

**SHARED PERSPECTIVES 2023 HOW TO MAKE THE GREEN  
TRANSITION HAPPEN?**

**Bertinoro**

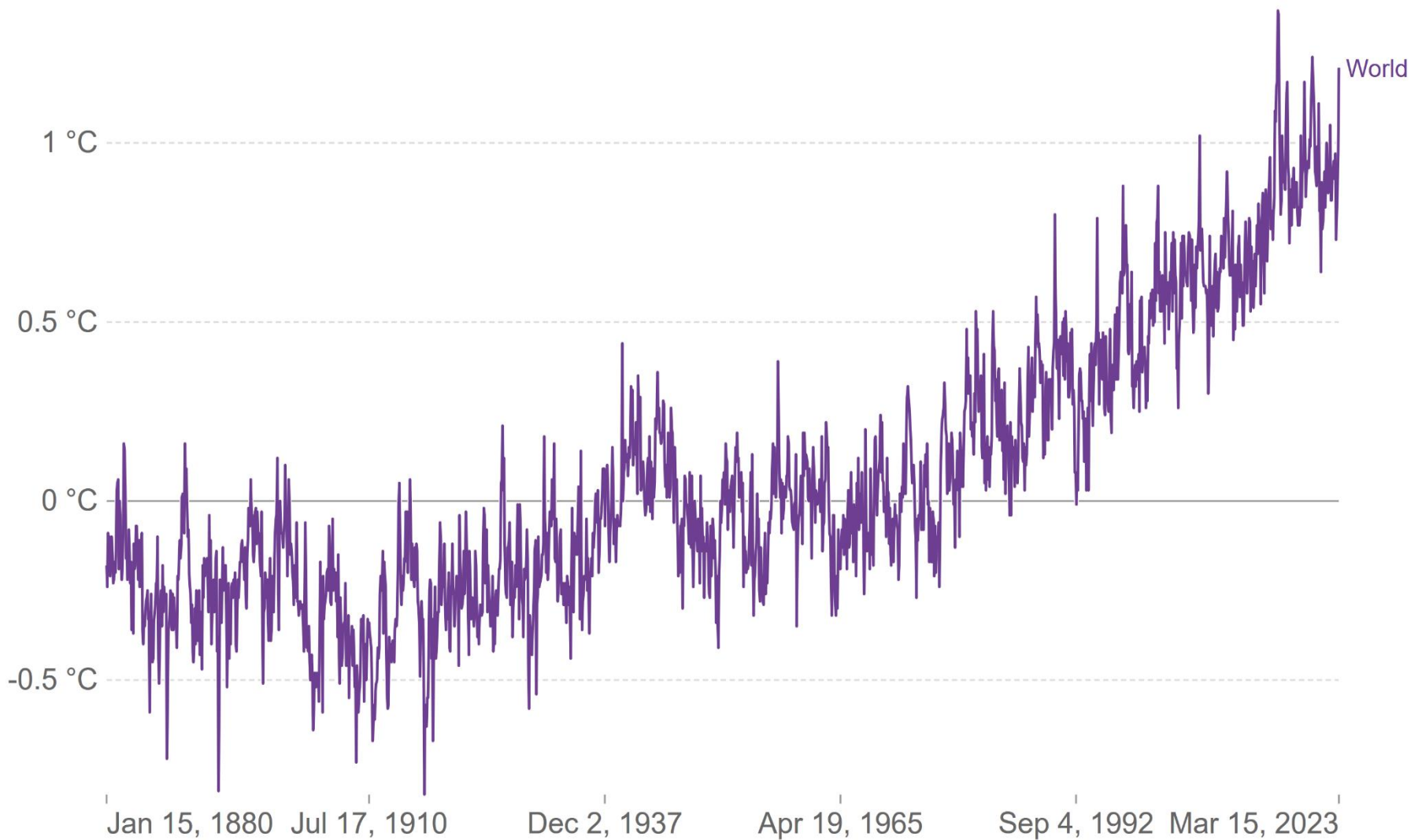
**October 6, 2023**

***Financial and environmental sustainability:  
the value of the future***

**Daniele Franco**

**What we can reasonably expect**

# *Global temperature so far*

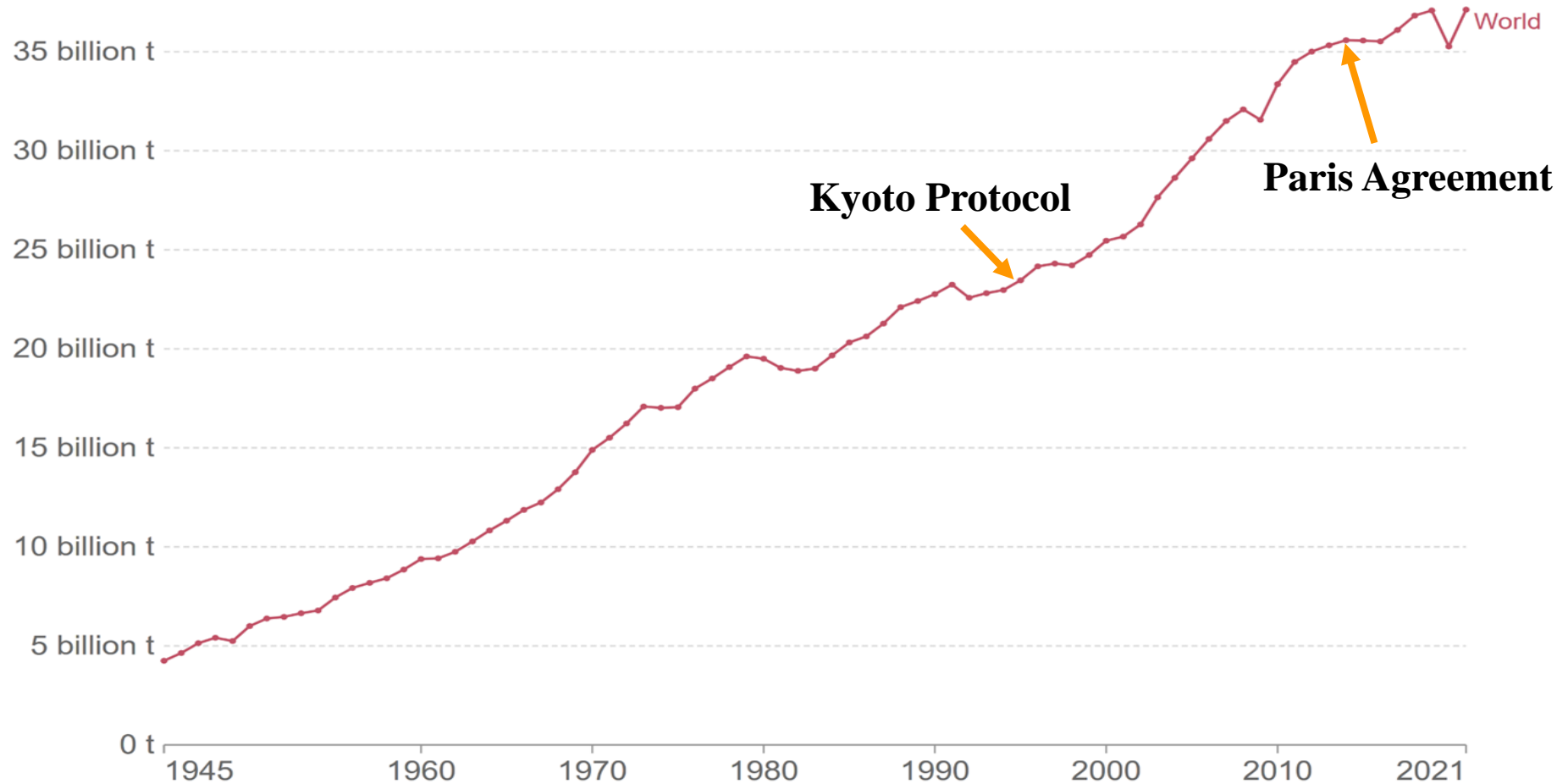


# CO<sub>2</sub> emissions so far

## Annual CO<sub>2</sub> emissions

Carbon dioxide (CO<sub>2</sub>) emissions from fossil fuels and industry<sup>1</sup>. Land use change is not included.

Our World  
in Data



Source: Global Carbon Budget (2022)

OurWorldInData.org/co2-and-greenhouse-gas-emissions • CC BY

**1. Fossil emissions:** Fossil emissions measure the quantity of carbon dioxide (CO<sub>2</sub>) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO<sub>2</sub> includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.

# Expected evolution of global temperature

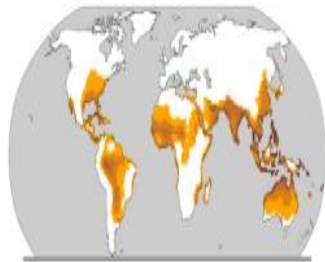
Intergovernmental Panel on Climate Change (2023): **if emissions remain constant**

– global temperature will exceed the pre-industrial level by  $1,5^{\circ}\text{C}$  before 2040;

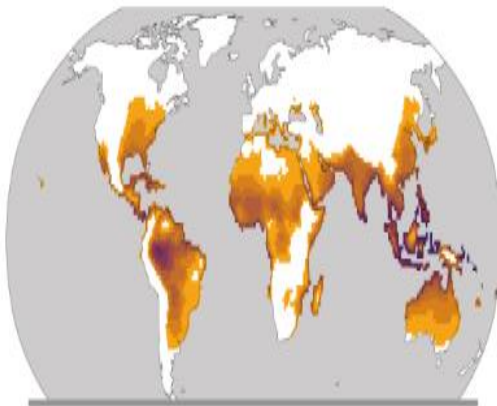
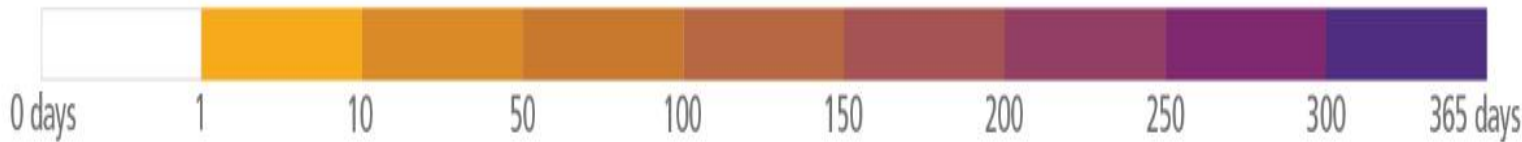
– **at the end of the century it might exceed that level by a range of  $2^{\circ}$  to  $4,5^{\circ}\text{C}$ .**



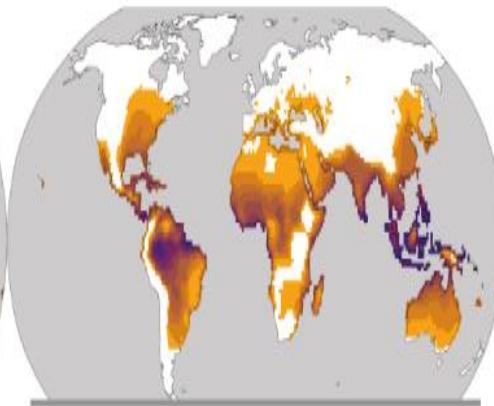
## b) Heat-humidity risks to human health



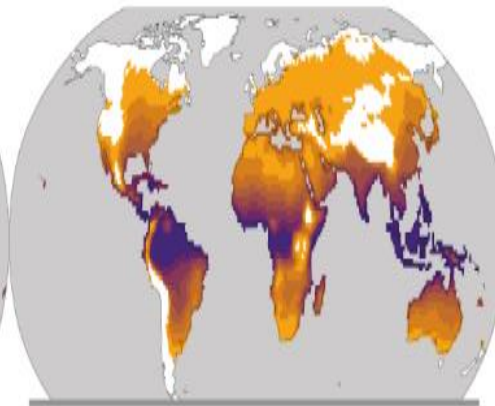
Historical 1991–2005



1.7 – 2.3°C



2.4 – 3.1°C



4.2 – 5.4°C

Days per year where combined temperature and humidity conditions pose a risk of mortality to individuals<sup>3</sup>

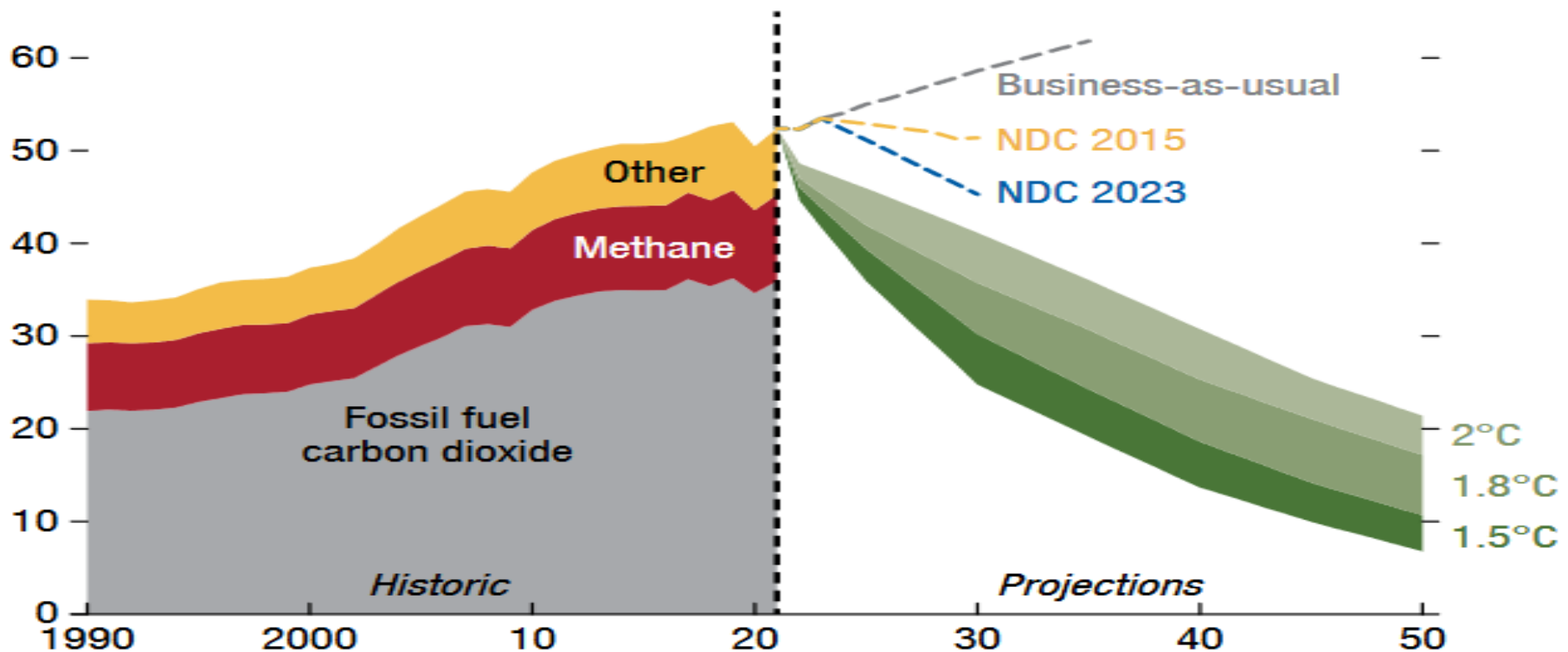
<sup>3</sup>Projected regional impacts utilize a global threshold beyond which daily mean surface air temperature and relative humidity may induce hyperthermia that poses a risk of mortality. The duration and intensity of heatwaves are not presented here. Heat-related health outcomes vary by location and are highly moderated by socio-economic, occupational and other non-climatic determinants of individual health and socio-economic vulnerability. The threshold used in these maps is based on a single study that synthesized data from 783 cases to determine the relationship between heat-humidity conditions and mortality drawn largely from observations in temperate climates.

# A drastic cut of gas emissions is needed

IMF (2023), *Fiscal Monitor*, October

**Figure 1.1. Annual Global Greenhouse Gas Emissions, 1990–2050**

*(Billions of tons of carbon dioxide emissions equivalence)*



Sources: Intergovernmental Panel on Climate Change; Black, Parry, and Zhunussova 2023; and IMF staff estimates.

Note: The figure shows estimates from projection using the IMF–World Bank Climate Policy Assessment Tool. °C = degrees Celsius; NDC = nationally determined contribution.

# *The cost of inaction would be enormous*

- *“Global warming is threatening our planet and living standards around the world, and the window of opportunity for containing climate change to manageable levels is closing rapidly.”*

IMF (2019), *Fiscal Monitor*, October

- *“Technological change raised humans out of Stone Age living standard. Climate change threatens, in the most extreme scenarios, to return us economically whence we came.”*

Nordhaus W. D. (2019), *Climate change: The ultimate Challenge for Economics*

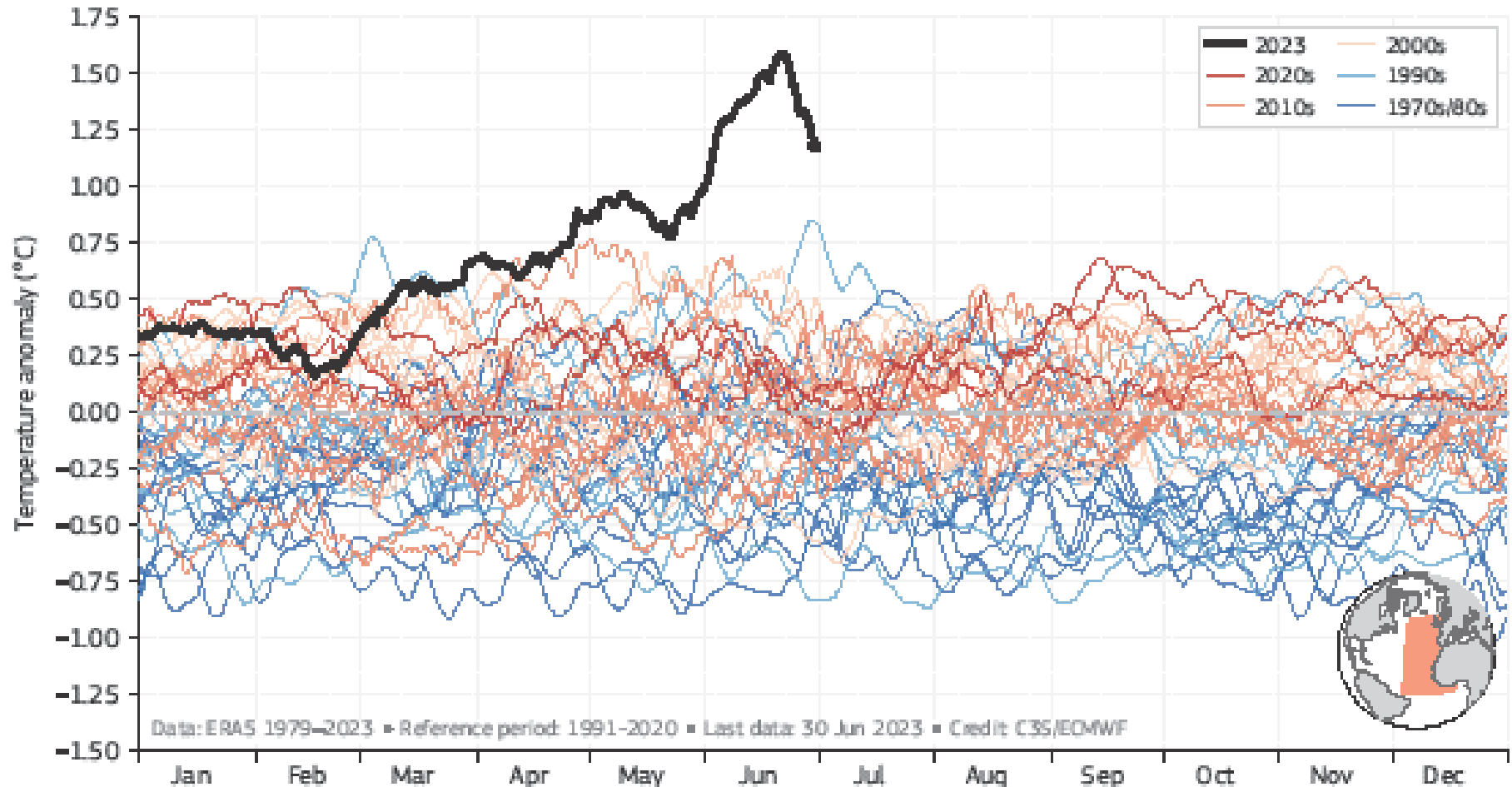
- *“ ... the longer humanity takes to curb emissions, the greater the dangers and sparser the benefits – and the larger the risk of some truly catastrophic surprises.”*

The Economist (2019), *The climate issue*, 19 September

# *The impact of climate change is becoming more evident*

## DAILY SEA SURFACE TEMPERATURE ANOMALY

Northeastern Atlantic (40°W–0°E, Eq.–60°N)



PROGRAMME OF  
THE EUROPEAN UNION

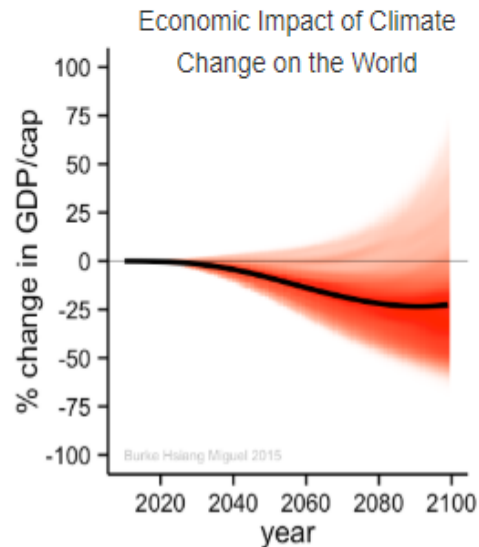
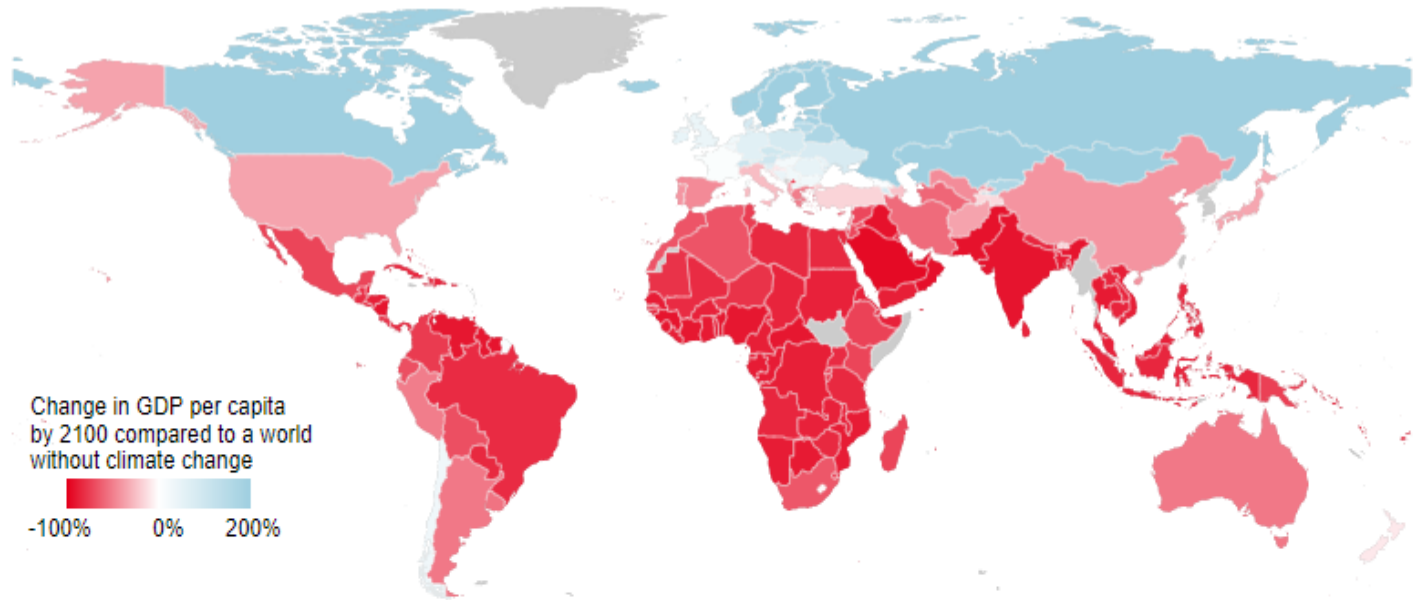




# *Impact on income will be unequal $\Rightarrow$ tensions*

**Burke, Hsiang and Miguel (Nature, 2015): climate change could reduce per capita world income by almost  $\frac{1}{4}$  by 2100 compared to a baseline with no climate change.**

**Income reductions will be larger in the South of the World and smaller in the North.**



Likelihood climate change will reduce the World's GDP per capita by

- more than 0%: **71%**
- more than 10%: **63%**
- more than 20%: **51%**
- more than 50%: **12%**

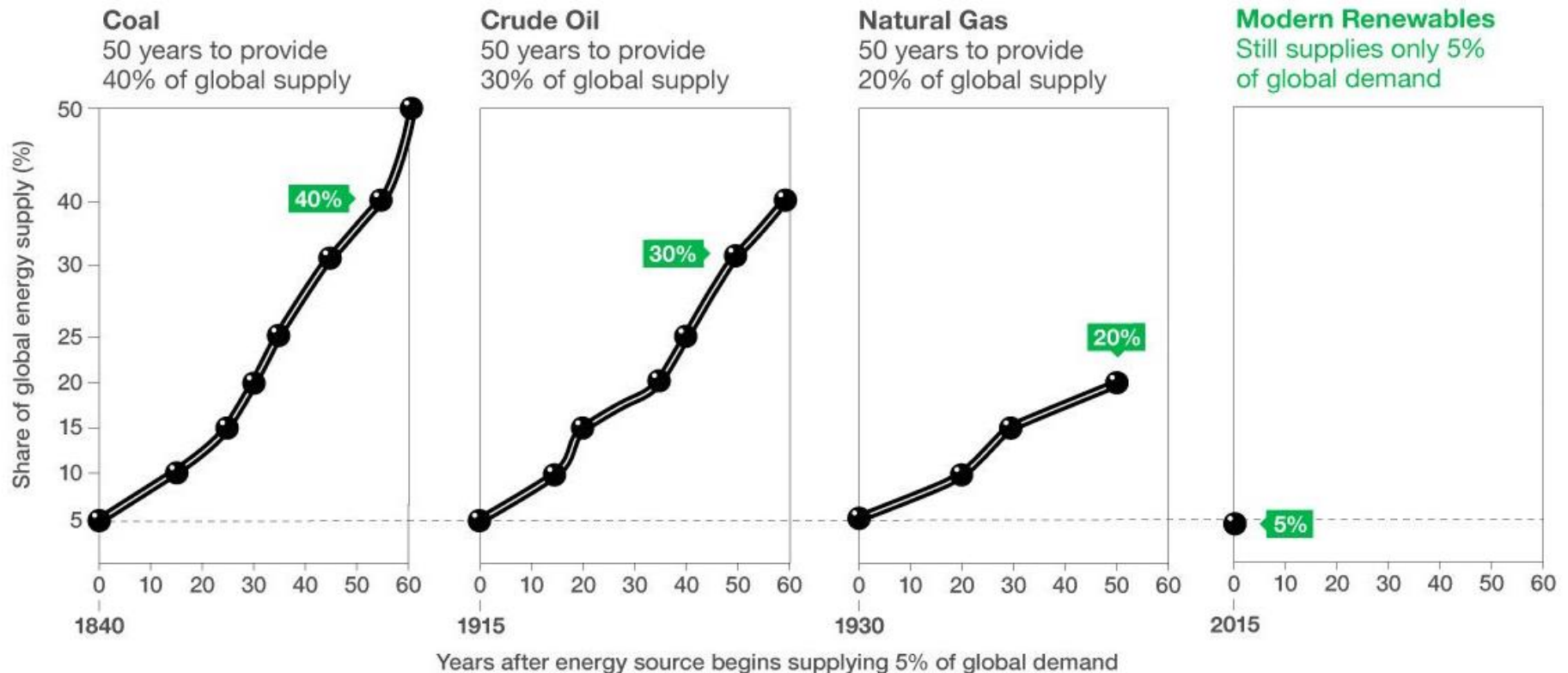
# **Obstacles to reducing emissions**

# The core issue: the technological problem

An unprecedented effort in spreading technological progresses is required:

- more renewable sources to **reduce carbon intensity**
- more efficiency to **reduce energy intensity**.

**History shows that moving from one energy source to another is a lengthy process.**



# *The economic issue: the costs of the transition*

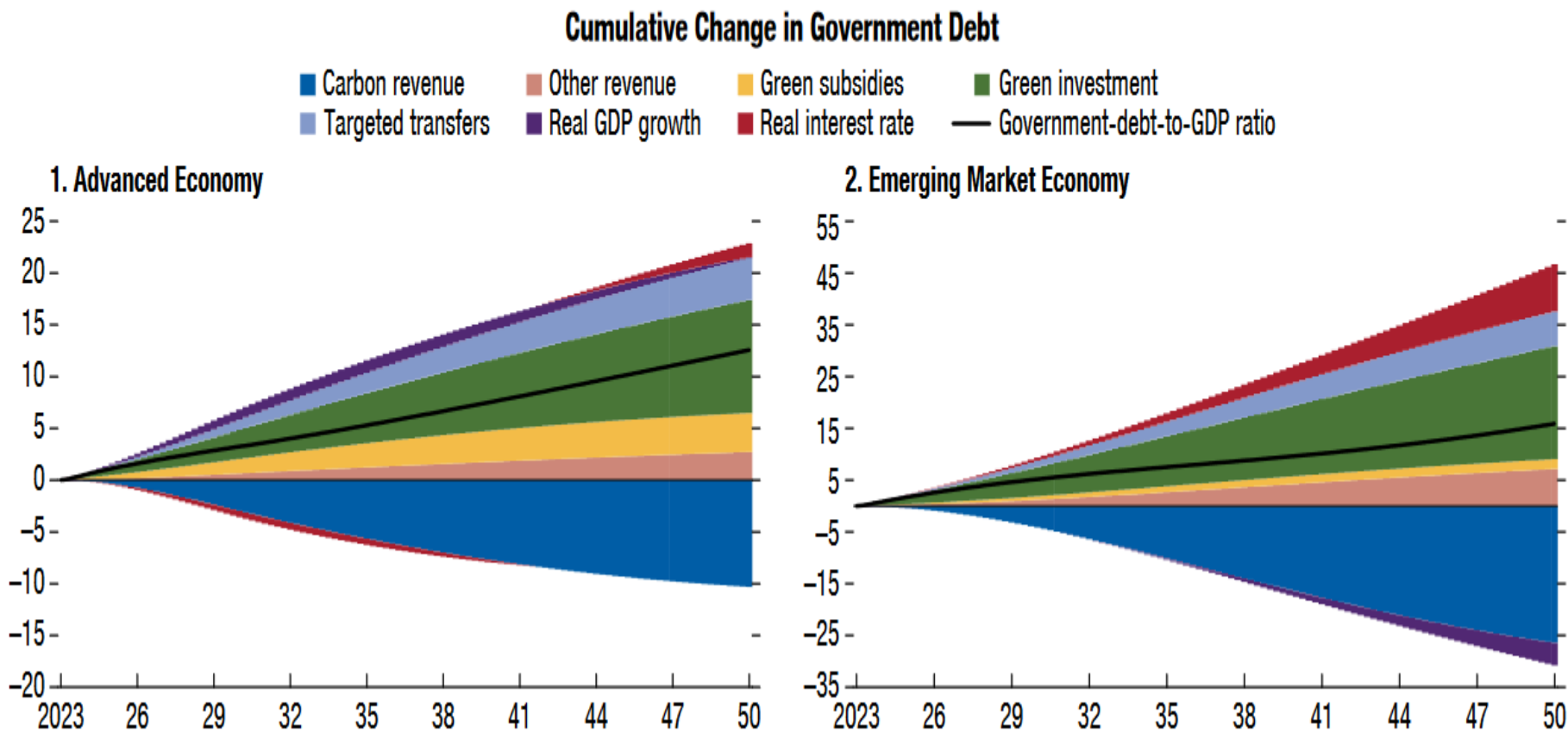
- **Decarbonization is associated to high costs:**
  - public & private **capital obsolescence** in key industries (as energy and transport)
  - **workers displacement** in the same industries.
- **Managing the transition will be costly, since it requires:**
  - **public and private investments**
    - \* *EU: additional investment = 1.2-1.9% of GDP per year*
    - \* *Global Infrastructure Hub: global infrastructure financing gap is estimated at \$15.000 bln by 2040. It can be much higher including environmental sustainability*
  - far reaching measures in **training and reskilling and in income support/redistribution programs.**

It is an exceptional challenge for the management of public finances, considering **other resource absorbing trends** (e.g. ageing).

# Even with carbon pricing, the transition is likely to increase public debt

IMF (2023), *Fiscal Monitor*, October

Figure 1.12. Implications of Net-Zero-Policy Packages on Debt and Primary Balance, Relative to “Business-as-Usual” Baseline, by Fiscal Component  
(Percent of GDP)

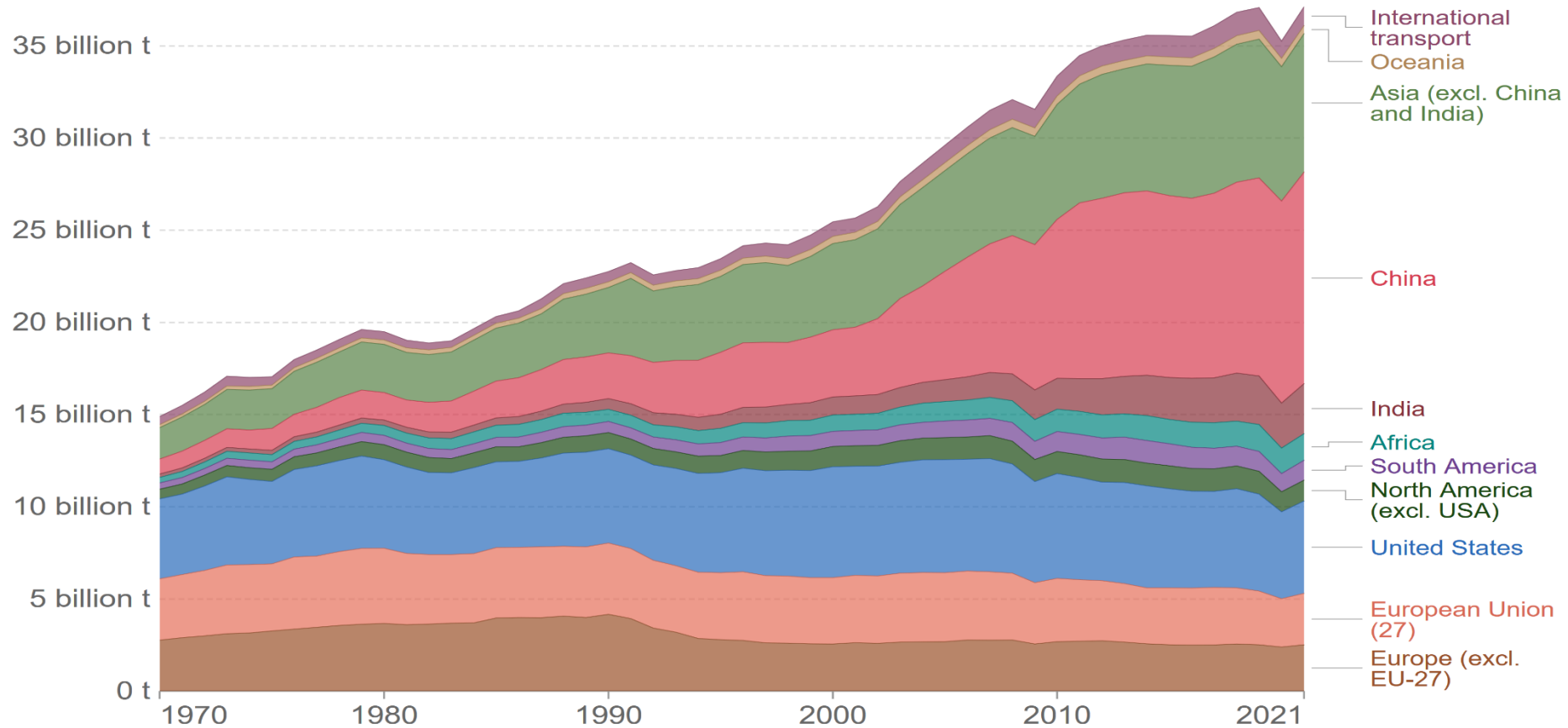


# *The political issue: most emissions now produced by emerging economies*

## Annual CO<sub>2</sub> emissions by world region

This measures fossil fuel and industry emissions<sup>1</sup>. Land use change is not included.

Our World  
in Data



Source: Global Carbon Budget (2022)

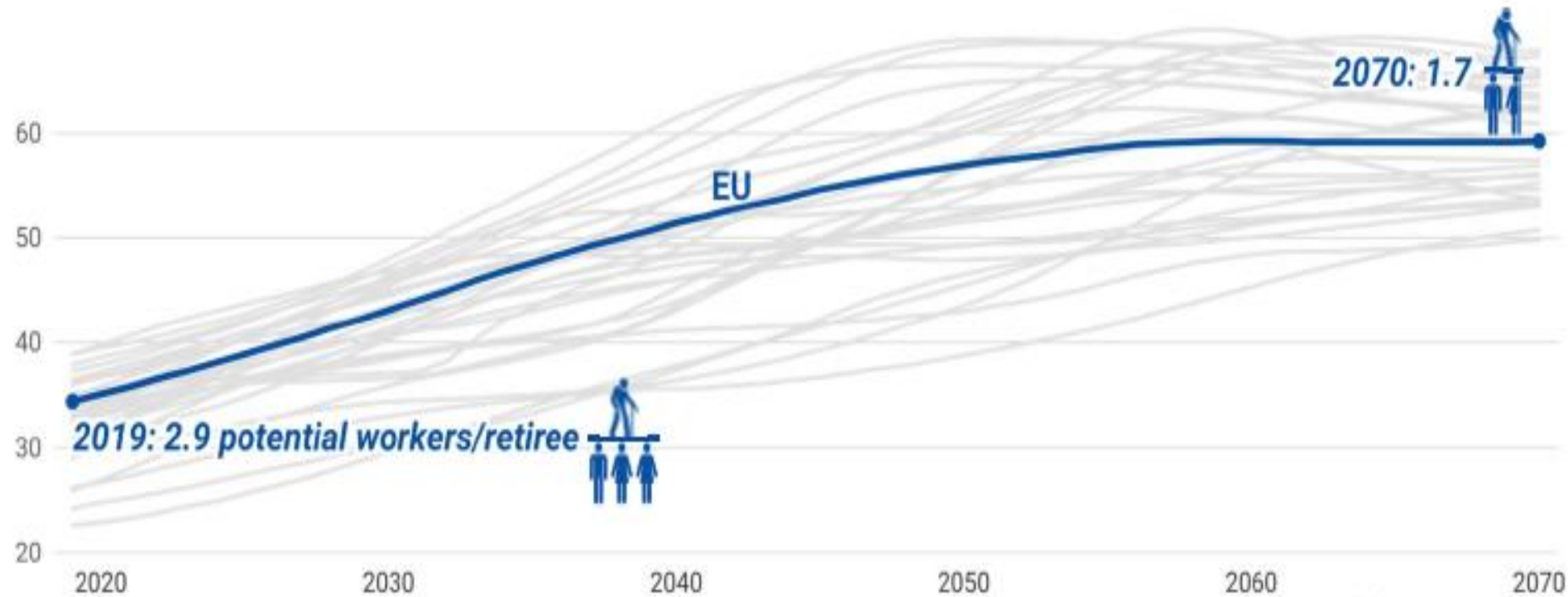
OurWorldInData.org/co2-and-greenhouse-gas-emissions • CC BY

**1. Fossil emissions:** Fossil emissions measure the quantity of carbon dioxide (CO<sub>2</sub>) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO<sub>2</sub> includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.

# *Many countries are also managing the demographic transition ... (EU Ageing Report 2021)*

## Old-age dependency ratio (%)

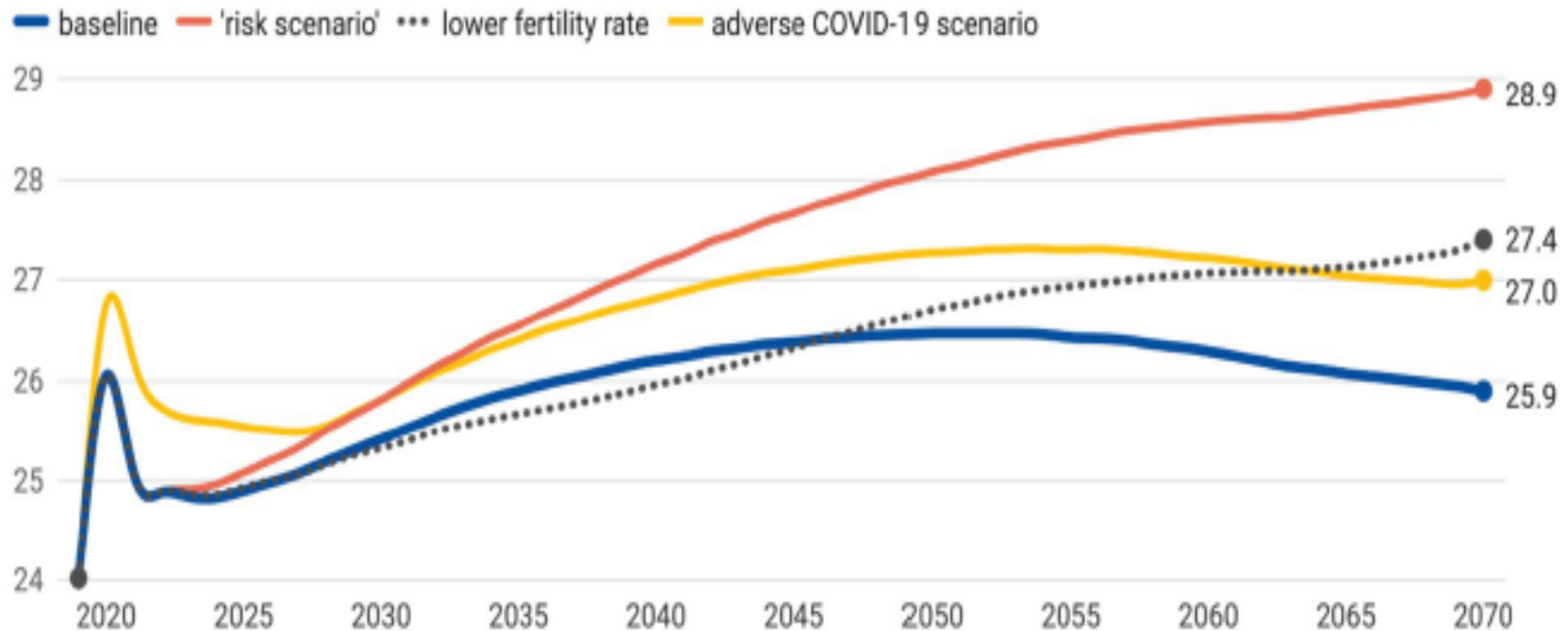
number of people 65+ / number of people 20-64



Source: Eurostat • Created with Datawrapper

# ... raising public expenditure

## Total cost of ageing (%GDP) - EU



The 'risk scenario' captures the impact of non-demographic factors on healthcare and long-term care expenditure. It assumes a partial continuation of upward healthcare expenditure trends, notably due to technological progress, and an upward convergence of coverage and costs of long-term care towards the EU average. It does not affect the pension and education projections.

Source: 2021 Ageing Report • Created with Datawrapper



# *High energy prices underscored new priorities*

- The post-pandemic recovery, combined with the shift from coal to gas and with lower investment trend in oil and gas, led to an **unprecedented increase in gas prices in 2021-2022**.
  - The Russian invasion of Ukraine exacerbated these developments and **brought energy security at the top of the policy agenda**.
  - The policy response in Europe aimed at:
    - ✓ mitigating the impact of high energy prices on firms and households;
    - ✓ reducing reliance on Russian energy sources :
    - ✓ avoiding the need for rationing in the 2022-2023 winter.
- ⇒ **More emissions in the short term (e.g. more coal), new investments in gas sector, etc.**

**The inter-temporal dimension:  
how do we balance current and future  
welfare?**

# *The intertemporal preference rate*

- A zero discount rate (or a very low one) implies that **the weight attached to the wellbeing of an individual should not be lowered if this person lives in the future.**

*Ramsey F.P., 1928, A Mathematical Theory of Saving. EJ; Parfit D., 1984, Reasons and Persons; Stern N., 2006, The Economics of Climate Change*

- On the other end, **not discounting future monetary amounts is equivalent to not recognizing per capita consumption growth**, which reflects the amount of resources (and innovation and knowledge) that future generations will inherit. This may lead to paradoxical outcomes, as forcing the first (poorer) generations to very high saving rates.

*Arrow K. e Kurz M., 1970, Public Investment, the Rate of Return and Optimal Fiscal Policy; Nordhaus W.D., 2007, A Review of the Stern Review on the Economics of Climate Change*

- What matters most **in practice is the discount rate implicit in policies, which often tends to be high.**

# *Policy-making frequently penalizes the future*

- *“Politicians themselves have, for the most part, short time horizons. For most of them, each election presents a critical point, and the primary problem they face is getting past this hurdle.”*

Buchanan J.M. e Wagner R. E. (1977), *Democracy in deficit*, p. 166

- *“a perfect democracy with retrospective evaluation of parties will make decisions biased against future generations. ... To the extent that investment requires a subtraction from present consumption ... the level of such investment will be lower than is optimal.”*

Nordhaus W. D. (1975), *The Political Business Cycle*, p. 187.

- *“there may be a tendency to under-invest in policy actions that are costly to the current electorate but generate benefits after the elections and to over-invest in actions whose costs occur in the future ...”*

Di Bartolomeo G. et al (2018), *Public debt stabilization: the relevance of policymakers' time horizons*, p. 290.

# *When consequences are catastrophic, Governments must act*

- “... *the State should protect the interests of the future in some degree against the effects of **our irrational discounting** and our preference for ourselves over our descendants. ... It is the clear duty of **Government, which is the trustee for unborn generations ... to defend the exhaustible natural resources of the country from reckless spoliation**”.*

Pigou A.C. (1932), *The Economics of Welfare*, pp 29-30

- “*There is no need to lower artificially the social rate of discount in order to increase further the prospective wealth of future generations. ... However, this does not mean that the future should in every respect be left to the mercy of the free market. ... Irreversibilities constitute a prime example. If we poison our soil so that never again will it be the same, ... **All the wealth and resources of future generations will not suffice to restore them.**”*

Baumol W.J. (1968), *On the Social Rate of Discount*, AER

# *How to make policies more long-term oriented*

- In the **fiscal policy context**, the objective to increase the relevant time span in decision making has been addressed:
  - a) **increasing information** available to decision-makers and the public (e.g. long term fiscal projections, sustainability indicators);
  - b) **assigning certain tasks to technical institutions** (e.g. EC, Fiscal Councils);
  - c) **introducing procedures/rules** making it more difficult to overlook medium & long term considerations (IMF, 2019).
- In the **climate policy context**, there are margins to improve on these lines of action:
  - a) IPCC's Reports are public but not well known. **Scientific info to the public and policy-makers can be improved;**
  - b) financial regulators are playing an important role. **Do we need more powerful national and international agencies dedicated to the climate transition?**
  - c) there are rules for specific emissions (e.g. cars) and ETS regulates the emissions of many European companies. **Extend to more companies and countries? Which global authority can manage it?**

# *Courts orders in favour of the rights of youth*

- **Neubauer, et al. versus Germany:** Ruling of the German Constitutional Court (24 03 2021) on the lawsuit against the Federal Climate Change Act (Dec. 2019 - providing for a cut in emissions of at least 55% by 2030) brought by nine young people.
- *“the challenged provisions **do violate the freedoms of the complainants, some of whom are still very young**. ...*
- *The fact that greenhouse gas emissions must be reduced follows from the Basic Law ... The constitutional climate goal arising from Article 20a GG is **more closely defined in accordance with the Paris target** as being to limit the increase in the global average temperature to well below 2 ° C and preferably to 1.5 ° C above pre-industrial levels.*
- *For this target to be reached, **the reductions still necessary after 2030 will have to be achieved with ever greater speed and urgency**. These future obligations to reduce emissions **have an impact on practically every type of freedom** because virtually all aspects of human life still involve the emission of greenhouse gases and are thus potentially threatened by drastic restrictions after 2030.”*

**Global temperature is a global public good:  
we need governments to act and cooperate  
globally**



# Public goods and *global* public goods

- Public goods are:
  - **non rival in consumption**; consumption of a good by one person does not reduce the amount available for others.
  - **non-excludable in consumption**; once there are produced, everyone can benefit from them.

P. A. Samuelson (1954), *The Pure Theory of Public Expenditure*

- **It is a case of market failure.** The price mechanism does not provide an incentive to provide them efficiently. Individuals have an economic incentive to free-ride. Governments typically intervene to ensure that they are supplied efficiently.
- **Global temperature is a *global* public good.** All individuals/companies/countries contribute to determine gas emissions and global temperature *for the entire planet*. **Governments must intervene and cooperate.**

# Defining a global response is a complex issue

Defining a **global response** is **complex**.

How to reconcile **sovereignty** (Westphalia principle) with global welfare?

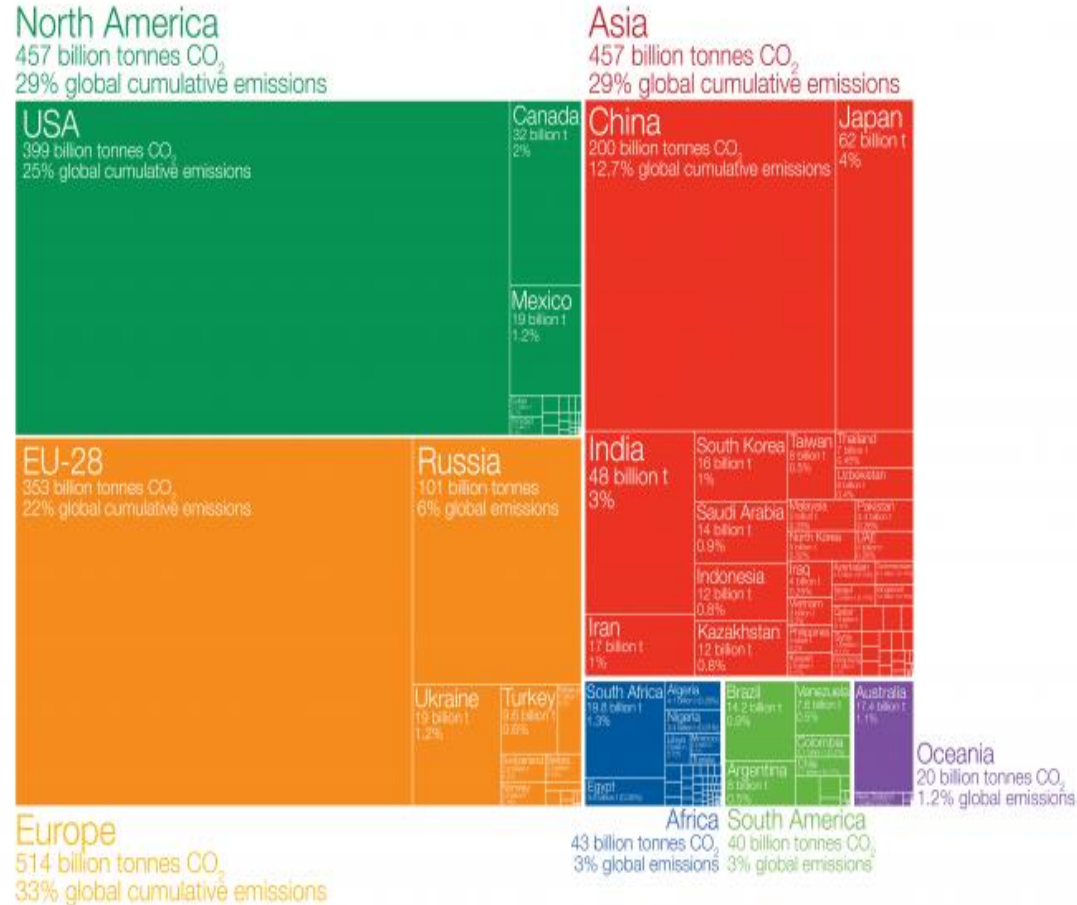
How to split **countries' contributions?** emission flows or cumulated stocks?

How to deal with emissions incorporated in **imported goods?**

## Who has contributed most to global CO<sub>2</sub> emissions?

Our World in Data

Cumulative carbon dioxide (CO<sub>2</sub>) emissions over the period from 1751 to 2017. Figures are based on production-based emissions which measure CO<sub>2</sub> produced domestically from fossil fuel combustion and cement, and do not correct for emissions embedded in trade (i.e. consumption-based). Emissions from international travel are not included.



Figures for the 28 countries in the European Union have been grouped as the 'EU-28' since international targets and negotiations are typically set as a collaborative target between EU countries. Values may not sum to 100% due to rounding.

Data source: Calculated by Our World in Data based on data from the Global Carbon Project (GCP) and Carbon Dioxide Analysis Center (CDIAC). This is a visualization from OurWorldinData.org, where you find data and research on how the world is changing.

Licensed under CC-BY by the author Hannah Ritchie.

# How to reconcile sovereignty with global welfare? (1)

- **Solutions: 1) international voluntary agreements.**

- **The ozone layer: a success story.**

The 1987 Montreal Protocol (signed by 197 countries) envisaged restrictions on the use of chlorofluorocarbons - CFC). Since 2000 the layer is gradually improving.

- **Global warming: relevant progress, but still not adequate.**

IPCC has been aggregating scientific consensus since 1988 .

Yearly COPs have had diversified impact, with accelerations and decelerations. Most countries are reducing the carbon intensity of GDP (e.g. EU 1990-2021: GDP + 65%, emissions -28%).

Large countries set targets for zero emissions: EU and USA by 2050; China by 2060; India by 2070. **Too slow?**

# *The role of G20*

- supporting the coordination of **climate policies**:

*“achieving global net zero greenhouse gas emissions or carbon neutrality by or around mid-century”* (G20 Rome Leaders Declaration, 31 October 2021)

- supporting work on the role of **carbon pricing**:

*‘This mix should include a wide set of tools, such as ... and, if appropriate, the use of carbon pricing mechanisms and incentives’*

*(G20 Finance Ministers and Central Bank Governors, Venice, 9-10 July, 2021)*

- supporting increased efforts to

*“**phase out and rationalize**, over the medium term, inefficient **fossil fuel subsidies** that encourage wasteful consumption”*

*(G20 Rome Leaders Declaration, 31 October 2021)*

**The role of G20 is crucial:** we need fora for discussing and agreeing broad policy strategies at the international level. G20 has a manageable number of countries.

# How to reconcile sovereignty with global welfare? (2)

- **Soluzioni: 2) Climate Clubs**

- **a group of countries agrees on climate targets and sets sanctions on other non-complying countries (e.g. tariffs on imports of goods).**

Nordhaus W. (2015), *Climate Clubs: Overcoming free-riding in International Climate Policy*, AER

**It is easier to agree on a minimum price of emissions than on quantities.**

Weizman M. (2017), *Voting on prices vs. voting on quantities in a World Climate Assembly*

Gollier C. e Tirole J. (2015), *Negotiating effective institutions against climate change*

**EU: *Carbon Border Adjustment Mechanism* (from 1 ott. 2023).**

**G7 (dic. 2022): ‘*open, cooperative and inclusive Climate Club’s objective is to support the effective implementation of the Paris Agreement*’.**

- **Large scale Climate Clubs have so far not been implemented.**

# *The EU strategy*

**The EU aims to be climate-neutral by 2050**, with an intermediate target of a **55% reduction in gas emissions by 2030** (from 1990 levels).

Recent new initiatives aim at **balancing sustainability and growth, with a focus on medium and long-term objectives:**

- **NGEU**: a strong medium-term investment strategy targeting climate change, technological innovation and inclusion.
- **REPowerEU**: a plan for saving energy, producing clean energy and diversifying energy supplies. To accelerate achieving energy independence from Russia which now is a key target.
- **Reform of EU Emissions Trading System**: faster reduction of the cap, new sectors, phasing out of free allowances, more funds for decarbonizing, etc.
- The **CBAM** operates from 1<sup>o</sup> October 2023. It initially applies to imports of certain goods whose production is carbon.

**What are the tools available for policy makers?**

# *The toolkit:* *many items, including carbon pricing*

- **There is a broad consensus that several tools are required:** R&D, carbon pricing, emissions' regulation, public investments.
- **Carbon pricing** (via taxation):
  - provides across-the-board incentives for increasing energy efficiency and investing in clean technologies;
  - comes with revenues that can be used for a just transition;
  - phasing out fossil fuel subsidies also helps remove distortions.
- According to **IMF estimates:** policies equivalent to a global carbon price of \$75 per ton are needed by 2030 (and much more later on), on top of existing policies, to achieve climate goals.
- But, it has to be part of a coherent strategy (e.g. including public investments).



# *Financial markets can contribute to the transition*

- **Financial regulation can also play an important role:**
  - in smoothing the impact of shocks;
  - in facilitating the transition.
  - **Microprudential regulation** can limit risks for single banks or financial intermediaries (e.g. capital requirements that consider climate risks);
  - **Macroprudential regulation** can limit systemic instability (e.g. stress tests exercises under various climate scenarios). Need to work on analytical models, information standards, transmission channels, ...
- Green bonds allow **allocating private resources** to finance green projects (e.g. for renewable energy projects or energy efficiency enhancements).

# Conclusions

# *A need for a broad strategy*

- The climate transition will be extremely costly, for the private and the public sector. It overlaps with the demographic transition. **Climate goals and fiscal sustainability are closely linked.** With political feasibility they represent a complex trilemma (IMF, 2023).
- In all dimensions (e.g. environment, public debt, pensions), **timely actions and prevention are more effective & less costly** than ex post emergency measures.
- The impact of climate change may **weight on income distribution and widen gaps between countries.** This can create national/international tensions.
- The transition challenge is primarily technological. **Several tools are required: R&D, carbon pricing, emissions' regulation, public investment,** etc.
- **International cooperation is a key factor.** Voluntary agreements are complex, but should not be underestimated. The G20 can have a leading role. **Climate clubs may represent a second best solution,** they should be tested rapidly.

# *How to make the future more important?*

- The consensus view among scientists is clear: net emission should be reduced as soon as possible. It is **crucial inform policy-makers and the general public** in a systematic and comprehensible way.
- We need to invest in education about sustainability. A **higher demand for sustainability would induce a stronger interest in the future** and a ‘not too high’ discount rate.
- The decision making process in democracies often leads to relatively high discount rates. **The role of the future in the process can be strengthened** via legislation (including Constitutional texts), procedures, technical bodies, etc.
- **Well articulated analyses of the available options are necessary.** While the final objective is clear, **the transition path** (e.g. role of natural gas, hydrogen, nuclear) **is still open for discussion.**