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Submission re 7.10 Modelling and Appraisal Report

Supplementary Submission of Evidence to TSC on SRN 2023

SUMMARY

This is a supplementary submission to my submission '*WinFoE Modelling and Appraisal Report 23.1*'. It comprises written evidence given by me to the parliamentary Transport Select Committee earlier this year. While it addresses specific questions within the consultation, it includes, through several appendices, the arguments I have consistently made over many years that the whole economic appraisal methodology in WebTAG, is without any real foundation in data or reason. The basic argument is that which was made to an earlier TSC (2013) and is summarised in the Kinnersly paper in the first footnote below. However I include the other appendices because they illustrate the unwillingness and incapacity of the Department for Transport to answer these arguments.

In particular I draw attention to the various pieces of correspondence with Ministers at the Department (Norman Baker and John Hayes) and the very specific questions about the evidence that the DfT has for giving credence to the WebTAG framework. In the submission to the Major Road Network consultation, I show that none of these questions has been answered in any plausible way and that essentially the DfT relies on a circular argument – WebTAG will generate economic benefit simply because it assumes that benefit as an axiom. The DfT can point to no evidence outside this circularity, to justify that assumption.

Transport Select Committee
Strategic Road Network 2023
Individual Submission
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My experience of submitting evidence to this Committee is a bad one. I made a previous submission to a similar hearing in 2013. This submission is copied in below (TSC2013: pp1-17). That evidence, like this one, questioned the whole basis of road transport appraisal which the Select Committee took (takes) for granted as matter of fact. In the report of that 2013 committee, not one mention of my submission was made, though its existence was acknowledged.

Any responsible committee would obviously take a view on the worthwhileness of any submission to it and that view could be that it was not worthy of mention. But a responsible committee could not dismiss a seriously constructed piece of evidence, without some reasons for dismissal – factual correction, counter argument, reference to countervailing material. The Committee did none of this – it simply ignored the whole document. The document was considered valid enough to be printed in a respectable transport journal[i]; that article did not attract any questioning or refutation in subsequent issues or in other transport journals.

The Circumlocution Office: The questions put to the DfT (TSC2013: pp10-12) were put again later, through the offices of my local MP, Steve Brine. After several attempts the answer came from a Transport Minister, John Hayes, in 2016. I append this letter at MRN2018: pp9-10. Presumably this letter and its references represented the definitive answers of the DfT to my questions. The MRN refers to my submission to the 2018 Major Road Network consultation – another example of how the DfT response to any evidence it does not like or cannot refute is to simply completely ignore it.[ii] In my submission I addressed every one of my questions against the documents that John Hayes asserted were the answers to them. This can be found in section 12 of the appended MRN document at pp5-8.

The upshot of all these attempts to get the DfT to answer basic questions about their economic justification for major road building, is that it has been unable to answer any of those questions and has simply chosen not to refute anything that I put in my submission to the Select Committee in 2013, nor to offer even the slightest countervailing argument. This conspiracy of silence in respect of the DfT Emperor's New Clothes extends to the Treasury. I have recently made FoIA requests asking:

> *"what research evidence the Treasury has that supports its contention that roadbuilding leads to economic benefit or even the more specific claim that it leads to economic growth as measured by GDP?"*

The response to this was that it would take 3½ working days to determine whether the Treasury held such information and that, therefore, the question could not be answered[iii]. In follow-up I stated

> *My simple question to you was what is the Treasury's evidence that the money spent on road building, by and through the DfT, has a beneficial effect on the UK economy? I do not understand your excuse for not answering this question: a) that it is too broad and b) that it has no time frame. You must at some level be able to answer that question straightaway. There must be, at some level, documents that justify the Treasury's position in spending these gigantic*

[i] See P Kinnersly; *World Transport Policy and Practice*; 20.2/3; May 2014; p75 et seq

[ii] Creation of the Major Road Network: Government Response; Moving Britain Ahead 2018

[iii] HM Treasury, in fact, has the worst record of refusing information under FoIA: see Figure 4.1.2 in 2021 FoI statistics: https://www.gov.uk/government/statistics/freedom-of-information-statistics-annual-2021/freedom-of-information-statistics-annual-2021-bulletin

> *sums of money. Or are you actually saying that there is nobody in the Treasury, from the Chancellor down, who has any knowledge of, or evidence in support of, the elementary justification for the way it spends money?*

The Treasury response was a further refusal to provide any answer to the question, but to refer me to the DfT (ignoring the fact that I had already pointed out that the DfT had been unable to provide any such evidence). So the Treasury doesn't have a clue about whether the money it spends on road building has an economic benefit; the Department for Transport cannot answer the question either. The Transport Select Committee never asks the question and when the question is put to it, it simply ignores it. Any attempt to get answers is met with Kafkaesque or Dickensian circumlocution.[iv]

In summary, the evidence that I have put forward on many occasions, over many years and which has never been refuted by any Government Department or elected parliamentarian, is that there is no sound basis for believing that spending money on new roadbuilding offers any economic benefit to the nation. Moreover, such evidence as there is, suggests that the economy actually suffers from new roadbuilding. So, as far as we know, the likelihood is that every mile of new road capacity provided, will have the effect of making the nation worse off economically. The Select Committee is thus once again looking into how it can make the economy worse by improving the efficiency of doing so.

The New Climate Change Denial: That a government can contemplate spending perhaps as much as £100B, in the whole catalogue of upcoming road schemes to 2035[v], yet talk of paying nurses the fair wage that might see us having enough of them, is 'unaffordable', indicates a topsy-turvy economic mentality. Money apart though, we now know that roadbuilding and the *'Great Car Economy'* costs far more in terms of our health and that of the planet.

Existential is the word that is much overused, but that is exactly what we are talking about here. The continued existence of a liveable planet depends on governments stopping the behaviours that threaten it. How is it possible for the UK government and Parliament to believe (as they clearly do, from the scoping of this Committee inquiry) that the worst environmental behaviours can continue and even that we should encourage them even more? Assuming, as I must, that parliamentarians are not actually malignant, the only answer to this that I can see, is purblindness – the *New Climate Change Denial*.

Outside 53 Tufton Street (and those of its disciples within Westminster) it is hard to imagine that there still exist actual anthropogenic Climate Change deniers. Because they are influential, they are dangerous. But the greater danger lies not in denying the physics, but in asserting that we do not need to change behaviour because technology will solve all our problems. As a physicist, who for much of his working life has been a technologist, I see several things wrong with this view. Firstly, it is counting chickens by counting unfertilized eggs (and in some cases counting imaginary eggs). Secondly that this starry-eyed techno-optimism is most frequently found in people without any technical, or even numerate, background. Thirdly it ignores the empirical data that tends to show that something for nothing is an illusory hope. Fourthly and relatedly, it ignores the Jevons Paradox.

The empirical evidence is that technology has scarcely[vi] yet come decoupled from environmental harm[vii]. It does not mean that it is impossible (another modern economist, Kate Raworth, says she is agnostic about the possibility of growth without harm), but there is certainly no case for assuming it will happen. The Jevons Paradox (Rebound) is also difficult to dismiss[viii]. In road transport we have a really clear example in the

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[iv] Little Dorrit: *CHAPTER 10. Containing the whole Science of Government*

[v] The infamous £26B only applies to RIS2. RIS1 leftovers, RIS3-4, MRN, HIF, miscellaneous LEP, CLI and Local Authority transport precepts actually spent on roads add up to much more: https://www.thetimes.co.uk/article/90bn-road-revamp-planned-despite-drive-for-green-travel-dfklzlnff

[vi] OK, well maybe the bicycle.

[vii] Tim Jackson: *Prosperity without Growth: Economics for a Finite Planet: The Myth of Decoupling*

[viii] In particular in relation to energy consumption: https://www.sciencedirect.com/science/article/abs/pii/S0165176521002329

Metz Effect[ix], where the DfT's basic Webtag assumption of the value of time was comprehensively dismissed – the single most-observable result of all the decades of road building is that drivers do not save time, they just travel further. Is this opportunity created to do different things or simply entropic distribution of the same activity? See §11.6 of MRN submission below.

Decarbonisation of Transport: The DfT argument is clearly part of the New Climate Change Denial. Its *Decarbonisation of Transport Strategy*, pays lip service to behavioural changes (i.e. political, societal and organisational changes):

> *Modal Shift: Decarbonisation of transport will not happen without users changing their behaviours. It is essential we continue to explore how best to encourage a shift to more sustainable and active travel and the adoption of zero carbon technologies and services to achieve a smooth transition to net zero transport.*
>
> *Public transport and active travel will be the natural first choice for our daily activities. We will use our cars less and be able to rely on a convenient, cost-effective and coherent public transport network.*

but there is nothing coming out of the DfT that actually encourages modal-shift; indeed all Government policies in reality (including and especially the Strategic Road Programme, but also on fuel duty) work in the direction of regressively subsidising car traffic and road freight that compete with public transport and rail freight.

The bulk of the Decarbonisation of Transport Strategy is about technology, including a lot of magic thinking. I attach a submission to the consultation on this strategy, made by the *A36/A350 Corridor Alliance* and authored largely by me, in which I argue that the greater part of the Strategy is misconstrued , both in its reliance on technology, its assumptions about renewable energy availability, and the environmental costs of the technology it imagines.

The Specific Questions put by the Select Committee: It should be apparent from the above that I consider most of the questions being asked are of the nature, not just of deckchair location planning, but of how to increase the efficiency with which the Ship of State picks up steam, in order to have maximum impact on the iceberg (broken off from the Greenland massif?). It is beyond my comprehension to imagine how serious politicians can debate how to facilitate such insanity.

So I will confine myself to short answers to the wrong questions.

Q1-3, 5,8
How effectively the RIS2 enhancements portfolio has been managed to date;
Whether risks to the enhancements portfolio for the remainder of the RIS2 period are being well managed;
What the impacts of delays and cost overruns are on the overall programme, and whether the revised programme can be delivered to schedule and on budget;
What lessons from RIS2 need to be incorporated into RIS3 to ensure it is achievable and delivers on policy objectives;
How RIS3 should take account of technological developments, and evidence on ways of increasing capacity on the Strategic Road Network (such as smart motorways and potential alternatives to them)
Given what I have said above (and in appended documents), the logical environmental, economic and social response to these questions is that one hopes the management has been as inefficient as possible. It would obviously be better for the future of our children if the money was not spent at all or that it was spent on

[ix] The TSC report on the 2013 inquiry did not mention this either, even though Professor David Metz was called as a witness.

something useful. But given that government has decided to spend money making the world a worse place, it would be best if its success at doing so were limited by incompetence within the spending department.

Q4
What progress[x] is being made on planning for the next Road Investment Strategy;
The signs are bad. Where civilised nations, aware of the threats to their children's futures, should have seen an end to such planning, it goes on and on. The Regional Transport Policies, especially in England, are nearly all of a type. Nearly all proclaim the importance of meeting climate objectives, having modal shift to public transport, of travelling less and nearly all start the process with asserting the necessity of carrying on with all the road schemes in plan – *just one more cigarette* and then we'll give up. Meanwhile National Highways gets on with creating ever more mischief, even looking to create more 'strategic' highway corridors. It is in the process of doing this with an M4-South-Coast Study, aimed at carving a new route through some of the most important countryside in southern Britain[xi]

This last indicates the triumphalism of the road builders. Where we used to have at least some pretence of concern for strategic transport, with multi-modal studies (there was indeed one precisely looking at M4 – South Coast connectivity), we now only have road planning.

Q6
Whether the Government's current and forthcoming roads investment programme is meeting the current and future needs of consumers and business;

How can we possibly know what this means, in the light of the fact that the government is unable to give any reasons for believing the economy benefits from such expenditure? Obviously some businesses prosper directly from the road building and some will prosper from a car-dependent economy. But if the net effect of the 'investment' is for the economy as a whole to be degraded by such dependence, then many other businesses will presumably suffer. For the reasons I give in all of the appended documents below, it cannot be assumed that an economy so skewed by the enormous regressive subsidy of externalities, can be as optimised as it would be if those externalities did not exist. For those whose political ideology is free market, Adam Smith's *Invisible Hand* cannot sensibly produce an optimally happy result. For those for whom social equity is a guiding political principle, regressive subsidy is anathema.

When we consider what meeting the challenges of Climate Change and species extinction signify for the way we must conduct ourselves in the near future (it should have been yesterday), does it in any case make survival sense to encourage existing businesses and consumers to carry on with unsustainable 'business as usual'?

Q7
Whether the Government's roads investment programme aligns with other policy priorities, such as decarbonisation, levelling up, productivity and growth;

Let us put aside the last word of this question for a future debate, simply acknowledging that there has to be a limit somewhere (surely we agree this? The planet, our lives, the economy are ultimately trophic – sustainable growth is oxymoronic).

The productivity question is akin to the question 6 above. How can we know whether productivity moves towards the optimum it could be if the economy were not skewed by externality and regressive subsidy?

[x] *"None will break ranks, though nations trek from progress"*
[xi] See https://www.a350-a36-alliance.com/a350-a36-corridor-overview

I have addressed transport decarbonisation above and in an appended submission to the consultation on this matter. I really struggle to understand how any intelligent person is unable to see that building loads of roads (with massive carbon emission in their construction and in the extra traffic they induce) is consistent with our Climate Change policies. The ability to hide behind the fiction of the Transport Decarbonisation Strategy, that traffic growth is somehow consistent with reduced carbon, because technology will make it so, is simply belied by the advice given to the Government by the Climate Change Committee:

> *"The Government has acknowledged the need to limit traffic growth, shifting travel to public transport and active travel".*

This is incoherence to the point of insanity – White Queen belief in impossible contradictions.

And how does all this relate to 'Levelling Up'? The one clear fact about increasing car-dependence in transport policy is that it relies on regressive subsidy - the poorest get no benefit and they suffer most of the costs.

Conclusion: I expect nothing of these hearings. I first got involved in road campaigning in 1975 - I've grown old hoping that politicians would open their eyes to see what was obvious decades ago and have the honesty and decency to acknowledge it. The hope was vain. The dishonesty of government and most of parliament on transport and the environment has become more palpable by the year – as the facts become more and more undeniable, the politicians become more and more able to equivocate – they *'swear in both the scales against either scale'*.

So carry on your *'primrose way'*; carry on ignoring the facts; carry on talking about climate change whilst adding petrol to the planetary fire; carry on yelling abuse at the brave young people who climb the gantries over your roads to Hell, while you destroy their future. I'm sure you think what you do is important. I wonder what our grandchildren will think of it when they look back from their ruined world.

1.

Transport Select Committee
Strategic Road Network 2013
Individual Submission – Christopher Gillham

2. Summary

2.1. This submission explores the assumptions on which the DfT (with Treasury approval) bases all its road planning. The problem is that the assumptions are so deeply entrenched that they have taken an *ex cathedra* aspect – no civil servant, politician or media correspondent questions them. When questions have been raised by a few individuals, the DfT has never answered them; it has never done any research to evaluate its assumptions.

2.2. The DfT makes three fundamental assumptions that it has never evidenced. First that road building must be an unqualified good for the economy; secondly that there is always an insufficiency of road space; and thirdly that Adam Smith's *invisible hand* acting through millions of road users' *willingness to pay*, guarantees that the macro-economy benefits by a kind of economic annealing.

2.3. The DfT takes the third assumption as the basis for its entire economic appraisal process (COBA) – if the user is willing to pay then, if the increase in road capacity allows him[1] to pay less for the same, there must be a benefit that accrues to the economy as a whole.

2.4. The first assumption depends upon the other two, but of itself it ignores the possibility that there may be costs to society that the road user does not perceive or associate with his activity. Summing the advantages to the users does not guarantee that the economy as a whole benefits. If burning fossil fuel is fatal to the stability of the planet, the *Invisible Hand* assumption still reckons society benefits.

2.5. It is possible to test the first assumption by seeing how measures of changes in economic welfare correlate with changes in road capacity. I carry out some simple calculations to show that the assumption is unreliable. I have presented these to various DfT officials over decades and they have never critically or analytically responded.

2.6. The second assumption is rooted in the proposition that you can never have enough of anything. Building a road in a country empty of such infrastructure demonstrably allows economic activity that would not occur without it. This does not mean, however, that there is no point at which extra such infrastructure impedes activity. Simple thought experiment shows there must be an optimum such level of infrastructure; the question is to know on which side of the optimum Britain lies. DfT has never considered this elementary question even though its assumption that we can always benefit from new road capacity does not appear to be borne out by my correlative tests.

2.7. The third assumption begs the question "*who is willing and who pays?"* because the user does not pay the full cost of what he is using. There have been many studies of cost externalisation and the biggest and most thorough study reckons the road user externalises costs to around 3 times the total taxes he pays. The DfT has never contested these studies or produced one of its own.

2.8. Eddington believed users should pay the true cost of what they do and it is hard to avoid this belief since the subsidy to motorists is highly regressive. What Eddington did not do was work out what would happen if the externalised costs were recovered. I show some calculations, based on the apparent elasticity of response to fuel price. These indicate that today's traffic levels would reduce to

[1] I use the male pronoun to represent a person of either gender, to avoid the infelicity of using the gender-free 3rd person plural.

those pertaining in the 1960s.

2.9. As an economic argument there is no need for more road capacity, indeed arguably there is a need to reduce it. This ought long ago have been considered to be the case as an environmental argument.

3. Introduction

3.1. In my submission I will try to get at the core assumptions underlying every government policy on roads since the war. I do not believe that any office of government, including the Treasury, has ever demonstrated that the assumptions are valid; nor have they carried out any research to inform or justify their assumptions. Vast elaborate structures of policy and appraisal have been erected on these unjustified assumptions and huge sums of money spent in consequence.

3.2. The Command Paper 'Action for Roads' is no different in this from any previous policy or strategy; it is informed by these assumptions and bound to this structure. It is *mumpsimus'* - consistency in error does not do away with error.

3.3. Before making my case on the false assumptions of road economics I give some background on how ordinary members of the public are confronted with government policy (usually through the public inquiry process) in this area and how barriers to fundamental questions are put in the way.

3.4. My name is Christopher Gillham of 16 Upper High Street in Winchester. I am a retired scientist with a PhD in physics and have worked in both academic and industrial research. I have spent more than half my life fighting road schemes, beginning in 1975 in the build-up to the second of the four M3 Inquiries at Winchester, and going on to take part in campaigns and inquiries in Hampshire, Dorset, Sussex, Kent, Surrey, Berkshire, Wiltshire, Somerset and London. I have not done this for fun - it is not a hobby, because I find the whole business of road inquiries to be amongst the most depressing, frustrating and fundamentally unfair and unfeeling activities to be involved with.

3.5. Two major barriers to reason manifest themselves at road inquiries:

- An inquiry cannot question *'government policy'*.
- The Inquiry must confine itself to the locality.

4. Questioning Government Policy

4.1. There are obvious problems of consistency in government policy, sometimes simply because governments change and emphasis changes, but very often within the policies of a single administration. The clash between policies on greenhouse gas emissions, air pollution, biodiversity, landscape and heritage protection and most other transport policy or practice is most obvious. On these matters one can only hope to stress the importance of the former and hope that an Inquiry Inspector is civilised enough to see it. It happens occasionally, but it is a lottery.

4.2. But there are also cases, cited frequently in public inquiries, where government policy is arguably counter to reality. There is a famous story of the US State that tried to legislate to make mathematical π exactly equal to 3.[2] The point I make in relation to road inquiries is that certain things, such as traffic forecasts and the methodology of cost-benefit analysis, are regarded as policy, even though they are

[2] This is not exactly apocryphal - in 1897 Representative T.I. Record of Posen County introduced House Bill #246 in the Indiana House of Representatives. He proposed that π take one of three rational numbers. Whether this was silly season politics or a serious attempt to deny reality is not recorded.

highly questionable in logic and arithmetic.

4.3. I will address below why I believe that the basis of appraisal of road schemes in this country is deeply flawed. What I would like to get over here is how unfair the process is. If the Department for Transport says the world is flat, ordinary mortals are required to accept that it is flat, whatever evidence they have for believing this to be untrue. Inspectors at Inquiries will sometimes listen to such evidence, but they always stress that they cannot take cognizance of it.

4.4. I have given evidence at more than a dozen major highway inquiries and the promoters have never chosen to answer the fundamental points I have made on the appraisal methods, nor have Inspectors ever required them to do so. Inspectors will usually say, quite reasonably, that such fundamental matters should be taken up directly with the DfT.

4.5. Unfortunately this avenue does not appear to be open either. Three years ago I made an attempt to get a definitive response from the DfT. I wrote to Norman Baker, making a number of points that I make in this submission. I received no answer to them. A year later I put questions on the basis of road appraisal in a succinct form (which I reproduce in Appendix A, but which are implicit in what I say below). Despite other letters and emails to the Minister since, requesting a response, I have not yet received any answer.

4.6. The DfT has spent many billions of pounds building roads over the last 60 years. It appears never to have justified the processes it uses to appraise what it does. It appears to be unwilling or unable to respond to questions on its processes.

4.7. Select Committees appear not to examine the fundamentals. Nor do committees of experts challenge these. SACTRA did some good work on issues such as traffic induction and worked on details of the COBA mathematics, but never really questioned the assumptions behind the appraisal process. Eddington did slightly better, in that he hinted that there were unproven assumptions (e.g. of economic benefit) and economic distortions such as cost externalisation, but he shied away from examining these. There is seemingly a process by which all official attempts to examine transport policy very quickly go native and swallow the received wisdom of the DfT and the Treasury. What does one do in this Kafkaesque world?

5. The Local Question

5.1. The appraisal of a road at a road inquiry supposes that one is simply comparing the expected effects of a scheme with *'Do-Nothing'* in the vicinity of the scheme itself. A bypass scheme, for example, is supposedly appraised environmentally for its local effects on a town being relieved and on the countryside that is to bear the burden of the bypass construction. It is appraised economically by considering the supposed reduced costs of journeys within the region of the scheme against the costs of construction and increased maintenance of a new road.

5.2. It does not appraise the effects beyond the area of a scheme. Thus the traffic induced by a new bypass affects the network and communities well beyond the scheme and this disbenefit, both environmental and economic, is simply ignored. More importantly it fails the test of the *fallacy of composition*[3] - a set of benefits are presumed to add up to an overall benefit. Just because a case is made (and I seriously doubt that any such case has ever been properly made) that there is an economic benefit to be had for a given road scheme, does not mean that the benefits of lots of individual road schemes add up to a

[3] *'"The fallacy of composition" is a logical error - a mistaken belief that what seems good for an individual will still be good when others do the same thing. For example, someone who stands at a crowded concert may get a better view of the stage. But if everyone at the concert stands up, nobody's view is improved.'* Fast Food Nation; Eric Schlosser p119

benefit for the nation.

6. Of Atoms and Diamonds - Infrastructure *'Investment'*

6.1. **Assumption 1:** It is taken for granted, almost uniformly it seems amongst parliamentarians, that spending money building roads must be beneficial to the nation economically. *Action for Roads* certainly takes this as read[4]. And we even see it quantified. Three years ago Philip Hammond asserted that *'for every pound we spend on Highways Agency schemes, on average we will get back £6 of benefits'*. Where does this calculation come from? We need to examine the other assumptions.

6.2. **Assumption 2:** It is supposed that we have an insufficiency of road infrastructure. It follows, therefore, that if we can add more such infrastructure or make the existing infrastructure more efficient at doing what it does, there must be a benefit. But this in turn supposes another assumption.

6.3. **Assumption 3:** That what we do with the infrastructure is, of itself, economically beneficial. This assumption essentially falls back on Adam Smith's invisible hand - his *'claim that individuals' efforts to maximize their own gains in a free market benefit society, even if the ambitious have no benevolent intentions'.*[5] This action of individuals is deemed (e.g. by SACTRA) to be mediated by *'willingness to pay'.*

6.4. What the DfT (with Treasury approval) does with these assumptions is atomistic. It takes a section of the road network and argues that the users of that network have made an economic decision guided by the *Invisible Hand* and that, if they benefit from an improvement at that section by more than it costs to make that improvement, then the overall economy must benefit from the difference.

6.5. The granularity of this atomism borders on the fantastic – COBA aggregates billions of tiny supposed time-savings and fuel-savings over a period of 60 years, augmented in turn by equally fantastic forecasts of traffic growth. It is so fantastic that it is very difficult, however fairly one tries to put it, to get over to a normal thinking member of the public that this is what the DfT does.

6.6. The COBA atomistic approach is akin to the physicist who reckons to model a substance by bringing together billions of atoms, without really knowing the true properties either of the atoms or of the crystal structure that will keep those atoms together. The man on the street probably knows whether he has a diamond or a heap of soot in front of him and probably knows the relative values much better than the atomist who has computed what he will get. The answer to the value of the modelling can probably only be seen at the macro level. That is where we should test the assumptions.

7. Testing the Assumptions

7.1. **Assumption 1 – Road investment is an automatic good.** Firstly making assumptions 2 and 3, it is still not axiomatic that building more roads must be good. People may make decisions based on individual economic benefit; there may be an insufficiency of infrastructure to allow them to make those decisions; by providing the infrastructure it may be that a national first approximation economic benefit results from summing those individual benefits. But what if those choices have consequences not felt or not noticed by those individuals, but which sum to some consequence to society, environmental, economic or both?

7.2. Obvious examples can include climate change, pollution and health consequences, which can easily

[4] It seems more concerned that Britain is falling behind other nations in its provision of roads than it is with attempting to show what the economic benefit might be.
[5] E.g. http://en.wikipedia.org/wiki/Invisible_hand

be argued as significant economic consequences. In a resource-diminishing world (energy, climate stability, water, food etc.) the *Invisible Hand* can create habits that are more and more difficult to break. We would not normally think in terms of buying bongs or needles and planting opium poppies as an 'investment'. Why would we think about 'investment' in oil dependency?

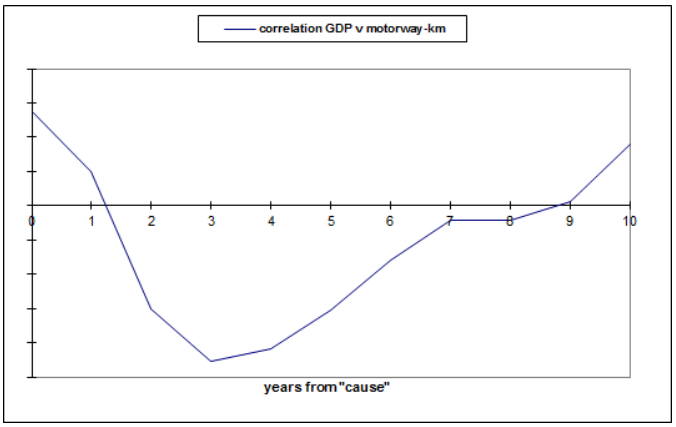
7.3. There is, therefore, no justification for assuming road building is beneficial as an axiom. How, at a macro, phenomenological level, do we demonstrate that road building represents an overall good for the economy? Obviously the sort of statement that Philip Hammond made (§6.1) does not do this because it is atomistic and starts from all three assumptions – if any one of them is even partly wrong, his statement is meaningless.

7.4. The only kind of answer to this that I have got from the DfT was in an email exchange a few years ago, in which I was referred to the Eddington Report as demonstrating that road building was good for the economy. In fact it does no such thing. Eddington refers to a correlation between GDP growth and road traffic, but is at pains to stress that he did not know which way the correlation ran – does GDP growth result from road building or the other way round? It is a pity that he did not commission a study of this (from my failure to extract any response from the DfT on this I think we can safely assume that they have never studied it either).

7.5. This ought to take our breath away. For 60 years the Department for Transport has been carving this country up on the assumption of an economic benefit and it doesn't know (and more importantly has never bothered to find out) whether economic growth comes from increasing traffic by building roads or whether roads are built to accommodate traffic brought about by economic growth.

7.6. Yet it is not that difficult to take a stab at it. There is historical series data on road building and on economic measures such as GDP and unemployment levels. In Appendix B I explain the process of determining correlation integrals. I would hesitate to assert that such integrals demonstrate the direction of causality, but they are a reasonable test of an assertion that there is a particular causality.

7.7. If we cross-correlate changes in GDP with increases in major road capacity we get curves of this nature:



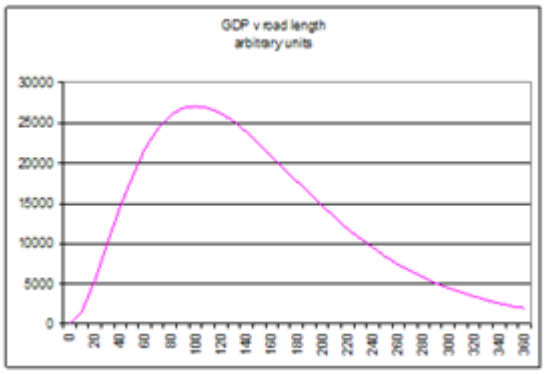
7.8. This would suggest that the direction of correlation is opposite to that we would expect from the presumption that roads increase GDP. The correlation is markedly negative – GDP tends to go down after road construction. Similarly other measures of economy appear not to have the positive effect reckoned for them. A correlation test indicates that a rise in unemployment, for example, follows an increase in road building (see Appendix B).

7.9. Even correlation of accidents with road building does not follow the direction of causality the DfT would have us believe. Considering that COBA always reckons an accident benefit from building roads this may come as a surprise, but it shouldn't do so. We know that the accident rate on motorways,

for example, is low compared with that on other roads, but that says nothing about how motorway driving may influence driving off the motorway (peripheral effects) or how road building induces traffic on other parts of the network and effectively contributes accidents there.

7.10. **Assumption 2 – There is an insufficiency of road infrastructure.** This is really a flawed belief that you can never have enough of a good thing. Nobody doubts that the ability to transport goods is a necessary factor in generating wealth. If there were no roads in Britain economic activity would be very local and very limited – the GDP of such an economy would be relatively low. On the other hand, if Britain were entirely laid down to road and the road was used, then we would have no space to grow or make anything, and since we would be travelling all the time, no time to be involved in any economic activity at all. Somewhere between no roads and country saturated with roads must be the optimum for economic activity.

7.11. Just consider what this means. There has to exist a curve representing economic activity of the country as a function of the amount of road space in it; that curve must increase from zero to some level and decline to zero again. Something like this:



7.12. The peak of this curve clearly occurs at the optimum level of road space. How do we know on which side of this peak we sit? Politicians, the Treasury and the DfT seem to be uniformly of the view that we must sit on the left hand side. What evidence is there for such a view? The correlation data I have shown above actually favours the supposition that we are on the right-hand side – that new road building makes us poorer (and the arithmetic of COBA becomes simply nonsensical). You would think the DfT or at least the Treasury would want to know. I see no evidence that they have ever asked the elementary question.

7.13. **Assumption 3 – The Invisible Hand tells us there is a benefit through 'willingness to pay'.** The question, however, is '*Who is willing and who pays?'* If we pay for all the economic choices we make, the market theory is that this somehow equilibrates or anneals to a stable optimum or quasi-optimum state. But that pre-supposes that we do pay for the choices we make. The Blueprint studies of the late Professor Pearce[6], however, showed that motorised road transport users externalise a very great part of their costs, so market choice is skewed.

7.14. If externalisation is large the skewed response would be expected to be large. How can we say there is a legitimate demand for road space when we don't know whether the users would pay the real cost? We could find out by observing the elastic response to forcing motorists and freight operators to pay an increasing proportion of the true costs. And we could work out what might happen to traffic if the users paid the full costs.

7.15. The last Pearce estimate for UK externalisation was that it totalled more than three times the total

[6] E.g. Blueprint 5: The True Costs of Road Transport ; Maddison D, Pearce D, Johansson O, Calthrop E, Litman T &Verhoef E; Earthscan, London 1996

vehicle and fuel duty taxation.[7][8] It is extraordinary that this is simply not known by most commentators and politicians (especially the Chancellor and the Secretaries of State for DEFRA, DfT and DCLG), who talk the absurd language of *'war on the motorist'* – the motorist is in fact highly subsidised and the subsidy is extraordinarily regressive[9]. Eddington also recognised the problem of externalisation and indicated that he thought road users should pay the true cost.

7.16. What if they were required to do so? We know that road traffic peaked in 2007 and has fallen steadily since[10]. We can guess that this is in part due to a fall in disposable income and economic activity from the recession, though the curve was plateauing before the 2008 economic collapse. It seems more likely that the response relates to the perceived immediate price of making journeys (i.e. the price of petrol).

7.17. We can do a simple test of the elasticity of this response (detailed in Appendix C). Data from 1990 to 2012 shows a surprisingly linear response to price suggesting a fall of 37km per year per vehicle for a fuel price rise of 1p. Pearce-type estimates of the cost externalisation at three times total taxation suggests that recovery of this externalisation via fuel price would require a price increment of 426p per litre. This suggests that the average km per vehicle would drop from the present 14000 to around 3000.

7.18. Consider what this means. Eddington said that road users should pay the true costs of what they do. Yet if they did, the data would suggest that traffic levels would be way down on present levels (indeed at a level last observed in 1959). On the current network it would be hard to see how there could be any congestion anywhere if this really happened, so why, if Eddington thought it should, did he still suggest that there was a need to relieve congestion hotspots? The position is nonsensical.

8. Other Assumptions

8.1. **Value of time.** We have heard much of the criticism of the DfT in relation to its cost-benefit analysis in respect of HS2, particularly focusing on its calculations of value of time. Clearly with roads there is no equivalent assertion that the time spent travelling can be used for other things. Nevertheless there are severe objections to how time is valued in COBA. I do not intend to dwell on this because it all sits in the classic paper by David Metz.[11]

8.2. Essentially the behaviour of motorists does not fit the DfT supposition that they seek to minimise the time they take driving, but rather, with the provision of extra road capacity, they tend simply to drive further. Indeed the net result of all the road building of the last 40 years has actually been slightly to increase the time motorists spend driving.

8.3. Undoubtedly the DfT would argue that people are merely taking advantage of the opportunities afforded to them by making longer distances easier to travel. But can this really plausibly be the case? Are we really doing new things with this opportunity or are we simply travelling greater distances to do the same thing. I'm sure we all know of the stories that milk from cows in Dorset travels to Glasgow for processing to be shipped back to Dorset for retail. And I expect we all have personal anecdotes, but I can certainly testify to the fact that the last 40 years has taken away many facilities that I had

[7] And we should remember that these estimates made in the mid-nineties were before the extent of air pollution costs were understood and certainly massively underestimated the climate change consequences of transport emissions

[8] There are a number of studies of externalisation, none of which come to a contrary verdict to Pearce. The DfT have never released any statement refuting these studies or reported on any research of their own.

[9] Arguably those least likely to own a car are the poorest, who suffer from lack of such mobility in very many other ways (facilities, shops etc. move further away from them) brought about by the mobility of those they subsidise.

[10] It seems extraordinary that the government is putting money into increasing capacity in a system with falling demand – why not put it all into a system with increasing demand – rail (which is probably less subsidised and subsidies are declining)?

[11] *'The Myth of Travel Time Saving'*; D Metz; Transport Reviews, Vol. 28, No. 3, 321–336, May 2008

within walking distance of my house in Winchester, firstly to edge-of-town industrial estates and then down the motorway to Southampton or beyond. Obviously we should not rely on anecdote, but what do you do when the DfT does no research whatever on the consequences of its actions?

8.4. **Peripherality.** It is common practice with authorities promoting roads, to assert that economic benefit will accrue to depressed regions and it is common practice for DfT and politicians to swallow this argument, even though it is never really evidenced. One has only to look at schemes such as Kingskerswell or Combe Haven[12] to see how these unevidenced assertions prevail.[13]

8.5. Roads are two-way things and in logic can as equally drag activity out of a region as bring it in. Eddington, who is hardly anti-road, fights very shy of asserting that an individual scheme can be assumed to bring a benefit to a particular area and certainly doesn't include this as one of his reasons for building roads. This is something else the DfT ought to have done some research on.

9. Conclusion

'Telle est la faiblesse de notre raison: elle ne sert le plus souvent qu'à justifier nos croyances' Marcel Pagnol – La Gloire de Mon Père

9.1. Road Inquiries are atomistic or reductionist - all about minute examination of lots of detail of variable provenance and credibility, which somehow an inspector is supposed to aggregate into an informative and decisive result. The problem is that the processes of appraisal are based on entirely unevidenced assumptions.

9.2. The DfT have had more than half a century in which to do the elementary research to justify their assumptions. They have not done it and they have not engaged in argument when elementary criticism of their assumptions is drawn to their attention. The DfT have always adopted a strategy of simply ignoring criticism.

9.3. COBA appraisal is a huge, elaborate edifice built on quicksand. It is junk science and no less junk because politicians and a whole transport planning industry is prepared to swallow it.

9.4. I am reminded of my first University exposure to experimental physics, when it was apparent that the supervisor was not particularly interested in the detail of the experiment or its outcome, but simply asked us *'Do you believe that this is a credible result?'.* He was not asking us to surrender the experimental evidence to an irrational (or rather non-rationalised) belief, but to stand back from the experiment and see whether what we had observed accorded with our wider knowledge and experience.

9.5. Does Britain's transport policy accord with what we believe and fear about the future of our planet? This is the big elephant-in-the room question – do we morally cop out from this question by paying all our attention to the atomistic detail of the Webtag process?

9.6. For me the answer to the holistic question is obvious. I can only say that everything we do know of the science and almost everything that we see of the politicians willingness to do anything about it, progressively and rapidly darkens our future. The dangers are imminent and the prospect is catastrophic, much more horrible than the very worst part of the cosy picture that Stern and Eddington

[12] To be fair to the DfT they did not see an economic case for this hugely damaging scheme – the Chancellor overruled them.
[13] Though the Inspector at the Westbury Bypass Inquiry in Wiltshire did look critically at the claims of economic benefit and reduction of out-commuting.

have painted.

9.7. Yet Government is in defiance even of these mildest of warnings. Who seriously believes that in 10 years time, possibly beyond the tipping point of climate change, anybody will see any sense in all the silly decisions from the Treasury and the DfT to carry on pouring fuel on to the planetary fire?

Appendix A – Correspondence with Norman Baker

After writing to the Minister in November 2010 and receiving no substantive reply to the points I made, I sent a second letter in November 2011 in which I spelled out the questions I was seeking answers to. I sent a further letter asking for a response to my previous letters in July 2012. I have not received a reply from either the Minister or the DfT. The questions I put were:

> So it seems reasonable to me to return to the unanswered questions of my original letter and ask that you obtain responses from the DfT to each of my points. Put simply my letter was about the false economics of DfT road scheme appraisal as represented by Philip Hammond's assertion that *'for every pound we spend on Highways Agency schemes, on average we will get back £6 of benefits'* and the wider economic assumptions famously encapsulated in Mrs Thatcher's *'Great Car Economy'.*
>
> **Economic Appraisal**
>
> 1) The economic appraisal process for road schemes is based on an assumption that road transport at the level it occurs in the UK represents a net economic 'good' for the country. Without this assumption there is no justification for further assuming that reducing the costs of road transport (especially through road building) represents an economic 'better'. I have asked at many public inquiries what research the DfT has carried out to justify that assumption, without receiving any definitive answer. **Question: has there been any research into this basic assumption?**
>
> 2) The Eddington Report has been adduced as demonstrating a basis for such an assumption, but while Eddington makes a link between GDP and road building he is careful to stress that he does not know which way round it goes – do we have growth because of road building (or road transport) or road building (or road transport) because of growth? **Question: does the DfT have any evidence on the direction of causality in the correlation between GDP and either road building or road transport use?**
>
> 3) While SACTRA did some useful things in the past and showed a degree of independence, notably when it insisted on the induced traffic effect, which the Highways Agency had denied for decades, unfortunately it got side-tracked by the labyrinthine processes of benefits calculation without ever questioning its fundamental principle of '*willingness to pay'*. The problem with the principle is that it does not ask the question *who is paying what?* **Question: how is *'willingness to pay'* a proper basis for determining the benefit of reducing the costs of a user, if the user is not paying the true costs of his activity and other people or other things are doing so?**
>
> 4) The Blueprint studies of the late Prof. Pearce at Leeds University suggest that the true costs of road transport are something like three times the total taxation burden on the road user. If we take the known elasticity of demand with respect to fuel price as an indicator, tripling the taxation on the road user would bring about a massive decline in the use of the roads. **Question: has the DfT carried out any research of its own seeking to establish the degree of externalisation of road user costs, and does it have any evidence to suggest that the Pearce calculations are fundamentally wrong?**
>
> **Cars for Prosperity:**
>
> **5)** ***The motor trade for prosperity:*** Governments are fond of subsidising car purchases, a subsidy which is clearly regressive in nature, from the scrappage scheme of the last government to the support for electric car selling under a spurious 'green' agenda. Car manufacture is an economic

activity and it certainly brings wealth to some countries. But what is the evidence that support for the sale (or even the manufacture) of cars in the UK is beneficial to the economy of the UK? We import in terms both of vehicle numbers and of money much more than we export. Any encouragement of indiscriminate growth of car sales might reasonably be presumed to increase a balance of trade deficit in this area. **Question: does the DfT have any evidence that there is a net economic benefit to the UK of encouraging the sale of cars?**

6) Surely the best environment (and hence the more natural home market) for developing any green technology is likely to be in those countries that most naturally think in terms of alternatives to wholesale conventional individual-vehicle-centred transport. The UK does not compare well with major European and Japanese competitors in this regard. Germans, for example, naturally seem to look for alternatives when it comes to transport, in a way that the British people mostly no longer do. **Question: has the DfT done any research on the relative economic benefits to the UK of investment in public transport compared with the support for private motoring?**

7) ***Car access for prosperity:*** The assumptions about economic benefit of road transport exist at many levels. Town councils throughout Britain have forever shied away from restricting car access to their town centres in the belief that it is bad for the economy. While Park and Ride often figures as an alternative to building more car parks in the centre of towns, very rarely do councils take the obvious logical step of significantly removing city centre car parks. Yet if you imagine planning the access for a town from scratch you would not decide that the most efficient access through a restricted street network was for individual shoppers or tourists to each enter in a separate box with 20 times the footprint of a human being.

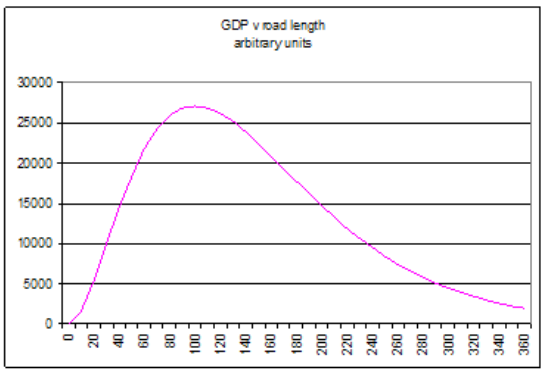
Conventional public transport with good reliability, frequency and coverage (spatial and temporal) would so clearly be the efficient way of doing things that you'd think every town council in the country would be making it happen. But ask them and they all say that local businesses fear a loss of trade if you restrict car access. While there are towns and cities on the Continent with clearly more radical transport policies and apparently at least as prosperous as car-choked towns, there appears to be no definitive research on this. **Question: has the DfT done, or had access to, any research on the economic consequences of more radical transport polices for urban centres, and if not would it consider urgently commissioning the definitive study that is needed?**

8) ***Road building for local prosperity (peripherality):*** two years ago the South-West saw the end of the Westbury Bypass in Wiltshire. After many years of planning and a wasted £7M of ratepayers money Wiltshire Council came to an Inquiry with a positive COBA (naturally! – it is quite difficult to make COBA negative) and a claim for local economic benefit. An argument used was that economic welfare was draining out of Westbury by out-commuting and that a bypass would somehow give better access to its industrial estate and thereby create more employment in Westbury. The notion that a new bypass to Westbury might actually increase the propensity for out-commuting (by reducing the transport costs of it) had simply not occurred to the planners. But it did occur to the Inspector.

The obvious truth that a road is a two-way thing and can just as easily suck economic activity out of an area as draw it in, is simply ignored all over the country. At this moment the DfT is actively considering an appraisal for the Kingskerswell scheme (where the local authority is apparently prepared to risk several tens of millions of pounds of ratepayers money) which makes assertions of economic benefit to the region without any consideration of peripherality evidence at all. **Question: Has the DfT ever done any research on the economic peripherality effects of road schemes? Supplementary Question: when the DfT analyses road bids made to it, does it ever look at or attempt to quantify its likely peripherality effects?**

9) ***Road building is an economic good in itself?:*** The biggest assumption is that building roads, allowing greater growth in transport, must be good for the economy *per se*. But because something at some level may be a good does not mean that more of it is better.

If there were no roads in Britain economic activity would be very local and very limited – the GDP of such an economy would be relatively low. If the British Isles were entirely laid down to road and the road was used, then we would have no space to grow or make anything, and since we would be travelling all the time, no time to be involved in any economic activity at all. Somewhere between no roads and infinite roads must be the optimum for economic activity.



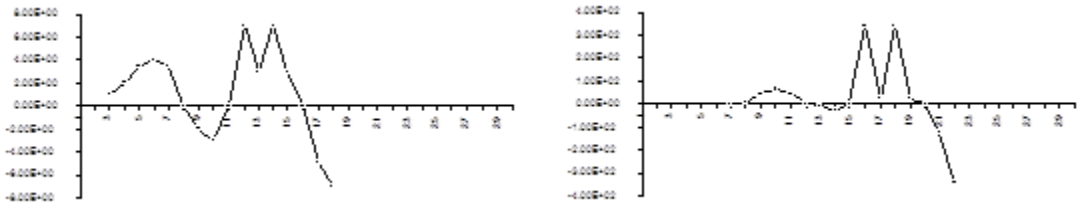
If (as a result of our mistaken way of assessing road schemes) we have built so many roads and created so much traffic that we are on the wrong side of this optimum, then the more we build the worse the economy gets. **Question: does the DfT recognise that there must be an optimum level of road space for the economic good of the country, and if so what research has it done to discover where that optimum lies?**

Appendix B – Correlation Techniques

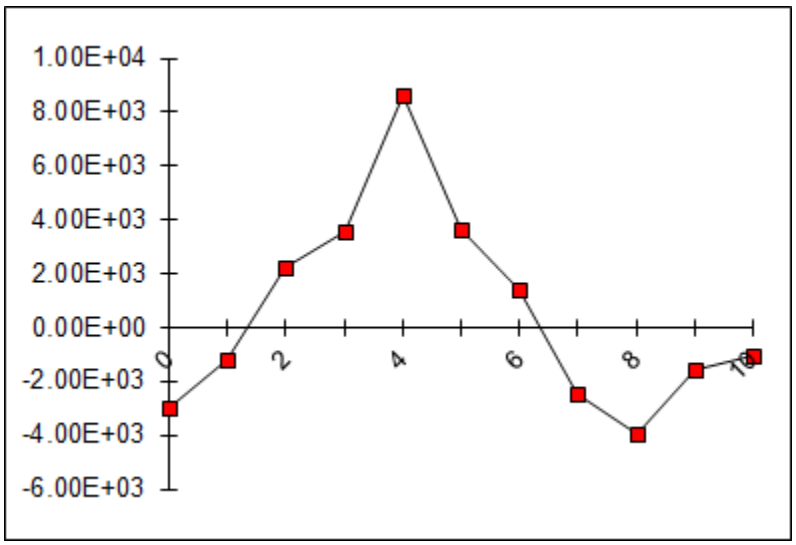
Time series of data can be depicted as simple curves. If there were an underlying causal link between one time series and another, say between series A (the cause) and series B (the result), we would expect there to be a correlation of some sort between data in A at some point in time and data in B at some later time. If a quantity y in series A 'causes' quantity z at some time T later in series B, we say y is a function of time t, y(t), and z is a function z(t), and that

$$z(t+T) = g(y(t))$$

where g is the correlative function. Let us take a simple example. Suppose a value y at any time gives rise to (i.e. causes) a value $z=y^3$ 4 years later, we can plot for any series A of y, a series B of z.



The chosen function is a positive correlation, that is an increase in y results in an increase in z in 4 years. Although the two curves are not identical, it is easy to see the correlation, because if we slid the y curve 4 years to the right, the peaks and troughs would match up with those in the z curve. With real data, however, especially where complex phenomena are involved, a causal relationship between y and z will be blurred by other factors, i.e. z may be only partially a result of y and other systematic and random influences may be present. An underlying correlation trend is then no longer obvious to the human eye and we have to use a mathematical process to find it. The mathematical process of the correlation integral is to test the coincidence (by summing the products) of the two curves as one slides over the other in time. We plot the

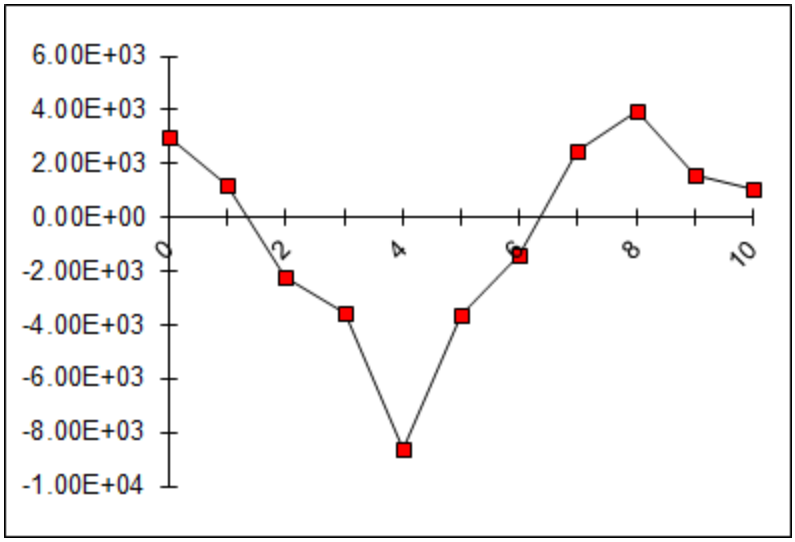


integral as a function of how much we have slid the curves in time. Thus for the example above we get:

Here we can see that there is a strong correlation peak centred on 4 years into the future, which is precisely the causative correlation we defined. One might expect intuitively that since we defined a precise relationship between a cause and an effect only and exactly after 4 years delay, and we have not added any other influences or corrupting effects, the correlation integral should have a very sharp spike at 4 years and

no value elsewhere. The reason it is not as perfect as that, is because the first time series I have used is not a random set of numbers but possesses its own internal correlations (auto-correlation).

If we had defined an anti-correlation, that is a functional relationship such that an increase in y causes a decrease in z, the correlation integral will show a negative peak. If, as a trivial example, I just change the sign of the relationship, so that $z=-y^3$ 4 years later, we get the inverse curve:



We have, of course, to be careful not to confuse correlation with cause and effect. A particular danger arises with false correlations that arise from two independent quantities each correlating similarly with a third. The commonest mediating quantity is time, with untold numbers of examples of quantities monotonically (that is only ever going one way) declining or increasing as time passes. Over the last 50 years there has probably been a monotonic growth in the number of young people who wear T-shirts, and over the same period a monotonic growth in civilian air traffic. Those two quantities will positively correlate, but you would be hard put to make a causal connection between them.

However, the DfT claims effects from a particular cause, road building, which has properties which do allow the possibility of testing for sensible correlation, by which I mean a correlation which indicates a phenomenological relationship, which may or may not be causal. A time series of the total length of motorway is not of itself very useful, being (unfortunately!) a monotonically increasing function, so that it would, for example, correlate positively with the growth of population or the consumption of hamburgers. But road building itself, that is the time series of the number of roads being built in each year, is not monotonic - it rises and falls. If road building has a causative effect on other measurable quantities, those rises and falls should statistically correlate, and since those rises and falls are likely to have a pattern all of their own (determined by budgets and policy changes), the likelihood of significant coincidental correlation is much smaller.

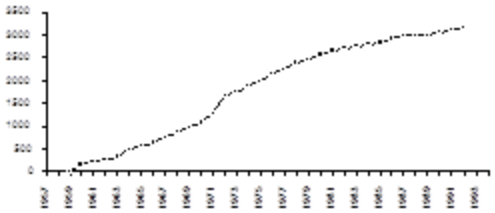
So it is the minor variations in quantities, which have patterns which are statistically traceable, rather than underlying trends, which will give sensible correlations, if they exist. In the following testing of DfT hypotheses, the quantities I use will be derived from published time series data. I am looking for the patterns of changes in quantities, so I need to remove the underlying trends, the monotonicity, and leave the differential or incremental data. That after all makes sense - we are interested in whether an incremental increase in roads causes or at least correlates with an incremental increase or decrease in some other quantity, like GDP. I find the incremental pattern by removing a smooth underlying trend, using a standard process of polynomial curve fitting by least squares minimisation.

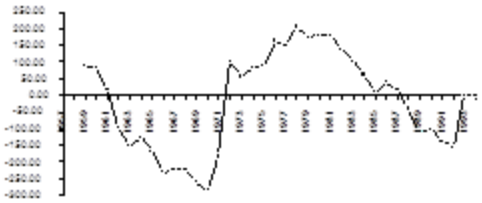
I do not want to go into too much detail on this. At its simplest we fit in a statistically 'best' manner, a parametrised curve to the overall data, with as few parameters as possible. All of the time series data to which I shall refer have some marked curvature in their overall form (e.g. GDP historically until very recently tends towards an exponential-like function on a steepening curve, and motorway length increases historically with a tendency for a declining rate), so that straight line fits are probably not appropriate. The first curved polynomial is quadratic in form and I have chosen to do all the fittings to this same polynomial level for consistency. In fact the results are not very sensitive to the level chosen anyway.

To summarise the process I will use, I will take a time series that represents road length and a time series that represents some other interesting quantity such as GDP. I will turn each of these series into incremental patterns by removing a smooth underlying trend. I will then determine the correlation integral for these two patterns.

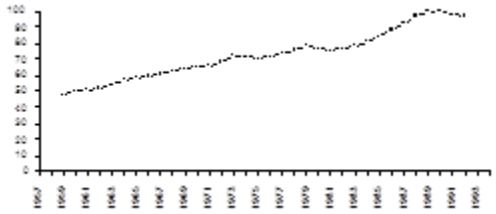
Here I must make a disclaimer. While this is *bona fide* numerical analysis, I am not seeking to demonstrate that there are causal correlations, merely testing whether the statistical evidence supports the DfT's presumption that a particular causal relationship exists.

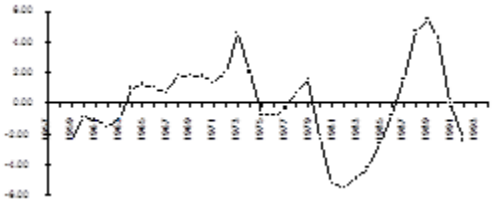
To explore this I take the significant period of motorway building. The most obvious indication of road building activity would be the growth in road space available. By road space I mean the area of drivable road, or the length of road times the mean number of lanes. I show the time series of motorway km and the residual (magnified in scale here) after removing the underlying trend:



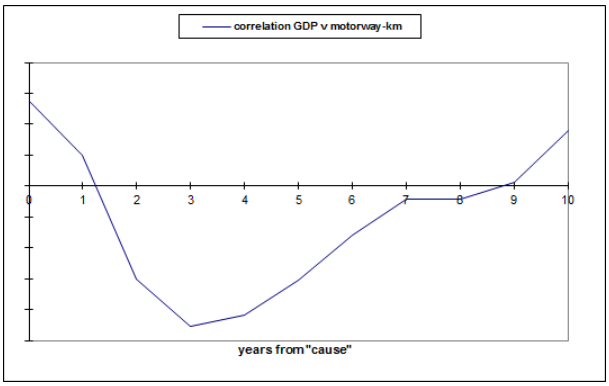


As a first measure of economic well-being I choose GDP at constant factor cost:

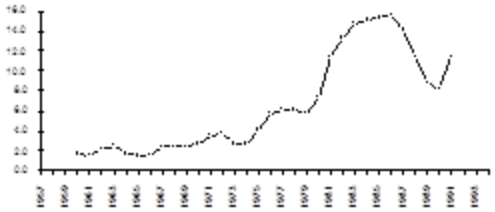


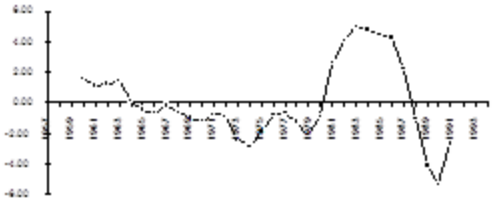


The motorway building correlates with changes in GDP as:

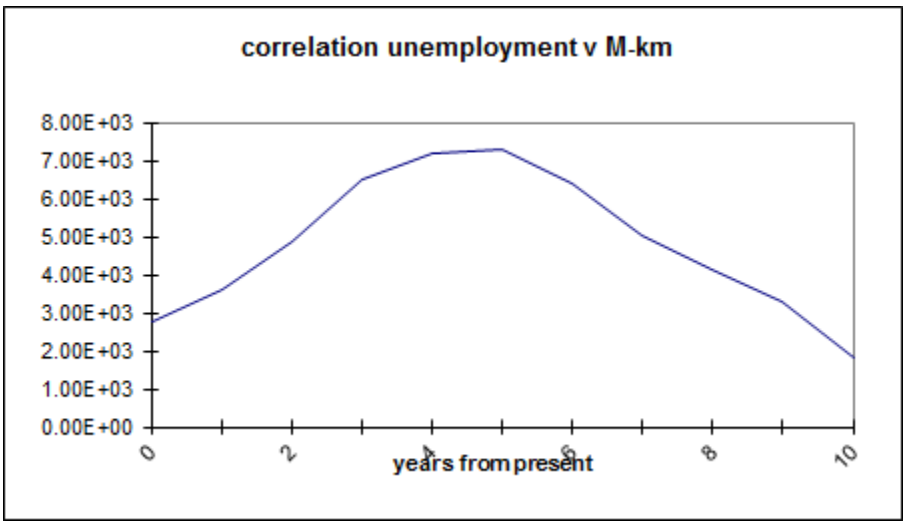


This shows a very marked anti-correlative form. The historical statistics show that road building is followed by a decline in GDP troughing after about 3 years. Employment is another supposed benefit of road building. Taking unemployment measures for the same period:





A trend line is a bit more difficult to assert here, but it is probably still more valid to use the 'changes' curve

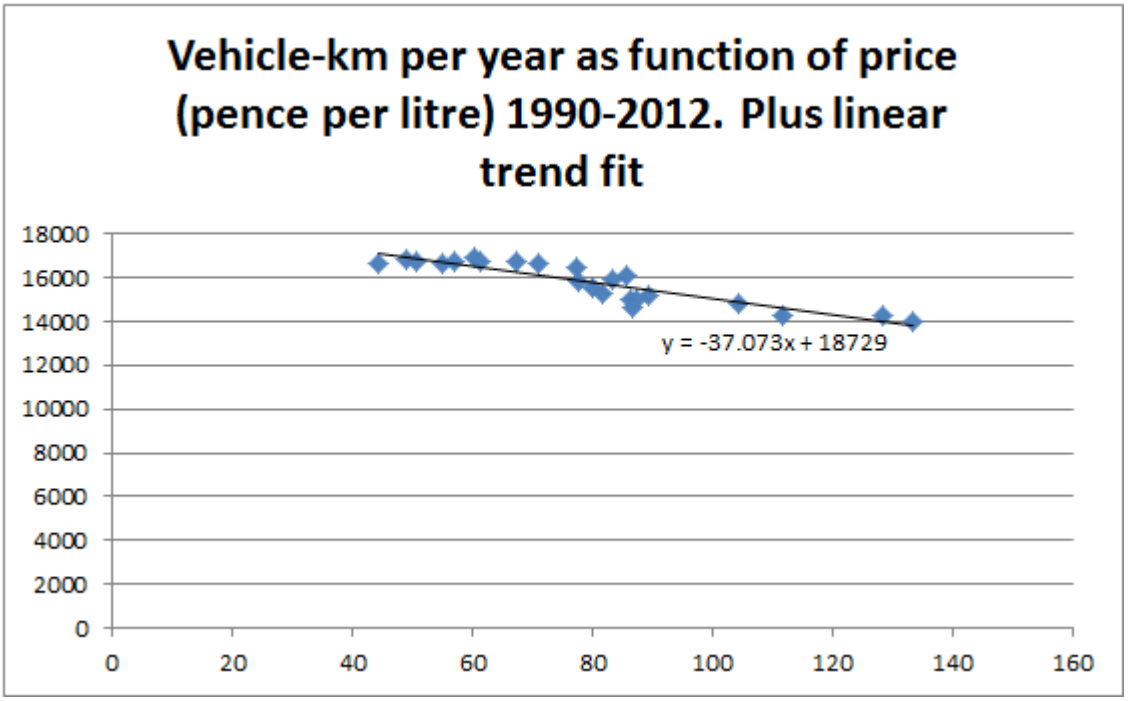


than the overall historic curve. The correlation integral becomes:

Suggesting the historical statistics show a strong correlative effect and telling us that unemployment tends to rise following road building with peak effect after about 4-5 years.

Appendix C Elasticity of traffic to fuel price

For the years 1990 to 2012 the average number of km/vehicle travelled can be plotted against fuel price (unleaded) at pump:



We can determine the price of petrol that would recover the externalised costs for an average vehicle[14]:

			pence
A	fuel duty approx per litre		60
B	pump price		133
C	price per litre less all tax = B/1.2 [VAT] - A		51
D	B-C = total tax per litre		82
E	mid range petrol car road tax (AA)	£200	
F	average km per year travelled	14,000	
G	road tax per km (pence) =E/F	1.4	
H	average petrol cost (pence) per km (AA)	9.9	
I	km per litre = B/H	13.5	
J	road tax (pence) per litre = G*I	19.3	
K	total tax (pence) per litre= J+D		101
L	externalised costs = 3* K		304
M	price that ought to be paid = L+C		355
N	predicted veh-km per year at this price = -37.07*M+18729	5562	
O	price that ought to be paid incl VAT as normal economic activity (M*1.2)		426
	predicted veh-km per year at this price = -37.07*O+18729	2929	

Assuming the user should pay tax (VAT) as on any normal economic activity, this suggests that recovery of externalised costs per vehicle, via fuel price, would result in a price of £4.26 per litre. The apparent elasticity relating distance travelled to pump price (the trend line fitted in the above graph) suggests that veh-km would drop from around 14000 now to around 3000.

[14] Figures from Transport Statistics and AA: http://www.theaa.com/motoring_advice/running_costs/index.html

Proposals for the creation of a Major Road Network
Consultation 2018
Individual Submission – Christopher Gillham

[redacted]

10. Introduction

10.1. The on-line consultation form is a highly tendentious document. It starts from the assumption that we all accept there are good reasons for road building, that a clear economic case exists for it, that its justification (as represented by magical cant words and phrases – e.g. journey time reliability; congestion reduction; resilience; economic benefit; etc.) relates sensibly to its outcome. And if we do not accept these axioms we know what your response is – to ignore. We know this from the FACT that the DfT, Highways England, all government including Parliamentary Select Committees have NEVER BOTHERED OR EVEN ATTEMPTED TO ANSWER the objections to the assumptions.

10.2. In order to enlarge upon this statement I summarise my attempts to get answers from the DfT. The history is a long one. I have asked fundamental questions about transport economics and road appraisal at public inquiries since the 2nd M3 Inquiry at Winchester in 1976. These include inquiries in 1985 and 1987 (M3 Winchester), 1994 (A36 Salisbury), 1994 (A35 Morcombelake), 1995 (A259 New Romney), 1996 (A259 Pevensey, Bexhill, Hastings), 2004 (A303 Stonehenge) and 2008 (A350 Westbury). At none of these inquiries was any attempt made by promoters to answer the questions of transport economics or appraisal processes that I raised. At all of these inquiries the essence of rebuttal was that these questions are beyond the scope of a local inquiry and are of a national policy nature. Inspectors usually listened but echoed the point that I should take such matters up with government.

10.3. There is some sense to the last point. Transport appraisal is something that is determined at government department level and, therefore, must have an element of government policy about it. Nevertheless if it is government policy to use a process of evaluation that is demonstrably suspect, logically, statistically and economically, then it is surely appropriate to demonstrate this at the point where that policy meets the real world.

10.4. But I have also made many attempts to get my questions in to the people who make policy. I have asked questions of this nature of Ministers and Prime Ministers over many years, without any response other than rehearsal of meaningless policy junk. Between 2010 and 2012 I tried more systematically to get a response through Norman Baker as Minister. After some exchanges in which I received one or two boiler-plate-text responses from DfT, my last attempt to get meaningful answers via Mr Baker was in November 2011 where I repeated my request that 9 specific questions should be answered. I show this letter in Appendix I. Despite the fact that a Department, that claims to have a huge resource of economic evidence and to be able to compute economic benefit of road-building, ought to have found it easy to answer these fundamental questions it failed to do so and indeed never bothered to reply to this last request or to a reminder a year later.

10.5. In October 2013 I made a submission to the Transport Select Committee hearings on the Strategic Road Network , in which I made my case for the unsoundness of most of the assumptions of the road appraisal process. This submission was published[1]. The Transport Select Committee chose not to make a single comment on my submission. On making a submission of this nature amongst all the other material presented by others, I would not expect that its readers would agree with all I said. It was, after all, a radical questioning of everything the DfT has said and done over several decades. But if the Transport Committee had had anything in the way of an open mind, or even the common decency of a proper response, it would have given reasons as to why it thought my submission was wrong. But

[1] See P Kinnersly; *World Transport Policy and Practice*; 20.2/3; May 2014; p75 et seq.

it did, what the DfT, Ministers and MPs have always done, ignored uncomfortable questions. It should be noted also that the DfT or Highways England could have responded in the normal way in respect of matters published in a reputable journal. I have seen no published reasoned response by the DfT to the paper published in *World Transport Policy and Practice.*

10.6. In November 2016 I wrote to my MP, Steve Brine, issuing a challenge to the DfT to justify a statement by the then Secretary of State, Philip Hammond, that *'for every pound we spend on Highways Agency schemes, on average we will get back £6 of benefits'*. This letter and the reply from the Roads Minister, John Hayes, are shown in Appendix II. We must assume that this reply is the definitive response to the question of how Mr. Hammond's £6 benefit claim is justified. I deal with the contexts of Mr. Hayes letter at §12 below.

11. MRN Consultation Claims

11.1. The five policy objectives of the consultation document are:

- Reduce congestion – alleviating local and regional congestion, reducing traffic jams and bottlenecks.
- Support economic growth and rebalancing – supporting the delivery of the Industrial Strategy, contributing to a positive economic impact that is felt across the regions.
- Support housing delivery – unlocking land for new housing developments.
- Support all road users – recognising the needs of all users, including cyclists, pedestrians and disabled people.
- Support the Strategic Road Network (SRN) – complementing and supporting the existing SRN by creating a more resilient road network in England.

11.2. ***Reducing Congestion***: The consultation document makes a rather strange case for tackling congestion by road-building. It states that total congestion has risen over the last 3 years by 9.7%. If a major purpose of road-building is to reduce the costs of congestion then an obvious question is how has the history of roadbuilding so far reduced the cost of congestion? The statistics of delays on the network as a whole are rather hard to come by and indeed the methodology of collecting such data appears to have changed somewhere around about 2014. However, the government stated that the cost of congestion in 2017 was £9B. The Eddington Report of 2006 suggested that the figure was £7-8B.

11.3. So the roads built over the last 12 years have certainly not reduced the cost of congestion but have actually contributed to its rise. This ought to be unsurprising since everyone knows since the SACTRA report (that everyone of intelligence knew for decades before) that the main effect of roadbuilding is to increase traffic. Eddington, incidentally, pointed to a conclusion of the Victoria Transport Policy Institute (2003), that:

> *investment in alternative modes of transport and in management strategies to encourage more efficient use of existing road capacity (e.g. pricing congestion/parking) tends to provide greater economic benefit than expanding existing highways to reduce congestion.*

11.4. ***Supporting Economic Growth:*** This is the crucial statement made by the DfT at all times in its various enthusiasms for major roadbuilding. Yet the DfT has never demonstrated that there is a positive economic benefit either in terms of GDP or any more useful measure of economic welfare. The DfT gleefully extracted from the Eddington report that there was a correlation between growth in road building and growth in GDP, but outrageously forgot to mention that Eddington was particular to point out that he did not know the direction of causality (does road capacity follow GDP growth or the other way round?) Such statistical evidence as there is actually suggests the opposite of the DfT assumption

– road-building tends to lead to a lowering of GDP - see §12 and op. cit. footnote 1.

11.5. ***Supporting Housing Delivery:*** The implication of this objective is appalling. Let us think what the various road-building frenzies have brought us. They have brought a massive expansion of traffic with gigantic externalities – motoring and road freight are hugely subsidised. The DfT has never countered the OECD or Blueprint 5 estimates of the externalities. Blueprint 5 was showing these at three times the total tax and duty levy on road users, long before the enormous costs of climate change and air pollution[2] were known. Traffic growth is the result of this massive subsidy and traffic levels would likely (op.cit. footnote 1) be at 1950s levels if road users paid their true costs (as indeed Eddington recommended – another bit of his report the DfT chose to forget).

11.6. And there is a secondary effect. Road building did not bring the time savings promised. David Metz[3] demonstrated that what has actually happened with the post-war road-building frenzy is that people spend just as long travelling by road as they ever did; it's just that they travel much further. This has generated a diffusion of economic activity away from traditional centres. How the national economy benefits from such entropic behaviour is anyone's guess. It has certainly resulted in some extraordinarily baleful effects on our countryside with strung-out development corridors lined with megasheds and car-dominated retail. This in turn has led to a significant social exclusion of those who cannot benefit from car ownership.

11.7. The housing crisis (of which the social housing crisis is arguably entirely of the government's making) ought to have been tackled by strategies to create harmonised communities. Since an essential and probably growing part of society is marginalised or excluded from the supposed benefits of a growing economy, any kind of social cohesion sought through housing policy ought to take account of the unlikelihood of this sector to have access to the subsidy of the car-owning population. They are doubly or even triply excluded by the entropic nature of the development brought about by the car economy: not only do they have no means of accessing the facilities that the better off can access, but the facilities they would have had have moved away from them[4] – local shops towards out-of-town centres, with remaining retail more expensive for them; then deprived of bus services that have been made unviable because subsidised private motoring deprives them of customers and congests the network, so increasing the costs of provision. Transport policy is highly regressive and getting worse.

11.8. If housing is to be provided in such a way as to create or reinforce harmonised communities, in such a way as to maintain a representative distribution of the general population, then the logical policy direction should be towards urban living, through accretion or renewal of 'brownfield' areas of existing towns or through new towns built around environmental sustainability with efficient public transport, streets for people and provision for healthy mobility. What is happening at the moment is the very antithesis of this – development corridors with megashed car-dependent and lorry-dependent functionality and mono-class car-dependent commercial housing estates with token gestures towards social housing need through so-called 'affordable' provision, that is not remotely affordable for significant sections of the population who need to live in areas of high commercial rent. Under this government, even this last provision is circumvented by the 'viability' dodges of the developers.

11.9. This objective of the MRN is clearly designed to serve commercial rather than social interests by giving us much more of this tawdry development. It is worth pointing to a particular example of this

[2] On the data that DfT uses to evaluate a fatality, air pollution in the UK, which is very largely the result of road traffic, amounts to £60B p.a., more than twice the total tax take on petrol and diesel

[3] D Metz: *The Myth of Travel Time Saving'*; Transport Reviews, 28; 2008; pp. 706-709.

[4] Undoubtedly a part of the trend to extra journey lengths that Metz identifies. There can be no argument that these extra journeys are beneficial because they realise opportunities that were not there before government built the infrastructure, which is the argument the Highways Agency gave for thinking traffic induction was beneficial. These are journeys for a purpose, simply made more expensive (by increasingly exorbitant bus and train travel) or impossible (where bus services are axed by reason of Austerity) for those least able to afford them.

disastrous abandonment of government responsibility for creating cohesive community. Though it is not my home area I am very familiar with the growing threat of corridor development and greenfield housing construction without thought for sustainability, social cohesion or efficient healthy transport policy in West Wiltshire. Wiltshire Council (WC) appears to have one single thought, indeed obsession would be the right word, and that is with turning the A350 into a superhighway. They seek to create what they call a new north-south 'Strategic Route' from the M4, north of Chippenham, via Warminster, to the South Coast. They have two routes in mind south of Warminster. One is to develop the A350 through Dorset to Poole and through some of the finest countryside in Dorset. Until the rumours of this new MRN road-building binge, Dorset Council had not really considered this possible, but now it is being seduced with the promise of taxpayer cash. The second route is to resurrect the A36 (previously a candidate for de-trunking) corridor from Warminster to Southampton. This has been enthusiastically endorsed by WC and various shire MPs including the member for Salisbury, John Glen, apparently with the backing of Jesse Noman, Roads Minister. Never mind that the lovely valley of the Wylye River and Constable's meadows at Salisbury would be irredeemably desecrated by their plan. And never mind that Hampshire County Council was not consulted by John Glen or Jesse Norman in this grand plan. Nobody asked them if they or their constituents minded an 'improved' strategic highway through the New Forest or the Blackwater Valley.

11.10. But it is north of Warminster that the true horror of obsessional road-building is taking place and it presages what MRN will do all over this country. WC sought to create a superhighway section as a bypass of Westbury through the lovely Wellhead Valley and under Westbury's White Horse (the landscape of two iconic Ravilious paintings and poems by Betjeman and Chesterton; the landscape too of Alfred's decisive battle of Ethandun - which is why the world speaks English and not Danish). WC was defeated in this ambition at public inquiry in 2008 on the basis of its unacceptable countryside impact and the joint inspectors being unconvinced by the employment claims being made by the Council (see peripherality below….). WC have never accepted this defeat and continue to press for the A350 strategic route including this 'Eastern Westbury Bypass', though without specifically mentioning it.

11.11. WC gets its inspiration from the unofficial Highways Agency handbook – if you want to build a controversial road, build the less controversial bits first, create congestion and then assert that no alternative remains but to build the last bit through the most important landscapes, habitats, ancient monuments or World Heritage Sites that get in its way. I know this from how the Highways Agency came to wipe out my local landscape at Twyford Down. I see it now with the A303 at Stonehenge where Highways England propose a piece of pure Philistinism of a nature, if not of scale, of the destruction of Palmyra by ISIS or the statues of Bamiyan by the Taliban.

11.12. So what WC is now trying to do is build sections (it got away with Semington Melksham; it proposes widening of Chippenham bypass or even an additional bypass; it proposes a new Melksham eastern bypass and a Yarnbrook-West Ashton so-called 'Relief Road') assuming that the traffic generated will then put such additional burden on the town of Westbury that the Wellhead Valley can be seen in the light of a necessary sacrificial victim like Twyford Down or the wider Stonehenge World Heritage Site. How is it doing this?

11.13. The WC Core Strategy has responded to central government's mandatory requirements for major housing provision[5], aiming in West Wiltshire almost entirely at green-field sites mostly around Chippenham and Trowbridge. Trowbridge is a classic example of a neglected townscape, a once pleasant town with good vernacular architecture, much of it laid waste to bad planning and outdated transport policy. It is crying out for urban renewal, a return of urban population and streets intended for people to live and work in. But urban renewal is not something that most housing developers

[5] Read 'commercial demand' rather than social housing 'need'. And be willing to accept developers' claims of non-viability for provision of affordable housing.

favour – profits are much easier to make from green-field sites. Housing estates can be built there without significant planning for public realm or transport needs. For most housing developers, unless there is a firm requirement from thoughtful planning authorities, access and transport policy simply means roads. Where there is a poor planning environment, as in Wiltshire, this is as far as it goes. See, for example, how estates east of Trowbridge are being built.[6]

11.14. But WC sees these car-fed housing developments in another way. It sees them as a means of incremental A350 development, with the developer contributing, through CLI levy, to the roadbuilding. A typical example is the current plan for the Yarnbrook-West-Ashton Relief Road[7] which is to be part-funded from CIL levy on a new Ashton Park housing estate. Of course developers who are so poor as to be unable to 'viably' build a decent proportion of 'affordable' housing are unlikely to contribute a significant fraction of the cost of road-building. So WC looks to the LEP to find the rest of the money.

11.15. Local Enterprise Partnerships (LEPs) are the latest bizarre factor in local planning. LEPs are unaccountable, undemocratic groupings of vested interest, spending public money without any consultation with the people who are to suffer the consequences of their schemes and, to boot, be made to pay for it through their taxes.

11.16. So now, after years of frustration when growing environmental, air pollution and climate concerns were putting in question the whole consensus of post-war transport planning, Councils with old-fashioned transport and development ambitions are catching the whiff of tarmac. They see a government that no longer even bothers to pay lip service to environmental concerns or at least one that inverts those concerns in a perfect Orwellian or Trumpian sense.[8] The so-called protection agencies (Natural England, English Heritage, Environment Agency) are emasculated and told that their 'customer' is the developer. The centre of Trowbridge will continue its decline into public squalor while large sums of public money are distributed, with democratic deficit, through the DfT and MRN and the LEPs in order to destroy the precious landscape of west Wiltshire and wipe out its important habitats.[9]

11.17. ***Support all road users (cyclists, pedestrians and disabled):*** Oh Yes? MRN will make that happen.

11.18. ***Support the Strategic Road Network:*** In the thought processes of the road-builders this is an unsurprising point of view but it ignores an obvious deduction. Clearly the MRN will feed traffic into the SRN and vice versa. Both will generate traffic and both together will feed traffic (with its congestion, its air pollution and its carbon consumption) into the rest of the network, into towns and villages and cities. By what possible distortion of reality is this 'resilient'? But it doesn't have to be – resilience is the new cant word of government.

12. The DfT Argument (John Hayes letter)

12.1. The MRN consultation document makes the usual assertions of economic benefit. For example

[6] See https://www.transport-network.co.uk/Estates-without-footways-homes-without-transport/14106 or https://www.youtube.com/watch?v=KVxqdThAv88

[7] An interesting definition of Relief Road when you build an intended superhighway close alongside the new estate that is to contribute to the cost.

[8] Like the Ministry of Peace that concerned itself with war. One has only to see how DEFRA behaves on air pollution, or the Prime Minister's 20 year Plan for the Environment, to know that now all that is needed is an assertion that government plans to protect the environment, without any commitment to doing so, indeed the reverse. This consultation is simply a part of that dislocation between words and intent.

[9] WC road building and development ambitions are very likely to lead, for example, to the extinction of some of the most important rare bat populations in the country.

(quoting RIS – see below):

> *Through boosting the productivity of local economies and improving journey times for businesses and commuters major road schemes produce an average benefit of over £4 for every £1 spent.*

I note that this is a different claim from that made by Philip Hammond (see §10.6), but how good are any of these claims? If the John Hayes letter is the definitive answer (and if it isn't why, was I not given other answers?) to the questions I posed to the DfT in my correspondence then we must test it against those questions.

12.2. The Hayes' letter makes no case of its own but apparently relies on a number of documents:

1. The Road Investment Strategy 2015 (RIS)
2. Webtag
3. **Transport investment and economic performance: implications for project appraisal 2014 (TIEP)**
4. Post-opening project evaluation (POPE) – several documents feed into a 'meta-analysis' 2015
5. Understanding and Valuing Impacts of Transport Investment Wider Economic Impacts Consultation Response 2017
6. Highways England the Road to Growth 2017 (3 documents)
7. Monitoring and Evaluation Programme 2015 Update

12.3. Of these documents 7 is simply a statement of how transport investments will be monitored and has nothing to say about any of my questions about economic assumptions. Document(s) 6 are replete with economic assertions of the sort that are in the MRN, but nowhere can I find anything which relates to any of the questions I ask about the assumptions behind those assertions. Document 5 is a consultation response report, relating to appraisal methodology. None of the questions I asked about fundamentals is addressed in this document. Documents 4, though interesting (especially to those concerned with environmental matters) in comparing outcomes with promises, are also irrelevant to my questions – on economic matters they simply compare outcomes by the same metric that they used to predict them (i.e. they have the common Webtag assumptions behind them).

12.4. Documents 2 are the vast array of Webtag with which I was reasonably familiar and which I was fundamentally questioning in my original correspondence. It is possible that in this vast array of stuff, there are statements which might relate to some of my questions but I can't find any. If there is anything relevant to my questions in these documents I would have expected DfT to have pointed me to it. My contention remains that Webtag entirely depends on the assumptions that I am questioning. Document 1, which is one of two primarily cited by Hayes as answering my questions, does nothing of the sort. It is merely a long summary of Webtag or COBA outcomes and is therefore built on the very assumptions I am questioning.

12.5. This leaves document 3, the TIEP. Mr Hayes is quite right in asserting that TIEP regards the DfT appraisal as world-leading – in fact it says:

> *The Department for Transport appraisal guidelines provide a rigorous framework for appraising projects. Its assessment of user-benefits is well-grounded and it has been a world-leader in incorporating some of the wider impacts of transport improvements. The recommendations that follow are intended to inform discussion on how to extend and improve appraisal techniques in order to more fully capture (and critically evaluate) the economic impact of transport investments, while maintaining the Department's standards of rigour.*

12.6. But there are three things to say about this. Firstly the report gives no reference for asserting this

reputation and since this is a report commissioned by the DfT we ought to have more than self-serving assertions (pipers and tunes). Secondly, the guidelines may be a 'rigorous framework' in the sense of being a consistent framework, but it does not mean that the framework rests on a secure basis. Thirdly and similarly TIEP asserts that assessment of user benefits are well-grounded, but without saying why or giving any reference to work that justifies such an assertion. I would then say two things about user benefits. Firstly that the perceived time benefits to a user of travelling faster on a road link may not actually contribute a real economic advantage to him/her, for various obvious reasons including that one's perceived costs may not be the same as the real cost to the user.[10] And the real costs to the country (including all the externalised costs) are certainly not the same as the perceived costs that determine the user's behaviour.

12.7. The TIEP certainly gets closer to asking fundamental questions than anything else in Webtag or any other document to which Mr Hayes points. So let us look at our questions in relation to it.

12.8. ***Question 1: The economic appraisal process for road schemes is based on an assumption that road transport at the level it occurs in the UK represents a net economic 'good' for the country. Has the DfT carried out any research into this basic assumption?*** The TIEP does not address this question. It assumes in all its arguments that, because transport links are a necessary part of the economy of a modern country, that road transport is an essential part of it and that anything that makes that road transport more efficient must be economically advantageous. That is not a valid assumption. Rail, for example, might be a better way to increase the movement of goods and people. Considering TIEP lauds the economic benefit of population clusters (towns and cities) it is very strange that they should see benefit in a form of transport which is geographically entropic. The point, however, is that TIEP is not a document that poses, let alone answers this question. We must assume therefore that DfT have never carried out any research to justify its assumption of an automatic good from additional road building.

12.9. ***Question 2: Does the DfT have any evidence on the direction of causality in the correlation between GDP and either road building or road transport use?*** TIEP does mention causality in this relationship but is not convincing. It refers to the US network of interstate highways – firstly this is much closer to a country with a less dense network than the UK (see Question 9) – the issue in the UK is whether incremental road-building always provides economic benefit no matter how much of it there is. Eddington was clear that the direction of causality in the UK was unknown. Though it makes reference to Eddington, there is nothing in TIEP that questions that conclusion. We must assume that the DfT has no answer to this question.

12.10. ***Question3: how is 'willingness to pay' a proper basis for determining the benefit of reducing the costs of a user, if the user is not paying the true costs of his activity and other people or other things are doing so?*** There is nothing in TIEP about this fundamental concept in the calculation of economic benefit in Webtag. We must assume that the DfT has no answer to this question.

12.11. ***Question 4: has the DfT carried out any research of its own seeking to establish the degree of externalisation of road user costs, and does it have any evidence to suggest that the Pearce calculations are fundamentally wrong?*** TIEP has nothing to say about externalisation of road user costs. It says quite a lot of vague things about externalities as though they were generally good things that appraisal wasn't counting. It says nothing about the Pearce or any other calculations of road-user externalisation. We must assume that the DfT has not sought to compute externalities.

12.12. ***Question 5: does the DfT have any evidence that there is a net economic benefit to the UK of encouraging the sale of cars?*** TIEP does not address this. It is very strange that government should not have an answer to this question, but since DfT have not provided it we have to assume that car

[10] We all know people who will drive an extra five miles to a town that charges 50p less for car parking for example.

manufacture and sales do not necessarily figure beneficially in what Thatcher was pleased to call the Great Car Economy.

12.13. ***Question 6: has the DfT done any research on the relative economic benefits to the UK of investment in public transport compared with the support for private motoring?*** No TIEP discussion here. But surely DfT must have researched this question. Why did DfT not answer it?

12.14. ***Question 7: has the DfT done, or had access to, any research on the economic consequences of more radical transport polices for urban centres, and if not would it consider urgently commissioning the definitive study that is needed?*** Not an issue before TIEP. The question is left hanging.

12.15. ***Question 8: Has the DfT ever done any research on the economic peripherality effects of road schemes? Supplementary Question: when the DfT analyses road bids made to it, does it ever look at or attempt to quantify its likely peripherality effects?*** TIEP has something to say about this with various thought experiments. But there is no reference to any research so we must assume that DfT have not done any. Considering HE asserts great benefits of improving links to the SW peninsula one would think they would have some idea of the nature of peripherality effects. It is worth noting that despite the A30 improvements over recent years the A30 Chiverton consultation recently pointed out that Cornwall's economic performance has continued to fall over time.

12.16. ***Question9: does the DfT recognise that there must be an optimum level of road space for the economic good of the country, and if so what research has it done to discover where that optimum lies? [see diagram in Appendix I].*** Not a question TIEP puts to itself. Yet it is fundamental – are we past the point at which road building makes the economy better or worse?

Department for Transport

From the Minister of State
The Rt. Hon. John Hayes CBE MP

Great Minster House
33 Horseferry Road
London
SW1P 4DR

[redacted]

Web site: www.gov.uk/dft

Our Ref: MC/183343

21 DEC 2016

Steve Brine MP
House of Commons
London
SW1A 0AA

Dear Steve

Thank you for your email of 25 November to Chris Grayling, enclosing correspondence from your constituent, Christopher Gillham, 16 Upper High Street, Winchester, Hampshire, SO23 8UT, on the important subject of road building, and its impact on the economy. Mr Gillham has suggested that the Department was unable to come up with any evidence that road building is beneficial to the economy, and has asked DfT to demonstrate that expenditure on road building is beneficial to the economy. I am replying as Minister responsible for this issue.

I am confident that the Government's road investment is beneficial to the economy, and that the approach to road scheme appraisal is sound. A large proportion of road schemes' benefits go direct to business, and also create wider economic impacts by boosting the productivity of towns and cities. In March 2015, the Department published an economic assessment of the Roads Investment Strategy (RIS)[1]. This showed that the RIS will provide a large amount of such economic benefits. This analysis also included the value of other impacts, such as on the environment, and showed that the RIS as a whole was very high value for money.

As I believe your constituent is aware, the Department's evidence base for understanding and valuing the impacts of transport investments is set out in WebTAG[2]. This has been developed over many years and has been noted as representing international best practice. However, the Department has asked world-leading experts to review our approach to understanding how transport improvements impact on the economy. Their conclusions were reported in the 'Transport Investment and Economic Performance' report[3].

[1] https://www.gov.uk/government/collections/road-investment-strategy
[2] https://www.gov.uk/guidance/transport-analysis-guidance-webtag
[3] https://www.gov.uk/government/publications/transport-investment-and-economic-performance-tiep-report

They found that the Department's approach is world-leading in incorporating some of the wider impacts of transport improvements.

Furthermore, to evaluate whether road schemes provide the forecast benefits, Highways England produces 'Post Opening Project Evaluation' (POPE) reports one and five years after the opening of a road scheme[4]. The POPE studies provide anecdotal evidence to show that Major Schemes have assisted local and regional economic development through congestion reduction and improved journey time reliability which provides improved access to potential employment centres.

Nonetheless, the Department is not complacent. It has a clear strategy for improving the way it understands the impact of transport schemes on the economy. In October 2013, the Department launched the 'Understanding and Valuing the Impacts of Transport Investment' Analytical Strategy, which set out DfT's approach to maintaining and enhancing this evidence base through open, transparent and collaborative working with academics, stakeholders and other experts. Following a substantial programme of work, the Department has recently published a consultation on its proposed improvements to the way it understands and estimates economic impacts in transport appraisal[5]. Highways England is also working with a wide range of stakeholders to develop a strategic economic growth plan to explore and explain the contribution of road investment to the UK's economy. It has recently published a consultation on delivering this strategy[6].

DfT and Highways England are exploring ways to further evaluate economic impacts. For example, DfT's Monitoring and Evaluation Programme[7] lists the Department's priority projects for monitoring and evaluation with information about their activities to date.

Thank you again for your letter, and I hope that this reply goes some way to answering the concerns that Mr Gillham raises.

Yours sincerely

[redacted]

[redacted]

THE RT. HON. JOHN HAYES CBE MP

[4] https://www.gov.uk/government/collections/post-opening-project-evaluation-pope-of-major-schemes
[5] https://www.gov.uk/government/consultations/transport-investment-understanding-and-valuing-impacts
[6] https://www.gov.uk/guidance/highways-england-supporting-growth
[7] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/468420/monitoring-and-evaluation-programme-2015.pdf

Decarbonising Transport
Setting the Challenge

This document does not appear to be structured as a consultation. There is a questionnaire about 'ideas' but it appears not to contain any scope for critiquing the Department's document. We will address the questionnaire in an Addendum, but it seems most important to us to give our views on what Government appears to be thinking about.

Summary: The Minister's Foreword to this Department for Transport (DfT) document is beguiling in its recognition of a problem and a clear statement that existing policies will not solve the problem. Furthermore it encourages us to believe that the government sees a future in which *'public transport and active travel will be the natural first choice for our daily activities. We will use our cars less and be able to rely on a convenient, cost-effective and coherent public transport network'*. And yet the content of the document and known current policy belies this stated view of the future.

The tenor of the document is pseudo-technical (lots of extrapolatory data handling, of the sort the DfT is fond of but does not do well) and coloured with wishful and often magical thinking. There is one clear principle within this document and that is that the transport business will proceed as usual and that reality will have to change to meet this principle. It has the Micawber optimism that *'something will turn up'* but not the Micawber arithmetic that says *'live within your means'*. There is no acknowledgment that behaviours or policies would need to change to reflect the realities of planetary limitation.

The Minister's recognition that current policies are not enough is welcome, but understates the size of the problem. It does this by ignoring the carbon costs of international aviation, maritime emissions and imported embedded carbon. It also ignores the glaring policy commitments of this Government to expand road construction and airport capacity, which are already building in large future carbon profligacy.

The document does not critically examine the likelihood of the renewable energy coming on stream to feed its energy expansionist vision. Its Micawberish optimism falls back on UK decarbonisation progress so far, neglecting to properly scope the progress (e.g. how much of our carbon have we simply exported?) or analyse the major one-off contributions to that progress (demolition of the coal industry and the luck of the North Sea gas bonanza). Nor does it seem to account for slowing progress in renewables expansion, which shows a fragility in any expectation of enough fossil-fuel-free energy being available in a short enough time, to meet even current energy demands, let alone the demands of a growing economy (and DfT's predicted growing transport demand).

Nor does the document attempt to justify its expectation that transport, despite its record as the worst economic sector in respect of emissions reduction, should be able to grab as much of the likely available renewable energy as it wants. It does not acknowledge that most road transport and aviation are highly discretionary activities, compared with most other economic activity – we do not need to travel so much as we do, in the way that we need to eat, to stay well and to live in warm houses. We travel so much because both road transport and aviation are highly subsidised - the true (externalised) costs of the activity significantly exceed the tax and duty returns to the public purse and the subsidy is regressive – the poorest do not have the benefits and bear much of the costs. The supposed benefits to the overall economy (as computed within DfT's elaborate but fraudulent appraisal process, Webtag) have never been demonstrated. If true costs were paid by the user, traffic levels on roads and in the air would be drastically reduced. This is the last sector of the economy to have any claim to whatever renewable energy is available.

The DfT does not appear to understand the importance of trajectories in decarbonisation and seems wholly focused on a target date for zero carbon as a fulfilment of our international COP commitments. The cumulative carbon is what matters for the climate and the DfT appears to pay this no mind, which presumably is why it remains in procrastination mode.

It is this procrastination that allows the DfT to maintain its *'just one more cigarette'* habit feeding. Just as with any other irrational compulsion it talks itself into self-delusion. Thus all the extra emissions that will clearly come from the RIS2 road expansion programme are dismissed, insanely, as insignificant against the total emissions of the UK economy.

The procrastination is also made possible by the magic thinking in the Department. Technologies, real, extrapolated or just screwball are envisaged, which, in a golden future, will save us from having to take responsible decisions. Technology is undoubtedly important in getting us to a sustainable economy, but no cognisance is taken in this document of what may be the 'rebound' effects of technology. Just as road construction with the aim of reducing journey time did nothing of the sort, but rather increased journey length (and carbon emission) for the same economic activity, so seemingly innocent 'improvements' like electric vehicles can, despite a physical efficiency improvement, lead to behaviours that increase carbon.

Therein lies the greatest failure of the document. It manages to suggest that technology is the solution to something that technology has not solved up until now. Indeed technology is arguably what has created the problem, or rather the use to which we put technology. The DfT have given the impression that there is nothing for us to do; no responsibility to take; nothing for policy to do to nudge or direct what we do; no behaviours to change.

Our transport habits are the *'soma'* of the Brave New World we are promised by government – *'just keep taking the pills'*.

Introduction: If we take the Minister's Foreword as a touchstone of this document then there is much to commend it. It appears to recognize the importance of decarbonisation of transport, it acknowledges that it is in the transport sector that the least progress has been made in meeting Greenhouse Gas (GHG) commitments and it has an ambition to eliminate carbon from the sector, not within a timescale appropriate to the seriousness of the problem, but at least has a timescale that implies a direction of progress.

By this last we mean that hitherto the Department for Transport has shown no willingness in its policy direction, to engage with the idea of reducing carbon, but has rather worked towards increasing emissions. It is our clear view from this document that that misguided policy direction remains intact, but the acknowledgement of even an inadequate timescale for reduction will mean that the Department for Transport will have to confront the disconnect between its general policies and its climate commitment.

Data: There is useful data in this document, but, as always with DfT productions, there is much false analysis and a predilection for prognostication that is not justified by experience (see figure below and[1]). This is especially important in this document as everything hinges on it, so we need to understand just what the DfT does with forecasting.

[1] Professor Phil Goodwin*: Local Transport Today*, April 2012.

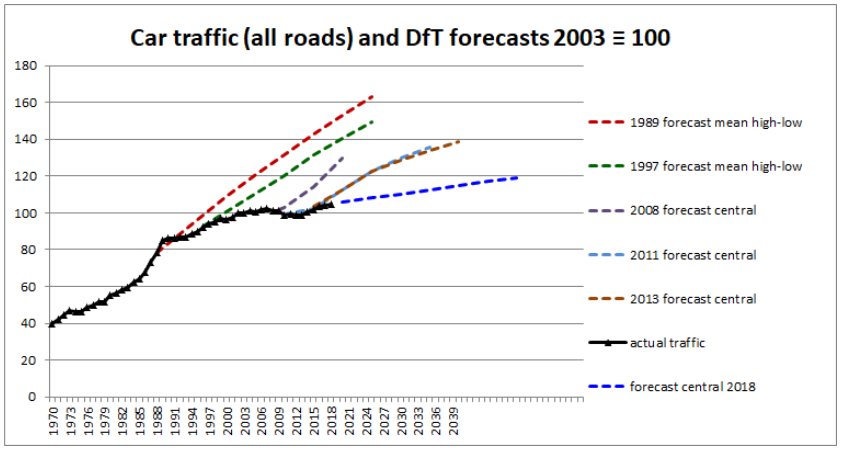


Figure 1 Porcupine forecasting

Forecasting necessarily introduces data extrapolations but mathematical functional extrapolations give a spurious sense of authority, especially appealing to the politicians who rarely have numerical backgrounds. Anyone acquainted with data processing will know that it is dangerous to make extrapolations on the basis of a neat fit of data to a mathematical function, without a deep process of thinking what factors can come into play beyond the available data set. Amongst those factors are those that arise from what system changes you will make in response to the extrapolation result (see below).

Thus for, example, plenty of amateur modellers will have fitted the rising COVID infection curve to mathematical functions. At first an exponential works very well and then as limiting factors (like a lockdown or growing herd immunity) come into play some sort of s-curve like the logistic curve that is still a favourite part of DfT forecasting. A logistic curve fit to the UK cases and deaths predicted the peak to within two or three days, from very early on in the lockdown. But then what? For the tailing down, secondary bumps, secondary waves etc., what is mathematical function fitting doing for us then? The vagaries and vagueness of government policy changes, relaxations, whackamoling etc. clearly have no likelihood of meeting a mathematical form.

Traffic and transport forecasts (like Treasury growth forecasts – which have the same porcupine record) are all very well fitted to mathematical functions for early growth curves, but are unlikely to be predictors beyond the point where resource limitations start to bear hard down on growth. The Department for Transport (like the Treasury) has never considered limits to growth within its modelling (so it hardly counts as modelling at all – it is really just curve fitting and extrapolation). Now we have the biggest limit to growth imposing itself on us by the planetary climate system and the DfT has no idea how to cope with it.

The DfT does of course argue that its forecasts are not simple functional extrapolations but informed by some sort of multi-parameter model. But mathematical complexity does not of itself ensure relevance. In fact DfT forecasting gains its complexity by breaking data down into different (atomistic) sets[2], which themselves are fitted to simple mathematical functions – the whole process remains in essence a simple curve fitting; it is not a model in any sense that examines or guesses at the way the world works.

In addition to forecasting without a world model, the DfT process, whether by design or accident, contains an element of self-fulfilment. Thus, for example, by building roads because the forecasting says they are needed, generates the traffic[3] that tends towards justifying the forecast. It is surprising, therefore, that even with this advantage, that road building policy works toward making its predictions come about, the DfT still comes up with its porcupine quills and never seems to learn from its persistent failures.

[2] In this sense it is very like the whole Webtag process of road appraisal and suffers from the same lack of grounding in reality: see *World Transport Policy and Practice*; 20.2/3; May 2014; p75 et seq.
[3] As per SACTRA 1994

The point of these remarks is not to rub the noses of the DfT 'modellers' in the failure of their analysis, but to highlight the meaninglessness of most of the dotted lines in the graphs in this document. For what the DfT[4] appears to have done is extrapolate a number of data fits and then modified those extrapolations to reflect predicted effects of some not very-well-specified decarbonisation measures - the so-called *'current firm and funded policies'.*

The consultation document acknowledges that current policies are not enough, but we have to ask if this is still not a massive understatement. There appear to be many unstated things in the DfT document but which are staring us in the face.

Elephants in the Room – I. Not Counting Everything. The decarbonisation document is disingenuous (at best, obscure) in its treatment of international aviation and shipping emissions:

> *Domestic aviation emissions are included in the UK's carbon budgets with international aviation and shipping emissions accounted for via "headroom" within our existing carbon budgets, meaning that the UK can remain on the right trajectory for net zero global greenhouse gas emissions across the whole economy.*

When it says *'accounted for'* it simply means 'ignored'. Ignored because treaty allows it to be, even though climate moral responsibility does not (see **Elephants IV** below). This document trots out the usual excuse for this:

> *These international emissions are treated differently, largely because the inherently international nature of both sectors means that it is difficult to attribute these emissions to individual states.*

This is a document from a major Department of the State which has built up enormously elaborate (though largely spurious - see footnote[2]) structures for infrastructure investment appraisal, but which apparently cannot imagine a way of accounting for the energy in international aviation and shipping that should be attributable to the uses of the UK population and economy. It is incredible. Indeed the Committee on Climate Change (CCC) did not believe it back in 2012:

> *In April 2012 we published our statutory advice on inclusion of international aviation and shipping emissions in carbon budgets. We concluded that there is no longer any reason to account for these emissions differently to those from other sectors in UK carbon budgets (e.g. power, buildings, surface transport), and therefore recommended that emissions from international aviation and shipping should be included in carbon budgets and the 2050 target.*

The CCC were clearly led to believe that this would happen before the end of that year[5]. Eight years on and it has not happened yet and this consultation document ignores it[6].

Also not counted is the net energy (emissions) embodied in imports of goods. In total this apparently amounts (2017) to about 36% of UK domestic emissions.[7] We do not know how much of this should be ascribed to the transport sector, though ONS[8] put the 2018 import value of 'Machinery & Transport Equipment' at 32%

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[4] The projections come from the *DBEIS Updated Energy and Emissions Projections*, but the road transport data appears to come from the DfT extrapolations and so have the same level of credibility as the traffic forecasts.

[5] *There is an important decision for Parliament … to be taken by the end of the year. Our advice was that international aviation and shipping emissions should be included in carbon budgets and the 2050 target. A failure to do so would represent a departure from the approach taken by the Government in its Carbon Plan, and could result either in increased costs and risks of meeting carbon budgets, or in accepting higher risks of dangerous climate change.*

[6] Prime Minister Theresa May in June 2019, announcing the 2050 zero carbon deadline, said *"This is a whole economy target…and we intend for it to apply to international aviation and shipping."*

[7] *Global Emissions Mapped: The world's largest CO_2 importers and exporters*; Zeke Hausfather: www.carbonbrief.org/mapped-worlds-largest-co2-importers-exporters

[8] UK trade bulletin: August 2019; ONS

higher than export value, so 30+% of domestic transport emissions seems a reasonable figure to ascribe to transport embodied emissions.

Elephants in the Room – II. Renewable Energy: The DfT's assumptions about likely availability of renewable energy and what proportion of it should reasonably be assigned to the various transport sectors are not revealed in this document.

Getting clear data on the UK's total energy consumption and total carbon emission is less easy than one would think. It looks as though[9] energy consumption in the UK in 2019 totals 197.60MToe[10] (2298TWh), though this appears to exclude UK share of international aviation, marine transport and embodied energy in imported goods[11]. Of this total, transport uses 56.67MToe, of which road transport consumes 40.91MToe and internal UK aviation 13.68MToe. Of the 56.67MToe, 54.45MToe is petroleum-sourced, 0.47MToe is electricity (renewable element unknown) and 1.74MToe of bioenergy (carbon content of sourcing unknown). Of the 40.91MToe road transport, 0.03MToe is electricity (carbon content unknown) and 1.74MToe is bioenergy and waste (carbon content of sourcing unknown[12]).

The renewable energy total for the UK[13] (2019) is 25.52MToe, of which electricity generation is 16.84MToe and of which road end-use is 1.36MToe. Assuming the same distribution of activities and unchanging efficiencies across the economy, it would seem that carbon neutrality (even discounting international aviation, shipping and imported embedded energy) requires a 6-fold increase in renewable energy production by whatever date we set as a target. How plausible is this?

The first thing to understand is that the renewable energy of 25.52 MToe in 2019 is not entirely carbon free in any real sense. Energy from waste processing, landfill gas emissions etc. is carbon emissive and ultimately much of it is fossil fuel sourced. Digestion of plant waste raises the arguable point that its carbon might more sustainably be sequestered in soil. The very large element (6.70MToe) from burning biomass, mainly wood, is certainly renewable apart from energy required for shipping and processing, but it is also certainly carbon emissive over the lifetime of this decarbonisation plan. Mature trees, cut down now for burning, release CO_2 immediately, the replacement trees (if we are sure they are replaced[14]) take several decades to recapture that carbon.

The only really important renewables are those from conversion of sunlight (directly or meteorologically), i.e. solar, hydroelectric and wind, and lunar gravitational (tidal). And if we are to look at where energy will come from it is clear that it is only in these that we can get significant growth of supply with very low carbon emission. On the basis of this energy growth rate we can form an idea of how many years of such growth rate are necessary to reach current total energy requirements (UK international aviation and marine energy excluded and forecast aviation and road use excluded). Doing this calculation for years to 2019 we get:

[9] Digest of UK Energy Statistics (DUKES) 1.1-1.3.
[10] Two units of energy: MToe = megatonnes of oil equivalent; TWh = terawatt-hours
[11] Strictly the embodied energy difference between imported and exported goods.
[12] But see: *Carbon balance effects of U.S. biofuel production and use*; JM De Cicco et al; *Climatic Change*; **138**; pp 667-680; 2016, who concluded: *'rising U.S. biofuel use has been associated with a net increase rather than a net decrease in CO2 emissions'*
[13] DUKES 2019 dataset
[14] Most of the biomass is transatlantic and out of UK control, and in any case its emissions are in danger of double counting – are the replacement trees used to offset US emissions?

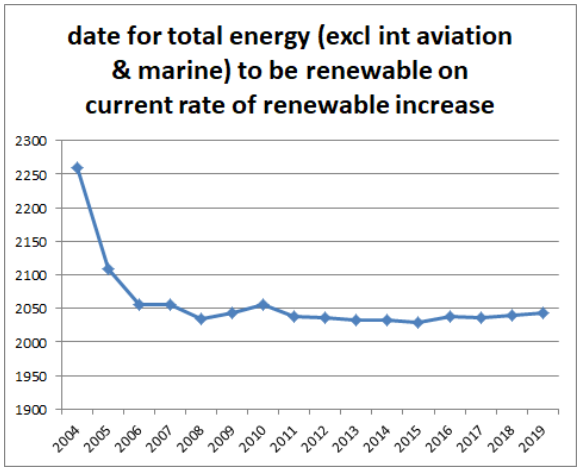

Figure 2 How fast can renewables grow?

At 2019, therefore, the true renewables growth rate takes us to 100% of the 2019 energy requirement by 2043. Again setting aside the true UK carbon additions of international aviation and marine emissions and imported embodied carbon, a 2043 date looks plausible.

In favour of plausibility is likely efficiency gains. Electric vehicles use less primary energy by virtue of drive-train efficiencies (perhaps as much as 65% less), but use more in grid transmission and in embedded energy. It is not easy to get information on lifetime primary energy use, but it seems[15] that typical electric cars in terms of emissions do about 30% better overall than the most efficient conventional petroleum cars and around 50% better than the average petroleum vehicle, *'using average European electricity'*[16]. Of the lifetime primary energy use the Average European electricity in 2018 (year of ICCT report) is about 34.6% renewably-sourced[17]. The ICCT report appears to assign about 45% of the lifetime emissions to the running emissions (with the assumption of 34.6% renewable electricity). Relating this to the problem of decarbonising total energy, we need to know how EVs reduce primary energy use on their own (i.e. not by virtue of using renewable energy in their running). If 45% of the EV emissions in Europe currently come from electricity of which 34.6% is renewable, then if that electricity came from non-renewable sources 45% of the emissions would be 1/0.346 = 1.56 times greater. Since the ICCT report puts the figure for the former at 50% of the average petroleum car, the figure for the emissions of the EV technology by itself (i.e. without renewable electricity for running) would be 0.5*(0.55+0.45*1.56) = 62.6% of the average petroleum car.

The efficiency gain from using electric cars, therefore, is significant, but much less than is commonly supposed from basic drive-train efficiencies. Clearly the imported embodied carbon in vehicles may come down as the providers of battery technology reduce their emissions in manufacture, but we cannot be sure that such gains may not be offset by increasing environmental cost of lithium and cobalt.

Is there an overall efficiency gain in converting domestic heating to electric input heat exchangers? There is a clear efficiency gain if electrical heating uses exchange technology – perhaps a multiplication of energy by a factor 2.5-4[18] in say air-source heat exchange[19]. To compare efficiency with natural gas burning we have to consider the primary energy input. Energy loss in the electricity supply chain, however, is very considerable about 51.3% (2019 DUKES 1.1-3). The inefficiency of natural gas heating almost entirely occurs at the domestic premises. The ratio of primary energy use (gas-burn to heat-exchanger-electricity) could thus be in the range 1.28-2.05, assuming no rebound effects.[20]

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[15] *Effects of battery manufacturing on electric vehicle life-cycle greenhouse gas emissions*; Briefing ICCT, 2018
[16] The ICCT report is framed in terms of carbon emissions, but this is a reasonable proxy for conventional primary energy use.
[17] See: https://www.power-technology.com/news/eu-energy-renewables-record-estimates/
[18] https://www.renewableenergyhub.co.uk/main/heat-pumps-information/benefits-of-heat-pumps/
[19] Ground-source heat exchange may have much greater efficiency but has debatable carbon costs relating to construction difficulty, and, in any case it is very unlikely that the great bulk of existing housing can be retrofitted for this technology.
[20] See https://en.wikipedia.org/wiki/Rebound_effect_(conservation) or https://en.wikipedia.org/wiki/Jevons_paradox

Against plausibility are Government policies that encourage growth of energy-demanding activity. These include in particular the DfT's road programme, the government's desire to expand aviation (both international and what it chooses to call regional *'connectivity'*), road speed limit relaxation and the continuing Treasury policy of reducing the taxation levy on road vehicles in real terms. It is possible also that policies to subsidise electric vehicles will have additional rebound effects of increasing both car ownership and car use.

But a significant argument against plausibility can actually be seen in the graph of Figure 2 How fast can renewables grow?Figure 2. We may view with terror an exponential growth of infection, but we are used to taking comfort from exponential growth in technology implementation. Yet exponential growth never goes on forever. The remarkable growth of renewables in the electricity generation sector has certainly given rise to optimism that fossil-fuel-free energy may be achievable in the relatively short time that exponential growth implies. But Figure 2 actually shows a declining base to the exponent. At each year in this graph the current rate of growth of renewable energy is taken as a five-year average and then the time taken for the current renewable energy to be grossed up to the current total energy demand is computed.

Thus in 2009 when the annual growth rate in renewables was 16%, exponential growth at that rate would reach 100% of the 221TToe total energy for 2009 by the year 2043. Ten years later, the growth rate had declined to 14.6% and the predicted date for 100% renewables is still 2043 despite a fall in total energy demand for 2019 to 198TToe. So what? The end date is still 2043. But there are two things to say about this. Firstly our true energy use is unlikely to have fallen in those ten years if we count the growth in UK share of international aviation and the import of embedded energy in the large growth in imported goods. Secondly, the decline in renewable growth rate[21] is such that the 100% year is moving away by more than a year for every year that passes. Indeed in the last 4 years the 100% year has advanced from 2029 to 2043, i.e. 14 years.

We are not so keen on mathematical extrapolation without a model as the DfT and second differentials are especially suspect, but there is a fairly linear trend in decline of renewables growth rate over the last 5 years and an extrapolation of this trend to just 2024 takes the point of 100% of current energy as true renewables out to the year 2075.

The point is not that this date is meaningful but that it shows how fragile is the assumption that there will be the renewable energy to meet not just current energy demands but the demands of the increased activity anticipated by the DfT in its road traffic forecasts and aviation forecasts and, more to the point, its policies of encouraging that growth through the RIS2 road programme and airport expansion.

Elephants in the Room – III. Why is Transport the Priority?: It is clear from the above that it cannot be assumed that there will be enough renewable energy generated within the timescale of the Climate Emergency for the government to plan for any increase in activity it wants. The DfT itself acknowledges that transport has made virtually no progress in cutting emissions and, of all economic activities, it stands out as the worst performer in this respect. This begs two questions:

- Why has transport performed so badly?
- Why has transport been allowed to perform so badly?

The answer to the first question is pretty clear in respect of road transport and aviation. There has been no proper economic framework within which these transport areas operate. Most activities within the economy operate within the bounds of an implied contract to pay for the costs they impose, that is apart from those activities which are accepted as being the social imperatives of a civilised society (the NHS, the law etc.). Road and air transport manifestly do not pay their costs, for the externalities of the activities are very large indeed. There have been several attempts to compute the true costs of road transport, most notably the

[21] Which may be reflecting increasing political difficulty (e.g. with decline in subsidy to generation and government resistant to on-land wind farms) or increasing difficulty in finding sites with the right geophysical conditions.

Blueprint report[22], which demonstrated that UK road transport externalised costs equivalent to about three times the total tax and duty take on the activity. The Blueprint report did not assign the large costs of climate damage that we would perceive today, so it is likely that the externalities were significantly underestimated. The DfT has never refuted these findings.

It is not very difficult to see that aviation is also a big externaliser. One has only to imagine how a household or school might assign at least a few pence of costs[23] to just the noise nuisance of a single aircraft passage and then sum those externalities over all properties and population under the flight path, to see that, assigned to a single aircraft, the seat price should be augmented by many hundreds of pounds.

Road travel and aviation are thus very significantly subsidised. There is no social imperative to justify this subsidy – it is a regressive subsidy in that it is not enjoyed by the poorest and indeed they take much of the burden of the externality. The DfT has consistently ignored the fact that the 2006 Eddington Report[24] said that transport externalities should be paid for by the user. If the Blueprint externalities were recovered by the State through taxation then the elasticities are such that road use would decline to levels last seen in the early 1960s.[25] It seems likely that aviation would show a similar decline if true costs were paid.

The exceptionally poor performance of the road transport and aviation sectors in addressing climate change is likely to be largely attributable to the economically unjustified growth in those activities as a result of the government both passively permitting the externalisation of costs and actively providing the infrastructure to encourage the growth of traffic and consequent externalities. Additionally the greenhouse gas emissions specific to road construction and maintenance appear to be excluded from the transport sector statistics (as, bafflingly, are the emissions due to the use of air conditioning in transport)[26].

The grotesque skewing of road and aviation transport economics towards regressive subsidy has led to a general presumption of privilege for those who make most use of it. Or rather, in the case of motoring[27], it reinforces a presumption that goes right back to the early days of motoring in England, when the owners of cars were of a class that had always presumed a superiority (the Mr. Toad phenomenon). It still manifests itself in all sorts of ways. Why did Margaret Thatcher think that people using public transport had failed in life? Why is it so difficult to get over the notion that urban streets ought to be for people rather than cars? Why do car users presume to occupy more space than other users of the road? Why are the State, the police and the law so insouciant over a death toll on the roads that since the end of WWII has amounted almost to the level of combatants killed in that war? Why are speed limits not rigorously enforced? Why has DEFRA gone out of its way in the courts, in the last three or four years, to avoid taking any responsibility for road traffic pollution that is killing some 40,000 people a year? Why has it been appropriate for the State to annihilate huge swathes of landscape, destroy large areas of historic importance and jeopardise habitats and biodiversity to feed this thing?

So now, with the Climate Emergency, when we are desperately in search of the natural resources that can get us out of our dependence on fossil fuels, why does the transport sector think it needs to be the last to act and that, when it does, it will be able to appropriate as much of the limited natural resources as it wants?

The truth is that with all the major consumers of energy in the economy, and the choices we must make for change, the transport choice is the most discretionary, i.e. the one where we have the greatest scope for

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[22] Blueprint 5: *The True Costs of Road Transport* ; Maddison D, Pearce D, Johansson O, Calthrop E, Litman T &Verhoef E; Earthscan, London 1996

[23] i.e. in Webtag jargon there would be a '*willingness to pay'* several pence to avoid the nuisance

[24] https://webarchive.nationalarchives.gov.uk/20081230093524/http://www.dft.gov.uk/about/strategy/transportstrategy/eddingtonstudy/

[25] See P Kinnersly; *World Transport Policy and Practice*; 20.2/3; May 2014; p75 et seq

[26] *2018 UK Greenhouse Gas Emissions*, DBEIS, February 2020

[27] Aviation for the most part is at least a form of public transport.

behavioural change. Consider other sectors of the economy that consume energy: agriculture, manufacture, construction[28], domestic infrastructure maintenance and operation (housing etc.), education, retail, healthcare and social care etc. All of these have energy demands and probably all of them could improve the efficiency of their energy use. But it would be very difficult to argue with any of these that the obvious way of reducing their energy demand was to reduce the activity. One would not, we hope, argue for reducing the energy use of social care by reducing social care. One would not argue that we could reduce the energy demand for domestic heating by asking the population to live in very cold houses.

The difference between all of these activities and transport is that a great deal of transport is unnecessary. We could change our transport behaviours drastically without being any the poorer for it. That much transport is unnecessary stems from the falsity of its economics. We referred above to the probable effect of road transport paying the true costs of what it does – traffic levels reverting to those pertaining at the start of the 1960s.

The classic paper by David Metz[29] clearly demonstrated that what has actually happened with the post-war road-building frenzy is that people spend just as long travelling by road as they ever did; it's just that they travel much further. This has generated a diffusion of economic activity away from traditional centres. How the national economy benefits from such entropic behaviour is anyone's guess. It has certainly resulted in some extraordinarily baleful effects on our countryside with strung-out development corridors lined with megasheds and car-dominated retail. This in turn has led to a significant social exclusion of those who cannot benefit from car ownership.

The housing crisis (of which the social housing crisis is arguably entirely of the government's making) ought to have been tackled by strategies to create harmonised communities. Since an essential and probably growing part of society is marginalised or excluded from the supposed benefits of a growing economy, any kind of social cohesion sought through housing policy ought to take account of the unlikelihood of this sector to have access to the subsidy of the car-owning population. They are doubly or even triply excluded by the entropic nature of the development brought about by the car economy: not only do they have no means of accessing the facilities that the better off can access, but the facilities they would have had have moved away from them – local shops towards out-of-town centres, with remaining retail more expensive for them; then deprived of bus services that have been made unviable because subsidised private motoring deprives them of customers and congests the network, so increasing the costs of provision. Transport policy is highly regressive and getting worse.

Much road transport is, therefore, highly discretionary. We choose to do it because the government subsidises us to do it. We could make much better choices – we could do much less of it, and we could do it with very much greater energy efficiency and much more social responsibility, through public transport. It is, therefore, very hard to see the moral or economic case for transport being so car-dependent and in consequence so energy-dependent.

There is, therefore, no case for assuming that road transport should have any particular access to whatever renewable energy becomes available. Rather there is a good logical case that it should come last in the queue[30]. In practice, of course, it would be difficult to have a prioritised rationing of the available energy. It would be simpler to address the necessity for the activity, or rather to address the externalities (as Eddington recommended 14 years ago). If the subsidy for the unnecessary activity were clawed back to more useful social and economic purposes, traffic levels would largely drop towards the level of true need, when transport could then expect its fair share of the available renewable energy.

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[28] Setting aside the unnecessary and mostly mischievous construction in the Government's infrastructure programme

[29] Metz, David; *'The Myth of Travel Time Saving'*, Transport Reviews, 28:3, 321 – 336; 2008

[30] The same thing really applies to aviation. Most of it is unnecessary in a world in climate crisis. No doubt, in principle one can imagine renewable energy being transformed into aviation fuel (though not the barmy notion of electric planes in the foreword to this DfT plan) but the lack of demonstrated 'need' for most aviation should mean that it should have low priority of access to the available renewable energy.

What happened to the Road Traffic Reduction Act anyway?

Elephants in the Room – IV. Trajectories: What is the Purpose of Decarbonisation? Is this a silly question? The purpose of decarbonisation is to stop adding to the greenhouse gases that we know threaten the future of the world and our place in it. We don't ask this question because we think the Government doesn't know this, though it is fair to point out that it is only 5 years since an actual climate change denier was Secretary of State for the Environment and it is very difficult to detect much in the way of policy since his departure, that suggests government has paid more than lip service to decarbonisation.

We are asking the question because we are not sure whether the Government is considering decarbonisation because it is necessary for the planet or necessary for the purposes of meeting treaty obligations. The difference is not trivial. It is very hard to get away from the idea that this year being the year we were supposed to be hosting COP26 has forced the government to start to address the problem, presumably out of sheer embarrassment.

Consider what the conference title means. COP26 – 26 years on from the first Conference of the Parties and what have we done? Apart from some initiatives towards encouraging renewable energy under the Blair government and the Fuel Price Escalator, both of which initiatives have been put back since the present party came to power, the answer is pretty well nothing. A clear mythology has been promoted by both parties in government, that the UK has been a world leader in reducing fossil fuel consumption, but this assertion needs a clear reality check.

The great bulk of reductions in our fossil fuel consumption have nothing to do with Government policy to tackle carbon emissions. The destruction of the UK coal industry under Margaret Thatcher was the result of policy driven by entirely different considerations and it was only facilitated by the accident of abundant North Sea Gas coming on stream. Much of the remaining decarbonisation has simply been off-shoring – other countries now manufacture most of our goods and we don't count the carbon as being ours.

Footnote[7] puts some numbers on this:

> *Between 1990 and 2014, UK domestic CO_2 production emissions have fallen 27%. However, more than half of that reduction is offset by imported emissions from other countries, with consumption emissions only declining by 11% over the same period.*

And what, in particular, has the Department for Transport done in these 26 years? Considerably worse than nothing. The carbon emissions it owns up to have remained constant in spite of improved efficiencies in machinery, whilst the UK share of international aviation has continued to climb and the export-import deficit in automobile manufacture signifies additional UK transport embodied emissions uncounted.

Now, of course, if we are to believe government statements, we are at last committing ourselves to a downward trajectory, albeit a very slow one. And here we come to the nub of the question of intent. If the proposed decarbonisation trajectory is to do with meeting treaty commitments and a defence of national reputation then it minimally, grudgingly serves that purpose. It is a '*what can we get away with?'* strategy.

If, on the other hand, the purpose of a decarbonisation strategy is to stop doing damage to the climate and the planet, then we ought to see some sign of this within documents like this one. **The main point about the climate emergency is not the target of zero emissions, but the cumulative emissions getting there.** The government would theoretically meet its zero carbon target in 2050 if it carried on with the status quo until 2049 and then switched everything off. This is more than a facetious thought experiment. Successive governments in the UK and around the world have behaved all along in a procrastination mode, with timescales set by electoral considerations, leaving future generations to sort the problem out.

The point is that such a trajectory maximises the damage to the planet. If the government and the DfT were the slightest bit interested in minimising the damage to the planet they would be looking for a trajectory that was as steep as possible, starting now. Quite apart from the point about minimising cumulative emissions it makes sense to have such a trajectory on grounds of practicality. Decarbonisation of many parts of the economy (e.g. household emissions) is going to be difficult, so a trajectory has to reflect doing the easiest things (lowest hanging fruit) straightaway.

For the reason given above that much of transport is discretionary, i.e. a matter of behavioural choice and not hard circumstantial reality (like a huge housing stock that cannot quickly be decarbonised) the lowest hanging fruit ought clearly to be seen in the transport sector. This is where a precipitate decarbonisation trajectory ought to be expected. Yet this is the very opposite of what the DfT are imagining.

Elephants in the Room – V. Every Little Bit Harms. Perhaps we should be talking camels (and straws) instead of elephants here. Anyone who has attended what passes nowadays for a public inquiry into a new road scheme will know that the extra carbon emissions generated by the scheme and grudgingly calculated by the promoters[31], are dismissed as *'not significant'* against the national picture. And they don't mean insignificant against the total transport emissions level, they mean against the total emissions of all sections of the economy.[32]

Normally this absurdity slips through public consciousness and is not noticed by the national media. However, the recent launch of a Judicial Review process on the RIS2 programme in relation to our Paris accord treaty obligations, has revealed the scale of these 'insignificances'[33].

BBC News recently reported a Treasury spokesperson bizarrely saying

> *it made sense to measure the carbon emissions from new roads against the UK's entire carbon budget, because climate change is a global problem, whereas smaller road schemes offer local benefits.*

It would be interesting to ask the Treasury spokesperson if a citizen could withhold his income tax, because in the grand total of taxation it would be insignificant and could be more usefully spent locally on mending his roof. That a Treasury spokesperson cannot see, that pence accumulate to pounds and tonnes of carbon accumulate to megatonnes, is a worrying signal of numerical incompetence.

Techno-fixes, Magic Thinking, Rebound: There is a great deal in this consultation document of anticipating *dei ex machina*. There seems little doubt that there will be significant energy efficiencies to be gained from the deployment of existing technologies (e.g. heat exchangers in domestic properties, electric drive-trains in transport) and from technology advances in future (e.g. battery development for higher energy densities, hydrogen for storage). But there is a seduction in this thought that needs to be resisted and an obfuscation that needs to be penetrated.

We do not quite accuse the DfT of dreaming up magical technological solutions to our problems, but the document is nevertheless falsely reassuring in its tenor. We are led to believe that a Science Plan will bring disruptive technological change in the *'near to medium'* future, yet the Plan or Roadmap[34] published in July

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[31] In almost all cases significantly underestimated, because the Webtag procedure still ignores much of the consequences of induced traffic and all the carbon emissions of that induced traffic away from the scheme itself (e.g. in the increased congestion in the rest of the unimproved network).

[32] Phil Goodwin August 2020: https://www.transportxtra.com/publications/local-transport-today/news/66363/road-appraisal-makes-carbon-dioxide-uniquely-insignificant--why-and-what-to-do-about-it-/

[33] See *'The carbon impact of the national roads programme';* L. Sloman and L. Hopkinson; *Transport for Quality of Life*; July 2020

[34] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/896799/UK_Research_and_Development_Roadmap.pdf

is pretty well empty of content and certainly has nothing that suggests any significant new disruptors on the horizon. We must even question whether whoever contributed the paragraph on electric planes has lost all touch with reality and surely we can discard the current DfT obsession with autonomous vehicles as unhelpful crystal ball gazing?

The obfuscation lies not in the ideas that electric vehicles and hydrogen storage technologies will have some part to play in the future, but in the impression given that these are, of themselves, zero carbon. This is amply illustrated by the bizarre Figure 6. in the consultation document which proclaims that an electric car has zero emissions. Indeed we are expected to believe from this figure that a car trip from London to Edinburgh is, therefore, much better than making the same trip by train. There is no caveat given to this nonsense; no drawing of attention to the embodied carbon of vehicle manufacture; and no reference to where the electrical energy comes from. Why for example is it assumed in this Figure that the electric car has priority access to the renewable energy that will be available – why not on the contrary assume that the train has this priority (as it should do of course on social fairness and simple efficiency grounds)?

The problem with not spelling these things out, but leaving an impression that government has a handle on techno-fix solutions is that it takes away all the force of the truth – that there are imperatives to plan for which will need profound behavioural change. Sure the document specifically mentions the truth, e.g.:

> *Modal Shift: Decarbonisation of transport will not happen without users changing their behaviours. It is essential we continue to explore how best to encourage a shift to more sustainable and active travel and the adoption of zero carbon technologies and services to achieve a smooth transition to net zero transport.*

But the truth is obscured and we see how badly obscured it is by the DfT's continuing pretence that these futures can be consistent with its deliberate plans to increase road transport and aviation, through the RIS2 programme and airport expansion aims. So when the Minister says in his Foreword:

> *Public transport and active travel will be the natural first choice for our daily activities. We will use our cars less and be able to rely on a convenient, cost-effective and coherent public transport network.*

is it that he doesn't understand that it is the growth of road traffic that has consistently impoverished public transport and made our travel habits so inactive? How will public transport be the natural first choice for our daily activities if its competitor, private motoring, gets even more subsidy than it does at the moment? And then the glaringly obvious. If we will *'use our cars less'*, why do we need more road capacity and how does the Webtag appraisal process work at all if car traffic declines?

One can only conclude that either the DfT inhabits a *White Queen* world where impossible or irreconcilable things coexist, or that documents like this are composed by different factions within the Department that do not talk to each other; and nobody proof-reads the result.

There is one further problem with promising disruptive technological solutions and that is 'rebound'. Just as David Metz demonstrated that the road construction programme has not led to the reduction in travel time that it promised, but merely to a growth of distance travelled (i.e. more traffic for the same economic activity), so technological efficiency improvements to private motoring and road freight may well not lead to any efficiency saving to the nation as a whole, but merely encourage more use overall.

There is evidence of rebound effects. A number of these are identified in a paper from *Transport for Quality of Life*[35], in relation to studies of various Norwegian incentives. Thus electric car use appears to strongly correlate with reduced use of public transport and active travel, so in Norway[36]:

> *The current owners of electric cars have changed their travel habits as a result of the acquisition: they have reduced the use of public transport to work from about 23% to less than 6%, and increased use of individual car transport from an average of 65% to 83%. Furthermore, we find that the electric car-owners walk, cycle and use public transport less frequently than the population sample, and they use individual car transport more often. The differences are large and statistically significant.*
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> *Modelling suggests that each 1%-point increase in electric car registrations leads to a 0.63% increase in average car kilometres in the short term, and a 0.78% increase in the long run*[37].
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> *The availability of electric cars has resulted in an increase in multiple car ownership, such that 15-20% of electric vehicles represent cars that would not have been purchased if there were no electric vehicles on the market*[38] .

The Norwegian incentives apparently were of the 'pull' kind and the studies concluded that 'push' incentives (i.e. deter petroleum car use) might be more successful. A Norwegian government agency commented:

> *"If this is the trend that stays in the future transport market, it will produce results that are very adverse for public transport. There is good reason to question whether it is desirable for the urban transport situation and land use in the long term, to maintain these incentives in the form they have today"*

Policies, Behaviours and Priorities: As we said at the beginning, the questionnaire does not seek responses to the consultation document, but we have felt compelled to make such a response. The consultation seeks 'ideas', but the questionnaire so circumscribes the 'ideas' that it is necessary to look at the problem from a wider perspective. We believe that the ideas that come from a wider perspective can be much more fundamental and can indeed lead to solutions to the decarbonisation problem, in a way that current DfT thinking clearly cannot.

In making our response we believe we have identified an underlying set of assumptions that bring into question whether the DfT has seriously addressed the issue before it. Chief among these assumptions is that decarbonising transport in the UK is a technological problem, when it is actually a political one.

Imagining technological solutions certainly has its uses and any technological contribution to improving the efficiency of an activity is beneficial, provided, of course, that the activity is beneficial to society as a whole and provided that the increase in efficiency does not act to the detriment of efficiency in other activities. The caveat may be illustrated by the perennial problem of access to town centres – improving the efficiency of access by car (e.g. through faster, traffic-light-free road space) encourages the growth of car traffic, which takes visitors away from intrinsically more efficient bus services and, moreover, congesting the roads so that the bus services operate less efficiently.

Technological 'solutions' are also notoriously subject to rebound effects. Roadbuilding increases the speed of travel (at least for a while) but has the Metz effect of generating greater distances of travel for the same

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[35] *More than electric cars*; L Hopkinson and L Sloman, *Transport for Quality of Life;* December 2018
[36] See https://www.vegvesen.no/_attachment/120733/binary/225415?fast_title=Trafikk+i+kollektivfelt+(pdf) English summary.
[37] https://brage.bibsys.no/xmlui/bitstream/handle/11250/2454238/masterthesis.PDF?sequence=1
[38] www.sciencedirect.com/science/article/pii/S1361920916305235?via%3Dihub

economic purpose. Of course non-technological policy or organisational interventions can have rebound effects as well – e.g. Park and Ride leads to more and greater length of car journeys and modal shift away from public transport[39]. But misguided policy can be changed. Disruptive technology can lead to a self-perpetuating habit that gets hard to break.

The other aspect of the assumption that decarbonisation is a technological problem is that it leads to magical thinking and a Micawberesque anticipation that *'something will turn up'*.

Essentially the DfT does what it usually does; it selects a part of a problem and addresses it in isolation from the rest of the problem. The Climate Crisis should be telling us to think fundamentally about what we are doing. What are the essential aspects of a sustainable society and what transport does that society need? The DfT starts from the assumption that all the aspects of the transport system we have are what we need and then tries to shoe-horn reality into that narrow conception.

The fact is that road transport and aviation have largely become gigantic addictions, into which we pour large amounts of our wealth for very little reward; we poison our air; we destroy landscapes, heritage assets and habitats; we surrender our street spaces and our peace and quiet (how much we realised this during lockdown when people started to hear birds singing); we carapace ourselves away from human contact in tin and plastic boxes and console ourselves with surround-sound and the reassuring messages from government that we can go on doing this (or even more than this in the insane vocabulary of Barnard Castle Man: *Build, Build, Build*) forever. But the planet burns, the seas will rise and people will starve.

We all need to change behaviours, but we won't all change behaviour if we continue to be encouraged to carry on 'as normal'. We need to kick the habit, but we will find that very difficult if Government keeps feeding us the narcotic.

If there is any sincerity in the Department for Transport for tackling the damage transport is doing to the climate and so many other aspects of our environment, then it will perceive, not only that it must stop making things worse (as with road and airport expansion), but must undo as soon as possible all that it has done in the past to add to this problem. It will not, of course, undo the carbon it has already pumped into the Greenhouse, which won't disappear for hundreds of years, but that must be forgiven. Continuing on its path of making the world worse is unforgivable.

[39] Parkhurst G: Transport Policy 7, p159-172, 2000. Parkhurst G and Richardson J: Journal of Transport Geography 10, p195-206, 2002