

# Climate Protection: state of play, division of labour, steps forward

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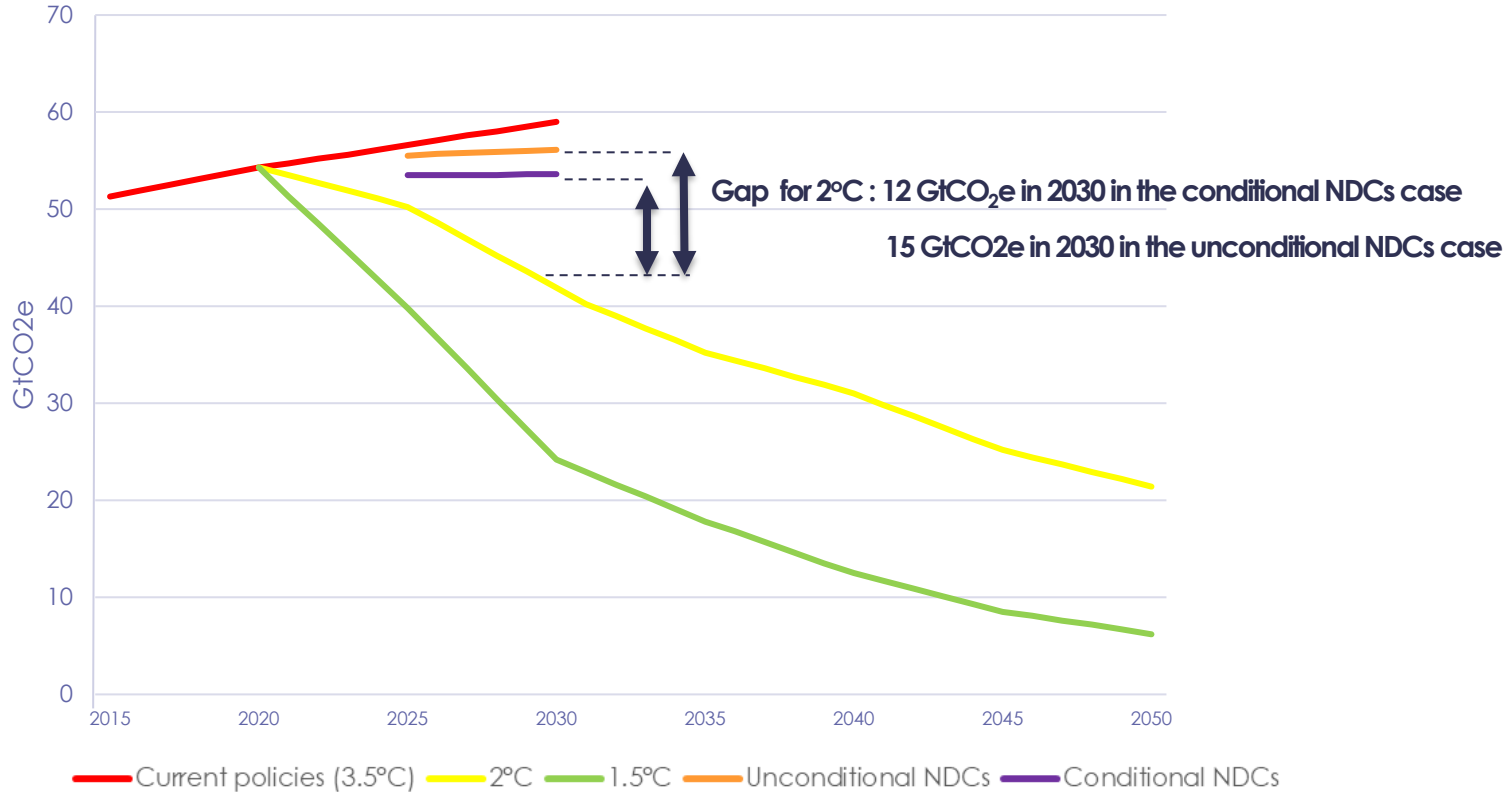
October 2021

*These slides are intended to have sufficiently detailed argument to be read independently of the lecture.  
Time constraints imply that some slides will be presented only briefly. References are provided at the end.*

# Structure

- **State of play: the urgency of action on climate change, sustainable growth and development, and investment and innovation**
- Division of labour: policy, finance, and collaboration
- Steps forward: priorities for the near-term

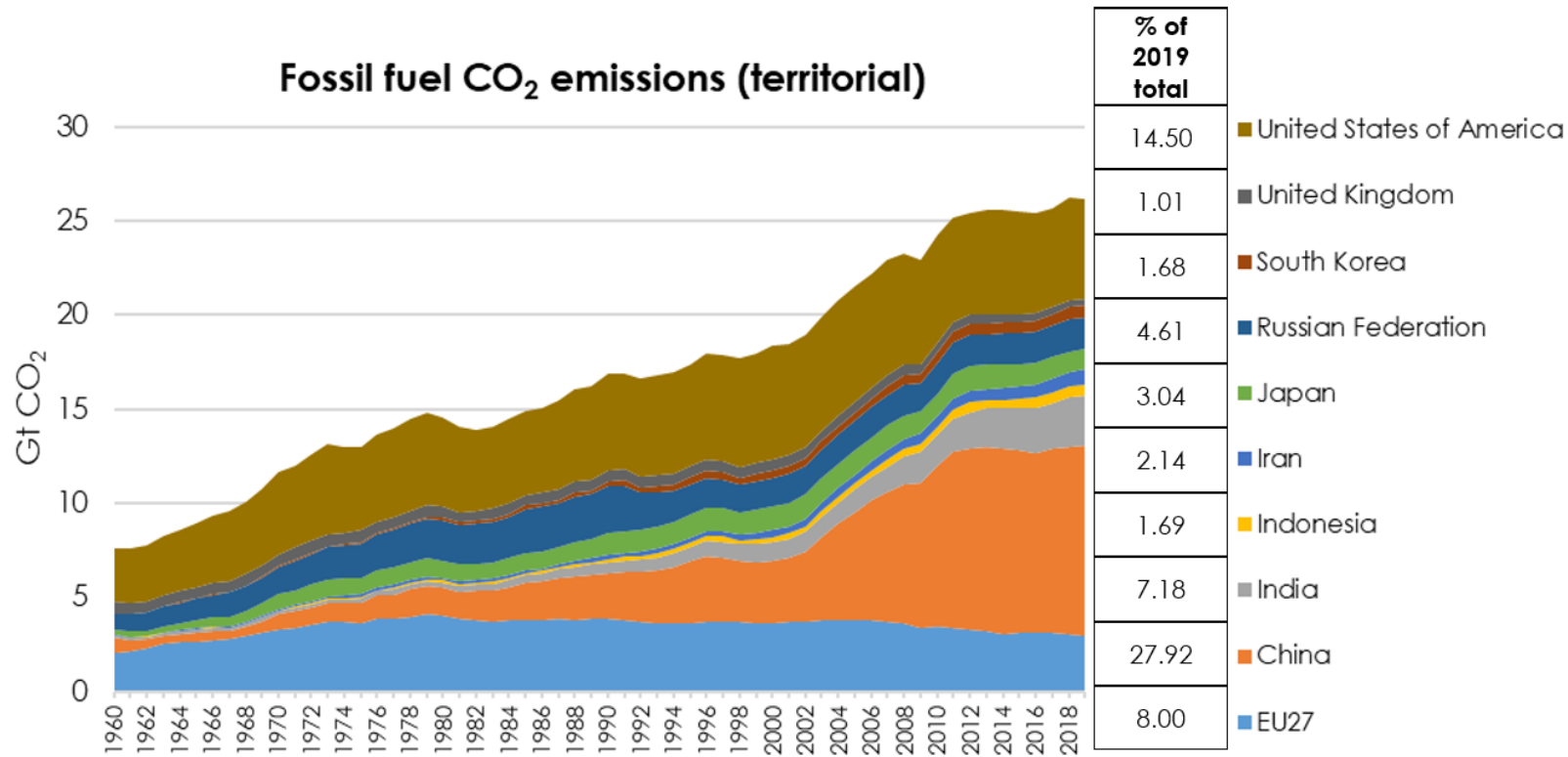
# Large gap between current NDCs and what is required to reach the Paris temperature targets



Source: Trajectories based on UNEP (2020)  
 NB: The 1.5°C scenario used by the UNEP report relies on the widespread use of negative emissions technologies (NETs) later in the century.

**The challenge is now to accelerate action to 2030 to close the gap. Requires immediate action across whole economy. Must peak emissions in next few years and go to “net zero” in next 50-60 years.**

# Global GHG emissions are on the wrong track



Source: GCP (2021)

Global greenhouse gas emissions in 2019:  
**59.1 Gt CO<sub>2</sub>e**

Global fossil fuel CO<sub>2</sub> emissions in 2019:  
**38 Gt CO<sub>2</sub>**

Source: UNEP (2020)

NB: **Fossil fuel carbon dioxide emissions** are from the use of coal, oil and gas (combustion and industrial processes), the process of gas flaring and the manufacture of cement. **Energy-related carbon dioxide emissions** are from fuel combustion only. **Carbon dioxide-equivalent emissions** convert non-CO<sub>2</sub> gases into their carbon dioxide-equivalents.

Fossil CO<sub>2</sub> figures are typically **around 2/3** of CO<sub>2</sub>e figures.

Overall increases in CO<sub>2</sub> emissions 2016, 2017, and 2018. 2019 emissions estimates are roughly stable. A record drop of over 5% in global energy-related CO<sub>2</sub> emissions 2020, relative to 2019 due to COVID (IEA, 2021), but will it be temporary? Important to keep going down and go to zero-carbon by mid-century for 1.5°C and within five decades for 2°C.

# Momentum is building but not yet enough for 1.5°C

- More than **130 countries** have set or are considering a target of reducing emissions to net zero by mid-century, while **110 Parties** to the Paris Agreement have submitted new or updated Nationally Determined Contributions (NDCs).
- **Private sector commitments** are increasing. E.g. the Glasgow Financial Alliance for Net Zero now consists of over 250 financial institutions responsible for \$80 trillion in assets and anchored in COP's Race to Zero (Carney, 2021).
- Recent increases in commitments for climate finance, and some bans on high-carbon finance (e.g. for coal), from largest economies.
- However, **action is still insufficient**. Even newest NDCs fall far short of the ambition needed to limit temperature rises to 1.5°C (CAT, 2021). Only 20% of targets set by G20 companies are science-based (SBTi, 2021).
- Rich countries have not provided **\$100 billion in climate finance** to developing countries, stalling climate action and threatening the trust required to further international negotiations.

**Critical to ramp up both bilateral and multilateral financial flows several-fold. Larger interventions and decisive policy support are necessary to increase multipliers and leverage private sector finance at scale.**



# The impacts of failure could be devastating; difference between 1.5°C and 2°C strongly significant

	1.5°C	2°C	2°C vs 1.5°C
Extreme Heat <sup>1</sup> (Proportion of global pop. exposed to severe heat at least once every 5 years)	14%	37%	2.6x worse
Number of sea-ice-free Arctic summers <sup>2</sup>	At least 1 after ~100 years of stabilised warming	At least 1 after ~10 years of stabilised warming	10x worse
Bioclimatic range loss of >50% <sup>3</sup>	Vertebrate species: 4% Plant species: 8% Insect species: 6%	Vertebrate species: 8% Plant species: 16% Insect species: 18%	Vertebrate species: 2x worse Plant species: 2x worse Insect species: 3x worse

Differences between 1.5°C and 2°C are major. Differences from 2°C to 2.5°C, and then to 3°C, likely larger still. Currently on a path to more than 3°C, with risks of still higher temperatures.

Immense risks to lives and livelihoods across the world. Clearly and strongly expressed in IPCC (2021) AR6, WG1. Hundreds of millions, or billions, having to move, with possibility of widespread, severe and extended conflict.

# Most economic modelling fails to capture nature and scale of risks

- Current economic analyses of climate change fail to incorporate many of the largest risks, including the effects from **crossing climate thresholds** or '**tipping points**'.
- The impacts would significantly affect and disrupt the **lives and livelihoods** of hundreds of millions, probably billions, of people worldwide. How many people could a world of 4°C or 5°C support and how many would be killed along the way?
- These impacts would also undermine economic growth and development, **exacerbate poverty** and **destabilise communities**.
- These risks - existential for many - are different from the kind that we use expected utility theory to deal with.



**A. Amazon rainforest**  
Frequent droughts

**B. Arctic sea ice**  
Reduction in area

**C. Atlantic circulation**  
In slowdown since 1950s

**D. Boreal forest**  
Fires and pests changing

**F. Coral reefs**  
Large-scale die-offs

**G. Greenland ice sheet**  
Ice loss accelerating

**H. Permafrost**  
Thawing

**I. West Antarctic ice sheet**  
Ice loss accelerating

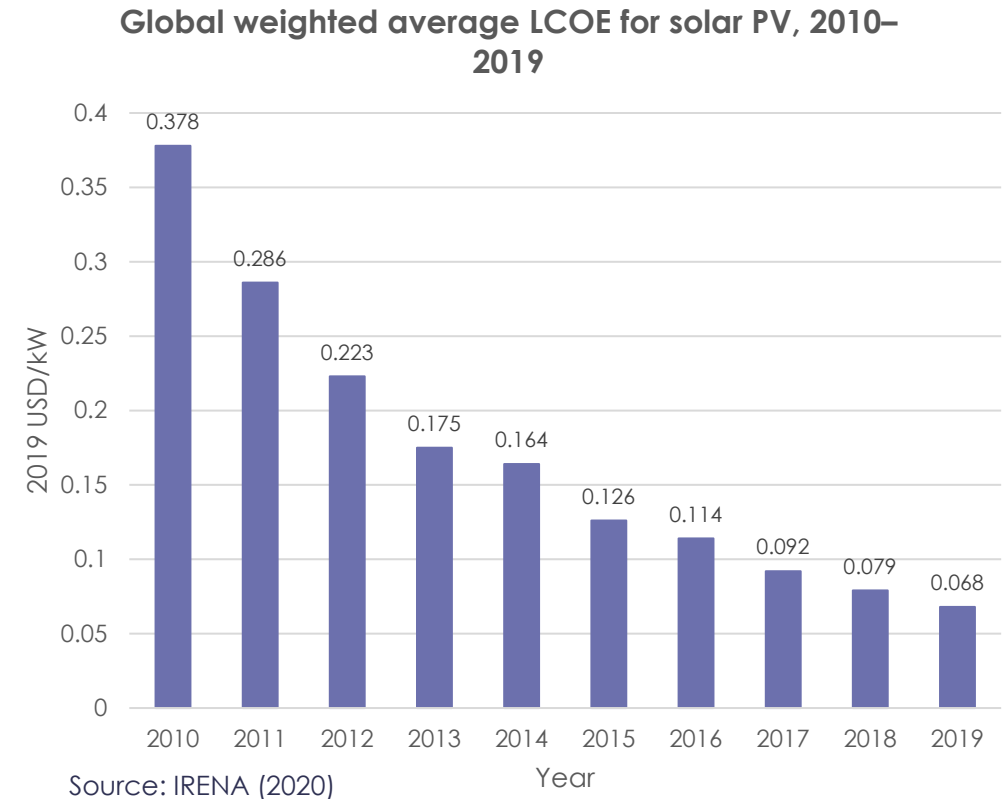
**J. Wilkes Basin, East Antarctica**  
Ice loss accelerating

©nature

Source: Lenton et al., 2019

# The perceived costs of climate action are often overstated; increasing returns to scale and dynamics of learning

- **Innovation and discovery** - drives down costs, spurs further innovation and spillovers.
- Solar power and LED **costs have plummeted** as the world has scaled investment and innovation, with co-benefits of reduced emissions and pollution. Same can happen with batteries, hydrogen, etc...
- **Co-benefits** extend beyond climate: biodiversity, less congestion, better health, new jobs, fuel cost savings, etc.
- Much of what we need to do can be done with existing technologies, but to get to net zero by mid-century, strong development of **new technologies** will be necessary.



Increasing returns to scale, both dynamic and static, are enormously important.



# The growth story of the 21<sup>st</sup> century: strong, sustainable, inclusive, resilient

- **This is a powerful growth story driven by investment and innovation.**

5 - 10 years



Investment in sustainable infrastructure and other assets can boost shorter-run demand and growth, sharpen supply and efficiency, reduce waste and pollution, promote sustainable development and reduce poverty.

~ 10 years



Spur innovation, creativity and growth in the medium term, unleash new waves of innovation and discovery.

~ 20 years



Low-carbon is the only feasible longer-run growth on offer; high carbon growth self destructs.

- Large **job** opportunities. Strong **multipliers**. Powerful effects on **health and well-being**.
- By 2030, **low-carbon technologies and business models** could be competitive in sectors representing over 70% of global emissions (today 25%) (Systemiq, 2020) .
- **Not a story of cost** but of large **net benefits**. Requires substantial investment but has high returns.
- **Adaptation/resilience** will be crucial. Many investments foster **development, reduce emissions and promote resilience** (alternative farming methodologies, public transport, building design, restoring degraded lands, decentralised solar...).
- But fundamental change involves **dislocation of work and changing relative prices**. Need for **just transition**. Political economy and ethics. Support training, skills, places, and relocation where necessary. Revenues to protect the poor.

# The centrality of investment

- **Investment is at centre stage** right through from rescue to recovery to transformational growth / net zero.
- The investment rate has been low over the last decade. Need to invest to drive out of the recession we are in and to re-establish growth. **Magnitudes ~2-3% of GDP** (less in some places, more in others) and change in **composition**. We now know more about what we need to invest in. Would roughly restore levels of two decades ago.
- Investment can tackle **simultaneously**: health/ education; unemployment/ growth; inequality/ social cohesion; climate/ biodiversity.
- The realisation of investment requires **sound policy** and the right kind of **finance**, on the right scale, at the right time.
- Across the world there is **great investment potential** and **strong savings** (negative or zero real interest rates for many countries), but a great deficiency in linking potential investment and savings.

**Failing to take strong, internationally coordinated action on investment would give us a deeply dangerous world. A key moment in world history.**

# Structure

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- **Division of labour: policy, finance, and collaboration**
- Steps forward: priorities for the near-term

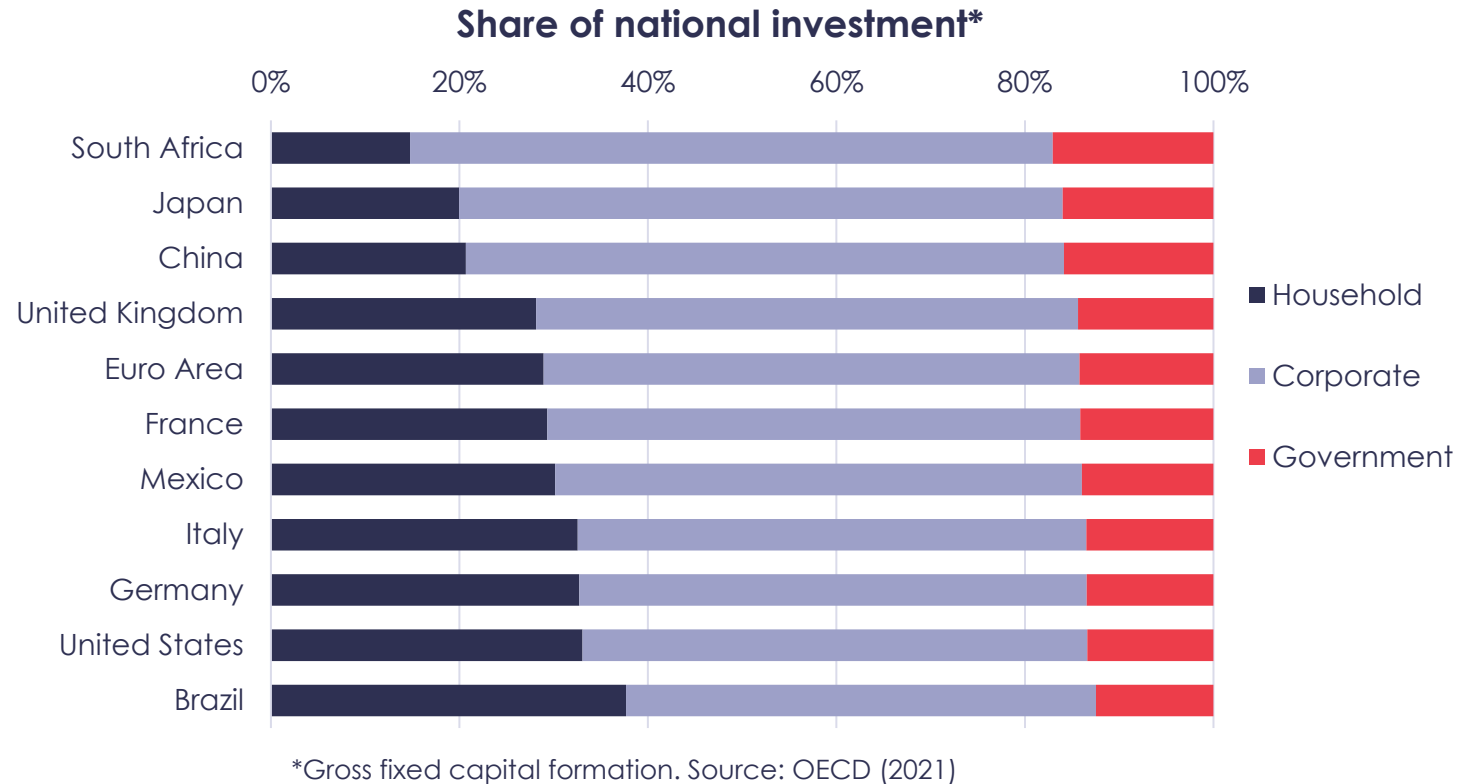
# A credible public policy framework can guide private investment towards sustainability/climate action

- **Expectations**, and how they are formed, are crucial for investment. They can and should be shaped by public action, including by the key public policy and financial institutions which set direction.
- **Clear, credible signals** can draw through both investment and innovation.
- Different market failures point to the use of **different instruments**, but the collection should be **mutually reinforcing**. We have the tools to drive action.
- Government-induced policy risk is the biggest deterrent to investment worldwide. Policies must be credible over time; '**predictably flexible**'.

Sound, stable and credible public policy, sustained and long-term public investment, and a commitment to growth, play central roles in guiding and fostering private sector investment.

# Enabling policies and public finance are key, but private investment at scale is necessary for transformative change

- The private sector provides a large share of investment in every economy.
- The **shift in the financial system** to support sustainable growth, climate action, and responsibilities towards the environment and biodiversity can be accelerated by working together and with the private sector.
- Growth and stability requires **enabling policies** and institutions to manage and reduce risks. **Public investment** to drive innovation and catalyse system change.



Given the scale of investment required a significant increase of finance is needed from all sources — domestic public, international, private — and the links between them made stronger.



# A package of overlapping policies is necessary

Market Failure	Description	Policy Options
Greenhouse gasses (GHGs)	Negative externality because of the damage that emissions inflict on others.	Carbon tax/ cap-and-trade/ regulation of GHG emissions (standards)
Research, development and deployment (R,D&D)	Supporting innovation and dissemination.	Tax breaks, support for demonstration/deployment, publicly funded research.
Imperfection in risk/capital markets	Imperfect information assessment of risks; understanding of new projects/technologies.	Risk sharing/reduction through guarantees, long-term contracts; convening power for co-financing.
Networks	Coordination of multiple supporting networks and systems.	Investment in infrastructure to support integration of new technologies in electricity grids, public transport, broadband, recycling. Planning of cities.
Information	Lack of awareness of technologies, actions or support.	Labelling and information requirements on cars, domestic appliances, products more generally; awareness of options
Co-benefits	Consideration of benefits beyond market rewards.	Valuing ecosystems and biodiversity, recognising impacts on health

**Collaboration between national government ministries, development finance institutions, and central banks and supervisors to increase and coordinate policies and mobilise investment.**

# Finance is both an enabler and catalyst for change

- **Strengthen domestic public finances:** potential to broaden tax bases; including through international cooperation and clarity on the global tax regime, including a minimum tax rate on corporate profits.
- Importance of **international public finance**. The biggest needs for climate-related investment are with the largest emitters, in particular, the middle-income countries, and those particularly vulnerable to climate risk. Delivery of the \$100 billion commitment key to success of COP26 and ambition to 2025 .
- The **international financial institutions** (especially the IMF and multilateral development banks) have a crucial role to play across all elements of the finance agenda. The **MDBs** are uniquely positioned to support transformational change – provide proactive capital increases within a requirement to work better together.
- Act strongly to **alleviate the debt constraints of low-income and vulnerable countries**. This could include **extending the Debt Service Suspension Initiative**, requiring comparable treatment of the private sector and tackling over-indebtedness by **strengthening the G20 Common Framework for Debt Treatments**, reprofiling and reducing the cost of official debt, and considering the potential of debt-for-nature and debt-for-climate swaps.
- Mobilising **private sector finance**, at scale, will be critical. Need to shift the whole financial system (Mark Carney's 3Rs- reporting, risk management, returns). Critical role of information on risk and mechanisms for de-risking. Set out plans to make portfolios and operations entirely sustainable.
- Potential great importance of **voluntary carbon markets**.

# Macroeconomic and fiscal policy frameworks

- Macroeconomic and fiscal policy should **systematically integrate** climate mitigation and adaptation policies, both to incorporate the impact of climate change and to accelerate the transition to a low-carbon, climate resilient growth path.
- In addition to carbon pricing, **fiscal policy instruments (taxes and subsidies) can help create the incentive** structure for low-carbon and resilient investment and growth, together with supportive regulatory policies such as standards, land-use and city design.
- **Carbon pricing and elimination of distortionary subsidies** for fossil fuels and agriculture/fertilizers can generate substantial **fiscal revenues** that can be used to support innovation and investment in climate mitigation and adaptation.
- **Fiscal support for research and development** in new technologies and stronger international collaboration (such as the International Solar Alliance) can catalyse basic research, development and deployment of new technologies that might be impeded by high upfront costs, long time horizons and uncertain returns.
- Fiscal policy can also play a powerful role, through **investment decisions and policies**, in shaping and supporting investments in sustainable infrastructure (including adaptation), even in the absence of carbon pricing.

**Long-term investment must be distinguished from consumption and will require long-term borrowing. Must generate and clarify revenue streams that can reduce cost of capital and unlock long-term finance.**

# The role of central banks

- **Climate is macrocritical:** nature and magnitude of shocks have changed and economic structures are moving rapidly.
- **Physical risks** from climate change and **transition risks** from the shift to net-zero will create consequences for **price stability** as well as **financial stability**. Linkages to **biodiversity** loss: need an integrated approach.
- In the face of pervasive market failures (associated with capital markets, R&D, networks, information and co-benefits, as well as the GHG externality), climate and environmental risks continue to be **mispriced** in financial markets. Standard economic modelling, including IAMs, systematically underestimates the damages from climate change and overestimates the costs of climate action.
- Principle of '**market-neutrality**', narrowly interpreted, therefore, induces a **carbon bias** in central bank operations. Alternative is a proactive response to minimise disruption based on putting **guardrails** in place then asking how to keep within them (embodied by the Paris Agreement).
- **Supervisory tools**, such as stress tests and prudential regulations, can ensure institutions resilience to shocks related to climate and biodiversity to manage systemic risk in the financial sector.
- In order to fulfil core mandates for price and financial stability in the medium and long-term and, in some cases, secondary objectives to support growth or economic objectives, central banks need to introduce explicit strategies to support the transition to net zero (Robins et al. 2021) to provide a framework for the whole financial system.

*These arguments will be developed in more detail in OeNB research seminar, Friday 8<sup>th</sup> October.*

# Importance and opportunities for international action

- “Four wins” to **collaboration**: Keynesian recovery; expectations and growth; cost/technology; pollution/climate/biodiversity.
- Key **institutions** for international finance and policy: MDBs/IMF/DFIs.
- Collaboration of **finance ministries**, including Coalition of Finance Ministers on Climate Action, and the big challenge of **debt restructuring**.
- WEF and voluntary initiatives can mobilise capital from the **private sector**.
- Collaboration of **central banks**, including NGFS. Can deepen understanding of international financial flows and impact on investment for the transition. Joined-up action is necessary to tackle systemic nature of risks.
- 3 years of G7/G20 (UK, Italy; Germany, Indonesia; Japan, India) could be 3 years of **acting together** to make this a transformational decade. The central banks and finance ministries of the world would be at the heart of this process.

Analogous to recovery and rebuilding from the second world war, this is a crucial period for international collaboration.



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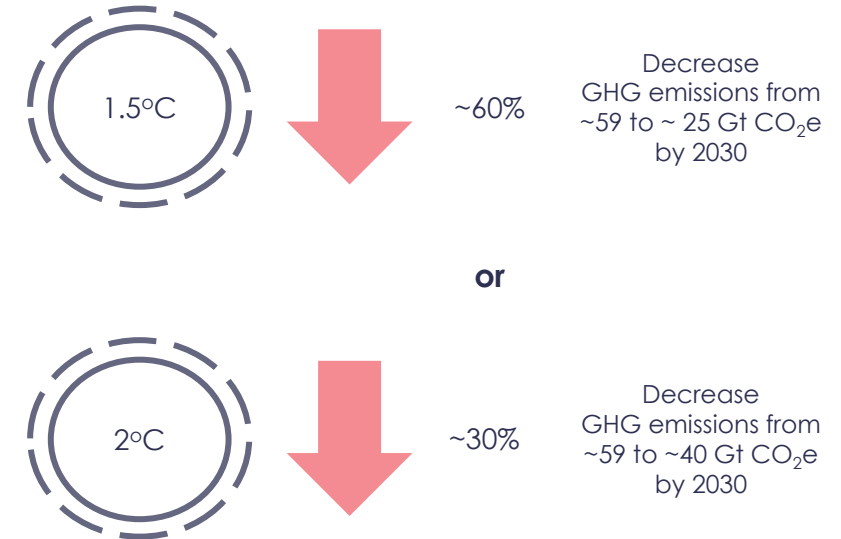
# An important year, a critical decade

- Major events in 2021, including **G7**, **G20** and **COP26**.
- **3 years of G7/G20** could be 3 years of acting together to make this a transformational decade.

## Change in the next decades



## At the same time (to meet Paris targets)



Source: UNEP 2020

**The next decade is critical. Choices made on infrastructure and capital now will either lock us in to high emissions, or set us on a low-carbon growth path which can be sustainable and inclusive. Cities are central.**

# Government policies for delivery

- **Commit to putting an appropriately high price on carbon and to eliminating fossil-fuel subsidies no later than the target date of 2025.** This could include consideration of an international carbon price floor among large emitters, such as the G20, and border adjustments for energy-intensive trade-exposed sectors. But look beyond carbon prices (see below).
- **Lead in the global energy transition by setting targets for zero-carbon power and road transport;** investing strongly in clean energy and energy efficiency in developed, emerging and developing economics; phasing out unabated coal power generation by 2030; ending overseas support for fossil fuel investments, starting with coal power generation; and defining a clear phase-out strategy for fossil fuels other than coal, in line with the goals of the Paris Agreement. Foster and share research and development in energy and beyond.
- **Transform systems,** like the design of cities and food supply chains.
- **Commit to a 'just transition':** ensure that the benefits and opportunities are shared widely; protect those that are most vulnerable to economic losses.
- **Significantly increase public support for R&D and innovation,** e.g. following through on Mission Possible programme.

**Structural policies would accelerate progress towards net-zero emissions and climate resilience, while boosting recovery and social cohesion.**

# Financial institutions' influence and resources can mobilise capital and reduce risks

- Central banks can develop **climate neutrality roadmaps**, to shape and stabilise **expectations** around a sustainable growth path. Work closely with other economic policymakers in government. Integrate climate variables into modelling used for making decisions.
  - This includes ensuring the quality and **credibility of transition plans** of supervised entities, including through stress tests, and commit to achieve **climate neutrality in their own operations** within timeframes required to meet international goals.
- Governments can strike a “**Grand Bargain**” with MDB/DFIs: expansion in return for improvement. **The great value for money in MDBs**: for one-shot \$40 billion increase in paid-in capital, could double finance flows to around \$150 billion p.a. (Bhattacharya et al., 2015). **Central role in transforming infrastructure in next two decades.**
- Governments at national, local and municipal levels to strengthen their systems of **planning, budgeting, public investment management and procurement to unlock** and scale up investments in infrastructure, with a strong focus on sustainability and climate resilience.
- The **IMF's emergency lending facilities** can provide rapid assistance especially to low-income countries in the face of climate shocks. Highly vulnerable SIDS could also benefit from enhanced IMF facilities. The IMF can more broadly help countries put in place effective resilience and adaptation strategies.

**Ambition depends on finance. Finance follows ambition.**

# Shared international vision for strong recovery and sustainable growth (from Stern (2021), prepared for UK Presidency of G7)

- Ensure a **timely, effective and global roll-out of vaccines and treatments** based on principles of common humanity, mutual responsibility and self-interest.
- **Deliver credible pathways to meet the stepped-up commitments** on net-zero emissions by 2050 and emission reduction targets by 2030. This must include: the **preparation and submission of well-specified national determined contributions (NDCs) ahead of COP26**; putting in place **sufficiently strong and green recovery programmes** for delivery; recognising the dangers from attempts to 'backload' action.
- Support a **global target for nature with the protection of 30% of land and ocean areas by 2030**, accompanied by appropriate domestic targets.
- Set a **collective goal to raise annual investment by 2% of GDP above pre-pandemic levels for this decade and beyond** and **improve the quality of investment** to support a strong recovery and transformation of growth.
- **Collaboration through the G20, G7 and international institutions** is crucial for progress on mutual goals. Building consensus in the G20 presents greater difficulty and will take active dialogue and support.
- **Crucial gatherings** in October and November 2021: World Bank and IMF meetings, G20 summit, COP26 in Glasgow.



# Can it be done? Four forces present us with a special opportunity to deliver at scale



Historically **low interest rates** and **no shortage of global savings**.  
Search for growth.



**Rapid technological change** and **falls in cost** (digital, materials, biotech...)



International agreements have **provided political direction** and evidence that collaboration is possible and will continue



Strong movements of **young people** across the world

Opportunities exist now to finance the transition with low interest rates; excess global savings and new, changing technology. Move from talking to action.

Seizing the opportunity requires a radical change. Most of what we currently do will have to be done differently (technologies, institutions, business models, city planning processes, natural resource management...)

Have in our hands a much more attractive sustainable and inclusive form of growth and development; do we have the political will/capability?

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