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# Climate risk and the Norwegian economy

## Better climate risk management

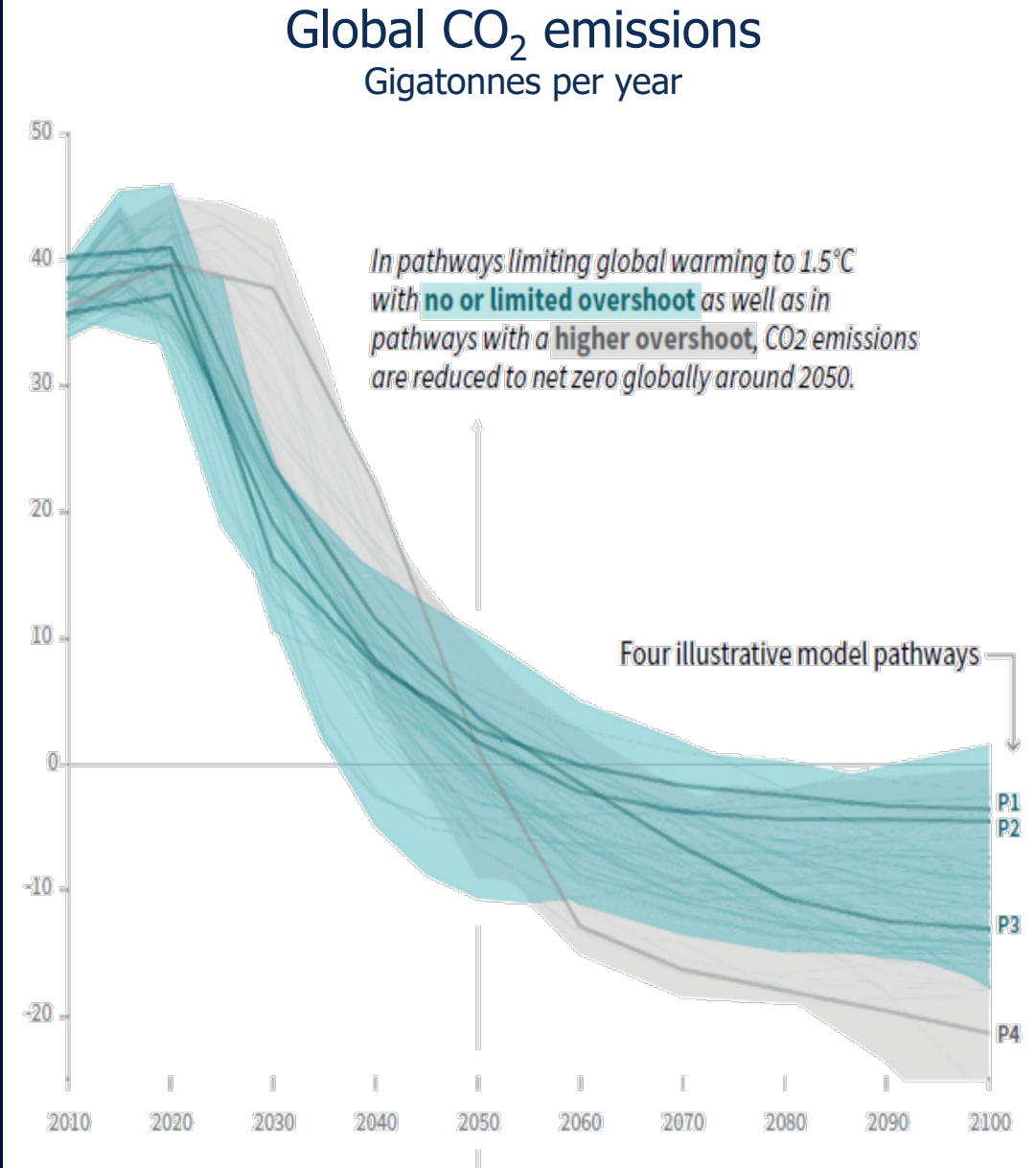
'Risky Days', Sparebank1 group  
Stavanger, 2 September 2019

# The climate challenge is massive

Paris was just a teaser, the work starts now

- Success requires continuous scaling of policies and effort
- Global net emissions shall have to be zero by 2050
- Demand and extraction of fossil fuels needs to be cut
- Any delay will add complications - and cost

Source: IPCC.



# The world is not on the right track

Energy demand and CO<sub>2</sub> emissions keep increasing

## Global Energy & CO<sub>2</sub> Status Report

The latest trends in energy and emissions in 2018



“

Despite major growth in renewables, global emissions are still rising, demonstrating once again that more urgent action is needed on all fronts — developing all clean energy solutions, curbing emissions, improving efficiency, and spurring investments and innovation, including in carbon capture, utilization and storage.

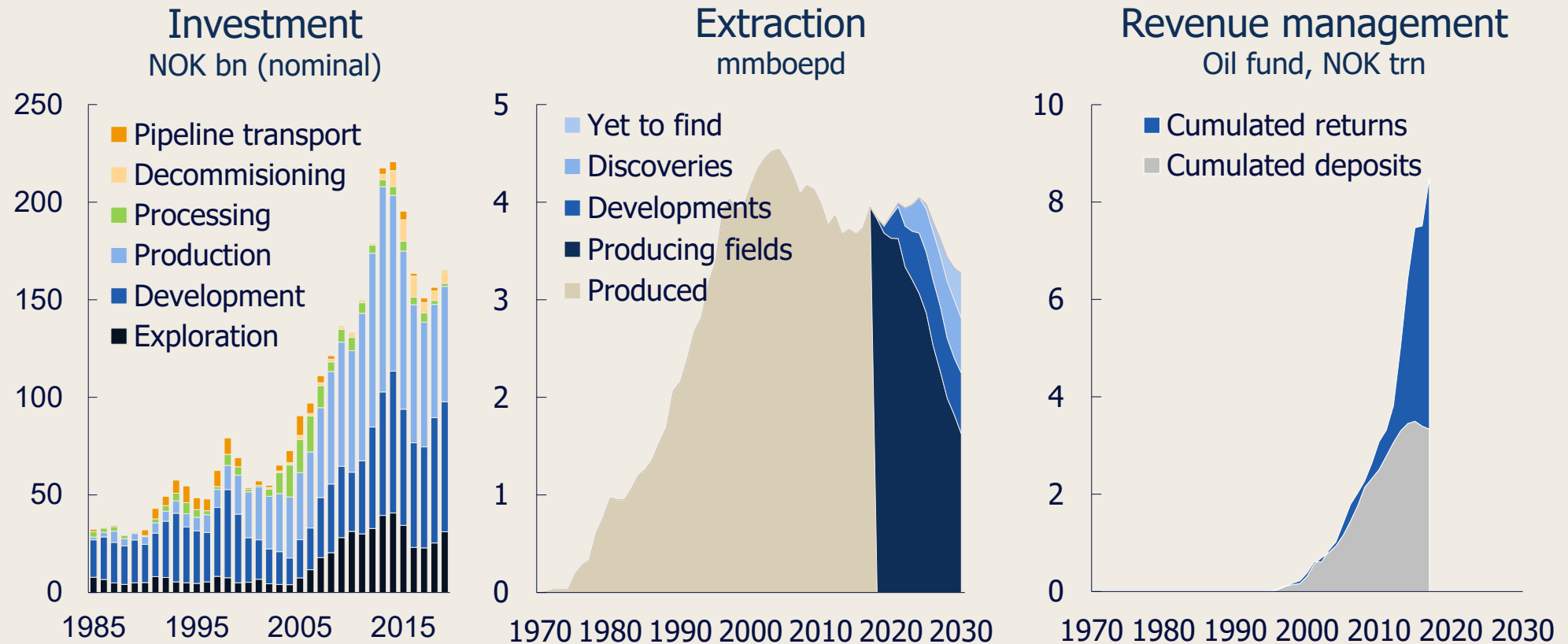
FATIH BIROL  
EXECUTIVE DIRECTOR, IEA





# Conversion of natural capital

From below-ground resources to financial resources

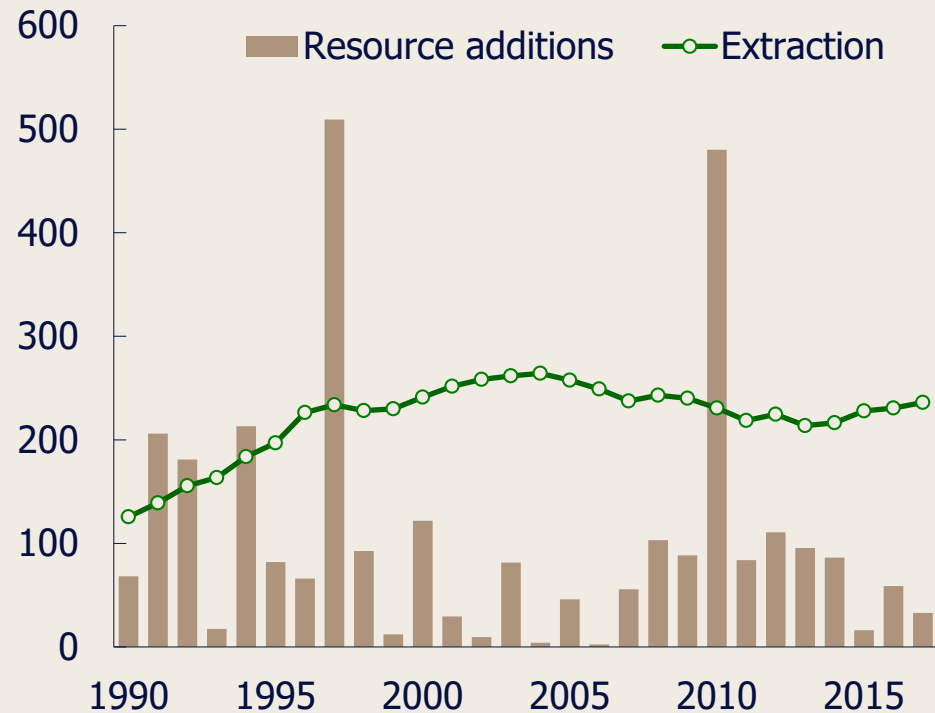


# Clouds on the horizon

Constraints resource mobilisation and demand

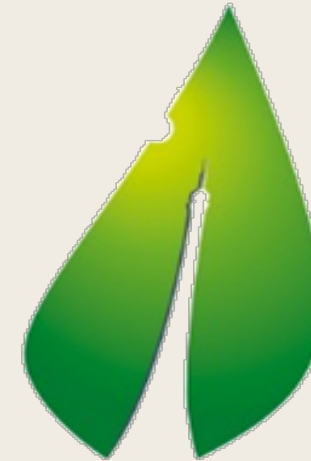
## Resource scarcity...

... raises challenges for reserve replacement



## Climate policy uncertainty...

... raises raises risk around demand and prices

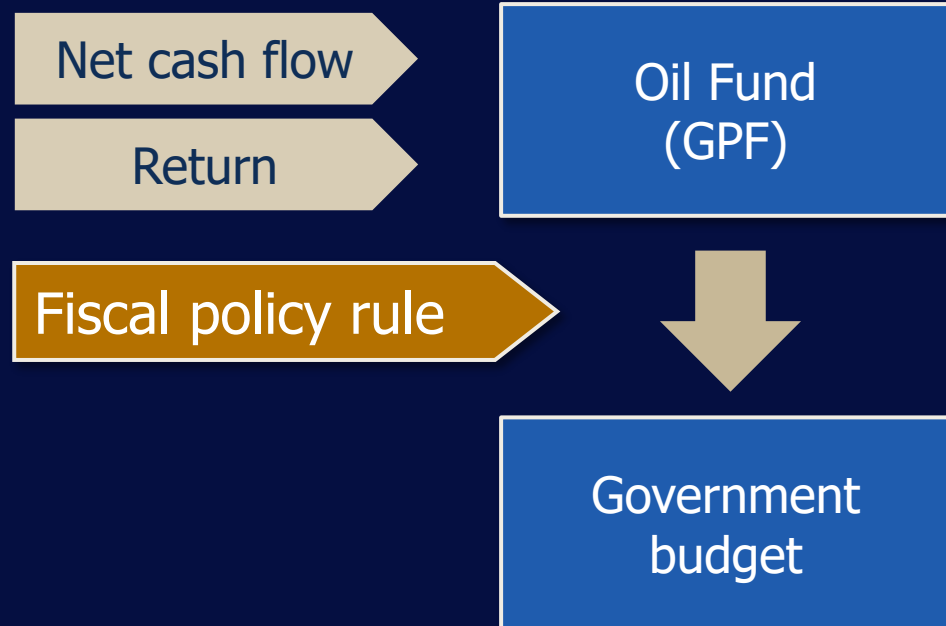
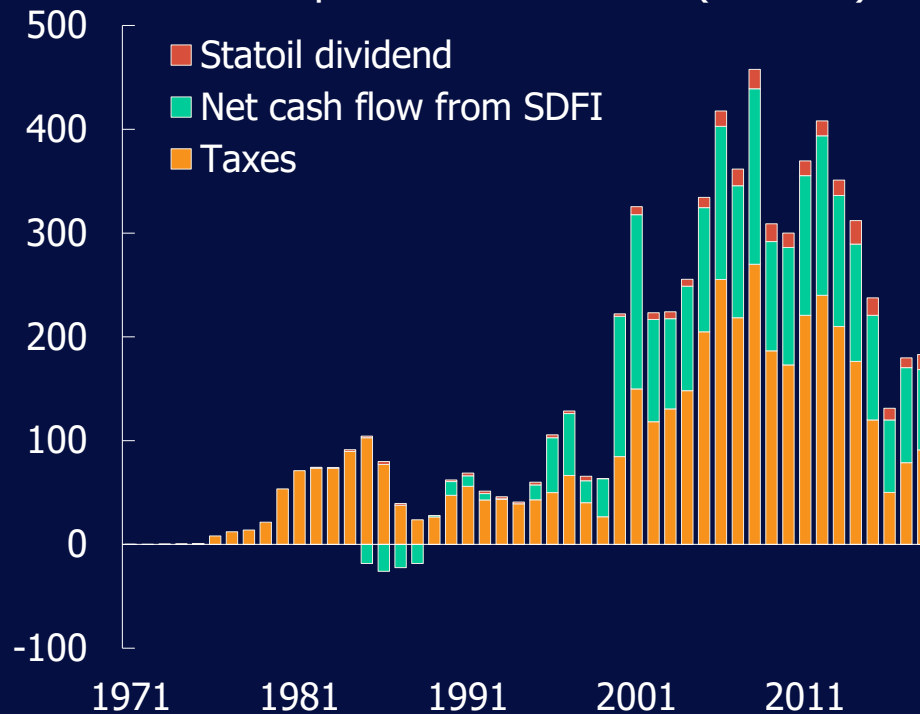


COP21-CMP11  
**PARIS2015**  
UN CLIMATE CHANGE CONFERENCE

# Oil fund mechanism and fiscal policy rule

Separation of accrual and spending of oil and gas revenues

Government net cash-flow...  
...from petroleum activities (NOK bn)



# Norway's Climate Risk Commission

Better climate risk management

Official Norwegian Reports NOU 2018: 17 Summary

## Climate risk and the Norwegian economy



### Vedlegg 6

#### Klimarisiko: Respons og

Klaus Mohn, professor Hans

#### 1 Innleiing

Den norske olje- og gassverksamda fører med i omfattende ringvirkningar for fastlandsøkonomi og store kostnadsstrømmer til statskassa. Utvikle for olje- og gassnæringa spelar dermed ei viktige rolle for norsk økonomi og offentlege finans. Etter meir enn 40 år har gassnæringa blitt ei olje- og gassnæringa no overfor utfordringar, bl internasjonalt og i Noreg (Mitchell og Marx 2012; Mitchell mfl, 2015).

Det siste tåra har ny teknologi utleyst store leggeservar verda over (Mohn, 2010), som i tur har lagt grunnlag for eit strukturelt sjøkk tilbudsida av olje- og gassmarknaden (Baffes i 2015). Aukende produksjon av olje frå tette l gartar i USA førte til at eit overskottstilbud i demma opp i oljemarknaden frå 2010 og utv som blei utleyst til Opec og kontrollen i oljefundet og overset til marknaden å bestem oljeprisen frå november 2014. Resultatet var oljeprisen fallt, frå eit årsgjennomsnitt på 90 US\$ i 2014 til 50 US\$/fat i 2015. Rett nok har o prisen stige vesentleg frå dei lågaste nivå i 20 men mykje tydar likevel på at dei langsigte i vestingane til oljeprisen kan ha fått eit per nest negativt skutt.<sup>1</sup>

I tillegg kjem at oljeselskapa i den vest verda er i beit for olje- og gassreservar til frste fashufbyggingar. Reservar i heimlege s visuar er i ferd med å tannast, leiteresultat avake og kostnadane per eining ved leiting utvinning blir pressa opp av mogning og restt kappelid. Dei lågaste fruktene er plukka, og o selskapa må no akseptere meir risiko – teknisk og politisk – om aktiviteten skal haldst v

<sup>1</sup> I ei lrig spørundersøking blant oljeselskapa frå i Equin Research (2017) er dei gassressurslege-geve reserndene for innleiing planlegging oppført til 92 US\$ i 2015, og 55 US\$ frå 2017 angitt av undersøkinga. P reserndene i oljemarknaden responderer meir dristig endringar i spotprisen, og muliggjer i skruende ut (15.11.2018) ein oljepris i desember 2022 rundt 67 US\$.

## Official Norwegian Report Climate risk and the Norwegian economy

Summary of a report from 6 October 2017 to assess for the Norwegian economy

The original report is in Norwegian  
Finance on 12 December

Translation from Norwegian



January 2019

## Energy Transition, Uncertainty, and the Implications of Change in the Risk Preferences of Fossil Fuels Investors

### Abstract

Energy transition risk is often viewed as a long-term risk, the impacts of which will not be felt for decades to come. However, this view is an imprecise presentation of reality. This is because although completion of transition might take decades, the increased uncertainty around the transition impacts the energy markets on a much shorter time scale than the transition itself. This article presents the results of a survey of institutional investors on hurdle rates for new energy projects and compares it with information available in the public domain about discount rates on completed projects. The survey shows that uncertainties associated with energy transition have already started to alter the risk preferences of investors in fossil fuel projects. Investors are demanding a much higher hurdle rate in order to invest in long cycle oil and coal projects. We contend that such changes in risk preferences will have several key implications for fossil fuel markets. First, the payback period of discounted investment costs is extended dis-incentivising long cycle projects, therefore concentrating upstream investment around short-term projects with shorter payback periods. Second, it impacts asset valuation of fossil fuel companies with consequences for firms' cash flows and asset payoffs. Third, it encourages the oil and gas companies to adopt a low risk operation model, focus on the harvesting phase of their oil assets, and move away from exploration, appraisal and development. Fourth, it could affect the volume of available supplies if there is not enough investment into the sector with potential consequences on prices depending on demand projections. Fifth, it could affect the long-term price of oil when energy markets start to price in transition related risks. Sixth, the energy transition process could be accelerated as higher long-term oil prices improve the economics of alternative resources.

### 1. Introduction

Energy transition is inherently a risky process. Generally market participants will be exposed to four types of risk during the transition (i) demand and technology risks (ii) market price risks (iii) policy risks and (iv) other risks. Demand and technology risks are related to the entire set of parameters that affect the volume of the goods and services that are traded annually (e.g. electric vehicles vs. internal combustion engine (ICE) vehicles) and the technology or the fuel that is associated with them (e.g. renewable kWh versus coal kWh). Market price risk pertains to factors that impact the ways in which non-policy related prices of goods and services evolve. This includes commodities themselves (for example oil and gas prices or the price of carbon emissions) and technology inputs into the production process (for instance the price of batteries). Policy risk is related to all types of policy related incentives (e.g., subsidies), costs (e.g., tax), performance standards (e.g. fuel efficiency standards), production

Oxford Energy Insight: 45

Bassam Fattouh, Director, OIES,  
Rahmatullah Poudineh, Lead Senior Research Fellow, OIES &  
Rob West, Head, Global Energy Research, Redburn & Research Associates, OIES

# Government Commission on Climate Risk

Members, mandate, and priorities

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Martin Skancke



Terje  
Aven



Trude  
Myklebust



Nalan  
Koç



Linda  
Nøstbakken



Klaus  
Mohn



Ragnar  
Torvik

## The commission was asked to describe climate risk

- Climate-related risk-factors and their significance for the Norwegian economy
- How climate risk can be analysed and described most appropriately
- How private and public sector entities can be provided with an analytical framework for analysing and managing climate risk in the best possible way



# Too many questions, too little time

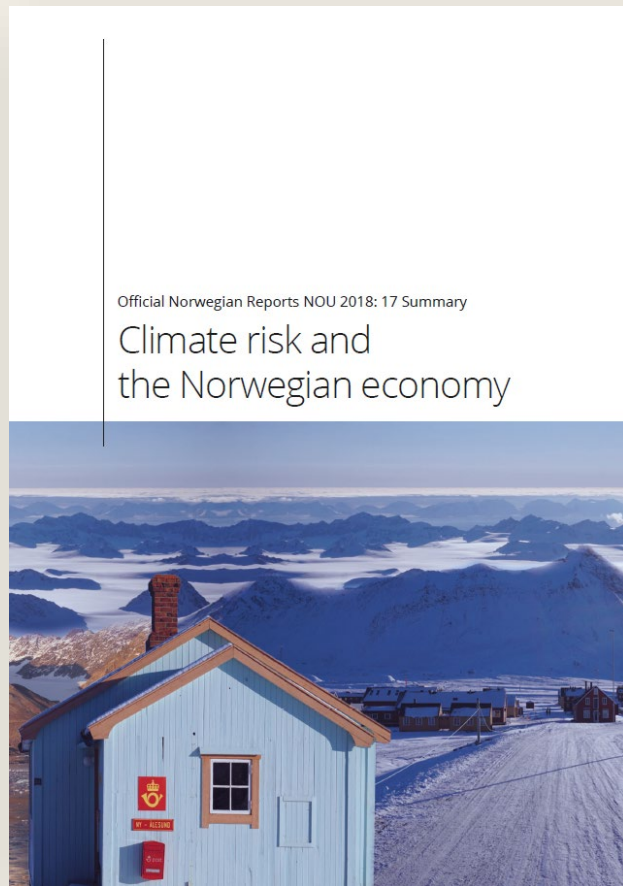
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- Twelve months, nine meetings
- Wide range of stakeholder input
- Univocal report and proposals
  - Call for more systematic approach to climate risk
  - A broad and aggregate perspective
  - Sound principles and processes
  - Information, reporting, knowledge



# Main themes of the commission's work

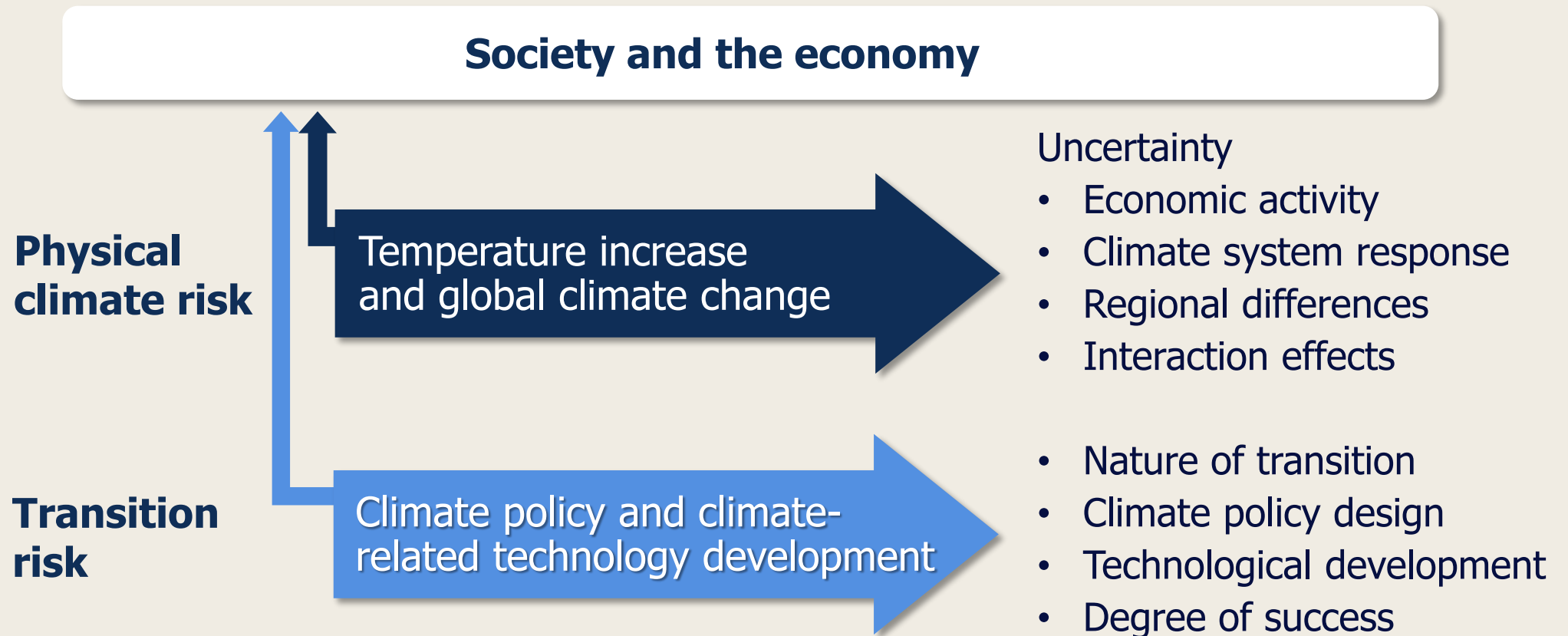
Climate-related risk factors and their significance for the Norwegian economy



- Assessment of climate risk
- Framework for ongoing monitoring of climate risk
- Climate risk management principles
- Sound decision-making processes that integrate climate risk
- Appropriate incentives

# Climate risk – key relationships

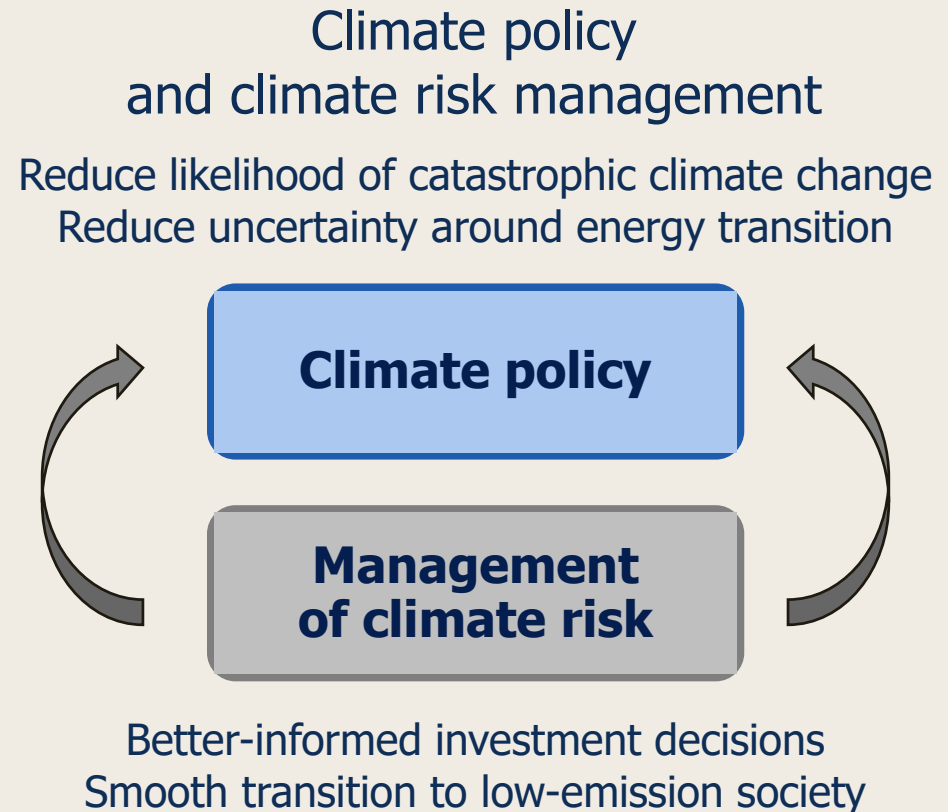
Climate change, climate policy, technology, economy, and society



# Government commission on climate risk

Climate-related risk factors and their significance for the Norwegian economy

- The climate system is changing
- Global appreciation of climate risk
- Economics and risk theory
- A broad and general perspective
- Sound climate risk management may support climate policy

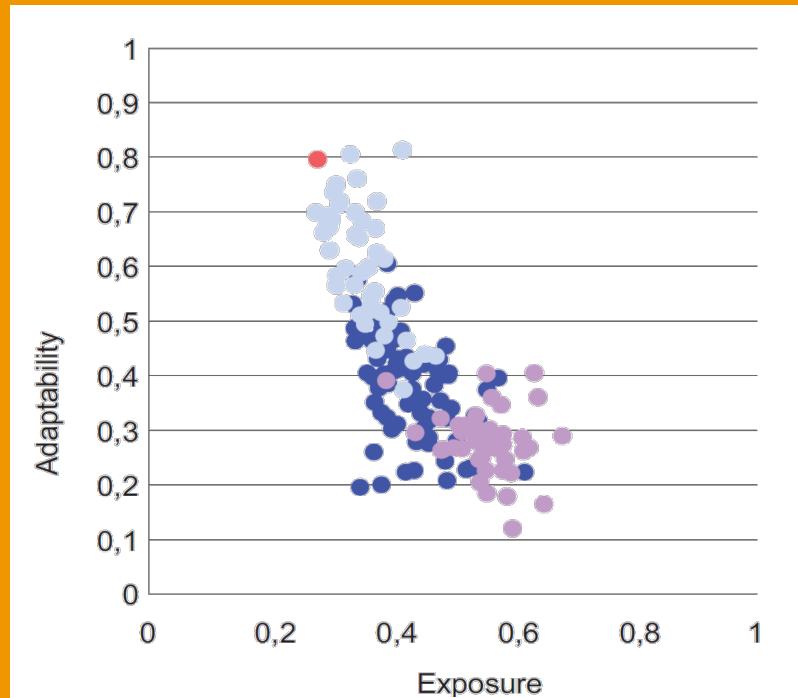


# Climate risk to the Norwegian economy

Well developed, well adjusted, well managed

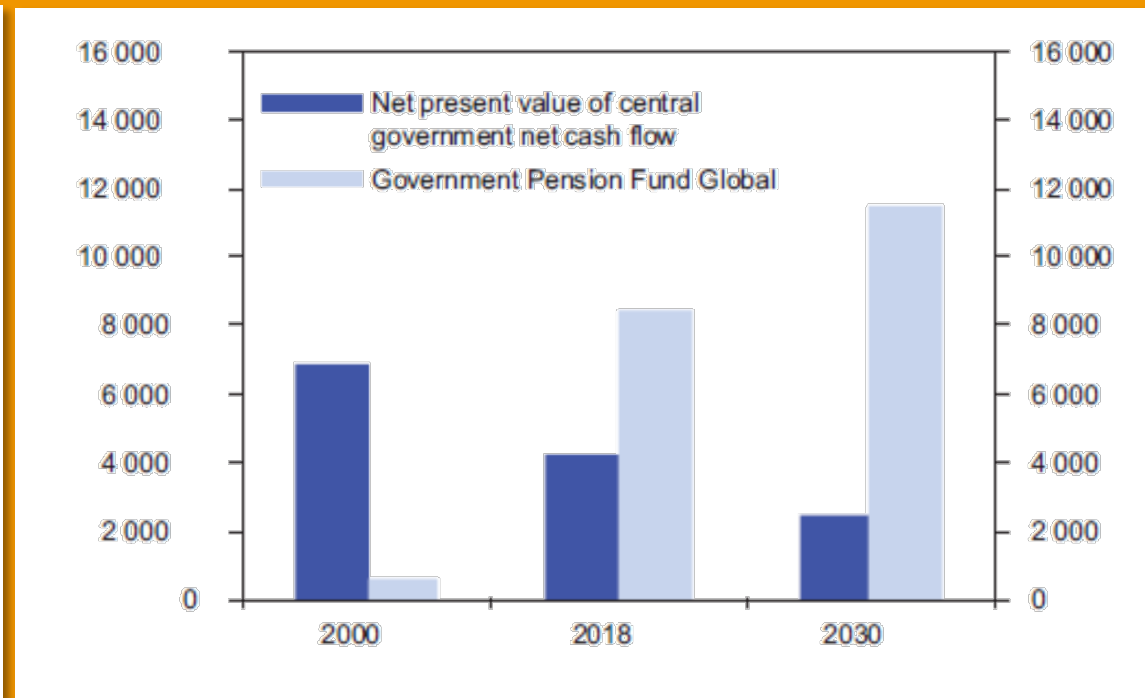
## Climate risk exposure

University of Notre Dame Global Adaptation Index



## Resource revenue management

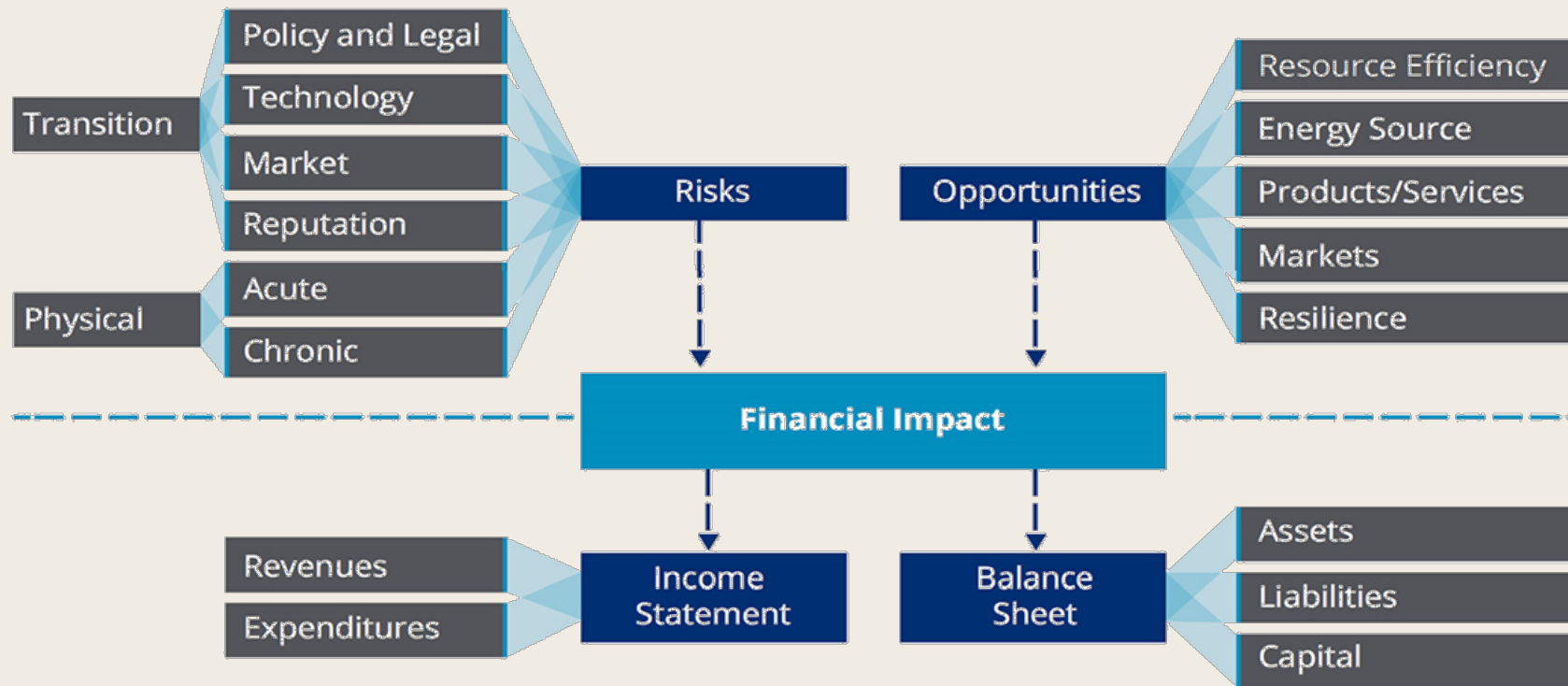
Gradual reduction in climate risk exposure





# Climate risk for business and industry

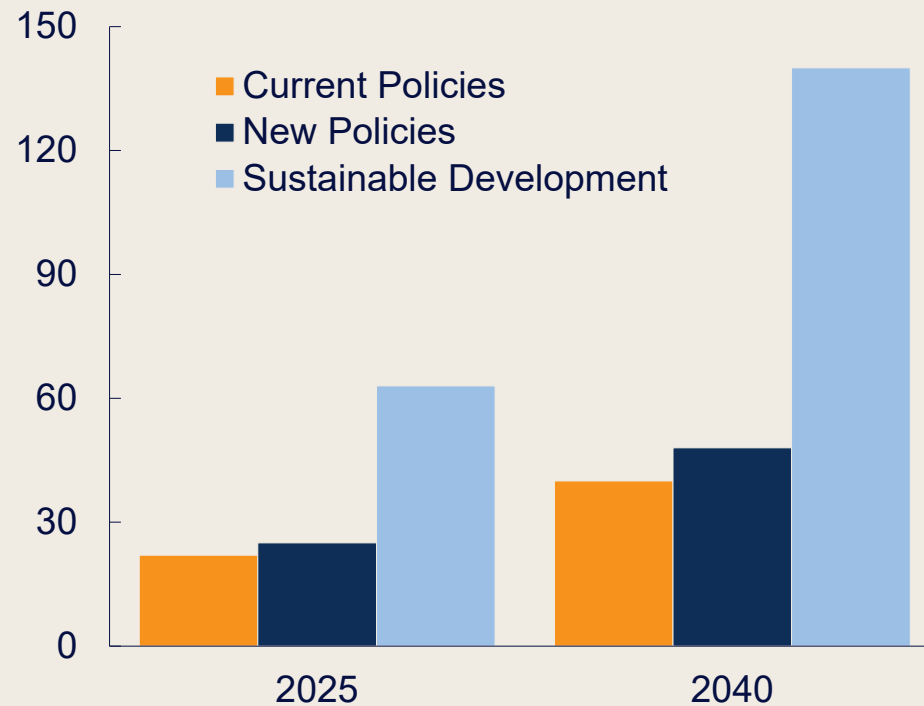
TCFD approach to climate-related risks, opportunities, and financial impact



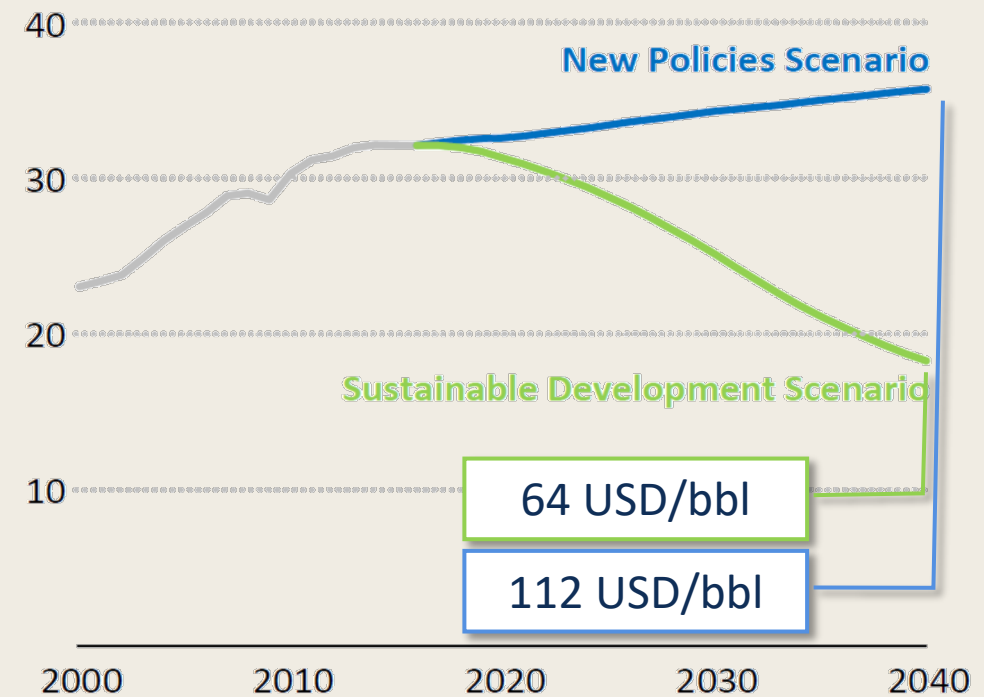
# Climate risk for the oil and gas industry

All about prices and valuations

CO<sub>2</sub> prices in EU in IEA's scenarios  
USD/tonne



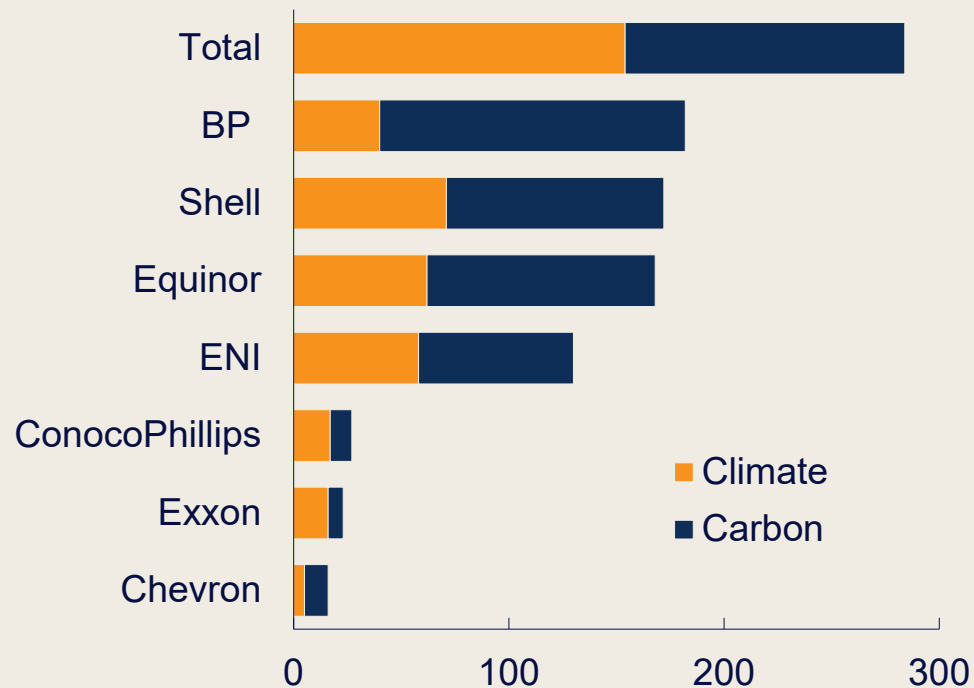
Global CO<sub>2</sub> emissions towards 2040...  
... and oil price impact



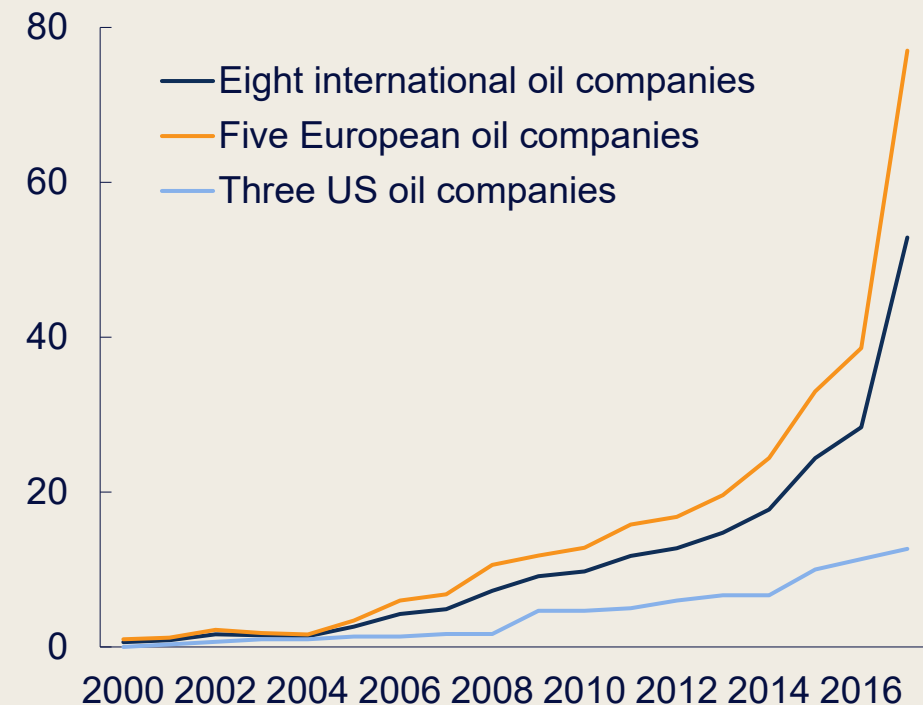
# More words about climate and CO<sub>2</sub>

Indicators of climate risk: Word counts from annual reports

Word counts from annual reports 2017



Average frequency for 'climate'



# Adjustment of operations

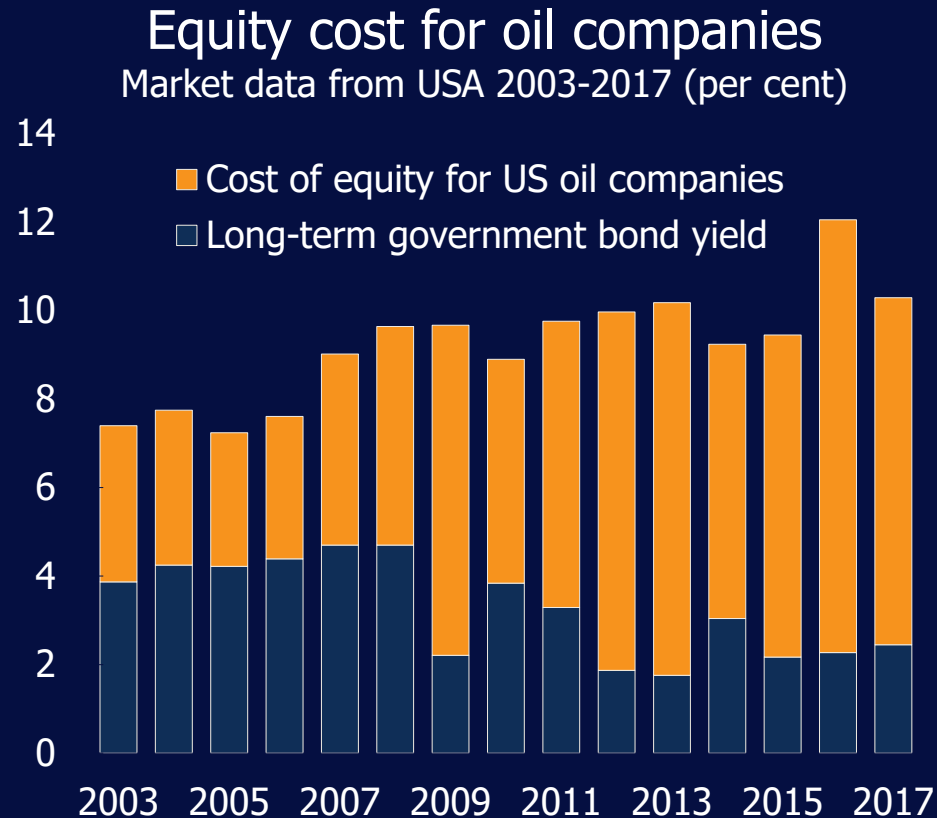
## Short-term response



- Climate risk is long-term
- The response is immediate
- Push for lower CO<sub>2</sub> intensities
  - Energy efficiency
  - Electrification
- Push for lower costs

# Adjustment of investment

Higher uncertainty, lower project values, more caution



- Lower capital expenditure
- Myopic investment behaviour
- Appreciation of flexibility
- Cross-fire on gas projects
  - Attractive CO<sub>2</sub> intensity
  - Capital intensity and project horizon



# Adjustment of strategy and governance

Impact on strategy and business development

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- Public outreach
- Diversification
  - Horizontal integration
  - Vertical integration
- Acquisition and development of new business activities
- Governance and shareholder activism

Companies with energy scenarios  
Increasing engagement in energy dialogue



# Government commission on climate risk

## General climate risk management principles

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- **Comprehensiveness:** Use an integrated process in analyses of threats, opportunities, and risk factors
- **Framework:** Address climate risk in the context of other risks and risk frameworks
- **Appetite:** Desired level of risk must be based on a broad assessment of benefits, costs, and robustness
- **Resilience:** Attach weight to resilience in line with the precautionary principle
- **Incentives:** Clear links should be established between decisions and implications
- **Standardisation:** Risk assessments should be performed as similarly as possible across various fields
- **Communication:** Risk management should be based on cooperation, information sharing, and transparency

# Norway's climate risk commission

Better climate risk management

- Climate change means climate risk
- The only answer is climate policy
- Norway's economy is highly exposed, but also resilient
- Climate risk should be understood and managed
- TCFD principles should be adopted





” Thank you for listening!

