



Green Solutions:

Off-grid Power



Telent Green Solutions Working Group

telent
talent with technology

Green Solutions: Off-Grid Power

**Railway stations
play a crucial role in
connecting people,
communities and
businesses**

Serving as transportation hubs for people and goods, they link remote areas with urban centres, supporting economic growth through reliable and efficient transportation.

Telent maintains critical telecommunications systems that keep stations open and trains running, by providing integrated solutions across many of the UK's rail infrastructures.



Green Solutions: Our Vision



Telent have committed to achieving net-zero GHG emissions by 2050 through the Science Based Targets initiative (SBTi)

This includes emissions created indirectly by our entire value chain, from raw material extraction to customer use of our products and services - providing sustainable whole-life solutions to our customers

In 2023, we set a near-term target to reduce all emissions by an average of **50%**, no later than 2030



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UK Railway infrastructure can be extremely remote and the Scottish Far North Line has some of the most inaccessible stations on the whole of Britain's rail network

There are stations which are only accessible by track, sometimes miles from the nearest road and there is nothing for miles in any direction

Despite this and in some cases having no mains services, the line's stations provide a vital link to cities and services for the local communities

These are "request stop" stations, meaning trains will only stop if passengers hand signal to board, with trains slowing down on approach to a speed where they can stop if necessary.







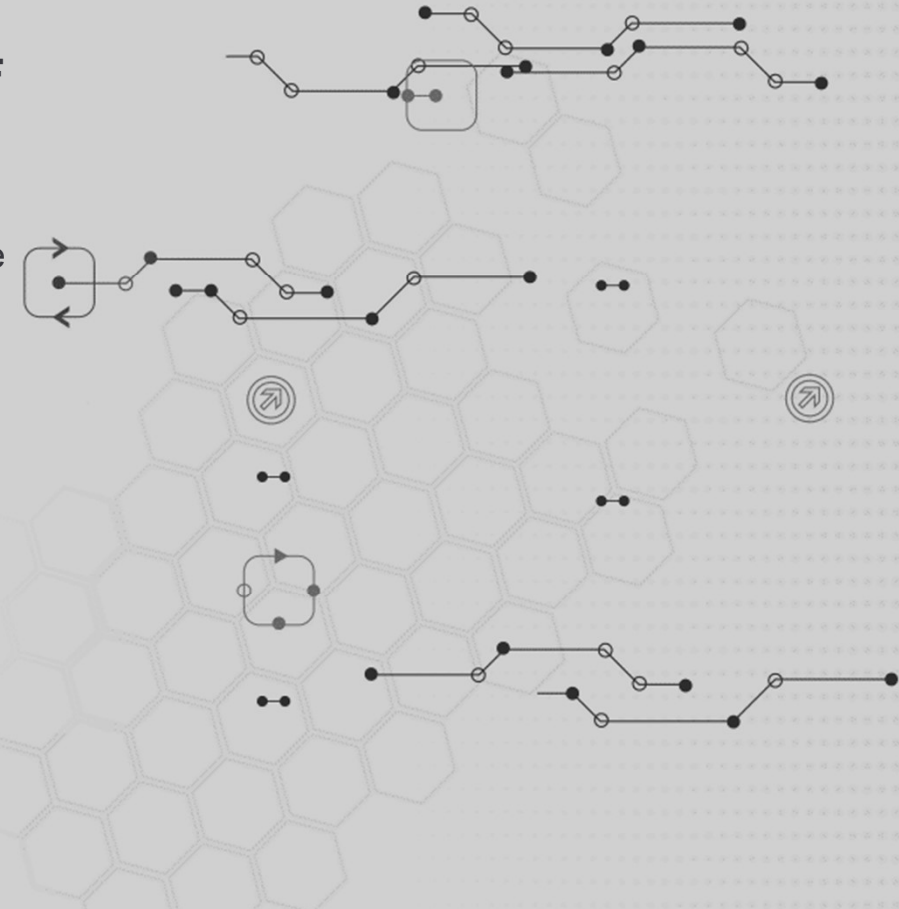
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To allow single-line working, the signalling system used on the FNL is Radio Electronic Token Block (RETB), using VHF radio to issue electronic tokens to Cab Display Radios (CDRs) on the train

Telent were tasked with designing an enhancement programme to improve the customer experience through:

	Baseline coverage enhancement	Enhancement of the baseline radio coverage of the RETB radio systems
	A digital “request to stop” system	Introduction of a “request to stop” customer kiosk to communicate with approaching trains
	Enhanced Token Transfer	Modification of the trackside & onboard radio systems to enhance the speed of transfers
	Automated Train Descriptor	Introduction of token message and signaller action-based train describer stepping



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Solutions: Traditional Power Options for remote locations

Traditional options were considered to power the new technology



New DNO Connection



- ▶ The viability of mains power connection was investigated
- ▶ Concerns over the potential disruption this would cause and associated implementation timeline
- ▶ Nearest connection approximately up to 10km away
- ▶ Prohibitive at a surveyed cost of £500,000

Diesel Generator



- ▶ Traditional on-site power generation via a diesel generator running 24/7
- ▶ Constant onsite CO₂e and noise emissions
- ▶ Access concerns for regular fuel deliveries
- ▶ Variable operating costs due to fluctuating fuel and delivery prices via specialist vehicles

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We set out to devise a more sustainable solution and are testing on site at Inverness.

Working with our supplier partners, we developed a renewable hybrid approach for low environmental impact and operating costs, with maximum reliability.



Solar Array

Primary power source for at least 80% of the year according to survey



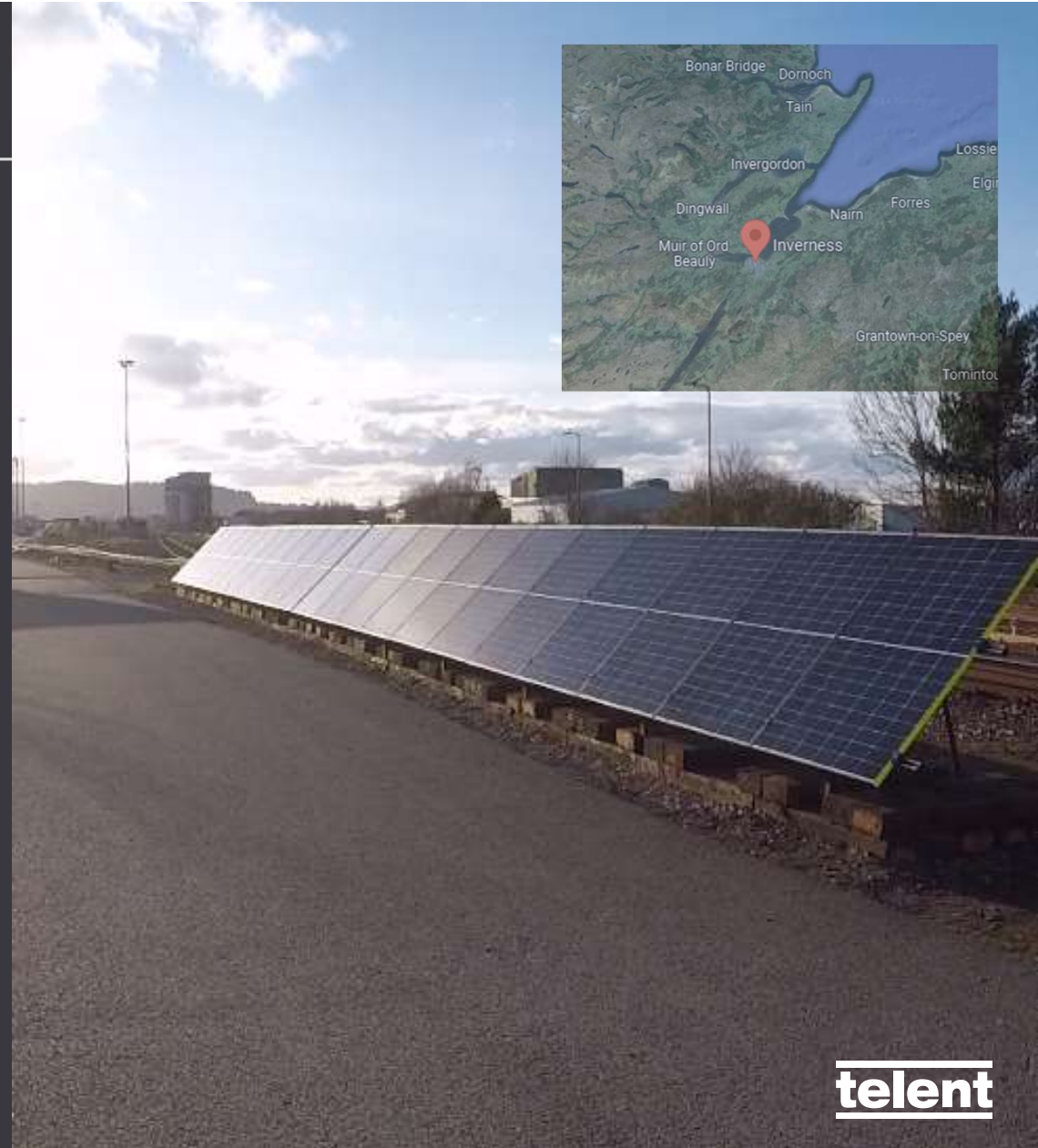
Battery System

For power storage at night and periods of low irradiance



Back-up Biofuel Generator

Using hydrotreated vegetable oil (HVO)



Green Solutions: Environmental benefits

Telent regard this as a sustainable solution for all railway infrastructure, not just remote locations.

This hybrid solution offers a range of sustainable benefits compared to traditional options:



Reduced costs and CO₂e emissions



Zero onsite CO₂e and noise emissions when running on solar/battery vs diesel generator



Biofuel back-up generator produces 99% less CO₂e than diesel equivalent



Fuel deliveries reduced from 6 per year for diesel to 1 for HVO, minimising travel emissions



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Operational Efficiencies: Telent Hybrid Solution vs Diesel Generator

Comparing power from 24/7 diesel generation to Hybrid with 80% solar/battery and 20% HVO biofuel backup generator

74% annual fuel cost savings*

From 100% Diesel to 20% HVO



from **£6,342**
to **£1,680**



99% annual CO₂e reduction*

Including delivery emissions



from **11.2t**
to **<1t**



*Based on comparing an estimated 4,200L of diesel annually to 840L of HVO Biofuel. Fuel prices as of June 2023, subject to market changes. 4,200L of diesel at an average cost of £1.51 and 2.66 KG CO₂e per litre vs 840L of Biofuel HVO at £2.00 and 0.03558 KG CO₂e per litre (according to UK Government GHG Conversion Factors for Company Reporting 2022)

Green Solutions: Data & Technical Specifications

PRIMARY EQUIPMENT

Solar array

22 No. 405W Mono Half Cell Panels Super High Efficiency Arranged in one continuous row capable of 9kW peak power dependent on weather

Battery system

24 No. Powersafe TS Series TYS 8 Battery System 32kWh

Backup generator

1 No. Micro Turbine Genset Hydrotreated Vegetable Oil Fuelled, 12kW, 230V AC 50Hz, Single Phase

1 No. 950L U.N. Approved Bunded Diesel Polycube for Hydrotreated Vegetable Oil

ASSUMPTIONS

- Professional survey estimates the solar array can power the system for at least 10 months of the year, generating in the region of 7.7 megawatts

Generator – Diesel

- Assumed Bladon Micro Turbine with continuous load of 300w using 350L of diesel per month or 4,200L per annum
- Carbon conversion factor of 2.68kg CO₂e per litre of diesel (UK Government GHG Conversion Factor for Company Reporting 2022 Condensed Set Version 2.0) is 11.3 tonnes CO₂e per annum

Generator – HVO

- Assumed Bladon Micro Turbine with continuous load of 300w 20% of the year using 840L of HVO biofuel
- Conversion factor 0.03558 KG CO₂e per litre UK Government GHG Conversion Factors for Company Reporting – Bioenergy - Biodiesel HVO per litre

Fuel Deliveries

- Fuel provided by Telent approved supplier located in Thurso (39km from a typical site)
- Emissions factor used per km 0.99337 (UK Government GHG Conversion Factors for Company Reporting 2022 Condensed Set Version 2.0 for Freightling Goods - HGV all diesel, rigid >17 tonnes, average laden)
- Total CO₂e per delivery 38.74kg

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