

Achieving Net Zero: implications for fossil fuels today

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The Oxford Net Zero initiative

Nochua International, 2021



Is this good news for the planet?

ENERGY

Dutch court rules oil giant Shell must cut carbon emissions by 45% by 2030 in landmark case

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KEY POINTS

- A Dutch court on Wednesday ruled oil giant Royal Dutch Shell must reduce its carbon emissions by 45% by 2030 from 2019 levels.
- That's a much higher reduction than the company's current aim of lowering its emissions by 20% by 2030.
- Shares of Shell were trading 0.3% lower in London. The stock price is up almost 10% year-to-date, having tumbled nearly 40% in 2020.

In this article **RDSA-GB +4.20 (+0.31%)**



A cyclist passes oil silos at the Royal Dutch Shell Pernis refinery in Rotterdam, Netherlands, on Tuesday, April 27, 2021.



TRENDING NOW

- amazon** Amazon to buy MGM Studios for \$8.45 billion
- 2** Meme stocks GameStop, AMC are popping again as speculative trading ramps back up
- 3** Bitcoin crash opens door to a tax loophole for investors
- 4** Millionaire and CEO shares 5 'quick tests' he always uses at job interviews to decide when to hire



We need to stop fossil fuels from causing global warming before the world stops using fossil fuels



Lignite mining in Anthochori, Greece, 2007



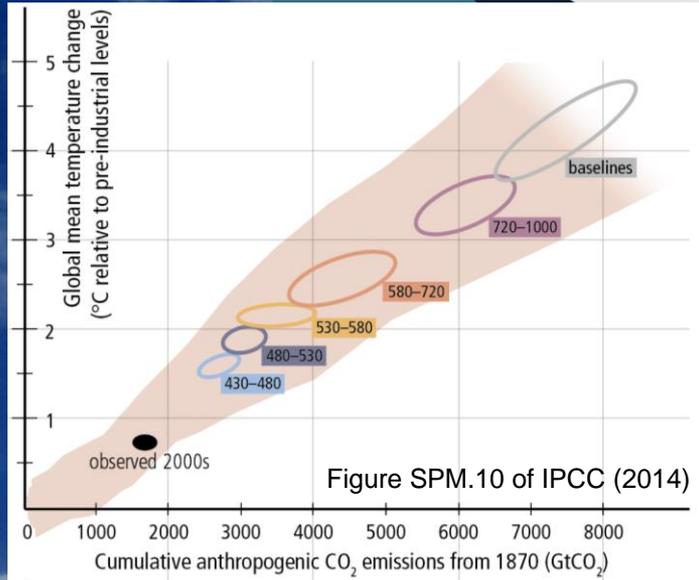
Achieving Net Zero

Cumulative carbon dioxide emissions
to the time of net zero largely
determine peak warming



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Achieving Net Zero

Near-term emissions reductions complemented with Nature-based Climate Solutions





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Achieving Net Zero

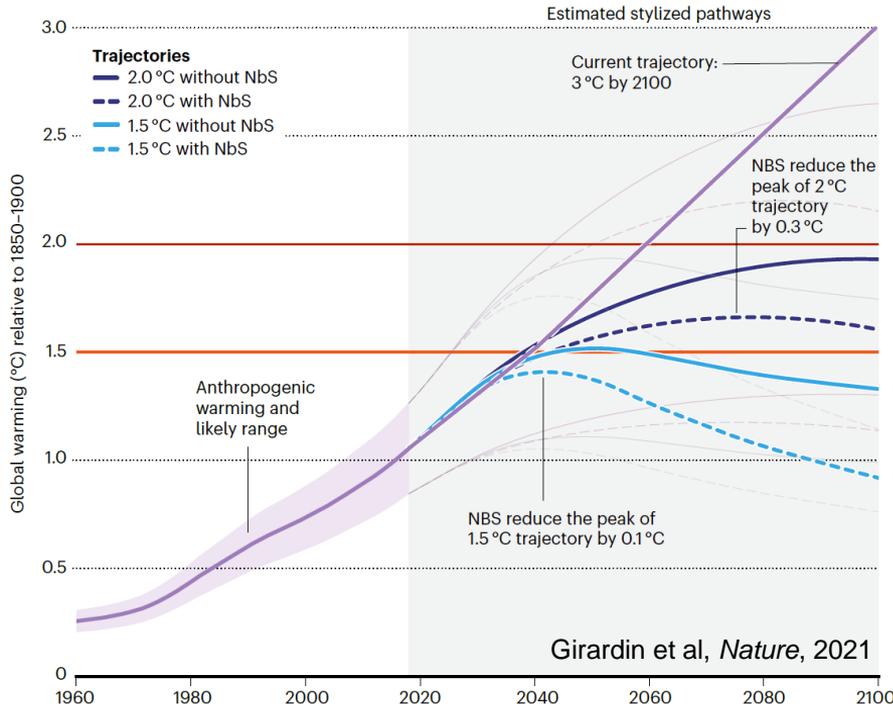
Near-term emissions reductions complemented with Nature-based Climate Solutions



Achieving Net Zero

THE LONG GAME

Nature-based solutions (NBS) could reduce the global peak temperature and suppress warming beyond 2100 — if they are ambitious and designed for longevity.

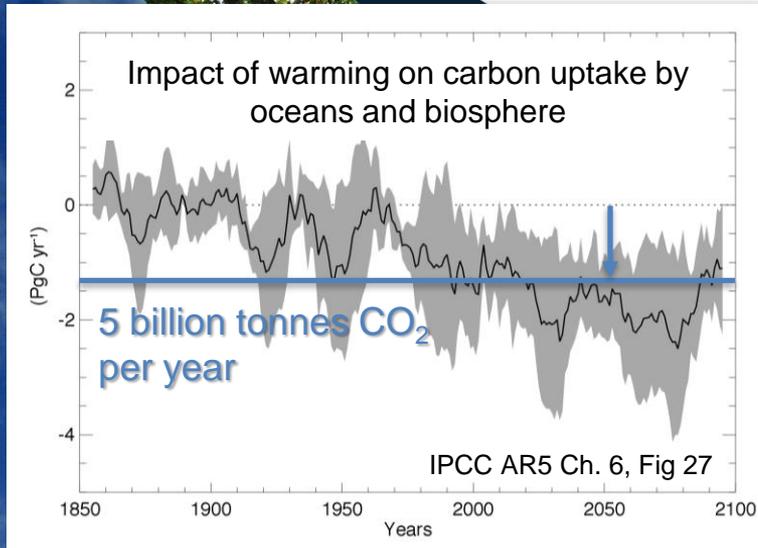


Nature-based Solutions have immediate benefits, but take time to reduce temperatures: limited impact on peak warming if this occurs around mid-century



Achieving Net Zero

In the longer term, net CO₂ uptake by the biosphere declines due to warming itself



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Achieving Net Zero

So invest in nature, but don't count on it as a permanent solution



?



Achieving Net Zero

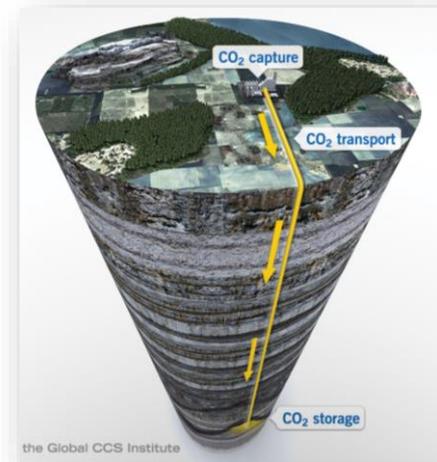
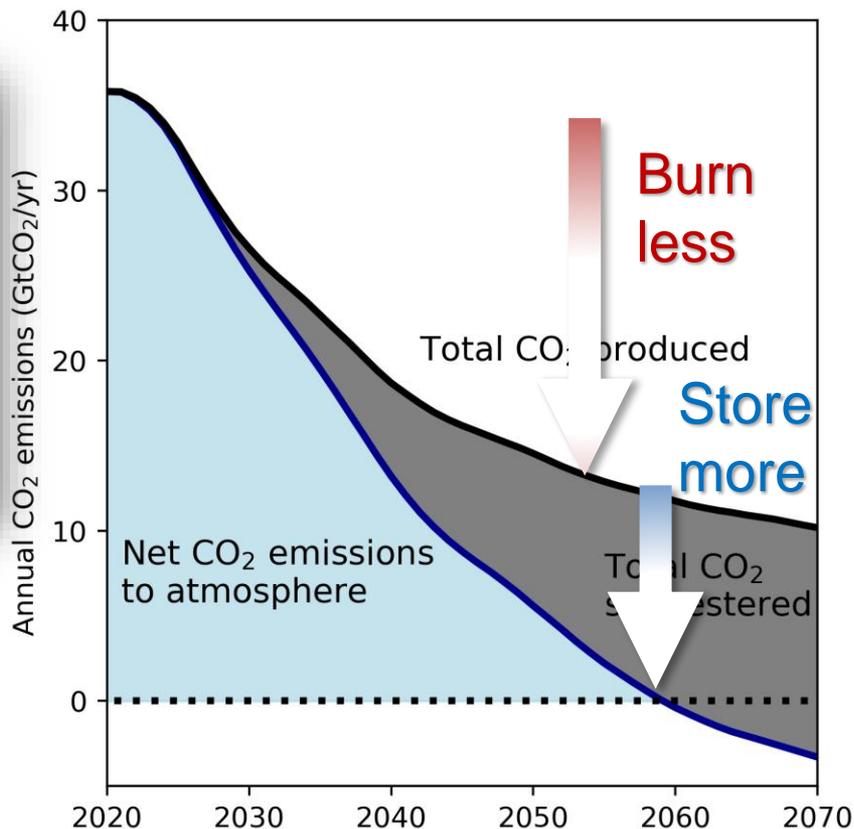
Stopping fossil fuels causing global warming means scaling up permanent CO₂ storage



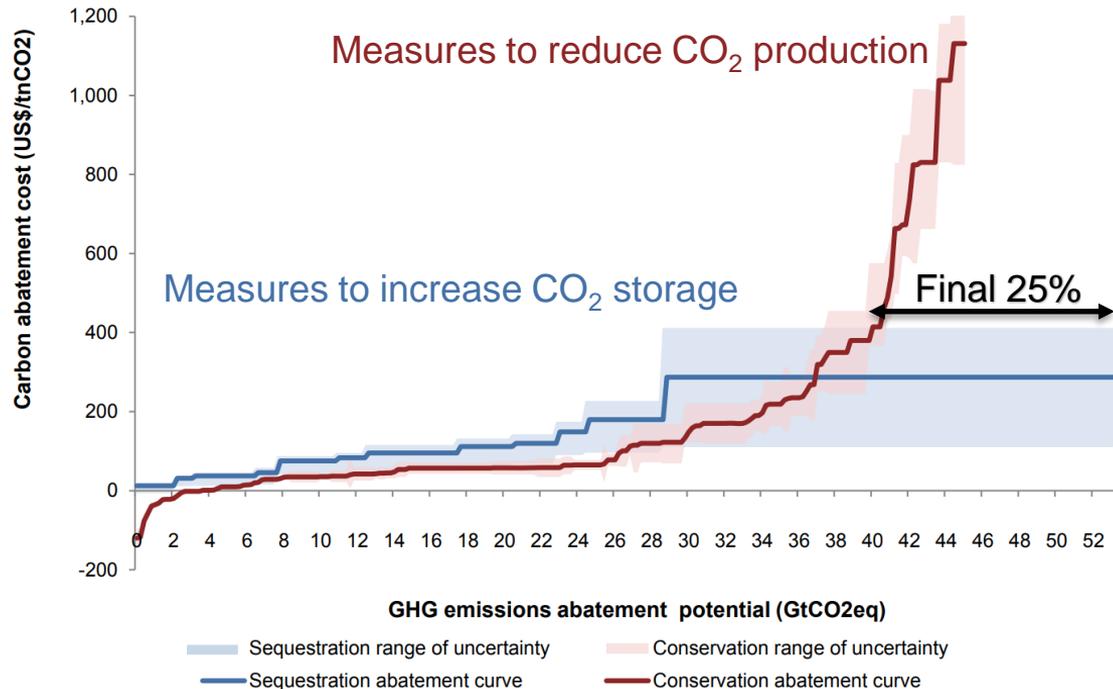
How to stop fossil fuels from causing global warming



Global CO₂ production and storage from energy and industry in average “technology neutral” scenarios that limit warming to about 1.5°C



The challenging economics of CO₂ storage



Source: Goldman Sachs Global Investment Research

We can eliminate 75% of emissions with very little use of CO₂ storage, but we can't get to net zero...

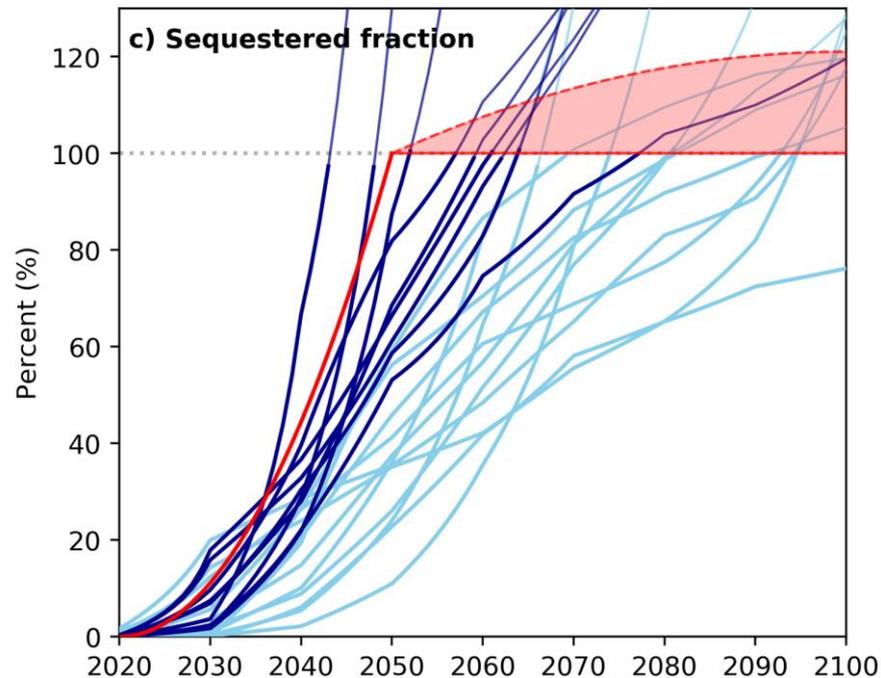
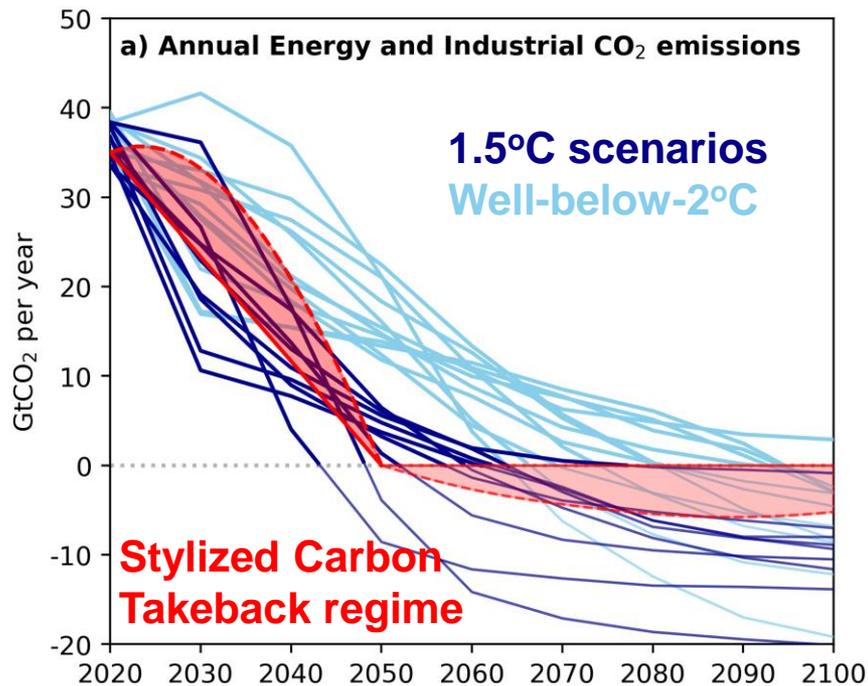


Introducing the “Carbon Takeback Obligation”

- Fossil fuel suppliers agree to store a rising fraction S of the CO_2 generated by their activities AND products
- S starts at zero and accelerates smoothly to 100% in 2050.
- Least-cost sequestration opportunities are found through a market in tradeable Carbon Storage Certificates:
 - Initial low-cost industrial capture opportunities.
 - Progressive transition to higher-cost direct air capture.
- Allen et al, “The Case for Mandatory Sequestration”, *Nature Geoscience*, 2:813-814, 2009 & <https://go.ted.com/mylesallen>



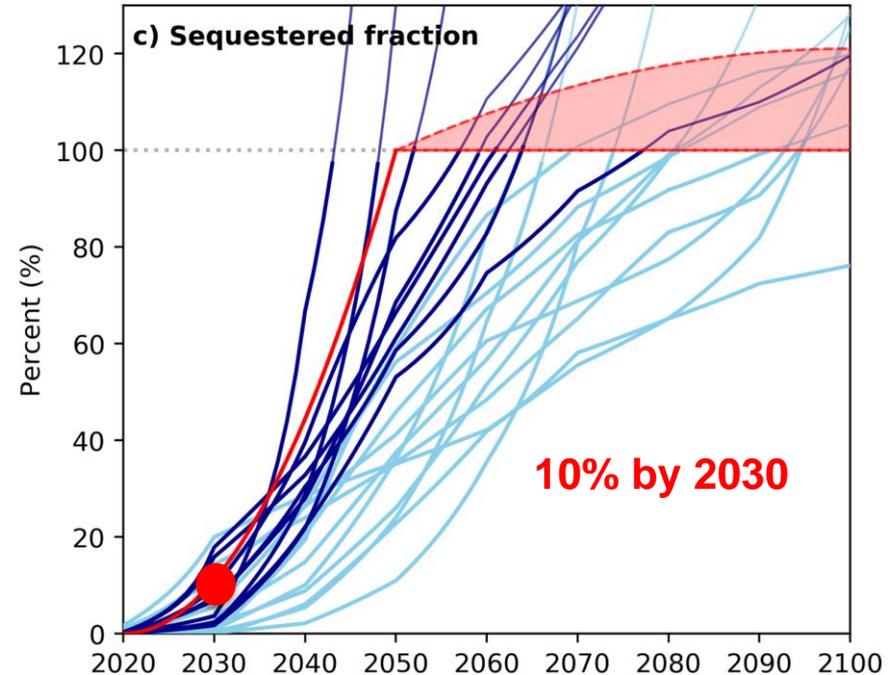
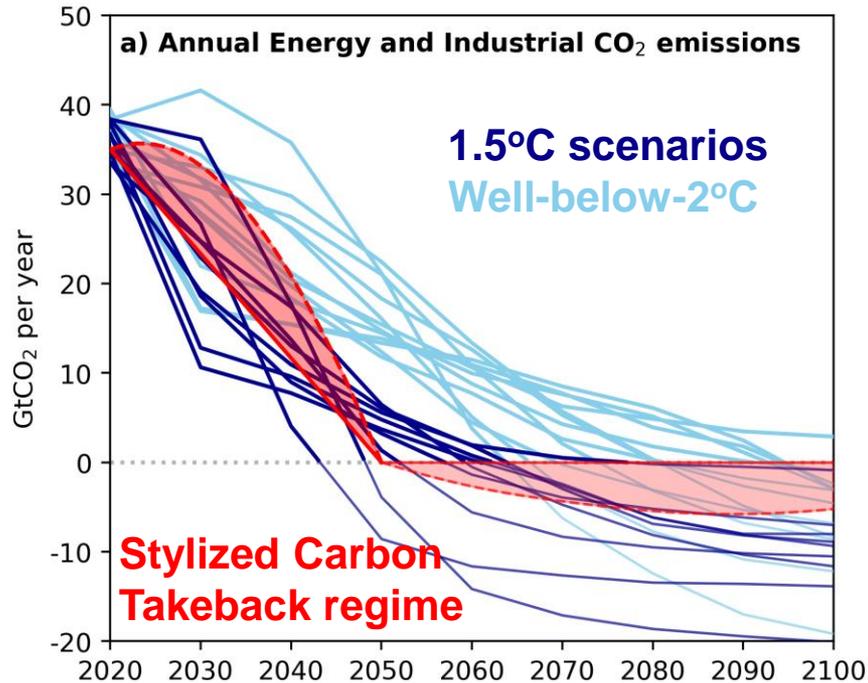
How to stop fossil fuels from causing global warming



Source: Jenkins et al, 2020, submitted, based on IIASA SR1.5 database



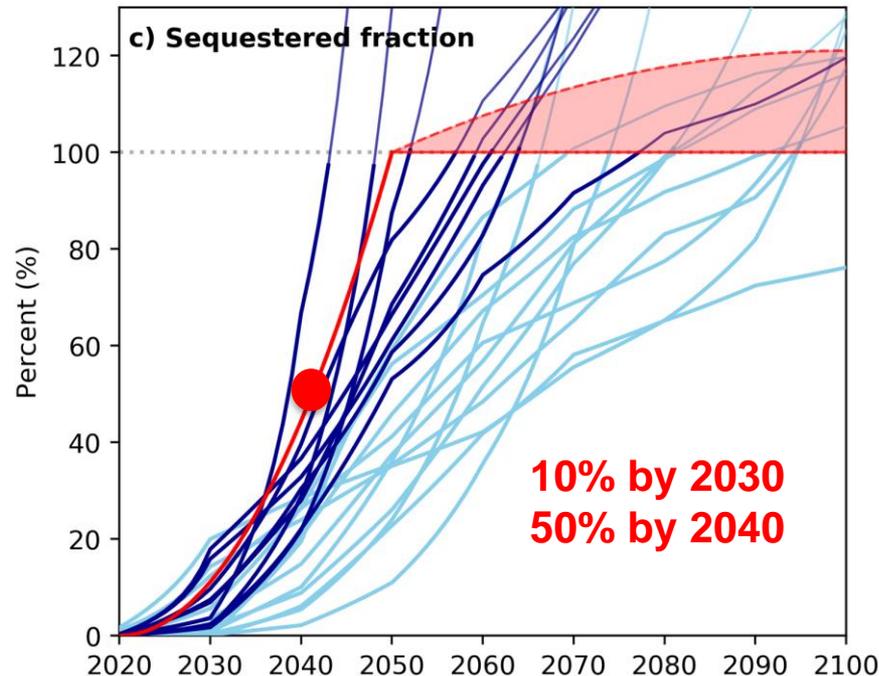
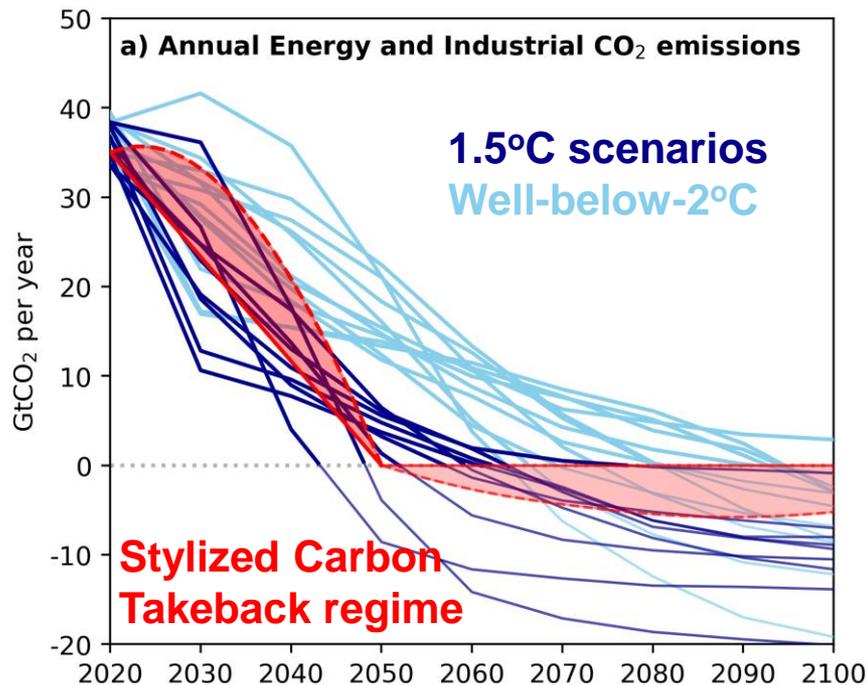
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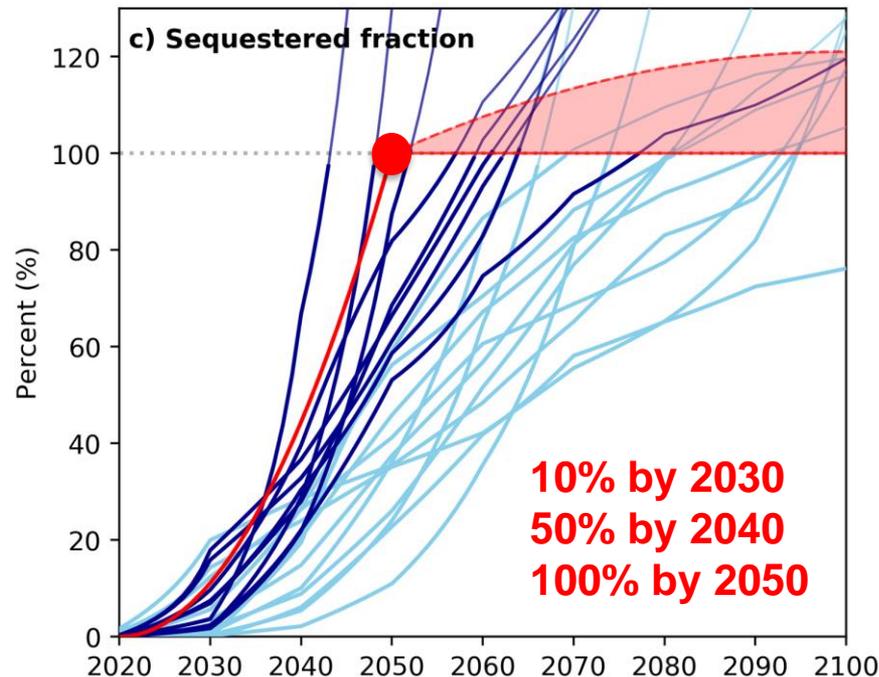
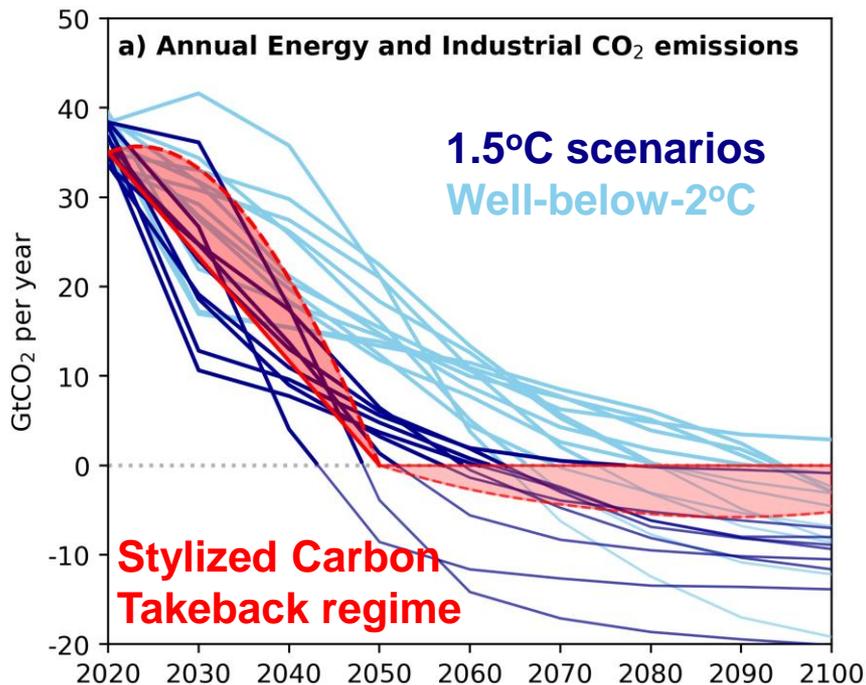
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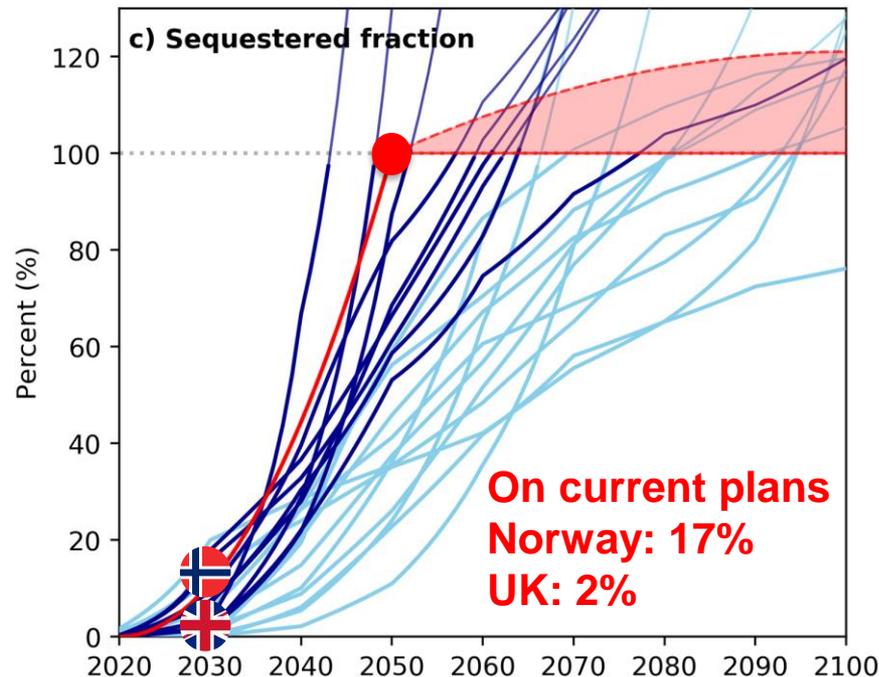
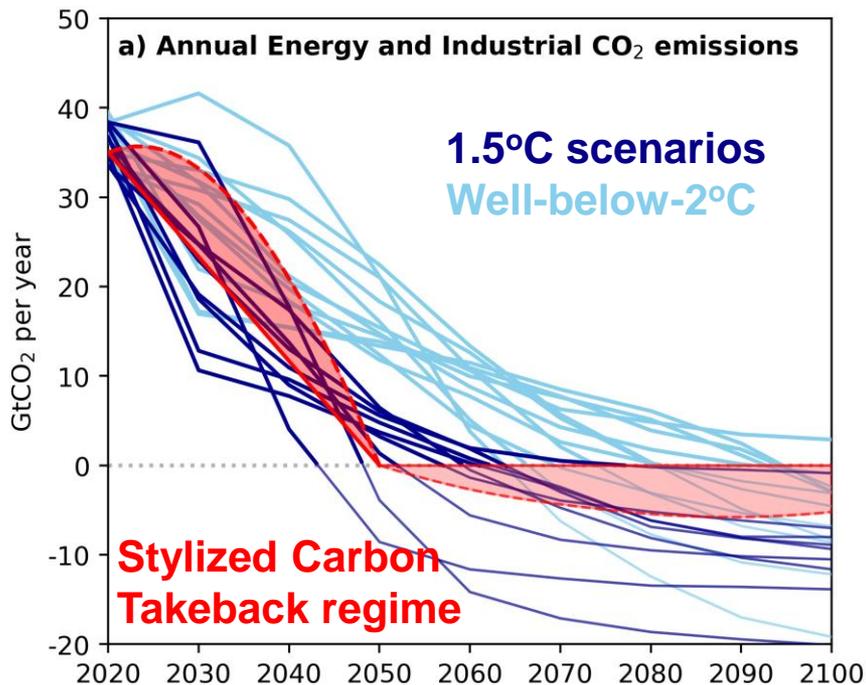
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The surprising economics of Carbon Takeback

- Suppose CO₂ disposal costs
 - \$50/tCO₂ *sequestered* initially (CO₂ captured at source),
 - \$250/tCO₂ at net zero (point sources + direct air capture).
- Cost per tCO₂ of fossil carbon *sold* = $S(50+200S)$ where S is sequestered fraction.
- This is equivalent to a carbon price of:
 - \$ 0.52 /tCO₂ at $S=1\%$ (early 2020s)
 - \$12.00 /tCO₂ at $S=15\%$ (early 2030s)
 - \$250 /tCO₂ at $S=100\%$ (2050s)



The surprising economics of Carbon Takeback

- Suppose CO₂ disposal costs
 - \$50/tCO₂ *sequestered* initially (CO₂ captured at source),
 - \$250/tCO₂ at net zero (point sources + direct air capture).
- Cost per tCO₂ of fossil carbon *sold* = $S(50+200S)$ where S is sequestered fraction.
- This is equivalent to a carbon price of:
 - \$ 0.20 /bbl at $S=1\%$ (early 2020s)
 - \$ 5.00 /bbl at $S=15\%$ (early 2030s)
 - \$100 /bbl at $S=100\%$ (2050s)



How the UK nearly solved the climate change problem – and no-one noticed

- “Within one year of this Act coming into force, the Secretary of State shall undertake a consultation on the measures requiring extractors and importers of petroleum to contribute to the development of carbon capture and storage.”
 - Amendment 34a of the Energy Bill, September, 2015
 - see Oxburgh et al (2016), Report of the Parliamentary Advisory Group on CCS



Fossil fuel companies, investors and the Oxford Martin Principles for Climate-Conscious Investment



- Commitment to net-zero?
 - Is it just words, or do they recognize what net zero means?
- Profitable net-zero strategy?
 - What is their business model in a net-zero world?
- Quantitative medium-term targets?
 - How can we measure progress?



Questions?

<https://netzeroclimate.org>
<https://carbontakeback.org>

