The race to Net Zero : a fantastic opportunity for bulk materials producers

An economist’s perspective

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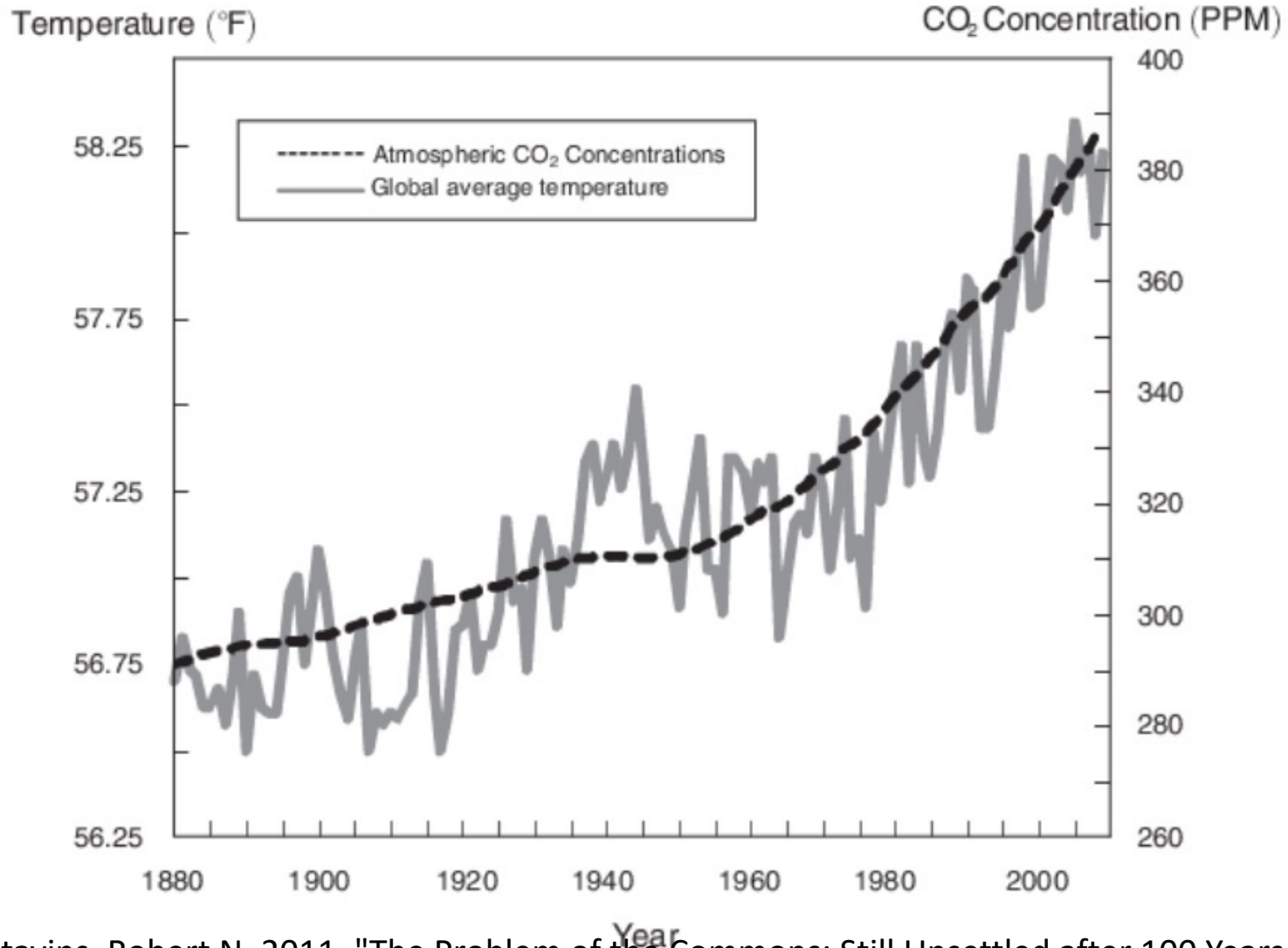
Main messages

1. The end of an era : mankind's unsustainable impact on the planet

2. A fantastic opportunity to reinvent entire industries

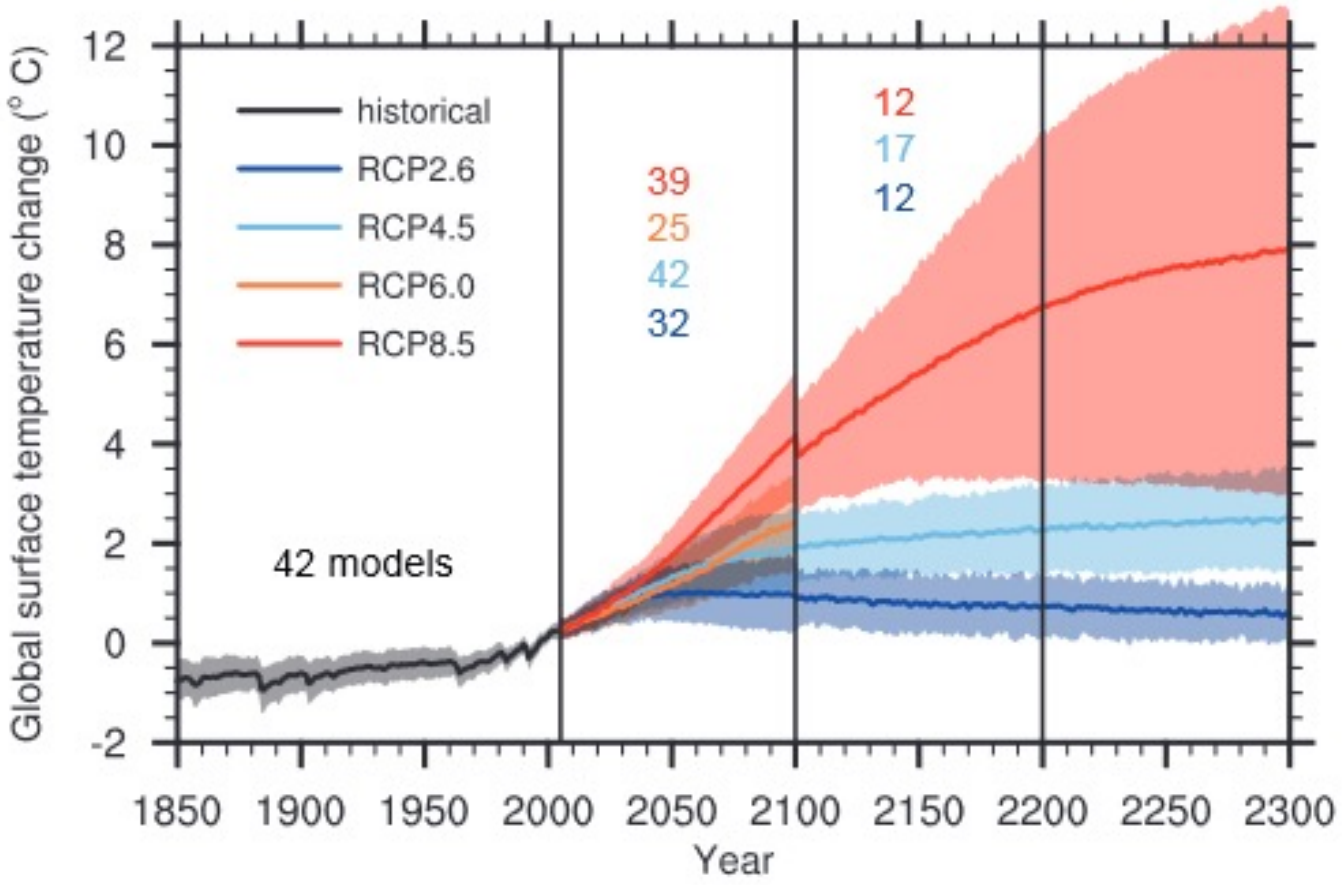
3. Shaping the transition

A strong observed correlation between CO_2 concentration and global temperature



Source: Stavins, Robert N. 2011. "The Problem of the Commons: Still Unsettled after 100 Years." American Economic Review, 101 (1): 81-108.

A risk of significant temperature increase compared to pre-industrial age



Legend

RCP2.6 : Very low emission scenario with a peak before 2050, the most optimistic scenario

RCP4.5 : stabilization of emissions before the end of the 21st century at a low level

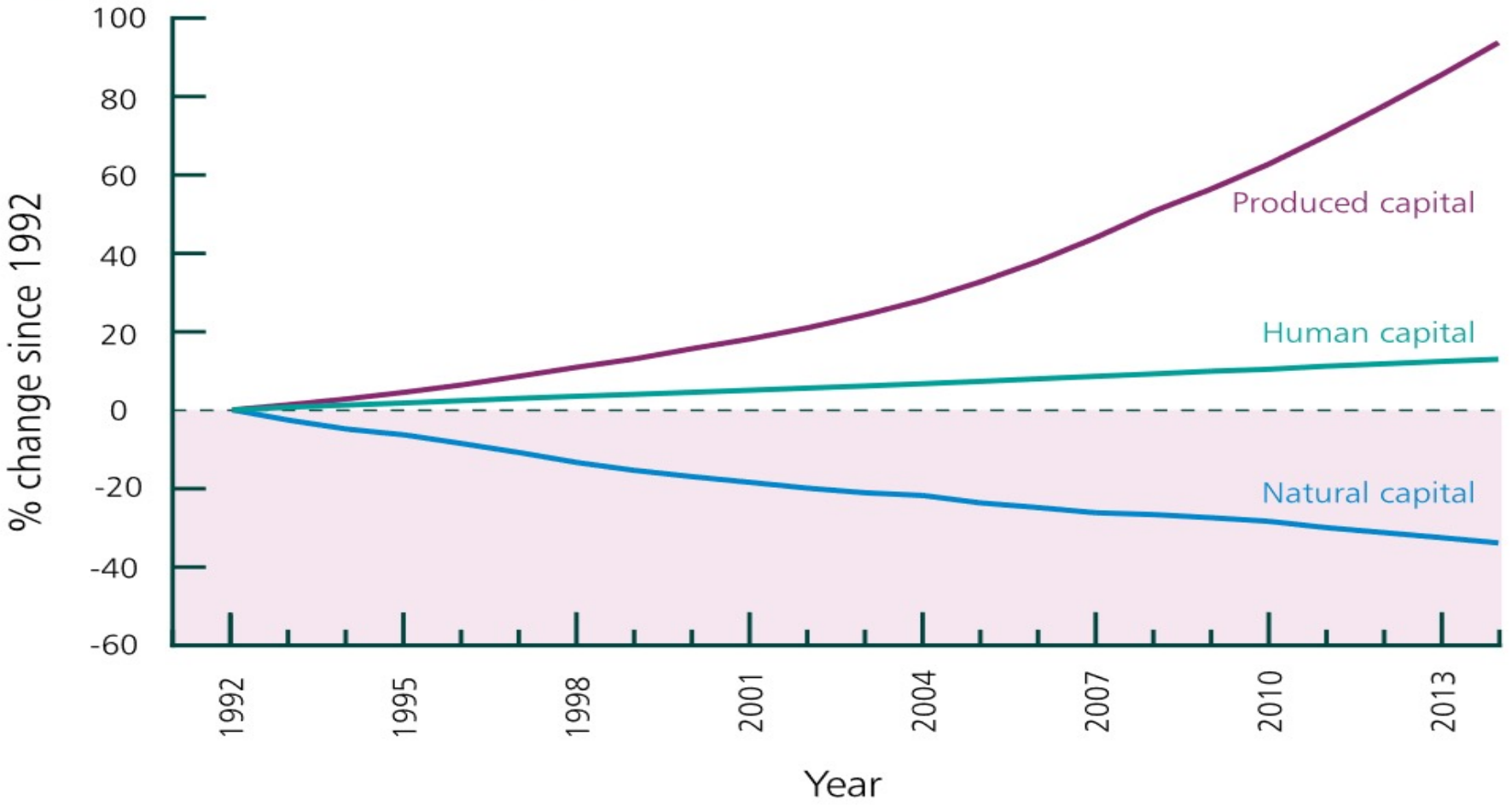
RCP6.0 : stabilization of emissions before the end of the 21st century at an average level

RCP8.5 : GHG emissions continue to increase at the current rate, the most pessimistic scenario

Source: the Intergovernmental Panel on Climate Change, 2013. Contribution of Working Group I to the Fifth Assessment Report, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

Beyond global warming, a progressive destruction of our natural capital …

Figure 4.8 Global Wealth Per Capita, 1992 to 2014



Source: Managi and Kumar (2018), reproduced in Dasgupta, P. (2021), The Economics of Biodiversity: The Dasgupta Review. (London: HM Treasury)

Economists hold differing views on climate change

William Nordhaus

(Yale,

Nobel Prize 2018)

- Global warming is likely to have a moderate impact on GDP
- The optimal increase in global average temperature, when taking into account the cost of CO2 emissions reduction, is around 3° to 3,5°C

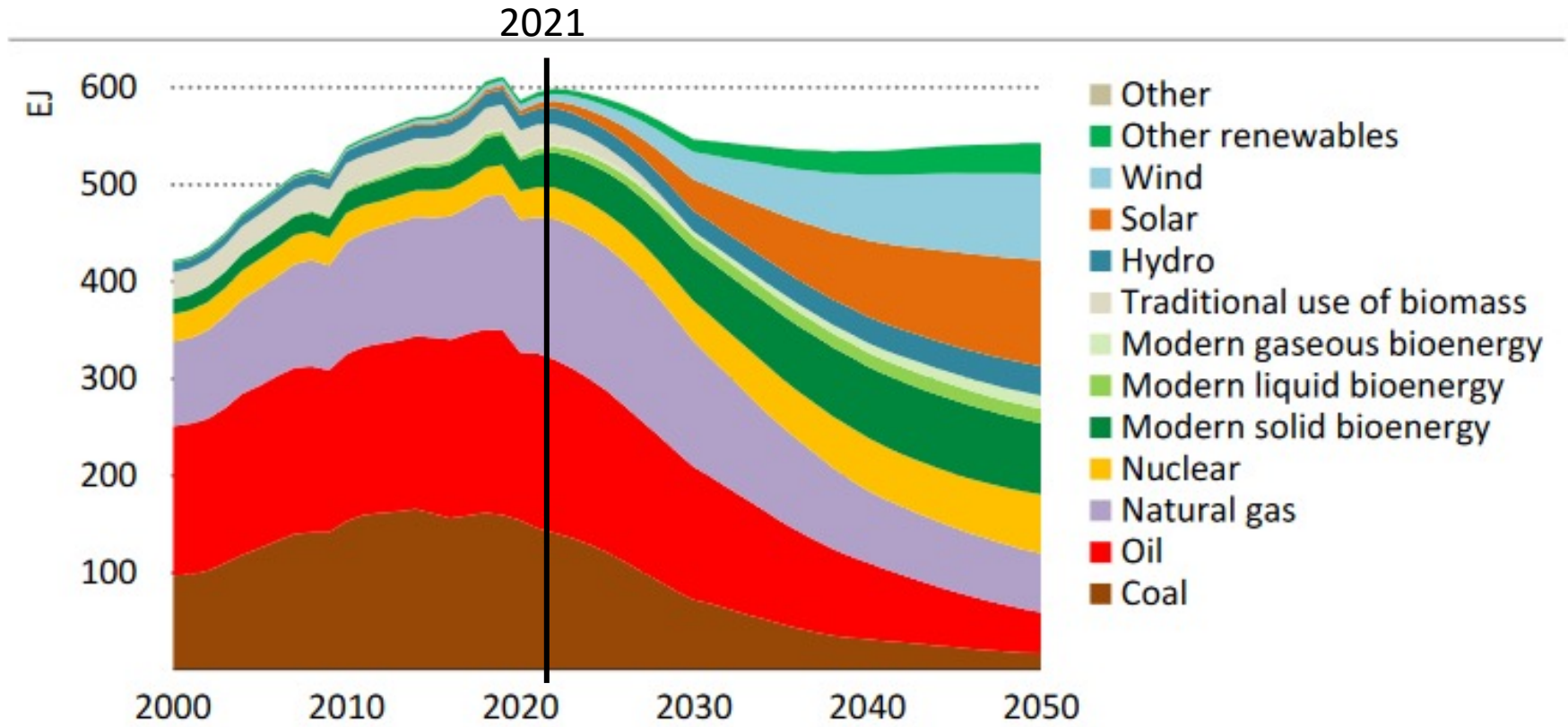
- The true societal impact of a 3° to 3,5°C temperature increase is unknowable and potentially catastrophic
- We cannot rely on expectations (averages) in such a case
- We have a moral imperative to limit global warming to 2°C

Martin Weitzman

(Harvard)

Reflected in 2015 Paris protocol, although emissions growth has continued

We now know how to get there: energy roadmap to net zero



Renewables and nuclear power displace most fossil fuel use in the NZE, and the share of fossil fuels falls from 80% in 2020 to just over 20% in 2050

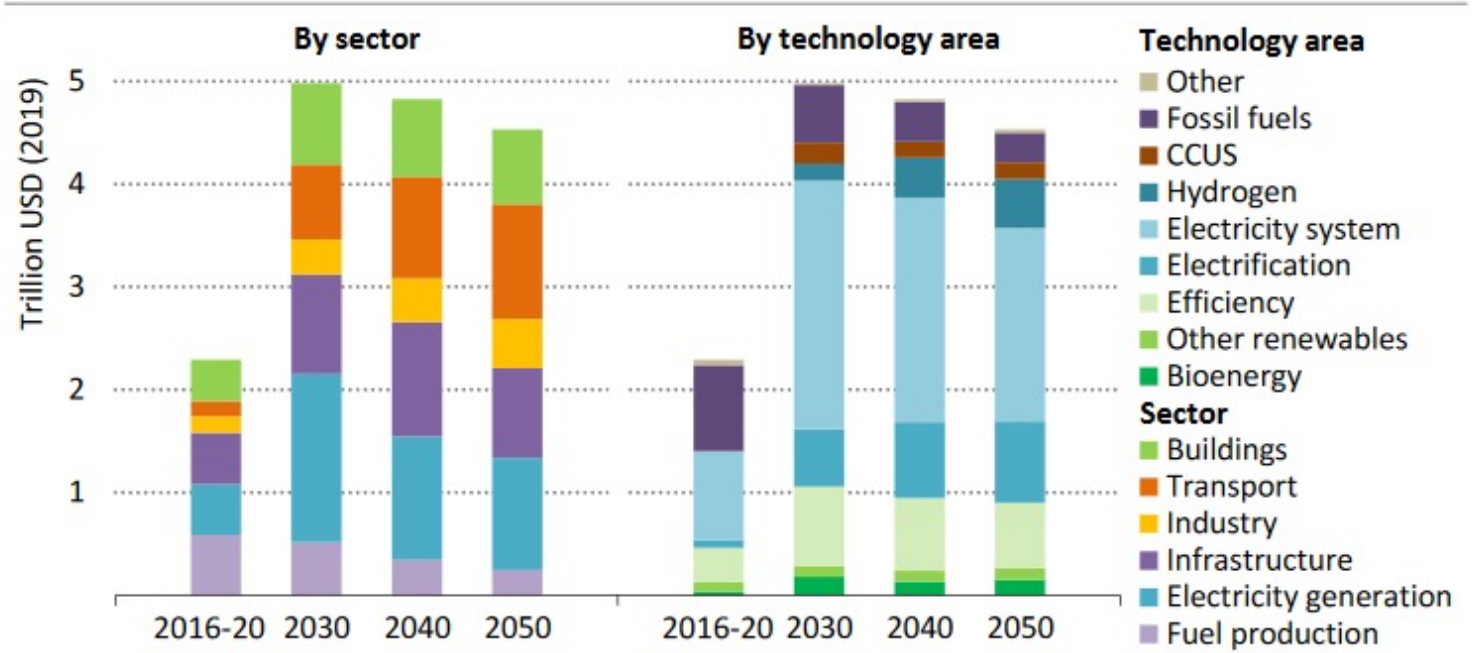
Source: International Energy Agency, May 2021. Net Zero by 2050 : a Roadmap for the Global Energy Sector

An unprecedented opportunity to reinvent entire industries

Develop and deploy new technologies …

- Electricity production and storage
- Electric vehicle and heating
- Carbon Capture Usage and Storage
- Hydrogen production and usage
- CO_2 free materials (eg, CO_2-free steel, CO_2-free aluminium)
- Endless and efficient recycling
- …

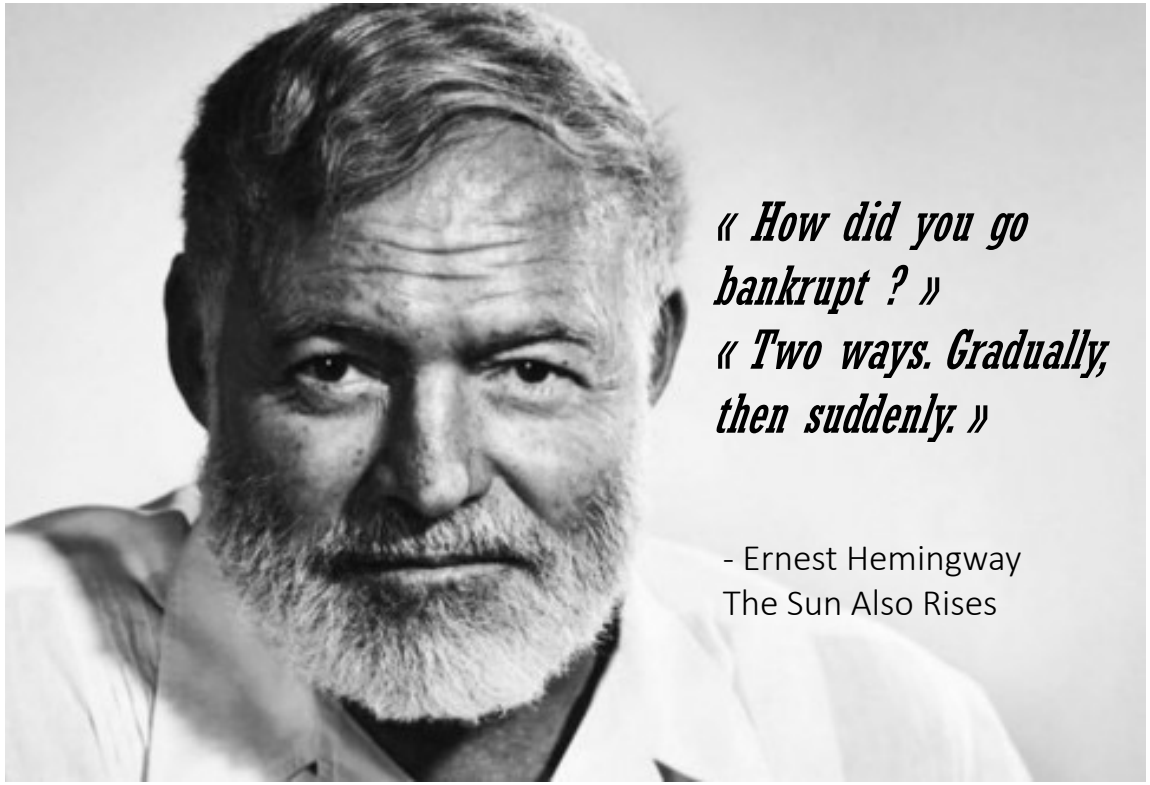
Figure 2.22 ▷ Annual average capital investment in the NZE



Capital investment in energy rises from 2.5% of GDP in recent years to 4.5% by 2030; the majority is spent on electricity generation, networks and electric end-user equipment

Source: International Energy Agency, May 2021. Net Zero by 2050 : a Roadmap for the Global Energy Sector

Shaping the transition



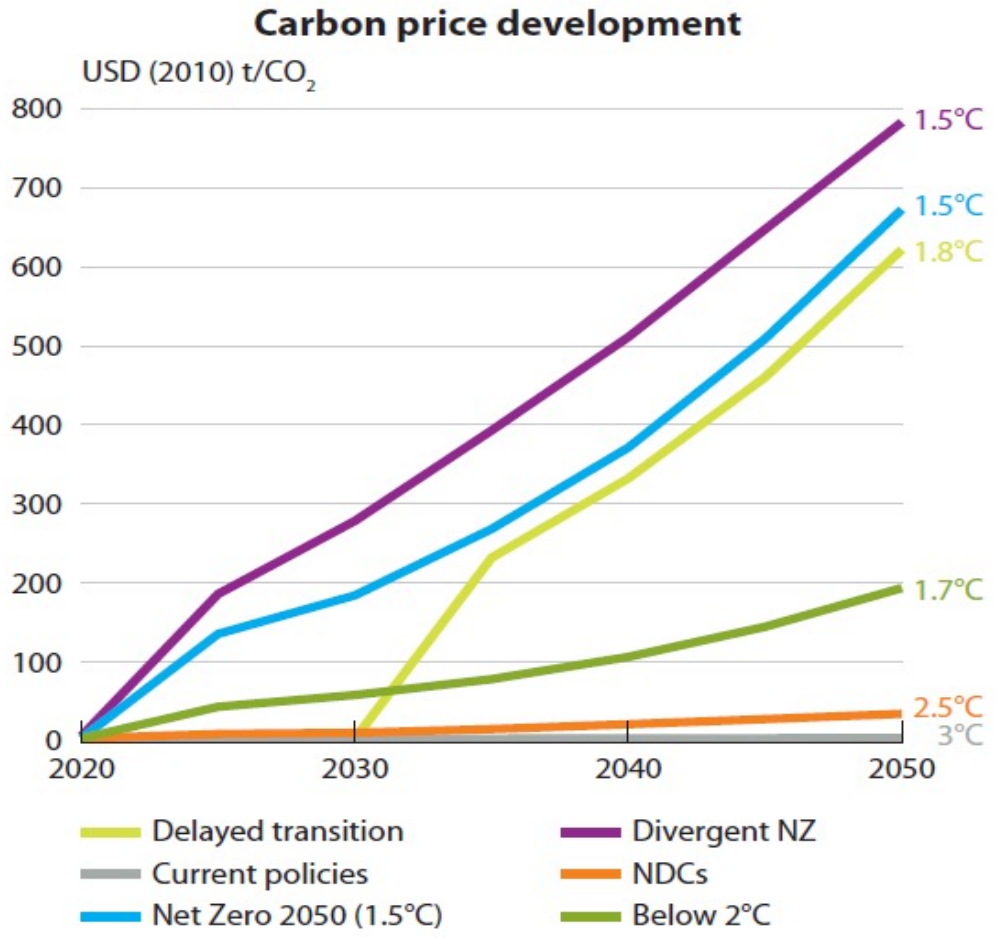
Two possible transitions paths

- **Orderly** : sufficient new capital is deployed rapidly and receives a return, social disruption is minimal even though behavioural change is required (e.g., more walking and bicycling, less driving in city centers)

- **Disorderly** : not enough capital is deployed, global warming ensues, social unrest starts : migration, anti-capitalist/degrowth movements become majority parties

Industrial companies can and must shape the transition

Advocate for CO_2 price trajectory

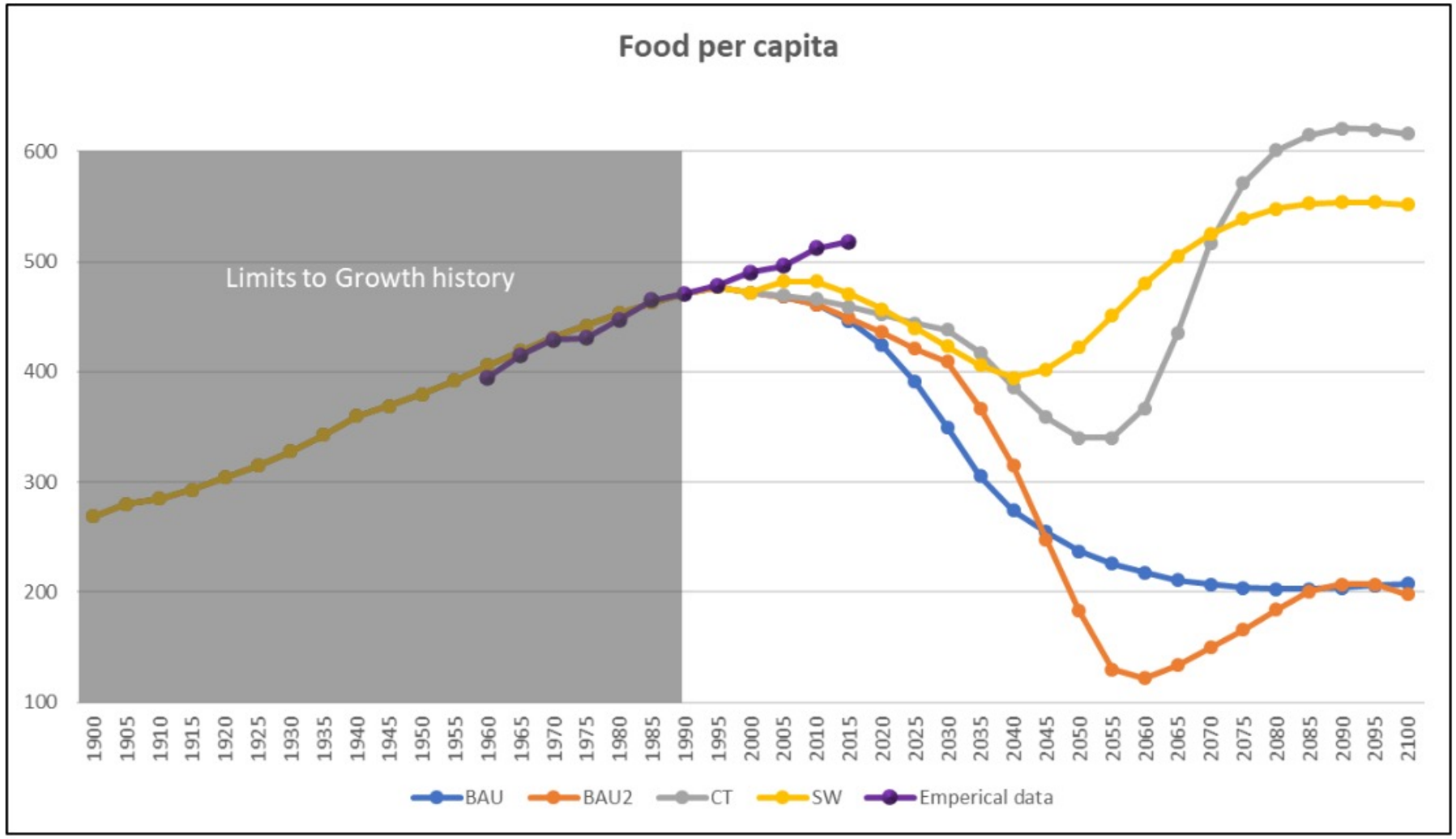


Source: IIASA NGFS Climate Scenarios Database, REMIND model. Carbon prices are weighted global averages. End of century warming outcomes shown.

- Current CO_2 price modifies behavior, appliances and technologies choices
- Anticipated future CO_2 price modifies investments decisions
- CO_2 price trajectory provides business case for investment in CO_2 -free technology
- CO_2 price provides revenues for governments to support low-income households most affected by transition

Merci

… and significant risks in business as usual scenarios



Source: Branderhorst, Gaya. 2020. Update to Limits to Growth: Comparing the World3 Model With Empirical Data. Master's thesis, Harvard Extension School

We now know how to get to Net Zero Emissions

- **Zero carbon electricity mix**

  Key to reducing emissions in the electricity sector, which is today the single largest source of CO_2 emissions

- **Energy efficiency**

  Many efficient solutions are already available today and can be scaled up quickly, creating a lot of jobs in the process

- **Electrification**

  In particular transport, heating and some industrial processes, as electricity generation becomes progressively cleaner

- **Other: Bioenergy – Carbon Capture, Utilisation and Storage (CCUS) – Behavioural changes …**

Source: International Energy Agency, May 2021. Net Zero by 2050 : a Roadmap for the Global Energy Sector