

Low Carbon Energy Transition:

New risks and opportunities for
downstream refining and petrochemicals sectors



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The business of sustainability





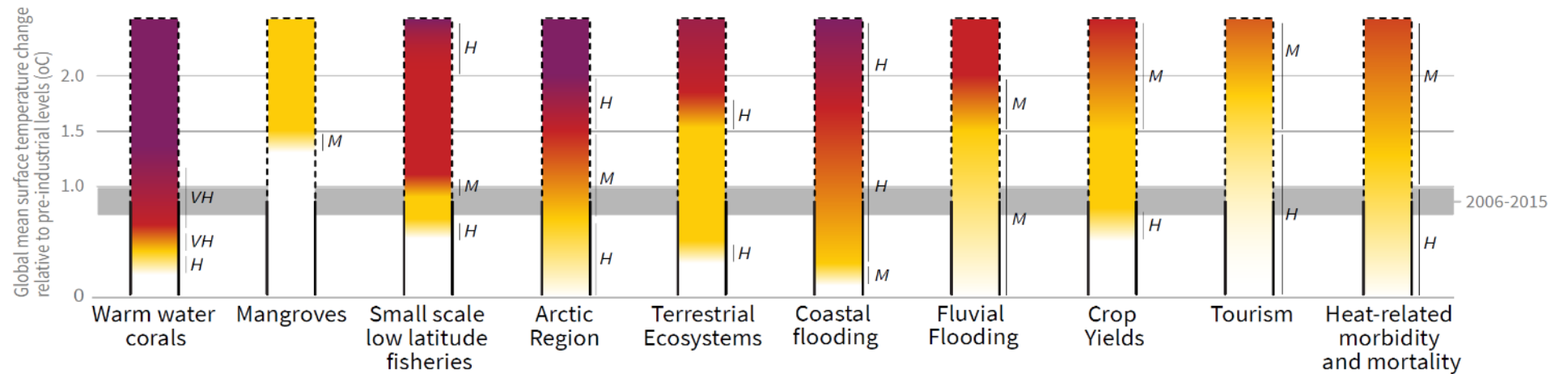
Climate Change: New Challenges for the Industry

Where is the market going and why?

Impacts of Climate Change

Even under the best 1.5-2 °C future climate scenarios, there will be unavoidable climate impacts that present real threat to the oil and gas and downstream industries

Projected climate impacts by 2100 under 1.5 and 2 °C scenarios



Confidence level for transition: L=Low, M=Medium, H=High and VH=Very High

Source: IPCC: Special 1.5°C Report, 2018

Projected climate impacts for the oil and gas and downstream industries

EXPLORATION

Physical damage from wave height and high winds

DEVELOPMENT

Physical damages due to flooding
Physical damages due to extreme wind and waves

PRODUCTION

Physical damage from wave height and high winds

TRANSPORT & PIPELINES

Physical damage from flooding, Storm surges, high winds and wave heights
Physical damage on shore pipelines

REFINING & PROCESSING

Physical damage from flooding, storm surges and high winds
Loss of access to water

Source: <http://www.noqtec.com/the-oil-gas-industry-and-climate-change/>

Climate Change Risks and Opportunities

especially for companies in the Oil & Gas downstream sectors that depend on fossil fuels

PHYSICAL CLIMATE RISKS

TRANSITION RISKS AND DRIVERS

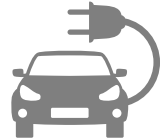
Policy | Technology | Market

Legal Liability

Reputational Issues



Stranded Assets



Market Disruption



Litigation Damages



**Macroeconomic &
Local Policy Impacts**



Customer Demands



**Increased Operating
Costs**



**Capital Upgrade
Requirements**



**Supply Chain
Disruption**



**Investment
Opportunity**



**Investor
Requirements**

Carbon Policy Risks

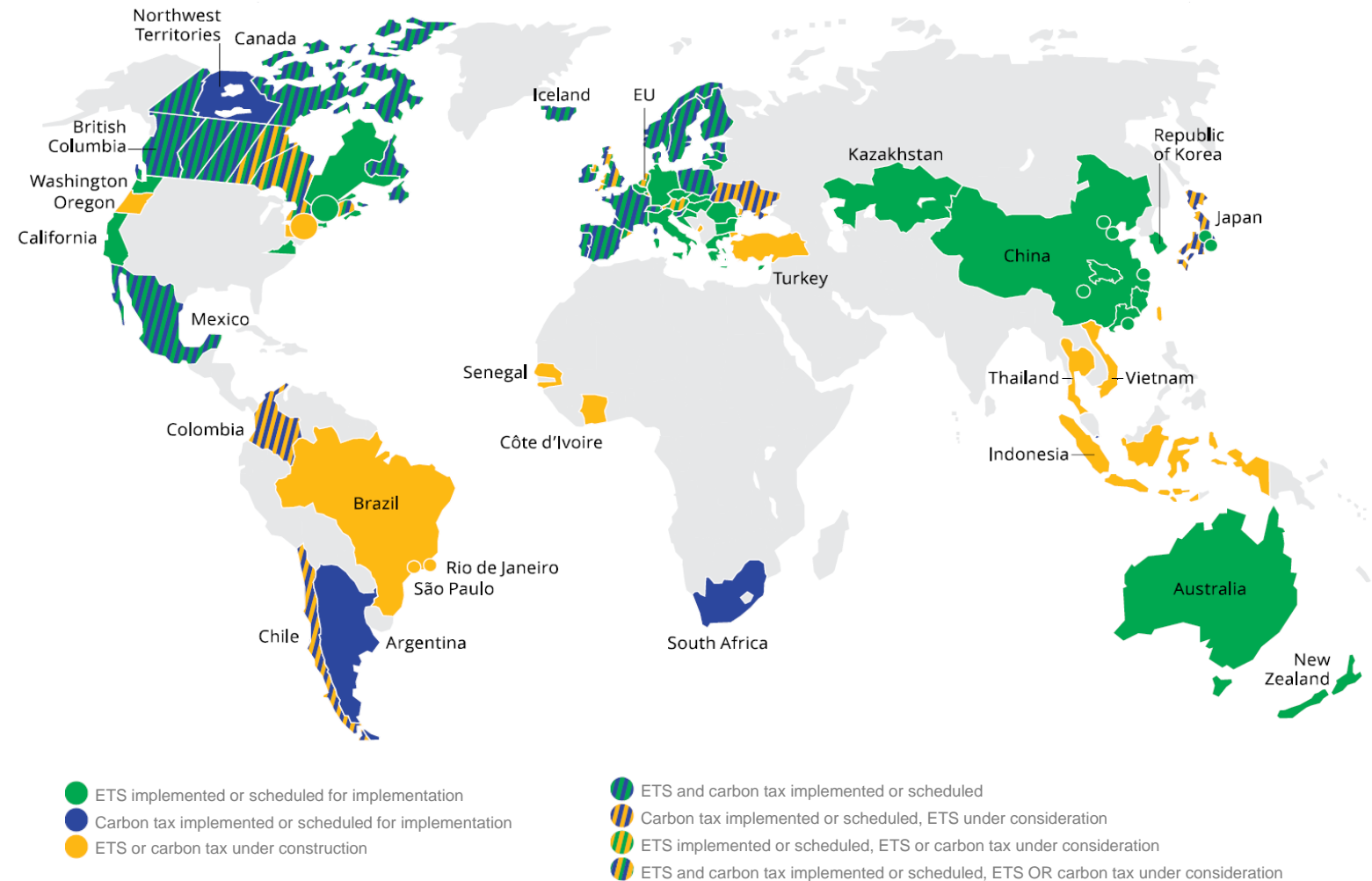
The growing number of jurisdictions are introducing price on carbon emissions

61

Carbon pricing initiatives (such as carbon taxes or emission trading schemes) are in place globally or scheduled

1600

Companies have announced that they are already using or plan to introduce internal carbon pricing



Source: State and Trends of Carbon Pricing, 2020 (World Bank)

CEOs are squaring up to the challenge

Including making big public commitments

911

companies have committed to
set Science-Based Targets
(SBTs)

392

companies have already
approved SBTs.

911 companies globally are taking science-based climate action in line with the Paris Agreement, of which 392 companies have already approved science-based targets (SBTs) by 2030.

5 MAY 2020



Total third oil supermajor to set net-zero goal and target renewable growth

French giant joins BP and Shell in setting emissions goals and pledging renewable energy expansion

5 May 2020 7:45 GMT UPDATED 5 May 2020 9:14 GMT
By Andrew Lee

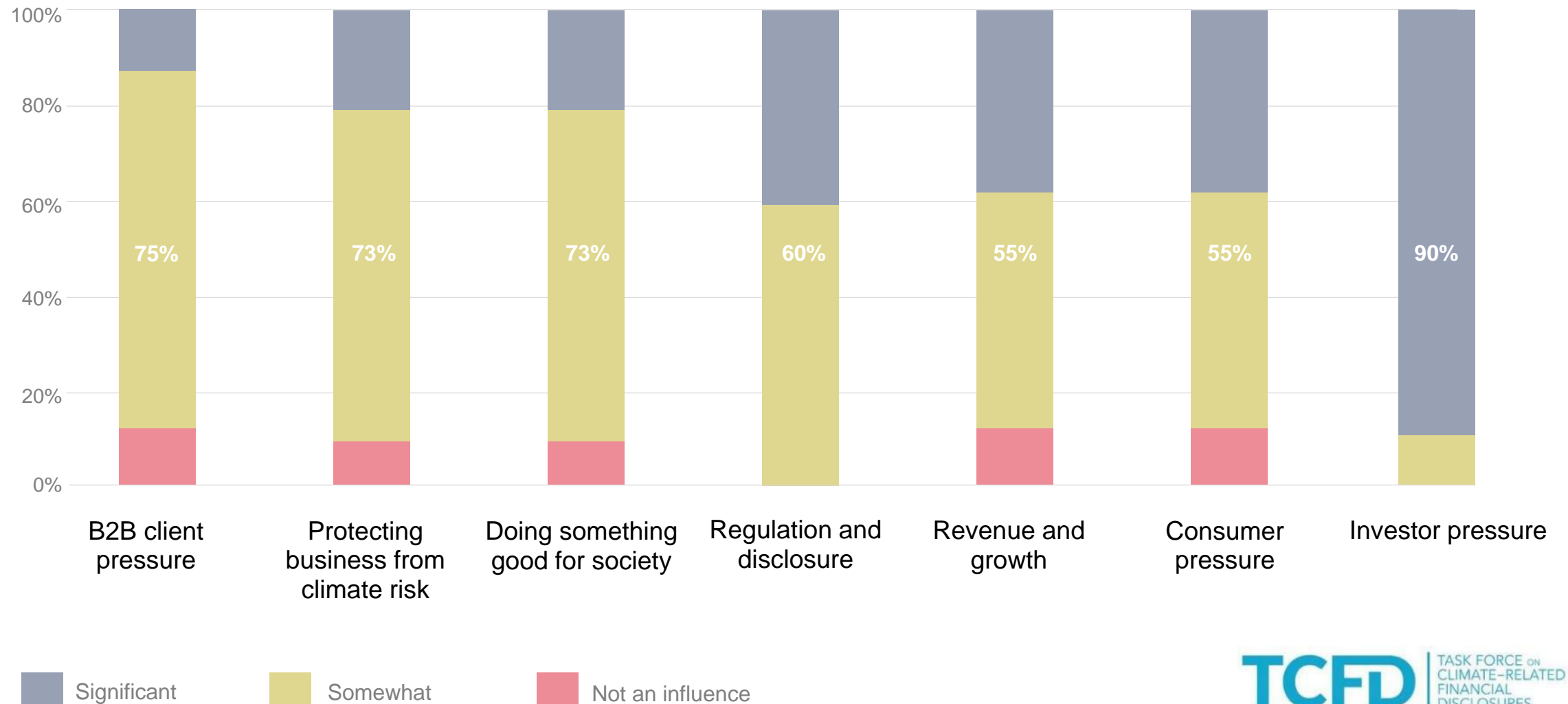
RECHARGE
Global news and intelligence for the Energy Transition



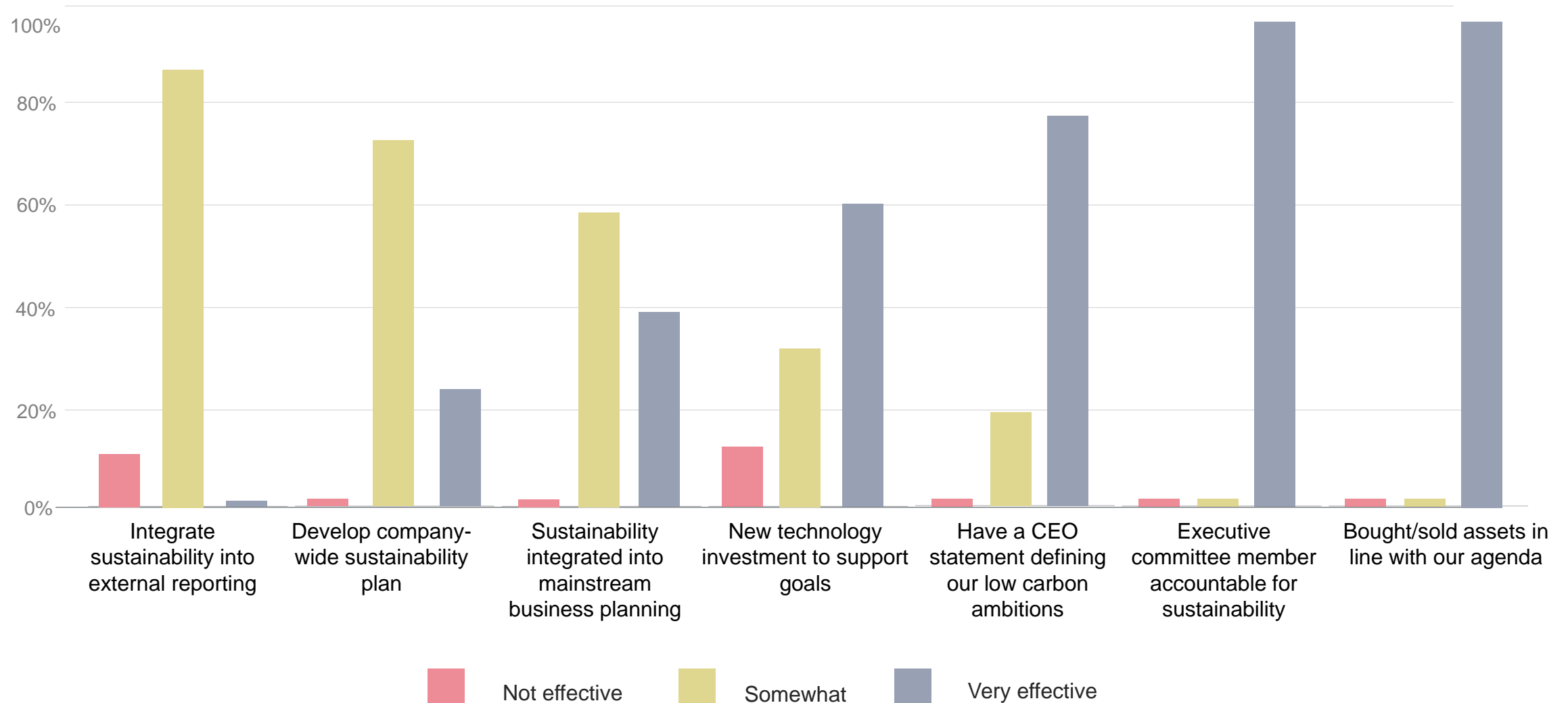
What is Driving the Low Carbon Energy Transition?

Global opinion survey with executives in the Oil & Gas and downstream sectors by ERM and Yale University (2019)

What is driving your low carbon strategy?



What's been effective in furthering your low carbon agenda?

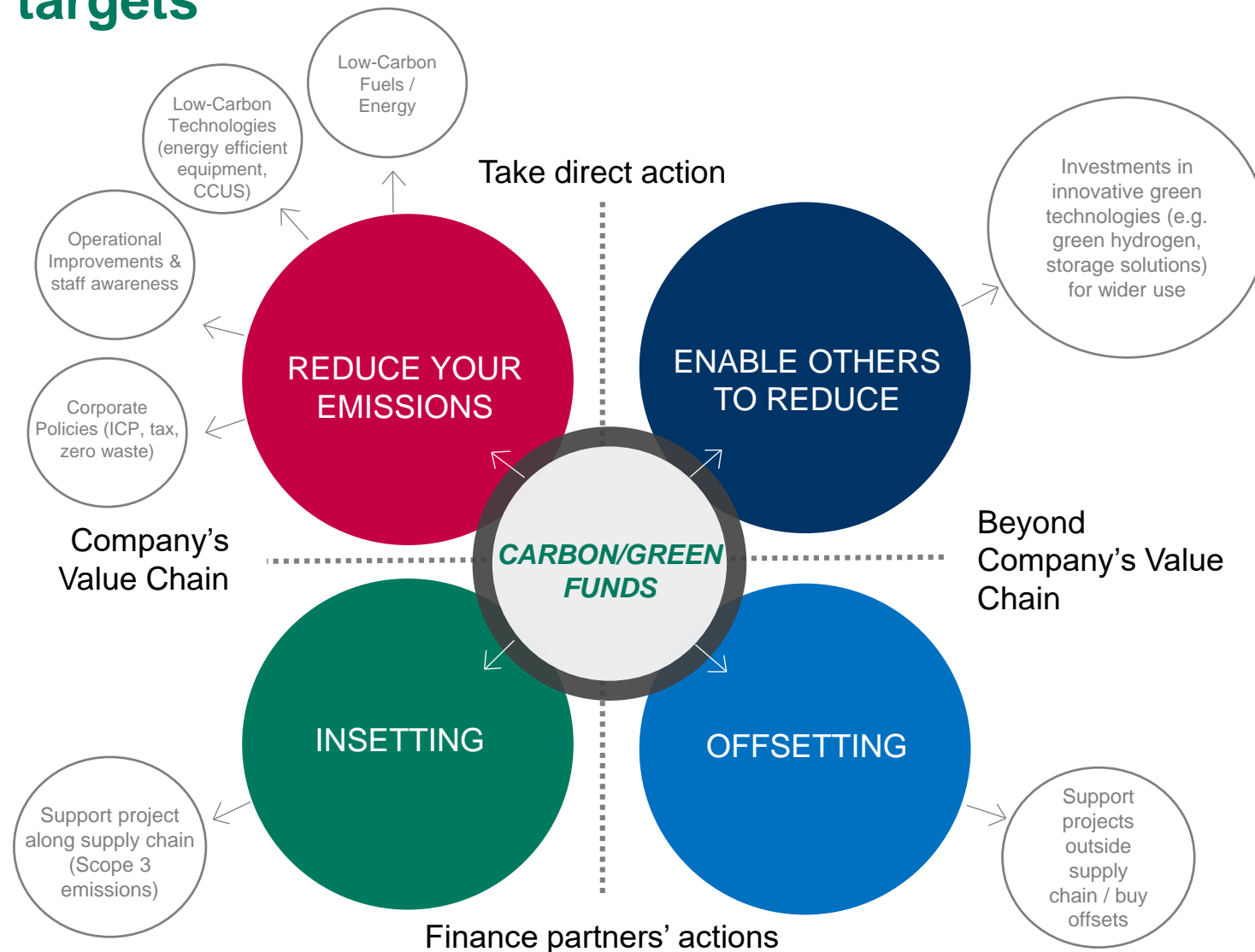




Addressing Low Carbon Transition Risks

What companies can do to address transition risks to low carbon economy?

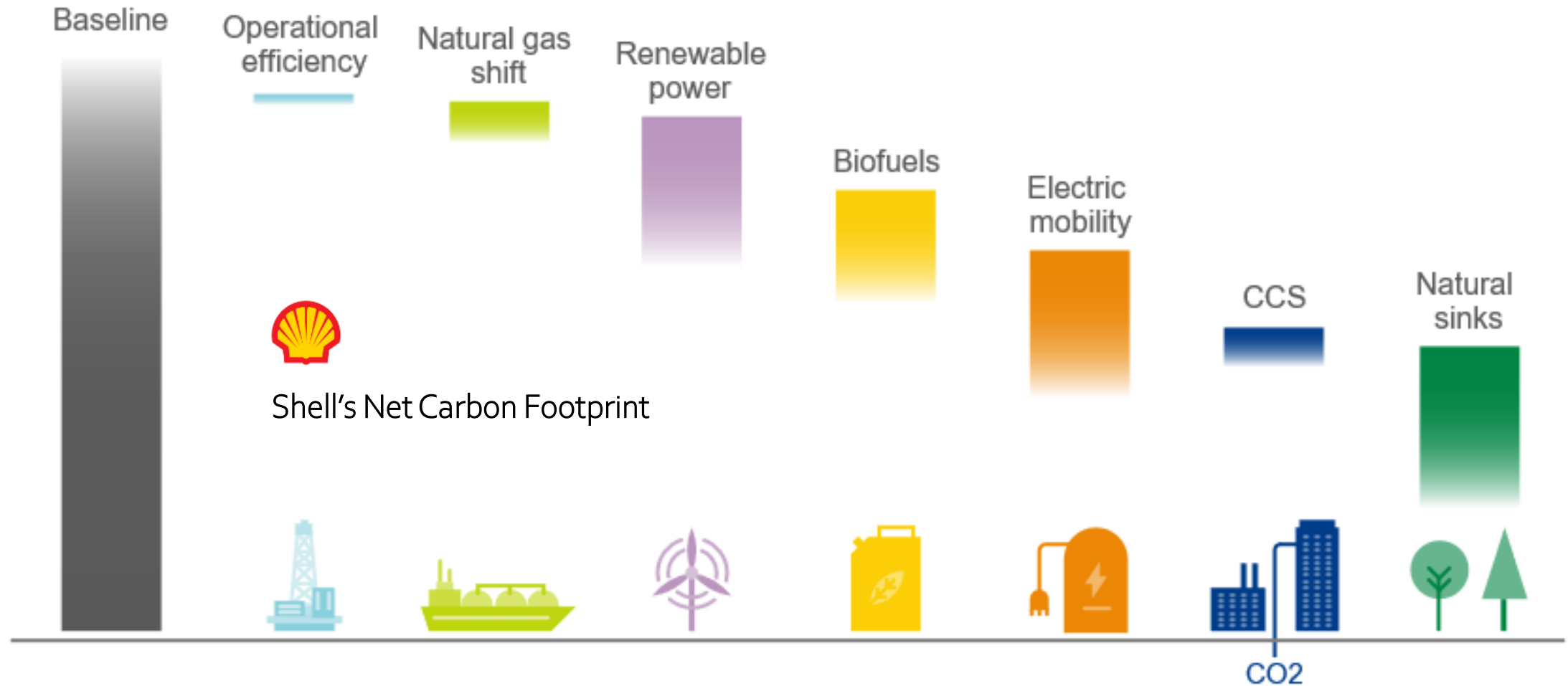
Oil & gas and downstream companies have various means to reach their zero-carbon targets



Source: adopted from Quantis

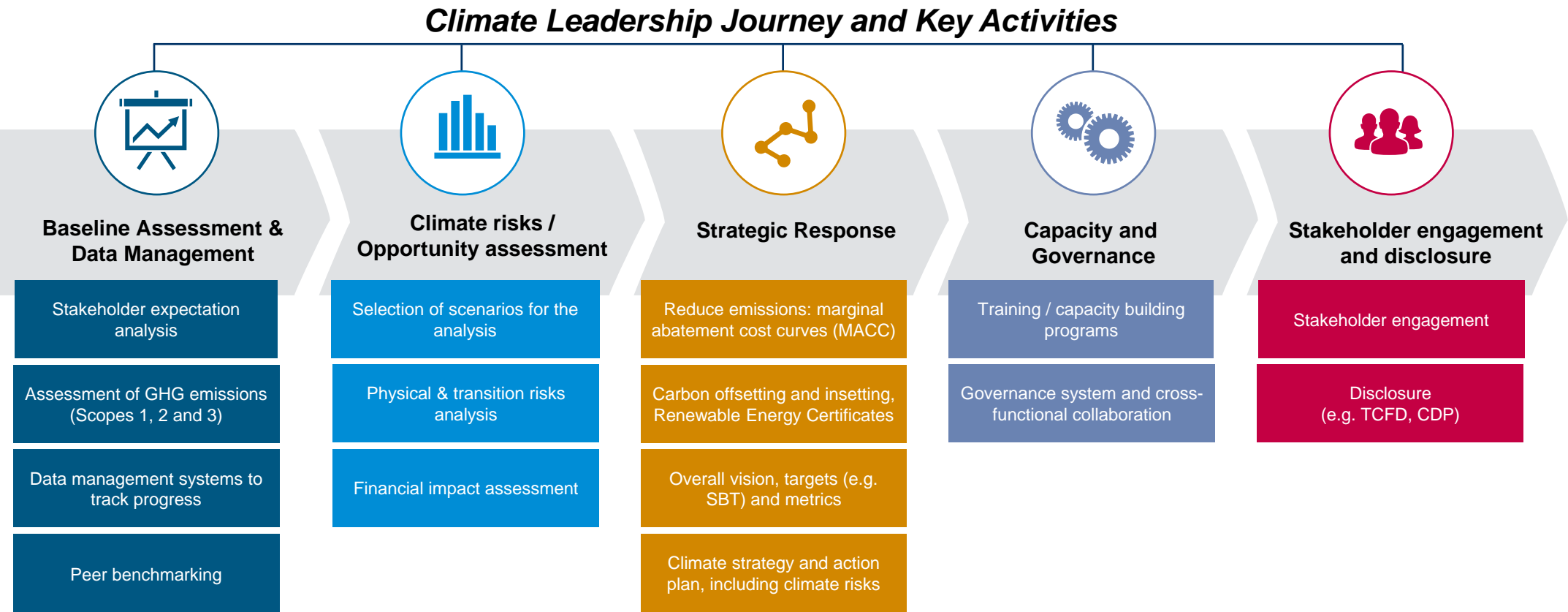
Oil & Gas and downstream companies have various means to reach their zero-carbon targets

Shell example



Climate Leadership Journey

Illustrative example of key activities

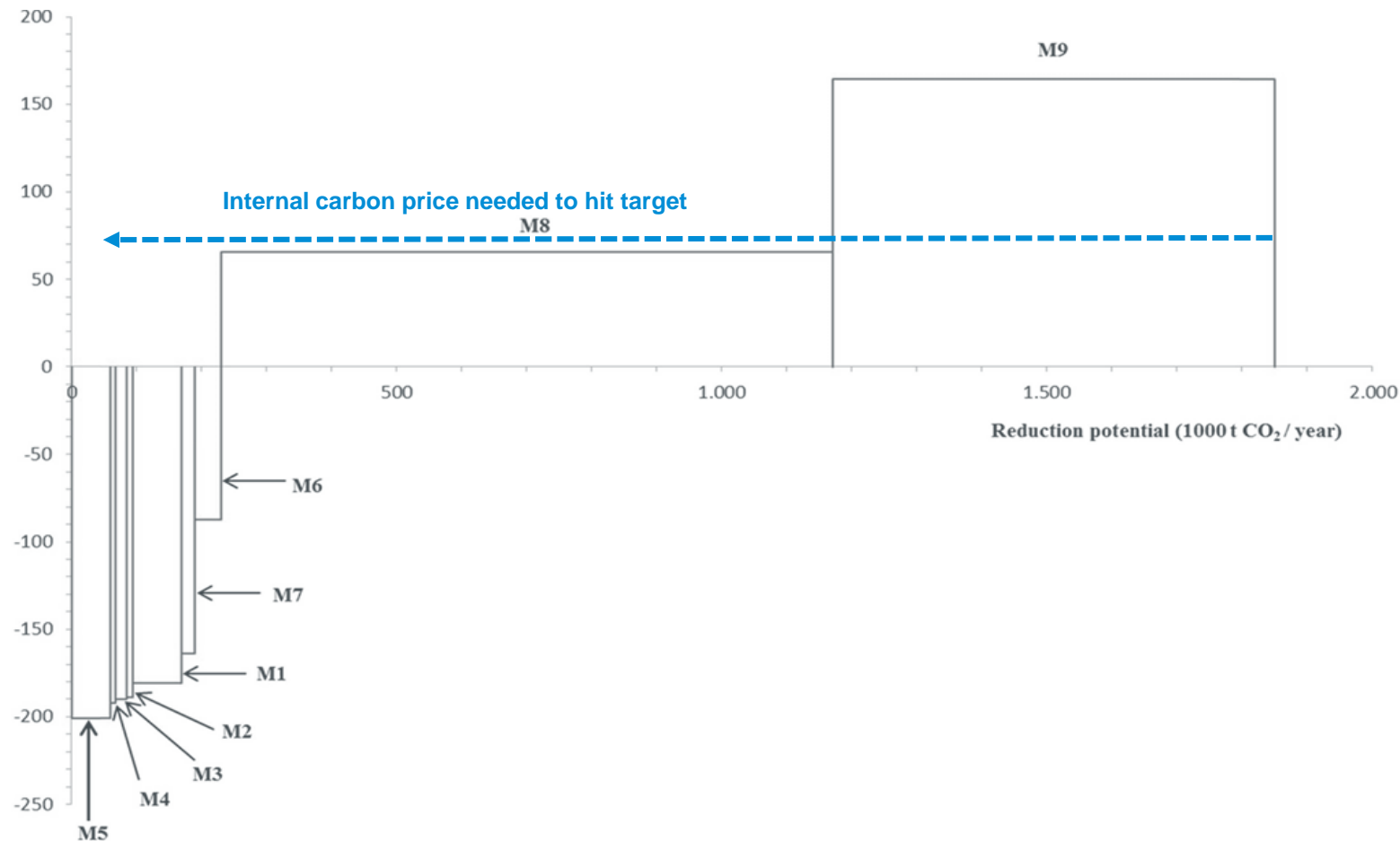


ERM's support along your project lifecycle



Use of MAC Curve and internal cost of carbon to understand GHG mitigation options

MAC Curve example for a refinery project



M1. Improved heat integration

M2. Operation improvement

M3. Waste heat recovery

M4. Hydrogen management

M5. Energy optimization for utility systems

M6. Onsite power generation

M7. Substitution of fuel oil by natural gas

M8. CCS with oxyfuel combustion capture (FCC units)

M9. CCS with post-combustion capture (hydrogen production)

5 things that winners will be doing



Get real – and transparent – with investors



Make **profound changes in business models**, portfolios and practices to address the deep structural transformation



Equip executives and operational managers to lead through the transition – work ever harder to attract the young generation



Understand what **carbon data** are really saying about the state of the business – and upgrade systems and processes



Do whatever it takes to **eliminate GHG emissions** from ongoing operations – dare to imagine carbon as the only license to operate that really matters



Choose to harness new corporate leadership, social will and financial drivers to lead the low carbon energy transition



Thank You



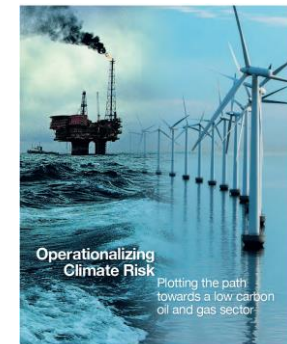
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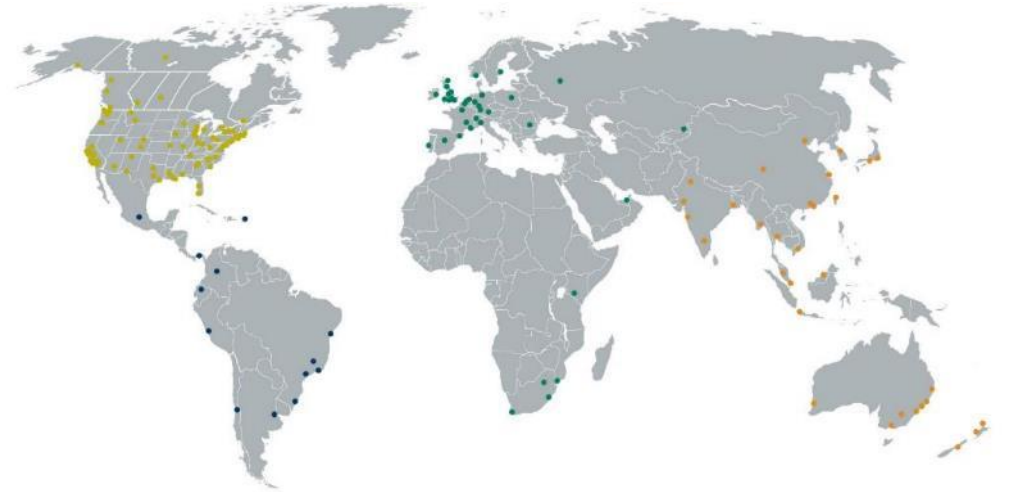
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40

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ERM is a leading global provider of environmental, health, safety, risk, social consulting and sustainability related services.

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