

Climate-related policies and commitments

Climate macroeconomics & finance course 2022/23 - Lecture 4

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In the last lecture

- Climate change threat → Rapid decarbonisation needed
- However, obstacles
 - Economic competitiveness of low-carbon technologies
 - → Policies needed to give markets the right incentives
- What can policy-makers do?

Outline of today's lecture

- Rationale for environmental policy
 - Market failures and externalities
 - Overview of policy options
- Focus on carbon pricing
 - The economic theory: Pigouvian taxation
 - State of carbon prices initiatives
- Public finance
 - Public consumption/investment; development banks
- Sustainable finance policy-making
 - A step back: who guards the financial system?
 - Green monetary policy and green financial regulation
- Forward-looking government planning
 - International agreements and strategy coordination
 - The net-zero race
 - Focus on EU strategies

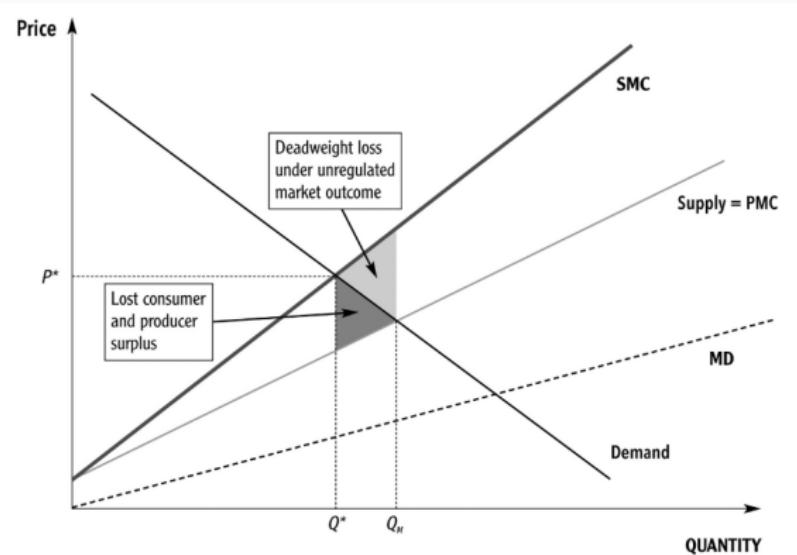
The rationale for environmental policy

Market failures

- Concept of 'market failure'
 - A situation in which market dynamics does not lead to efficient outcome → policies required
 - Climate change as 'the greatest and widest-ranging market failure ever seen' (N. Stern)
- Market failures can be created by:
 - Externalities: (uncompensated) cost created by an agent and affecting another agent (e.g. smoke, noise, pollution, etc.)
 - Public goods: private provision of public goods inefficiently low
 - Open-access resources: tragedy of the commons

Externalities lead to inefficiencies

- Equilibrium where demand=supply (= private marginal cost)
- Negative externalities lead to overpollution



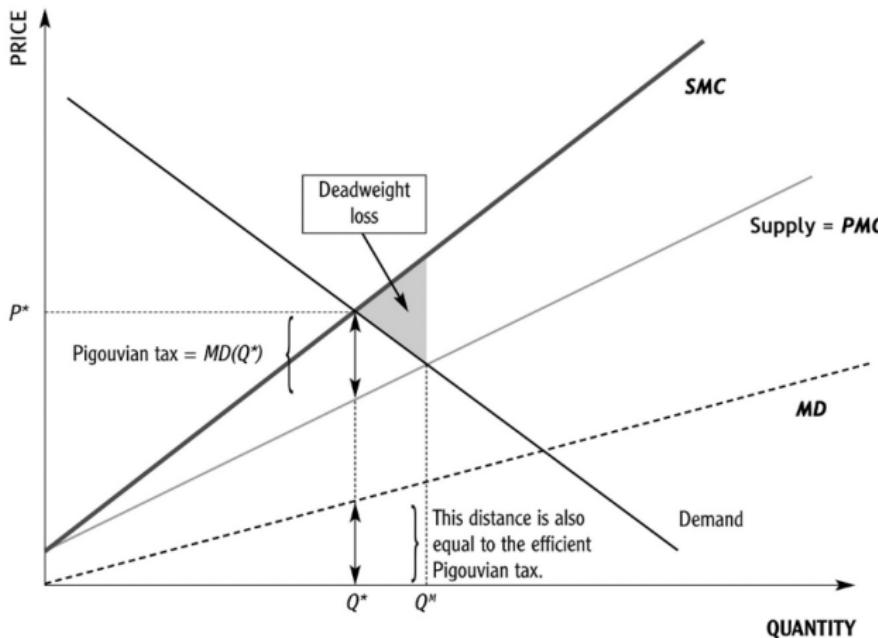
Market with a negative externality (assuming pollution=production). Source:
Keohane and Olmstead (2016)

Policy options

- Command and control regulation
 - Technology standards: use a specific technology
 - Performance standards: respect specific parameters (e.g. max NOx/km from vehicles → 2015 Volkswagen Dieselgate)
 - Often uniform across firms → inefficiencies
- Market-based instruments
 - Use price incentives to modify (not force) behaviour
 - E.g. taxes, subsidies, cap&trade systems
- Information-based policies
 - Compulsory disclosure; labelling and certification programs (e.g. energy classes for homes); nudging
- Public spending/lending
 - Government investment and consumption; public development banks; official development assistance (ODA)

Pigouvian taxation

- A tax = marginal damage internalises the externality!



The efficient (Pigouvian) tax. Source: Keohane and Olmstead (2016)

Market-based policies

Overview of market-based climate policies

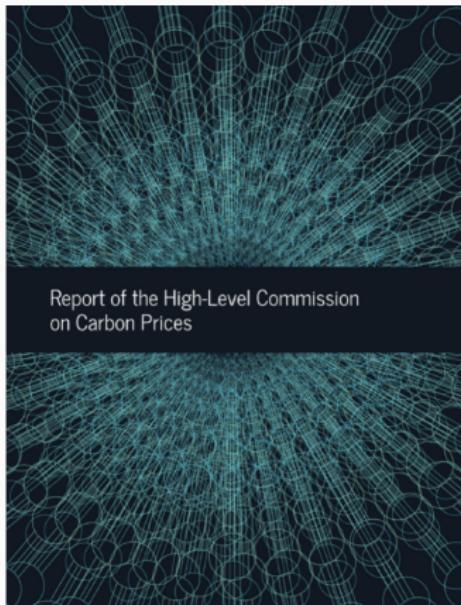
- Introduce a price on the carbon content of goods and services
 - Shift incentives away from carbon-intensive goods
 - Incentivize R&D in low-carbon and carbon-saving technologies
 - Additional public revenues can be recycled
- Introduce a subsidy to support production/consumption of clean goods
 - Grants and low-interest loans; preferential tax treatment (e.g. rebates, tax credits); protection from imports; etc.
 - → Boom of European renewable energy investments pre-2011
- Remove subsidies for fossil fuels
 - Subsidies supporting fossil production/consumption should be phased-out

Two main strategies to price carbon

- Carbon tax
 - Fix tax base and tax rate → set prices, uncertain emissions
 - Doesn't require new legal infrastructure
 - A clear price allows firms to plan ahead
 - But.. people don't like taxes
- Emission trading schemes (ETS)
 - Cap-and-trade: create (shrinking) amount of allowances
 - Allowances can be auctioned or distributed for free
 - End of year: companies surrender allowances proportional to emissions. No surrender → fine
 - If they emit more → buy on market; if less → sell
 - Weakness: hard to administer; uncertainty about prices
- + Indirect carbon pricing
 - Instruments that introduce prices not proportional to GHG emissions e.g. fuel excise

What is the ‘right’ carbon price?

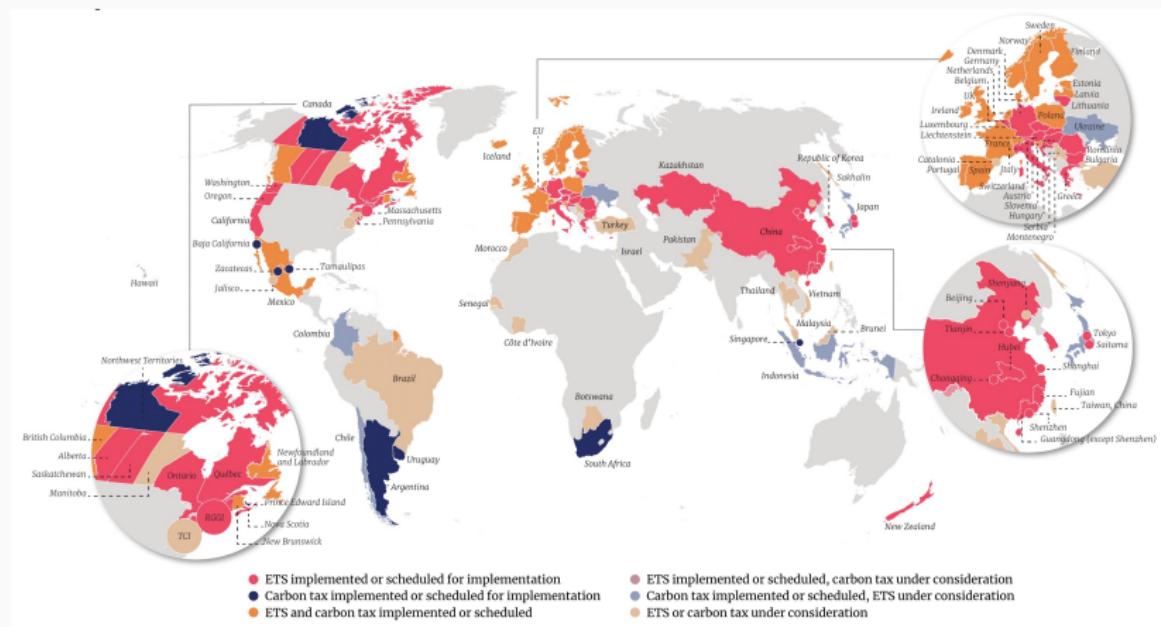
- 2017 High-Level Commission on Carbon Prices
 - Led by Nick Stern and Joe Stiglitz
- A 2°C-compatible carbon price needs to be in the range of:
 - \$40-80/tCO₂ by 2020
 - \$50-100/tCO₂ by 2030



Source: [High-Level Commission on Carbon Prices](#)

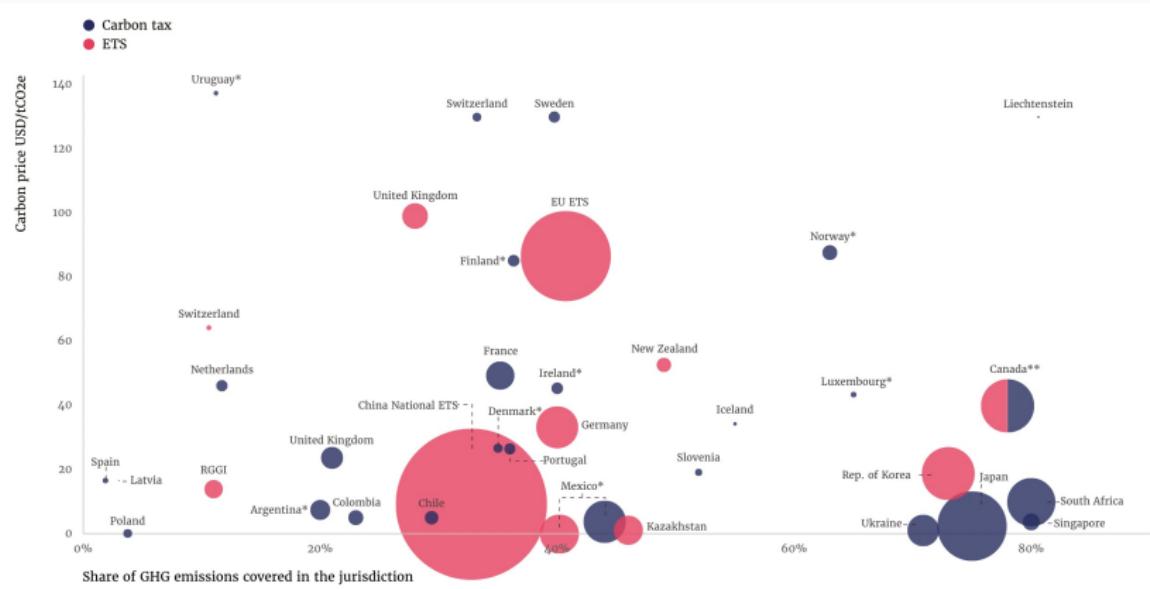
Current carbon pricing initiatives

- 68 CPIs covering 23% global GHG emissions



State of carbon pricing initiatives. Source: [World Bank \(2022\)](#). See also [Carbon pricing dashboard](#).

Carbon prices and emission coverage

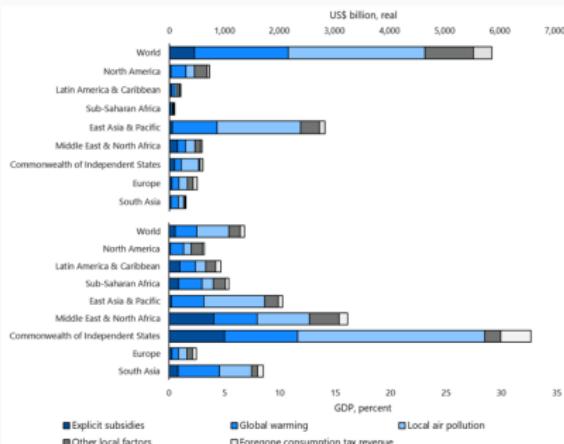
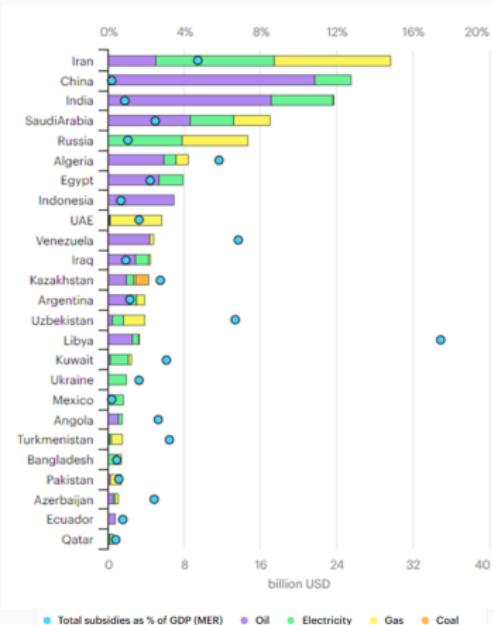


Emissions coverage, share of emissions covered, and carbon prices. Bubble size represents absolute covered total greenhouse gas emissions. Source: [World Bank \(2022\)](#). See also [Carbon pricing dashboard](#).

Fossil fuel subsidies

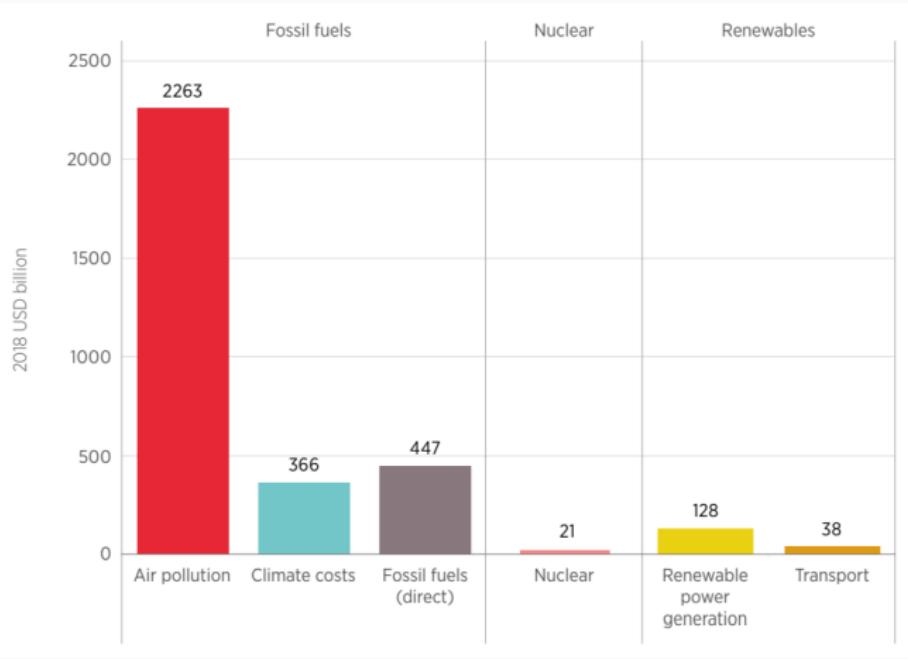
- Two main forms
 - Production subsidies to reduce cost of producing fossil fuels
 - Consumption subsidies to reduce consumer cost of using fuels
 - [Fossil fuel subsidy tracker; OECD database](#)
- Several motivations
 - Sustain national industries
 - Support lower-income households (e.g. heating)
 - Spread the wealth in resource-rich countries
- Hard to get rid of them
 - Powerful fossil lobbies
 - Social/economic/distributional impacts → protests
 - Social programmes needed (e.g. cash transfers)

Fossil subsidy estimates



Left: 2020 fossil fuel subsidies by fuel in the top 25 countries ([IEA 2022](#)). Right: 2020 fossil fuel subsidies including implicit costs ([IMF 2022](#))

Comparison with environment friendly subsidies



Total energy sector subsidies by fuel/source and the climate and health costs in 2017.
Source: [IRENA 2020](#))

Public finance

Green public spending

- Some investments are just too large and/or unprofitable
 - Direct intervention by public actors needed
- Green public investment
 - Public intervention needed to create infrastructure (e.g. high-speed railway, smart electricity grids)
 - Problem: public debt and austerity narrative
 - Change of pace with European Green Deal?
- Green public procurement
 - Public procurement represents around 15-30% of GDP
 - Secure source of demand (but is supply available?)
- Climate-related ODA
 - Commitment: 100 US\$bn per year by 2020 from OECD to developing regions
 - Multilateral climate funds
 - Pledges vs disbursements

Public development banks

- Financial institutions with a strong public component with the goal of supporting economic development
 - Multilateral development banks: World Bank group, EIB, EBRD, ADB, IaDB etc.
 - National development banks: KfW, BNDES, CDP, and others
- Development banks at the forefront of international climate financing
 - And instrumental in the diffusion of green bonds
- Development banks have two main sources of finance
 - Public budgets
 - Private finance raised on capital markets
- However, development banks' action is limited
 - Not real banks
 - Constrained by government capital commitment and leverage ratios

A step back: The guardians of the financial regime

Who guards the financial regime?

- Government
 - Ultimate decision-maker on development strategies
 - Can be more or less democratic/market-oriented/efficient
- Central banks
 - Delegation from the government with stated mandates
 - Price stability; macroprudential stability; employment; etc.
 - How independent is the central bank?
- Financial supervisors
 - Also public institution with a delegation
 - Microprudential aims: protect financial service consumers
 - Often specialised (insurance, banks, securities)

Central banks

- National/regional institutions
 - European Central Bank (ECB); Federal Reserve (Fed); Bank of England (BoE); Bank of Japan (BoJ); People's Bank of China (PBOC); Reserve Bank of India (RBI); Hong Kong Monetary Authority (HKMA); ..
- Historical evolution
 - Originally banks of the sovereign (e.g. war financing)
 - Lenders of last resort; monopoly on note issuing; public ownership; reserve system
 - Central bank independence (CBI) and inflation targeting
 - Global financial crisis: central banks to the rescue! → new powers, new responsibilities

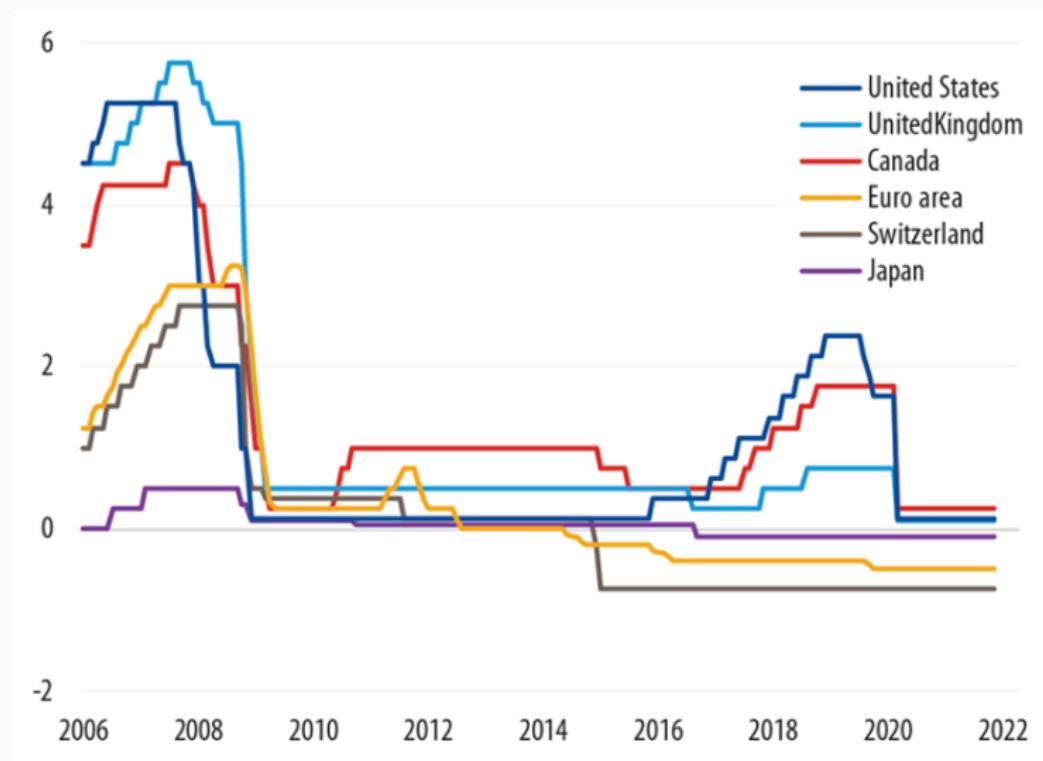
Central banks' mandates

- Price stability
 - E.g. ECB 2% inflation target over the medium term (ie. with overshoots allowed) (before 2021: 'below, but close to, 2%)'
- Economic support
 - TFEU Art. 127: ECB "shall support the general economic policies in the Union", if this is "without prejudice to the objective of price stability"
 - Fed 'dual mandate': stable inflation and maximum sustainable employment
- Other goals
 - Stable exchange rates; government lending; etc.

Central banks' policy tools

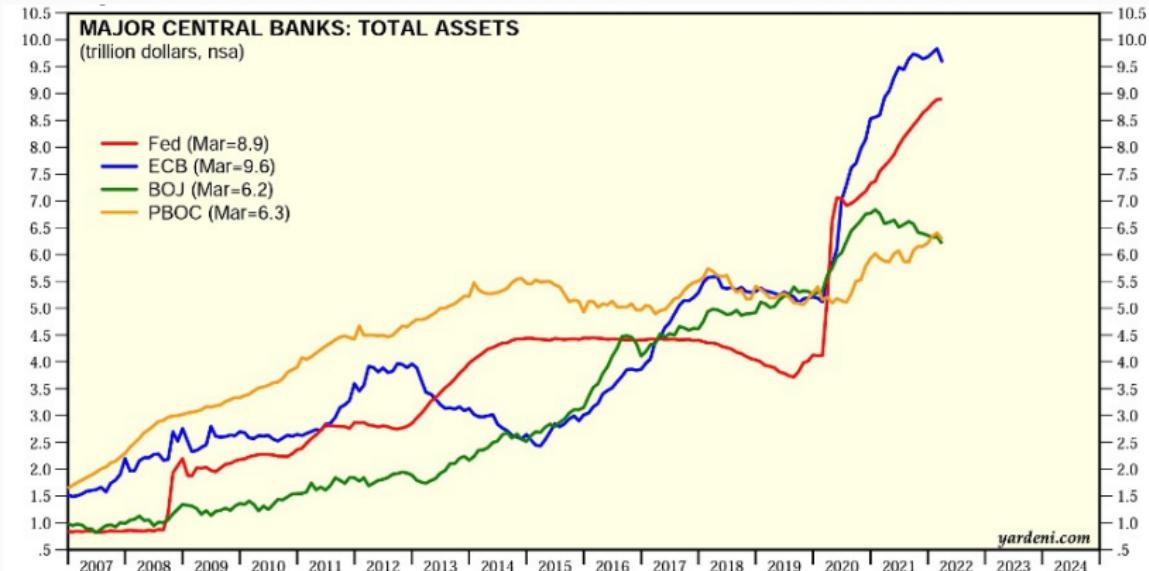
- Set the reference interest rate
 - Price at which commercial banks can borrow from CB → Drives (imperfectly) other rates and bank lending
 - Inflation increases → Rise interest rates (money more expensive)
 - Low inflation or growth → Cut interest rates (cheaper money)
- Other policy tools depending on jurisdiction and context
 - Reserve ratio requirements; Interests on excess reserves; Collateral requirements; Forward guidance; Foreign reserve management; etc.
 - Unconventional monetary policy: Quantitative Easing

Policy interest rates



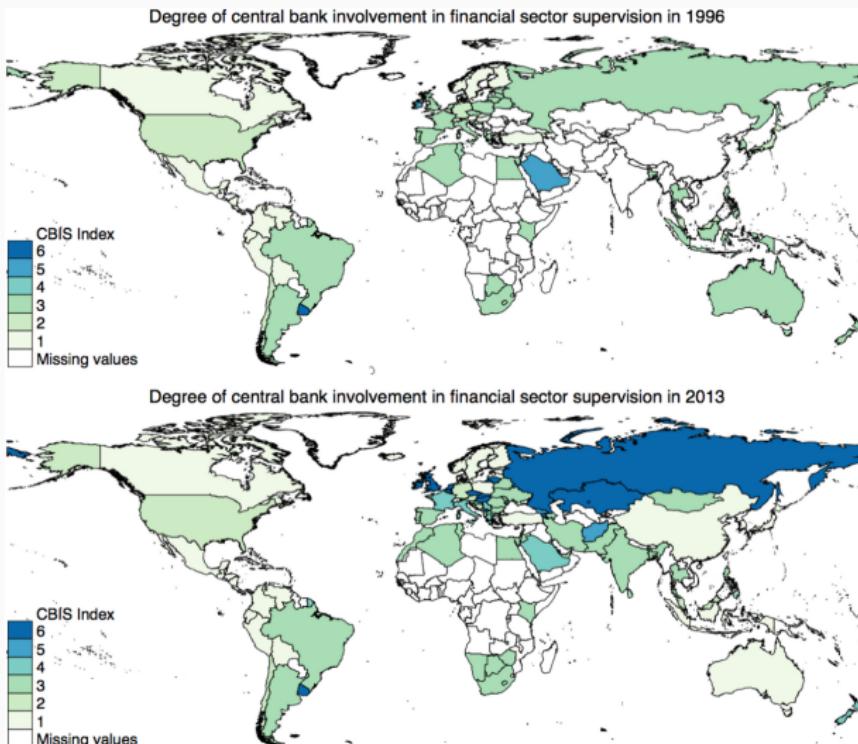
Evolution of policy rates of selected central banks. Source: IMF (2022) from BIS data

Quantitative easing and central bank balance sheets



Evolution of balance sheets of selected central banks. Source: [Yardeni Research \(2022\)](#)

The return of CB financial supervision



Central bank involvement in supervision (CBIS) index. Source: [Masciandaro and Romelli \(2018\)](#)

Indices of central bank independence

Selected indices of central bank independence

(main components of the indices)

Grilli, Masciandaro and Tabellini (1991)	Cukierman, Webb and Neyapti (1992)
Political independence	Legal independence
1. Governor not appointed by government	1. Chief Executive Officer (CEO): <ul style="list-style-type: none">term of office;appointed by;dismissed by;possibility of holding other offices in government.
2. Governor's term > 5 years	
3. All Board members not appointed by government	
4. Board term > 5 years	
5. No mandatory government representative on Board	
6. No government approval for monetary policy formulation	2. Policy formulation <ul style="list-style-type: none">Who formulates monetary policy?Who has the final word in the resolution of conflict?
7. Statutory requirement to pursue monetary stability	
8. Provisions to strengthen the central bank in the event of conflict with the government	
Economic independence	
1. Direct credit facility to government is: <ul style="list-style-type: none">not automatic;at market interest rates;temporary;for a limited amount.	3. The objectives of the central bank <ul style="list-style-type: none">Price stability is sole objective or one among others
2. Central bank does not participate in primary market for government debt	4. Limitations on lending to the government <ul style="list-style-type: none">Types of lending (advances, securitised lending)Terms of lending (maturity, interest, amounts)Who controls the lending terms?
3. Discount rate is set by central bank	
4. Banking supervision entrusted to central bank	
5. Banking supervision entrusted to central bank alone	

Sources: Grilli, Masciandaro and Tabellini (1991) and Cukierman, Webb and Neyapti (1992).

Central bank independence scores

Measures of central bank independence in G20 economies

(index value from 0 to 1)

Central bank of	Bodea and Hicks (2015)		Garriga (2016)	
	2005	2014	2005	2012
Argentina	0.78	0.73	0.82	0.77
Australia	0.31	0.31	0.35	0.35
Brazil	0.25	0.25	0.17	0.17
Canada	0.47	0.47	0.48	0.48
China	0.69	0.69	0.55	0.55
ECB	0.86	0.86*	0.80	0.80
India	0.25	0.25	0.26	0.26
Indonesia	0.95	0.95	0.83	0.83
Japan	0.44	0.44	0.55	0.55
Korea	0.40	0.40	0.44	0.44
Mexico	0.64	0.64	0.67	0.67
Russia	0.60	0.60	0.64	0.64
Saudi Arabia	n.a.	n.a.	0.42	0.42
South Africa	0.41	0.41	0.43	0.45
Turkey	0.80	0.80	0.86	0.86
United Kingdom	0.58	0.58	0.59	0.59
United States	0.51	0.51	0.40	0.40

Sources: Authors' own elaboration using the indices calculated by Bodea and Hicks (2015) and by Garriga (2016).

- Semi-autonomous agencies with prudential aims
 - Protection of financial service consumers; stability of markets
 - More micro- than macro-prudential
- Structured by markets
 - EU: European Banking Authority (EBA); European Securities and Markets Authority (ESMA); European Insurance and Occupational Pensions Authority (EIOPA)
 - China: China Banking and Insurance Regulatory Commission (CBIRC); China Securities Regulatory Commission (CSRC)

Basel III regulation

Capital					Liquidity
	Pillar 1		Pillar 2	Pillar 3	
	Capital	Risk coverage	Containing leverage	Risk management and supervision	Market discipline
All Banks	<p>Quality and level of capital</p> <ul style="list-style-type: none"> Raising minimum common equity to 4.5% of risk-weighted assets, after deductions. A capital conservation buffer comprising common equity of 2.5% of risk-weighted assets brings the total common equity standard to 7%. Constraints on a bank's discretionary distributions will be imposed when it falls into the buffer range. A countercyclical buffer within a range of 0–2.5% comprising common equity will apply when credit growth is judged to result in an unacceptable build-up of systematic risk. <p>Capital loss absorption at the point of non-viability</p> <p>Allowing capital instruments to be written off or converted to common shares if the bank is judged to be non-viable. This will reduce moral hazard by increasing the private sector's contribution to resolving future banking crises.</p>	<p>Revisions to the standardised approaches for calculating</p> <ul style="list-style-type: none"> credit risk; market risk; credit valuation adjustment risk; and operational risk <p>mean greater risk-sensitivity and comparability.</p> <p>Constraints on using internal models aim to reduce unwarranted variability in banks' calculations of risk-weighted assets.</p> <p>Counterparty credit risk</p> <p>More stringent requirements for measuring exposure; capital incentives to use central counterparties for derivatives; a new standardised approach; and higher capital for inter-financial sector exposures.</p> <p>Securitisations</p> <p>Reducing reliance on external ratings, simplifying and limiting the number of approaches for calculating capital charges and increasing requirements for riskier exposures.</p> <p>Capital requirements for exposures to central counterparties (CCPs) and equity investments in funds to ensure adequate capitalisation and support a resilient financial system.</p> <p>A revised output floor, based on Basel III standardised approaches, limits the regulatory capital benefits that a bank using internal models can derive relative to the standardised approaches.</p>	<p>A non-risk-based leverage ratio including off-balance sheet exposures is meant to serve as a backstop to the risk-based capital requirement. It also helps contain system-wide build-up of leverage.</p> <p>Supplemental Pillar 2 requirements address firm-wide governance and risk management, including the risk of off-balance sheet exposures and securitisation activities; sound compensation practices; valuation practices; stress testing; corporate governance and supervisory colleges.</p> <p>Interest rate risk in the banking book (IRRBB)</p> <p>Extensive guidance on expectations for a bank's IRRBB management process; enhanced disclosure requirements; strict threshold for identifying outlier banks; updated standardised approach.</p>	<p>Revised Pillar 3 disclosure requirements</p> <p>Consolidated and enhanced framework, covering all the reforms to the Basel framework. Introduces a dashboard of banks' key prudential metrics.</p>	<p>The Liquidity Coverage Ratio (LCR) requires banks to have sufficient high-quality liquid assets to withstand a 30-day stressed funding scenario that is specified by supervisors.</p> <p>The longer-term, structural Net Stable Funding Ratio (NSFR) is designed to address liquidity mismatches. It covers the entire balance sheet and provides incentives for banks to use stable sources of funding.</p> <p>The Committee's 2008 guidance Principles for Sound Liquidity Risk Management and Supervision takes account of lessons learned during the crisis. It is based on a fundamental review of sound practices for managing liquidity risk in banking organisations.</p> <p>Supervisory monitoring</p> <p>The liquidity framework includes a common set of intraday and longer-term monitoring metrics to assist supervisors in identifying and analysing liquidity risk trends at both the bank and system-wide level.</p>
SIBs	<p>The Committee identifies global systemically important banks (G-SIBs) using a methodology that includes both quantitative indicators and qualitative elements. In addition to meeting the Basel III risk-based capital and leverage ratio requirements, G-SIBs must have higher loss absorbency capacity to reflect the greater risks that they pose to the financial system. The Committee also developed principles on the assessment methodology and the higher loss absorbency requirement for domestic systemically important banks (D-SIBs).</p>				
	<p>Large exposures</p> <p>Large exposures regime established to mitigate systemic risks arising from interlinkages across financial institutions and concentrated exposures.</p>				

Basel III regulation. Source: Bank of International Settlements

Sustainable finance policy-making

- Unclear how to calculate exposure to climate/transition risks
 - Exposure of business operations (firms)
 - Exposure of financial assets (financial institutions)
 - Exposure of financial systems (financial supervisors)
- Once assessed, risk exposure needs to be disclosed for market discipline (and regulation) to work
- Examples
 - See: Task Force for Climate-Related Financial Disclosures (TCFD)
 - See: EU Disclosure Regulation
 - See French Energy Transition Law (Art. 173)

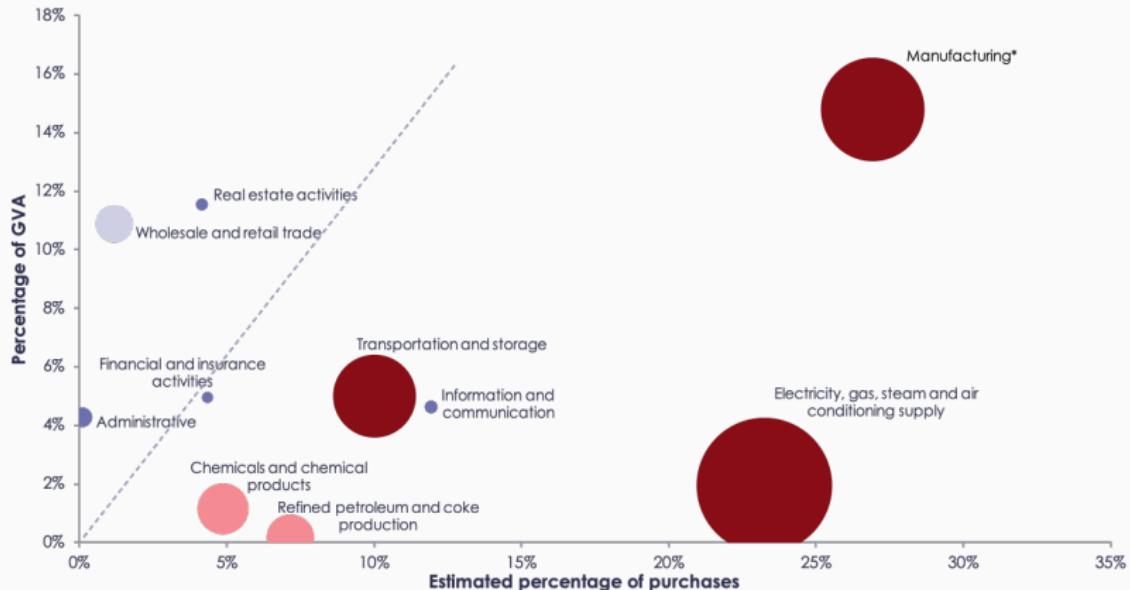
Sustainable finance: promotional policies

- Recalibrate prudential regulations so to give incentives to low-carbon investments:
 - Similar in spirit to a carbon price
 - Capital, liquidity and reserve requirements
 - E.g. Banque de Liban differentiated reserve ratios
- Use monetary policy tools to offer incentives:
 - Bank of Japan refinancing conditions depending on greenness
 - Chinese MPA framework by PBoC: greener banks pay lower interest rates on reserves
- Force banks to give credit:
 - Credit quotas set by Reserve Bank of India and Bank of Bangladesh

Green quantitative easing

- Quantitative easing (QE):
 - Programmes of purchase of financial assets by central banks (ECB, Fed, BoE, BoJ..)
 - Necessary when policy interest rates reach zero
 - Mainly sovereign bonds, but also corporate bonds, ABS, ..
 - Driving criteria: market neutrality
- Green quantitative easing idea:
 - Purchase green assets (e.g. 'green bonds') to ensure liquidity to green activities and lower their financing costs
 - Might help ease current high-carbon bias of QE programmes

A high-carbon bias in the ECB QE programme?



Size of bubble indicates relative contribution to emissions in the Eurozone. Source:
Matikainen et al. (2017)

The Green Central Banking Scoreboard

Rank	Country	Aggregate Score (out of 100)	Grade (A+ to F)	Research and Advocacy (out of 10)	Monetary Policy (out of 50)	Financial Policy (out of 50)	Leading by Example (out of 20)
1	France	52	C	10	8	26	8
2	Brazil	51	C	10	18	19	4
3	China	50	C	10	17	23	0
4	European Union	47	C-	10	8	23	6
5	United Kingdom	46	C-	10	6	23	7
6	Italy	45	C-	10	8	23	4
7	Germany	44	C-	10	8	23	3
8	Indonesia	26	D	10	1	13	2
9	Japan	25	D	10	6	6	3
10	India	18	D-	10	5	2	1
11=	Mexico	17	D-	10	1	5	1
11=	South Korea	17	D-	10	0	6	1
13	Australia	16	D-	10	0	5	1
14=	Canada	15	D-	10	0	4	1
14=	United States	15	D-	10	0	5	0
16	Russia	12	D-	6	0	4	2
17	South Africa	10	D-	10	0	0	0
18	Turkey	5	F	3	0	2	0
19=	Argentina	0	F	0	0	0	0
19=	Saudi Arabia	0	F	0	0	0	0

Green monetary/financial policies around the world

GREEN MONETARY AND FINANCIAL POLICIES (GMFP) TRACKER

Landing Page

Landing Page

Map Overview

This view shows an interactive classification of all policies included in our database

Click a square to see a list of all policies in each category. Click on the individual policy to learn more about it.

FINANCIAL POLICY	MONETARY POLICY				ADDITIONAL POLIC..
82 Policies	Collateral	Credit operations	Domestic asset purchases	Foreign asset purchases	24 Policies

Policy name	Country	Date	Within this policy type	Link to Policy Page
Climate disclosures as eligibility requirement for ECB do..	EU	Announced	Domestic asset purchases	More info
Integration of climate change risks and considerations in..	EU	Announced	Domestic asset purchases	More info
Green Mortgage Bond Purchase Programme	Hungary	06/07/2021	Domestic asset purchases	More info
Climate stress test on monetary portfolios	Netherlands	2020	Domestic asset purchases	More info
Programme for the Riksbank's asset purchases for	Sweden	01/2021	Domestic asset purchases	More info
Riksbank reports carbon footprints for its holdings of cor..	Sweden	31/03/2021	Domestic asset purchases	More info
Green Adjustment of the Corporate Bond Purchase Sche..	UK	05/11/2021	Domestic asset purchases	More info

Green Monetary and Financial Policies Tracker. Source: [E-axes Forum](#)

Climate-related policy objectives

- The United Nations Framework Convention on Climate Change ([UNFCCC](#))
 - Signed in 1992, effective from 1994
 - Aim: ‘achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system’
- Annual Conference of the Parties (COP)
 - Kyoto Protocol (COP3, 1997)
 - Copenhagen conference (COP15, 2009)
 - Paris Agreement (COP21, 2015)
 - Sharm el-Sheikh ([COP27](#): November 2022)

Paris Agreement

- Paris Agreement ([text](#)) objectives set in art.2:
 - Hold increase in global average temperature to well below 2°C above pre-industrial levels; pursue efforts to limit temperature increase to 1.5°C
 - Increase ability to adapt to adverse impacts of climate change; foster climate resilience and low GHG emissions development, without threatening food production
 - Make finance flows consistent with a pathway towards low GHG emissions and climate-resilient development

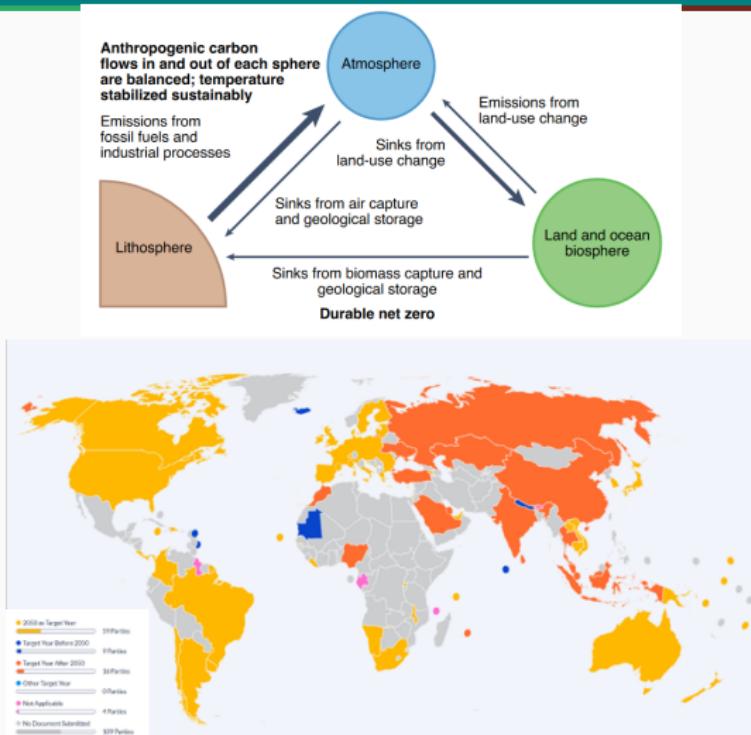


Nationally Determined Contributions

- Decentralised approach
 - No global agreement (eg. Kyoto Protocol)
 - Each country sets its own objectives: Nationally Determined Contributions (NDCs) by 2020 ([NDC registry](#); [NDC Explorer](#))
 - Collective progress assessed through a Global Stocktake
 - Every 5 year: report on actions taken → more ambitious NDCs
 - Conditional vs unconditional NDCs (e.g. access to financial resources)
- Current NDC objectives:
 - EU: -55% GHG emissions by 2030 w.r.t. 1990
 - China: -65% CO₂ per unit of GDP by 2030 w.r.t. 2005
 - India: -45% emission intensity by 2030 w.r.t 2005
 - US: -50/52% GHG emissions by 2030 w.r.t 2005

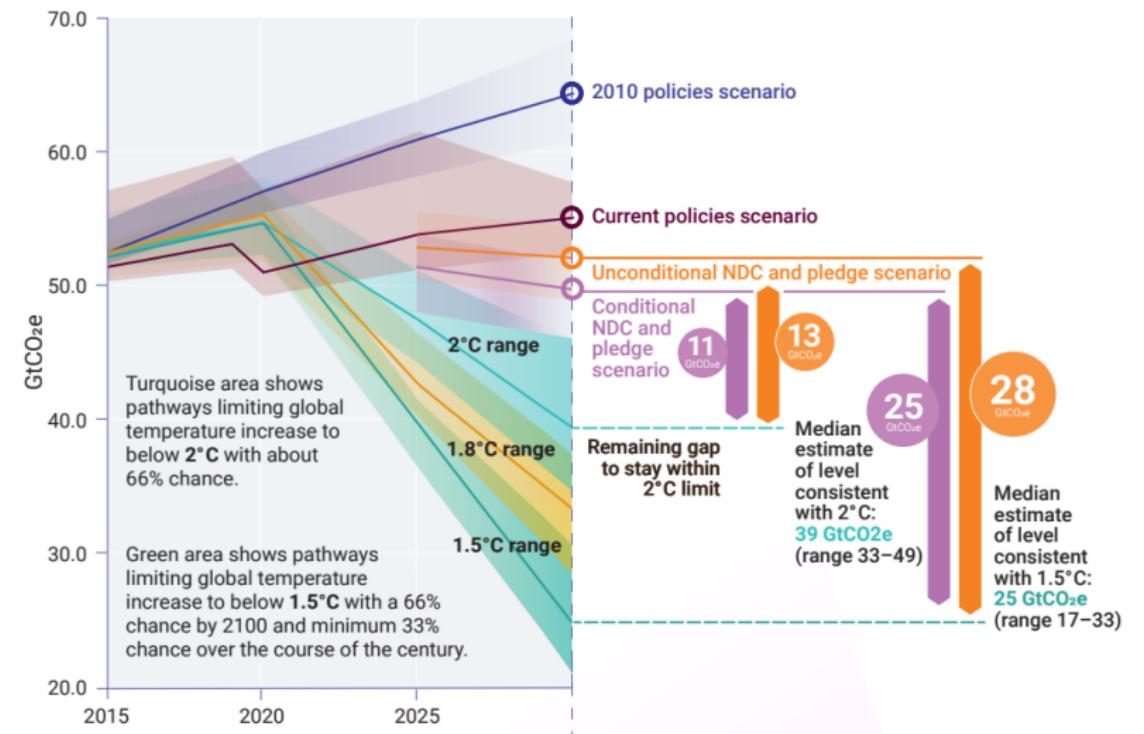
Net zero targets

- Net-zero concept
 - Emissions less sequestration
- Explosion of net-zero target/pledges
 - In law, policy doc, pledges
 - Countries, regions, cities, companies..



Above: the net-zero balance ([Fankhauser et al. \(2022\)](#)).
Below: net-zero pledges by target year ([Climate Watch](#))

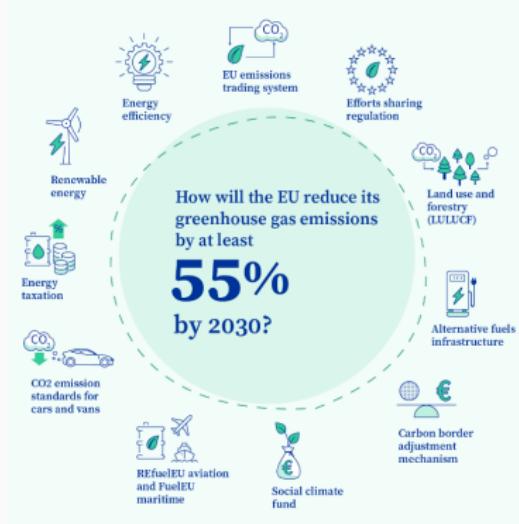
Are NDCs enough? No.



The emission gap. Source: UNEP 2021

The European strategy

- Overarching strategy: the European Green Deal
 - Broad strategy outlined in 2019 ([text](#))
- European Climate Law (2021)
 - Legally binding targets ([text](#))
 - Climate neutrality by 2050
 - 55% reduction of net GHG emissions by 2030, as compared to 1990
- Fit-for-55 package
 - 13 legislative proposals (8 revisions + 5 new proposals)



The Fit for 55 proposals. Source:
[European Council](#)

EU Emission Trading Scheme (EU ETS) (i)

- Participating countries:
 - 27 EU states + Iceland, Liechtenstein and Norway
 - Since 2020: link with Swiss ETS
 - UK → UK ETS ([see differences](#))
- Compliance entities:
 - ≈ 10,000 stationary installations (e.g. power/industrial plants)
 - ≈ 350 aircraft operators
 - Both compliance and non-compliance entities can buy/sell
- GHG emission coverage:
 - carbon dioxide (CO₂) from electricity/heat generation, energy-intensive industries, commercial aviation within EEA
 - N₂O from glyoxal and nitric/adipic/glyoxylic acids
 - Perfluorocarbons (PFCs) from production of aluminium
 - ≈ 40% emissions covered

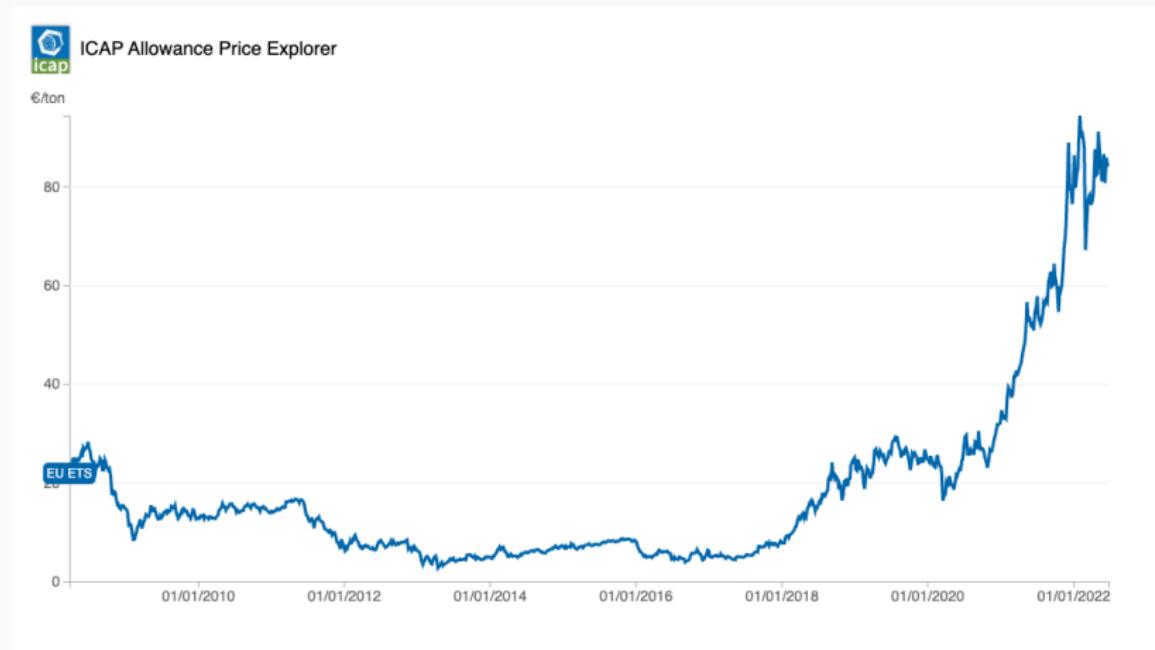
EU Emission Trading Scheme (EU ETS) (ii)

- History
 - Three phases so far (2005-07; 2008-12; 2013-20)
 - Now in the Fourth phase: 2021-2030 (linked to EU new climate objectives). See [2021 EC Report](#)
- Cap-and-trade system
 - 2021 cap: 1,597 MtCO₂e (1,572 from stationary installations + 24.5 from aviation)
 - Annual redemption at the end of March (EUR100 fine per tCO₂ not surrendered)
 - Linear cap reduction factor of 2.2% per year
 - [ETS transaction log](#); [EEA EU-ETS data viewer](#)
- Distribution of allowances
 - ≈ 57% of EUAs are [auctioned](#), the rest [distributed for free](#)
 - Partly free EUAs to aviation, industry, modernising energy, sectors under threat of carbon leakage

EU Emission Trading Scheme (EU ETS) (iii)

- Carbon revenues
 - At least 50% to climate and energy-related purposes
 - → Innovation Fund for breakthrough technologies e.g. low-carbon hydrogen, CCUS, renewable energy
 - → Modernisation Fund: modernisation energy systems and just transition in lower-income member states
 - 2021 carbon revenues: EUR31 billion in 2021
- Market Stability Reserve
 - Issue: demand volatility vs fixed supply reduction → possible oversupply of permits → low carbon price
 - Solution: Market Stability Reserve (MSR). Move EUAs from market to MSR in times of oversupply, from MSR to market in overdemand, according to pre-defined rules
 - 2021: reduced auction volumes by $\approx 40\%$
 - Review of the EU ETS market stability reserve

EU ETS allowance price dynamics



EUA spot price. Source: [ICAP Allowance Price Explorer](#)

EU ETS reform proposals

- Increase reduction factor from 2.2% to 4.2%
- Inclusion of maritime sector into EU ETS scope from 2023
- Separate ETS for buildings and road transport
- Carbon border adjustment mechanism (CBAM) on imported goods from 2026
- Gradual phase-out of free allocation to aviation sector
- Strengthened Market Stability Reserve
- Creation of the Social Climate Fund (just transition)

Conclusions

Conclusions

- It makes sense to introduce policies to mitigate climate change
 - Externalities → market failures
- Several option available
 - Carbon pricing (taxes, subsidies, ETS)
 - Public finance
 - Sustainable finance policies
- Governments fix long-term objectives
 - Paris Agreement and NDCs
 - Net-zero commitments
- What could go wrong?
 - → Next lecture: transition risks