railfuture the independent campaign for a better passenger and freight rail network

in the North of England – North East, North West, Yorkshire, Lincolnshire branches

Response to Transport for the North decarbonisation strategy, August 2021

This is a joint to response to Transport for the North (TfN)'s draft decarbonisation strategy, from Railfuture branches in the north of England.

We welcome TfN's strategy, which is positive and ambitious.

In this submission we focus on issues related to decarbonisation of North of England passenger and freight transport, and on the role that rail must play.

- Rail includes mass transit from very light rail to tram and tram-train and metro systems.
- Rail is already relatively low-carbon and has a clear strategy to decarbonise further, principally by electrification.
- Modal shift to rail and from road and air should be seen an opportunity to accelerate decarbonisation of transport.
- Multi-modal links between train, tram, tram-train, bus, advanced bus and of course active travel modes enter the discussion where relevant.
- This document focus on the role of rail in the North. ***We have also completed the more general consultation questionnaire.***

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1 Electrification is the priority for rail decarbonisation, based on energy efficiency and business advantages including cost reductions and the "sparks effect". The aim must be a zero-carbon railway.

All figures are approximate. Based on recent RIA paper[1]	Electric	Battery	Hydrogen	Diesel
Energy efficiency (% of energy not wasted from source to wheel)	**80%**	**65%**	**34%[2]**	**25%**
TDNS[3] recommendation (% track miles) of present unelectrified routes	**86%**	**5%**	**9%**	**0**

Electric trains are highly energy-efficient because they minimise the number of energy transfers from source to wheel. By contrast, whilst hydrogen will have a role in rail decarbonisation, hydrogen-powered

[1] www.riagb.org.uk/RailDecarb21 Why Rail Electrification, Rail Industry Association, March 2021
[2] Also quotes lower figure 25% based on source to wheel energy transfer.
[3] TDNS: Traction Decarbonisation Network Strategy - Interim Programme Business Case (networkrail.co.uk) Exec summary: Traction Decarbonisation Network Strategy – Executive Summary (networkrail.co.uk)

trains involve producing "green" hydrogen by electrolysis, compressing into tanks and using fuel cells on the train to recover the energy as electricity. At every stage some energy is wasted.
We understand that hydrogen trains about to introduced on Teesside may use "blue" hydrogen produced from fossil fuels rather than green hydrogen from electrolysis of water. A by-product of blue hydrogen manufacture is carbon dioxide; this may be "buried" (carbon capture and storage – CCS) but this technology is not yet established.[4] Nor is its long-term security established. The CO_2 is still there, even if in undersea storage. Using the CO_2 to manufacture materials (carbon capture and utilisation – CCU) feels like a safer option. Neither CCS nor CCU are yet developed. Until they are, the proposed hydrogen trains on Teesside may be as high-carbon as the present diesels.

Energy-efficiency is reduced (compared with pure electric) if trains are made more complicated – and heavier – by employing bimode or hybrid systems, for example bi-mode trains with both overhead electric supply and on-board diesels. Hybrid systems employing diesel engines with batteries and energy recovery in braking may have a role in the transition towards zero carbon but only reduce carbon consumption (and CO_2 output) by around 25%.[5] As electricity generation moves towards zero carbon, genuine electric trains will move towards 100% CO_2 reduction. That is what we need.

Pure electric trains are:

- cheaper to buy and cheaper to maintain than bi-mode, or multi-mode units, including hydrogen-fuelled trains;
- travel greater distances between failures;
- have more rapid acceleration aiding performance on routes in North of England with many stops and can also recover energy whilst braking (reducing the environmental impact of friction brake wear);
- less heavy than trains containing diesel engines, fuel storage, fuel cells or large traction batteries, meaning that because less energy is required overall, and the cost per passenger or tonne of freight carried is less. In other words the presence of additional hardware for different modes reduces the overall efficiency even when running from the "overhead";
- appeal to passengers as clean and quiet – no diesel engine fumes and reduced noise/vibration;
- fast and modern, increasing revenue – ***the sparks effect***;
- have short payback time in terms of embedded carbon from electrification work as shown in the recent RIA paper[6].

Most of the North's railway network needs to be electrified. Batteries may be appropriate for short branch lines, and hydrogen for longer but lesser used routes. Batteries or hydrogen may be interim solutions for routes that are later electrified. TDNS explores this in more detail. TDNS supports in general terms the recommendations of the Northern Sparks task force report of March 2015.[7] See Appendix.

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[4] https://www.globalwitness.org/en/blog/why-blue-hydrogen-is-fossil-fuel-industry-greenwash-and-wont-fix-the-climate/#:~:text=A%20major%20problem%20is%20that%20fossil%20fuel%20companies,cook%20food%20and%20produce%20electricity%20%E2%80%93%20into%20hydrogen .

[5] See for example RAIL 937 (11-24 Aug 2021), page 14: 'HybridFlex launch a "huge step" on decarbonisation'. See also HybridFLEX Battery-Diesel Train, UK (railway-technology.com)

[6] RIA (op. cit.)

[7] "Northern Sparks" was report of the cross-party Northern Electrification Task Force, March 2015, chaired by Andrew Jones MP (Harrogate and Knaresborough), and comprising a group of MPs and local authorities, advised by Network Rail and the DfT. The

TDNS is also supported in the DfT decarbonisation paper.[8]

Neither passenger nor **freight** can carry on using diesels and the energy density of hydrogen or battery storage is insufficient for heavy freight locomotives which require high installed power. The recent RIA report[9] into why electrification was the most effective way, highlighted an earlier report in 2019 by the Chair of CILT [10] which estimated that just 800 route-km of electrification nationally would enable 70% of UK rail freight to be electrically hauled. The objective must be 100%. So TfN must support a national research programme into the amount of extra electrification needed to support this aim, in addition to routes specified in TDNS/Northern Sparks, particularly freight-only infill. (We note that research is being undertaken into means of safely electrifying freight yards. [11])

Examples of particular freight improvements, with electrification required:

- **Peak Forest** line included in Hope Valley electrification, along with Dore South Curve.
- Railfuture Castlefield proposals – August 2020 – **new route between Cheadle Hulme and Trafford Park container terminal**, using existing line with new linking curves. Clearly this must be electrified.[12] As noted in Railfuture's proposals, it also opens up the possibility of a new, much less constrained container terminal in **Carrington**, that can sustainably meet the freight trans-shipping needs of Manchester for many years to come.
- **Teesside to Skinningrove (steel) and Boulby (potash) branch**, in North Yorkshire. A good example of freight for which the only zero-carbon alternative appears to be electric – 1500 tonne trains daily with heavy gradients. A prime example of an application where neither batteries nor hydrogen provide an alternative. And when the line to Saltburn is electrified for freight, passenger trains should also be electric.

The above are examples of many routes where electrification is the only long-term solution.

To conclude this section, apart from active travel modes (walking and cycling), rail is the easiest transport to decarbonise. Indeed, rail is already low carbon compared with road, air and marine transport. Overhead electrification is tried and tested technology, but:

- a rolling programme is required to reduce costs, maintain experience and build skills and techniques;
- alternatives such as hydrogen or batteries will help the transition but are not a long term solution for most passenger services or for freight, other than on lightly used, short routes or sidings;
- UK is behind in terms of both absolute amount of electrification and rate of new electrification in comparable advanced economies.

It seems that the UK Treasury still has to be persuaded that electrification will deliver long term benefits in

report went to the then secretary of state for transport Patrick McLoughlin: EFT_Report_FINAL_web.pdf (transportforthenorth.com)

[8] Recent DfT document: https://www.gov.uk/government/publications/transport-decarbonisation-plan

[9] RIA https://riagb.org.uk/RIA/Newsroom/Publications%20Folder/Why_Rail_Electrification_Report.aspx

[9] CILT www.railwayelectrification.org/events Julian Worth, Chair of CILT

[11] See for example: Prototype funded to electrify UK rail freight terminals | RailBusinessDaily

[12] https://www.railfuture.org.uk/article1855-Relieving-Castlefield

both financial and environmental terms. Cost overruns on schemes such as Great Western Main Line had an unfortunate effect on government view.

The RIA has since shown that a rolling programme could cut electrification costs by 33% to 50%.[13]

Persuasion of government must be an urgent objective for TfN and political representatives – of all parties – in the North. Any line with at least 1 train per hour should be considered for electrification – it could be argued the TDNS (and before it the Northern Sparks report) have already done this. Now we must move forward, ***and implement***.

2 Importance of modal transfer to rail from higher carbon modes. Rail is already low carbon and will tend towards zero-carbon with electrification as described above, and decarbonisation of the electricity supply. It follows that modal transfer to rail of both passengers and freight can cut carbon (CO_2) emissions. We need to build on the capacity of our rail network to achieve this. This is not only about building new lines, but upgrading the lines we have now and considering reopening lines that have been closed since the Beeching era.

The rail offer must be improved by creating new services for passengers and freight, opening up new markets. In the post-Covid world, travel for work – including daily commuting – seems likely to become less dominant, releasing resources to develop services for a wider range of human needs, attracting more people to rail transport. ***People want to travel. They are enriched by travel. A key aim should be to make public transport and active travel attractive to more people for more purposes.***

There is not just a perception that the railway infrastructure needs improving. It is crying out for improvement and expansion. If modal transfer is to be effective, potential passengers and freight customers need to be confident that their train will run as timetabled, and their goods will be delivered on time. It is assumed that there will be adequate investment in the present network as well as suggested new routes, and new zero-carbon traction. ***We ought to be able to safely assume that all trains will be reliable and punctual.***

Key principles and ideas include:

(a) **Modal shift** from road for both passengers and freight (including parcels/mail). This is not emphasised in recent government statements. It needs to be encouraged by improving local/regional rail services, offering simple low fares. Proposed high speed rail developments NPR and HS2E also need to be progressed.

We want to see positive decisions urgently on Trans-Pennine Route Upgrade (TRU) and high speed proposals, …

… ***but we also emphasise resources should be prioritised towards existing routes serving local communities and making rail travel attractive to a larger fraction of the population***.

(b) **Modal shift** from air. Follow French example – ban internal flights of under (say) 300 miles if there is a rail alternative taking under (say) 4 hours. (An alternative would be a punitive tax on such flights). Rail journeys on these corridors should be available through the airline booking system for

[13] Rail Industry Association, 2019 Electrification Cost Challenge Report (riagb.org.uk)

convenience of international connections.

(c) **Line openings and reopenings**. These will be needed for the railway to reach more people, and enable transfer of freight to rail. We welcome recent progress to open the Ashington line in Northumberland. Other examples that should be considered include (*inter alia*):

i. **Ferryhill-Washington-Newcastle (Leamside route)**, possibly linked to (c)(vii) and (d)(i) below. This line would also relieve congestion on the ECML through Durham,

ii. **Penrith-Keswick,**

iii. **Skipton-Colne,**

iv. **Skelmersdale,**

v. **Fleetwood** (heavy rail, tram, or tram-train[14]),

vi. **Beverley-York** (Minsters Line),

vii. **Harrogate-Ripon-Thirsk/Northallerton…**
… and perhaps also **Harrogate-Wetherby-Cross Gates/Thorpe Park**
….with possibility of southward link via Thorpe Park and Woodlesford for **freight.**

Along with the Leamside route (c)(i) and Stillington (d)(i), this would provide an alternative route for freight (as well as regional passenger services) between **Tyneside/Teesside and West Yorkshire**, then westward via **cross-Pennine** routes, and southward to **South Yorkshire**, the **Midlands** and beyond. Congested locations at Leeds and York would be avoided. (The present local service Leeds-Harrogate-York would not be affected.)

viii. Former rail routes as part of **mass-transit proposals** e.g. Otley, and Spen Valley (West Yorks),

ix. **Sheffield to Stocksbridge and Penistone** (possibly linked to (d) (iv) below),

x. **Peak District Matlock-Buxton/Manchester** (We note there is understandable opposition to conversion of green leisure routes back to rail. Some sensitivity is required here – would, for example, require provision of a new walking and cycle route.)

xi. Upgrade of preserved railways to enable operation of wider public transport alongside heritage trains. A good example would be the East Lancashire Railway (Rawtenstall-Bury, Heywood and on to Manchester).

xii. Railfuture's proposal for an alternative route for freight into Trafford Park and Carrington in Manchester [15] must be pursued. This proposal will help relieve congestion in central Manchester which has been exercising the industry recently.

(d) **New direct or improved services over existing lines** such as (*inter alia*) the following examples.

i. Teesside routes around Middlesbrough, such as
- **Darlington-Hartlepool**;
- **Middlesbrough-Newcastle via Hartlepool or via Stillington and Leamside/Durham**

ii. (Blackburn-)**Clitheroe-Hellifield**(-Lancaster/Carlisle);

[14] As in recent report by Lancashire County Council https://www.lancashire.gov.uk/council/strategies-policies-plans/roads-parking-and-travel/major-transport-schemes/fleetwood-railway-line-reopening-feasibility-study/
[15] https://www.railfuture.org.uk/article1855-Relieving-Castlefield

iii. **Calderdale, Kirklees, Wakefield network:**

- From Preston/East Lancs/Calderdale via Brighouse,
  and from Manchester via Stalybridge
  to Huddersfield, Wakefield, Castleford and York;
  including links via routes crossing at Elland/Brighouse between Bradford, Calderdale, Huddersfield and Leeds, where greater frequency is required;
- New/increased services could include some of the following -
  - New service Preston-Wakefield-Castleford-York (additional to existing Blackpool-Bradford-York)
  - Huddersfield-Castleford service extended to Pontefract/Knottingley
  - Manchester-Stalybridge-Hud service extended to Wakefield and York
  - Increased frequency upper Calderdale-Brighouse-Leeds/Wakefield connecting into increased frequency Bradford-Huddersfield at Elland/Brighouse
  - New service upper Calderdale-Huddersfield;

And:

- Leeds/Wakefield/Castleford via Pontefract extended -
  → to Goole…
  → and to Askern and Doncaster,
- Leeds-Pontefract-Askern-Scunthorpe-Cleethorpes.

iv. **Sheffield to Chesterfield via Barrow Hill.**

v. Better services on routes that at present only have basic limited or "parliamentary" service, for example:

- **Sheffield-Pontefract-York** (improve to hourly)
- **Gainsborough-Barton/Cleethorpes** (improve to hourly)
- **Stockport-Denton-Manchester Vic**, connecting with Metrolink near Ashton, additional to an improved **Stockport-Stalybridge** service (at present 2 trains per week). Both of these routes could be hourly and would offer alternative cross-city regional connectivity. Central Manchester (Castlefield corridor) congestion would be reduced, though track and signalling improvements would be required at Stockport.

vi. **Mid-Cheshire line** (Stockport-Northwich-Chester – increased frequency with two trains/hour one of which would semi-fast).

(e) **Zero-carbon.** New routes such as those in (c) and (d) above must of course be zero-carbon, usually meaning electrified.

(f) **Sunday frequencies similar to weekday,** meeting work, social and leisure demand.

(g) **New stations** – and new housing and commercial developments where possible located near to railway lines, with stations as appropriate.

(h) **Carrot and stick pricing.** Appropriate and simple fares, seen as sufficiently affordable to attract people from car use.

Could be free travel for local journeys on bus, tram and train, balanced by selective road pricing, workplace parking levies etc

Existing anomalies such as "tunnel tax" where fares are excessive over borders between adjoining metropolitan areas need to be eliminated – by levelling down, not up! Rail needs to be made attractive to people who see car travel as cheap and convenient.

(i) **And making train travel convenient**, removing barriers between modes:

- smart and seamless ticketing, and an "Oyster"-type system with daily and weekly capping that automatically charges cheapest price for journeys made – "pay as you go",
- easy to use ticket machines, and staff presence wherever possible, both on platforms and in ticket/information "shops" which could also offer wider retailing,
- connectivity between modes: walking/cycling/bus/tram/train interchange.
- appropriate provision of car parking at stations, particularly for disabled and other people who depend on cars to get to/from home, with electric charging points. Discounts could be available on charging fees for rail users.

  What is appropriate will depend on location, with relatively more parking (with adequate charging points) at rural stations where access by active travel or local public transport is less easy or impossible. Car users must **not** be tempted to "drive all the way".

  But we recognise that unlimited growth of station parking provision in urban areas may be counter-productive in reducing road congestion, particularly in a future where high quality local bus or mass-transit are provided.

(j) **Freight.** TfN needs to advocate and plan for a major increase in rail freight volumes over viable distances, representing modal shift from road and internal air, as well as capturing new flows.

(k) **Parcels and mail** – rail for trunking, train delivery to staffed stations, use of passenger trains at less busy times for premium parcels. Possible caveat: effect on performance of loading/unloading parcels on passenger trains?

(l) **Mass transit**, such as advanced bus, tram and tram train should be developed where appropriate:

- We strongly support proposals for West Yorkshire, also Merseyside, and extension of Sheffield Supertram.
- Very light rail (VRT) might be considered for York, Hull/Holderness, parts of Teesside, Grimsby-Immingham.

(m) **Transport development decisions must put climate first.** There must be limits on new roads – restricted to congestion and pollution reduction, new development, genuine safety improvement. Reduction of congestion-causing motorised road traffic is the priority, rather than attempting to provide for increases which are clearly unsustainable in the long run.

(n) **Planning** – wherever possible new major warehouses/distribution centres to be rail connected. Sidings must be electrified or otherwise zero-C. TfN should advocate for necessary planning reforms to help achieve this.

(o) **Wider regional opportunities** should include direct trains to the continental mainland, as well as to Scotland and Wales. Within Great Britain, examples include Yorkshire via Settle to Glasgow, and North East England to North/South Wales.

3 Summing-up: Our essential point is that electrification of most[16] of the present rail network is a key to efficient decarbonisation of all transport, not just rail itself. This is achieved through re-openings, increased network usage, and capacity to encourage mass modal transfer.

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Appendix: Northern Sparks task force recommendations and TDNS

Northern Sparks schemes (Northern Electrification Task Force, March 2015: Tier 1 schemes were identified for an initial 5-year plan) EFT_Report_FINAL_web.pdf (transportforthenorth.com)			**TDNS recommendations** (Network Rail *Traction Decarbonisation Network Strategy*. From full document, Appx 8, Sept 2020) https://www.networkrail.co.uk/wp-content/uploads/2020/09/Traction-Decarbonisation-Network-Strategy-Interim-Programme-Business-Case.pdf
Tier	**Route**	**Score[17] /100**	
Baseline	*Midland Main Line*	N/A	**Electrification** (including Nottingham etc)
	TRU (Manchester-Huddersfield-Leeds-York/Selby)	N/A	**Electrification** (without gaps, obviously)
	Windermere Branch	N/A	**Multiple option – Battery** (could be Electrification)
1	Calder Valley full (Yorkshire-Manchester & Preston)	84	**Electrification** throughout, except: (Colne-)Rose Grove-Blackburn Multiple option: electrification recommended (through route) but "could operate as battery".
1	Liverpool-CLC-Manchester	80	**Electrification** throughout
1	Southport/Kirkby-Salford Crescent	79	**Electrification** Kirkby-Bolton/Manchester. **Multiple option** Southport-Wigan: **Battery** recommended or "short extension of electrification"
1	Chester-Stockport (Mid Cheshire)	75	**Multiple options** in 2 sections: • West of WCML: **Battery** recommended (or electrification) • East of WCML: **Electrification** recommended (freight mentioned)
1	Northallerton-Middlesbrough	73	**Electrification**
1	Leeds-Harrogate-York	70	**Multiple options** in 2 sections: • Leeds-Harrogate: **Electric** recommended "to at least Harrogate" • Hgt-York: **Battery**
1	Selby-Hull	70	**Electrification** throughout (+ Doncaster-Goole-Hull)
1	Sheffield-Barnsley/Castleford-Leeds and connections	68	**Electrification** (Leeds suburban network inc. Pontefract area etc. Also appears to inc. Mirfield-Wakefield)
1	Bolton-Clitheroe	67	**Electrification** throughout and on to Hellifield.
1	Sheffield-Doncaster/Wakefield (GN)	67	**Electrification**
1	Hazel Grove-Buxton	66	**Electrification**. Freight links via Chinley mentioned.
1	Warrington-Chester	64	**Electrification**

[16] See table on page 1.
[17] NETF scored schemes /100, based on economic benefits/50, environment (diesel replacement)/20, capacity provision/30.

Northern Sparks schemes (continued)			TDNS recommendations
Tier	**Route**	**Score /100**	
2	Manchester-Sheffield + Man SE local routes	59	**Electrification** Mentions significant freight
2	York-Scarboro	53	**Electrification** ("approaching maximum capability for current battery technology")
2	Bishop Auckland-Darlington-Saltburn/Sunderland, ***plus***…	53	**Electrification:** Darlington-Middlesbrough/Sunderland (Durham coast). **Battery**: Bishop Auckland & Whitby branches (but requires adjacent sections electrified for charging; could be **H_2**). **Multiple options** Middlesbrough-Saltburn – **Electrification** recommended; could be **H_2** interim or permanent. (Implication if not enough done electrification in this area to support battery charging more of it will be **H_2**.)
3	*… Middlesbrough-Whitby*	*26*	
2	Barnsley-Penistone-Huddersfield	50	**Battery**
2	Sheffield-Retford-Lincoln	49	**Electrification** (includes all N Lincs routes)
2	Chester-Crewe	47	**Electrification**
2	Colne-Burnley + Kirkham-Blackpool South	45	**Multiple options:** • Colne **Electrification** recommended (could be battery) • Blackpool South **Battery** recommended (could become light rail)
2	Knottingley-Goole	45	**Electrification**
3	Barrow-Carnforth plus…	38	**Electrification** throughout (regional passenger, freight)
3	… Cumbrian Coast	32	
3	Pontefract to Ch Fenton	38	**Electrification**
3	Hull-Scarborough	38	**Multiple options:** • Hull-Beverly **electrification** recommended • Beverley-Sca **battery or H_2** (hydrogen may be temporary or permanent solution)
3	Ormskirk to Preston	37	**Electrification**
3	Carlisle to Newcastle	36	**Electrification**
3	Skipton-Carlisle	35	**Electrification** throughout (regional passenger, diversionary, freight)
3	Barton on Humber	34	**Electrification + Battery**
3	Doncaster to Gilberdyke	32	**Electrification**
3	Cleethorpes to Thorne (Doncaster)	26	**Electrification** NOTE includes Gainsboro, Lincoln and "joint" lines
3	Skipton-Heysham	7	**Electrification** Skipton-Carnforth. **Multiple options** Lancaster-Heysham, recommending **Electrification** to Morecambe**, battery** beyond.

JSW, 27 Aug'2021