



The Collision Between Infrastructure & Carbon Emissions

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Introduction

There is an ongoing collision taking place between the development of large-scale infrastructure in the UK and the UK's carbon targets. Infrastructure (including airports, toll bridges and roads, oil and gas facilities, energy generation, water treatment plants and commercial real estate) takes a long time to develop, secure planning consent, finance and build, and in the period between conception of development projects and them actually being in front of a decision maker, the need to reduce carbon emissions has become more and more urgent.

When infrastructure reaches a planning decision, the framework against which it is assessed has often moved faster than the thinking on design. Infrastructure is too often planned with inadequate analysis of the impacts on carbon emissions, and thus with minimal or insufficient mitigation. More decisions are likely to be subject to appeal or judicial review, or risk being called in by the Secretary of State.

Climate change has been an issue for infrastructure development since the 1992 United Nations Framework Convention on Climate Change (UNFCCC), but the urgency of climate action has increased, particularly in the UK with the Climate Change Act (2008). This included an 80% cut in carbon emissions, a five-yearly budgeting process to get there, and the set-up of an independent Climate Change Committee (CCC) to advise on targets and measures. The Paris Agreement (2015) aims to keep the increase in global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the

increase to 1.5°C. It is widely recognised that this needs net-zero carbon emissions by the middle of this century.

Following Paris, the UK amended its target in the Climate Change Act in 2019, from an 80% reduction to a 100% reduction by 2050. This tougher carbon target required carbon budgets to be reconsidered, and the UK committed to a 67% cut (compared to 1990 levels) by 2030, and a 78% cut for the sixth carbon budget (2033-2037), and then in April 2021 decided to include international aviation and shipping within that target.

Cases where this collision has become evident include airports (with refusals leading to public inquiries at Stansted and Bristol, and consents being withdrawn for reconsideration at Manston); road schemes (with legal challenges to the Road Investment Strategy 2 and then particular projects like the A38 Derby Junction); and energy projects, like the proposed coal mine in Cumbria. A new major building in London, the Tulip, was refused on grounds that included embodied carbon.

What is current policy?

The difficulty we face at the present time is that policy is not clear. New targets have been announced (particularly the 78% cut in emissions, including aviation in the sixth carbon budget period) so the target is clear. Except that the UK is behind on meeting the fifth carbon budget target, let alone the sixth, and detailed policies have not been announced to deliver the sixth carbon budget.

The Government has more than once refused to release its analysis of UK carbon targets and how each sector is contributing to the net-zero goal, following a request by the Press Association news agency for the information under Environmental Information Regulations (EIR).¹

The CCC has concluded that: *“An ambitious heat and buildings strategy is urgently needed; delayed plans on surface transport, aviation, hydrogen, biomass and food must be delivered; plans for the power sector, industrial decarbonisation, the North Sea, peat and energy from waste must be strengthened.”*²

The House of Commons³ and House of Lords⁴ have added their criticisms of the strategy, and Client Earth, Friends of the Earth and the Good Law Project filed separate claims early this year, arguing that the Government has breached its legal obligations under the Climate Change Act to demonstrate its climate policies will reduce emissions enough to meet the legally binding carbon budgets. The cases have been granted permission to proceed to the High Court and will be heard together in a full hearing expected to be in June 2022 with a decision later in the year.⁵

The energy security strategy announced on 6 April⁶ fell well short of what was needed. It failed to tackle on-shore wind, which could be the fastest to build and is the cheapest form of power generation available today. It didn't even mention tidal lagoons as a long-term baseload renewable energy option. It failed to add any new support for energy efficiency at home and in businesses. Ricardo is supporting businesses to tackle electricity prices that are expected to almost triple (from around 12p to around 30ppkWh). Our clients will not be helped to bring forward proposals for onsite, or near-to site but directly connected, wind and solar projects under this new strategy. Government is failing to support its own carbon targets with the detail to deliver.

Aviation

Government has consulted on a strategy to get to net-zero aviation (the Jet Zero Consultation⁷ summer 2021). The strategy laid out a desire for a 60% increase in capacity, and stated this was compatible with net zero (which is now a duty in law). However, the strategy relies on:

- A rate of improvement in aircraft efficiency that is hard to see happening in reality (being faster than international historical rates and the UK does not have the vires to increase the rate of improvement through regulation).
- A high rate of implementation of so-called Sustainable Aviation Fuel (SAF), derived largely from wastes or biomass. This requires a wholesale industrial transformation of fuel supply. Though proposals have been consulted upon which might drive the use of SAF up to 75%, these are not yet law; refining capacity does not yet exist; prices and supply chains are unknown; and engines are not certified above 50% use.
- Uptake of hydrogen and electric aircraft, which are not yet technically or commercially proven.

- Offsetting measures that depend on an offset market, which is currently unregulated.

That's not to say that those technologies don't have potential, they clearly do, and I'm pleased to say Ricardo is involved in supporting development of all of these measures. Ricardo manages the SAF innovation programme for the UK Government (the Green Fuel Green Skies competition⁸); we have a fuel-cell-powered aircraft in the air⁹; and we are part of a consortium developing an electric drivetrain for aircraft¹⁰. The potential is not the issue. The issue is whether the Secretary of State can deliver a policy framework to deliver sufficient change to fulfil his legal duty, and that is the subject of reasonable doubt. Thus, there is a genuine question as to whether there is a case for capacity constraint until such technologies can be proven to deliver. That was the proposition made by the CCC in their sixth carbon budget recommendations¹¹, but not (yet, anyway) accepted by the Government.

The key test in airports planning policy is whether expansion would put at risk the UK carbon targets¹². To date, planning inspectors, like those at the Bristol Airport expansion public inquiry, (refused on grounds that included carbon emissions, but allowed on appeal), have taken the view that it was reasonable to rely on the assumption that the Secretary of State would, in due course, fulfil their duty to meet the targets in the Climate Change Act¹³. The Government, they concluded, had indicated expansion would be compatible with net zero, and thus it was safe for them to consent to an expansion. But relying on that assumption may get harder.

A further issue is that it would be easier to judge an additional airport development, against progress within aviation as a whole, if each sector had a defined target. There is no obligation on an airport seeking expansion to conduct a cumulative impact assessment in carbon emissions terms, compared to other recent airport proposals, and compared to a carbon target for aviation. But that's because at the present time, there is no binding and separate aviation carbon target (or target for any economic sector come to that). The target is for the UK as a whole.

So, should it be a material consideration to a planning officer considering an airport that we don't know how much aviation will be allowed to emit, compared to say, housing, in any given time period?

Is it safe to consent an airport expansion when the Secretary of State is relying on unproven technologies, limited commercialisation, non-existent markets and missing cumulative impact assessments? Or should we pause airport expansion until the technologies and markets that the Secretary of State is relying on are proven? At some point in time, the argument will be tested as to whether the Secretary of State is acting reasonably in such a reliance on unproven technologies and markets in discharging a duty laid out in the Climate Change Act. At some point, decision makers may conclude the Secretary of State is not acting reasonably. Indeed, it may be so unreasonable¹⁴ as to be *‘Wednesbury unreasonable’*.

Proponents of expansion will undoubtedly argue (as at Bristol and Stansted) that further facilities like hydrogen or electric refuelling could be added later under permitted development rights (airports are a statutory undertaker and have significant rights) and thus don't need to be in a planning application for airport expansion. On the other hand, if they are not in the application, they can't be considered to be mitigations against the increased emissions, and the UK carbon target is thus put at greater risk, and this, in turn, surely jeopardises consent.

Figure 1 Airports developments facing challenge from carbon emissions targets

1. Heathrow Airport. The basis for a third runway at Heathrow has been up to the Court of Appeal and Supreme Court. At issue was whether the Airports National Policy Statement considered carbon emissions and particularly the 2015 Paris Agreement. Eventually, the Airports National Policy Statement (ANPS) was reinstated, though it was recognised by the Supreme Court that any future applications for development consent would be assessed against the emissions targets and environmental policies in force at the time, rather than those set out in the ANPS (the decision, para 10, and para 98). In addition, there are emissions from aviation that have climate-change impacts other than just carbon emissions. Paras 159-166 discuss non-carbon warming impacts in some detail, and conclude it was not irrational for the Secretary of State not to consider them, but it would be rational for the applicant for a Development Consent Order to have to address the environmental rules and policies that were current when its application would be determined, and this could well include non-CO2 warming impacts. This decision, that policy is updated, has implications for other airports and potentially, other infrastructure. Heathrow has set out a plan to achieve net zero by 2050, but the plan has not been tested as part of any application.

2. Manston Airport was consented, but subsequent judicial review proceedings were not contested by the Government and developer, and consequently the consent was withdrawn, pending a new decision.

3. Stansted Airport expansion from 35 to 43 million passengers per annum was consented after a public inquiry. The council and opposition groups, with the status of Rule 6 parties, took the decision to judicial review, but were refused a review.

4. Bristol Airport expansion from 10 to 12 million passengers per annum was consented after a public inquiry. The decision included a requirement for a Carbon and Climate Change Action Plan (Condition 9). The plan seems to have set a template for expansion proposals at other airports.

5. Leeds Bradford Airport. The local planning authority (LPA) resolved to approve the expansion, circa 3.5mppa, but the Government has issued an Article 31 Direction that prevents a decision being issued until the Government has decided whether to call in the application for a public inquiry. If consented, planning condition 37 would require submission of a carbon

and climate change action plan to be submitted and approved. The S106 is to include net-zero carbon from all ground-based operations.

6. Southampton Airport. The LPA has recently resolved to approve (subject to a legal agreement) the extension of the runway by 164m, which will allow larger aircraft to use the airport. However, arguably there were very particular local circumstances, given the liquidation of Flybe, and the dispersal of fleet that could use the shorter runway, as well as significant surface access traffic constraints. Consequently, much of the impact from the development is restoring the airport to previous operations.

7. Luton Airport. The airport applied for consent to expand from 18 to 19 million passengers, was consented at local level, but has now been called in by the Secretary of State for a local inquiry.

Roads infrastructure

The Roads Investment Strategy (RIS2) and National Policy Statement for National Networks (NPS NN) have been challenged by Transport Action Network (TAN) on environmental, particularly climate change, grounds.

RIS2, which set Highways England's (HE) objectives and funding resources (£27.4bn) for the expansion of the UK's strategic road network, has been subject to judicial review for inappropriate consideration of carbon. TAN claims RIS2 will make carbon emissions from the roads network go up by about 20 MtCO₂, during a period when we need them to go down by about 167 MtCO₂. TAN thus claimed the programme will negate almost all of the reductions from increased take-up of electric vehicles, and thus RIS2 is incompatible with our legal obligation to cut carbon emissions in line with the Paris Agreement and the Climate Change Act and should be cancelled. However, the High Court eventually ruled that the Secretary of State for Transport did not fall foul of the law in approving the Road Investment Strategy.

The NPS NN was also subject to legal challenge from TAN on the basis it doesn't allow decision makers to seriously consider climate change, and was claimed to be outdated regarding air pollution, natural capital (biodiversity) and design. The Government announced they would review the policy, but would take up to 2023 to do this. In the meantime, the NPS would continue to have effect, despite this effect also being the subject of challenge.

As well as challenging the policy framework, individual schemes under the framework (such as the A38 Derby Junction Scheme) are also subject to challenge.

Figure 2 Road building projects

8. A38 Derby Junction Scheme. Inspectors recommended the DCO be approved, subject to the Secretary of State making decisions on carbon emissions under the Paris Agreement. However, local campaigners launched judicial review proceedings against the decision on the basis of carbon emissions, and the Government has withdrawn the decision and a new one will need to be made.

Real estate

The Tulip, a proposed skyscraper in London, was first consented by the City of London, and then refused by the Mayor, and finally refused on appeal in November 2021 on grounds that included embodied carbon. The appeal decision notice discussed embodied carbon extensively, in particular para 44: “*Extensive measures that would be taken to minimise carbon emissions during construction would not outweigh the highly unsustainable concept of using vast quantities of reinforced concrete.*”¹⁵

Berkeley Group achieved outline consent in 2017 for the masterplan for Southall Waterside in Ealing, for nearly 4,000 homes to be built over 25 years. The low-carbon solutions approved in the planning consent are not necessarily the same solutions appropriate to achieving net zero, likely to be required under building regulations for future phases. Ricardo has worked with Ealing Council and Berkeley Homes to explore potential solutions.

Energy infrastructure

Several energy assets have been through appeals and public inquiries, not to mention the many wind projects that have gone to appeal. Drax won its consent, but didn't go ahead with the project. A decision is awaited on West Cumbria coal.

Figure 3 Energy projects

1. Drax Power. The Court of Appeal upheld Drax's power station DCO despite its carbon emissions impact, but the court was clear carbon must be weighed in the planning balance. Also to be weighed in the planning balance was that the power sector has made huge strides in decarbonisation and there was a need for plant (either gas plant like this, or storage) to offer grid stability alongside decarbonisation. However, following this decision, Drax decided that it would not construct the consented project, but would focus instead on becoming carbon negative by 2030 (generating power using biomass with carbon capture and storage)

2. West Cumbria Coal. After the LPA resolved to grant planning permission the Secretary of State decided that there had been changes since his original decision, particularly the Climate Change Committee's sixth carbon budget recommendations that raised issues of more than local importance, and as a consequence he called in the application for a public inquiry. The decision of the public inquiry is awaited. Even if consented, the proposals are reportedly facing uncertainty over financial backing.

Business planning risks

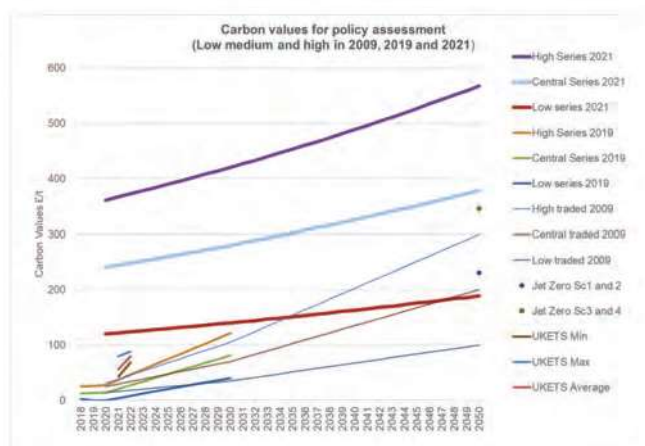
There is a key difference between planning decisions and investment decisions. Planning decisions must consider policy as it exists now (and that's quite hard when it's moving very rapidly). But investment decisions require an assessment of future risk, including the risk that policy might change, and threaten costs or income streams before the asset pays for itself and starts to make steady returns to investors.

In September 2021, the Government published new valuations of carbon emissions. It has been publishing its forward view of the value of carbon every two years

since 2009, given future carbon targets. The September 2021 valuations were the first since the amendment of the Climate Change Act to net zero, and since decisions on the sixth carbon budget.

The carbon valuations were based on the cost of measures to deliver targets and indicate that, in one way or another, policy should internalise carbon valuations. One way might be through changing the number of permits available under the UK Emissions Trading Scheme over time to drive up price. Another might be an obligation to use SAF.

Figure 4 Carbon Values for policy assessment¹⁶



Nowhere is policy risk to future revenue greater than in airport expansion, from a combination of changing carbon values and changing policy.

An example is the non-carbon warming impact of aviation. The total warming impacts of aviation (including contrails and other effects) are up to three times the direct warming from carbon, and though we have known about this issue for two decades, an element of scientific uncertainty means there is no current policy that requires airport planning to consider non-carbon warming. To meet Paris objectives and limit emissions to keep warming to between 1.5 and 2 degrees, any and all sources of warming must be addressed at some point. Thus, there is a clear economic risk to airport investment even if a development is consented.

Task Force on Climate-Related Financial Disclosures (TCFD)

The TCFD was formed at G20 level in a bid to encourage the uptake of unified climate risk and opportunity measurement and disclosure internationally and across the private sector. It first published its framework in 2017, outlining guidance for disclosures regarding governance, strategy, risk management and climate targets. TCFD reporting became mandatory in the UK from 6 April this year.

Governments, businesses, banks and even pension schemes planning investment in infrastructure must recognise that incomes may be at risk or costs may be higher. Thus, building infrastructure may get harder than consenting infrastructure. Or worse, infrastructure may get built, but become a 'stranded asset' if it is not able to be operated as intended.

Pension funds and infrastructure

Significant infrastructure is owned by pension funds. Pension funds have been supportive of, for example, airport expansion, because of the perceived improved return to pension fund members, and indeed, this would have been consistent with their fiduciary duty.

But in 2018, requirements were introduced for a Statement of Investment Principles under which trustees must “take account of financially material considerations over an appropriate time horizon, which the trustees should consider when making investment decisions, including Environmental.”¹⁷ Then the Pension Schemes Act 2021 (section 124¹⁸) put the Paris Agreement on the face of pensions legislation. In other words, fiduciary duty now extends to a 2050 time horizon. Trustees in the UK are now required to understand and manage climate impacts, and climate policy risks, to meet a net-zero target by mid-century. So, if a pension scheme owns an airport, or shares in oil extraction industries, or any other major infrastructure with significant carbon emissions, either directly, or indirectly through a fund, it now needs to review its fiduciary obligations, its holdings, and its future plans.

Conclusions

Infrastructure takes a long time to develop, and climate impacts and mitigations may not adequately have been considered in the development phase. The decision-making framework (both planning and business planning) cannot now ignore carbon emissions. Policy development may not be smooth but targets

once set need policy to deliver. Policy is open to challenge in the courts (and policymaking through legal challenge is not a helpful environment within which to develop long-term infrastructure). Policy indicates a higher cost of carbon which needs considering in plans.

While little in the way of infrastructure has been refused consent on climate change grounds to date, that may change. We may end up with situations where proposed infrastructure will get consent, but may not get built, because funders perceive a risk to investors of a future change in policy that may constrain the ability of an infrastructure asset to be used, and thus constrain the return on the project. Sometimes, an asset will get consent and then will get built, but investors risk losing out from changes in policy. Those managing investment now have new obligations under TCFD and under the Pensions Schemes Act and this will in due course impact decisions on infrastructure.

The best way forward for long-term assets is to build in climate risk and mitigations at an early stage and constantly review risks and mitigations. In any case, the collision between climate and infrastructure development is real. Ricardo can help with carbon management, strategy and planning, mitigation option analysis, renewable energy and alternative fuels, electrification of transport and heating, and implementing new technology, and if all else fails, expert witness services.



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The author

Mark has worked in energy and climate change for 30 years, nine of these spent at Ricardo. He has supported government policy development as an academic at the University of Oxford and on secondment to government. As a developer, he achieved planning consent for a number of wind and solar farm projects. Mark has appeared as an expert witness at public inquiries in support of local authorities who refused planning on climate change grounds to two airport expansions. He is also working with several airports on strategies to ensure they minimise carbon emissions, as part of proposed submissions for Development Consent Order.

Mark is currently finishing a book called "How Green is your Pension?" which explores how the £6 trillion invested in UK Pension schemes can be invested differently, to minimise risk of stranded assets, and maximise returns in the face of climate change.

Ricardo has nearly 5,000 experts in vehicles, rail, aerospace, energy, carbon emissions, and air and water pollution. To find out more see

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