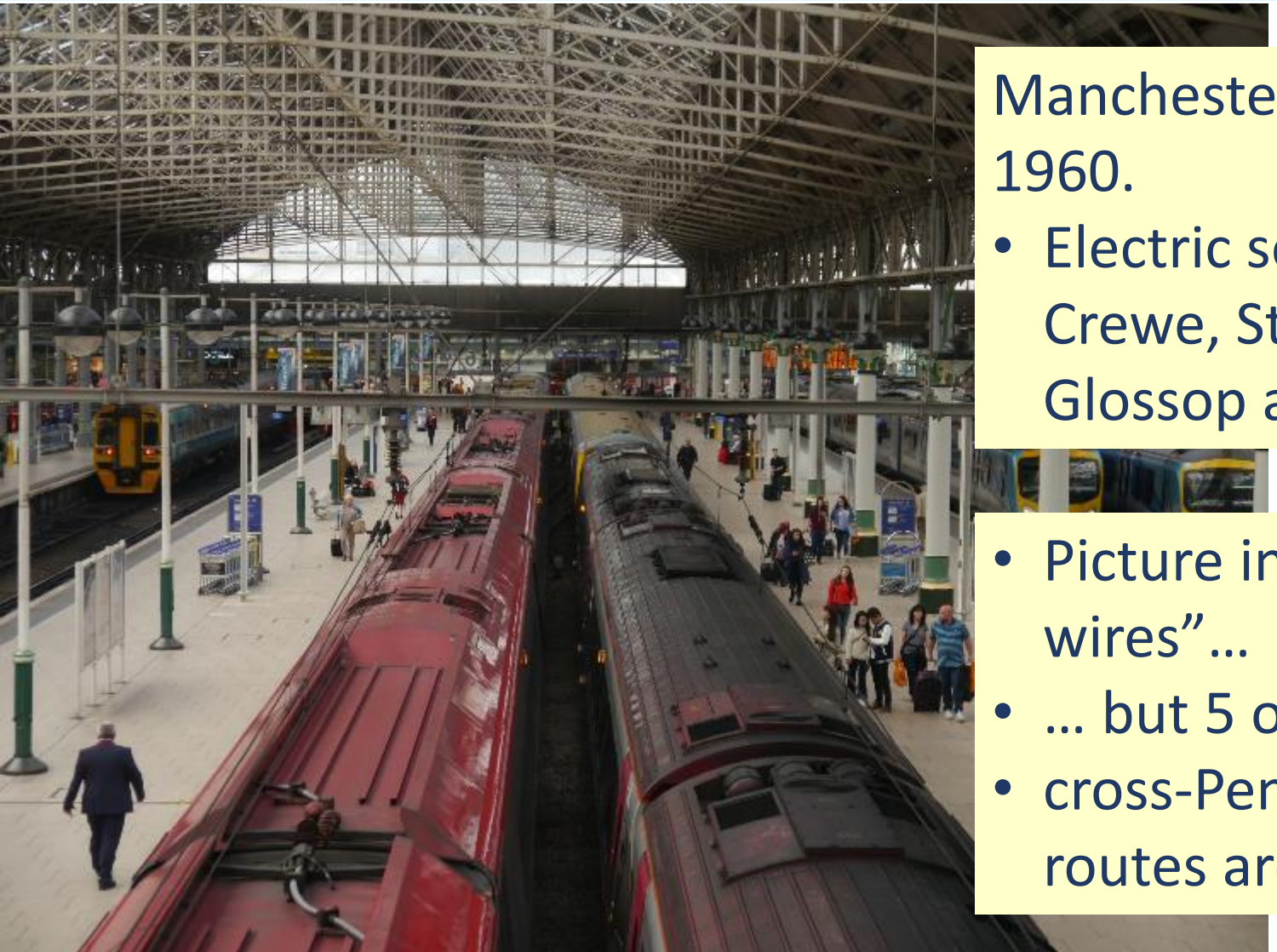
Campaigning rail user groups on the Calder Valley Line in the North of England

Electric Railway Charter 2018

Presented at the Railfuture Conference in Carlisle on 23 June 2018



Manchester Piccadilly station, fully electrified 1960.

- Electric services run to Manchester Airport, Crewe, Stoke, Birmingham, London, Glossop and Liverpool.

- Picture includes 6 trains “under the wires”…
- … but 5 of them are diesel!
- cross-Pennine, Chester and Warrington routes are not electrified.

Campaigning rail user groups on the Calder Valley Line in the North of England

Electric Railway Charter 2018

We launched the Charter on 24 May 2018.
But who are “we”?

Our four groups:

- STORM
- Upper Calder Valley Sustainable Transport Group
- HADRAG
- Bradford Rail Users’ Group

Supported by two Railfuture branches.

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Electric Railway Charter 2018

Charter is a commitment to campaign for:

- Rolling programme of electrification across the North…
- Based on "Northern Sparks" recommendations of Northern Electrification Task Force (NETF), March 2015…
- Starting with top-ranked NETF scheme – Calder Valley Line (Leeds-Bradford/Brighouse-Preston/Manchester)

We want to co-opt business, environmental, and other groups along the line as supporting signatories and seek the support of local and combined authorities.

Happy for others to take up the idea!

Arguments for electrification

3 strands:

Business and economic:

Electrics are

- cheaper to buy, run and maintain;
- lower mass → lower track wear, higher performance, more passengers carried,
- wider economic benefits
- *Sparks effect (promotes modal transfer)*

Environmental and resources:

- local - air quality (particulates, brake dust)
- global - combatting climate change.
- *We are Railfuture we want modal transfer; rail must maintain its environmental advantage.*

Alternatives are unsustainable, uncertain

- ***Diesel bimodes most expensive, least efficient option*** (mass, waste!)
- Hydrogen power (fantasy of widespread UK use?)

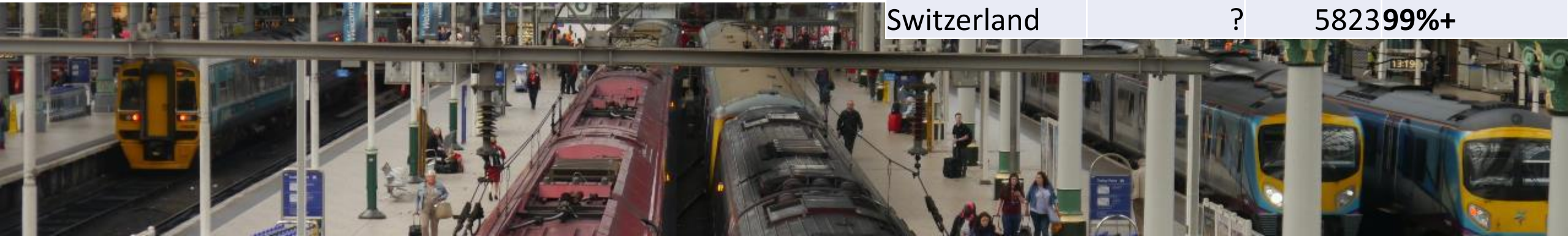
But latest battery technology (promoted by renewables, road transport) can help with sections that are difficult to electrify.

International context

(data combined from several sources)

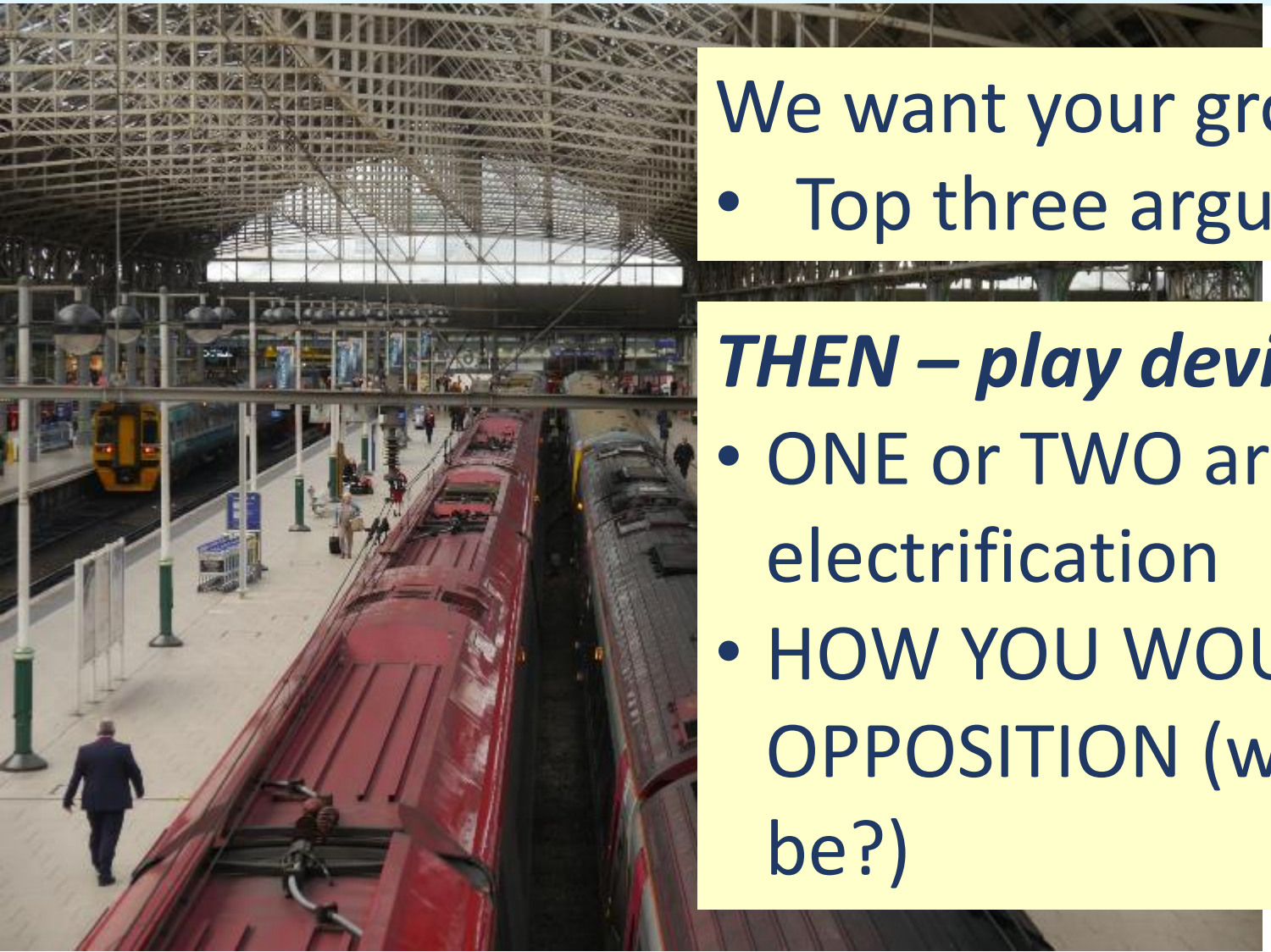
Nothing here we don't know!

Country	Electrified railway/km	Total/km	%
UK	5331	15799	**34%**
Germany	19983	33331	**60%**
France	15140	29901	**51%**
Belgium	3064	3607	**85%**
Netherlands	2321	3223	**72%**
Spain	10182	16026	**64%**
Portugal	?	2786	**?**
Italy	13217	16723	**79%**
Denmark	640	2667	**24%**
Sweden	7918	12821	**62%**
Norway	2622	4087	**64%**
Switzerland	?	5823	**99%+**



Electric Railway Charter 2018

Audience activity in groups



We want your group's

- Top three arguments for electrification

THEN – play devil's advocate to give:

- ONE or TWO arguments AGAINST electrification
- HOW YOU WOULD COUNTER THE OPPOSITION (what would your answer be?)

Audience activity

Remember the 3 strands:

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Electric Railway Charter 2018

Plenary

Rail already has environmental advantage over road/air and is small fraction of total transport emissions; why do more?

- But we are Railfuture!
- We want to increase rail use relative to other modes.
- Moral imperative to play full role improving air quality and reducing CO_2
- Let's not be driving our electric car to the station to catch a diesel train!

And…

Electric Railway Charter 2018

Plenary

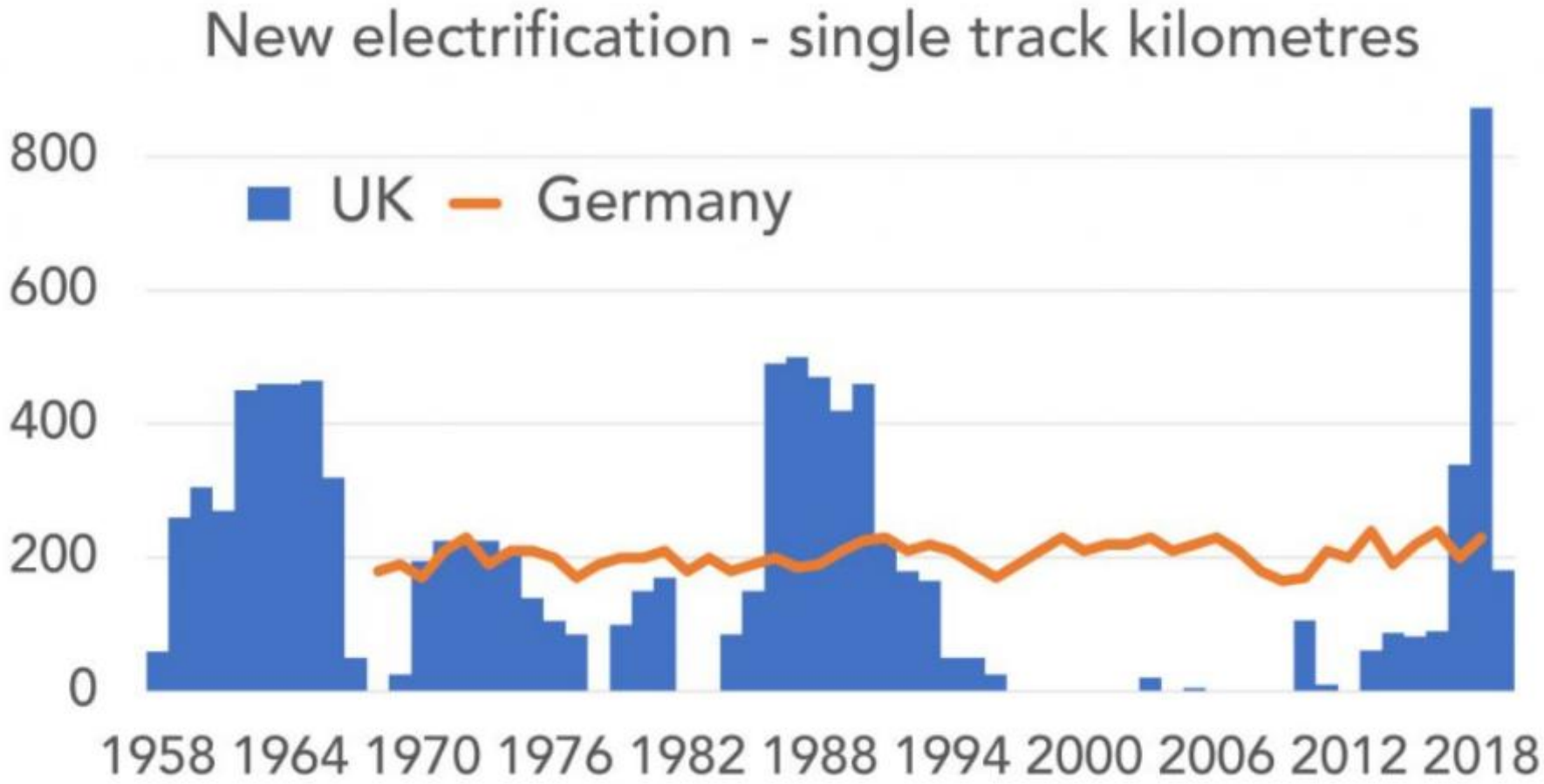
What about capital cost, disruption in construction, etc; is the pain worth the gain?

- Operational savings
- Rolling programme with effective project management will learn from recent experience and continually build expertise.
- Don’t have to wire every km (long tunnels etc) – use trains with battery storage, not dirty diesels.
- Don’t have to have long possessions!

Electric Railway Charter 2018

Plenary

RailEngineer HOME NEWS IN PRINT ABOUT SUBSCRIBE ADVERTISE IN



Remember the happy couple driving off in electric car?

… hopefully not to catch a diesel train!

Electric Railway Charter 2018

Plenary

Contact us via www.HADRAG.com

or

www.electriccharter.wordpress.com

Other useful links:

www.railwayelectrification.org - excellent factsheet by Campaign to Electrify Britain's Railway;

www.railengineer.uk/2018/06/04/getting-electrification-right/ on rail industry working to reduce costs; and

http://bettertransport.org.uk/blog/rail/electric-railway-charter - the Charter's guest blog for Campaign for Better Transport

Business and economic arguments for electrification

Compared with diesels or other fuel-burning trains, electrics are

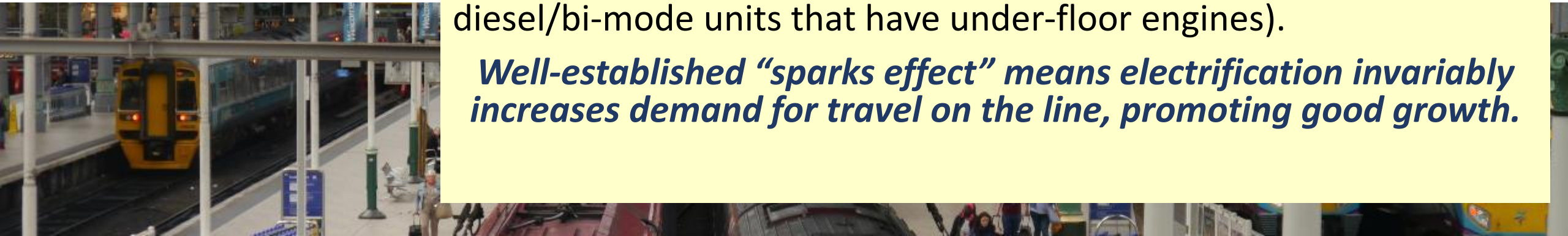
- cheaper to build,
- more reliable requiring less maintenance,
- cheaper to operate
- longer-lasting.

Lower mass (lighter weight!) means

- more passengers can be carried…
- …with lower energy costs
- Better acceleration/braking journey times even with frequent stops.

Passenger experience improved – cleanliness, air quality, noise levels both in stations and on trains (particularly in comparison with diesel/bi-mode units that have under-floor engines).

Well-established "sparks effect" means electrification invariably increases demand for travel on the line, promoting good growth.



Environmental and resources arguments for electrification

Electric railways achieve objectives that can only ever be partially achieved with diesel traction:

- improved local air quality (zero exhaust + reduced brake dust)
- reduced noise in stations, at trackside and on trains
- combatting climate change
- reducing wastage of resources

Environmental and resources arguments for electrification

Electric railways achieve objectives that can only ever be partially achieved with diesel traction: improved air quality (zero exhaust + reduced brake dust), reduced noise in stations, at trackside and on trains, combatting climate change and reducing wastage of resources, objectives that can never be achieved with diesel traction.

- Even with non-renewable electricity generation, electric trains have 20-35% lower carbon emissions than diesel – already doing better than this with current renewables mix.
- **As electricity generation moves towards zero-carbon, so will electric transport.**

Commitment to stop the sale of conventional diesel/petrol cars and vans on UK roads by 2040 must be matched by a commitment to a zero-carbon, zero-emission railway over a similar or shorter timescale.

Alternatives

Electro-diesel bimodes are worst of both worlds

Bi-mode train – two different systems of traction energy collection on board – typically electric + diesel or "electro-diesel" has both:

- electric collection "pantograph" and transformer
- diesel engines and electrical generators

(Not to be confused with hybrid car.)

Compared with pure electrics, electro-diesel bimodes are inherently

- heavier, more complex, more materials-hungry,
- less energy-efficient

Increased costs: …

Alternatives

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Increased costs:

- capital - more complex train with both diesel and electric traction systems
- operation – uses more energy
- train maintenance - complexity
- track maintenance – increased track forces due to greater mass.

Reliability is unproven and performance unlikely to match that of pure electrics.

Alternatives

The hydrogen (H_2) dream?

Alstom Coradia iLint train entering service in Germany:

- Fuel cell transfers energy from hydrogen as electricity.
- Also has high Li-ion battery for efficient energy management. (NOTE: could also be used on conventional electric train for running through unwired sections!)
- 140km/h max speed; range 600-800km.
- Plans to convert electric train UK to hydrogen operation. (Not yet in service!)
- Pollution free at point of use but may not be zero-carbon.

See **ISSUES** on next slide.

The hydrogen (H_2) dream?

ISSUES with hydrogen based traction.

- Needs new infrastructure for supplying hydrogen to trains.
- Hydrogen stored as of compressed gas in large tanks on train roof. Tank size may be limited by British loading gauge, reducing range compared with German prototype.
- Lower efficiency compared with pure electrical operation.
- BEWARE claims of "pollution free, zero-carbon acceleration". Much current H_2 production by steam reforming of hydrocarbon fuels (e.g. natural gas) with CO_2 as by-product.
- Sustainable H_2 produced by electrolysis of water using electricity generated from renewables.
  - Could this be done locally at train depots? Would need upgraded electricity supply at depots. Possibility of local generation use photovoltaics, wind energy etc???
  - Alternative hydrogen pipelines or rail or road deliveries reducing overall energy efficiency.

Potentially part of electric railway solution not complete solution.

Still need electrification.

Alternatives

Electro-diesel bimodes are worst of both worlds

Reliability is unproven and performance unlikely to match that of pure electrics.

Environmental impact – air quality, CO_2: Diesel bi-modes commit rail for a generation to polluting technology which is planned to be phased out on UK roads:

- Need to improve air quality now and combat climate change for the future.
- Rail must do this over same timescale as road transport.

Other options:

- Hydrogen power – rail use may be limited – safety? – not necessarily zero-carbon.
- Energy storage using batteries has potential to bridge gaps where electrification is too costly or disruptive – ***YES!***
- Battery development driven by renewable generation and electric cars!

Contact us via www.HADRAG.com

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