

# Climate change – the interaction between physics and central banking

*Meet the Energy Leaders – TU Delft*

Olaf Sleijpen, 12/02/20

DeNederlandscheBank

EUROSYSTEEM

# Agenda

- 1 The role of central banks in climate change and the energy transition
- 2 DNB's initiatives over the past years
- 3 The international context
- 4 The interaction between physics and central banking
- 5 Questions



## Nederland gebruikt minste duurzame energie van alle EU-landen

24 januari 2020 23:52

Laatste update: 1 dag, 12 uur geleden

300



**Nederland maakt van alle lidstaten van de Europese Unie het minst gebruik van duurzame energie, zo blijkt vrijdag uit cijfers van Eurostat. 7,4 procent van de Nederlandse energie kwam in 2018 van hernieuwbare bronnen, terwijl dat percentage dit jaar 14 zou moeten zijn.**

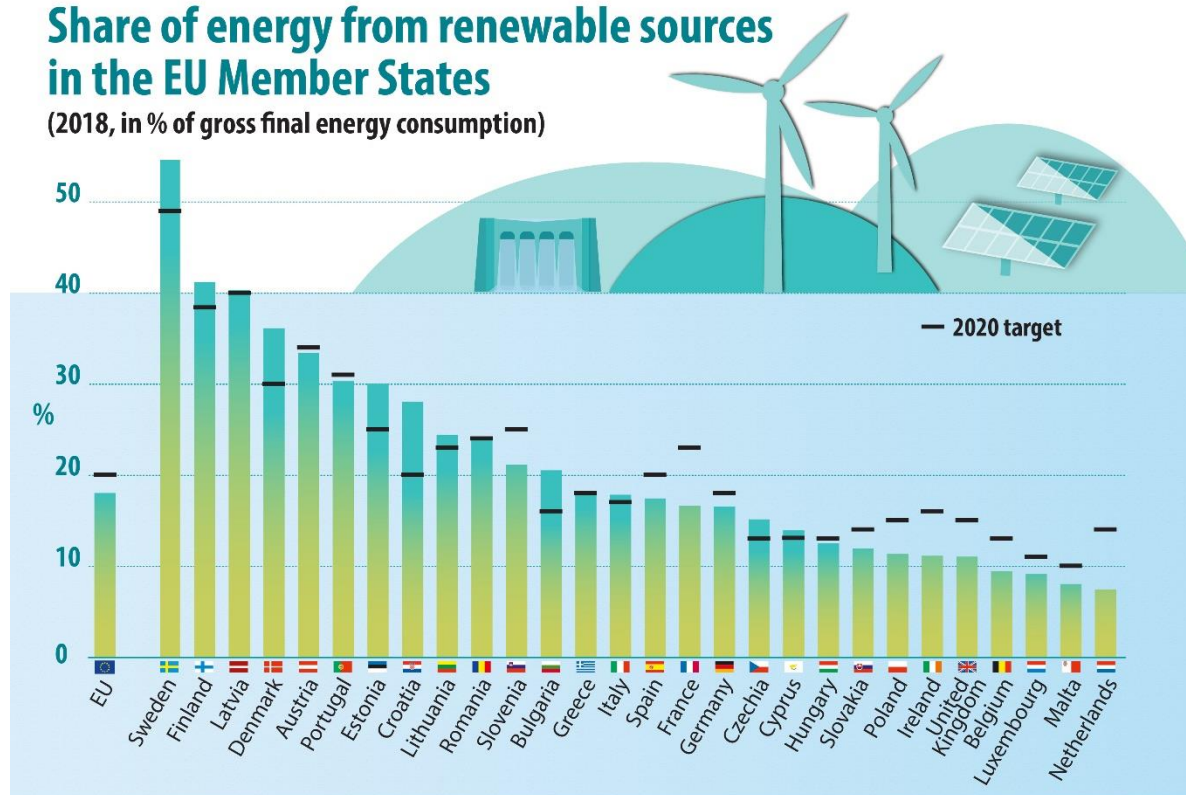
Hiermee lijkt Nederland ver verwijderd van de klimaatdoelen van 2020. De Europese Unie als geheel lijkt de doelen wel te kunnen halen. Het gemiddelde in 2018 stond op 18 procent, waardoor ze in 2020 het doel van 20 procent zou kunnen halen.

Zweden maakt het meest gebruik van duurzame energie: daar komt 54

procent van de stroom van duurzame bronnen. Het Scandinavische land

# Share of energy from renewable sources in the EU Member States

(2018, in % of gross final energy consumption)



ec.europa.eu/eurostat

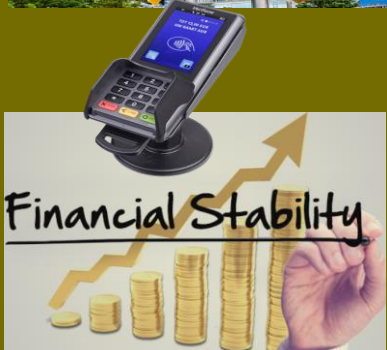
# The role of central banks in climate change and the energy transition



# Tasks of DNB

## Governing Board

### Central Bank



### Supervision

#### Supervision:

Banks, pension funds,  
insurance companies,  
payment service  
providers, investment  
firms and trust sector



### Resolution



# Why do central banks care about the climate and the energy transition?

DNB, in its capacity as **prudential supervisor, resolution authority and central bank**, seeks to safeguard financial stability and thus contributes to sustainable prosperity in the Netherlands.

DNB in this mission also focuses on **climate- and environment-related risks**, and calls attention to issues of sustainability such as the transition to a **carbon-neutral economy**.

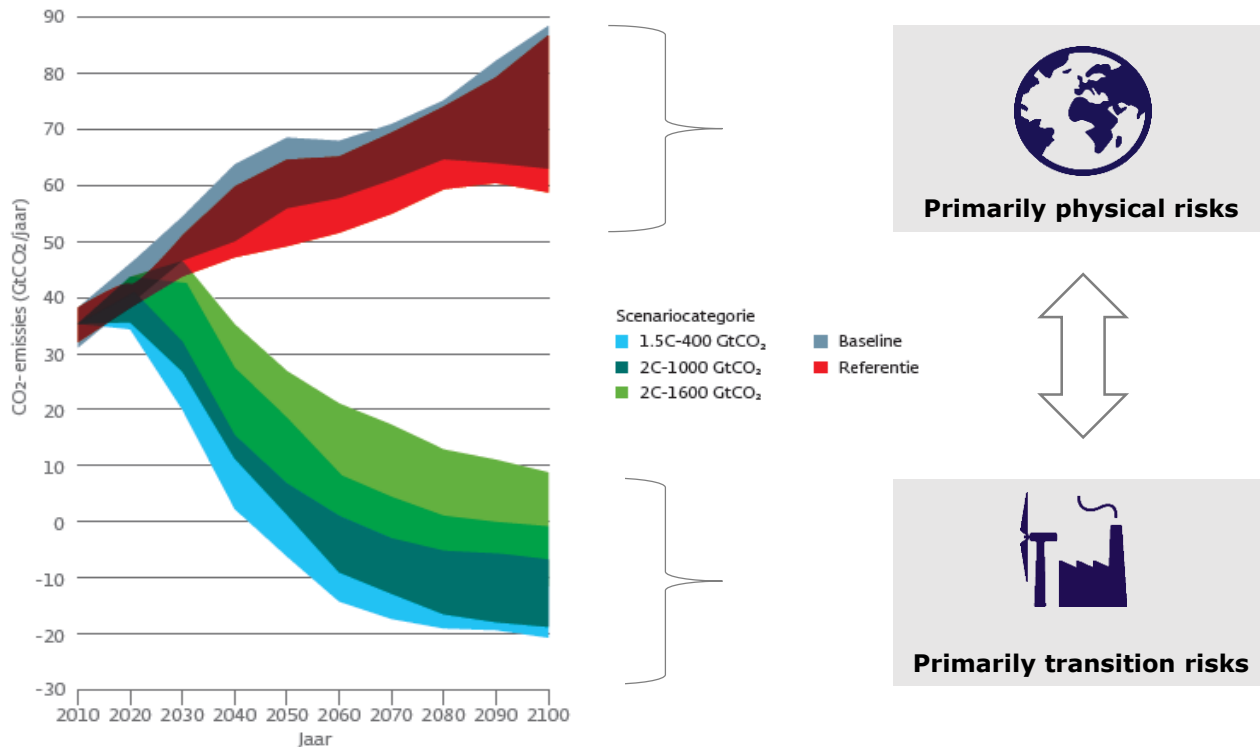


## DNB: Nederlandse economie moet af van kolen, olie en gas

**Energie** Nederland moet investeren in duurzaamheid, zegt De Nederlandsche Bank. Er dreigt een 'koolstofzeepbel'.

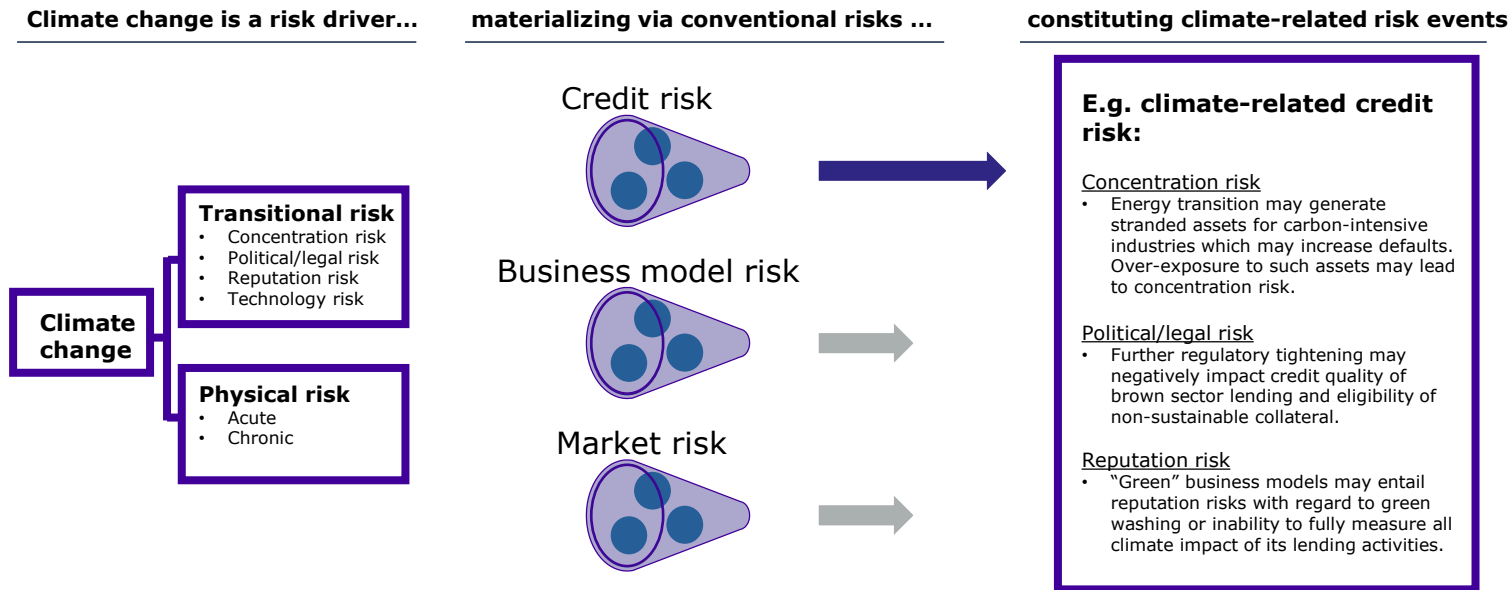
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# Climate related physical and transition risks





# Climate change is a driver via conventional risks



# Practice what you preach!



# Sustainable prosperity

Strategy

Themes

Priorities



# DNB's initiatives over the past years

- DNB occasional study *Time for Transition* (2016)
- DNB report *Waterproof* (2017)
- DNB occasional study *Price of Transition* (2018)
- DNB occasional study *Transition risk stress test* (2018)
- DNB working paper *The Heat is On* (2019)
- DNB report *Values at Risk* (2019)

# Time for Transition (2016)

An exploratory study of the transition to a carbon-neutral economy.

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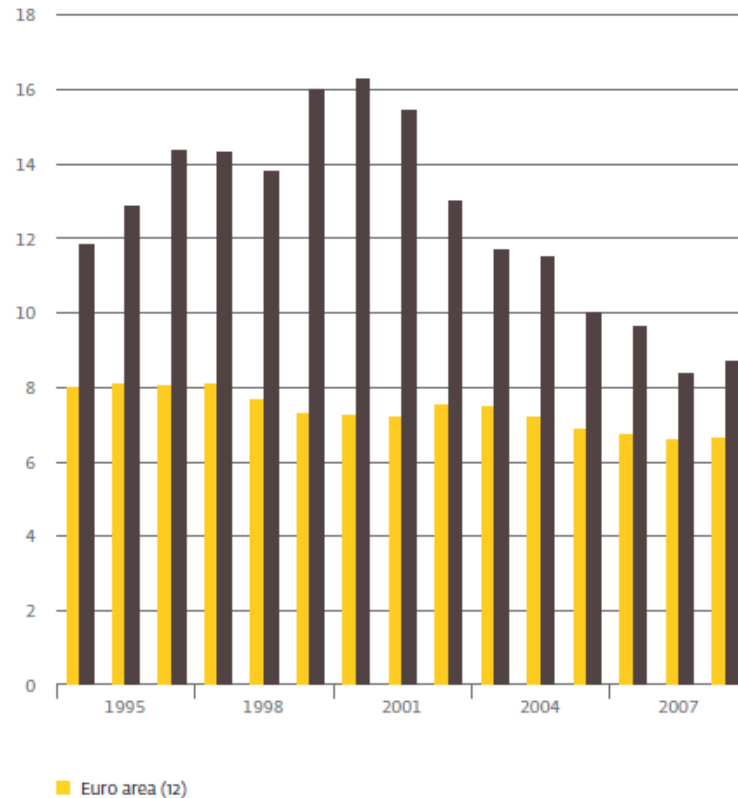


# Time for Transition (2016)

- A sudden transition to a carbon-neutral energy system may harm economic growth and affect financial stability due to the depreciation of existing assets. Conversely, a transition that lacks sufficient decisiveness may result in a failure to achieve the climate targets, which may ultimately have much greater consequences for the economy and society.
- De Nederlandsche Bank (DNB) sees **energy transition as one of the greatest challenges** that the economy faces in the long term. Moreover, there are still a great many uncertainties, and opinions on the best way to achieve the climate targets agreed in Paris vary considerably. That said, there is a strong **consensus that inaction is no longer an option.**
- Main takeaways: Importance of **long-term** view; Cost-effective policy to **reduce carbon output**; **Transparency** concerning risks.

Chart 2.7 Energy intensity of Netherlands and euro area

Private sector (excluding energy sector), percentage of real gross value added

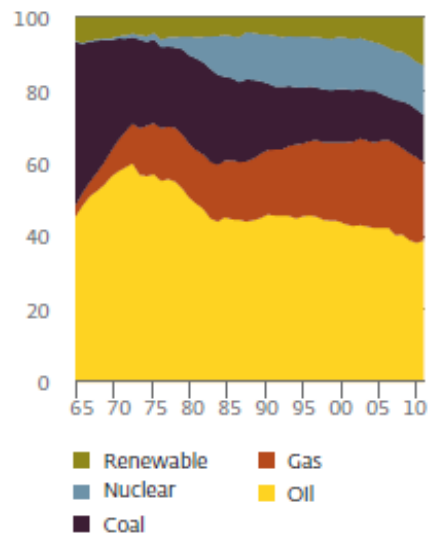


Source: World Input-Output Database.

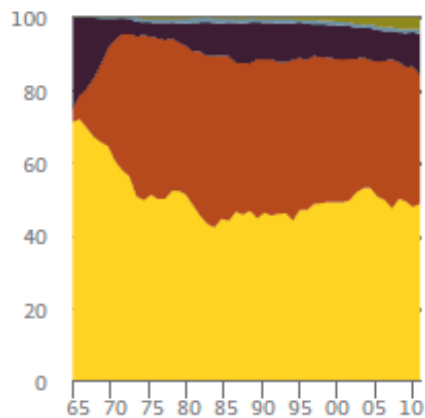
## Chart 4.1 Energy mix

Percentage of total energy consumption

Euro area (core)



Netherlands



Source: BP Statistical Review of World Energy 2015.

# Waterproof? (2017)

An exploration of climate-related risks for the Dutch financial sector.

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# Waterproof (2017)

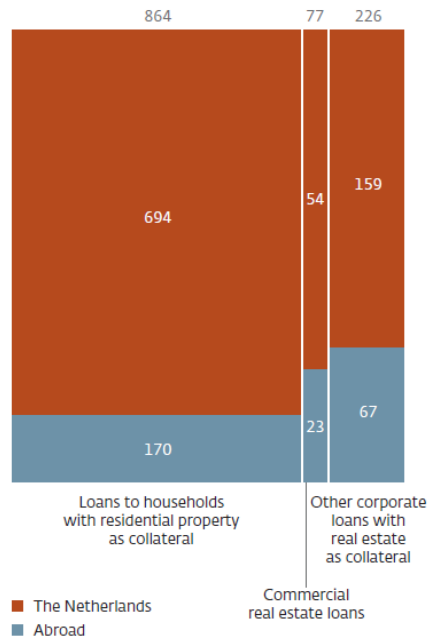
- We examined **the consequences of climate change** for insurers, the impact of large-scale flooding on the financial sector, the risks arising from carbon-intensive investments and the risks related to green finance.
- “As the prudential supervisory authority we believe it **is important that climate risks be identified and controlled appropriately**. We therefore expect financial institutions to have a thorough understanding of the risks that are relevant to their own balance sheets.”
- One way of achieving this is to further develop **forward-looking risk management methods**. Financial institutions must **make better use of relevant available data** in assessing risks, including by having an overview of the energy labels of their real estate exposures.

# Risks in Commercial Real Estate

Private and Commercial Real Estate Exposures

EUR billion

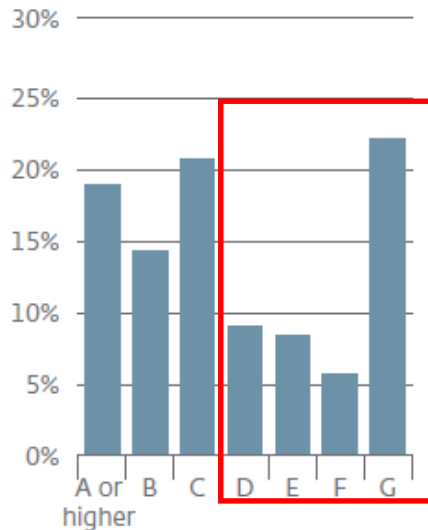
Banks



Energy label distribution

Banks

Sample size: EUR 28.4 billion

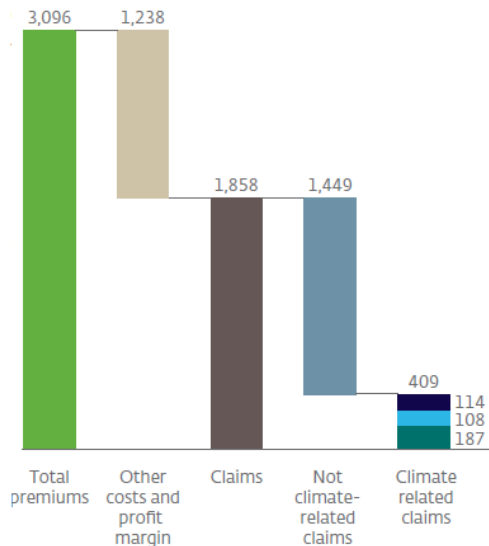




# Physical risks: possible higher losses because of climate change

## claims burden as a proportion of premiums in 2016

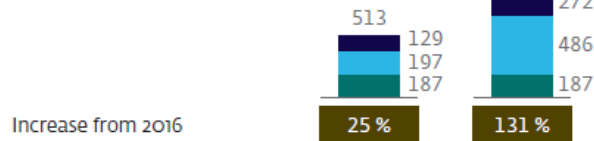
Homeowner's insurance policies (EUR million)



## Homeowner's insurance policies (EUR million)

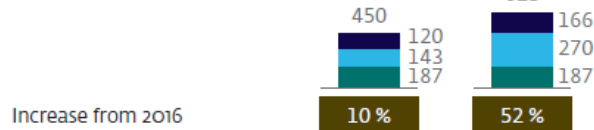
3,5°C Climate-related claims burden in 2085

Lower estimate Higher estimate



1,5°C Climate-related claims burden in 2085

Lower estimate Higher estimate



■ Rain  
■ Hail  
■ Storm

Sources: DNB, KNMI, CVS.

# Chart 4 Exposures to carbon-intensive sectors vis-à-vis the balance sheet total and broken down by sector and asset type

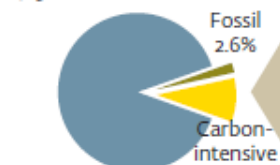
Exposures to carbon-intensive sectors vis-à-vis total assets (2016)

Exposures analysed by sector and asset types

% change from 2015

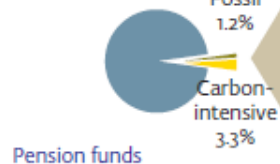
Banks

1,898 EUR billion



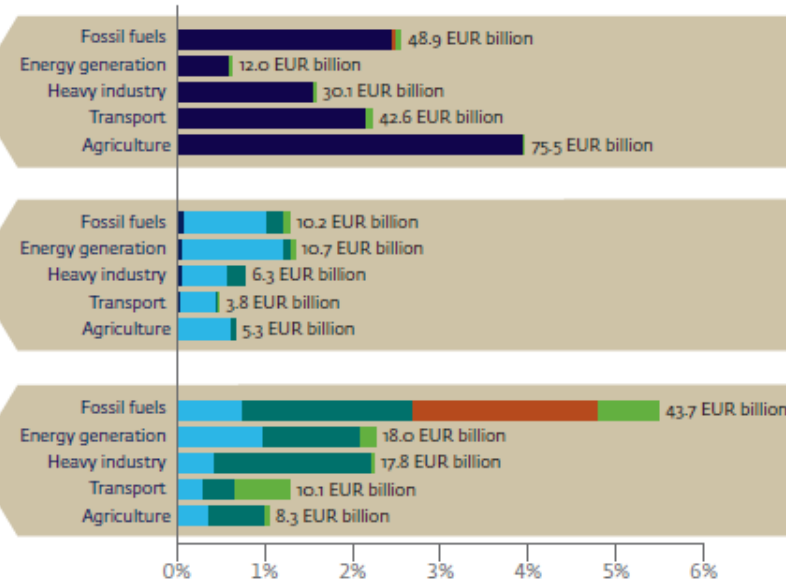
Insurers

800 EUR billion



Pension funds

790 EUR billion



Exposures (as a % of total assets)

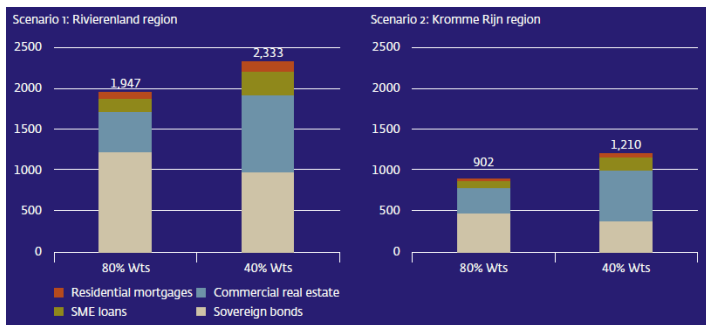


# Assessment of climate-related risks at the micro-level via both the physical and transition risk channels

## Physical risk channel



### Estimated impact of flooding on credit losses

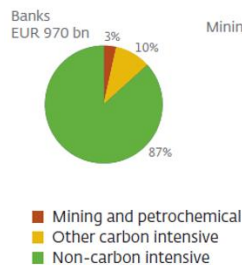


## Transition risk channel

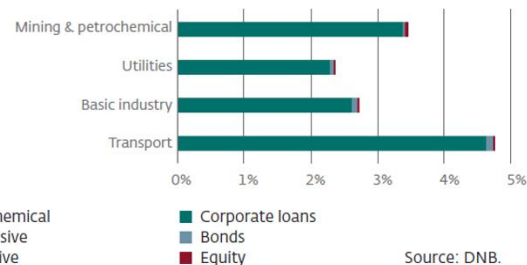


### Exposures to carbon-intensive industries

as a proportion of assets in sample



Exposures broken down by financial sector and asset class



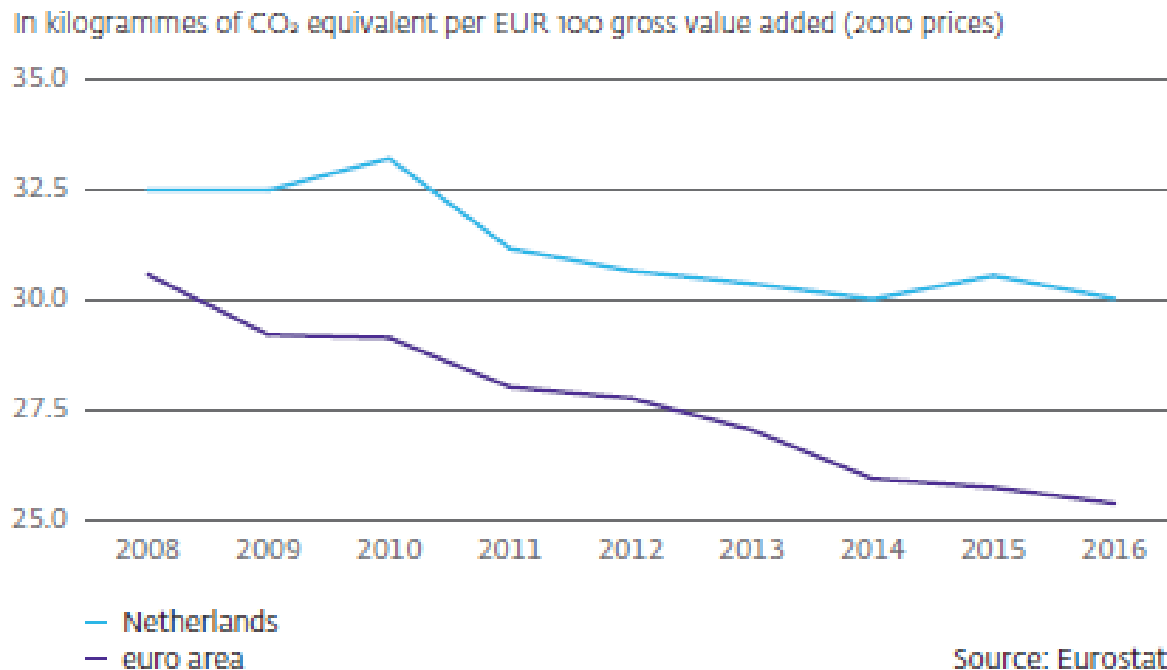
# The price of transition (2018)

An analysis of the economic implications of carbon taxing.

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# Carbon pricing



# The economic implications of a carbon tax

- For the economy as a whole, **increasing emission taxes by EUR 50 per tonne proves not to have a major impact;** GDP is depressed by roughly 1% after five years.
- The emission tax would, however, have a profound impact on a number of carbon-intensive industry sectors. **The largest cost increases would occur in the chemicals, base metals, mining and quarrying, and energy sectors, resulting in significant deterioration of their international competitiveness.**
- Overall, the adverse economic impact is much less pronounced when a carbon tax is levied across the European Union. Even then, however, the differences between the individual industry sectors will still be significant in some cases. **Sales of the Dutch chemicals industry may for instance still fall sharply in the case of a European carbon tax.**
- The wider macroeconomic effects of a carbon tax are to a large extent determined by how the government uses the additional tax revenues. Lowering income tax could relieve the burden of adjustment that households face.
- Alternatively, carbon tax revenues could be recycled by reducing corporate income tax overall. Most likely, however, it is more effective to use financial incentives to encourage the transition to clean technologies in specific industry sectors.
- **Carbon tax revenues may for instance be used to set up an innovation fund targeted at developing more energy-efficient and less emission-intensive production technologies.**



# The international context

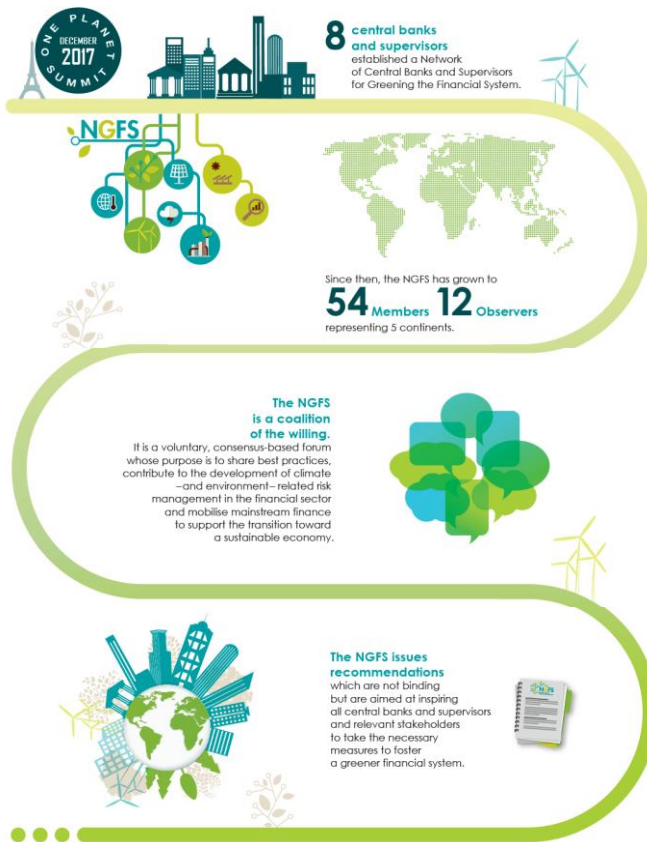


Central Banks and Supervisors

# Network for Greening the Financial System

# NGFS: origins and mandate

**NGFS Chair:** F. Elderson (De Nederlandsche Bank); **NGFS Secretariat:** M. Després (Banque de France)



# NGFS: organisation of the work

## **WS1: Microprudential/ Supervisory**

- Mapping of current supervisory practices
- Encouraging climate-related risks disclosure
- Considering the extent to which a financial risk differential exists between 'green' and 'brown' assets

## **WS2: Macrofinancial**

- Sizing the impact of climate related risks on the economy both in the central case and in the event of tail scenarios
- Transmission channels of climate-related risks to the economy and the financial system
- Identify areas where further research is needed

## **WS3: Scaling up green finance**

- Leading by example and Greening the activities of Central Banks and supervisors
- Understanding/monitoring the market dynamics of green finance
- Being catalysts for a sound scaling up of green finance

# NGFS: Six recommendations (April 2019)

## Central banks and supervisors

1.



Integrating climate-related risks into financial stability monitoring and micro-supervision.

2.



Integrating sustainability factors into own-portfolio management.

3.



Bridging the data gaps.

4.



Building awareness and intellectual capacity and encouraging technical assistance and knowledge sharing.

## Policy makers

5.



Achieving robust and internationally consistent climate- and environment-related disclosure.

6.



Supporting the development of a taxonomy of economic activities.

# The EU Case for Sustainable Finance

The EU committed to three ambitious climate and energy targets for 2030 in line with the Paris Agreement




Minimum 40% cut in greenhouse gas emissions compared to 1990 levels




At least a 27% share of renewables in final energy consumption



At least 30% energy savings compared with the business-as-usual scenario

Public money 

€185 - €290bn of yearly investment is needed to reach these targets

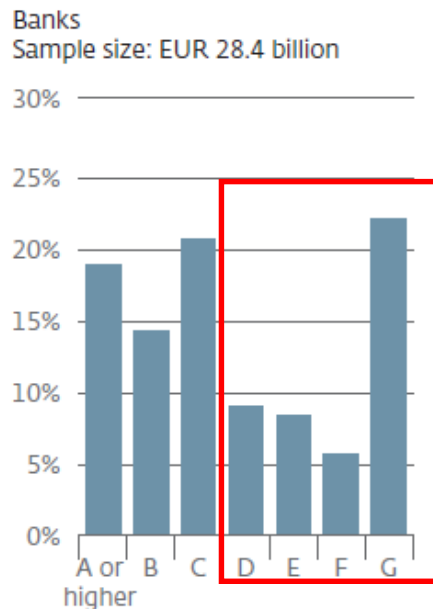
 Private money

Private and public sector need to make a common effort to reach the EU's energy and climate targets

# The interaction between physics and central banking

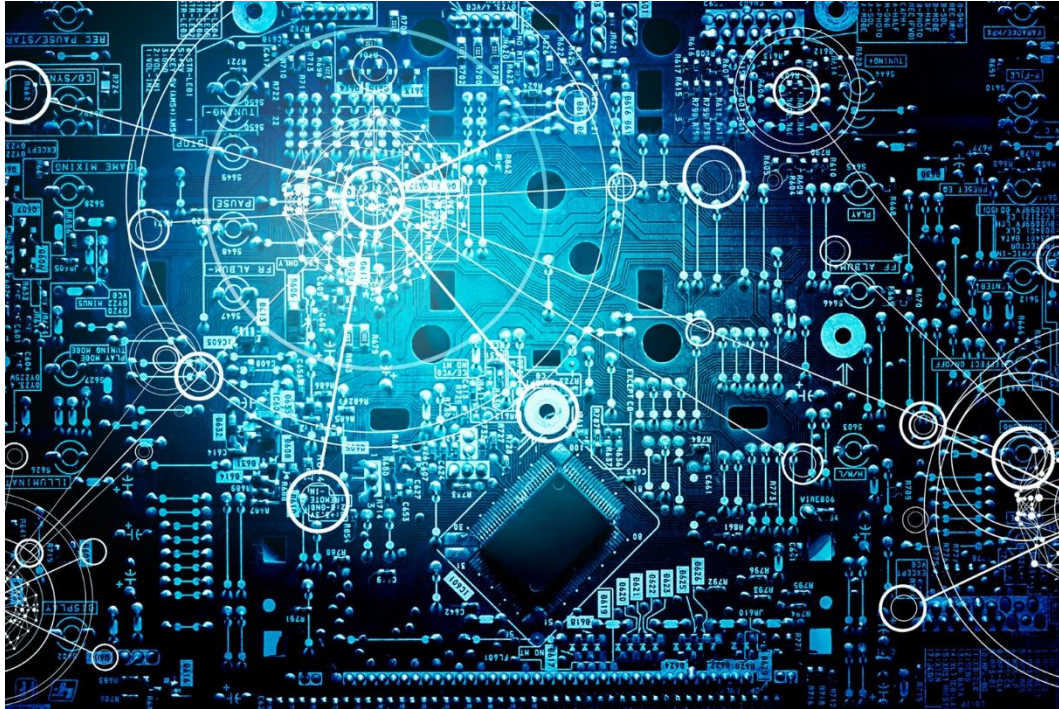
# An example to illustrate the co-dependency of technical and economic experts...

- Example: Energy Label C Obligation for All Office Buildings in the Netherlands in 2023.
- How will we accurately map the current energy label distribution?
- And also: how will financial institutions make the transition to better their energy labels? What technology will help us get there? And what shocks will this transition put on the market?
- The above are all questions we cannot solve without the technical expertise of scientists like yourselves.





# Data





# Questions?

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# Interested?

- [DNB CSR Strategy](#)
- DNB occasional study [Time for Transition \(2016\)](#)
- DNB report [Waterproof \(2017\)](#)
- DNB occasional study [Price of Transition \(2018\)](#)
- DNB occasional study [Transition risk stress test \(2018\)](#)
- DNB working paper [The Heat is on \(2019\)](#)
- DNB report [Values at Risk \(2019\)](#)
- Voor de [verzekeringssector](#) heeft DNB een Good Practice document en Q&A gepubliceerd.
- Voor de [bankensector](#) zijn de GP en Q&A ter consultatie aangeboden (loopt tot 14 februari 2020).
- Voor de [pensioensector](#) is een factsheet gepubliceerd.