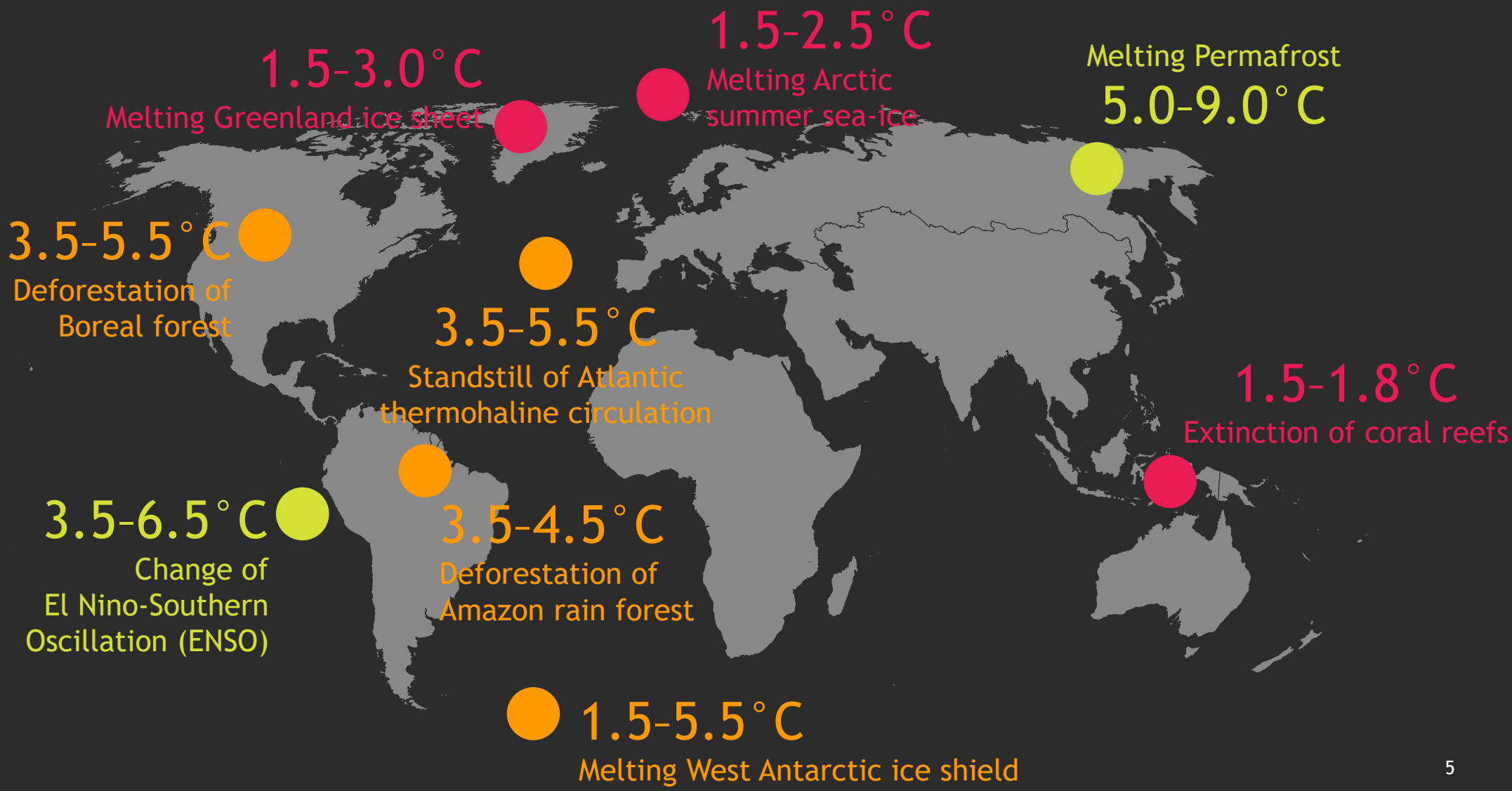
2.0°C range: ~450 ppm

1.5°C range: ~430 ppm

Yesterday: 419 ppm

Source: NASA's Goddard Institute for Space Studies

‘Tipping points’ ahead



Human civilization severely threatened

1.5° Paris ambition

-8 % GDP[1]

+2 months of droughts[2]

2° Paris goal

-13 % GDP[1]

+4 months of droughts[2]

Key “tipping points”

4+° Current path

-30 % GDP[1]

+>10 months of droughts[2]

Severe food crises risk[3]

6x wildfire area in US

Holland, NYC, … flooded

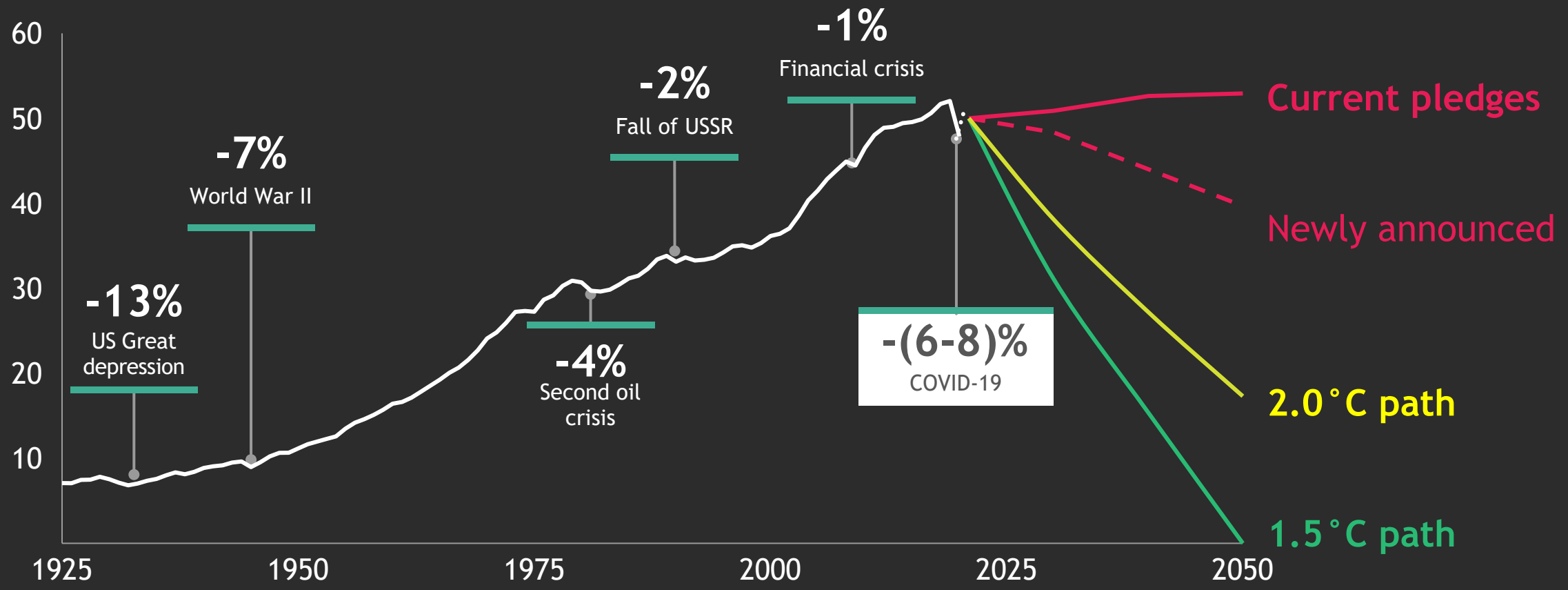
…

1. Per capita, relative to no additional warming 2. Increase in avg. drought duration 3. Severe risk of close-to-annual occurrence
Note: Temperature increase refers to global warming by 2100
Source: UN Intergovernmental Panel on Climate Change (IPCC); Burke et al

Radical shift in emissions needed

Before COP

Global net CO_2e emissions and pathways (Gigatons per year)



Note: Current pledges assumes countries decarbonize further at same annual rate that was required to achieve NDCs between 2020 and 2030; 2.0°C path assumes 25% reduction by 2030 and net-zero by 2070; 1.5°C path assumes 45% reduction by 2030 and net-zero by 2050
Source: EDGAR 5.0, FAO, PRIMAP-hist v2.1, Global Carbon Project, IPCC, UNEP Emissions Gap Report, WRI, Nature (May 2020), BCG

The decade of disruption

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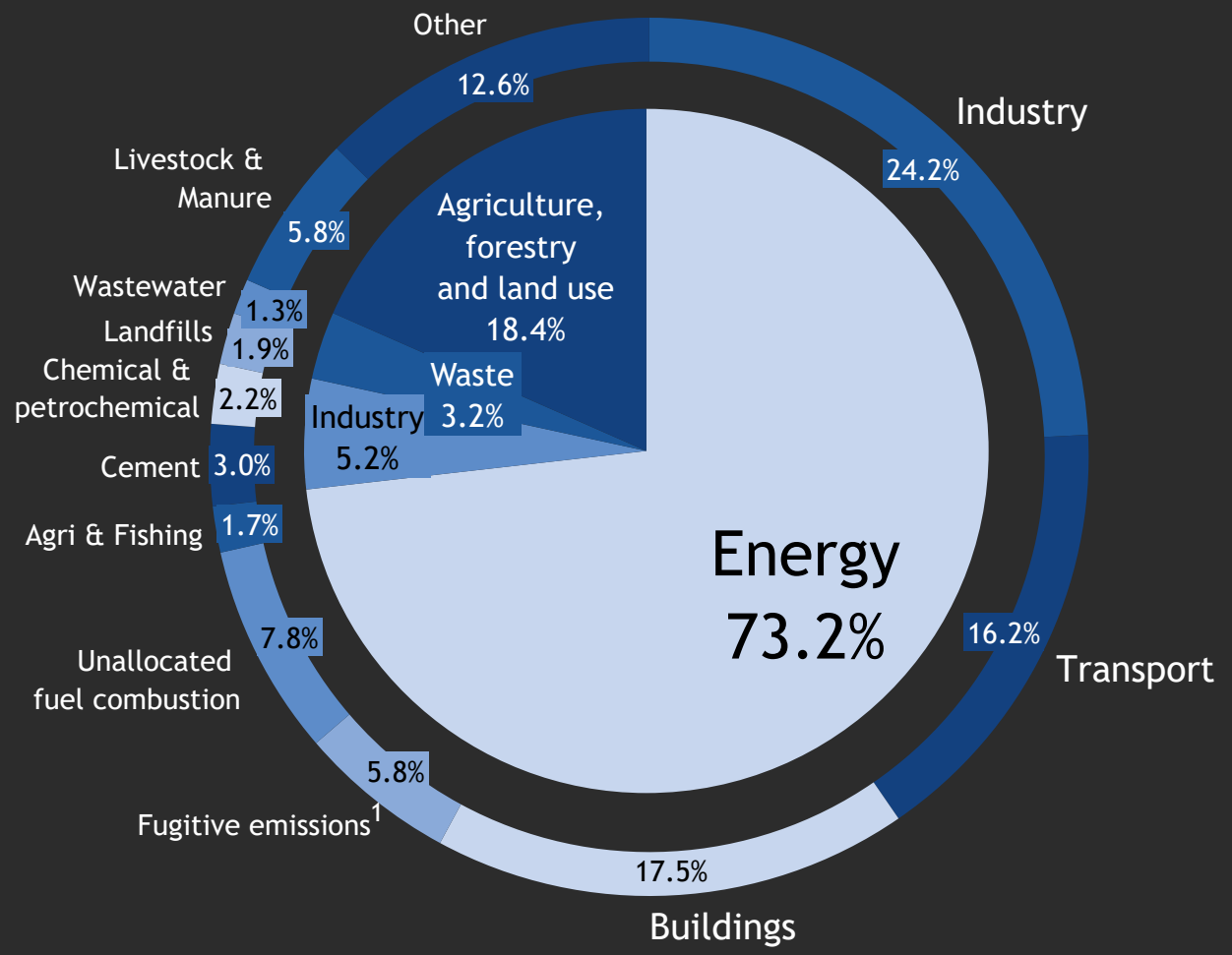
Energy transition is the key driver for climate action

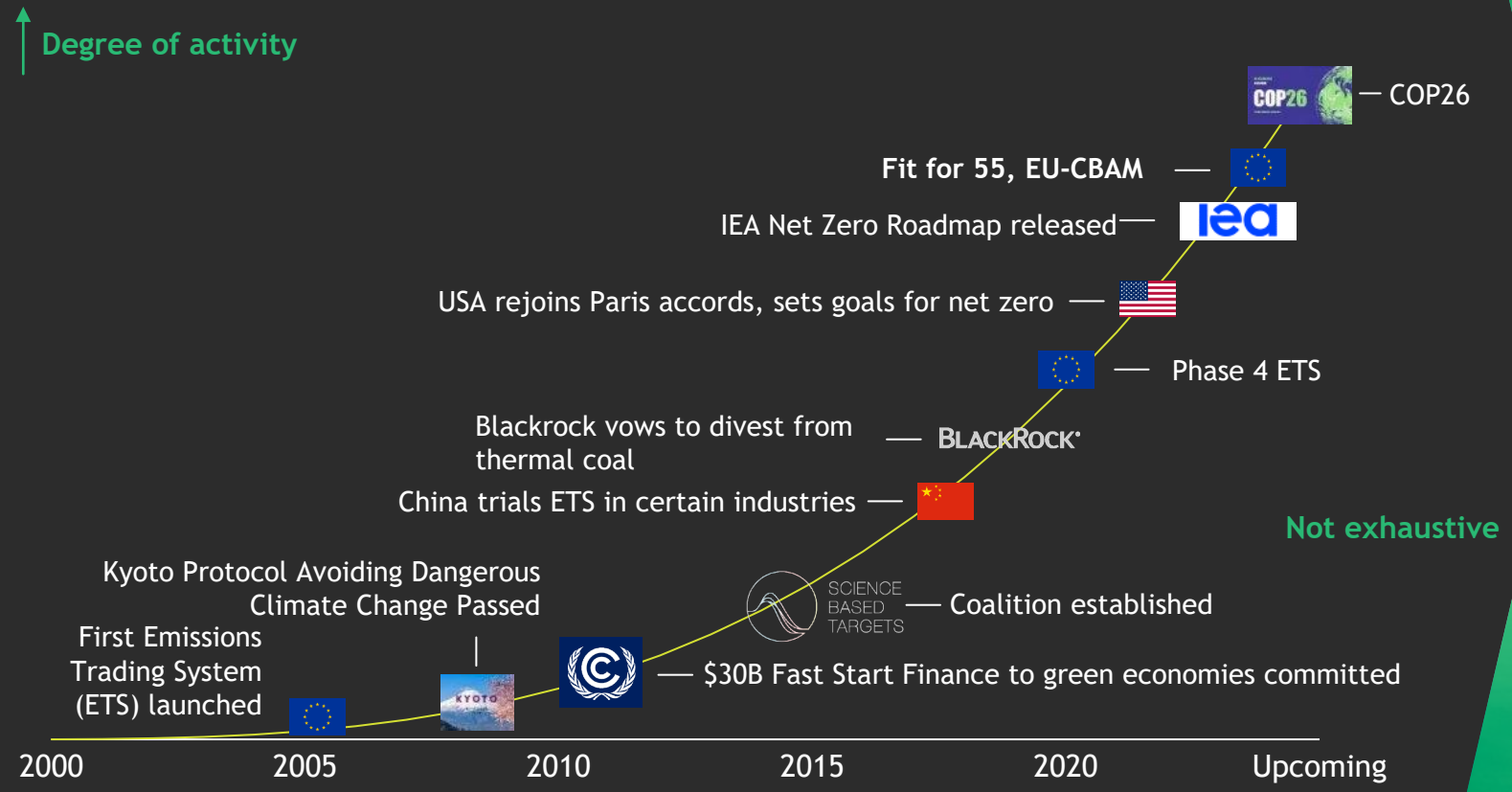
Almost three-quarters of emissions come from energy use – of which >60% from Industry, Transport, Buildings

Global greenhouse gas emissions by sector



1. Fugitive emissions are the often-accidental leakage of methane to the atmosphere during oil and gas extraction and transportation
Source: Climate Watch, the World Resources Institute (2020)

Globally there is an accelerating focus on climate action



Source: Natural Earth States and Provinces boundaries without large lakes

What does this mean for businesses?

A net-zero target is table-stake, the question is how quickly

Investors are looking for commitments to be backed up with credible transition plans run by top management/board

Customers and suppliers are also facing increasing pressure to address their Scope 1, 2 and 3 emissions, creating opportunities for fast movers

Companies are under pressure from multiple stakeholders to commit to Net Zero targets

Governments & institutions

Environmental policies are evolving towards more stringent standards

59 Countries have already signed Net Zero commitments

Investors

Investors are forcing companies to espouse sustainability policies

$8.5 billion of financial assets were tied to Net Zero policies by market-leading funds

Customers

Demand is starting to favour "green" products

In 2019, 72% more consumers bought green goods than in 2014

Activists

Protests and demonstrations against energy-intensive sectors on the rise

>90k "Fridays for Future" events organized worldwide

Talents

Difficulties in attracting and retaining talent in high-emission industries

40% of millennials have chosen the company they work for based on sustainability performance

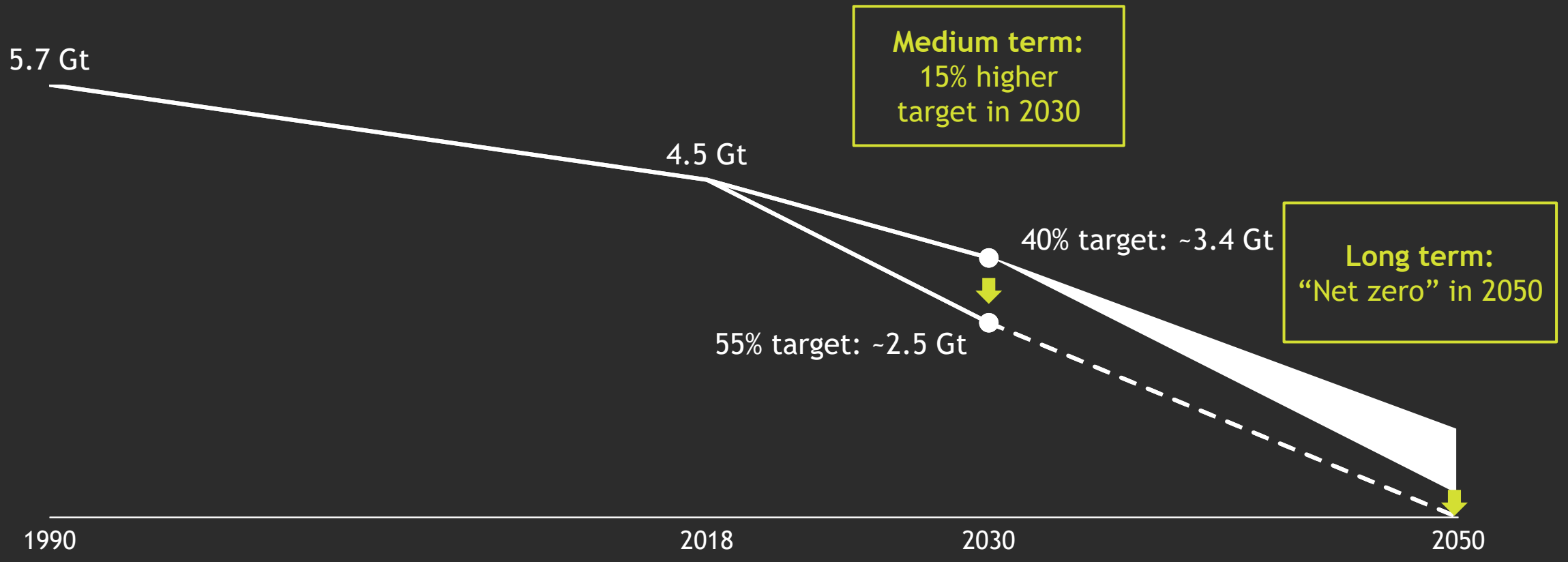
633 companies (corresponding to $13T in market cap) have already defined a target Net Zero

1. Climate watch data

Source: interviews with business managers; GSI review 2018; Accenture Chemicals Global Consumer Sustainability Survey 2019; STNR analysis

EU Fit for 55: achieve carbon neutrality by 2055

Greenhouse gas emissions EU-28 in Gt CO_2e



Source: European Commission

What do these targets actually mean?

Power

Complete exit from coal in the 2030s

~3x as much annual expansion of wind & solar

All gas plants running on low-carbon H_2 by 2045

Transport

No new ICE passenger car sales by 2035 (today: >95%)

No new ICE truck sales by the late 2030s (today: Almost 100%)

Import of ~20 Mt CO_2-neutral e-fuels per year (today: zero, excl. int. aviation & shipping)

Buildings

All new buildings 100% fossil-free, starting today

2x today's building renovation rate (1.5-2% of buildings per year)

No new oil or gas boilers after 2025, including replacements

Industry

Fossil-free heat in every reinvestment after ~2025, mostly power-to-heat, bioenergy

Full replacement of all blast furnaces, steamcrackers, …

CCS for cement, starting in late 2020s also for waste, bioenergy, …

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5 key instruments of the Fit for 55 bill affect the construction industry

Selection - Not exhaustive

Importance for the Construction sector

Strengthening Emissions Trading

1

ETS mechanism for industry and energy sector is strengthened through reduction of allowed emissions (-43% 2030 vs. 2005)

A new ETS mechanism is introduced for emissions from buildings and road transport and a target to renovate and upgrade 3% of public buildings a year

Carbon Border Adjustment Mech.

2

High CO2 content materials entering the European market will be taxed with a carbon tax

Goods made with low CO2 emission processes or in countries with pre-existing CO2 taxation will be partially exempt from the European carbon tax

Fossil fuel tax reform

3

The tax structure on energy consumption is updated to consider the origin of energy and its environmental impact

The above results in an increase in minimum tax rates (eg. on diesel and petrol)

Exemption for aviation and marine fuels ended

Incentives to individuals & SMEs

4

Monetary and fiscal incentives will be provided to homeowners and small and medium sized businesses through the new "Social Climate Fund" to ensure a smooth and least impactful transition

Only zero-emission cars from 2035

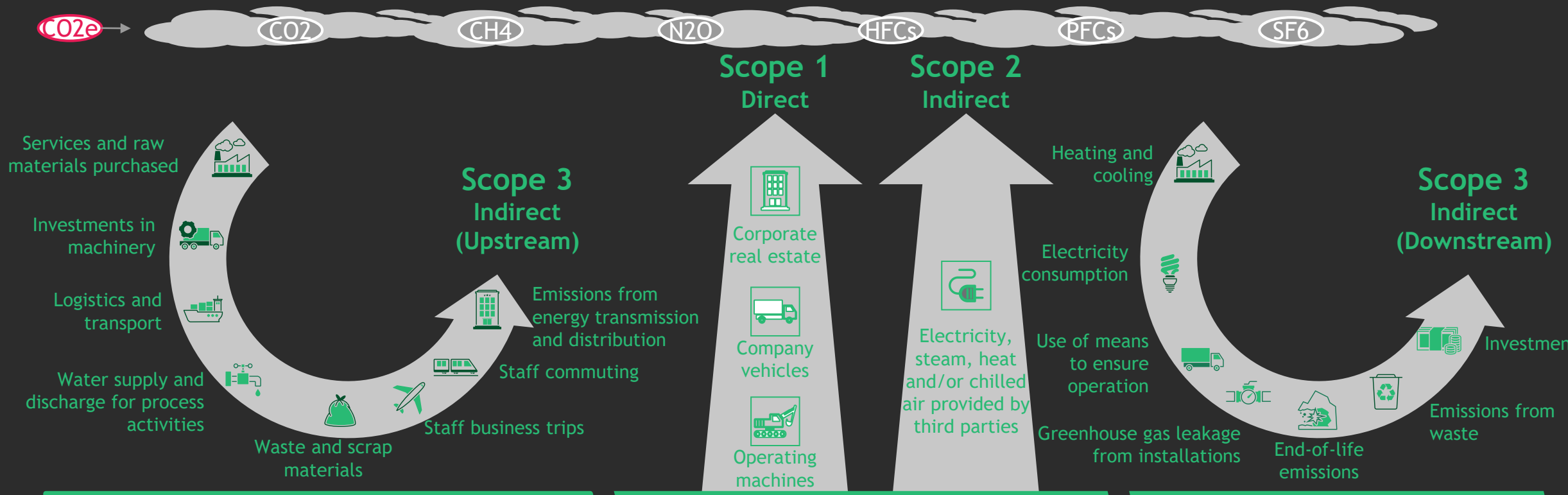
5

Tightening CO2 reduction targets to 2030 effectively means eliminating internal combustion engine cars from 2035

The new Alternative Fuels Infrastructure Regulation (AFID) sets out clear targets for the delivery of public charging infrastructure for electric and H2

Source: EU Fit for 55, BCG analysis

The emissions baseline for construction industry considers all sources of direct and indirect emissions



Scope 3 Upstream
Emissions from assets not directly controlled by the builders but necessary for the construction of the works

Scope 1: Emissions from fuels used in company operations

Scope 2: Emissions related to consumption of electricity/heat/steam purchased from 3rd parties

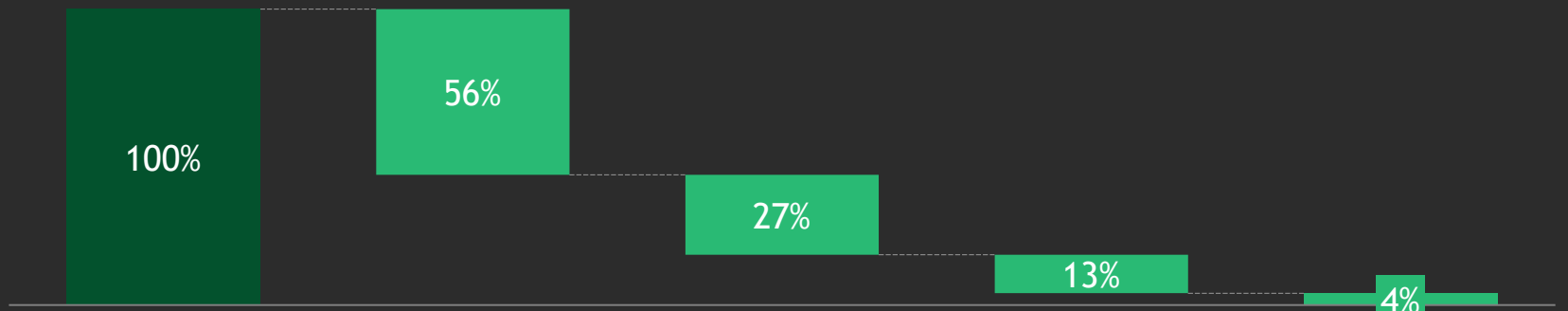
Scope 3 Downstream
Emissions generated during the entire life cycle of the works carried out

Note: CO2, carbon dioxide; CH4,methane; N2O, nitrous oxide; HCFs, hydrofluorocarbons; PFCs, perfluorocarbons; SF6, sulphur hexafluoride
Source: GHG protocol, BCG analysis

EPC Contractor: construction equipment & generators represents the main scope 1 and 2 emission source

Example EPC Contractor

Estimated scope 1 & 2 emission baseline by emission source



Total Baseline	Construction Equipment & Power	Diesel Power Generators	Vehicles	Water
	Fuel for construction equipments & site power (generators)	*Fuel to power camps*	*Emissions related to fuel for vehicle fleet & buses*	*Emissions related to fuel for water transportation to site*

The estimate accounts for all Scope 1 and Scope 2 emissions generated by EPC contractors in relation to the execution of project portfolio (mix of infra & buildings, on/offshore, piping etc.)

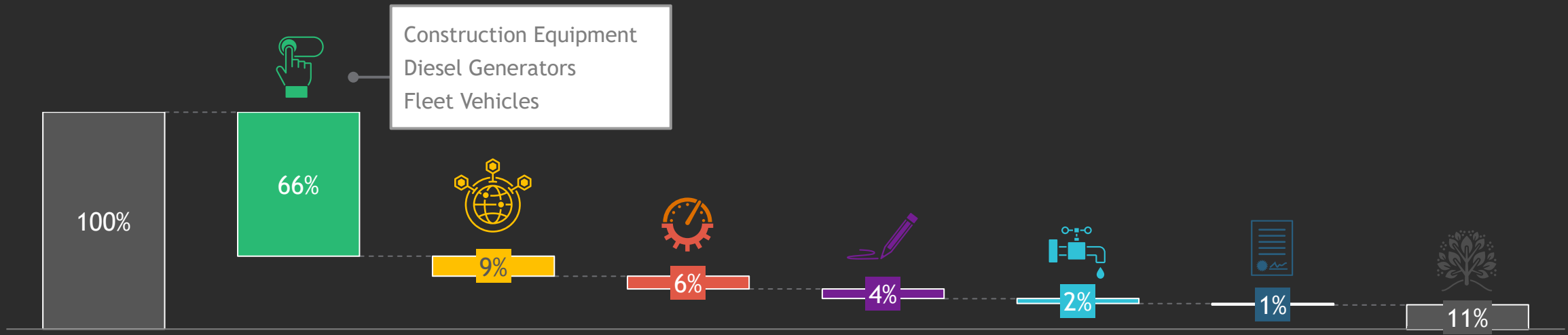
Scope 3 emissions (e.g. CO2 from materials such as concrete, steel, etc.) not considered in carbon footprint perimeter

Note: reported figures assuming project portfolio mix composition, including Infra & Building, Onshore, Offshore, Pipeline, etc.
Source: Client data, Desk research, BCG relevant case experience, Expert interviews; BCG Analysis

Net Zero achievable through 7 types of levers, of which 66% unlocked by Electrification & Renewable Energy

Example EPC Contractor

Lever abatement potential by cluster, % of baseline



2020 Emission baseline	Electrification & Renewable Energy	Digital & IoT (in Constr.)	Energy Efficiency	Design	Water Management	Green Policies	Offsetting
	Substitution of current fuels with low carbon sources	Adoption of Digital Technologies to foster productivity	State-of the-art technology to improve efficiency	Promotion of modularization & site layout optimiz.	Closed loop water cycle & initiatives to reduce consumption	Promotion of green behaviors across value chain	Carbon credits to abate remaining emissions
Period of lever applicability	*Mid-long Term*	*Short Term*	*Short Term*	*Short Term*	*Short Term*	*Short Term*	

Development of Electrification & Renewable technologies will unlock improvements in Construction

Illustrative

Electric Vehicles

- **>50%** Global share of **electric powertrains** in 2030
- **75%** **EV market share** in Europe by 2030

Renewable Energy

- **40%** **Share of renewable energy** by 2030 (EU target)
- **3.1 TW** **PV capacity** expected to be installed globally by 2030

Electrified Construction Equipment

- **2024** Planned **start date** for **heavy equipment** electrification
- **+8%** **'19-'30 CAGR** electrified off-highway market

Alternative Fuels

- **90Mt** **Hydrogen** global demand in 2020
- **200Mt** **Hydrogen** expected global demand in 2030

Battery Storage

- **+12%** **'16-'25 CAGR** for global demand of **Lithium Batteries**
- **-5/ 10%** Expected **reduction of battery cells cost** by 2025

Source: Desk Research, BCG experts, BCG analysis

Innovative technologies are available to improve construction productivity & energy efficiency

Illustrative

Digital & IoT

Equipments geared with **AI algorithm** collecting **physical parameters** to **guide the operator** to most efficient maneuvers

CATERPILLAR · VOLVO · Leica Geosystems · KOMATSU · JOHN DEERE · LIEBHERR

Real-time utilization/ emission monitoring. Emission prediction through **data analytics,** with **machine learning models** to identify productivity opps (e.g., idling, fuel waste)

MACHINEMAX

TENDERD

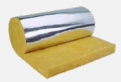
Energy efficiency

Lighting

Up to 90% **Lighting energy savings** from installing **LED lamps** vs traditional bulbs

Trailers insulation

20/ 30% **Heating & cooling energy savings** by installing **glass wool insulation** on facilities



Appliances

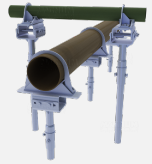
15% Avg **energy saving** from **smart** vs traditional **thermostats**

20% Average **energy savings** from installing **plug load controllers**

Design Modularization

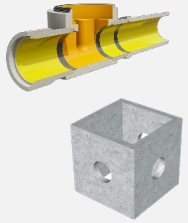
Up to 20% **Acceleration** on Project Timeline

20/ 30% Reduction of **onsite manhours**[1]



Modular pipe racks

Precast concrete components



Modular furnaces & heaters

1. Partially transferred to off-site activities

Source: Desk Research, BCG experts, BCG analysis

Implications and potential way forward

Define a net zero strategy, typically done in 6 phases:

- Establish emissions' baseline (scope 1, 2 & 3)
- Project the inertial evolution
- Benchmark emission reduction curve of the industry/peers
- Define targets in terms of reduction and timing (SBTi)
- Identify reduction levers and associated investments
- Activate an ecosystem (suppliers and partners)

Implement the defined levers to achieve net zero:

- Levers across the value chain (e.g. scope 1, 2 and 3) to reduce, neutralize or compensate emissions
- Based on defined ambitions and targets and following a precise order of priority
- Involving all stakeholders (internal, suppliers, clients, partners)

Monitor and support implementation through:

- Engagement of partners like for example SBTi to seek support
- Evaluate participation to strategic alliances (for ex. *Race to Zero, WEF alliance of climate leaders, …)*
- Develop a credible communication strategy to manage internal and external stakeholders


Questions?

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