

The (interim) Traction Decarbonisation Network Strategy (TDNS), dated 31-07-2020 appeared on Network Rail's website early in September¹:

- High-quality and truly revolutionary piece of work, TDNS sets out pathways to achieve net-zero carbon operation of all trains in Great Britain
- Great majority of routes at present “diesel-only” are proposed for electrification.
- Much-promoted hydrogen (H₂) trains may be deployed on less than 10% of track-km², usually more remote routes with less intensive, lower speed services.
- Battery trains (or battery/overhead bimodes) are also proposed for a few shorter routes³ often connected to the electrification at ends (e.g. Harrogate-York). Limited by battery range (but battery technology will improve.) See Hitachi video <https://www.youtube.com/watch?v=Q4JpoR0mJls&t=21s>
- freight traffic is part of argument for full electrification on a number of routes.

Scotland is of course ahead with a plan for net-zero carbon by 2045 with electrification beyond Inverness⁴. TDNS and the separate Scottish plan were well covered in Modern Railways magazine, Sept & Oct'2020 issues. TDNS executive summary⁵ discusses a total length (GB) of over 13000 [track-km] in need of electrification and offers three pathways to net-zero:

- by 2050, at 355t-km/year average (max 691),
- by 2061, at 303t-km/year (max 447), or
- by 2040, at 658t-km/year (max 922), with a warning this last option may not be feasible. But Scotland on its own is proposing 130km-year to reach an intermediate 2035 target – ***we must press for ambition.***

The Scottish document compares energy efficiencies – fraction of grid energy “not wasted”. Energy is as physically real as money. We must waste as little as possible. The percentage efficiencies are:

- electric trains (overhead wires) 83%
- battery trains 71%
- hydrogen trains 30% - meaning in making hydrogen, distributing it to trains and getting the electrical energy back through fuel cells, 70% of the equivalent grid energy is wasted. Hydrogen systems (e.g. fuel cells) will improve but will always be behind direct-electric and even batteries (which will also improve).⁶ Hydrogen is zero-carbon if made by electrolysis of water from zero-carbon electricity. But most hydrogen at present is made from hydrocarbon fuels with waste carbon dioxide going into the atmosphere – so it's not “green” unless reliable methods of CCS/CCUS (carbon-capture and usage/storage) are developed. Fingers crossed for that one. Don't get me wrong – hydrogen trains will certainly have some use.

Support for Northern Sparks!

TDNS provides single recommendations for most existing non-electric routes but multiple options requiring further assessment for a few. It provides new evidence supporting much of the rolling programme of electrification recommended in “Northern Sparks”, the Northern electrification task force (NETF) report published more than five years ago⁷. Table at end of this paper shows some of the NETF recommendations (including all Tier 1) with TDNS

¹ <https://www.networkrail.co.uk/wp-content/uploads/2020/09/Traction-Decarbonisation-Network-Strategy-Interim-Programme-Business-Case.pdf>

² Roger Ford's pie chart in Sep'2020 Modern Railways suggests hydrogen on at least 6.5% of track-km.

³ Roger Ford's pie chart (ibid) suggests battery trains on at least 4.5% of track-km.

⁴ Scotland action plan: <https://www.transport.gov.scot/media/47906/rail-services-decarbonisation-action-plan.pdf>

⁵ TDNS exec summary: <https://www.networkrail.co.uk/wp-content/uploads/2020/09/Traction-Decarbonisation-Network-Strategy-Executive-Summary.pdf>

⁶ There is a similar argument about proposals to make green hydrogen and pipe it to homes and workplaces for – why not just have electric heating?

⁷ https://transportforthenorth.com/wp-content/uploads/EFT_Report_FINAL_web.pdf

recommendations alongside. Sorry I have not had time to include all Tier 2 and 3 schemes, but intend to add later. Remember that NETF:

- assumed full Midland Main Line and Manchester-Huddersfield-York/Selby electrification would be completed, and therefore part of baseline.
- Tier 1 was a 5-year plan (originally CP6. Yes, that was 2019-24), 1450 track-km, i.e. average 290 t-km/year. Tiers 2 & 3 were longer term.

Remember also that the rail industry has shown that a rolling programme will cut costs by 33% to 50%⁸.

ZCY (<https://www.zerocarbyorkshire.org/>)

Some of Railfuture members are involved with Zero Carbon Yorkshire's transport group. Nina and I helped to finalise a draft template and supporting material for a letter that supporters could send to MPs. Focus is on urgent need for rolling programme, with continuity as current projects are completed. We made sure TDNS was mentioned!

Chas Ball, ZCY convenor, had an excellent letter published in the Yorkshire Post this week.

<https://www.yorkshirepost.co.uk/news/opinion/letters/levelling-rail-2030s-too-far-down-track-yorkshire-post-letters-3022772>

Supportive follow-up letters are expected. Maybe the YP should launch its own electrification campaign.

Shapps at YP conference

Grant Shapps spoke at the Yorkshire Post Great Northern conference in October⁹. Hydrogen was mentioned – some enthusiasm for Tees Valley Hub, which seems to be more about hydrogen “buses”, “trucks” and “ships” than trains. I got to ask a question asking for a rolling programme of electrification following TDNS, and mentioning the energy wastage of hydrogen. He said hydrogen needs a lot of power to make, which I took to be an admission of the efficiency argument and he said the government would continue to electrify railways. Glimmer of hope then? I think Shapps gets the arguments. I wish he would reply to the letter I sent from HADRAG and the Electric Railway Charter in September.

Incidentally, Shapps' speech also referred to the “£589M to kickstart” TRU (not clear how much that will cover and what how much is still TBA). And “unlocking the Castlefield corridor”. He did not say the latter was just £10M for more design and development (options decisions) on a scheme that was ready to go five years ago. A new tunnelled route might be better long term, but how much longer before we even get a decision? This autumn's expected integrated rail report from the National Infrastructure Commission may tell us more.

So let's campaign!

Earlier in the conference I had asked a similar question to a panel including a Network Rail's regional director. NetR needs to campaign for its own report! At Northern's stakeholder event last Monday the train operator's representative was much more enthusiastic. We have to campaign too, at a local and national level. TDNS says decarbonisation means electrification in most cases. Maybe bimode battery/overhead electric trains will help to bridge the gaps - diesel engines must go for scrap.

Surely, a zero-carbon, energy saving railway must be part of that **sociable transport system** serving the whole community and part of building back better after Covid.

Let's have a national campaign for electric trains as an ambitious pathway to decarbonisation. An achievable “moonshot project”. Starting now!

J Stephen Waring (Chair, [HADRAG](#) and joint coordinator, [Electric Railway Charter](#))

Railfuture Yorkshire Branch Secretary,

6 Nov'2020

⁸ RIA Electrification Cost Challenge report:

https://www.riagb.org.uk/RIA/Newsroom/Stories/Electrification_Cost_Challenge_Report.aspx

⁹ Read the Secretary of State for Transport's speech here: <https://www.gov.uk/government/speeches/speech-to-great-northern-conference>

Northern Sparks examples (including all Tier 1 schemes)			TDNS recommendations (full document, Appx 8)
Tier	Route	Score ¹⁰ /100	
Baseline	Midland Main Line	N/A	Electrification (including Nottingham etc, obviously!)
	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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 Hellfield.
1	Sheffield-Doncr/Wakefd (GN)	67	Electrification
1	Hazel Grove-Buxton	66	Electrification . Freight links via Chinley mentioned.
1	Warrington-Chester	64	Electrification
The following are a selection only. See TDNS full document Appx 8.			
2	Manchester-Sheffield	59	Electrification Mentions significant freight
2	York-Scarboro	53	Electrification (“approaching maximum capability for current battery technology”)
3	Hull-Scarborough	38	Multiple options: <ul style="list-style-type: none"> Hull-Beverly recommends Electrification recommended Beverley-Sca Battery or H₂ (hydrogen may be temporary or permanent solution)
2	Bishop Auckland-Darlington-Saltburn/Sunderland	53	Electrification: Darlington-Middlesbrough/Sunderland (Durham coast). Battery: Bishop Auckland & Whitby branches (but requires adjacent sections electrified for charging; could be H₂).
3	Middlesbrough-Whitby	26	Multiple options Middlesbrough-Saltburn – Electrification recommended; could be H₂ interim or permanent. (Implication if not enough done electrification in this area to support battery charging more of it will be H₂ .)
2	Sheffield-Retford-Lincoln	49	Electrification (includes all N Lincs routes)
2	Colne-Burnley + Kirkham-Blackpool S	45	Multiple options: <ul style="list-style-type: none"> Colne Electrification recommended (could be battery) Blackpool South Battery recommended (but could be converted to light rail)
3	Barrow-Carnforth	38	Electrification throughout (regional passenger, freight)
3	Cumbrian Coast	32	
3	Skipton-Carlisle	35	Electrification throughout (regional passenger, diversionary, freight)
3	Skipton-Heysham	7	Electrification Skipton-Carnforth. Multiple options Lancaster-Heysham, recommending Electrification to Morecambe, battery beyond.

¹⁰ NETF scored schemes /100, based on economic benefits/50, environment (diesel replacement)/20, capacity provision/30.