ERM Webinar: Climate-related Financial Disclosures

Part of ERM's 2018 Sustainability Means Business Webinar Series

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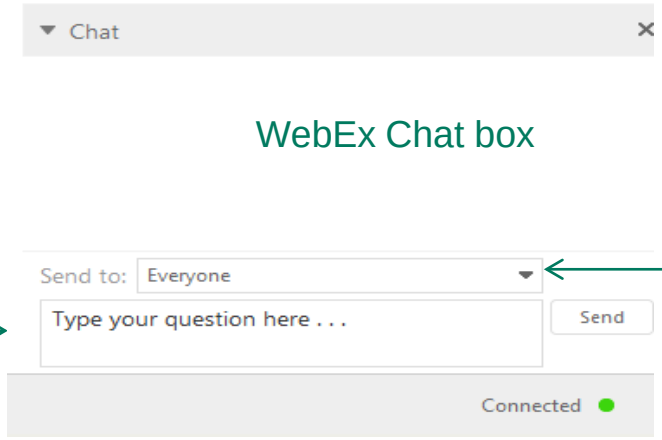
Welcome

- This presentation will be recorded and all who registered will receive a follow-up email containing a link to the presentation within a week.
- Participants can ask questions throughout the presentation using the WebEx chat function and they will be answered during the last 15 minutes of the webinar in the order that they were received.

WebEx Toolbar

Click on chat

- Send your question to “Everyone” so that those answering the questions will be able to see them.



WebEx Chat box

Select “Everyone”

Type your question and send

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2018 ERM Webinar Series

- Climate-related Financial Disclosures (today)
- Valuing Corporate Impacts on the Environment and Society (May)
- Maximizing the Value of Assurance (July)
- Emerging Disclosure Trends (Sept)
- Supply Chain Engagement (Nov)

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Presentation Overview

01 Turning Point: What is Driving the Change?

02 TCFD Overview

03 Climate Financial Risk Approach

04 Q&A

Turning Point: What is Driving the Change?

Financial Stability Issue…

The risks driven by a more rapid low-carbon transition mean the financial sector…

"has a clear interest in ensuring the financial system is resilient to any transition hastened by those decisions, and that it can finance the transition efficiently."

Mark Carney, Chairman G20 Financial Stability Board and Chairman UK Central Bank

Finance Sector Driven Initiative

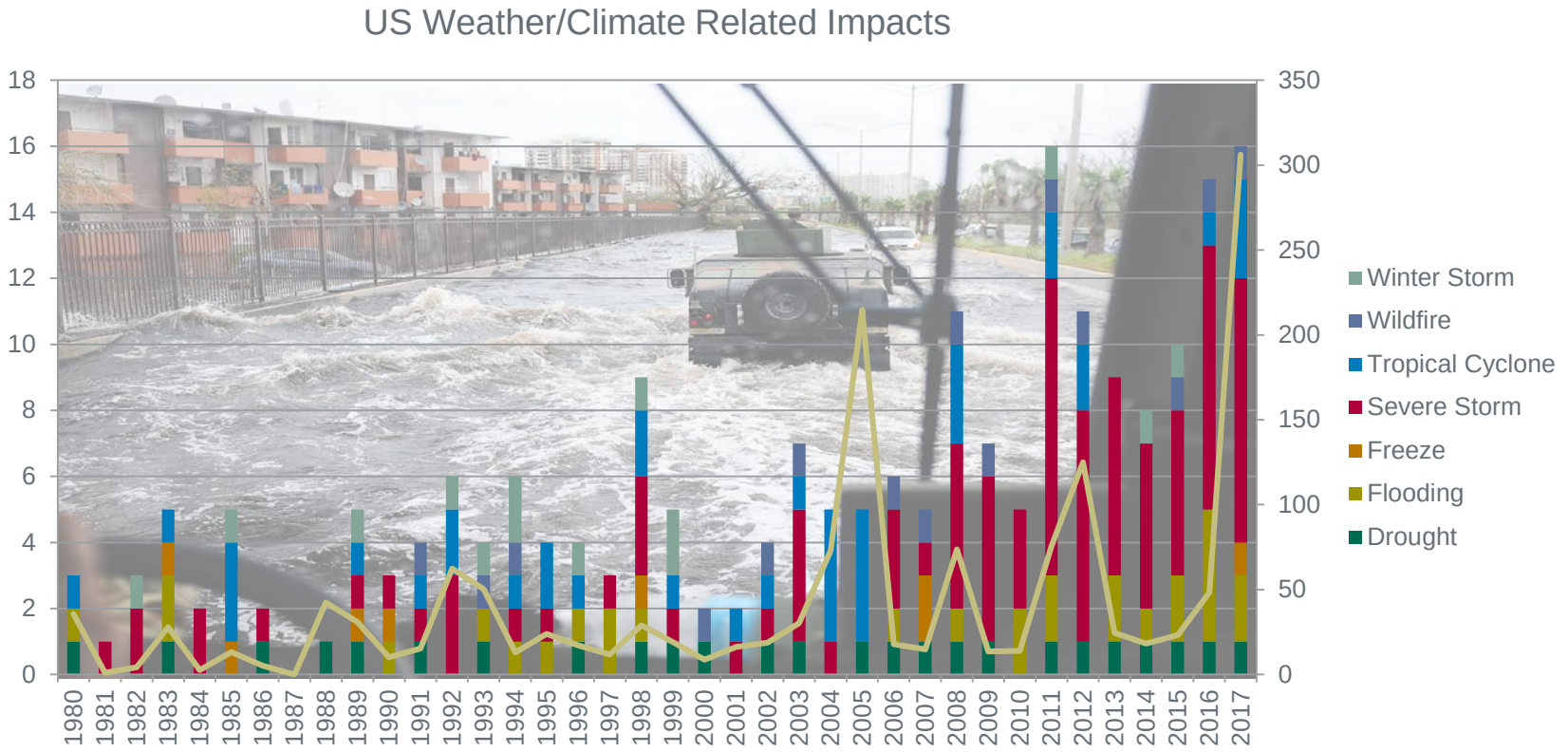
The imperative for companies to assess transition risks and opportunities continues to grow.

- **G20 Financial Stability Board** bringing transition risks into financial 'mainstream' with TCFD
- **Major stock exchanges** already integrating TCFD recommendations into reporting guidelines
- **S&P, Moody's** and former chair of the US **SEC** supported TCFD, the **London Stock Exchange** has already endorsed its recommendations
- So have the **world's largest insurance business** AXA and **world's largest asset manager** Blackrock
- **Climate-related shareholder resolutions** have been filed at many energy company AGMs
- Integrated with numerous sustainability disclosures - **CDP, DJSI, PRI, etc.**

62 shareholder resolutions filed already in 2018 on everything from conducting GHG emissions inventories to evaluating 2 degree scenarios

Climate change is the number 1 topic shareholder resolutions are being filed on

TCFD Focus is Transition & Physical Risk



Source: NOAA

TCFD Overview

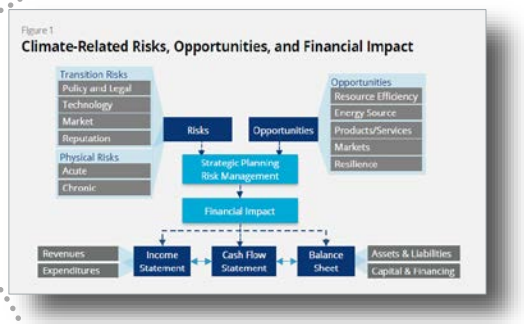
TCFD Overview

Developed **set of recommendations** for **voluntary climate-related financial disclosures** that provide decision-useful information for lenders, insurers, investors

Task force members represented **users and preparers** of disclosures across economic sectors and financial markets

JPMorgan Chase & Co.

Moody's



2015

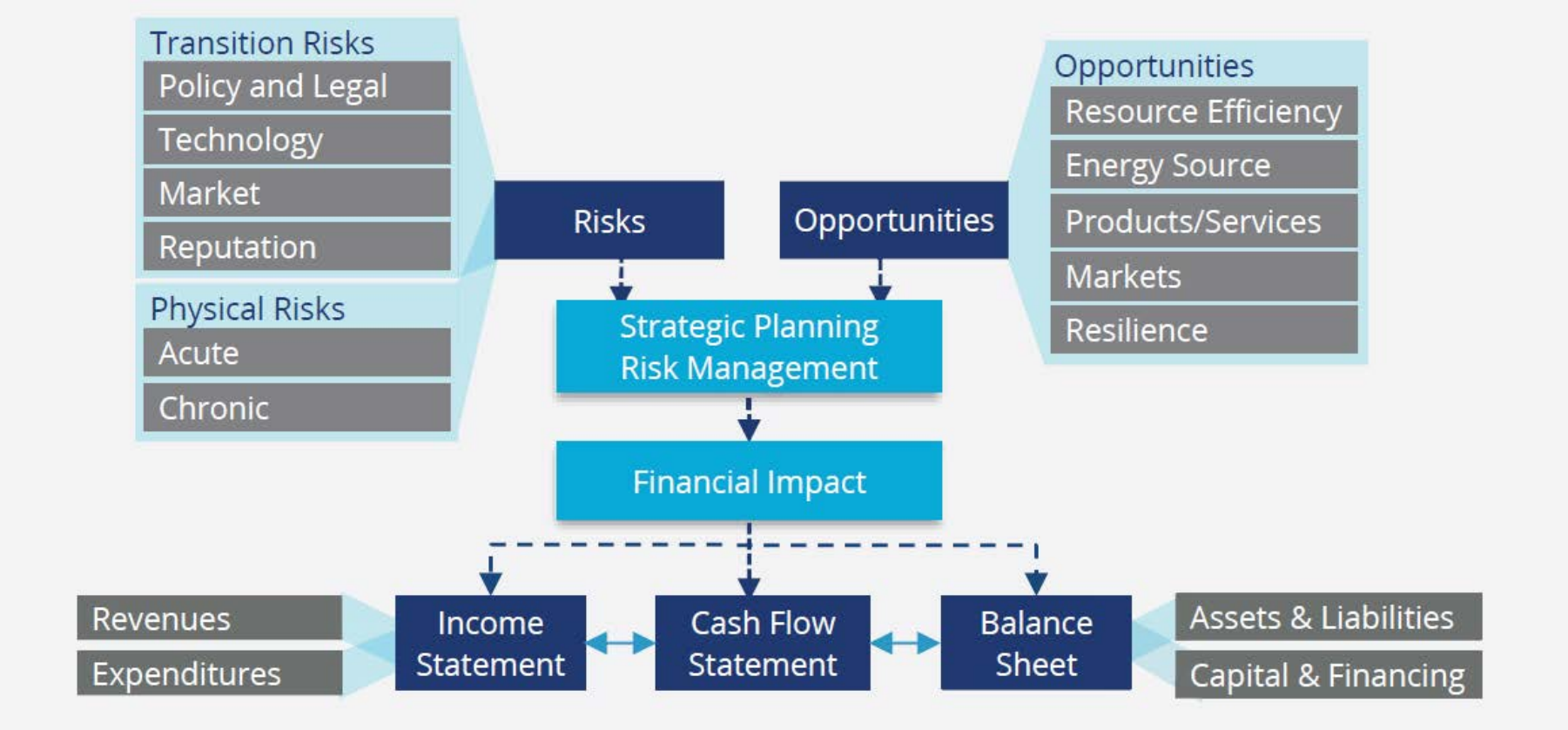
Formed in 2015 by **G20 Financial Stability Board** (FSB)

ERM supported in development of recommendations and supplemental **guidance on scenario analysis**

Source: TCFD Final Recommendations Report

Climate-related Risks & Opportunities

In the eyes of the TCFD…



Source: TCFD Final Recommendations Report

Climate Financial Risk Approach

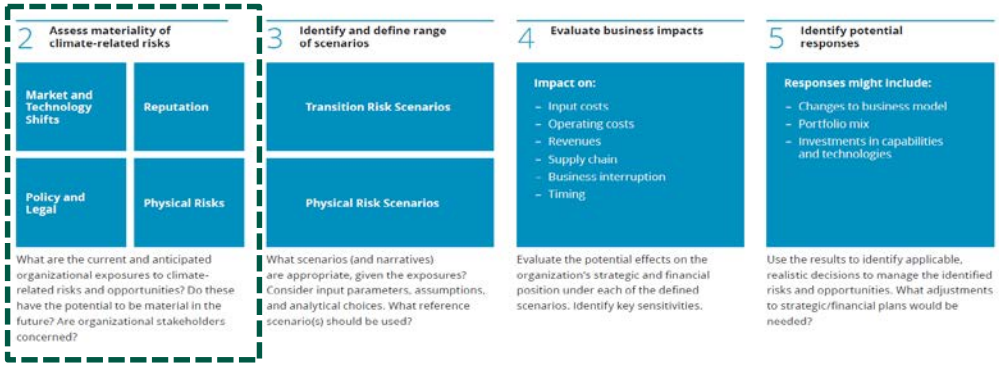
ERM

How do you respond?

The Task Force gratefully acknowledges the research, work and assistance of Charles Allison, James Stacey, Lee Solsbery and Adam Peirce of the consultancy ERM (www.erm.com) in the preparation of this Supplement.

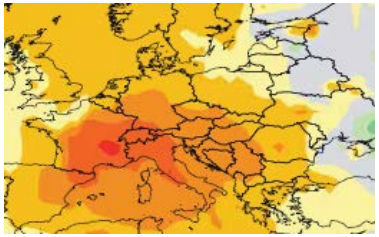
Source: ERM / G20 Financial Stability Board, Task Force on Climate-related Financial Disclosures (TCFD)

Materiality of Climate Risks



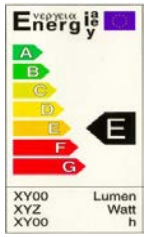
Climate Risk & Opportunity - Business Impacts

Supply chains disrupted. "Thailand floods result in loss of 150,000 units of production and 18% ($200m) fall in quarterly profits at Toyota" (FT)



Assets impaired. "French authorities forced to shut down nuclear power plants as heatwave raised river temperature and reduced flow." (UNEP)

Compliance burden is rising. "Already 40 countries require GHG reporting. 35 countries and more than 20 states or cities have carbon tax or trading schemes. (World Bank)



Products banned. "Phased ban on the sale of incandescent lightbulbs is completed following EU directive to reduce energy use of lighting." (Europa)

Markets eroded. "Peabody is the 50th coal company to file for bankruptcy since 2012 and a startling example of the industry's failure to anticipate how future markets might be limited by tighter environmental regulations." (Forbes)

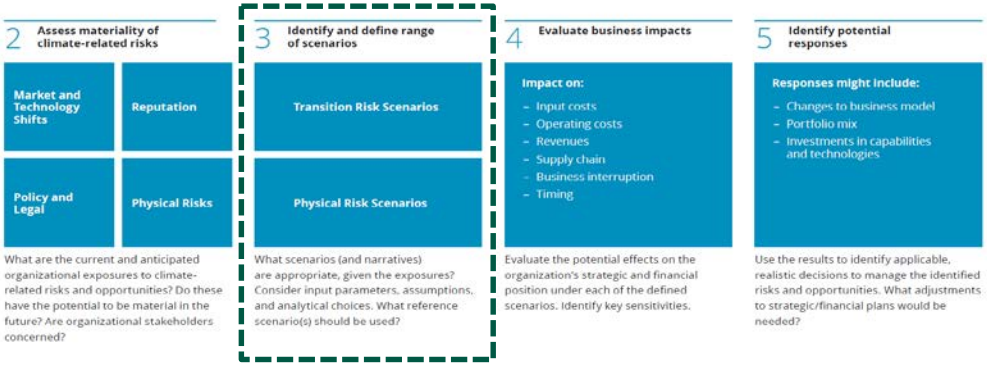
Brands tarnished. "VW warned of consumer backlash over CO2. Some analysts say understatement of CO2 emissions could hurt car sales more than scandal over diesel pollutants." (FT)

Financial Risks of Investments

Investments face a variety of financial risks from the low-carbon transition and climate change.

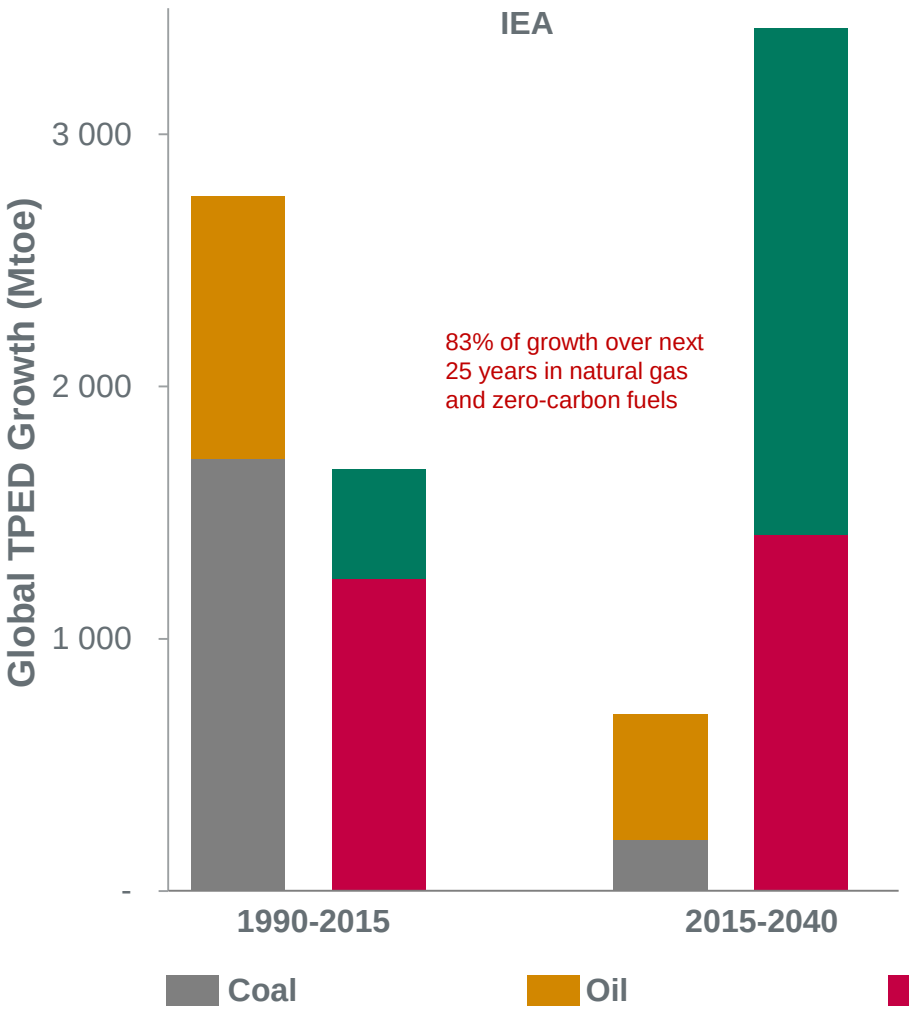
Source: ERM, TCFD Technical Supplement with reference to CDP questionnaire

Range of Scenarios



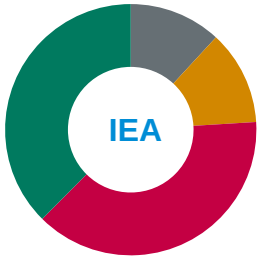
Why Scenarios?

Global energy growth shifting to lower carbon

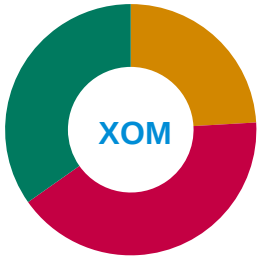


Key question is "how quickly"

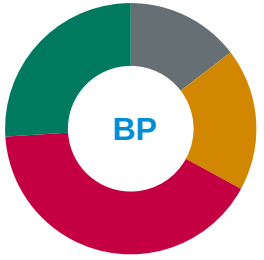
(1) Electrification / energy storage



(2) Divestment from coal



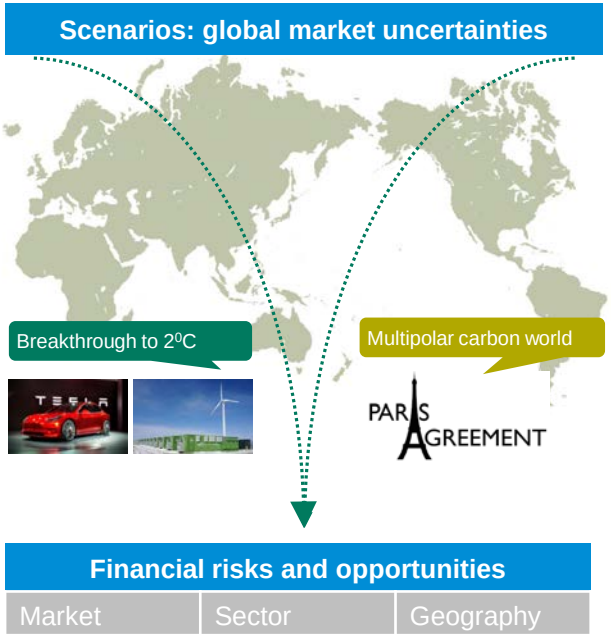
(3) Gas as a transition fuel



Source: IEA World Energy Outlook 2016, BP 2035 Outlook, XOM 2040 Outlook

Value Add of Scenarios & Climate Financial Risk

- Scenarios are:
  - Plausible alternative views about how future climate change issues could evolve
  - Not a “what if” exercise for only one uncertainty
  - Provide challenge to conventional wisdom of their users
- Assess financial exposure to both transition and physical climate-related risks and opportunities
- Ensure companies have a robust strategy to mitigate risks and capture opportunities
- Identify early market signals to monitor
- Define the range of business, strategic and financial impacts and management actions to be considered



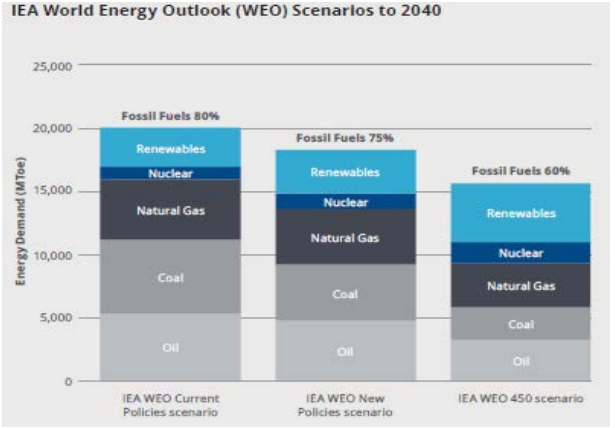
Which Scenarios to Use?

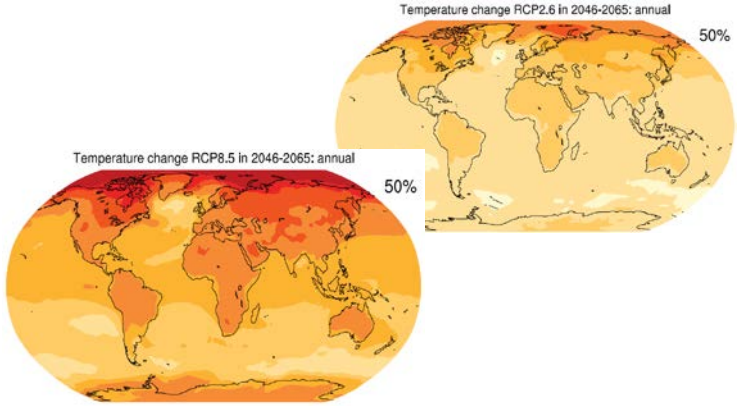
Transition scenarios

- Global balance (e.g. International Energy Agency)
- Country-specific (e.g. US EIA)
- Sector-specific (e.g. Cement)
- Policy (e.g. US mid-century strategy, Paris Agreement NDCs)
- Technology breakthrough research (e.g. CCS, EVs)
- Your own company-specific (e.g. BP)

Physical scenarios

- Intergovernmental Panel on Climate Change
- Regional scenarios published by government authorities (e.g. US National Climate Assessment)
- Think Tanks (e.g. World Resources Institute Aqueduct)





How Scenario Analysis Works in Practice

Asset Investment			Risk Impact			2°C vs BAU scenario	Trend		
Sector	Sub- sector	Geography	Impact Category	Financial Driver	Transition Risk Impact 2C vs BAU scenarios	Data Source	2020	2025	2030
Transport	Aviation	India	Revenue	Rev - flight demand	Decreasing number of flights passing through an airport	**IEA ETP** Total passenger kilometres travelled			
					Regulatory and strategic changes to city and intercity networks driving demand for high or low carbon transport options	**IEA ETP** Share of passenger kilometres travelled by air			
			Cost	CapEx & OpEx - Emission reduction requirements	Potential technology improvements in airplanes (to reduce emissions), leading to required investments in the airport infrastructure	**IEA ETP** Investment options to reduce flight carbon intensity			
				OpEx - Fuel provision for flights	Potential technology improvements in airplanes fuel requirements, leading to potential increases in providing fuel provisions for flights	**Government policy**			
				OpEx - Carbon pricing	Changes in carbon pricing	**World Bank** Historic data; government policy			

Assessing Risks - Portfolio to Asset-level

Asset level screening of physical climate threats for a portfolio of assets.

Example supporting GIS outputs from ERM climate-related physical risk screening tool.

Climate Change Risk & Resilience Tool

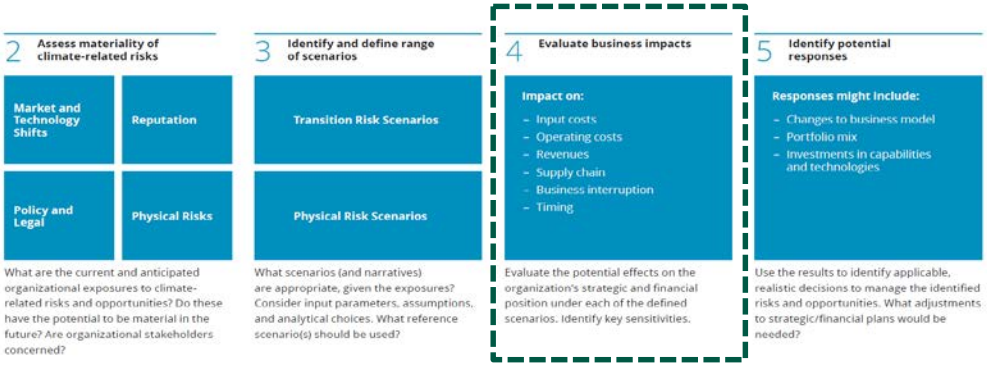
Vedanta Businesses

Sector	Country	Asset Types	Asset	Natural hazard threat score						
				Hurricanes	Storm surges	Wildfires	Floods	Water availability	Drought	Landslides
Zinc	India, Ireland, Namibia, S Africa	Mining, processing and refining (incl smelters)	Site 1	4	0	0	n.a.	n.a.	0	0
			Site 2	4	0	4	4	2	4	0
			Site 3	4	0	0	n.a.	n.a.	0	0
			Site 4	4	0	4	4	3	2	0
			Site 5	4	0	4	3	3	2	0
			Site 6	4	0	0	4	2	0	0
Lead			Site 7	1	0	3	2	3	1	0
			Site 8	2	0	1	2	3	2	0
			Site 9	1	0	0	n.a.	n.a.	0	0
Silver			Site 10	1	2	4	4	1	1	1
			Site 11	1	0	4	3	3	4	1
			Site 12	1	1	4	2	3	4	0
			Site 13	1	0	3	2	3	2	0
Oil	India, Sri Lanka, S Africa	E&P	Site 14	1	0	3	3	2	1	3
			Site 15	4	0	3	3	2	3	3
			Site 16	4	3	4	3	2	2	0
Gas			Site 17	4	3	4	4	2	2	1
			Site 18	1	0	4	3	2	2	0
			Site 19	1	0	4	3	2	2	2
			Site 20	3	0	3	3	2	2	2
Iron Ore	India and Liberia	Mining and processing (including power generation)	Site 21	1	0	0	n.a.	n.a.	0	0
			Site 22	1	0	4	2	2	2	2
			Site 23	1	0	4	3	4	2	0
Copper	India, Australia, Zambia	Mining and refining (including smelters)	Site 24	1	0	4	4	4	0	0
			Site 25	1	0	4	4	2	2	1
			Site 26	4	0	3	3	2	3	0
Aluminium	India	Mining, refining and fabrication (incl smelters and power generation)	Site 27	4	0	3	4	3	3	0
			Site 28	4	0	3	4	3	3	3
			Site 29	2	0	0	n.a.	n.a.	0	0
			Site 30	4	0	4	3	2	3	4
			Site 31	3	0	4	3	4	2	3
Power	India	Coal-fired power and wind	Site 32	1	0	4	3	4	0	2
			Site 33	1	1	3	3	3	2	1
			Site 34	1	0	4	3	4	4	0
			Site 35	4	3	4	4	2	4	0

Storm surges

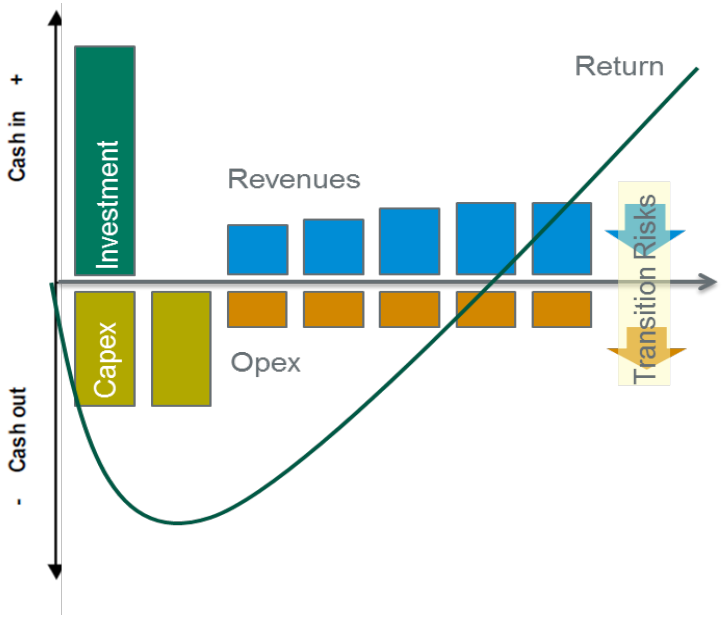
Hurricane / cyclone tracks

Business Impacts



Assessing Financial Impacts

Take for instance, an investment in a coal-fired power plant in the US



Key Financial Drivers

- **Drop in asset revenues** driven by:
  - Lower than expected plant utilisation, with more rapid uptake in renewables and gas
  - Lower power prices, as intermittent renewable supply grows (i.e. duck curves)
- **Rise in asset costs** driven by:
  - Capex: requirements to reduce emissions (e.g. more efficient operations, carbon capture)
  - Opex: changes in carbon pricing; physical risk impacts

Robust Investment Strategy for Solid Returns

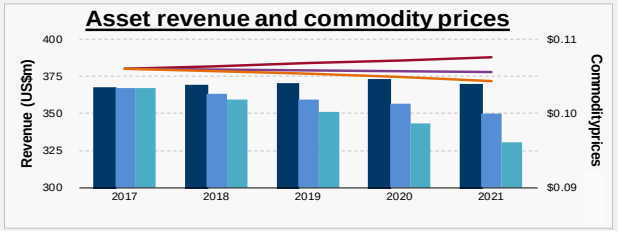
(1) Identify climate financial risks

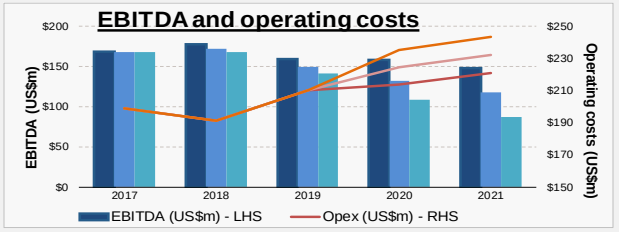
Investment: Company/Region/Asset X						Climate-related Financial Risk Impact					
						Fall/Rise in asset revenues			*Rise/Fall in asset costs*		
Risk category	**Risk**	**Financial impacts**	**Signposts to monitor**	**Mitigation options**	**Supporting evidence/sources**	**Short [d]**	**Med**	**Long**	**Short**	**Med**	**Long**
Regulatory	Carbon price escalates	Additional OPEX costs	Carbon price developments	Carbon reduction plans	Carbon price forecasts/asset footprinting						
Market	Gas demand rises as result	New revenue potential	Coal market	Spot market	Energy market outlooks						
Reputation	Access to project financing	Lower cost of capital	Bank investment guidance	Venture partnering	Reputational historic trends and scenarios						
...etc	*...etc*	*...etc*	*...etc*	*...etc*	*...etc*						

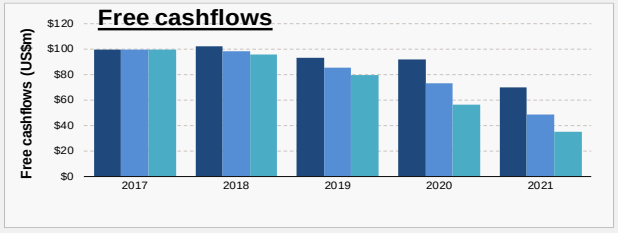
(2) Assess impacts using scenarios

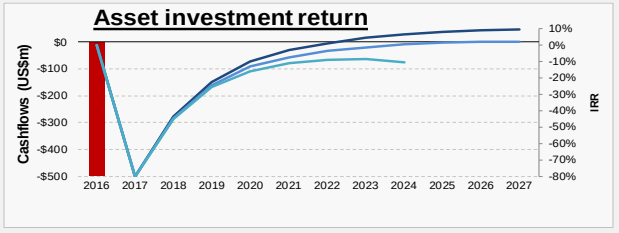
Year ended 31 December	[Unit]	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
New Policies Scenario			367	363	359	357	350	344	338	333	326	320	315	310
IEA 2C Scenario			367	359	351	344	331	319	307	296	284	269	255	241
Operating costs														
Base Case	US$m		(199)	(191)	(210)	(214)	(221)	(225)	(229)	(242)	(246)	(250)	(254)	(259)
Ne														(270)
IEA														(281)

(3) Evaluate business impact









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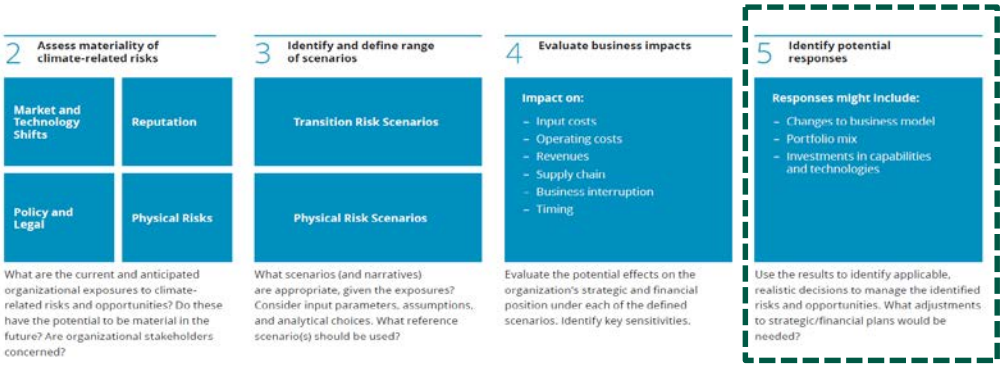
Potential Responses



Potential Strategic Responses

Adapt

- Adapt the business portfolio to mitigate climate-related risks
- Invest in adaptation and resilience building in asset operations
- Reduce carbon footprint of business value chain or financial portfolio

Invest

- Invest in capabilities to capture lower carbon opportunities
- Pilot new business models (e.g. partnering)
- Test the market for lower-carbon services and products (e.g. venture capital)

Capitalize

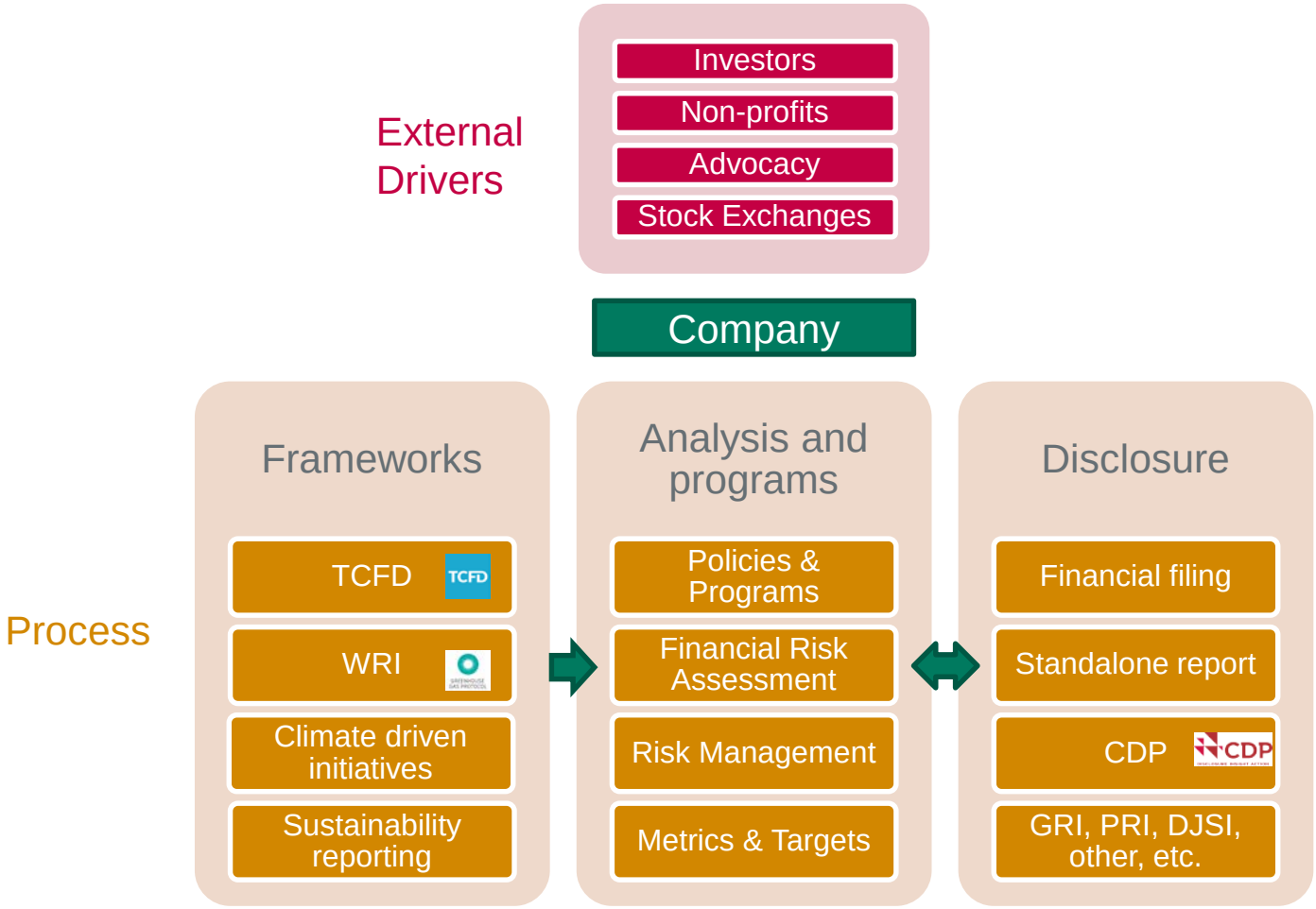
- Capitalize on new emerging markets (e.g. low-carbon transition, physical risk resilience)
- Build out new market strengths & capabilities
- Deliver new products and services

Disclosures

6 **Document and disclose**
Document the process; communicate to relevant parties; be prepared to disclose key inputs, assumptions, analytical methods, outputs, and potential management responses.

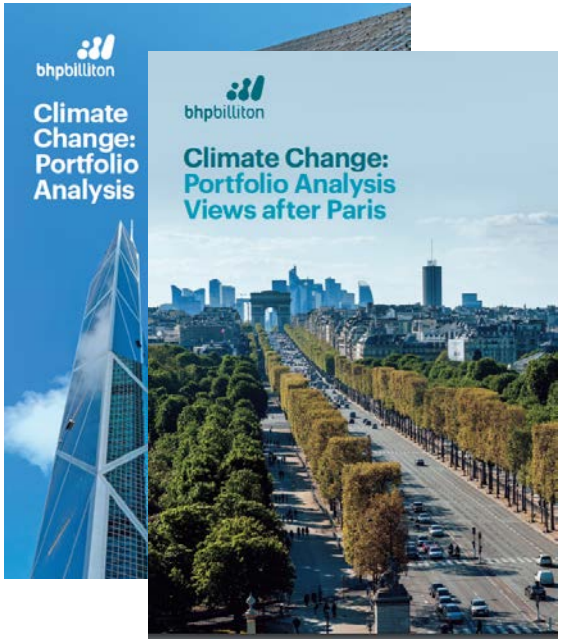
How Climate Financial Risk Fits

How does climate financial risk fit into your company?



Financial Filing Example

BHP Billiton is a leading example…



Percentage contribution to FY2016 revenue[1]	Attractiveness of investment outlook[2] in Central case	Change in attractiveness of investment outlook[2] in Global Accord compared to Central case	Impacts under our Global Accord scenario
Thermal Coal 4%	●	↓	• Remains competitive on the cost curve and generates acceptable returns. • Careful consideration would be required before pursuing growth opportunities given the current returns and growing regulatory and societal pressures that could impact future asset values. • Failure to achieve a breakthrough in commercialising low emissions technologies such as CCS would reinforce this view.
Gas[3] 10%	●	↑	• Key transition fuel as concerted efforts to reduce emissions are expected to increasingly focus on utilising gas for power generation and transportation. • This results in high demand for gas, particularly in the short to medium term, providing opportunities to invest in the quality gas resources in our portfolio.
Metallurgical Coal 11%	●	↔	• Although the sector is slightly less attractive, our higher quality assets remain very attractive compared to peers as penalties are applied to lower quality coals. • Key consideration is around pace of material substitution (e.g. steel scrap in steelmaking) with the advent of tighter environmental regulations.
Oil[4] 12%	●	↓	• By 2035, real crude oil prices are lower than our Central case primarily due to the higher penetration of EVs. • While crude oil will likely remain competitive in its core transportation market, it is the most adversely impacted commodity in our portfolio. Lower oil prices in this scenario reduce returns, but our options remain relatively attractive. • Due to the steepness of the oil supply cost curve, our existing oil growth projects remain very competitive with other options in the portfolio.
Copper[5] 27%	●	↔	• Remains attractive due to growing demand driven by the growth in renewables and EVs, which generally require more copper to produce. • Price is lower as higher demand is offset by higher recycling. • Aluminium substitution is assumed to be no greater. • Minimal impact on the copper growth portfolio as returns reduce minimally from the Central case and remain attractive. • Increasing regulatory approvals for mines delay the supply of greenfield developments, an advantage for low-cost incumbents.
Iron Ore 34%	●	↔	• Sector remains attractive and has a minimal impact on our existing portfolio. • Key consideration is around pace of material substitution (e.g. steel scrap in steelmaking) with the advent of tighter environmental regulations.

"Demonstration of our commitment to climate change-related disclosures"

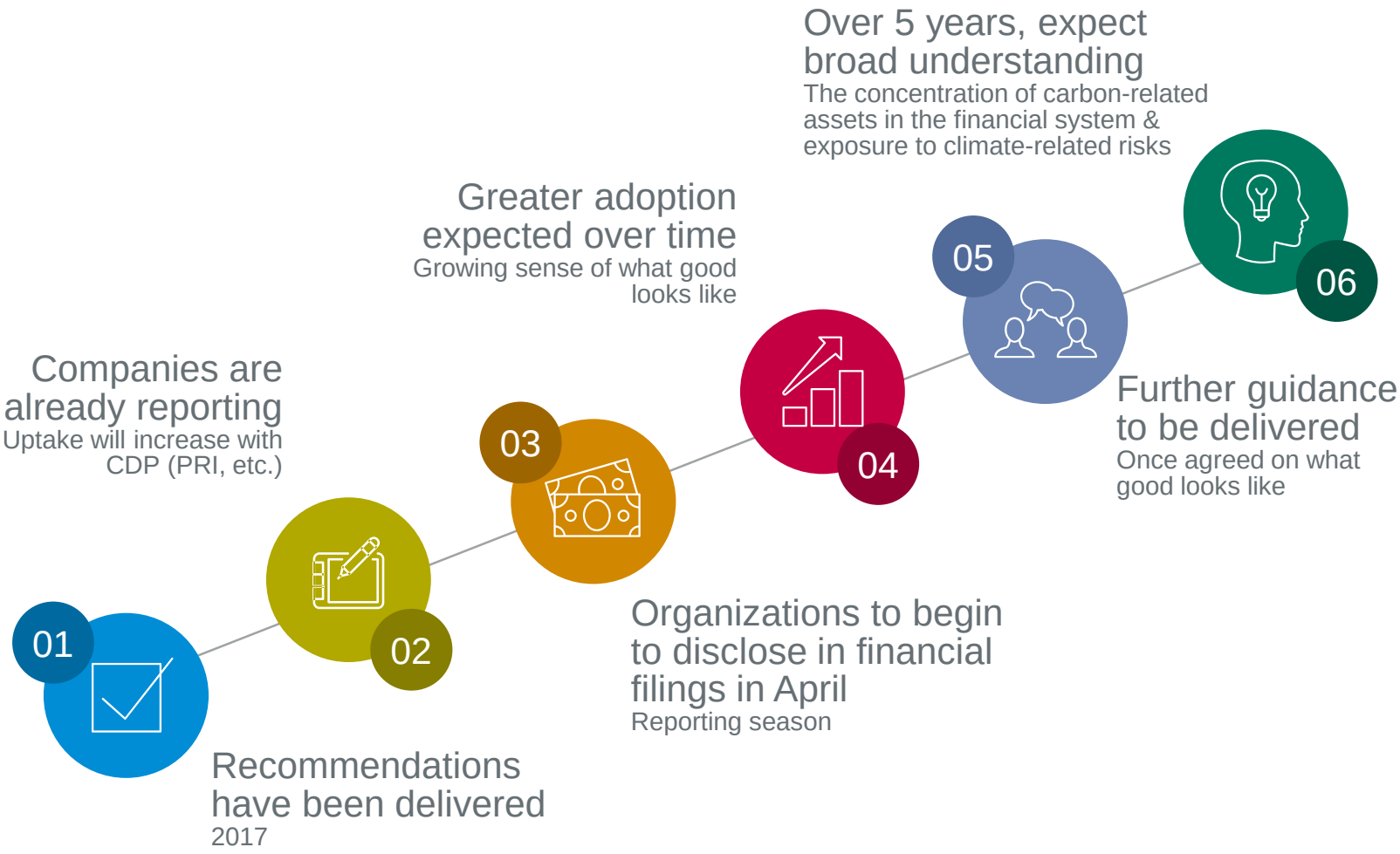
- Approach to strategic planning
- Insights: latest market signals which indicate shifts to low emissions world
- Portfolio implications
- Corporate actions
- Actions to manage climate change risk

CDP – New Questions

Section	2018 CDP #	2018 Question Detail
Risks and opportunities	C2.1	Describe what your organization considers to be short-, medium- and long-term horizons.
	C2.2b	Provide further details on your organization's process(es) for identifying and assessing climate-related risks.
	C2.2c	Which of the following risk types are considered in your organization's climate-related risk assessments?
	C2.5	Describe where and how the identified risks and opportunities have impacted your business.
	C2.6	Describe where and how the identified risks and opportunities have factored into your financial planning process.
Business strategy	C3.1a	Does your organization use climate-related scenario analysis to inform your business strategy?
	C3.1d	Provide details of your organization's use of climate-related scenario analysis
Governance	C1.1b	Provide further details on the board's oversight of climate-related issues.
	C1.2	Below board-level, provide the highest-level management position(s) or committee(s) with responsibility for climate-related issues.
	C1.2a	Describe where in the organizational structure this/these position(s) and/or committees lie, what their associated responsibilities are, and how climate-related issues are monitored.

Climate-risk Financial Reporting to Grow

The TCFD expects the adoption (and depth) of climate-risk financial reporting to grow over the next 5 years.



Questions

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ERM's Next Webinar in this Series

Valuing Corporate Impacts on the Environment and Society

May 2018

Measuring and valuing impacts on the environment and society provides companies the opportunity to mitigate risk, find new opportunities, and develop sound growth strategies. Join us to hear how companies are using the Natural Capital Protocol, Social Capital Protocol and Impact Valuation to create business value.

Speakers include:

Doug MacNair
ERM
Technical Director

Christian Heller
BASF
Senior Manager Corporate Sustainability Strategy

Eva Zabey
WBCSD
Director, Redefining Value – Natural Capital

Clemence McNulty
ERM
Principal Consultant