Office for Budget Responsibility

Fiscal costs of climate change

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- The UK government on climate change so far
- Costs of decarbonising the UK economy by 2050
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About the OBR

Created in 2010. Comprised of a 3 person council (BRC) plus around 40 civil servants

Remit:

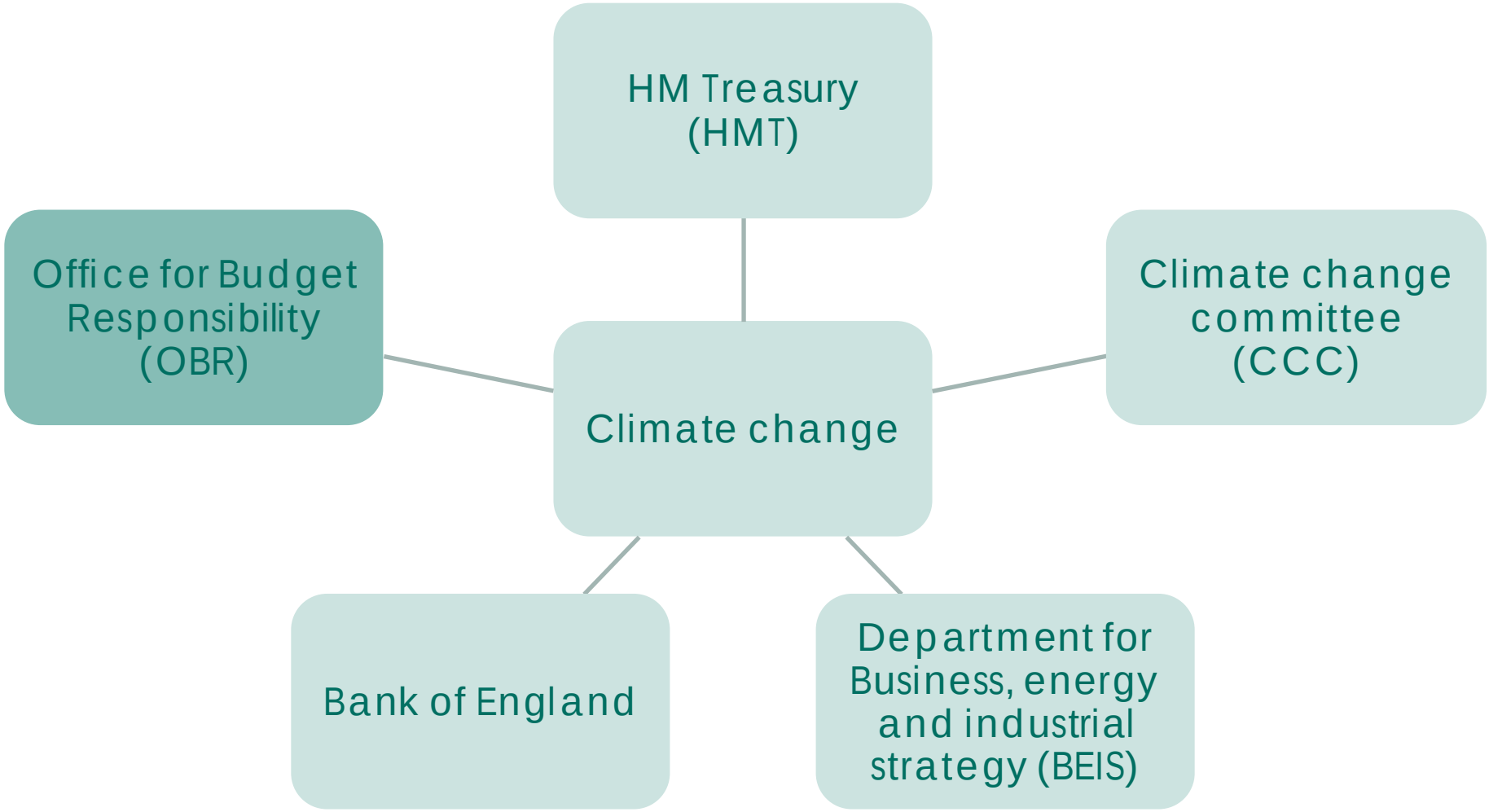
- Budgets:
  - To produce five-year-ahead forecasts for economy and public finances
  - Evaluate the Government's performance against its fiscal targets
  - Scrutinize costing/scoring of Budget policy measures
- Other:
  - Fiscal Risks Reports
  - Fiscal Sustainability Reports
  - Welfare Trends

Background on the Fiscal risks report

- OBR tasked with producing biennial *Fiscal risks report (FRR)* in 2015
- 2017 & 2019 FRRs took an 'encyclopaedic' approach to cataloguing 97 risks

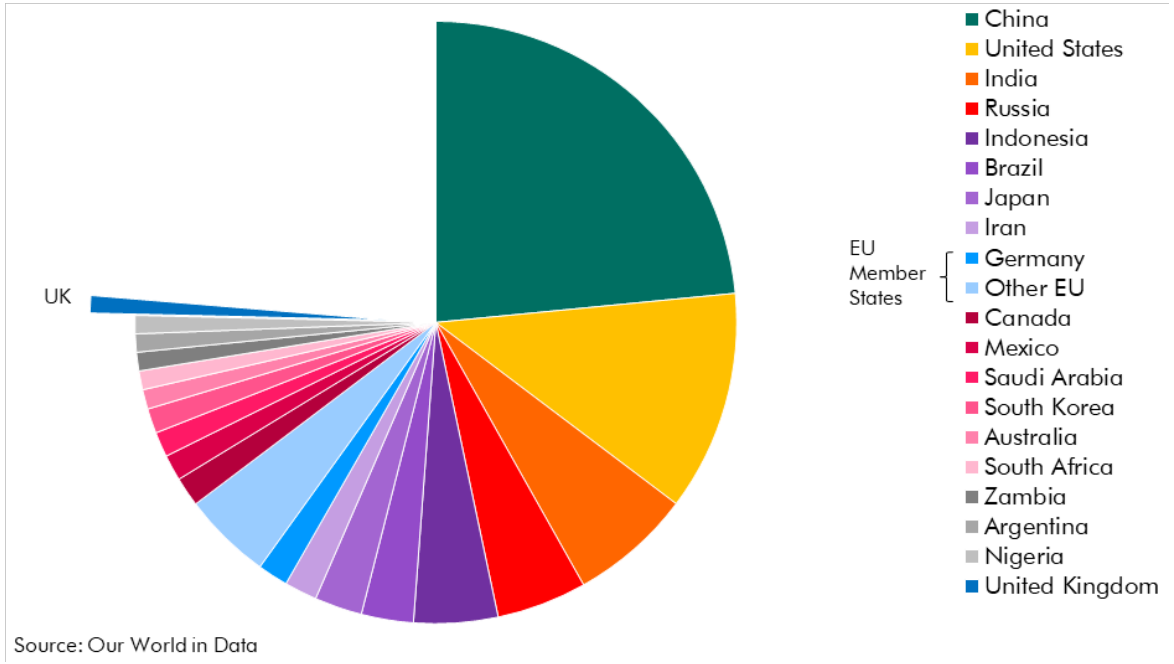
- July 2021 FRR shifted the focus to three potentially catastrophic risks
  - Coronavirus pandemic (Chapter 2)
  - Climate change (Chapter 3)
  - Cost of public debt (Chapter 4)
  - Update on other risks (Chapter 5)

Climate change across the UK government



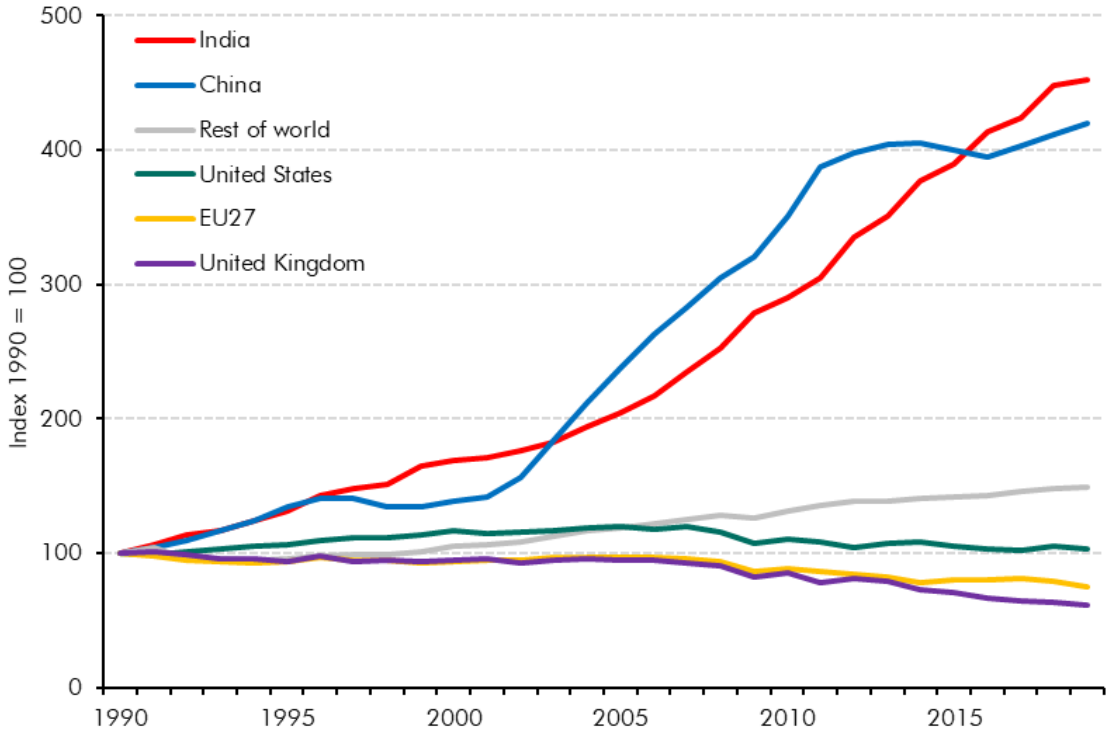
UK contribution to global CO_2 emissions

UK share of global CO_2 emissions in 2016



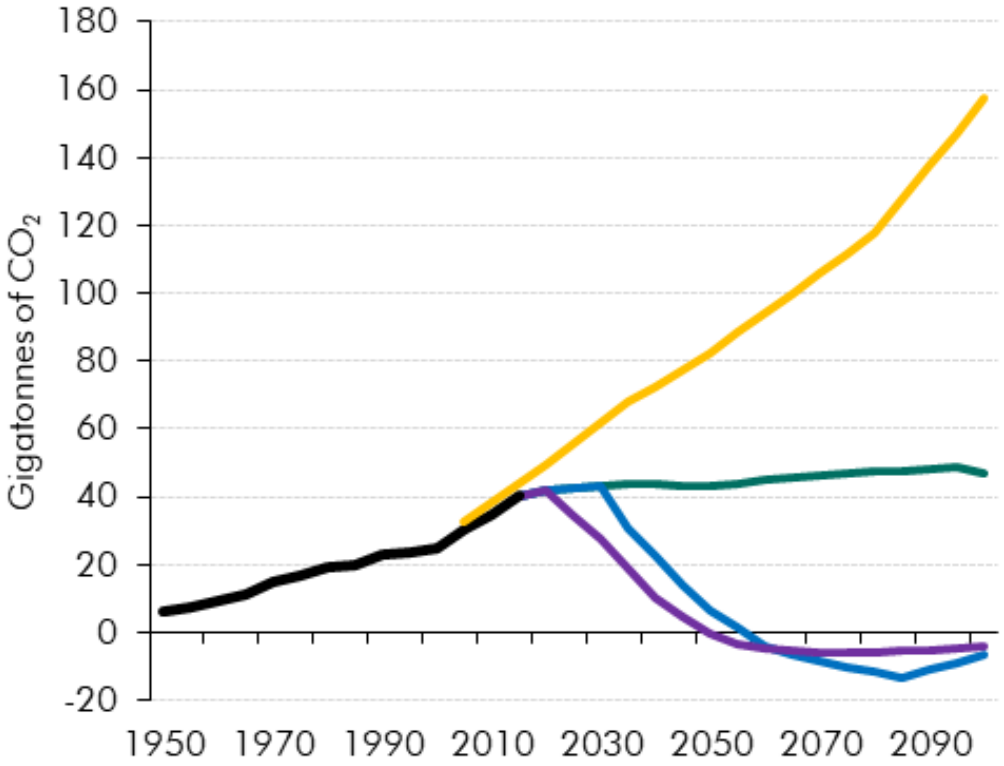
Source: Our World in Data

CO_2 emissions relative to 1990

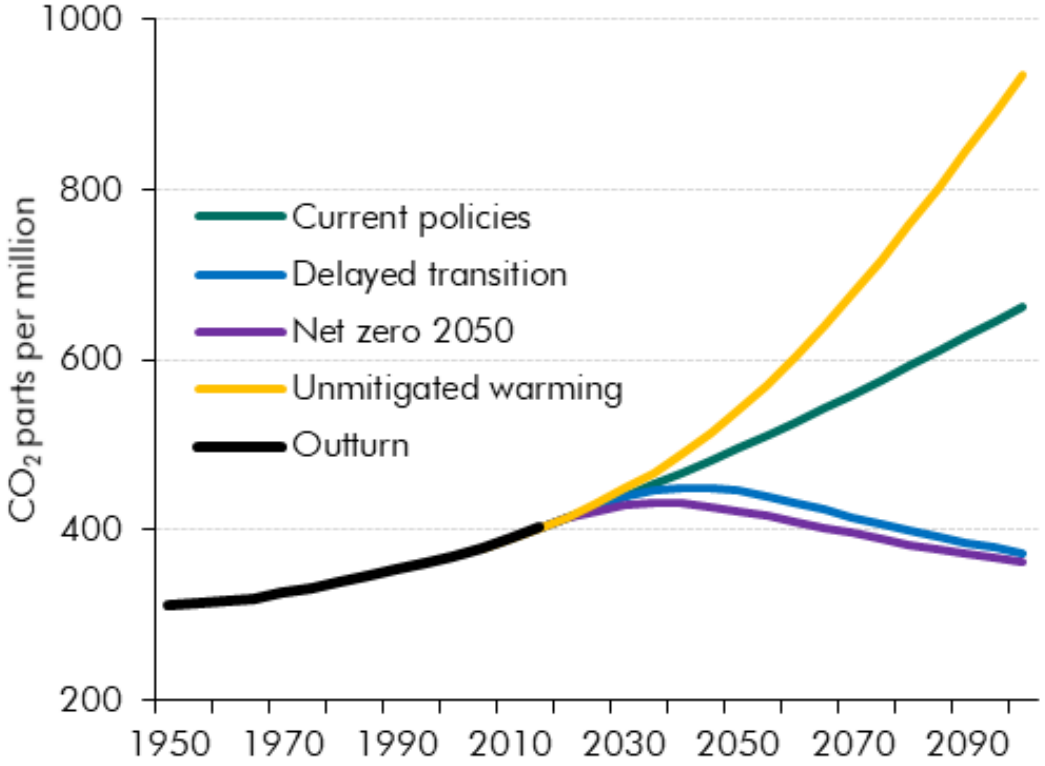


Global CO_2 emissions and temperatures

Global carbon dioxide emissions

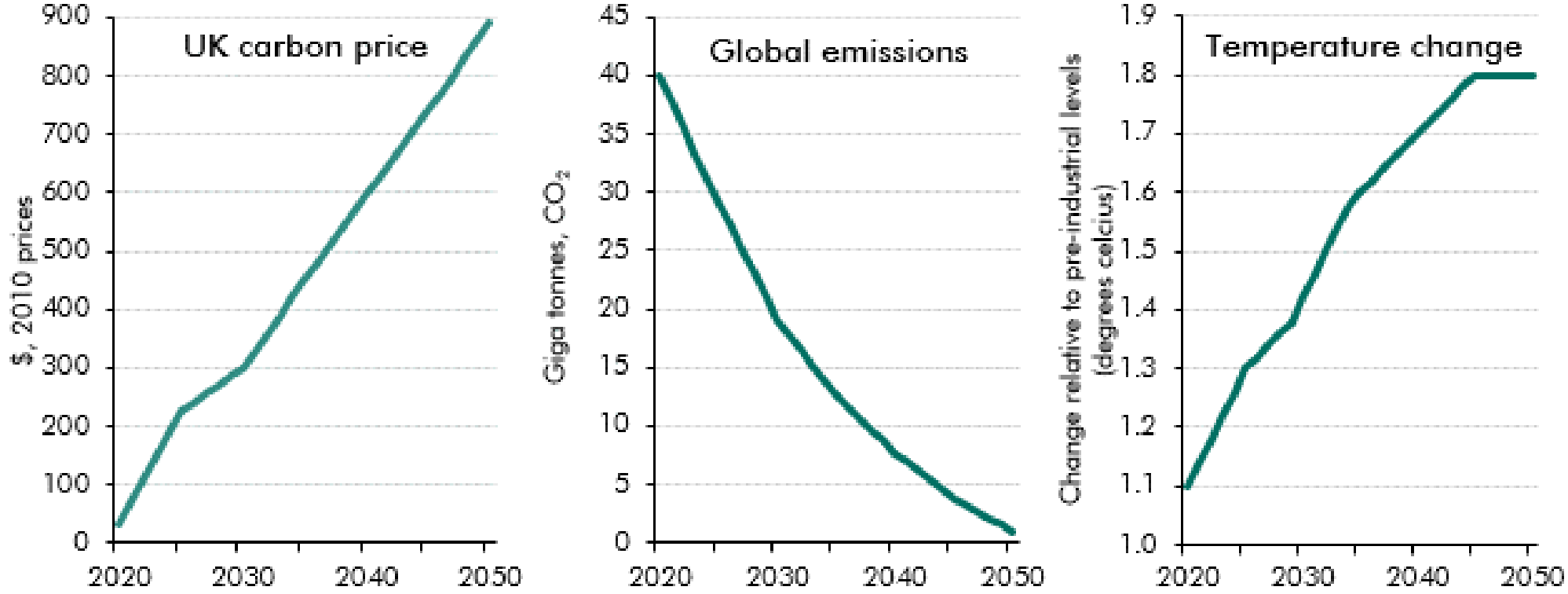


Atmospheric concentrations of



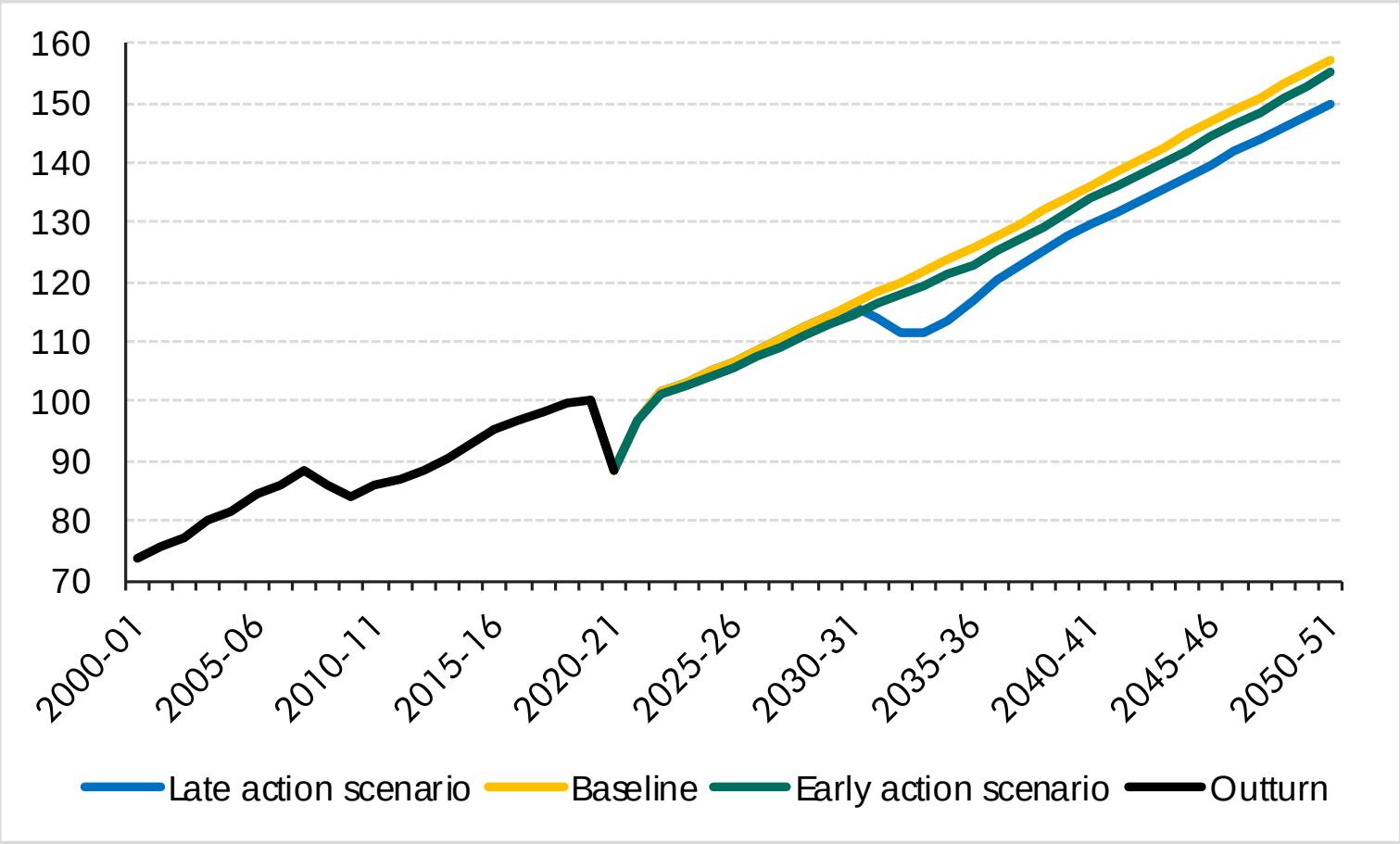
Source: Our World in Data, NGFS Climate Scenarios Database, GCAM model, International Institute for Applied Systems Analysis RCP database, Joint Global Change Research Institute GCAM database, and OBR calculations.

Scenario assumptions: global carbon price, emissions and temperature

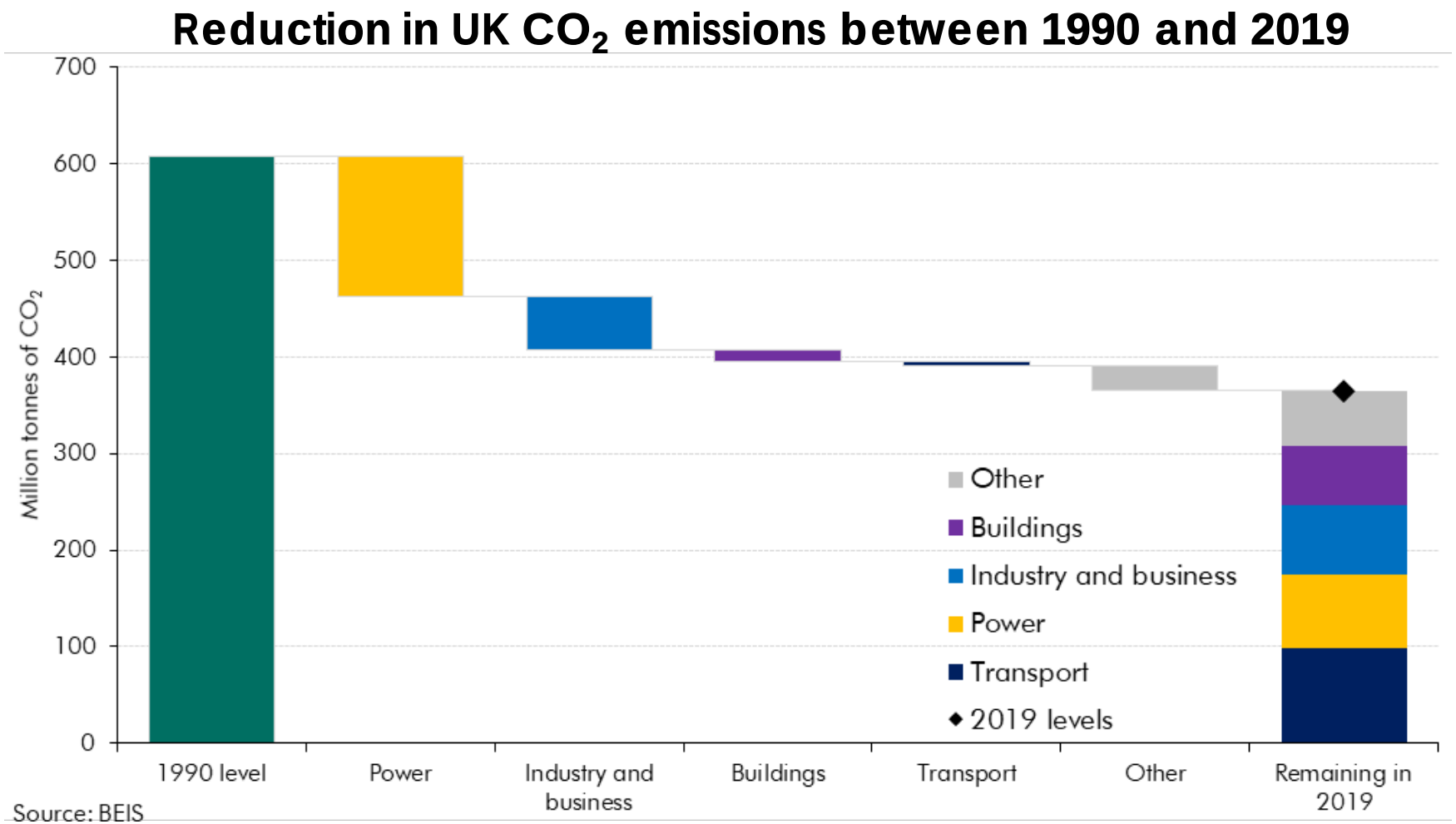


Source: Bank of England, NGFS Climate Scenarios Database

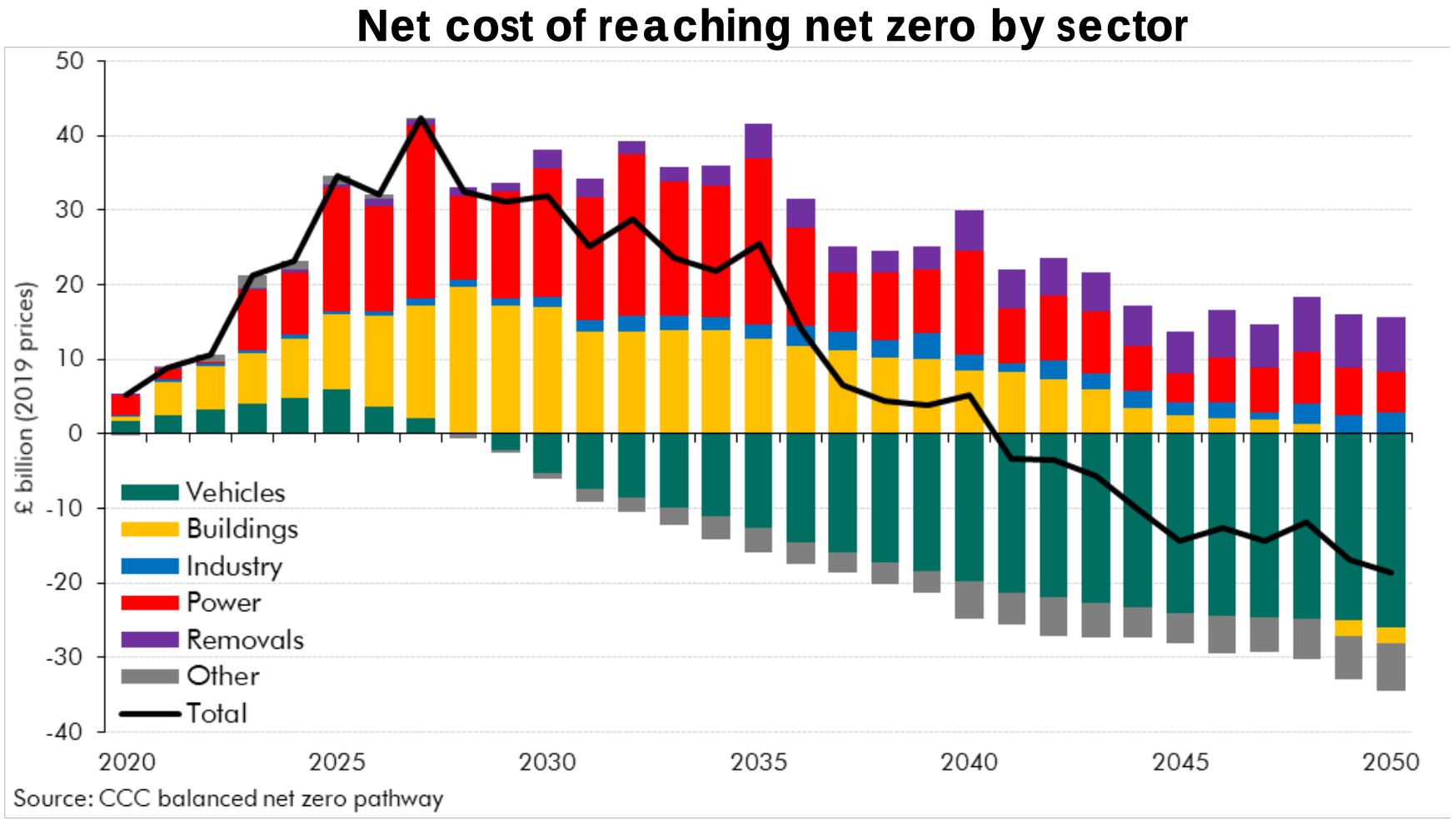
Real GDP: Early and late action scenarios



Contributions to cutting UK CO_2 emissions

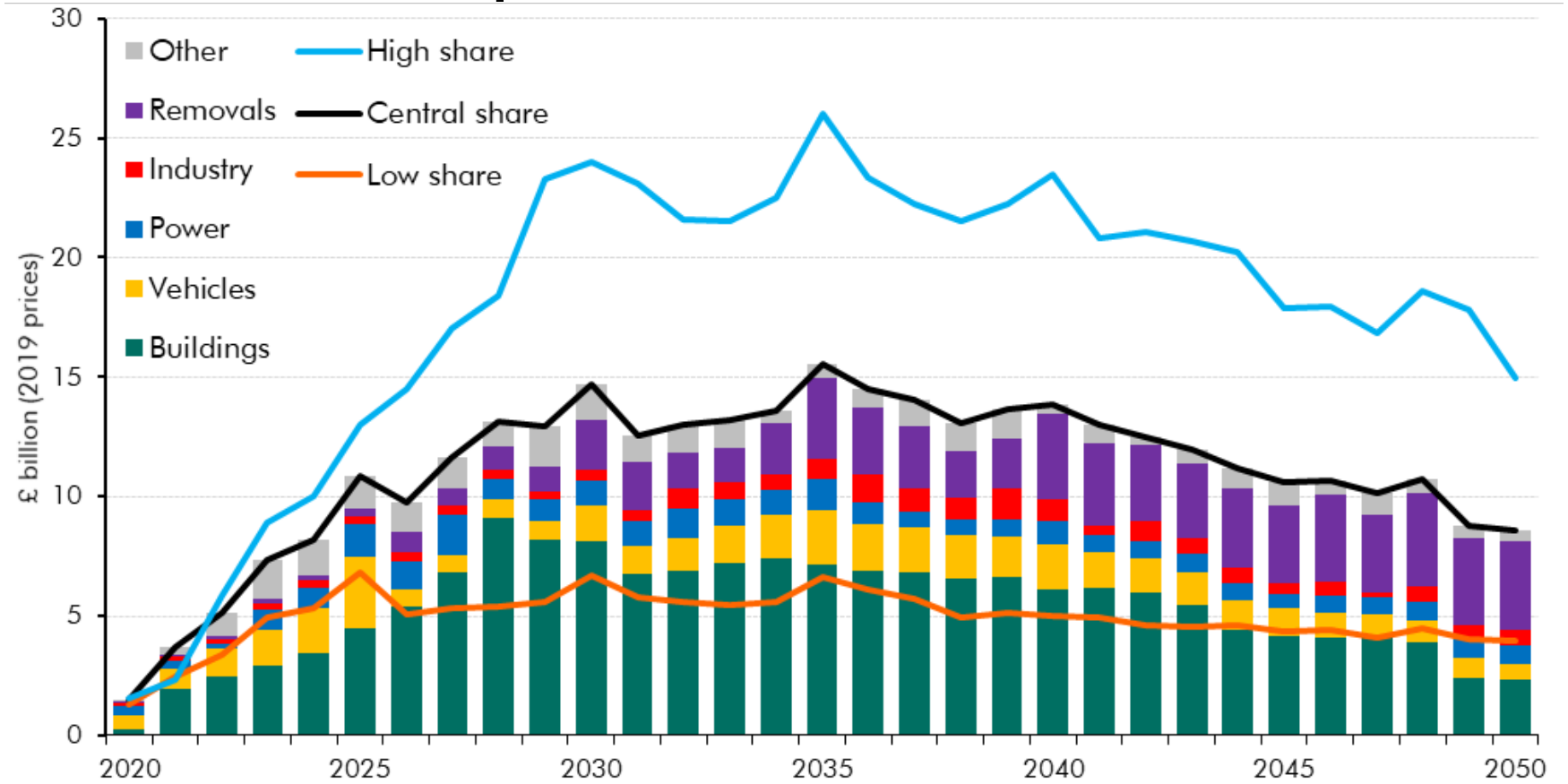


Whole economy cost of reaching net zero



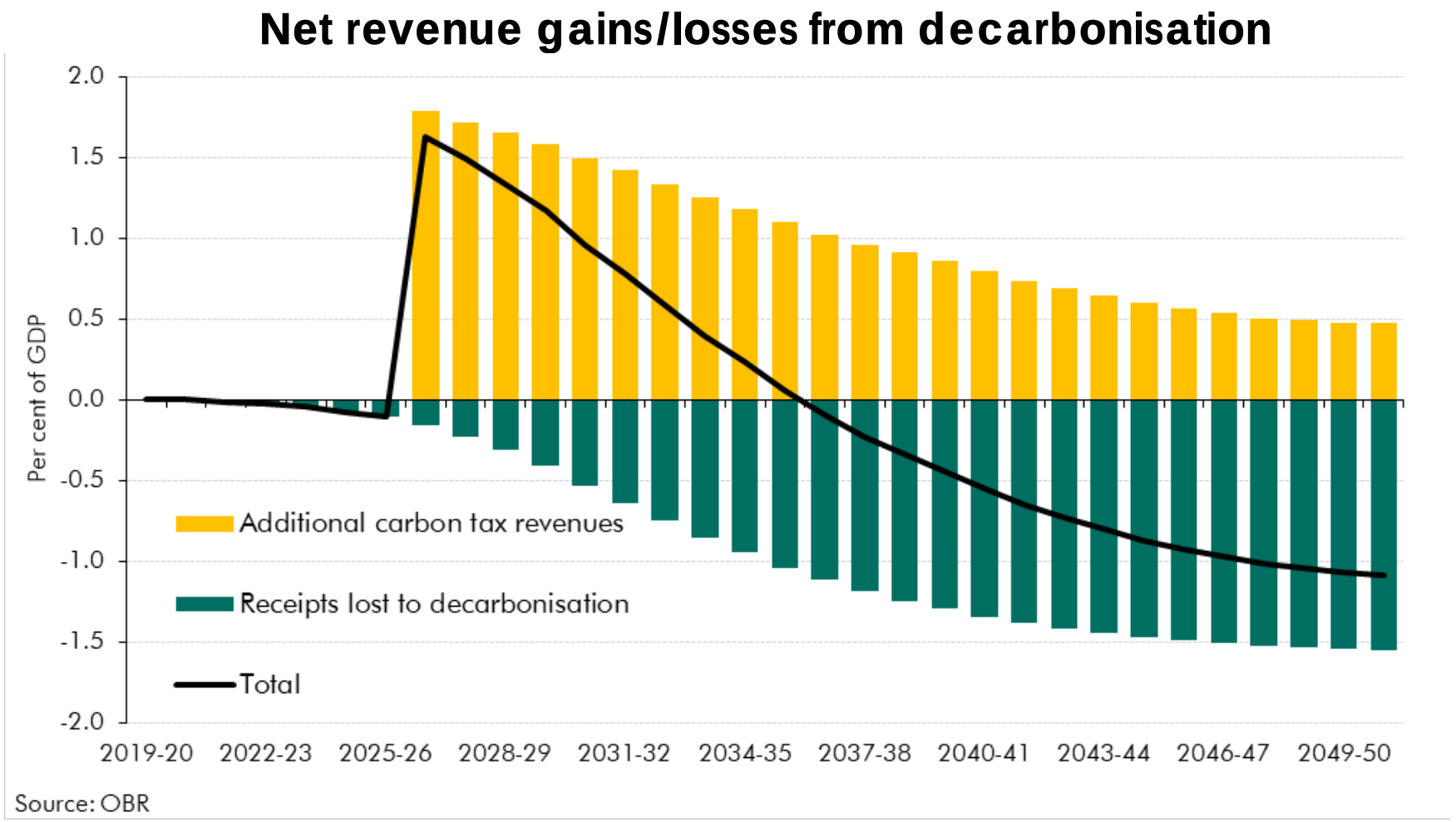
Fiscal costs of reaching net zero

Costs to the public sector of the transition to net zero



Source: CCC balanced net zero pathway, OBR

Fiscal opportunities on the way to net zero



Constructing fiscal scenarios

Baseline:

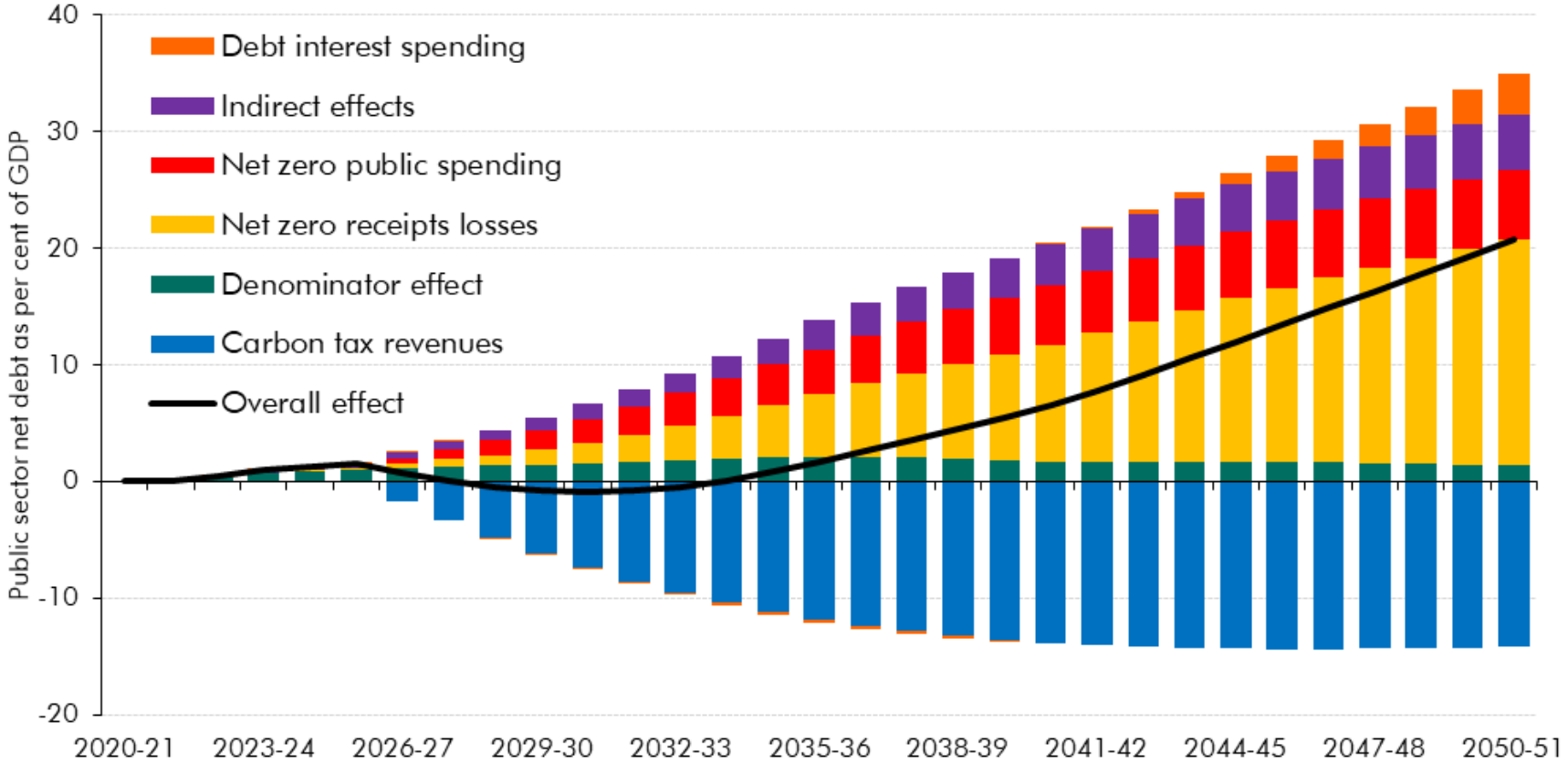
- OBR Long term economic determinants
- Assume capital spending is held at its 2025-26 level as a share of GDP and the current budget is held in balance.

Then for each scenario:

- Non-climate-related receipts
- Non-climate-related public spending
- Net zero public spending
- Net zero receipts losses
- Additional carbon tax revenues
- Debt interest consequences of any differences in borrowing.

Net debt impact of reaching net zero

Early action scenario: difference in PSND from baseline



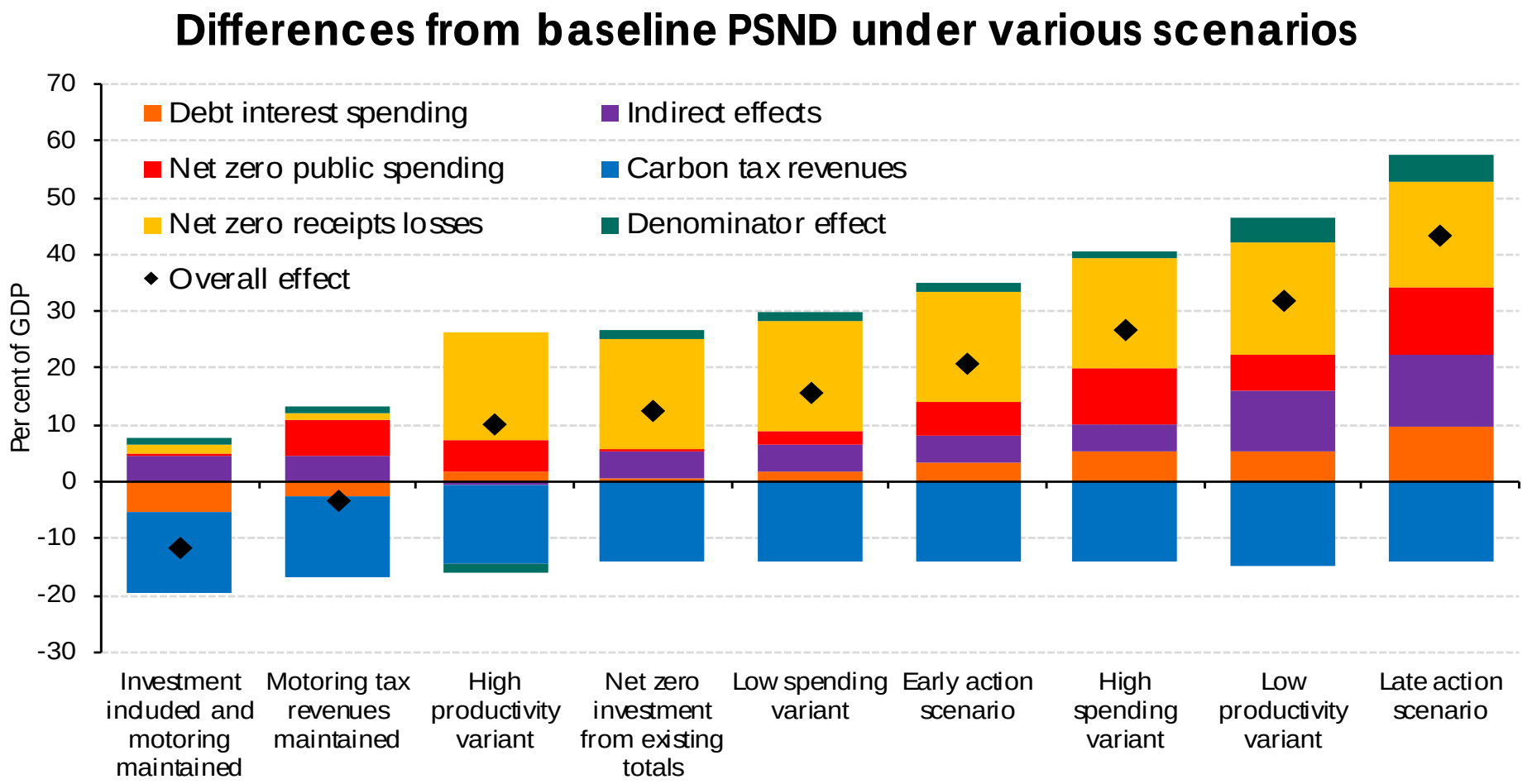
Source: OBR

Summary of climate-related scenario assumptions

	Real GDP (per cent deviation from baseline)	CCC scenario for whole economy costs[1]	OBR public spending share variant	OBR carbon-related revenue loss variant	OBR carbon tax variant
Early action scenario	-1.4	Balanced	Central	Central	Early
Late action scenario	-4.6	Late	Late	Headwinds	Late
High productivity variant	1.6	Balanced	Central	Central	Early
Low productivity variant	-4.4	Balanced	Central	Central	Early
High spending variant	-1.4	Balanced	High	Central	Early
Low spending variant	-1.4	Balanced	Low	Central	Early
Net zero investment from existing totals	-1.4	Balanced	Central	Central	Early
Motoring tax revenues maintained	-1.4	Balanced	Central	Central	Early
Investment included and motoring maintained	-1.4	Balanced	Central	Central	Early

[1] 'Balanced' is the balanced net zero pathway

Alternative fiscal scenarios toward net zero



Source: OBR

Conclusions

- Between now and 2050, the fiscal costs of reducing net emissions to zero in the UK could be **significant but not exceptional**.
- The largest fiscal cost of achieving net zero is the **loss of fuel duty receipts**.
- The UK has made good progress in reducing emissions, but there are greater challenges ahead.
- There could be significant fiscal benefits from transitioning to net zero sooner rather than later, not least the additional revenues that would come from taxing all emissions at higher rates.
- The costs of failing to get climate change under control would be much larger than those of bringing emissions down to net zero.

Reflections

- This work has built on work from two other independent bodies.
  - Each has made their own assumptions.
  - Each has produced this work for their own purpose.
- By piecing them together, we have had to make many assumptions to try to be internally consistent.
- As a non-policy and non-advisory body, we are well placed to publish best guesses on fiscal shares of the overall cost and the carbon tax rate required.
- The uncertainty around any of these individual paths is large.

October 2021: Measures in budget, spending review and net zero strategy

- Transparency – not just 'good news' but emissions increasing decisions
- Only able to show change in fiscal aggregate (£bn), not change in net emission (C02e)
- Difficult to compare gross spending with net from FRR
- Spending focused on public sector estate or innovation,

	£ billion						
	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	Total
Emissions-reducing spending	4.4	5.5	8.0	7.7			25.5
of which:							
Buildings	2.5	2.0	2.5	2.7			9.7
Transport	1.5	1.9	2.0	1.8			7.2
Power	0.2	0.8	2.1	1.3			4.4
Net zero innovation	0.0	0.4	0.4	0.7			1.5
Industry, CCS and hydrogen	0.0	0.1	0.5	0.8			1.4
Natural environment and waste	0.1	0.2	0.6	0.4			1.3
Emissions-reducing tax reforms[1]		0.0	0.0	0.0	0.0	0.0	0.0
of which:							
Business rates relief		0.0	0.0	0.0	0.0	0.0	0.1
APD higher rate for long haul		0.0	0.0	0.0	0.0	0.0	-0.1
Emissions-increasing tax reforms[1]		1.5	1.6	1.6	1.7	1.7	8.1
of which:							
Fuel duty freeze		1.5	1.6	1.6	1.6	1.6	7.9
APD lower rate for domestic		0.0	0.1	0.1	0.1	0.1	0.3

[1] Some other tax measures that could affect emissions have not been included because their effects are small, temporary or uncertain.

Next steps

1. Short run forecast
    - Develop our UK Emissions Trading Scheme and Electric Vehicle forecasts. Need to improve regardless of climate change fiscal risk!
2. Long run forecast baseline
    - Adaptation cost - damage in GDP growth from global emission stock. What forecasts to use for conditioning assumption?
    - Transition cost - loss of motoring taxes
3. Understand emissions and proactively prepare for policy changes e.g. ETS expansion

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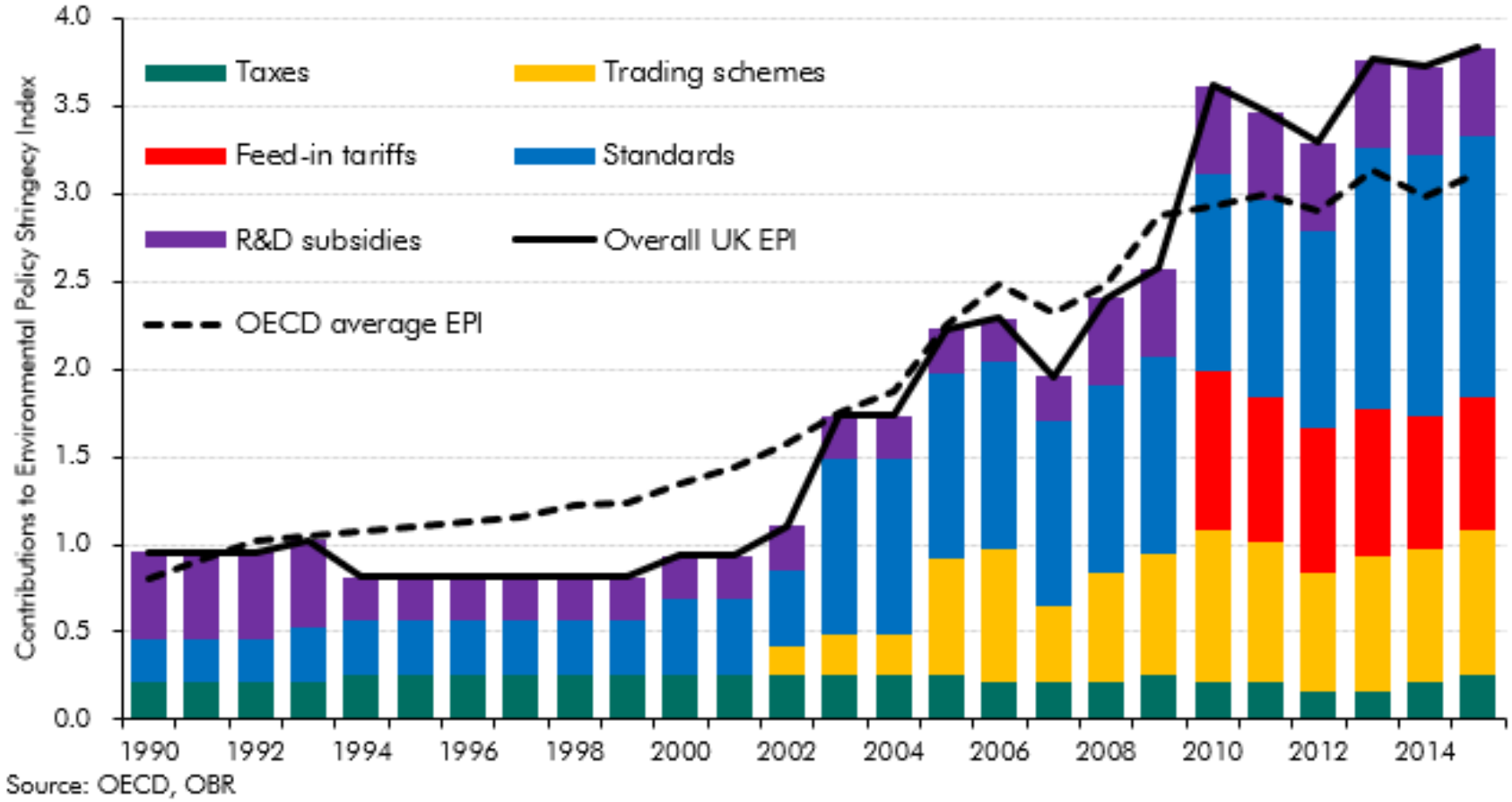
Questions?

Annex – selected charts and tables from the report

OECD environmental policy stringency index for the UK

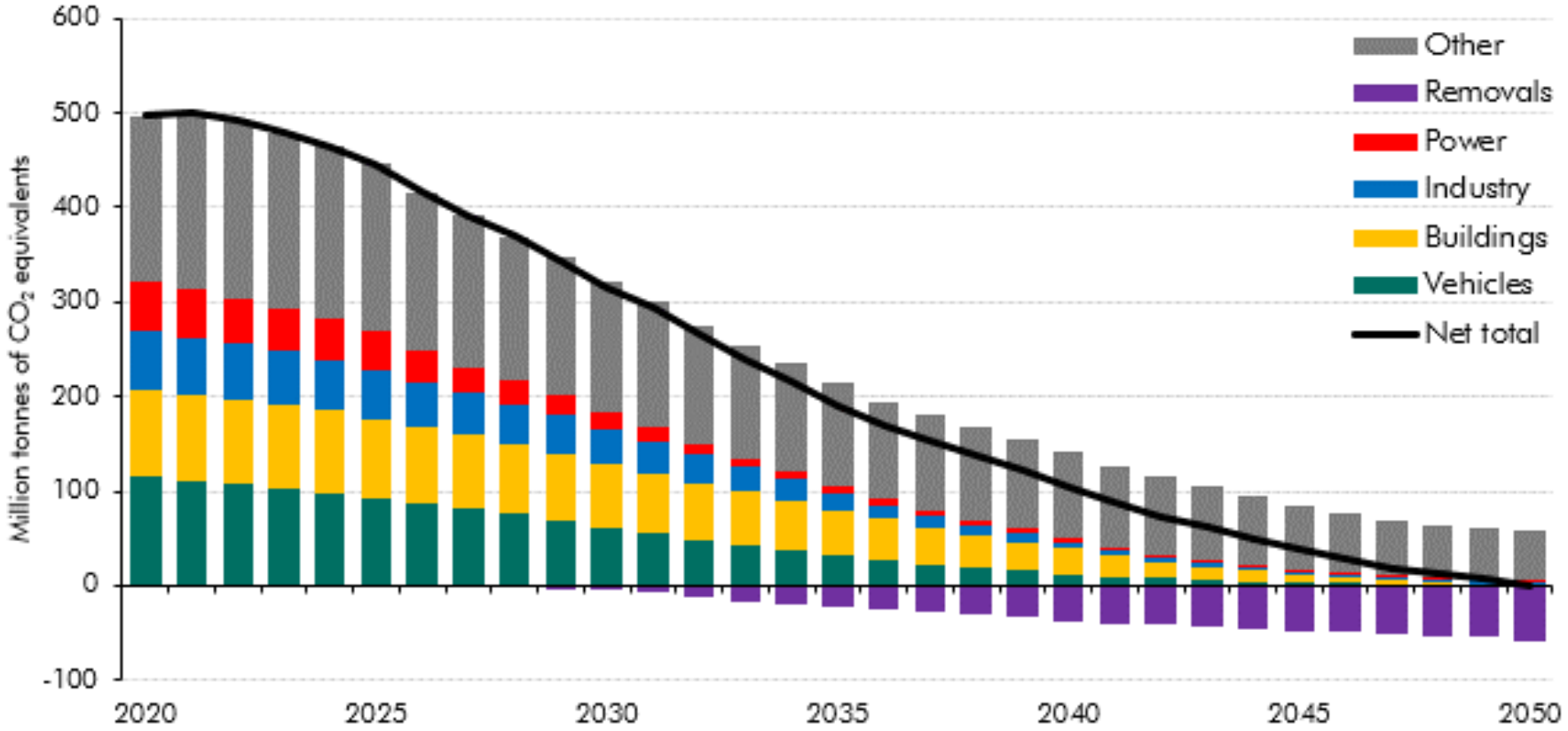


Source: OECD, OBR

Selected assumptions on the CCC's different net zero scenarios

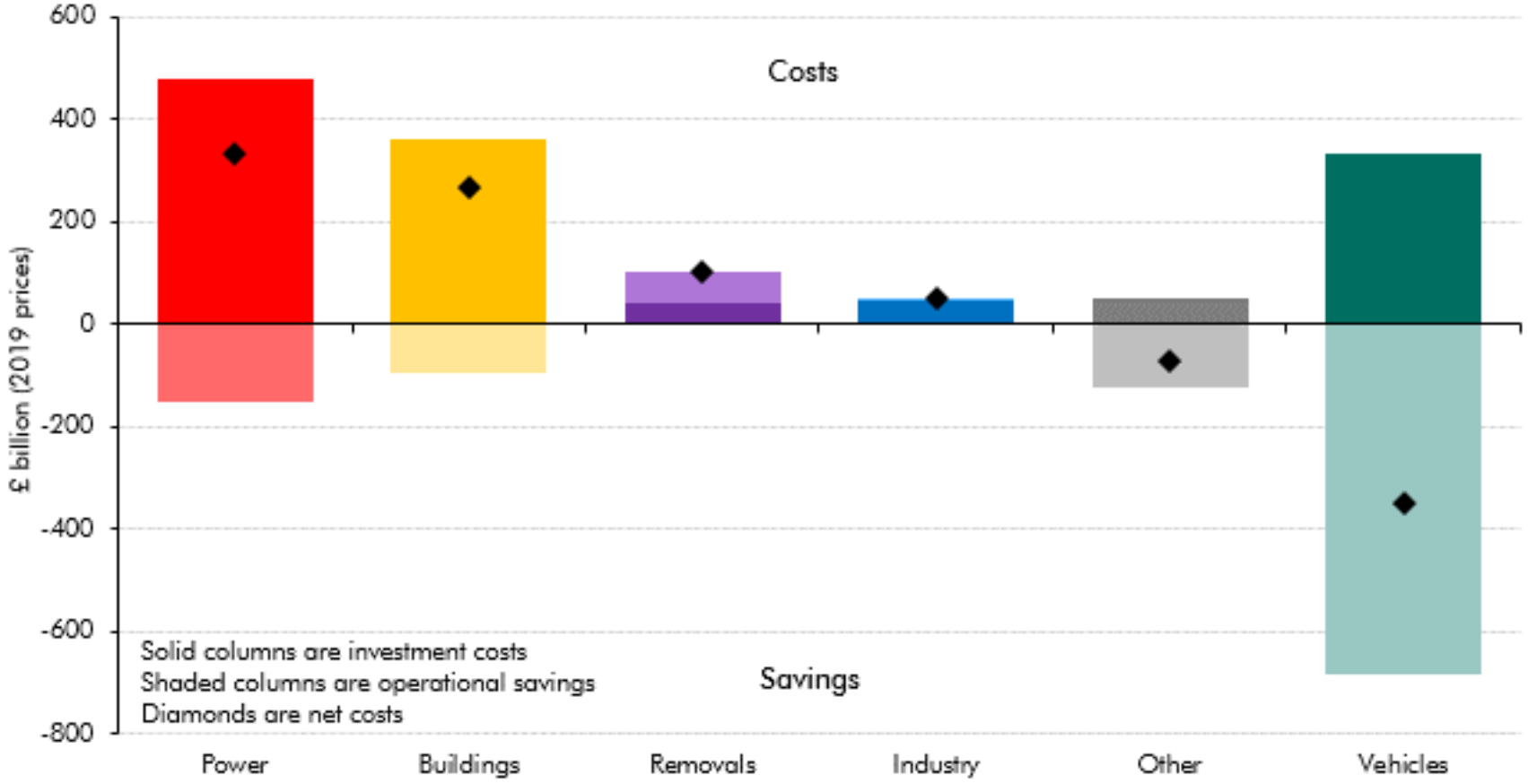
	Tailwinds	Balanced net zero pathway	Headwinds
Transport	• Electric vehicles (EVs) reach 100 per cent of sales in 2030 • Electric and hydrogen (H2) HGVs	• EVs reach 100 per cent of sales in 2032 • Lowest cost HGVs deployed	• EVs reach 100 per cent of sales in 2035 • H2 HGVs
Buildings	• Buildings fully electrified outside of industrial clusters • 11 per cent of homes use H2 for heat	Mixed scenario • 11 per cent of homes use H2 for heat • Electrified heat network	• 71 per cent of homes uses H2 for heat • H2 heat networks
Power	• 90 per cent of electricity from renewables	• 80 per cent of electricity from renewables	• 75 per cent of electricity from renewables • Lower power demand due to H2 use in homes
Industry	• Electrification and green H2 • Higher CCS capture rates	• Balanced H2 (mix of blue and green) and electrification	• More H2 (blue) than electrification • Wider CCS use
Removals	• More BECCS in power and H2 production • Large DACCS utilisation	• BECCS in power, H2, biojet, energy-from-waste and industrial heat • Some DACCS utilisation	• More BECCS across sectors • No DACCS
Other	• 50 per cent reduction in meat and dairy • 70,000 hectares per year trees planted by 2035 • 15 per cent reduction in flying, with 95 per cent use of low-carbon fuels	• 20 per cent reduction in dairy and 35 per cent reduction in meat • 30,000 hectares per year trees planted to 2025, 50,000 after 2035 • 25 per cent growth in aviation with 25 per cent use of low-carbon fuels	• 20 per cent reduction in meat and dairy • 30,000 hectares per year of trees planted • 25 per cent growth in aviation with 20 per cent use of low-carbon fuels

CCC balanced pathway for reduction in emissions by sector



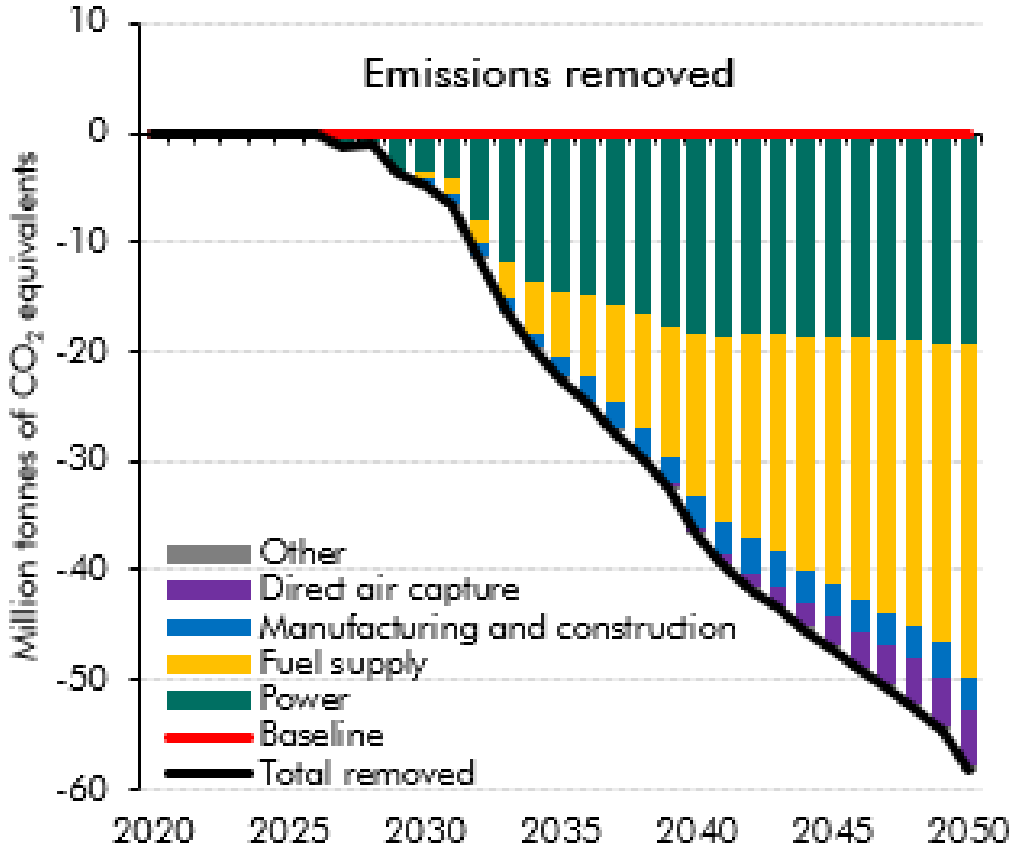
Note: The CCC reports emissions on a slightly different basis to BEIS. Emissions shown here include emissions from international aviation and shipping and are reported on the basis set out in the IPCC's Fifth Assessment Report, including peatlands.
Source: CCC balanced net zero pathway

Whole of economy transition costs by sector over 30 years

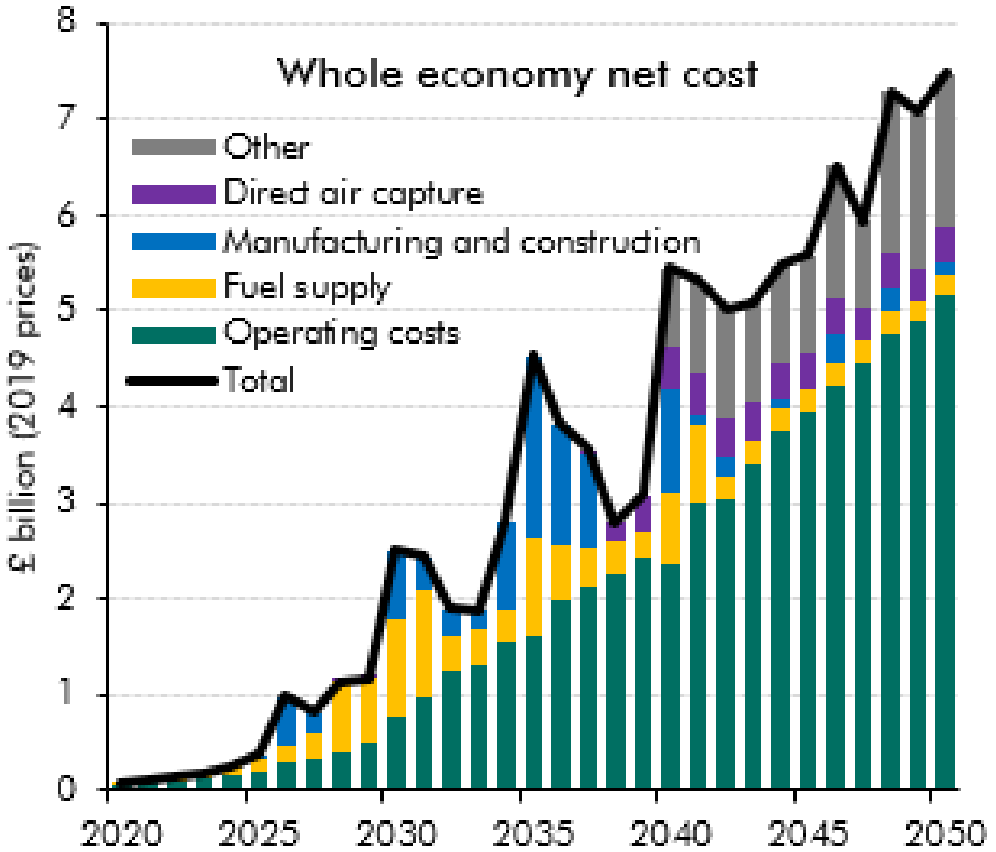


Source: CCC balanced net zero pathway

Negative emissions and whole economy costs from the removals sector



Source: CCC balanced net zero pathway, OBR

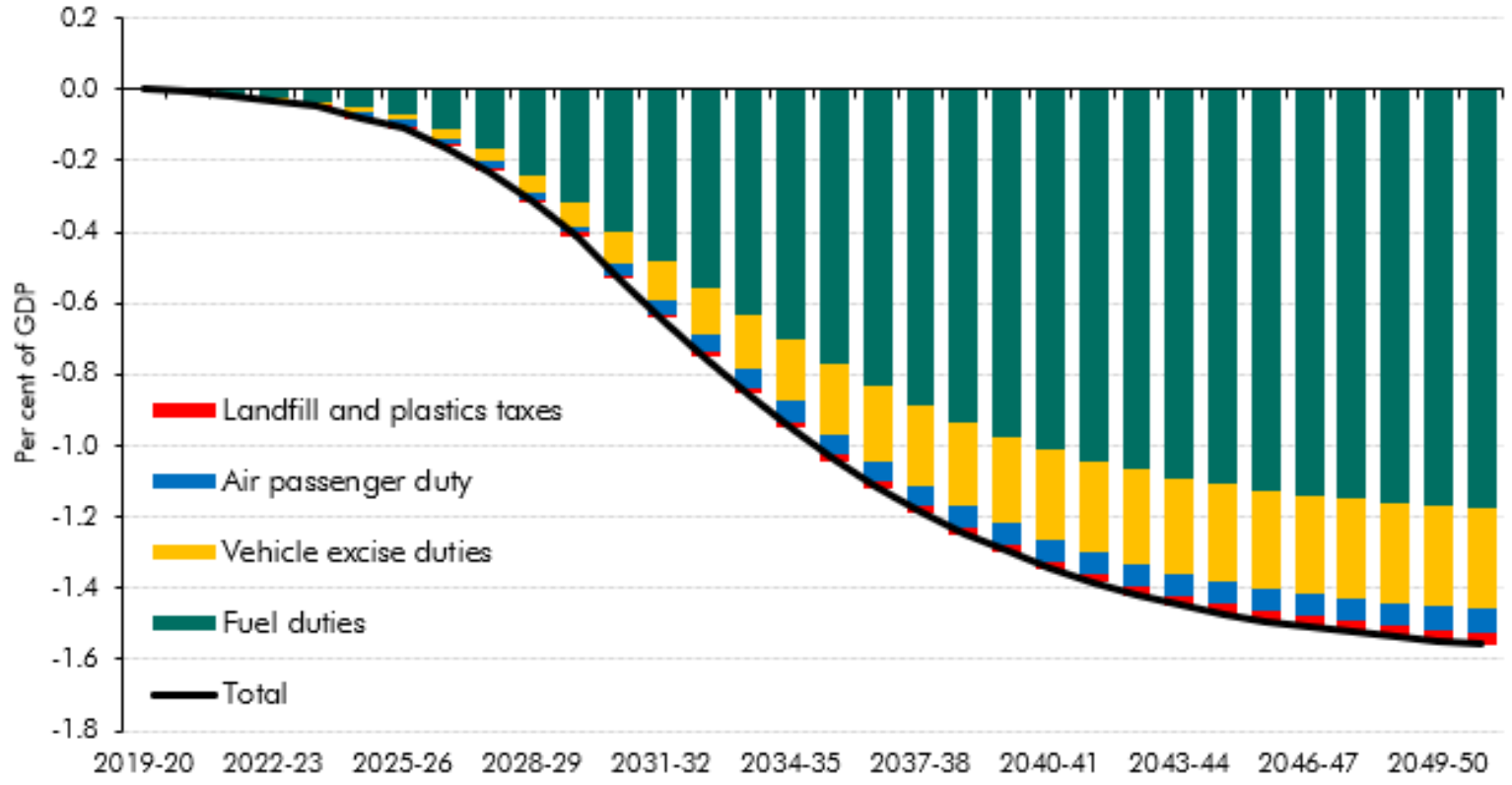


Source: CCC balanced net zero pathway

The share of costs borne by public spending

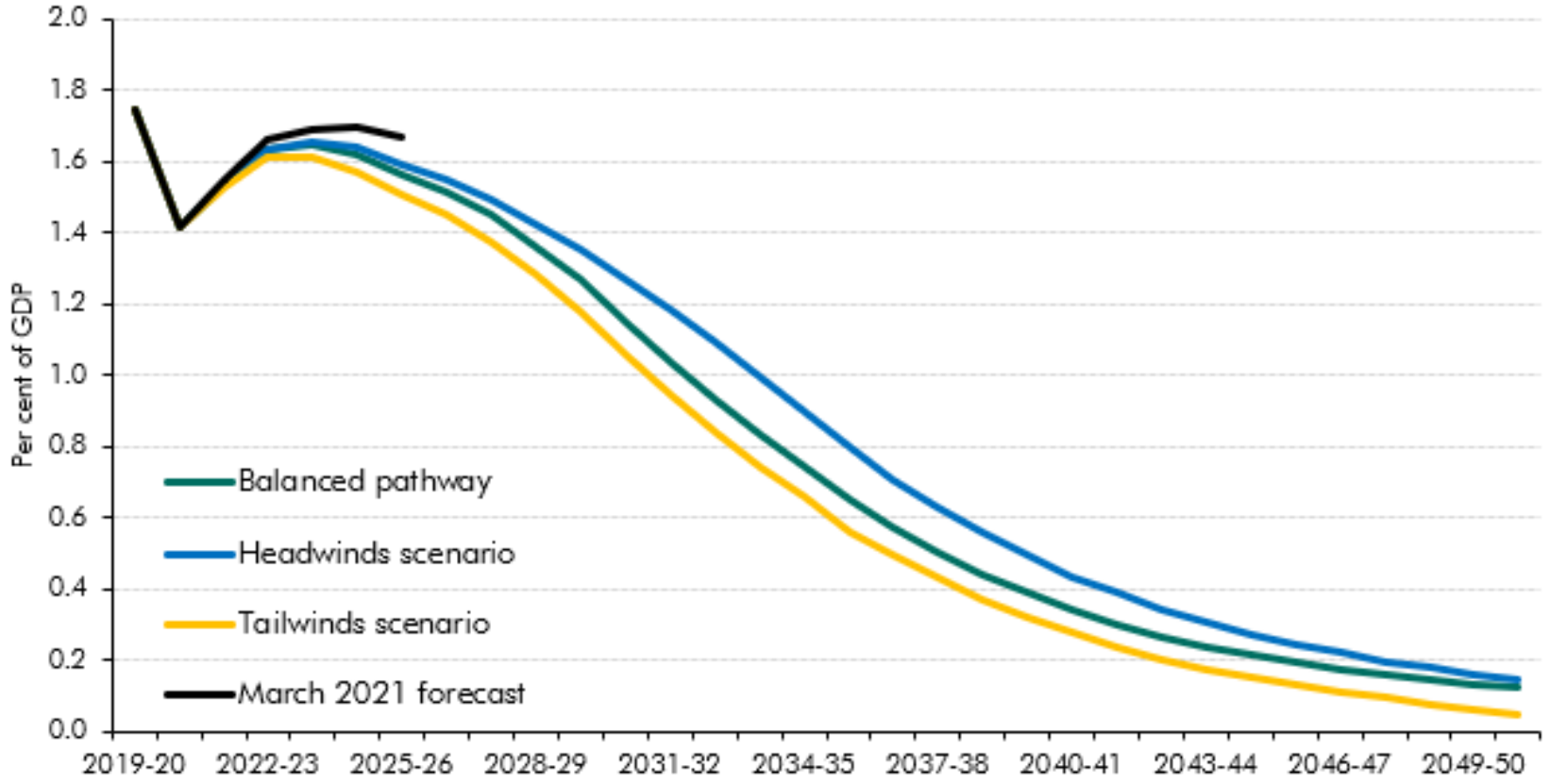
	Whole economy cost/saving £ billion (2019 prices)	Public share of costs (per cent)									
		2020s			2030s			2040s			Total
		Low	Central	High	Low	Central	High	Low	Central	High	Central
Costs											
Vehicles											
Cars	213	11	**11**	20	3	**3**	13	3	**3**	3	**6**
Car infrastructure	35	20	**29**	70	20	**20**	60	20	**20**	50	**21**
Other vehicles	69	71	**85**	94	25	**62**	85	0	**39**	76	**52**
Other infrastructure	15	25	**50**	75	25	**50**	75	25	**50**	75	**50**
Total	**332**	16	**18**	28	11	**21**	38	6	**18**	33	**19**
Buildings											
Residential	254	7	**44**	81	7	**44**	81	7	**44**	81	**44**
Non-residential	142	28	**43**	54	27	**42**	52	25	**43**	58	**42**
Total	**396**	15	**43**	70	14	**43**	71	13	**44**	73	**45**
Power	481	4	**7**	10	0	**5**	10	0	**5**	10	**6**
Industry	46	24	**54**	89	21	**42**	77	19	**31**	66	**38**
Removals	101	85	**89**	93	69	**75**	81	50	**59**	67	**64**
Other	52	59	**72**	84	41	**58**	75	30	**50**	65	**60**
Total costs	**1408**	**15**	**26**	**40**	**12**	**27**	**43**	**12**	**26**	**42**	**27**
Savings											
Vehicles	-684	3	**3**	3	3	**3**	3	3	**3**	3	**3**
Buildings	-131	5	**5**	5	5	**5**	5	5	**5**	5	**5**
Other	-272	1	**1**	1	1	**1**	1	1	**1**	1	**1**
Total savings	**-1086**	2	**2**	2	3	**3**	3	3	**3**	3	**3**
Memo: Net cost (£ billion)	321	46	84	128	58	138	226	45	113	189	***344***

Loss of motoring, aviation and waste revenues in the balanced pathway



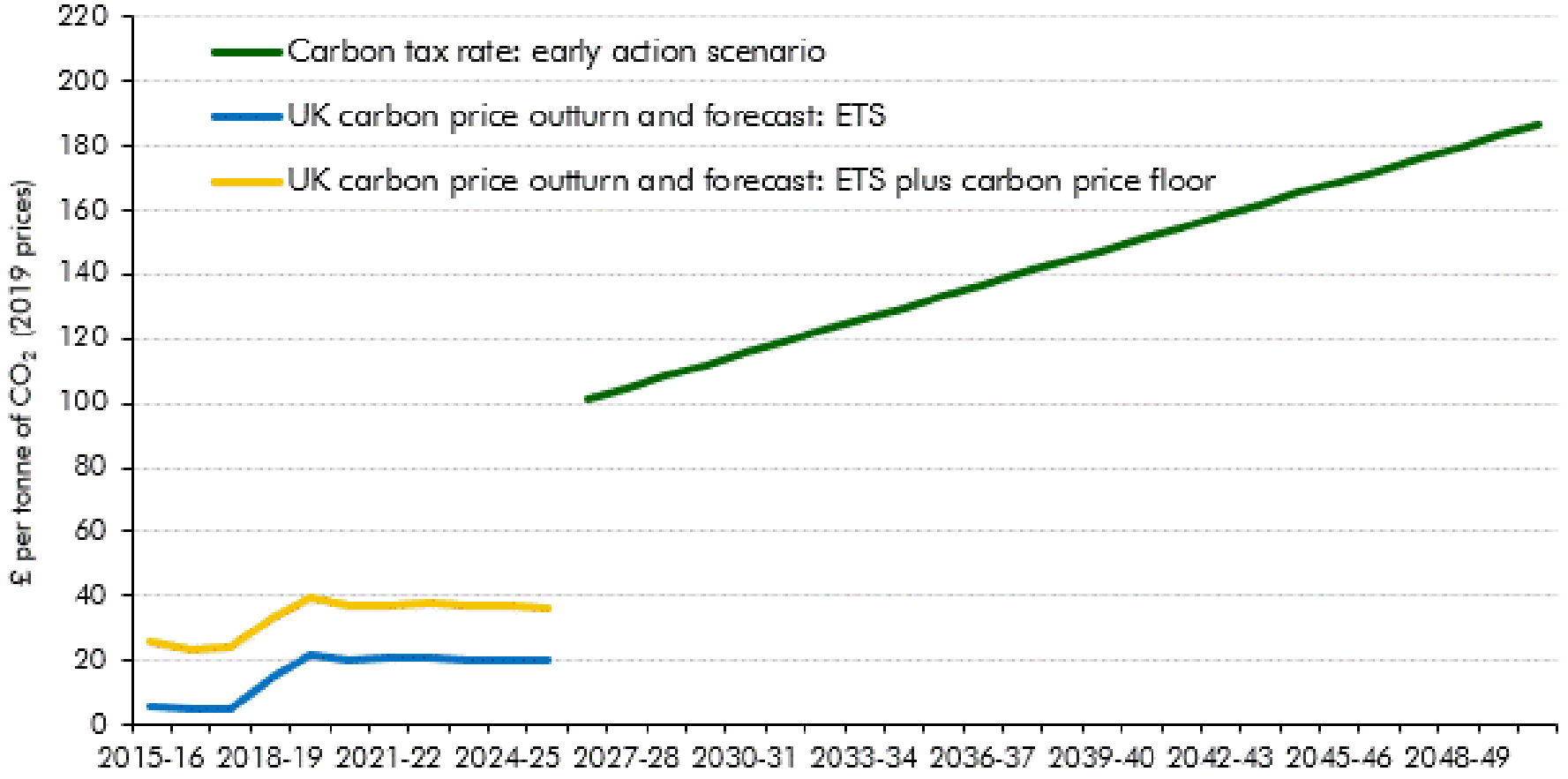
Source: ONS, OBR

Motoring, aviation and waste tax revenues under alternative scenarios



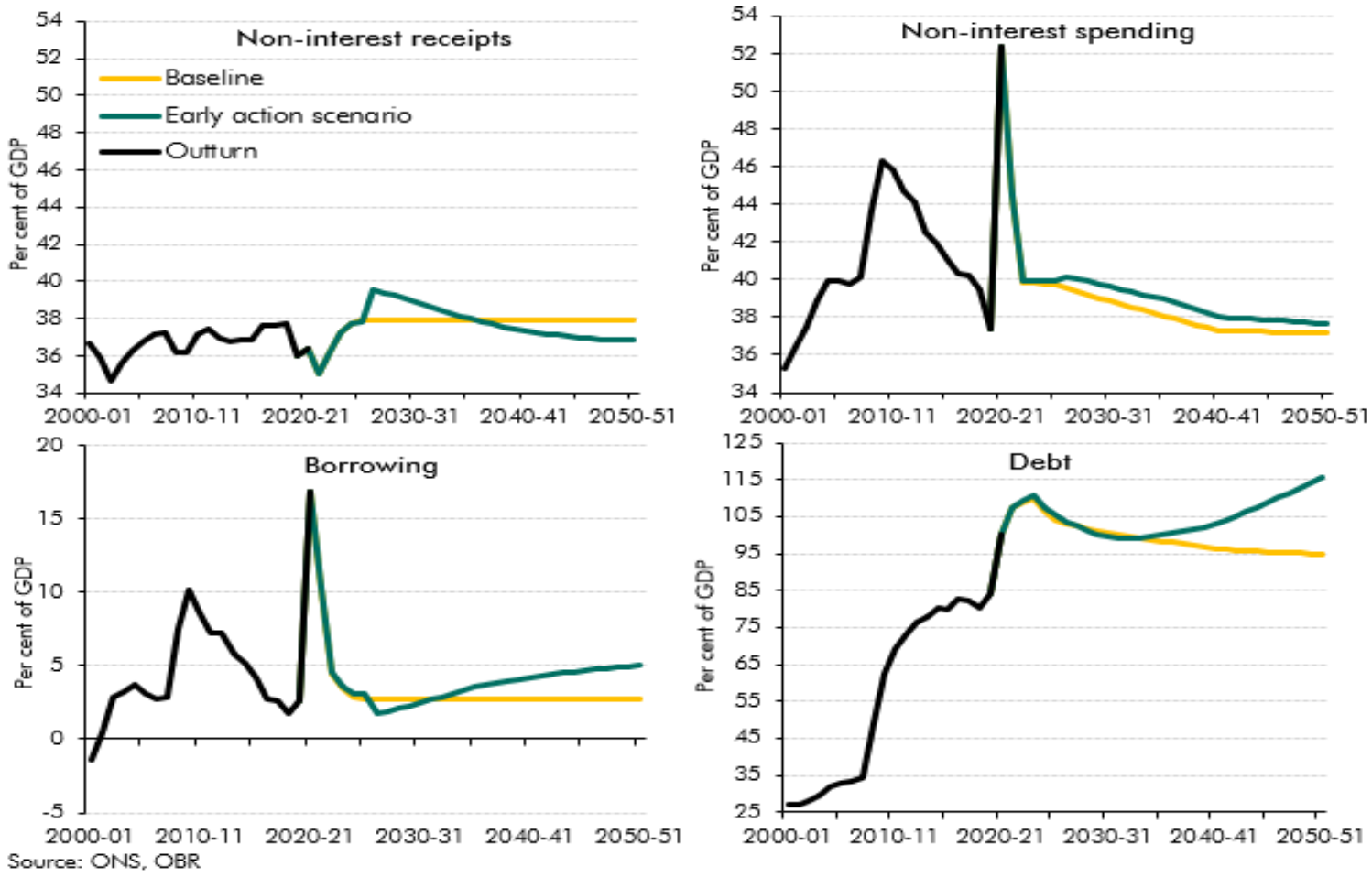
Source: ONS, OBR

Real-terms carbon tax rates: outturn and scenario assumption



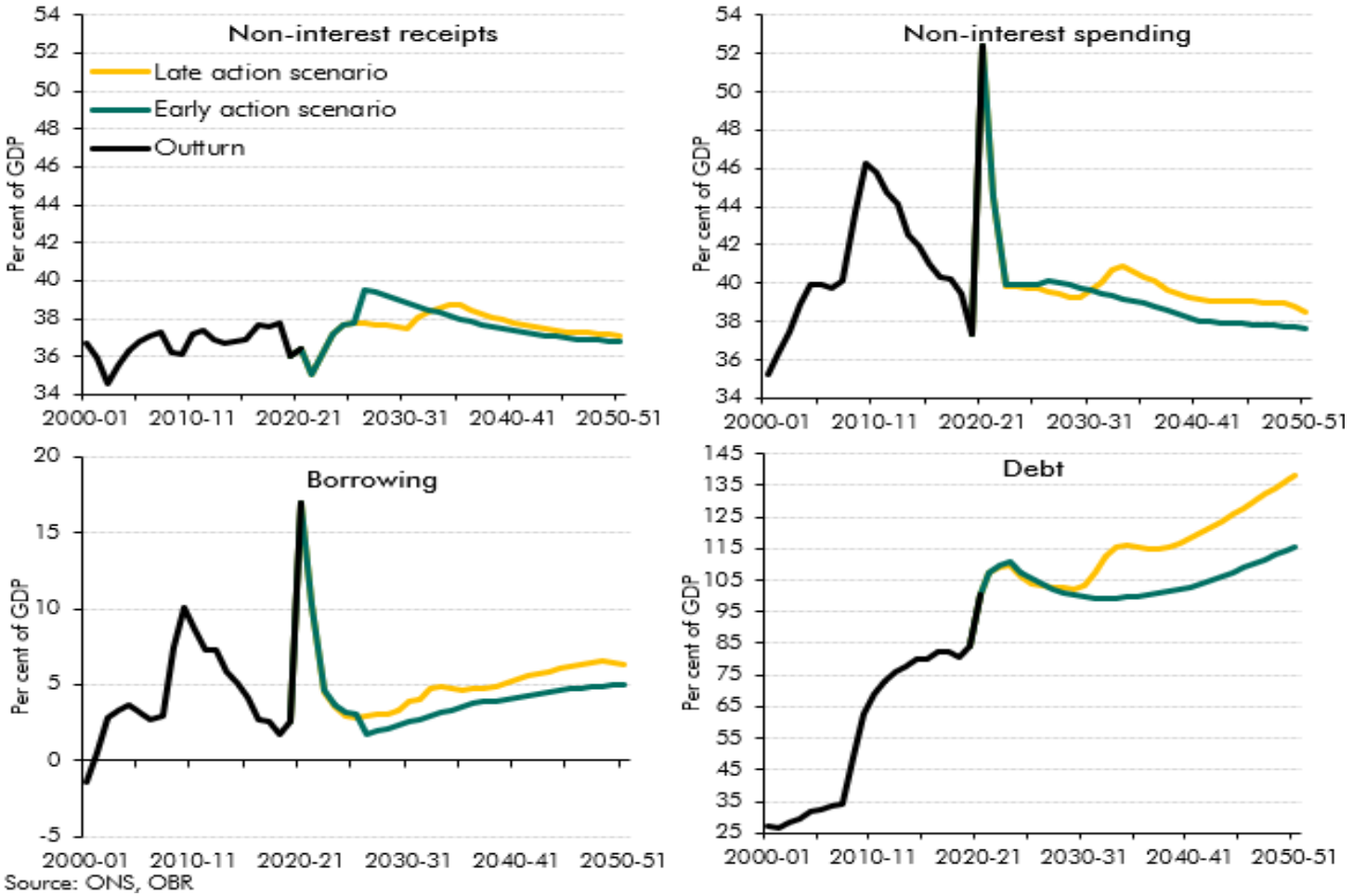
Source: Bank of England, Datastream, HMRC, OBR

Early action scenario: key fiscal aggregates



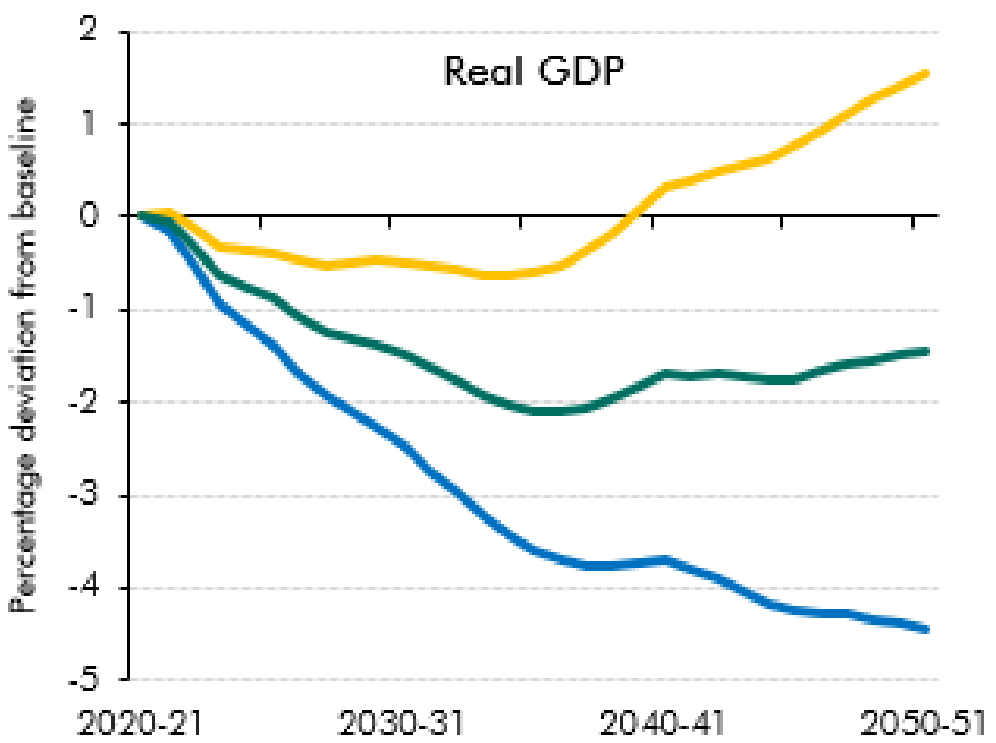
Source: ONS, OBR

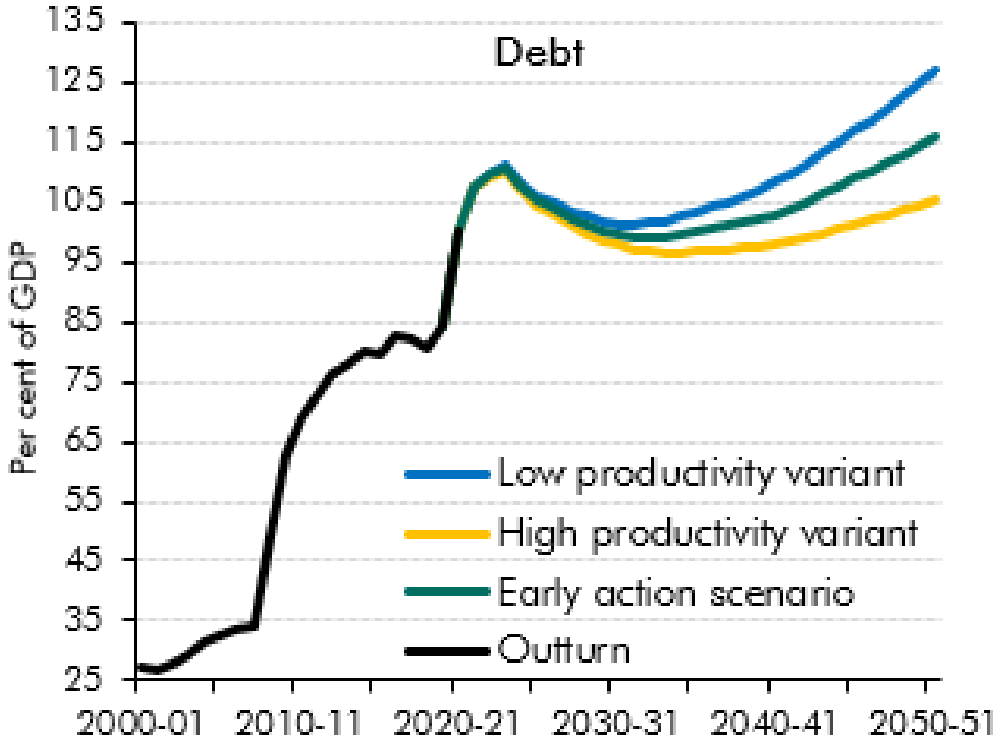
Early action versus late action scenarios: fiscal aggregates



Source: ONS, OBR

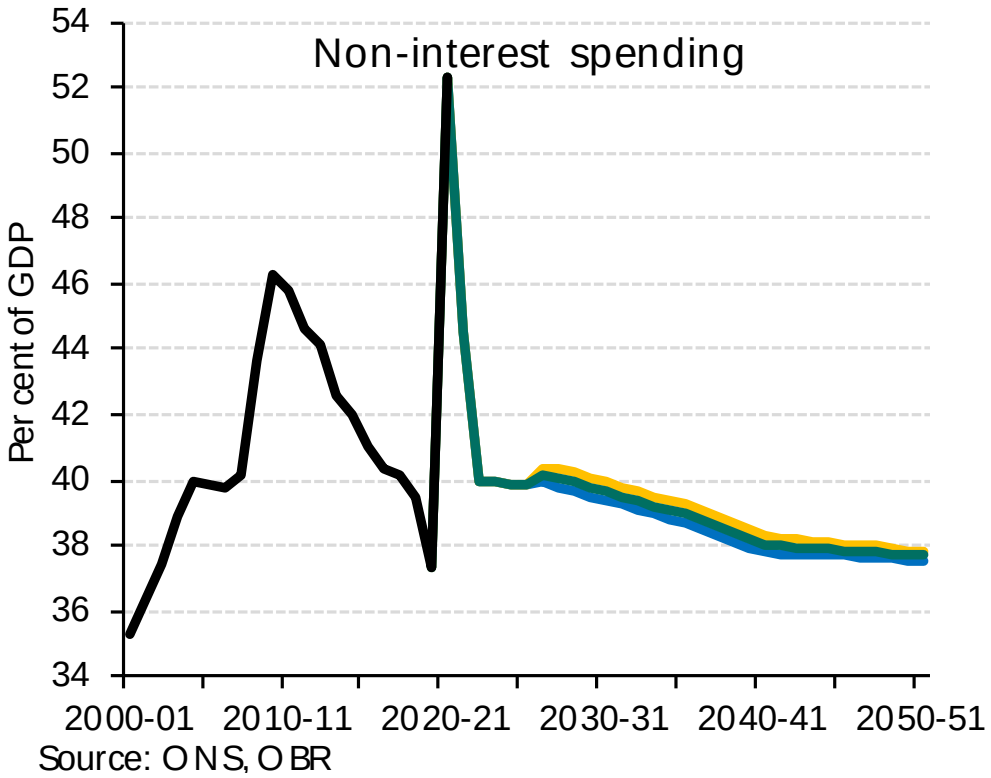
Alternative productivity variants: real GDP and the debt-to-GDP ratio



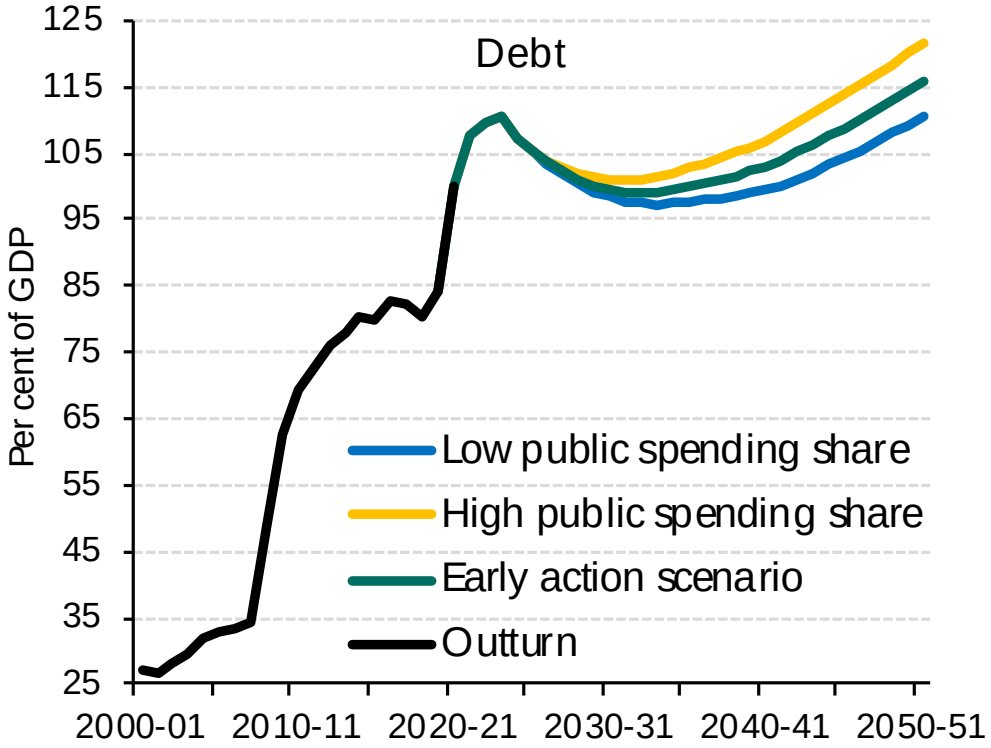


Source: ONS, OBR

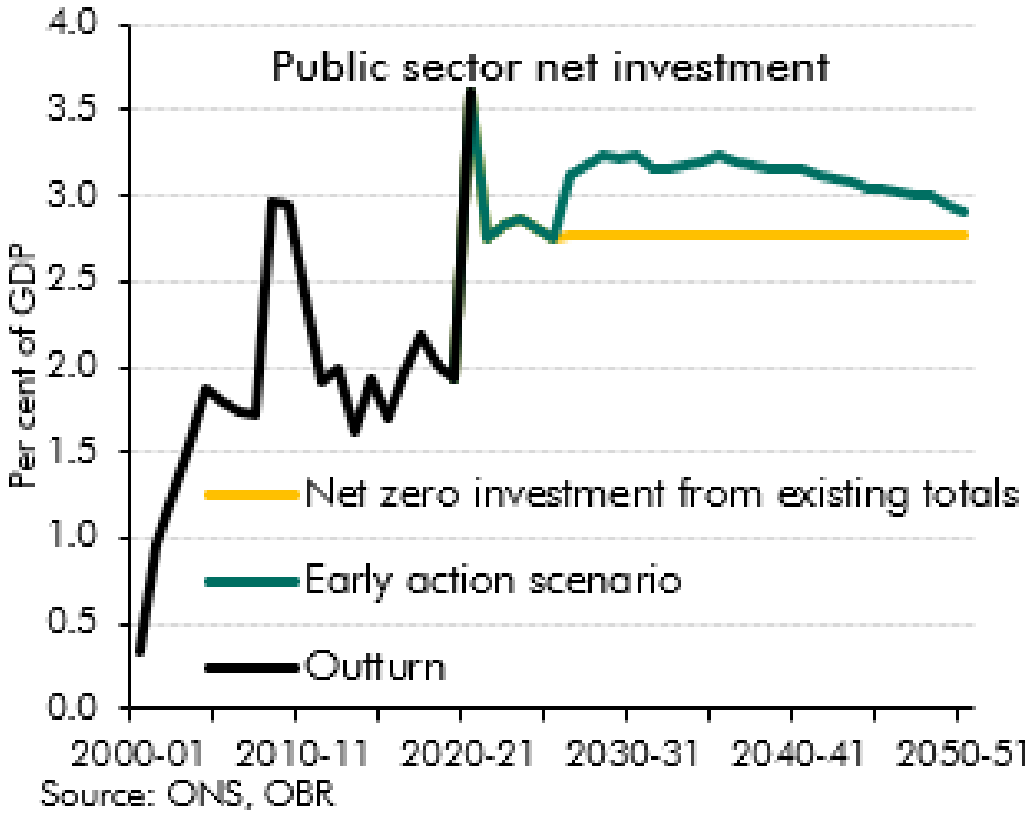
Net zero public spending variants: spending and debt-to-GDP ratios



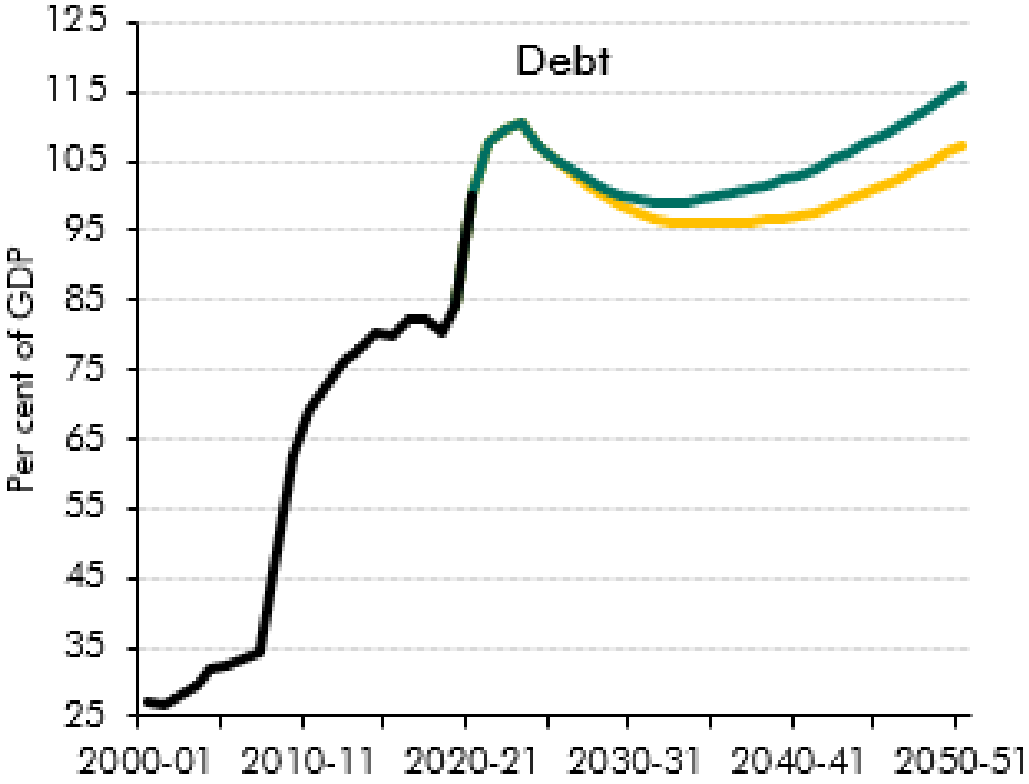
Source: ONS, OBR



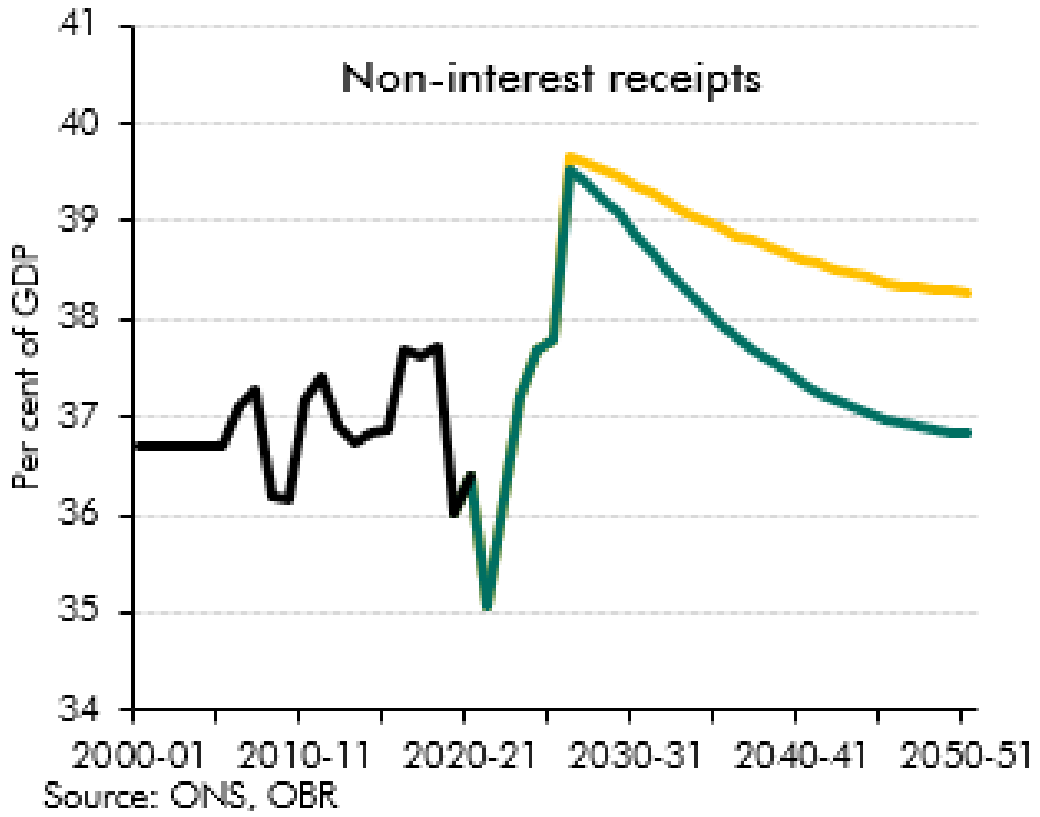
Public investment additionality sensitivities



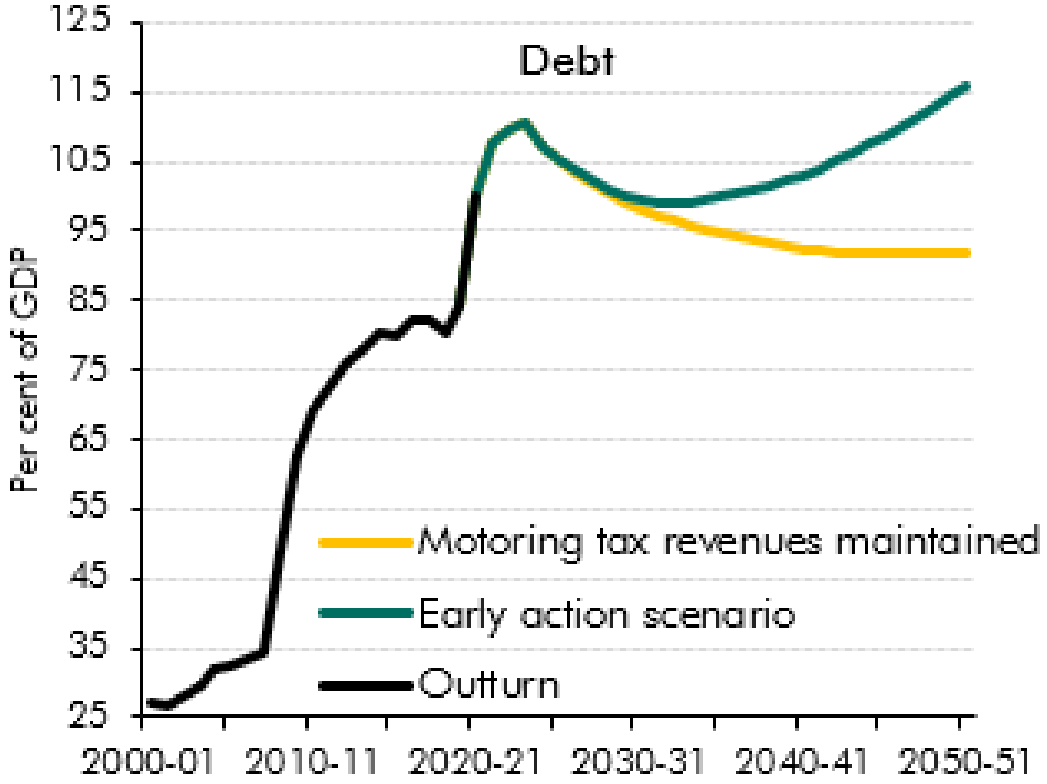
Source: ONS, OBR



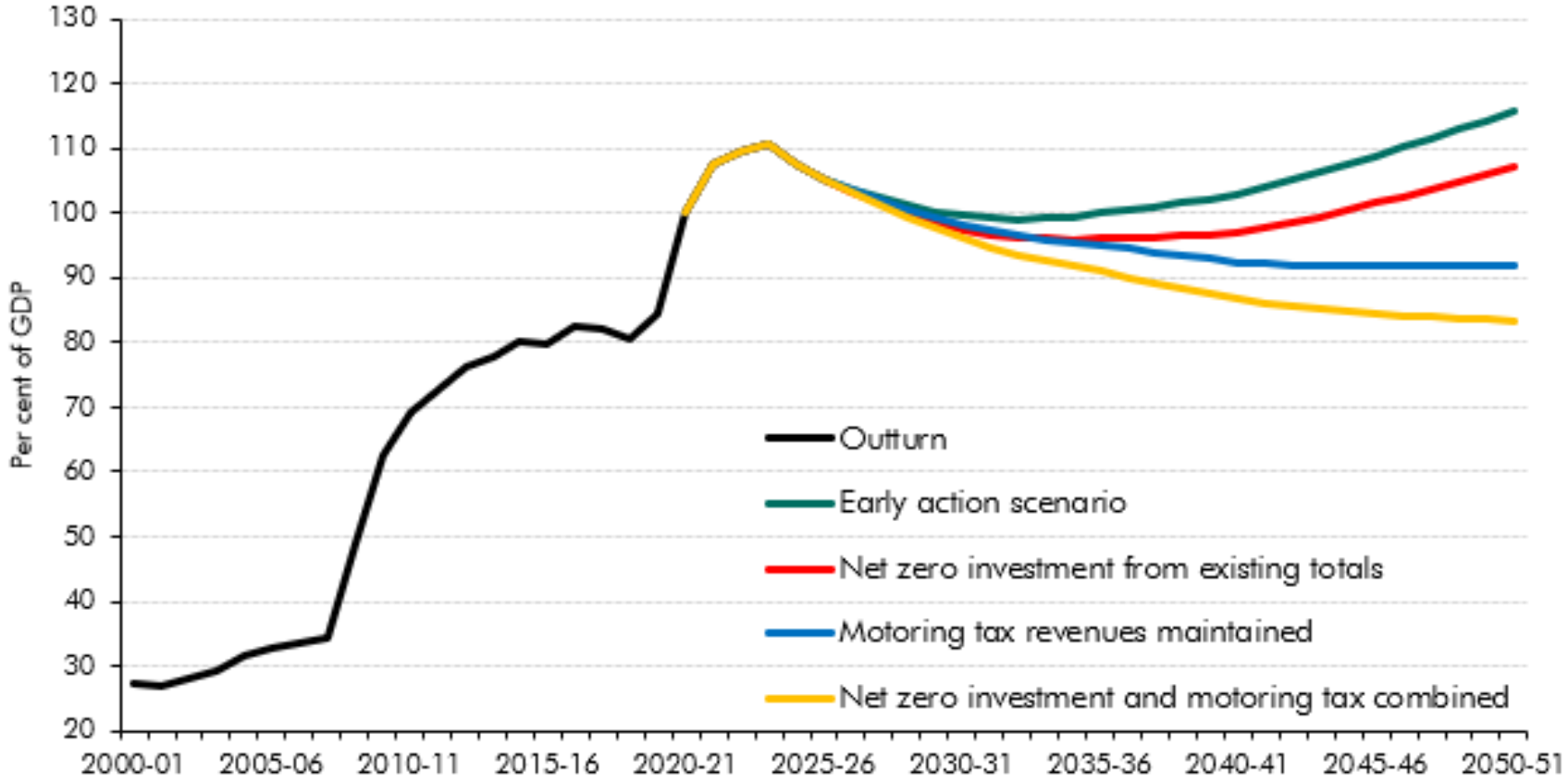
Motoring tax sensitivities



Source: ONS, OBR

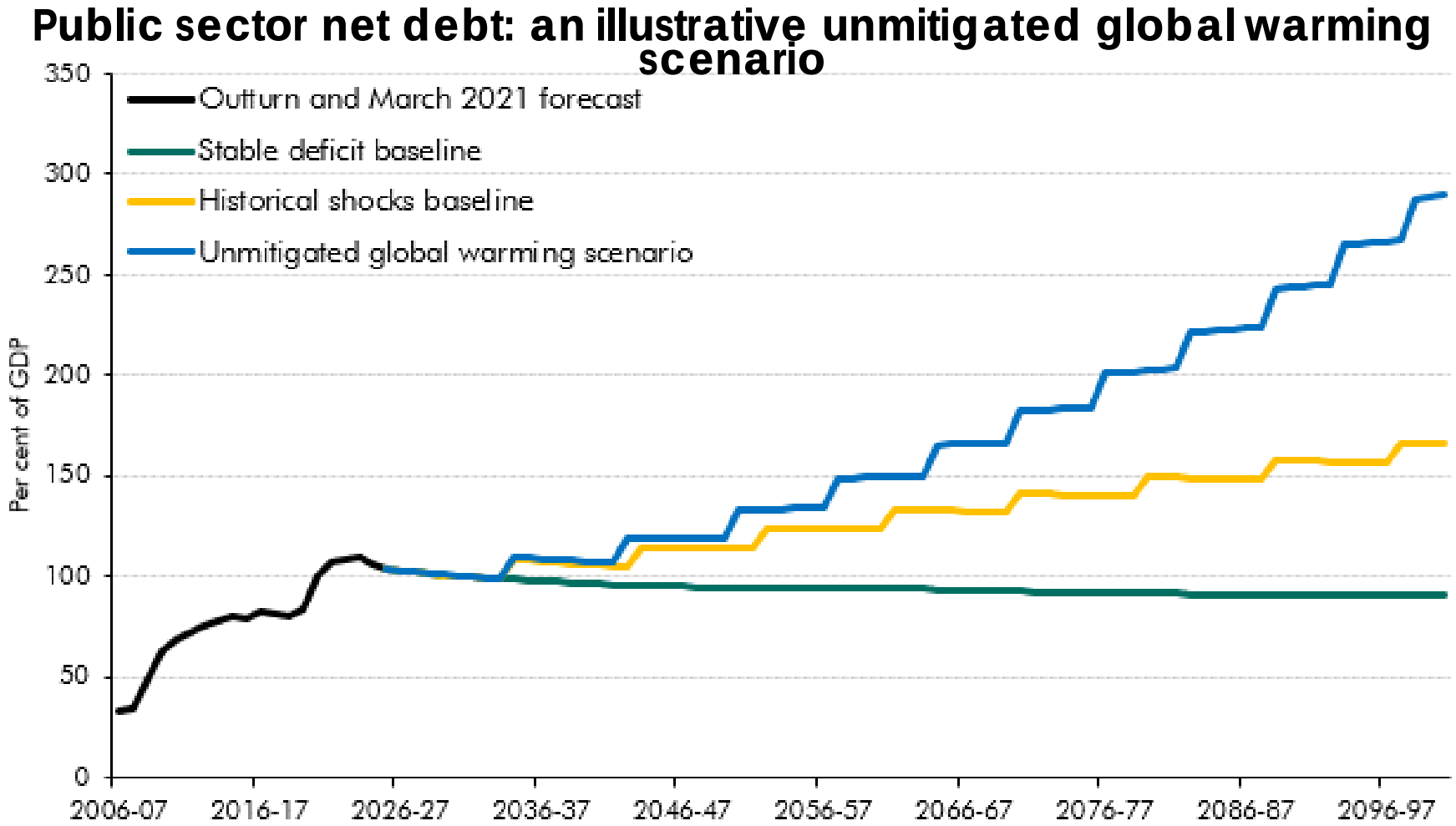


Long-term policy assumption sensitivities: debt-to-GDP ratio



Source: ONS, OBR

Unmitigated climate change



Source: ONS, OBR