Item:
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HITRANS
THE HIGHLANDS AND ISLANDS TRANSPORT PARTNERSHIP

Report to Partnership Board Meeting 26 April 2019

RESEARCH AND STRATEGY DELIVERY

April Fuel

Purpose of Report

To update Members on initiatives on alternatively-powered trains.

Hydrogen

1. HITRANS has been to see the Coradia iLint in Bremerhaven, the world's first revenue-earning hydrogen-powered train, which offers an opportunity to service non-electrified routes as diesel becomes less acceptable.

2. In March Transport Scotland commissioned AECOM to carry out a transport appraisal of options for independently powered rolling stock in Scotland, and a workshop was held in Glasqow.

3. HITRANS and HIE recently met up with Nigel Holmes CEO, Scottish Hydrogen and Fuel Cell Association in Inverness to plan an 'H2 Opportunities' workshop in Inverness. This will allow a number of the projects in the Highlands & Islands to be showcased, with the intention of helping other similar projects to take shape.

   This event is on Weds 29th May at HIE and will will start at 11:00-15:30 to suit travel to/from Inverness. The workshop is not just about the hydrogen trains, but this is likely to be one of the key topics for discussion. Speakers include:

   Nigel Holmes, SHFCA
   Stuart Mackay, Scottish Government. H2 strategy & vision
   Ewan Swaffield, Transport Scotland. Low carbon transport
   Frank Roach, HITRANS. Zero emission trains for the Highlands
   Dave Holman, Scottish Enterprise. H2 economic opportunities & vision
   Jon Clipsham, EMEC. Orkney H2 project developments
   Elizabeth Johnson, PURE. Shetland & OLHEH
   Alasdair MacLeod, UHI. Western Isles & Skills
   Paul O'Brien, HIE. Links and opportunities with offshore wind
   Fiona Landy, Scottish Cities Alliance. Urban Clean Mobility Solutions
   Colin Thomson, SGN. Energy networks vision: Power & Gas
   Alice Gillman, Vivarail. Zero emission train development & deployment
   Andrew Win, Aberdeen City Council. Bus fleet experience, green H2 & trains

4. A further meeting was held with THC's Head of Waste regarding the proposed new facility at the Longman which will produce Refuse Derived Fuel (RDF) that elsewhere is used to create electricity for hydrogen production.

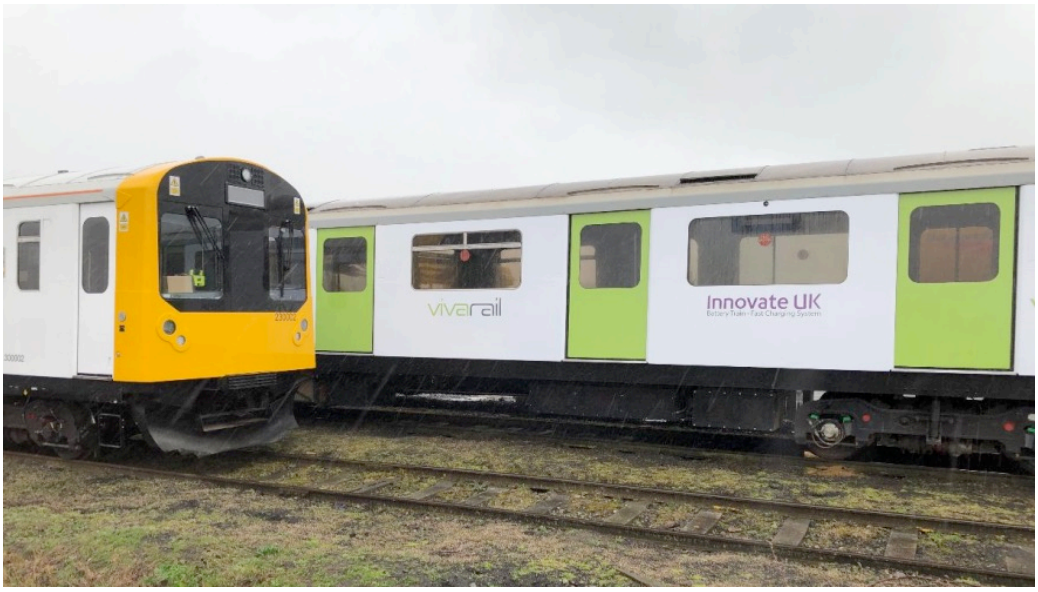
Battery Train

HITRANS is in the process of procuring consultancy support to investigate the business case for a battery-powered train to operate between Wick and Thurso. This route has been chosen because of the relatively short run of 20 miles each way, which fits in with the range of the current battery train as demonstrated at Bo'ness last year – a trial that was supported by Transport Scotland. We have had useful discussions with supplier Vivarail who wish to be involved and anticipate a joint visit to Wales with Transport Scotland to see

Press Release 29.03.19

Emission-free trains today ...

Battery trains are nothing new - the first one came into service over 100 years ago! But making them suitable for today's demanding railways has been a major challenge - until now.



A 60 mile range and patented fast charge systems

Clever design and engineering were needed to build a train that could meet demanding service patterns - there would be no point trying to produce one that could provide the range but be unable to charge in the required time. After all operators need to reduce dwell time as well as emissions! So we had to balance these important factors:

- cutting emissions
- meeting or improving timetable demands
- prioritising safety of passengers and staff
- keeping costs of installation and infrastructure low
- working within the constraints of the national grid

So what did we do?

1. Prove a battery train could operate a real route which we did last October in Scotland carrying passengers over 3 days

2. Design a fast-charge system based on existing technology - in this case 3rd and 4th rail - and combine it with innovative developments such as our carbon ceramic shoe as well as making the system autonomous so nothing is live when the train is not in place and no manual intervention is required from the driver

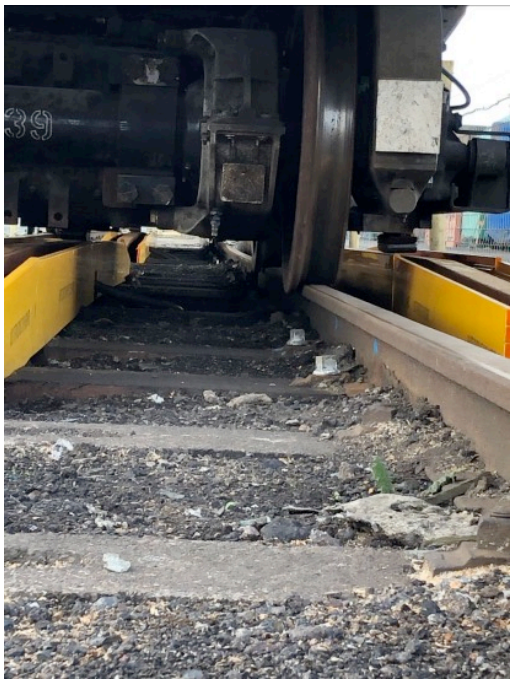
3. Reduce the draw on the national grid by buiding an accompanying battery bank from second-use batteries to trickle charge itself and then 'dump' all the necessary power back into the train in a short space of time - about 7 minutes to full recharge after a journey of 60 miles

How does it work?

The concept is simple - at the terminus 4 short sections of 3rd and 4th rail are installed and connected to the electronic control unit and the battery bank. Whilst the train is in service the battery bank trickle charges itself from the national grid - the benefit of this is that there is a continuous low-level draw such as an EMU would use rather than a one-off huge demand for power.

The train pulls into the station as normal and the shoegear connects with the sections of charging rail. The driver need do nothing other than stop in the correct place as per normal and the rail is not live until the train is in place.

That's it!



Sections of 3rd and 4th rail each a metre or so long are installed - there is no need for any expensive infrastructure upgrades with the fast charge system.

The train's shoegear is made of ceramic carbon so it is able to withstand the heat generated during the fast charge process. It connects with the raised sections as the train pulls to a stop.

RISK REGISTER

RTS Delivery

Impact - Positive

Policy

Impact – Innovation, carbon reduction

Financial

Impact – if positive outcome, there may be a need to seek funds for a Battery Train trial

Equality

Impact – Nil

Recommendations

1. Members and Advisors are asked to approve the report.

Report by: Frank Roach
Designation: Partnership Manager
Date: 26 April 2019