

Pwyllgor Newid Hinsawdd, yr Amgylchedd a Seilwaith /  
Climate Change, Environment and Infrastructure Committee  
Teithio ar fysiau a'r rheilffordd yng Nghymru / Bus and rail transport in Wales  
BRT05

Ymateb gan Mark Barry, Athro Ymarfer Cysylltedd - Ysgol Daearyddiaeth a  
Chynllunio, Prifysgol Caerdydd/  
Evidence from Mark Barry, Professor of Practice in Connectivity - School of  
Geography and Planning, Cardiff University

# Submission to Senedd Climate Change, Environment & Infrastructure Committee – *this is an update of my Sep 2021 submission*

May 15<sup>th</sup>, 2022, **DRAFT 1.0**

*Mark Barry, Professor of Practice in Connectivity at Cardiff University's School of Geography & Planning*

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*To note: the views and opinions expressed in this paper are those of Mark Barry and no other person or organisation.*

Thank you for inviting me to present evidence to the Senedd Climate Change, Environment and Infrastructure Committee. As many of you know, I have been involved in Transport Policy and Development in Wales since 2010, much of that related to the South Wales Metro. I have included a summary of my roles, articles and publications at the end of this submission.

Before I start, can I offer a brief *postscript* which I have recently shared in similar form, with senior public officials over the last few months.

I am sure most of you will be aware of the UN IPCC 6<sup>th</sup> Assessment Report on Climate Change Mitigation<sup>i</sup>: [Climate Change 2022: Mitigation of Climate Change \(ipcc.ch\)](https://www.ipcc.ch). A press summary was also prepared<sup>ii</sup>: [WGII Summary for Policymakers Headline Statements \(ipcc.ch\)](https://www.ipcc.ch)

Frankly the house is on fire, and we have to act...

So, I am perplexed, why, like Covid, we don't have a daily press conference from Ministers at Westminster and the Senedd, setting out the status and plans/progress to address the Climate Emergency....which is an order of magnitude at least more urgent than Covid.

I know Net Zero Wales does not go far enough, I know we need to do more, I know discussions and arguments about economic growth are arbitrary and secondary to the real issue at hand. We have to make some deep and meaningful changes on tax, mobility, our economy, food, energy, etc and we have to start now; not in 2 years, not after a future Regional Transport Plan, or the next "relevant" election. I am getting older and care less about process and sensibilities and more about the legacy of our generation and the kind of planet we will bequeath our children. It is also clear to me that those with the most need to make the biggest changes.

Clearly here in Wales we can't turn the dial globally on carbon emissions; but we can show others what it is possible to achieve? All of us in senior positions can influence political discourse, policy and actions.

So, please can we stop, briefly, and think ....then we have to stop talking and start doing.

## Summary...

Firstly, my apologies, I haven't had time to prepare a comprehensive submission and have just updated and augmented my submission to this committee from Autumn 2021. Also, to note, any discussion re decarbonisation and transport can't just be about bus and rail, so I am going to summarise for me, the key issues re: transport, planning, car use, demand management etc, we need to address (inc. reference to some of my on-line articles and publications which themselves include references to source data/material).

As context in Wales, we have to acknowledge that Welsh Government has set out, via [Llwybr Newydd](#)<sup>iii</sup> (The Wales Transport Strategy) ambitious targets for mode shift away from car by 2040, and more ambitious 50% reduction in surface transport emissions by 2030 which reflects the advice of the Climate Change Committee to UK Governments<sup>iv</sup>. This has

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been re-enforced in [Net Zero Wales](#)<sup>v</sup> and will be reflected in the upcoming National Transport Delivery Plan which will present a more detailed plan for Llwybr Newydd.

From all the work I have seen (formal & informal) from a number of organisations, and noting much fine grain detail, I think we will need, by the mid 2030s:

- A 30-40% reduction in car use (even when accounting for DfT projections for EV use)
- At least a doubling of Public Transport (PT) and Active Travel (AT); in that context the importance of [Welsh Government Metro programmes](#)<sup>vi</sup> cannot be understated. Their ongoing development and implementation is essential. *I prepared a brief summary/overview [here](#)<sup>vii</sup>.* The capital and operational funding challenges and the role/responsibility of UK Gov in any solution have to be addressed as well as the need for Bus Reform in Wales.
- In all this, and again re-enforced though all the work/discussion I have had, there is no getting away from the need for Demand Management to help reduce car use/dependency. The evidence is clear, you can build the public transport (PT) capacity, but you need “incentives” and disincentives” to encourage people to use it. This will inevitably include road pricing measures – or a reduction in the “car/road use discount” as I prefer to call it (*We have to look at removing “free” parking as well*)
- The reduction of fuel duty tax revenue will also force HM Treasury to consider such measures before too long as [the Westminster Transport Committee found in its report on Road Pricing](#)<sup>viii</sup> earlier this year. Wales should perhaps be on the front foot in this regard to secure its own “revenue stream” as, as recent evidence shows, one can't rely on UK Government to invest in Welsh Transport infrastructure even when they are responsible for it. I repeated this case in my submission to Welsh Affairs Select Committee (WASC) – [and summarised here](#) and earlier this year in my [formal response](#)<sup>ix</sup> to the Great British Railways consultation on their Whole Industry Plan (WISP). The non-devolved status of Wales' rail network and the open sore of HS2 being designated by HM Treasury as an England and Wales project for Barnett<sup>x</sup> purposes are material constraints on what WG can achieve.
- Our planning and land use ecosystem needs a radical overhaul in the context of Transit Oriented Development to enable us to make “better decisions” and to bring forward more sustainable development.

## Basic Physics and Geometry of Cars Vs Public Transport

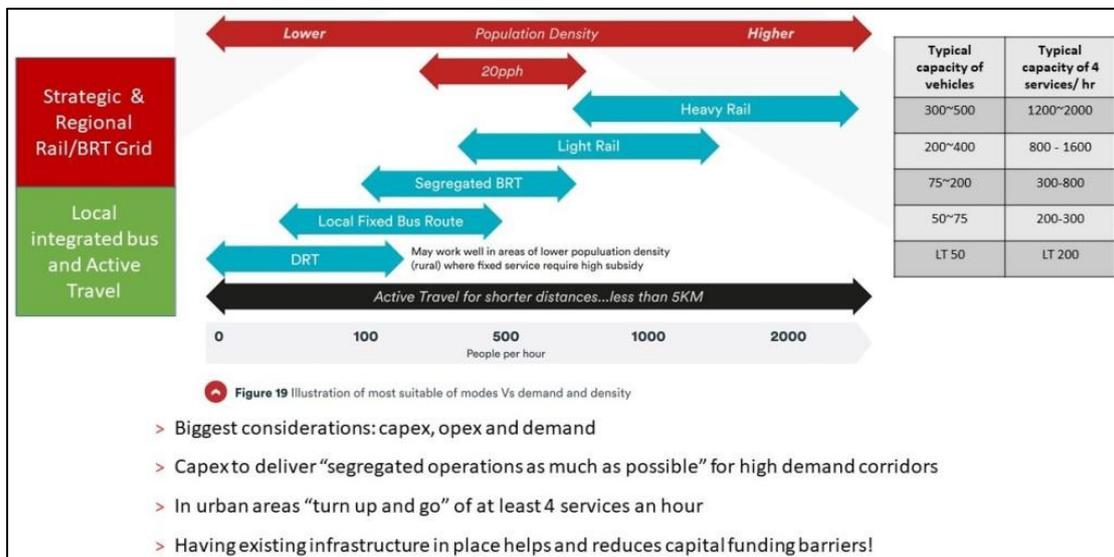
To help with context I think it might help to share some basis [transport planning principles](#)<sup>xi</sup>. *I originally set these out in an article earlier this year.* As illustrated in *Figure 1* it is operationally more efficient to move 1000 people an hour between two points in 2 or 3 trains (of 300~500 people) or 4 Light Rail Vehicles (of 200~400 people) instead of 14 or 15 buses (of 50~75 people). At 100~200 an hour then perhaps 3 or 4 buses works better than one train, remembering that a frequency of 4 services an hour is generally regarded as the minimum required to deliver a “turn up and go” services able to attract most passengers.

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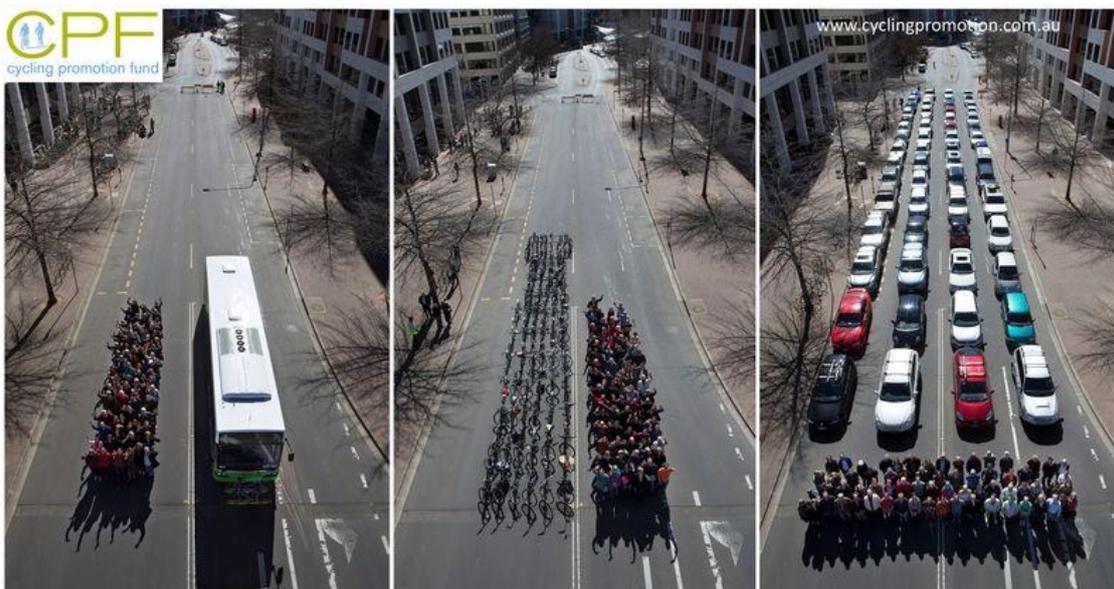
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In densely populated urban areas, it is always more efficient to move large numbers of people in fewer bigger vehicles, so trying to move 1000 people an hour in 500~1000 cars is always the least efficient and most environmentally damaging. Autonomous and/or electric vehicles or “pods” can't change the basic physics and geometry of the question – primarily road space required per passenger and energy costs per passenger. *Figure 2*



**Figure 1** Illustration of mode applicability Vs demand



**Figure 2** Road Space: car V bus V AT ((Source Cycling Promotion Fund, Canberra 2013)

So, broadly, the bigger the local demand (and this is often related to local population density) then fixed segregated rail (HR and LR) and BRT solutions are most efficient, for lower demand then local bus services can be most efficient. For much shorter journeys of up to 3~5km then Active Travel is best irrespective of population density.

In all cases trying to integrate all the various modes to create multi-modal, multi-operator public transport grids is fundamental. [Jarret Walker is always worth a read](#) on these subjects and in particular his book, Human Transit<sup>xiii</sup> which is an essential read for all transport planners. *Figure 3 Figure 4*

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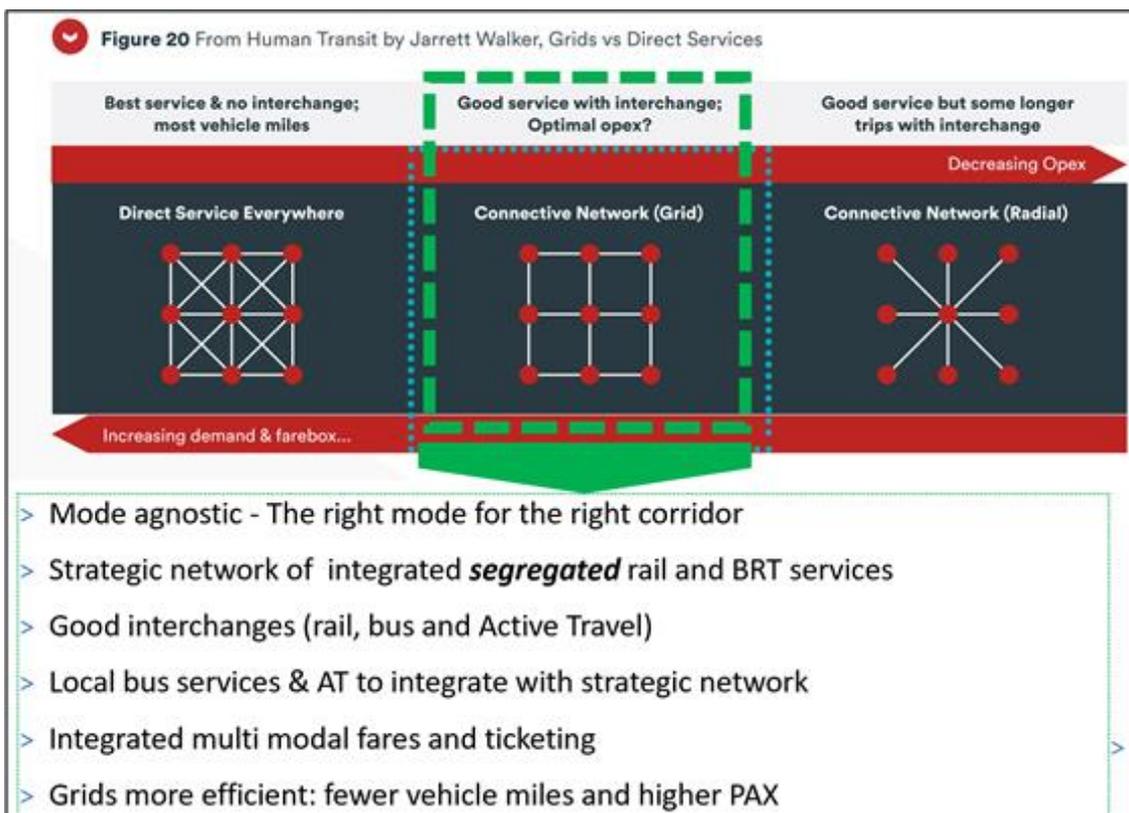


Figure 3 Service from everywhere to everywhere Vs Grids Vs Hub & Spoke

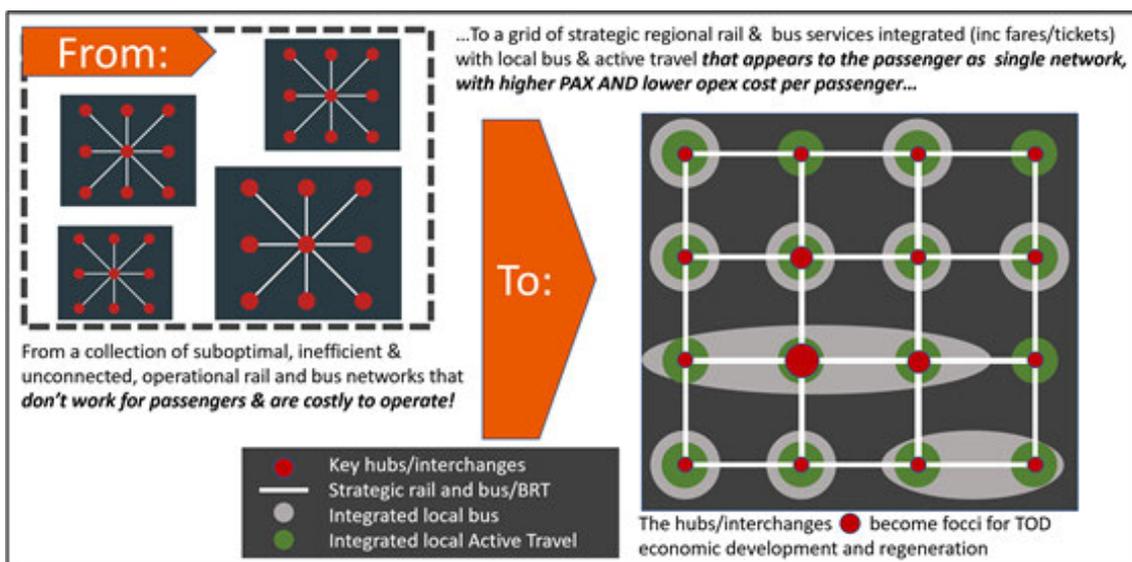


Figure 4 The multi-modal integrated grids we need for our Metros

It is overwhelmingly likely that in Wales, the full and effective integration of rail and bus (services & fares), and especially the ability to define and procure component bus services in the way described, needs both the [Bus Legislation set out by WG<sup>xiii</sup>](#) and the full devolution of rail powers and funding, which UK Gov currently seems disinclined to support. Furthermore, it is vital that when developing policy and plans for fares, integration, etc we think and develop interventions across rail AND bus; and not fall back on more traditional mode siloed interventions. This is what TfW are trying to do in respect of primary strategic regional connections via its Metro Development Programmes.

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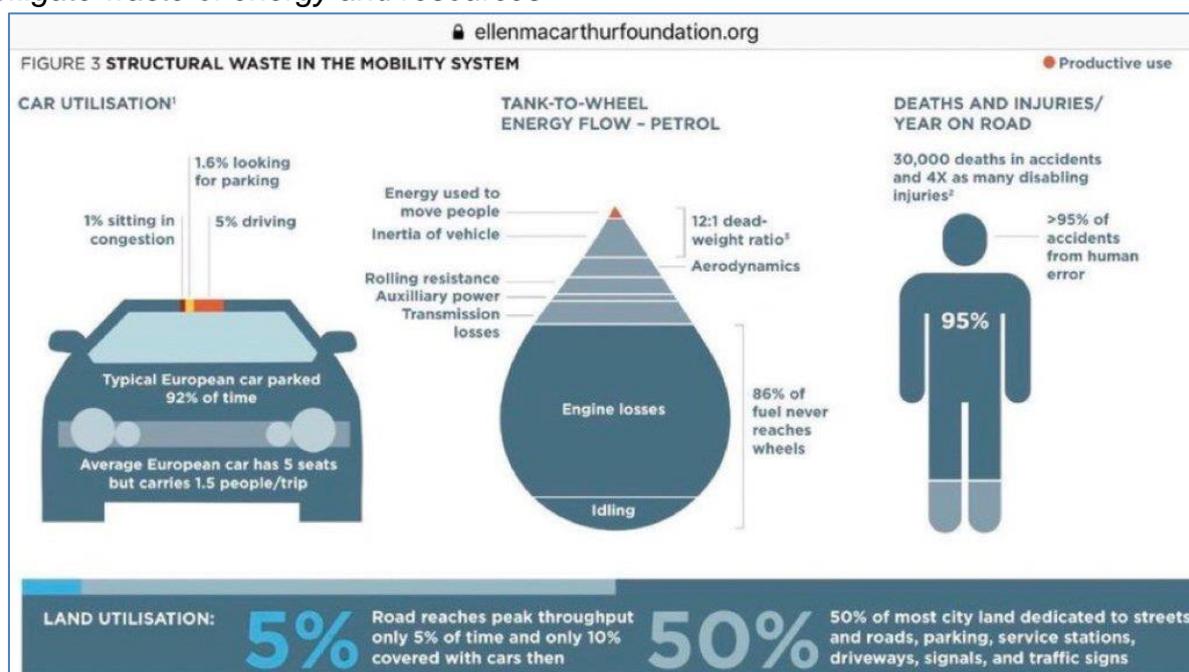
## Wider negative external costs of car use

The discussions re: carbon emission and cars, can and should not ignore the wider external costs of car use that have been shared across society for the last 50 years, rather than being borne by drivers (who in effect receive a discount to use cars). These include for example: 160,000 Road Traffic Accidents (RTAs) per year in the UK, 25,000 serious injuries, 1700 deaths (1 cyclist is killed on average in the UK each day due to RTA) at an annual cost of £16Bn<sup>xiv</sup>. Then add poor air quality & premature deaths as a result, particulates (esp. from tyres) and of course the phenomenon of induced demand (*i.e. build more roads get more cars unless you suppress demand*) and resulting unsustainable development and low-density sprawl.

I set out more details with references in this article on "[Cars and Climate Change](#)<sup>xv</sup>". This [recent article by Todd Litman](#)<sup>xvi</sup> of the Victoria Transport Planning Institute is also illuminating re: post covid equity in transport planning. I tried to capture some of Todd Litman's analysis re transport appraisal in another earlier this related to [Transport Planning Choices](#)<sup>xvii</sup>.

We also have blind spot as to the gross inefficiency of cars and the stark fact that they spend at least 95% of their time doing absolutely nothing. Aside from being a grossly inefficient use of scarce natural resources, this clogs up streets, ties up natural resources and has a high impact on everything else we do. The fact we have to design our cities around what cars do when they are not moving is as bad as having to do so when they are. The fact we are still producing millions of cars whose level of utilisation will be as low is even more "crazy" and I suggest, globally irresponsible.

This illustration from a [report by the Ellen Macarthur Foundation](#)<sup>xviii</sup> really exposes the profligate waste of energy and resources



The car industry greenwash, trying to persuade us that we can continue to use cars as we have over the last 50 years is deeply depressing – especially given many cars are getting

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bigger and heavier so requiring more energy to move, and now often being made available as part of an ongoing lease arrangement (*often with an option to replace with new every 2 or 3 years*). The reality is that [we need far fewer, smaller and better utilised cars](#) before they can help deal with our decarbonisation obligations.

In future, where “Autonomous Vehicles” may work well is in areas of low population density and more variable demand; we are already seeing this play out with Demand Responsive Transit (like Fflecsi) where opex could be reduced with the future application of AV technology. I did a blog on [Cars and AV back in 2017](#).

## What is really damaging our high streets?

*I have taken the following content from a recent blog – I feel it is very relevant to the challenge of reducing car depending in a way that can be linked to local regeneration.*

For me, after the collapse of local and employment intensive heavy industry, the biggest negative influence on many of our city and town high streets, has been the huge relocation of office, retail, public services, etc to car based “out of town” locations in the last 50 years. South East Wales is covered in them; Trago Mills, Cardiff Gate, Imperial Park, Spytty Park, Navigation Park, Royal Glamorgan Hospital, Celtic Springs, McArthur Glen, Culverhouse Cross, etc. *Figure 5 Figure 6 Figure 7*

When you combine this reality with mass volume car-based corporate supermarket retail, the consequential demise of local independent shops and food retail, and now the perversity of drive through coffee shops, the primary cause of the sickness afflicting our high streets becomes clear. In the CCR, it is not, 30,000 or 40,000 more people commuting to Cardiff City Centre out of regional working population of over 700,000, it is car based out of town development. We have a collective blind spot with cars and a failure to recognise the wider societal and economic costs of the apparent freedoms they provide.

This was a key finding of a [recent report<sup>\[xlii\]</sup> by the WG Foundational Economy Research Unit](#) that concluded that car based out of town and edge of town development had had a serious impact of the vitality of town centres such at Bridgend. A further report by [Audit Wales](#) further endorsed this analysis.



Figure 5 Newport Retail Park, Spytty, Newport

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Figure 6 Trago Mills Merthyr



Figure 7 Cardiff Gate Business Park

It is now abundantly clear that much of the damage to our high streets has been caused by the vast amount of car based low density sprawl, especially housing, offices and retail that over the last 50 years have sprung up at the edges of, or between our towns and cities.

The stark reality is that the best way to help regenerate our town and city centres is to disincentivise car based out of town development and to encourage the relocation of

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many “out of town” car-based offices, retail, housing, etc back to city and town centre locations. In fact, in a post Covid world with more flexible working this is essential. Local authorities need to take this seriously and focus their energies on the need to encourage much more development in/around public transport hubs and corridors and away from car dependent green field sites.

Welsh Government and our Local Authorities have a number of such car dependent carbon hungry offices, to which I would add the UK Government Patent Office, ONS and DVLA; there are more. Relocating much of the car-based office and retail estate back to city and town centres would be a good start to help regeneration and at the same time help make public transport more attractive and affordable by reducing the subsidy burden on government given the increased patronage.

I would also note that WG Health Department and Health Boards have a terrible record on locating major healthcare facilities – they are generally in places poorly connected to PT encouraging more car use. Llanfrechfa is a case in point and the proposed Velindre hospital in Cardiff has plans for 800 parking spaces – 500 for staff! Not surprising given it is planned to be located in area poorly connected to the rest of the region in public transport terms. Seems like Hywel Dda’s new hospital could go the same way. This cuts right against WG own planning policy - e.g. [Future Wales](#)<sup>xix</sup> and will further complicate our decarbonisation efforts.



Figure 8 Illustration of "TOD" from ITDP.Org<sup>xx</sup>

The move toward more widespread [Transit Oriented Development](#) (TOD) is a must and is perhaps as, if not more, important to deliver our decarbonisation obligations than the necessary investment in public transport infrastructure and services. See *Figure 8 Figure 9*

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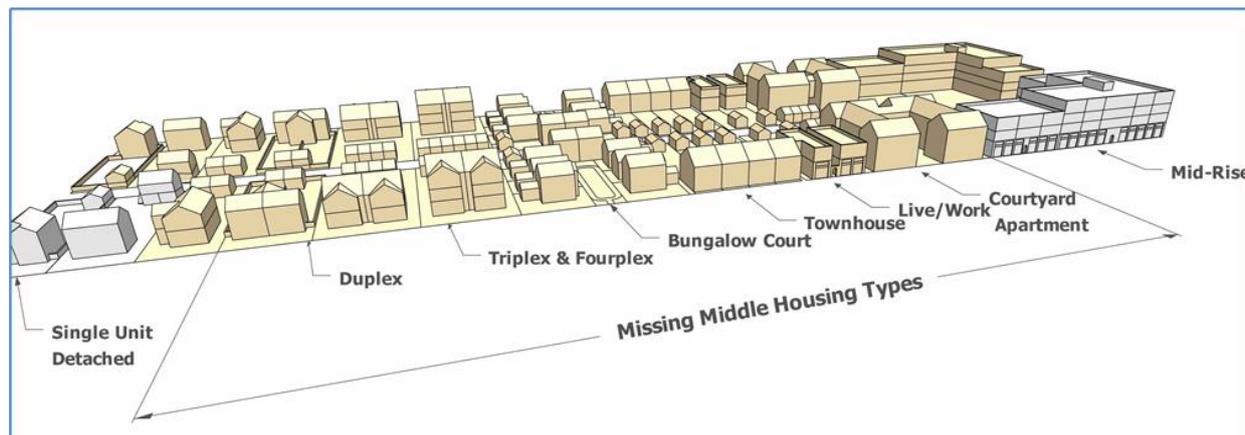


Figure 9 The Missing Middle [Source Opticos Design](#)

In this context, and as I have often replied to the challenge of “*Metro is just sucking the life out of valley towns*”, is, no, that is clearly just a lazy ill-informed assertion; the evidence is overwhelming clear that it is cars and car-based planning and development over the last 50 years that has destroyed many once vibrant local high streets. Metro and more of it, is essential to provide the public transport capacity we need to help deliver our decarbonisation obligations, alongside a transit oriented development based planning revolution and a focus on high street and community regeneration across Wales.

As a suggestion - I would make Transport for Wales a statutory consultee for major commercial, residential and public service developments. In such circumstance, perhaps TfW could support such a scheme but only when the developer/promoter provides, for example, £100M + for the extensive public transport infrastructure that will be required to minimise car use (*not as is often the case now, a S106 deal for a new bus stop*). In most cases the best and most sustainable solution is to densify existing sites (but whilst better for society and future generations may cost the developer a little more).

## WG and TfW

I also think WG and TfW need to be more aggressive in accelerating further phases of the CVL network post the completion of the current programme in 2024. They are responsible for the asset (not DfT and NR) and still need to allocate further capital resource to address some of the limitations of the current contracted programme. I originally set out some of my concerns, in a publicly palatable manner, in respect of the limitations and the risks they faced following the procurement in in my [submission to this committee's predecessor in 2018](#)<sup>xxi</sup>. Some of those risks have, in part, been manifest and the limitations I identified still need to be addressed (*eg 4tph on the City and Coryton Lines in Cardiff*) with a commensurate capital budget (to be fair a lot of work has been undertaken by WG and TfW to address these via TfW's Cardiff ad CCR Metro Programme). However, in my opinion, earlier choices/decision (& some I suspect political) re: traction power, rolling stock, staffing protocols and especially the retention of mainline standards, which were “cooked in” back in 2018, have in my opinion impacted in some cases, the potential overall capacity and flexibility of the network as well as increasing its build and operational costs.

I think WG and TfW have done a very good job to date, but I know in some cases better decisions could have been made....and still can. Certainly, the CVL network's formal

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designation should be reviewed ( I still maintain it needs to be designated as Non-mainline like Tyne and Wear or Manchester); then for example, the suggestion from some that the new Metro vehicles should not operate using “Driver Only Operation” is motivated I suspect by reasons other than passenger experience, network capacity and operational efficiency.

The legacy of the ERDF targets (*which I originally set out in my work with WG in 2015 to help drive an ambitions procurement – which it did*) should not be a constraint on developing and delivering the most attractive and efficient network when Metro services start operating over the next 2~3 years. We need to be thinking in terms of developing a high capacity, connected multi modal grid of public transport services (more like the London Underground) with high frequency services and good interchange and not a network where every service has to go Cardiff Central. Once the CVL transformation is delivered by 2024, I anticipate there will be an opportunity for further enhancement and optimisation. I did cover some this in an article earlier this year [South Wales Metro & Devolution – Mark Barry \(swalesmetroprof.blog\)](https://swalesmetroprof.blog)<sup>xxii</sup> for the rail industry trade press.

## To repeat and in summary...

To conclude, in summary and simply put, to get close to achieving our decarbonisation obligations re surface transport, we need to be far more aggressive:

- Fewer cars: 30~40% fewer, then let's support EV for those smaller and lighter vehicles that remain! – *the well-resourced lobbying of the car industry and a certain amount of greenwashing can't hide the fact we need fewer, smaller and better utilised cars before we EV them.*
- More Public Transport and Active Travel across Wales; in that context the development of multi-modal integrated grids of public transport services– especially in urban areas; the bus reform proposals will be essential to define and procure many of the component bus services and to help implementation of multi-modal fares and ticketing.
- I estimate [a capital programme of £3.5~4Bn](#)<sup>xxiii</sup> over the next 10-15 years to at least double capacity – half of which should fall to the UK Government given the work required is related to the NR rail asset for which UK Gov (via DfT and NR) are responsible. This is something WG Central Finance also need to come to terms with – and by implication the need to generate revenue to support both the additional operational costs and to service further capital borrowing – road pricing is an inevitable reality. *I would also point out that WG are still committed to spending a further £400-500M to complete the HoV rd?*
- Much more Transit Oriented Development and less car-based sprawl. It is the latter (as found in the Foundation Economy Research Report for WG) that is dislocating communities and high streets all over Wales. This has to be the focus of Wales regions and local authorities....do we in fact need “Metro Development

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Corporation(s)" in Wales, with a focus on TOD linked to our Metro Development Programmes which TfW have been developing?

- Demand Management for car use and road space, especially road pricing are unavoidable realities and socially justified. We cannot continue to subsidise such excessive and environmentally damaging car use.

All these require rough choices and sacrifices – but which are, in my opinion, unavoidable.

Thank you.

## Summary of relevant roles and reports, articles, etc

I have been acting as a Strategic Advisor to TfW (part time) since April 2020 and am helping, in an independent capacity, both Cardiff Council and the Cardiff Capital Region in respect of transport. I am also (again part time) Professor of Practice in Connectivity at Cardiff University (since April 2016) and have run events and published reports and articles related to Metro, most notably the "Metro and Me<sup>xxiv</sup>" report and event held on 8<sup>th</sup> October 2018 (in partnership with Cardiff University, Capital Law, IWA and Arup).

- Author of 2011 report, "A Metro Wales Capital City Region<sup>xxv</sup>" commissioned by the Cardiff Business Partnership and published by the Institute of Welsh Affairs
- Submitted and presented evidence to the Westminster Transport Committee's review of High-Speed Rail in 2011<sup>xxvi</sup>
- Author of, "A Cardiff City Region Metro: transform | regenerate | connect<sup>xxvii</sup>" in 2012/3 developed with the Metro Consortium
- Led development of the 2013 Welsh Government commissioned, "Metro Impact Study<sup>xxviii</sup>"
- Led development of South Wales Metro for Welsh Government (PT) Nov 2013 – Jan 2016
- Prepared, "The Rail Network in Wales – The Case for Investment", for WG in 2018<sup>xxix</sup>
- Presented evidence to the Senedd Economy and Transport Committee re: the procurement of the W&B franchise in 2018<sup>xxx</sup>
- Prepared Welsh Government's Rail Enhancement priorities<sup>xxxi</sup> in 2020 and the supporting analysis of rail investment in Wales<sup>xxxii</sup>
- Helped prepare Cardiff Council's Transport White Paper and the Cardiff Crossrail proposals<sup>xxxiii</sup>
- Prepared advice and suggestions to the South East Wales Transport Commission<sup>xxxiv</sup>
- Developed the concept of a Swansea Bay Metro now being progressed via TfW.
- Presented evidence to WASC re Rail investment in Wales<sup>xxxv</sup>
- Prepared articles re the [South Wales Metro<sup>xxxvi</sup>](#) and [Metros across Wales](#) for the trade and national media in the last six months<sup>xxxvii</sup>

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## >>>>>ENDNOTES

- i [Climate Change 2022: Mitigation of Climate Change \(ipcc.ch\)](#)
- ii [WGII Summary for Policymakers Headline Statements \(ipcc.ch\)](#)
- iii [Llwybr Newydd: the Wales Transport Strategy 2021 | GOV.WALES](#)
- iv [Advice-Report-The-path-to-a-Net-Zero-Wales.pdf \(theccc.org.uk\)](#)
- v [Net Zero Wales | GOV.WALES](#)
- vi [Wales' Metros – Update Feb 2022 – Mark Barry \(swalesmetroprof.blog\)](#)
- vii [Summary of Welsh Transport Priorities...and relative importance of HS2 - YouTube](#)
- viii [Road pricing \(parliament.uk\)](#)
- ix [GBR – WISP Consultation. My response...Jan 2022 – Mark Barry \(swalesmetroprof.blog\)](#)
- x [Wales, Barnett and HS2..... - YouTube](#)
- xi [Wales, Transport Planning & Choices... – Mark Barry \(swalesmetroprof.blog\)](#)
- xii [Human Transit — The professional blog of public transit consultant Jarrett Walker.](#)
- xiii [One network, one timetable, one ticket, Welsh Government sets out plans to change the way we travel | GOV.WALES](#)
- xiv [Road accident costs Great Britain 2010-2018 | Statista](#)
- xv [Climate Change, Cars & Challenges – Mark Barry \(swalesmetroprof.blog\)](#)
- xvi [bcpct.pdf \(vtpi.org\)](#)
- xvii [Wales, Transport Planning & Choices... – Mark Barry \(swalesmetroprof.blog\)](#)
- xviii [Growth within: a circular economy vision for a competitive Europe \(ellenmacarthurfoundation.org\)](#)
- xix [Future Wales: the national plan 2040 | GOV.WALES](#)
- xx [What is TOD? - Institute for Transportation and Development Policy \(itdp.org\)](#)
- xxi [Article \(senedd.wales\)](#)
- xxii [South Wales Metro & Devolution – Mark Barry \(swalesmetroprof.blog\)](#)
- xxiii [Levelling Up, Working Together? A Transport Enhancement Programme for Wales – Mark Barry \(swalesmetroprof.blog\)](#)
- xxiv Various, “Metro & Me (2018), IWA, Capital Law, Arup, Cardiff University, Mark Barry, Geraint Talfan Davies [Metro & Me, October 2018 – Mark Barry \(swalesmetroprof.blog\)](#)
- xxv Barry M (2011), “A Metro for Wales’ Capital City Region – Connecting Cardiff, Newport and The Valleys”, Cardiff Business Partnership/Institute of Welsh Affairs. [iwa-metroreport.pdf](#)
- xxvi [House of Commons - Transport Committee - Written Evidence \(parliament.uk\)](#)
- xxvii Barry M & Metro Consortium (2013), A Cardiff City Region Metro: transform | regenerate | connect, Institute of Welsh Affairs.

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- xxviii Barry M & Metro Consortium (2013), Metro Impact Study, Welsh Government.  
[South Wales Metro: impact study | GOV.WALES](#)
- xxix [The Rail Network in Wales \(gov.wales\)](#)
- xxx [Article \(senedd.wales\)](#)
- xxxi [Mainline railway enhancement requirements | GOV.WALES](#)
- xxxii [Historical investment in rail infrastructure enhancements \[HTML\] | GOV.WALES](#)
- xxxiii [Cardiff Transport White Paper – Mark Barry \(swalesmetroprof.blog\)](#)
- xxxiv [A Public Transport Grid for the M4 Corridor... – Mark Barry \(swalesmetroprof.blog\)](#)
- xxxv <https://committees.parliament.uk/writtenevidence/19482/html/>  
<https://committees.parliament.uk/writtenevidence/22844/html/>  
<https://committees.parliament.uk/writtenevidence/22844/html/>
- xxxvi [South Wales Metro & Devolution – Mark Barry \(swalesmetroprof.blog\)](#)
- xxxvii [Wales' Metros – Update Feb 2022 – Mark Barry \(swalesmetroprof.blog\)](#)