Briefing

The Cost of Net Zero

By David Turver

13 January 2026

Summary

- Since 2019, there have been many attempts to put a cost on achieving net zero by 2050, with wildly different results.

- The Climate Change Committee (CCC) has repeatedly revised down its estimates for the costs of net zero. From an initial cost estimate of £1.5 trillion for an 80% reduction in carbon emissions by 2050, the CCC now suggests that the cost of achieving net zero in the 2025–50 period will be 'just' £108 billion. However, this dramatic reduction in costs relies on some heroic estimates of the cost of renewables and other low-carbon technologies.

- The CCC's low estimates for the cost of renewables and low-carbon technologies, with correspondingly low costs of capital, mean they dramatically underestimated the cost of net zero and overestimated the alleged operating cost savings.

- The cost of net zero is highly likely to be above the 2020 estimate of roughly £3 trillion from the National Electricity System Operator (NESO), and could even be above this year's attempt, which calculated gross cash costs of £7.6 trillion or over £9 trillion including the carbon costs of emissions.

- If we are to have a serious debate about net zero, the various public bodies need to be more transparent and frankly more honest, both about the upfront costs and their assumptions about the operational savings that net zero will bring.

About the author

David Turver is a retired consultant, project management professional, and engineer who writes about net zero and energy policy. He is the author of the Eigen Values Substack.

This publication has been blind peer-reviewed by academics or researchers who are experts in the field.

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Foreword

In 2008, the UK Parliament passed the Climate Change Act, an ambitious piece of legislation which committed the country to reducing CO_2 emissions by at least 26% (relative to their 1990 level) over the next 12 years, and by at least 80% over the next 42 years. Although it implied substantial economic costs, it was adopted with near-unanimous support: only five MPs voted against it.

Climate change activists had achieved a near-total victory. Not only had they elevated climate change from a niche concern to a national and international top priority over the course of just a few years, but they had also secured near-unanimous political support for their position, across all major political parties, media outlets and civil society organisations. They had defeated all of their opponents – not just climate change 'deniers' (of which there were never that many to begin with), but also people who accepted the findings of mainstream climate science and merely drew different policy conclusions from them. Climate policy had ceased to be the subject of political debate in the conventional sense. It is hard to think of another contemporary example where one side had so completely won the argument.

On its own terms, the UK's climate policy consensus worked. In 1990, the UK emitted a little over 600 million tonnes of CO_2, so a 26% reduction – the 2020 interim target – would mean cutting those emissions to below 445 million tonnes. That was achieved in 2014, six years ahead of schedule. In 2018, the tenth anniversary of the Climate Change Act, total emissions had already been cut by more than a third, relative to the 1990 benchmark level.

Environmentalists would have had every reason to be in a jubilant mood. They had won, and everything was going according to plan.

But then in late 2018, something strange happened. A new climate movement sprang up, which started from the premise that the Western world was not doing anything on climate change and that policymakers were not taking the issue seriously. At a time when Western governments were already pursuing extremely ambitious decarbonisation agendas, and when CO_2 emissions were already falling rapidly, these new climate activists acted as if none of that was happening.

The new wave of climate activism started in Sweden, where a youth movement sprang up around teenage activist Greta Thunberg. Within days, it spilled over to the Netherlands, Belgium, Germany and Switzerland, and a few months later, the UK had its own version of it. The Extinction Rebellion movement emerged in parallel. Throughout 2019, there were regular mass climate protests across the UK.

We are familiar with political movements which refuse to accept defeat, inviting comparisons with the remnants of the Imperial Japanese Army that continued to 'fight' World War II years after it had ended. But the new climate movement of the late 2010s represents something far more bizarre than that: a movement which refuses to accept its own victory. They had already won. They had won at least ten years before their movement was even set up. It was as if somebody founded a pro-Brexit movement today, insisting that Britain is still in the EU.

The most bizarre aspect of it all, though, was that the political class went along with it, and pandered to the movement. They must have known that, far from 'doing nothing' on climate change, they were already doing a huge amount, and at a huge cost. In a panicked rush, the UK Parliament declared a 'climate emergency' in May 2019, and since the Climate Change Act 2008 was apparently all of a sudden no longer good enough, in June 2019, it was superseded by what we now call 'net zero'.

Net zero was essentially a more absolutist version of the original 2008 Act. There was much to criticise about the latter, but at least it was subject to parliamentary debate and scrutiny. Net zero, though, appeared to be the result of a mass hysteria and a terror of being seen to be on the 'wrong side of history'. To say the very least, it was clearly not a response to any new scientific information that had suddenly emerged on climate change.

Why was there so little interest in the potentially enormous cost of this measure? It probably helped that the new climate movement, even more so than the old one, was at its core an anti-capitalist movement. They managed to create the impression that emitting CO_2 is something which benefits only a few large fossil fuel corporations and billionaires, but which the average consumer has nothing to do with. If that were so, the flipside would be that those fossil fuel corporations and billionaires are the only ones who will feel the cost of net zero, while the rest of us will barely notice.

Except – we clearly have started to notice.

So I asked energy expert David Turver what I wrongly thought was a simple question: what is net zero actually going to cost us?
It turns out that nobody really knows. There have been a variety of estimates, but they differ wildly from one another, and as Turver shows in this paper, there are good reasons to believe that the truth is closer to the more pessimistic end of the spectrum (if not beyond).

The fact that realistic cost estimates are so hard to come by, and that proponents of net zero show no interest in them, is in itself telling us something. But as the cost of net zero is starting to bite, that question will only become more pertinent.

KRISTIAN NIEMIETZ
Editorial Director, Institute of Economic Affairs
London, January 2026

Introduction

Since 2019, there have been many attempts to put a cost on net zero. These attempts vary in scope, approach and assumptions and so produce widely varying results. However, it is clear that achieving net zero will require massive investment with uncertain returns and any rational discussion of the merits or otherwise of net zero requires far more transparency and analysis from the various regulatory bodies. The purpose of this paper is to discuss the different approaches and identify the gaps in knowledge and data to support a proper public debate.

Philip Hammond and the Treasury

The first attempt at putting a cost on net zero came in a May 2019 letter from then Chancellor Philip Hammond to the prime minister, Theresa May. He appeared to be fighting a rearguard action against Theresa May's proposal to enshrine net zero in law by amending the Climate Change Act. Hammond warned that the total cost of transitioning to a zero-carbon economy was likely to be in excess of £1 trillion. The letter quoted estimates from the Climate Change Committee (CCC) of £50 billion per year and from BEIS of £70 billion per year. Over a 30-year period these estimates would amount to a cost of £1.5 trillion to £2.1 trillion.

The letter was prescient, warning of the extra costs of heat pumps and home insulation and that net zero could make energy-intensive industries uncompetitive. Hammond also warned that for this radical transformation to be successful, and before it is set in law, it would be essential to better understand the implications of setting a target that will shape our economy and society for a generation.

National Energy System Operator (NESO)

The second attempt at costing net zero came from NESO in 2020 when they were merely the National Electricity System Operator. Now they have been promoted to the National Energy System Operator and were brought under the direct control of the government in 2024.

NESO analysed the cost of its 2020 Future Energy Scenarios (FES) report. This report envisioned four scenarios: Consumer Transformation, System Transformation, Leading the Way, and Steady Progression. Leading the Way envisages the fastest rate of decarbonisation and the highest level of societal change and hits the net zero target earlier than 2050. Steady Progression means the slowest pace of decarbonisation and the smallest level of societal change and does not hit net zero by 2050.

By remarkable coincidence, the costs of each scenario are very similar at around £3 trillion (see Figure 1).

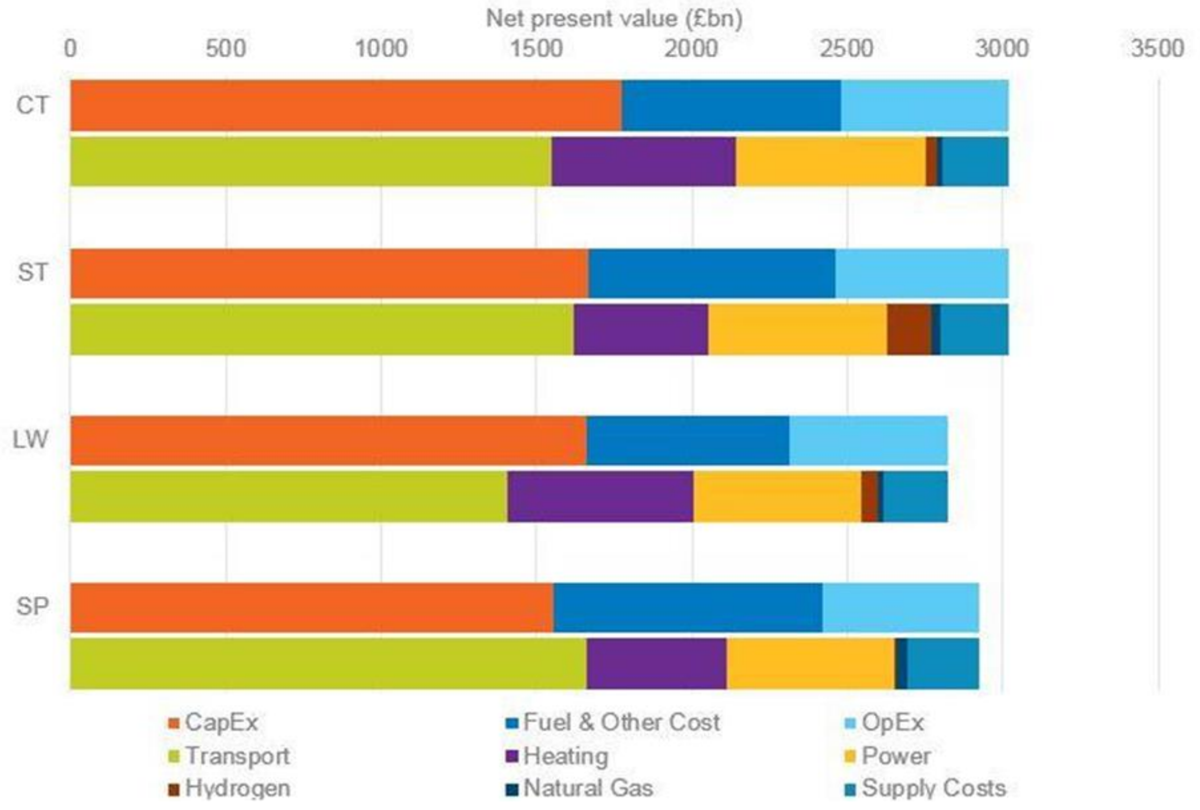

Figure 1: NESO analysis of net zero costs – December 2020

Both the System Transformation and Consumer Transformation scenarios were forecast to cost £3,020 billion. Steady Progression was cheaper at £2,930 billion, and, perhaps surprisingly, the most aggressive Leading the Way scenario was cheapest at 'only' £2,820 billion.

The costs estimated by NESO are far higher than the costs estimated by the CCC and BEIS. However, even these estimates conceal a sleight of hand. The earlier estimates were presented as gross costs arrived at by simply multiplying the annual costs by the number of years the costs will be incurred. The NESO costs are presented as a net present value. This method takes each year's cost and discounts it back to a present value because a pound in the future is worth less than a pound in the hand today. For instance, the net present value of £50 billion per year over 30 years at a discount rate of 5% is about £769 billion, or little over half the gross cost of £1,500 billion. NESO do not provide a time series of spending, nor the discount rate, so we cannot estimate the full gross costs, other than to say they will be considerably higher than £3 trillion, probably in the range of £5 trillion to £6 trillion (assuming £190 billion per year for 30 years at a discount rate of 5%).

Climate Change Committee Sixth Carbon Budget

The CCC has made several estimates of the cost of net zero. In 2015, they said the cost of meeting the then target of an 80% reduction in carbon dioxide emissions might be 1–2% of GDP. GDP in 2019 was about £2,500 billion, so this is the origin of Hammond's £50 billion per year estimate, giving rise to a total cost of about £1.5 trillion.

By the time of the sixth carbon budget (CB6) in 2020, the CCC had become more sophisticated. This time they acknowledge that the net zero transition will be capital intensive, with upfront spending that supposedly yields savings in fuel costs in later years. They estimate that the net costs of the transition (including upfront investment, ongoing running costs and the costs of financing) will be less than 1% of GDP over the period from 2020 to 2050.

They show the capital costs (see Figure 2) for their Balanced Pathway of £1,381 billion during the period 2020–50. This figure excludes operating costs and any offsetting savings.

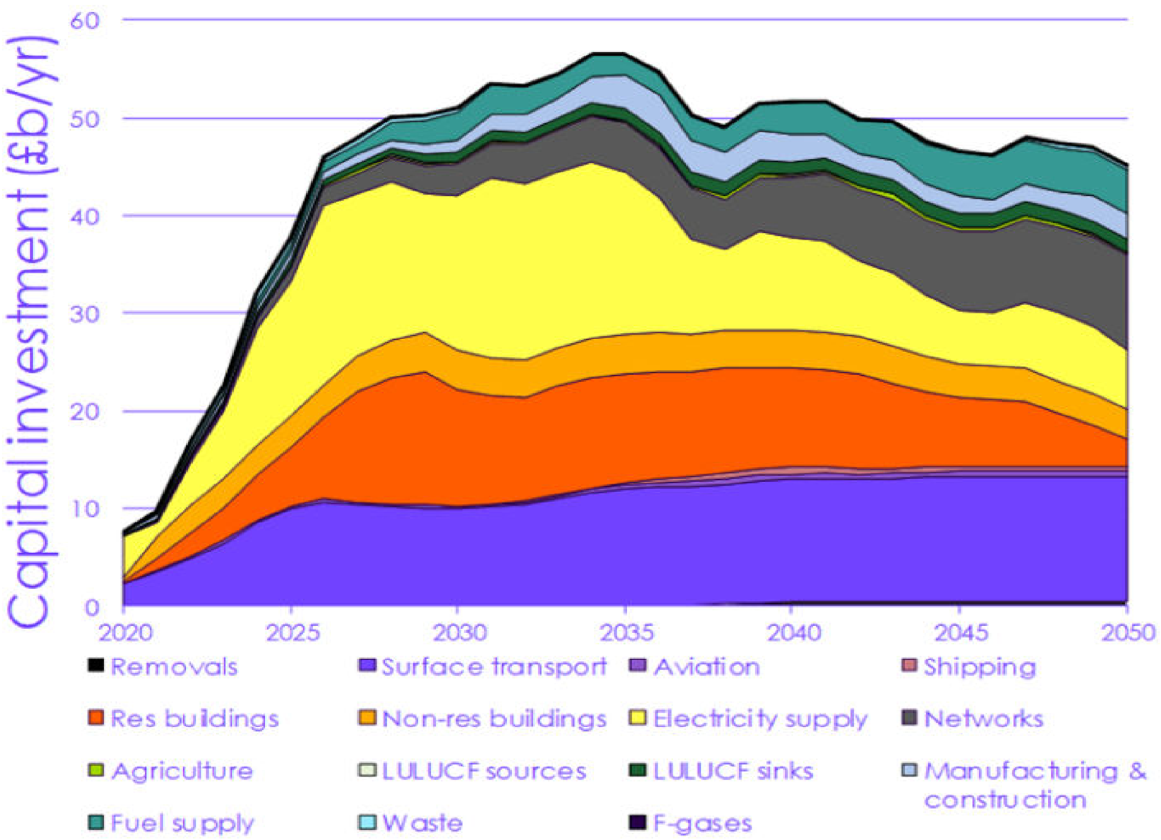

Figure 2: The Balanced Net Zero Pathway investment programme 2020–2050 (CCC Sixth Carbon Budget Figure 5.1)

They then add up all the capital expenditure and net off the alleged operating cost savings to arrive at a total cost of £957 billion; see Figure 3,

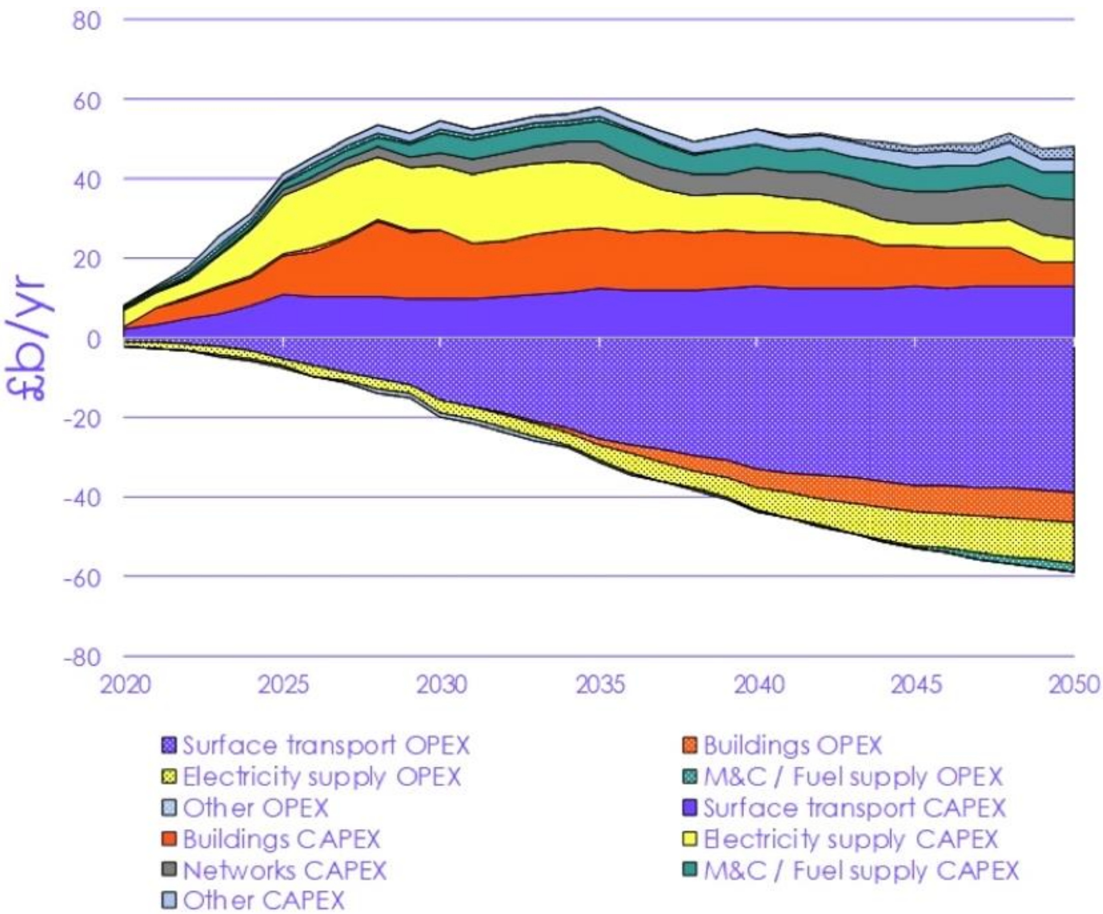

Figure 3: Capital and investment costs and operating cost savings in the Balanced Net Zero Pathway (CCC Figure 5.3)

These costs exclude the cost of capital, and the CCC go on to estimate the annualised costs at around 0.5% to 0.6% of GDP per year from 2030 onwards. This is much less than the 1% to 2% of GDP they estimated in 2015 even though the scale of ambition has increased from an 80% reduction in emissions to net zero by 2050.

However, this dramatic reduction in costs relies on some heroic estimates of the cost of renewables and other low-carbon technologies. They also use very low estimates for the cost of capital.

They make their cost estimates in 2019 pounds, and use £45/MWh and £55/MWh respectively for the costs of offshore wind and solar in 2020. In their Balanced Pathway, they estimate costs for both technologies will fall to £40/MWh by 2050. They even indicate that costs for both technologies could fall to £23/MWh by 2050 in their Widespread Innovation Pathway.

We can see how outlandish these estimates were by comparing these costs with last year's AR6 renewables auction and what is on offer in this year's AR7 auction (see Table 1).

Scenario	Fixed Bottom Offshore Wind (£/MWh)	Floating Offshore Wind (£/MWh)	Solar PV (£/MWh)
CCC Sixth Carbon Budget (£2019 for 2035 Delivery)	43		43
AR6 (£2024 for 2026-2029 Delivery 15-year contracts)*	102	245	85
AR7 (£2024 for 2028-2030 Delivery 20-year contracts)*	113	271	75

*From AR7 Announcement

Table 1: Comparison of offshore wind and solar costs from CCC, AR6 and AR7 (£ per MWh)

We should note that there are differences in the delivery years and the cost basis in CB6, which uses £2019, and the AR6 and AR7 costs, which are expressed in £2024. However, we can see the CCC estimates for fixed-bottom offshore wind are less than half those on offer in the last and current allocation rounds. Solar costs are also much lower. To meet their aggressive targets for offshore wind capacity will also require extensive deployment of floating offshore wind, which costs at least twice as much as conventional fixed-bottom offshore wind.

They also made some heroic assumptions about the cost of heat pumps. In CB6 the CCC estimated that air-sourced heat pumps cost £6,415 in 2020 and would fall to £4,970 by 2035. However, the Government's Boiler Upgrade Scheme statistics show the median costs of air-sourced heat pumps to be over £12,000 in the first quarter of 2025. They also estimated ground-sourced heat pumps would cost £10,365 by 2035 compared with £28,854 actual costs in the latest quarter.

To calculate annualised costs, they used a cost of capital of just 3.5% for government spending and the same rate for household spending on buying electric vehicles. This rate compares to current 30-year bond yields around 5.3% and typical car finance loans of 5.7% to 14.9% APR. Their assumptions for costs of capital for private investment were more reasonable at 6% to 10%; however, the hurdle rates assumed in AR7 are somewhat higher at 7.2% to 10.9% for relatively conventional technologies, rising to 11.4% to 18.8% for tidal, wave and geothermal.

These underestimates of the capital costs of the Balanced Pathway and the cost of capital mean their cost estimates are far too low. Moreover, higher actual costs of renewable electricity compared with the CCC estimates call into question their operational savings. The alleged operational savings will either not materialise or in fact be net operational costs, so we can safely say that both the gross and net costs of net zero will be higher than their estimates.

Climate Change Committee Seventh Carbon Budget

The CCC released their seventh carbon budget (CB7) in February this year and their estimates for the costs of net zero have fallen. This reduction in costs comes despite offshore wind projects being discontinued as uneconomic, for example Hornsea 4, or rebid at higher prices, for example Inchcape, Hornsea 3, and Moray West.

They achieve this remarkable feat by changing the goalposts on how the costs of the carbon budget are calculated. Instead of reporting the gross costs of net zero, they now report the cost as the difference between their Balanced Pathway and a notional baseline scenario.

Over the 25-year period from 2025 to 2050, they say the total net cost of the Balanced Pathway has fallen from £957 billion last time to 'only' £108 billion in CB7 (see Figure 4). Annualised costs, including cost of capital, have fallen to 0.2% of GDP per annum.

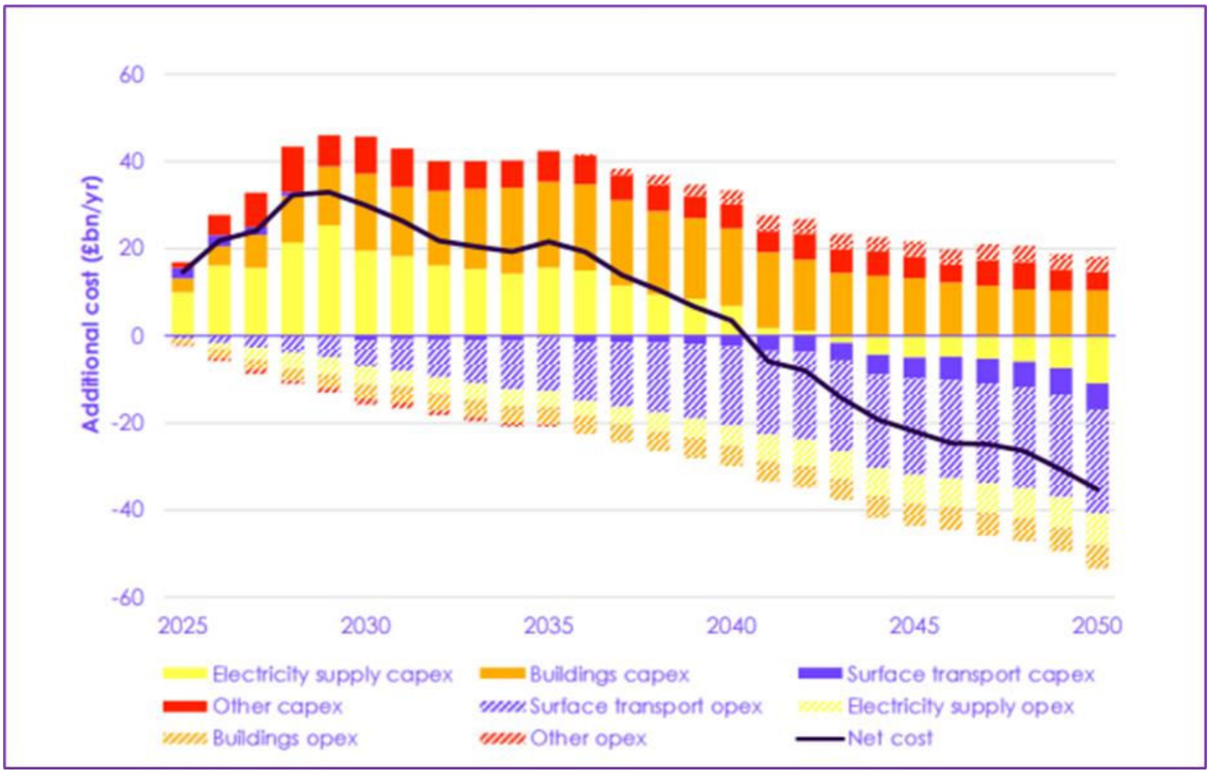

Figure 4: Additional capital expenditure and operating costs in the Balanced Pathway, compared to the baseline (CCC 7th Carbon Budget Figure 4.1)

To achieve this remarkable cost reduction, they make even more incredible assumptions. For instance, the spending on electricity supply falls from £334 billion (£2019) in CB6 to a net £197 billion (£2023) in CB7.

They say that the costs of offshore wind and solar power have fallen as shown in Table 2.

Scenario	Fixed Bottom Offshore Wind (£/MWh)	Floating Offshore Wind (£/MWh)	Solar PV (£/MWh)
CCC Sixth Carbon Budget (£2019 for 2035 Delivery)	43.00		43.00
CCC Seventh Carbon Budget (£2023 for 2035 Delivery)	37.80		29.69
AR6 (£2024 for 2026-2029 Delivery 15-year contracts)*	102.00	245.00	85.00
AR7 (£2024 for 2028-2030 Delivery 20-year contracts)*	113.00	271.00	75.00

*From AR7 Announcement

Table 2: Comparison of offshore wind and solar costs from CCC CB6 and CB7, AR6 and AR7 (£ per MWh)

Despite changing the cost base to £2023, their estimates for offshore wind for 2035 delivery have fallen to £37.80/MWh, little more than a third of the price on offer in AR7. CB7 solar costs have also fallen, to less than 40% of the price on offer in AR7. They failed to provide costs for onshore wind and again omitted costs for floating offshore wind.

These low renewable electricity prices are driven by low-ball estimates for the capital expenditure required to deliver solar power and offshore wind farms. They expect offshore wind to cost £1,500/kW of capacity for projects delivering in 2030. However, Hornsea 3 (2.9GW) expected to come online in 2028 is forecast to cost between £10 billion and £11billion, for a mid-point cost of £3,682/kW, more than double the CCC's estimate. They also expect solar power plants to cost £564/kW in 2025, falling to £403/kW by 2030. However, the recently delivered solar farms of Stokeford and Alfreton spent £952K/MW and £995K/MW, respectively, nearly double the CCC's 2025 estimate and more than double their 2030 estimate.

This dissembling about the cost of renewables has not gone unnoticed by the Shadow Secretary of State for Energy Security and Net Zero, Claire Coutinho. She wrote to the new chair of the CCC, Nigel Topping, challenging the cost assumptions and asked for the CCC to correct the record before Parliament votes on CB7. Unfortunately, Topping's reply doubled down on the error and tried to make a false distinction between the Levelised Cost of Energy used in their report and the 'policy-determined revenue guarantee' offered in renewables auctions.

To calculate the annualised cost, they again use a social discount rate of 3.5%, which is well below even the Bank of England base rate, let alone long-term borrowing costs. Although they have increased their estimates of the costs of heat pumps compared with CB6, they are still above the latest Boiler Upgrade Scheme prices, and prices are expected to fall by over 30% by 2050. They expect medium electric cars to cost just £23,160 this year. However, VW ID3 prices (the nearest equivalent of a VW Golf) start at £30,860, rising to £48,360 for a top-end model.

The low estimates for the cost of renewables and low-carbon technologies, with correspondingly low costs of capital, mean that the CCC have again dramatically underestimated the cost of net zero and overestimated the alleged operating cost savings. Any realistic estimate of the true costs will be much, much higher.

Office for Budget Responsibility 2025

The Office for Budget Responsibility (OBR) have also produced an estimate of the cost of net zero in their recent fiscal risks report (FRR). The OBR came up with a total cost of £803 billion; see Figure 5.

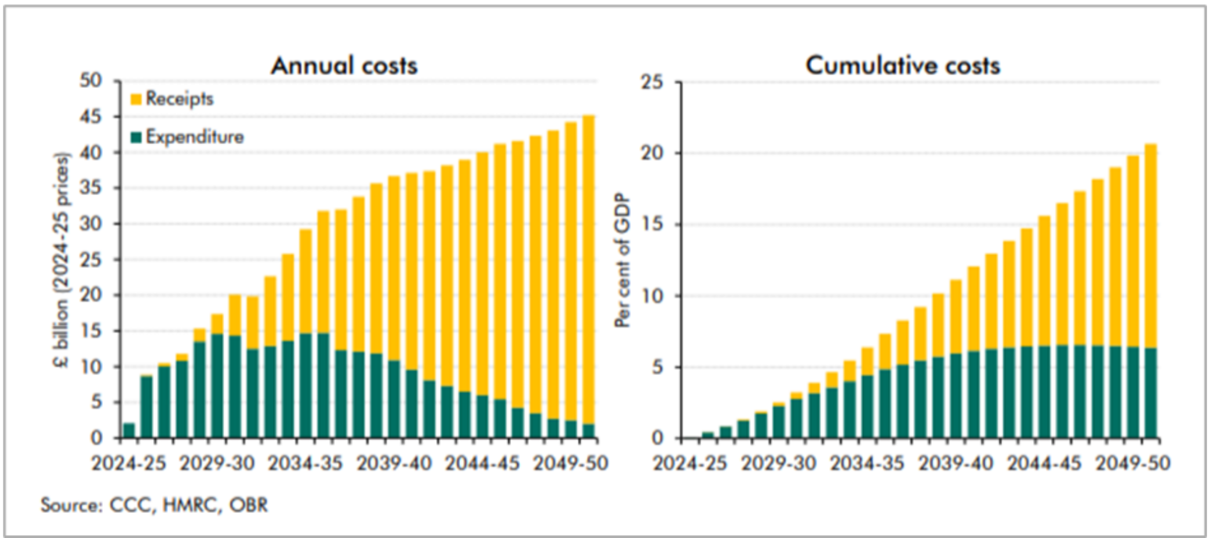

Figure 5: Fiscal costs of the net zero transition

They split the cost into two categories. The yellow bars, being described as receipts, represent lost tax revenue. The green bars represent the additional public spending required, derived from the 'whole economy' costs of the CCC's Balanced Pathway in CB7. Most of the lost receipts arise from lost fuel duty. The trouble is, the OBR never quite explain how their cost to the Exchequer of net zero at £803 billion is so much higher than the CCC's £108 billion cost to the whole economy.

NESO 2025

NESO produced their latest FES report in July 2025. They have recently produced an Economics Technical Annex that explores the cost of net zero. The headline finding, derived from the chart in Figure 6, is that their Holistic Transition pathway would cost £362 billion more than their Falling Behind scenario, which does not reach net zero by 2050.

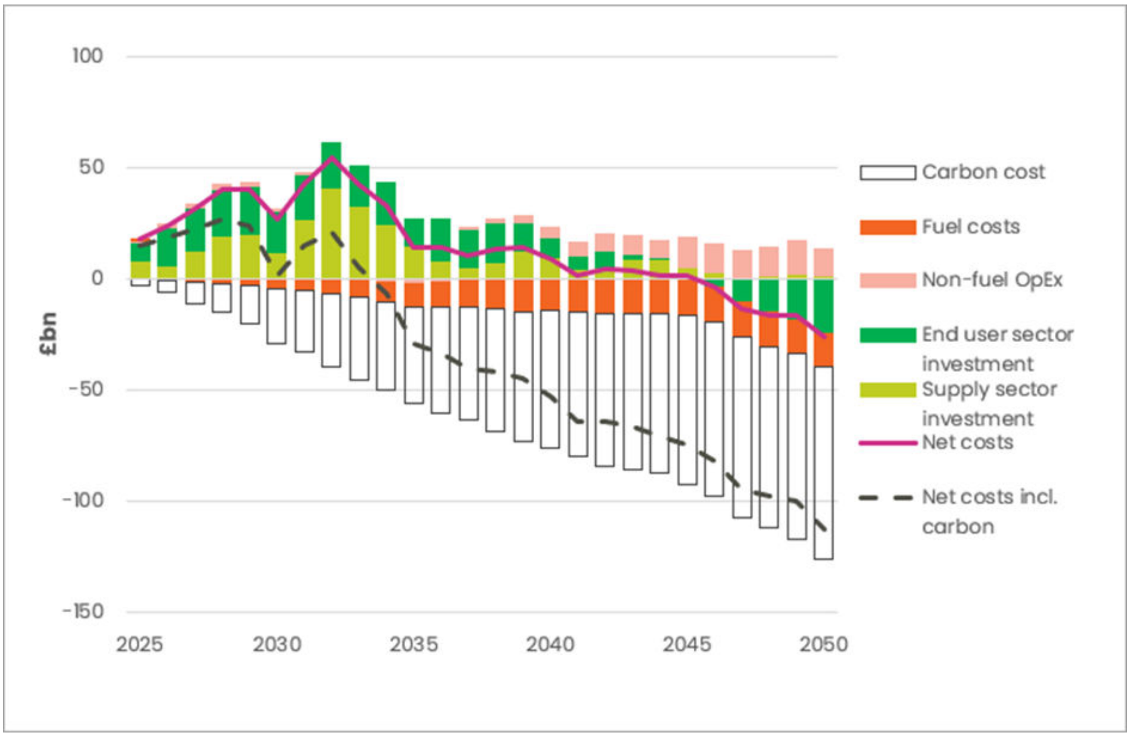

Figure 6: Total in-year energy cost of Holistic Transition compared with Falling Behind (Source NESO Fig. 11)

However, this ‘cost’ of net zero is misleading because it again measures the difference between two scenarios and does not identify the gross cost. Fortunately, NESO also provide the gross costs for their scenarios as shown in Table 3 (note that the sum of the detail in their supporting workbooks does not quite match the summary totals in the chart above).

	Holistic Transition					Falling Behind				
Cost Element 2025-2050 (£bn)	**Opex (£bn)**	**In Year Capex (£bn)**	**Total In-Year Cost (£bn)**	**Annualised Capex (£bn)**	**Total Annualised Cost (£bn)**	**Opex (£bn)**	**In Year Capex (£bn)**	**Total In-Year Cost (£bn)**	**Annualised Capex (£bn)**	**Total Annualised Cost (£bn)**
Electricity	407.5	1,076.1	1,483.6	1,540.0	1,947.5	327.4	813.4	1,140.8	1,051.4	1,378.9
Residential	280.4	584.9	865.3	443.8	724.2	359.5	335.7	695.2	257.7	617.2
Commercial	120.8	136.2	257.0	106.4	227.1	122.0	64.0	186.0	49.1	171.0
Industrial	68.7	42.9	111.6	30.7	99.4	0.0	86.1	86.1	0.0	86.1
Road Transport	2,123.2	2,641.5	4,764.7	2,538.5	4,661.8	2,285.1	2,807.0	5,092.0	2,603.6	4,888.7
Hydrogen	37.7	45.7	83.4	25.1	62.8	4.2	7.9	12.2	3.7	8.0
Engineered Removals	75.8	21.6	97.4	86.0	161.8	12.4	4.7	17.1	7.5	19.9
Rail	(7.5)	16.1	8.6	11.2	(18.8)	0.0	0.0	0.0	0.0	0.0
Aviation	(72.0)	(15.0)	(87.0)	(9.2)	(81.2)	0.0	0.0	0.0	0.0	0.0
Shipping	11.2	7.9	19.1	7.3	18.4	0.0	0.0	0.0	0.0	0.0
Total	**3,045.6**	**4,558.0**	**7,603.6**	**4,779.8**	**7,802.9**	**3,110.7**	**4,118.8**	**7,229.4**	**3,973.0**	**7,169.7**
Emissions			1,444.0		1,444.0			2,733.7		2,733.7
Total inc. Emissions	**3,045.6**	**4,558.0**	**9,047.6**	**4,779.8**	**9,246.9**	**3,110.7**	**4,118.8**	**9,963.1**	**3,973.0**	**9,903.4**
HT less FB (Total)						(65.1)	439.3	374.2	806.8	633.2
HT less FB (Total inc Emissions)						(65.1)	439.3	(915.5)	806.8	(656.5)

Table 3: Elemental costs of Holistic Transition vs Falling Behind (£bn)

The operating (opex) and capital (capex) expenditure for Holistic Transition totals some £7,604 billion before carbon costs and £9,048 billion when the carbon costs of emissions are included. The ex-carbon cost is some £374 billion more expensive than Falling Behind, and, with carbon costs included, Holistic Transition miraculously becomes £916 billion cheaper than Falling Behind.

NESO also include an estimate of the annualised cost of net zero, derived from spreading the capital costs over the life of the assets and adding a cost of capital. In this scenario, the total cost rises to £7,803 billion under Holistic Transition, some £633 billion more expensive than Falling Behind. When the carbon costs of emissions are included, the 'saving' from Holistic Transition falls to £657 billion.

However, we have good reasons to believe the costs of Holistic Transition have been understated and the costs of Falling Behind are overstated. Of course, both scenarios are much more expensive than stopping the race to net zero.

The costs of renewables are understated because although NESO's capital cost estimates for offshore wind are not understated quite as much as CB7, they still use wildly optimistic assumptions for other parameters such as load factor, asset life and discount rate. For instance, they assume the cost of capital for solar and onshore wind to be 5.0% and 5.2% respectively for projects delivering in 2035, which is below 30-year gilt yields around 5.3%. This leads them to calculate that electricity from renewables will cost much less than contracts awarded in AR6 and being offered in AR7, as shown in Table 4.

Technology	NESO 2025 (2025 Prices)	NESO 2035 (2025 Prices)	AR6 Awards (2025 Prices)	AR7 Offer (2025 Prices)	AR6 Award to NESO 2035 Increase (%)	AR7 Offer to NESO 2035 Increase (%)
Fixed Offshore Wind	70	53	85	118	59.7%	121.0%
Floating Offshore Wind	175	109	202	282	85.8%	159.4%
Onshore Wind	69	63	73	96	16.4%	52.6%
Solar		31	72	78	133.8%	153.3%

Table 4: Comparison of NESO electricity price assumptions compared with AR6 and AR7 (£ per MWh)

They calculate the cost of offshore wind as £70.10/MWh in 2025, falling to just £53.20/MWh in 2035. In the same 2025 prices, Hornsea 4 won a contract last year at £85/MWh and was cancelled as uneconomic. AR7 is offering £118/MWh in September 2025 prices for 20-year contracts, some 121% above NESO's estimate for 2035.

They assume Floating Offshore wind will cost £109/MWh in 2035 despite contracts being awarded at £202/MWh in AR6 and £282/MWh being on offer in AR7. Onshore wind will apparently cost just £63/MWh in 2035 despite £96/MWh being on offer in AR7. They assume solar will cost just £31/MWh in 2035 despite AR6 contract awards at ~£72/MWh and £78/MWh being on offer in AR7.

Clearly, the opex, capex and annualised capex for the electricity component of the Holistic Transition will be much more expensive than they indicate because they will have to build more of the more expensive kit at a higher cost of capital.

Moreover, outside the power sector, they have used a cost of capital of just 3.5%, which perhaps explains why the annualised costs of the residential, commercial and road transport and hydrogen components are lower than the total cash costs. If a more realistic discount rate were used, then the total annualised costs would of course be much higher. Even with NESO's optimistic assumptions, they show the total energy cost for the Holistic Transition rising from 10% of GDP in 2025 to 11.4% in 2029 before falling back in later years.

The costs of the Falling Behind pathway have been overstated as we can see from Figure 7.

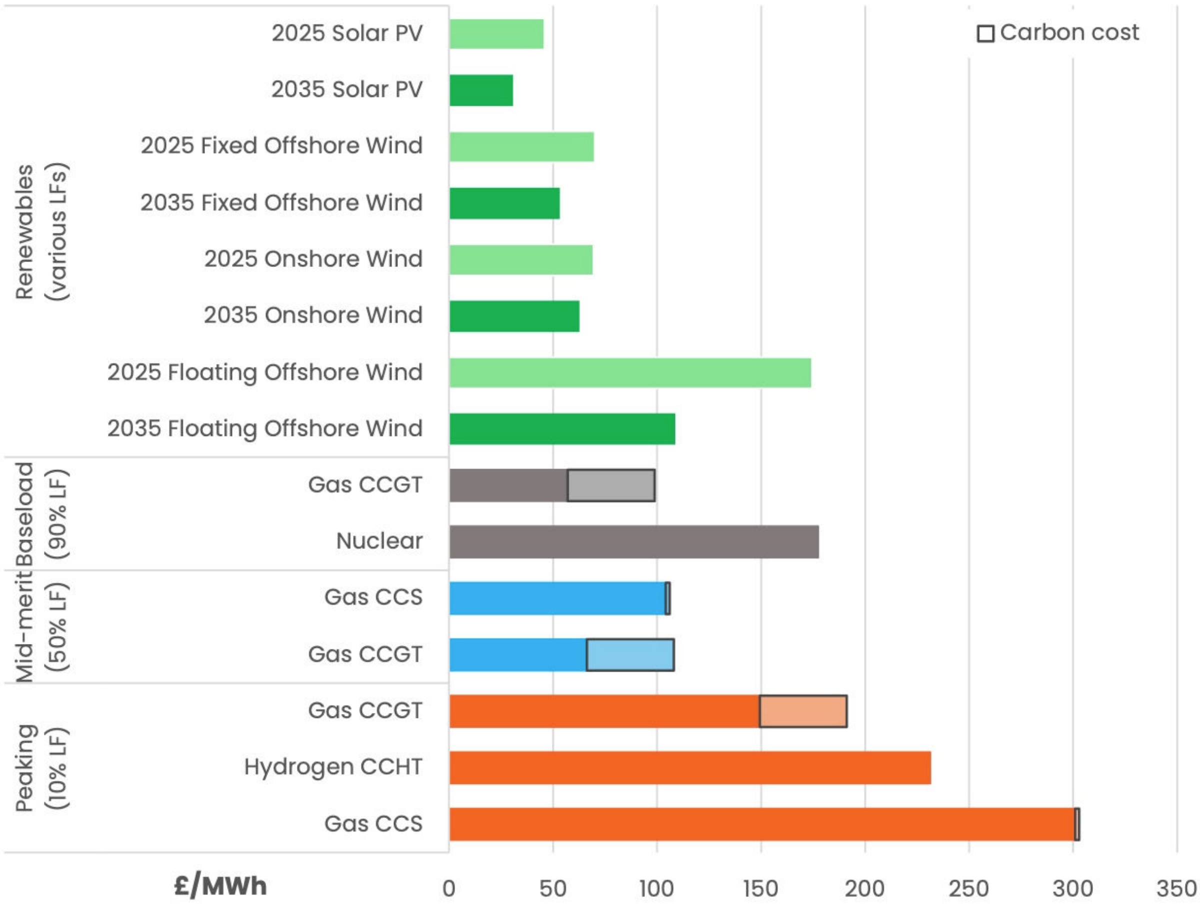

Figure 7: NESO levelised cost of electricity by technology type (£ per MWh)

They say the basic baseload cost of gas-fired generation will be £57/MWh in 2035, which looks like a reasonable assumption. But they add £41.80/MWh of carbon costs, giving a total of almost £99/MWh, which makes the electricity look much more expensive. They assume traded carbon costs £78.70/t in 2025 rising to £114.7/t in 2050. UK carbon prices were about £30/t in January this year, then leapt to £44/t as it was rumoured the UK would align with the EU emissions trading scheme. Since then, Keir Starmer has announced we will indeed align with the EU, and the carbon price has risen to over £60/t. Even though these costs are too high, NESO are assuming even higher and steadily rising costs to make gas-fired generation look even more expensive.

If we use realistic costs for renewables and remove the made-up carbon costs, gas-fired electricity becomes cheap. This would push up the operating costs of Holistic Transition and reduce the costs of Falling Behind.

However, Falling Behind still assumes hundreds of billions of pounds of spending on renewables and other low-carbon technologies, which of course pushes up the cost compared with ceasing spending on net zero, what we might term the Stop the Race scenario.

Falling Behind assumes offshore wind capacity goes up more than five-fold from 15.5GW in 2024 to over 80GW in 2050. Onshore wind more than doubles to 36GW, and solar more than triples to 62.8GW. Under Falling Behind, unabated gas capacity rises from 39.3GW to 45.2GW, and CCUS enabled gas goes from zero to 16.8GW, or a total of 62GW of gas-fired capacity. A notional Stop the Race scenario could avoid much of these costs, saving ~£200 billion of the spend on new renewables capacity planned in Falling Behind.

NESO's treatment of transmission costs also leaves a lot to be desired. They calculate a total of £315.6 billion of onshore and offshore spending on transmission by 2050 under the Holistic Transition scenario and £272.8 billion on Falling behind. Almost all this extra spending is to connect and manage the impact of remote renewables situated far from the source of demand. Most of this spending could be avoided if we adopted the notional Stop the Race scenario, saving at least another £200 billion.

If we stopped the hydrogen and engineered removals programme, we could save a further £29 billion from the costs of Falling Behind. We would no doubt find even more savings if we dug into Distribution (with £139 billion of spending in Falling Behind), Storage (£12.4 billion) and Interconnector costs (£1.9 billion).

It is also important to note that the assumed operating cost savings from electrification of everything in the Holistic Transition and to a lesser extent in Falling Behind will not materialise, because they are assuming costs of renewables electricity that are far too low and gas-fired electricity that is too high. Stopping the race would lead to even more operational savings, just from electricity.

There are extra savings from other components, too. For instance, NESO assume that a petrol/diesel car will cost £38,354, slightly less than a hybrid car, costing £39,160, and a full battery electric vehicle, costing £43,254. By 2028, petrol cars will go up to £39,999, but hybrid cars with a petrol engine, battery and electric motor will cost less than a basic petrol car at £39,250 and EV costs will fall to £38,500.

First, as an average this looks too high, and second, the current differential between petrol cars and EVs is much higher than their 12.8% estimate. The manufacturer's recommended price of a VW Golf Life 1.5l is £24,470, and the most basic VW ID.3 Life costs £32,990 (or £29,990 with subsidy), some 34.8% (22.6%) more than the petrol model. Differentials get even wider for higher specification Style models, 42.8% before subsidy and 31.1% after. Of course, using a tight differential between petrol cars and EVs makes the capital cost of the transition look cheaper than reality.

NESO duck the actual costs of Rail, Aviation and Shipping by adopting the CCC approach of simply reporting the difference in costs compared with the Falling Behind scenario. It does seem rather unlikely that we will save £87 billion of in-year opex and capex costs in aviation by continuing with the Holistic Transition.

A hundred billion here, a hundred billion there and soon you are talking real money – if we stopped net zero now, there is well over £400 billion in capital costs to save against the Falling Behind Pathway and hundreds of billions more from operating cost savings.

Other commentators

Energy consultant Kathryn Porter released a report earlier this year setting out the true affordability of net zero. This is an excellent report that details the pitfalls of intermittent renewables and the costs of subsidies and extra hidden costs of intermittency. However, the report did not offer an overall cost of net zero.

Engineer John Sullivan has also produced a report on the costs and retail price impacts of net zero. Even though some of the costs of net zero were excluded from the scope of his analysis, he came up with a total cost of net zero of about £3.4 trillion.

Conclusion

The cost of net zero is a political hot potato. At the outset of the net zero plan, there was at least some attempt to calculate realistic numbers. The Treasury estimated over £1 trillion in 2019, and NESO came up with £3 trillion net present value cost in 2020, which equates to around £5 trillion to £6 trillion in gross cash costs. Their 2025 estimate is £7.6 trillion of gross costs and, as we have seen, may well be a considerable under-estimate. Of course, if these costs were widely understood, public support for net zero would be at risk.

This leads to pressure on advocates for net zero such as the CCC and NESO to twist the truth to produce politically palatable figures. But as we have seen, this forces them into making fantasy assumptions about the cost of renewables and the cost of low-carbon technologies. This has not gone unnoticed by net zero sceptics, and now even the Conservative Party, which brought in net zero, are challenging the CCC by pledging to repeal the Climate Change Act and even disband the CCC.

The ‘true’ cost of net zero is likely to be even higher than NESO’s latest estimate. If we are to have a serious debate about net zero, the various public bodies need to be more transparent and frankly more honest about the upfront costs and their assumptions about the alleged operational savings. This lack of openness should be treated with extreme suspicion.