

THE “GLIDE-PATH” TO NET ZERO

*Too shallow/slow and we miss our target
Too deep/fast and the transition collapses*

BIEE Dialogue Session

13th September 2021



The Panel

- *Neil Strachan (Chair)*
 - Director, UCL Energy Institute (n.strachan@ucl.ac.uk)

Expert	Organisation	Perspective we asked them to challenge from
Alec Waterhouse	Head of Modelling BEIS	Technology and Innovation
Emily Cox	Research Associate Cardiff University	People and Society
George Day	Head of Markets, Policy, Regulation Energy System Catapult	Economics and Markets
Rachel Freeman	Senior Research Fellow University College London	Policy and Institutions

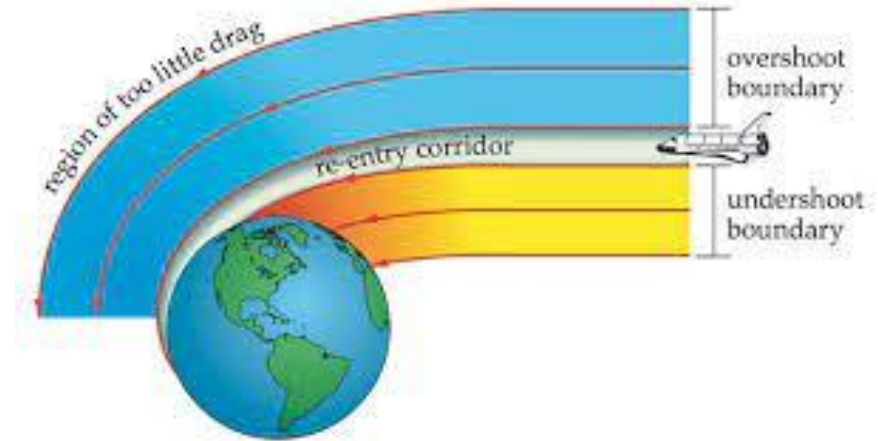


The Challenge

- Deep decarbonisation pathways (to net zero by 2050), must:
 - encompass a revolution in infrastructure and technology investment
 - include a societally driven transformation in energy demand changes and technology diffusion
- And require:
 - energy firms to find new and profitable business models
 - ambition and consistency of policy and governance initiatives



The Fragility



- **The net zero “Glide-Path”**
- If we are too timid
 - the scale and speed of investment will be inadequate
 - virtuous learning cycles won’t be enabled
 - consumer behaviours will remain largely unchanged
 - the scope for new pricing, regulatory and information policies will be limited
- However if we are too radical
 - we will strand capital intensive assets
 - deploy immature technology and services
 - get push-back and inertia from a non-engaged society
 - find the political price in enforcing the transition is too high

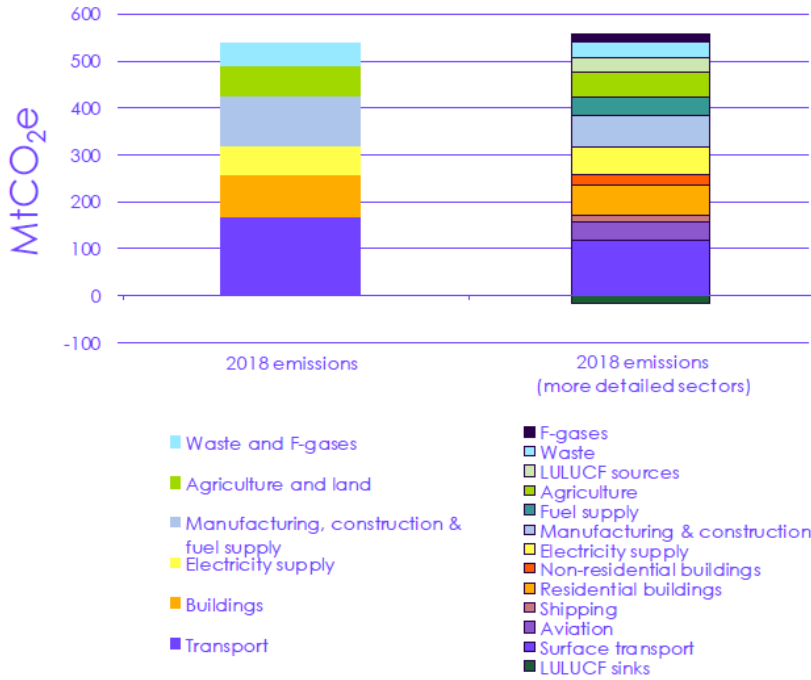


Analysis of a Net Zero Pathway

- Climate Change Committee's **Balanced Pathway**
 - CCC (2020). The Sixth Carbon Budget. London, Committee on Climate Change, <https://www.theccc.org.uk/publication/sixth-carbon-budget/>
- A “gold standard”
 - Combination of multiple scenarios
 - Detailed sectoral treatment
 - Stakeholder engagement
 - Thoughtful self-critique of uncertainties and milestones
 - 448 page report (plus 340 page methodology supplement)

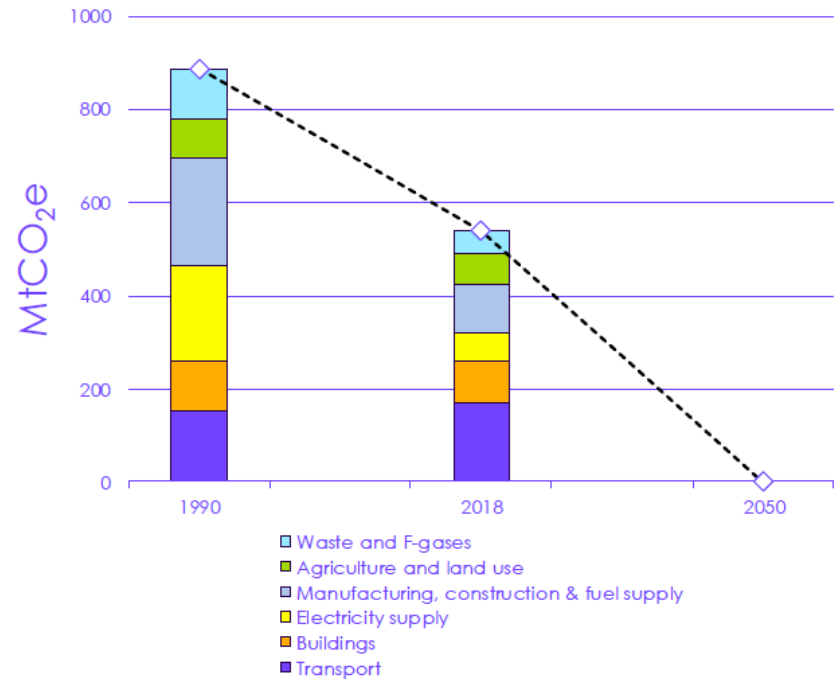


Figure 2.1 UK emissions by sector in 2018



Source: BEIS (2020) Provisional UK greenhouse gas emissions national statistics 2019; CCC analysis.
 Notes: Provisional emissions data for 2019 is not available for all sectors and for non-CO₂ emissions.

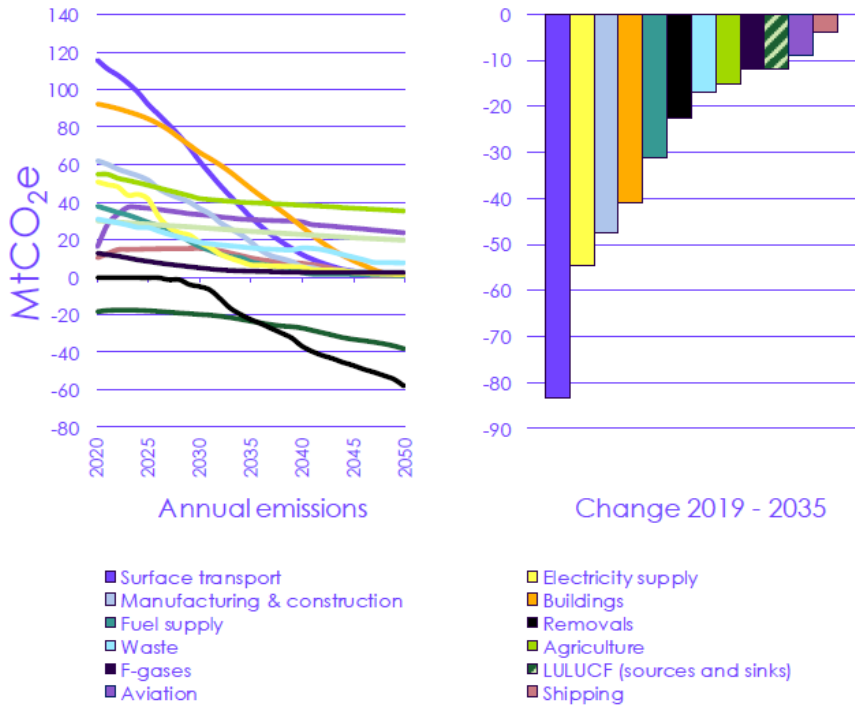
Figure 2.2 To meet Net Zero, emissions must fall in all sectors and at a faster rate than the last thirty years



Source: BEIS (2020) Provisional UK greenhouse gas emissions national statistics 2019; CCC analysis.
 Notes: Net Zero emissions in 2050 will require any residual emissions to be offset by the UK land use sink and greenhouse gas removals.

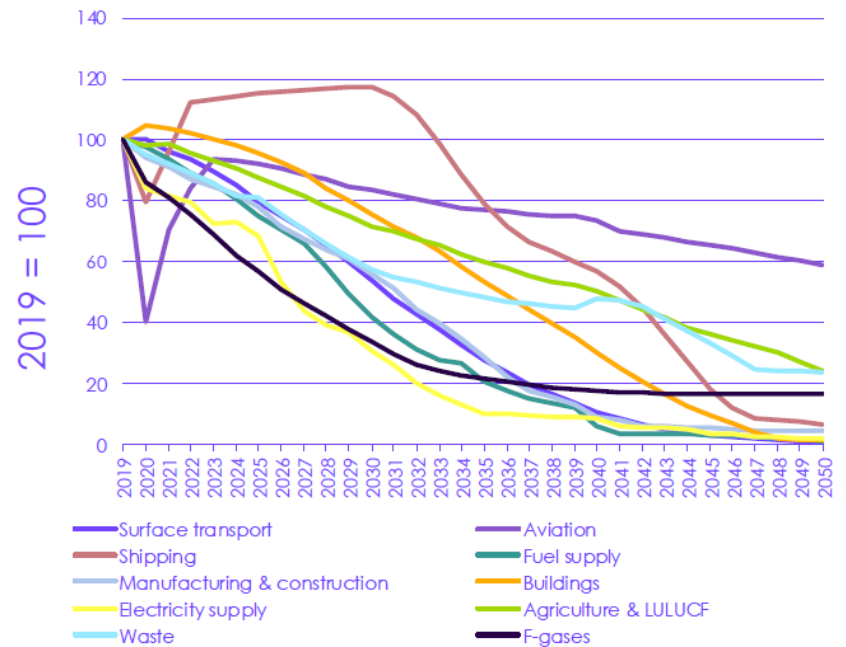


Figure 2.4 Sectoral emissions under the Balanced Net Zero Pathway



Source: CCC analysis.
Notes: LULUCF = Land-use, land-use change and forestry.

Figure 2.5 Change in sectoral emissions in the balanced Net Zero pathway compared to 2019 levels



Source: CCC analysis.
Notes: Aviation and shipping pathways are lower in 2020 due to COVID-19. LULUCF = Land-use, land-use change and forestry.



Table 2.2

Key metrics for actions in the Balanced Pathway to meet the Sixth Carbon Budget










		2019	2025	2030	2035	2050	Trend
UK greenhouse gas emissions	UK greenhouse gas emissions (MtCO ₂ e)	522	445	316	191	0	
	UK greenhouse gas emissions per person (tCO ₂ e/capita)	7.8	6.5	4.5	2.7	0	
Demand reduction	Weekly meat consumption (g) (includes fresh and processed meat)	960	880	770	730	630	
	Weekly dairy consumption (g)	2,020	1,840	1,620	1,620	1,620	
	Plane-km per person	11,700	11,000	11,000	11,400	13,700	
	Car-km per driver	12,900	12,600	12,400	12,200	11,700	
	Remaining waste per person, after prevention & recycling (kg)	490	400	310	280	300	
Efficiency	Carbon-intensity of a new HGV (gCO ₂ /km)	680	580	420	20	0	
	Increase in longevity of electronics	0%	30%	80%	120%	120%	



Table 2.2

Key metrics for actions in the Balanced Pathway to meet the Sixth Carbon Budget

		2019	2025	2030	2035	2050	Trend
Electrification, hydrogen and carbon capture and storage	Carbon intensity of UK electricity (gCO _{2e} /kWh e)	220	125	45	10	2	
	Offshore wind (GW e)	10	25	40	50	95	
	Share of BEVs in new car sales	2%	48%	97%	100%	100%	
	Heat pump installations (thousand per year)	26	415	1,070	1,430	1,480	
	Manufacturing energy use from electricity or hydrogen	27%	27%	37%	52%	76%	
	Low-carbon hydrogen (TW h)	<1	1	30	105	225	
	CCS in manufacturing (MtCO ₂)	0	0.2	2	5	8	
	CCS in rest of the economy (MtCO ₂)	0	0.1	20	48	96	
Land	UK woodland area	13%	14%	14%	15%	18%	
	Energy crops (kha)	10	23	115	266	720	
	Peat area restored	25%	36%	47%	58%	79%	
	Land-based carbon sinks (MtCO ₂)	18	18	20	23	39	
Removals	Greenhouse gas removals (MtCO ₂)	0	<1	5	23	58	



How narrow is the feasible glide-path?

- First questions to our interdisciplinary experts
 - **Alec:** What are the key innovations (and their timing) within and between the electricity, heat and transport sectors?
 - **Emily:** How will people and society respond to changes in energy demands and dominant technologies?
 - **George:** Can incumbents and new entrants make money in this new energy world?
 - **Rachel:** How much political capital needs to be spent (and will it be spent?) to enable the transition?
- Second question to our interdisciplinary experts
 - What development by 13th Sept 2026 would:
 - a) **Make you delighted and surprised!**
 - b) **Make you depressed and cynical...**
- Open Q&A with our audience
 - I will try to capture key points of agreement and controversy



**Thank you to our panel and to you all for
attending and contributing**

*See you at dinner
(real conversations with real people!)*

