

HS2

Diesel-Free Plan

Building a net zero future

November 2022



Introduction

We are building the world's most sustainable high-speed railway and our goal is to reduce carbon emissions and achieve net zero from 2035. Cutting the diesel we use to power our vast construction operations – and stopping using it completely – is fundamental to our ambition.

We are already using cleaner construction methods, reducing our reliance on diesel. We're challenging established ways of working and harnessing innovative new technologies to meet the wider global challenge of combatting climate change.

We want to speed up the pace of change across the wider construction industry, working with our contractors to end the use of diesel on all HS2's sites by 2029.

Everything inside our site boundaries will be powered by diesel-free, cleaner alternatives. This covers:

- all construction equipment and machinery,
- power generation units, and
- welfare and accommodation facilities for workers.

While this ambition and plan does not cover vehicle movements to and from HS2 sites, we have set a target to cut carbon emissions by 11% by 2027 from all heavy goods vehicles our contractors use for deliveries.

We're already making progress towards our 2029 target and unveiled our first diesel-free site, in south Kilburn, London in May 2022. In fact, we now have a total of 10 sites where we've ditched diesel. HS2's journey to a diesel-free future is well underway.



Why ditching diesel matters

The construction sector is responsible for 39% of global carbon emissions. In the UK, the sector produced 11.4 million metric tons of carbon dioxide emissions in 2020. These emissions were directly linked to building materials and burning fuels.

It's why cutting diesel is a key part of our ambitions, as set out in our **Net Zero Carbon Plan**. The plan and our overarching Environmental Sustainability Vision are central to our ambition to build a railway that will transform intercity connections, boost economic opportunities and level up.

We are already committed to using zero carbon electricity to power HS2 trains, which will be some of the quietest and fastest in the world. Reliable, long-distance train travel between the North, the Midlands and the South East will be emission-free. But how we build HS2 is as important as what we build.

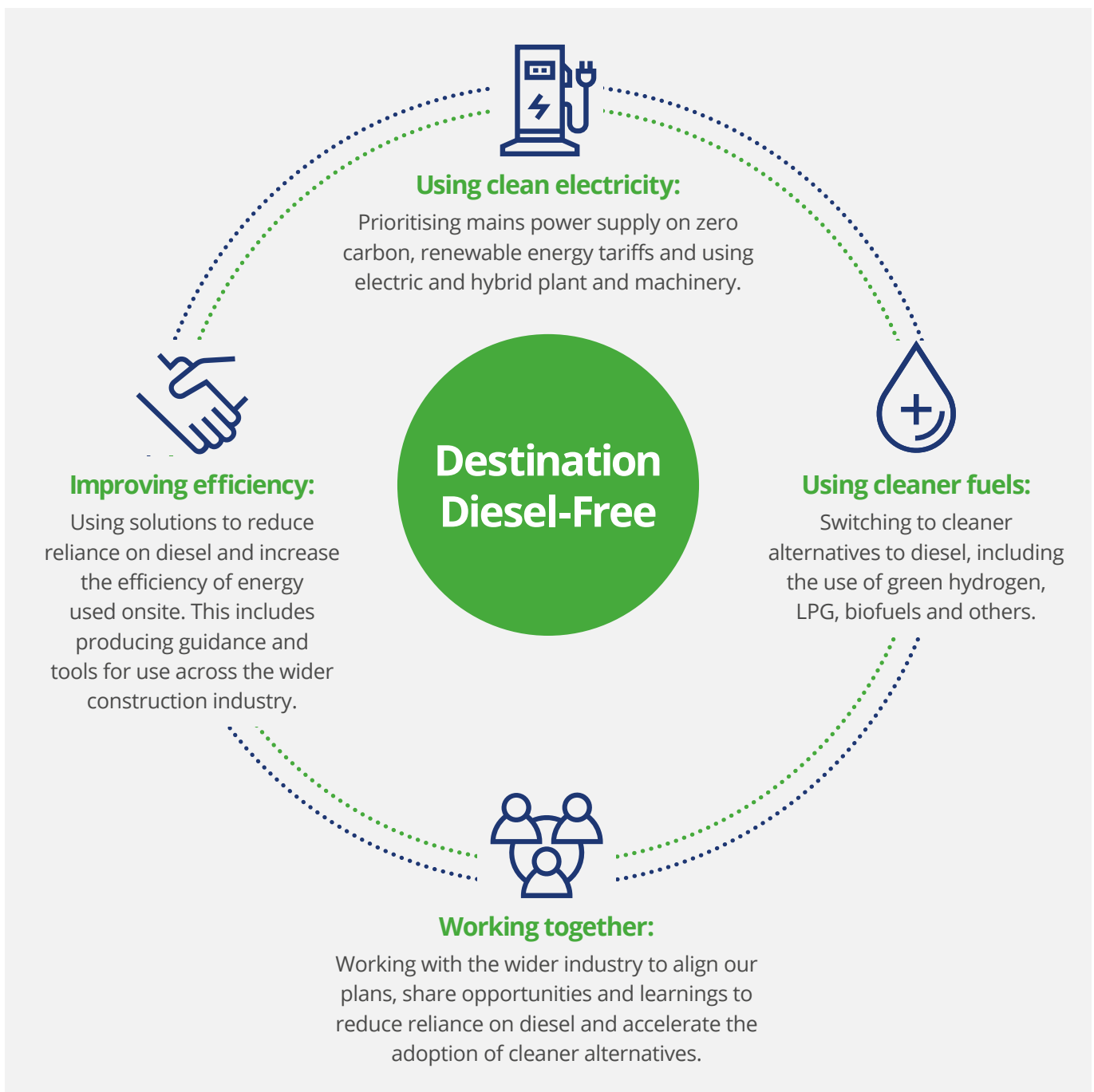
We are working hard to cut and eliminate emissions during construction to reduce HS2's environmental impact. We are acting now to phase out diesel and use cleaner energy as we build the tunnels, viaducts, cuttings and stations for HS2. As Europe's biggest infrastructure project, now supporting more than 29,000 jobs, we are setting an example and establishing a legacy for cleaner construction.



How we're getting to destination diesel-free

We are making progress towards diesel-free construction sites by 2029, guided by the following four core principles.

- Using clean electricity on zero carbon, renewable energy tariffs.
- Switching to cleaner fuels.
- Improving the efficient use of energy onsite.
- Working across the industry with partners to explore new cleaner energy solutions.



Innovating to cut emissions on HS2

We are already using cutting-edge technology and green innovations to reduce diesel and drive down carbon emissions. Advanced machinery and low carbon materials are allowing us to 'build back greener' with cleaner, more sustainably sourced fuels replacing diesel.

So far, we've cut our carbon emissions on the 140-mile Phase One route, between London and the West Midlands, by almost 25%; and we're going further as we aim to achieve our target of a 50% reduction. We've got a long way to go but we are on track to get to HS2's destination diesel-free in just over six years' time.

Here are some of the innovative ways we're accelerating our journey by replacing and reducing our reliance on diesel as we build HS2.



Case study

First diesel-free site

We set up our first diesel-free construction site in May 2022 at Canterbury Road in south Kilburn, London, where we're building a vent shaft for an HS2 tunnel.

The site has one of the UK's first 160-tonne, emission-free electric crawler cranes; we're using biofuels like hydrogenated vegetable oil to power plant and machinery; and we're using smaller electric machinery, like pumps and air compressors.

Crucially, we have a mains power grid connection on a renewable energy tariff.

Achieving the high-speed railway's first diesel-free site represents a major milestone as we progress on our journey to net zero carbon emissions from 2035.

There are now a total of 10 HS2 sites where we are carrying out major construction without using diesel and we are looking to continue our progress.

Innovating to cut emissions on HS2



Using clean electricity

Installing mains power grid connections early is a priority across the programme. We aim to source electricity on a zero carbon or 100% renewable energy tariff. This allows us to eliminate diesel generators and use cleaner electric machines on site.



Case study

Electric machines

We are using a range of fully electric plant and machinery across HS2 sites, setting new standards for cutting emissions in the construction industry.

We were the first in the UK to use an electric Eco Telehandler forklift and the first to use fully electric, heavy-duty crawler cranes.

Three 100% electric Liebherr machines, supplied by Select Plant Hire, are being used to build HS2. Battery or mains-powered, the cranes cut emissions, improve air quality and reduce noise. In addition, a Bauer electric piling rig has also been deployed – a first on our sites.



Case study

Renewable energy powering construction

We are harnessing renewable energy, like wind and solar, to power environmental monitors across the route of the railway.

We trialled the world's first solar and hydrogen-powered welfare cabins across construction sites. They have already cut over 100 tonnes of carbon emissions.

We have also used Nixon Hire Solar Pods to supply sites with sustainable power.

Innovating to cut emissions on HS2



Using cleaner fuels

As we ditch diesel for cleaner fuels, we're using and trialling different solutions to get the greatest benefit for construction.



Case study

Using hydrogen in construction

We have been using hydrogen technology as a replacement for diesel across our sites, for tower lights and welfare cabins. We have also used a hydrogen generator.

The two GeoPura 250kVA hydrogen power units were trialled by main works contractor Skanska Costain STRABAG in London. The trial showed the products can reliably produce the energy we need to power equipment.



Case study

Clean air gas engines

HS2 has trialled a clean air gas engine generator, developed by OakTec, that uses liquefied petroleum gas as a replacement for diesel. The system was first trialled by our early works contractor Costain Skanska, integrated into an Advanté Hybrid welfare cabin, and is now being trialled as a standalone generator by main works contractor Mace Dragados in Euston.

Emission testing by Imperial College London and the Centre for Low Emission Construction showed significant reduction in pollutants compared with conventional diesel generators.

Innovating to cut emissions on HS2



Improving efficiencies

We're using new and existing solutions to reduce our reliance on diesel and increase efficiency onsite.



Case study

F1 tech driving down emissions

Technology deployed in Formula 1 motorsport is being used on HS2 sites to cut diesel used by plant and machinery. A successful trial at a site in London halved the amount of fuel used by a tower crane.

The technology includes an energy storing 'flywheel' system developed and supplied by PUNCH Flybrid to dramatically cut fuel consumption, carbon emissions and improve air quality.



Case study

Sustainably sourced biofuels

Biofuels have become more widely available and we're using sustainably sourced biofuels like Hydro-treated Vegetable Oil (HVO) as a replacement for diesel in a wide range of plant and machinery.

All fuel is verified through an appropriate assurance scheme to ensure it is sustainably sourced, significantly cutting carbon emissions from construction.

Innovating to cut emissions on HS2



Improving efficiencies

We're using new and existing solutions to reduce our reliance on diesel and increase efficiency onsite.



Case study

Retrofit for a better fit

We are rolling out solutions to retrofit older machines to meet the cleanest diesel emission standards following successful trials. First developed by British company EminoX, one solution helps cut emissions from plant and machinery including piling rigs, excavators and bulldozers.

It also cuts waste as it reduces the need to scrap older machines to meet the cleaner emission standards.

This system, along with others, is certified by the Energy Saving Trust and is being widely adopted across the industry.

Innovating to cut emissions on HS2



Working together

We are working across industries and sectors to share lessons and opportunities to accelerate our diesel-free ambitions for major infrastructure.



🔍 Case study

'Turn it off' toolkit

We worked with the Supply Chain Sustainability School and partners to produce an industry-wide 'anti-idling' toolkit to raise awareness about the importance of switching engines off when they're not in use. We're also working with academic partners to test and quantify the benefits of demonstration trials.

🔍 Case study

Diesel-free route map

We collaborated with the Construction Leadership Council – CO₂nstructZero – on an industry-wide zero diesel sites route map. We're also working with Department for Transport arm's length bodies to share lessons and align plans to achieve diesel-free construction sites.

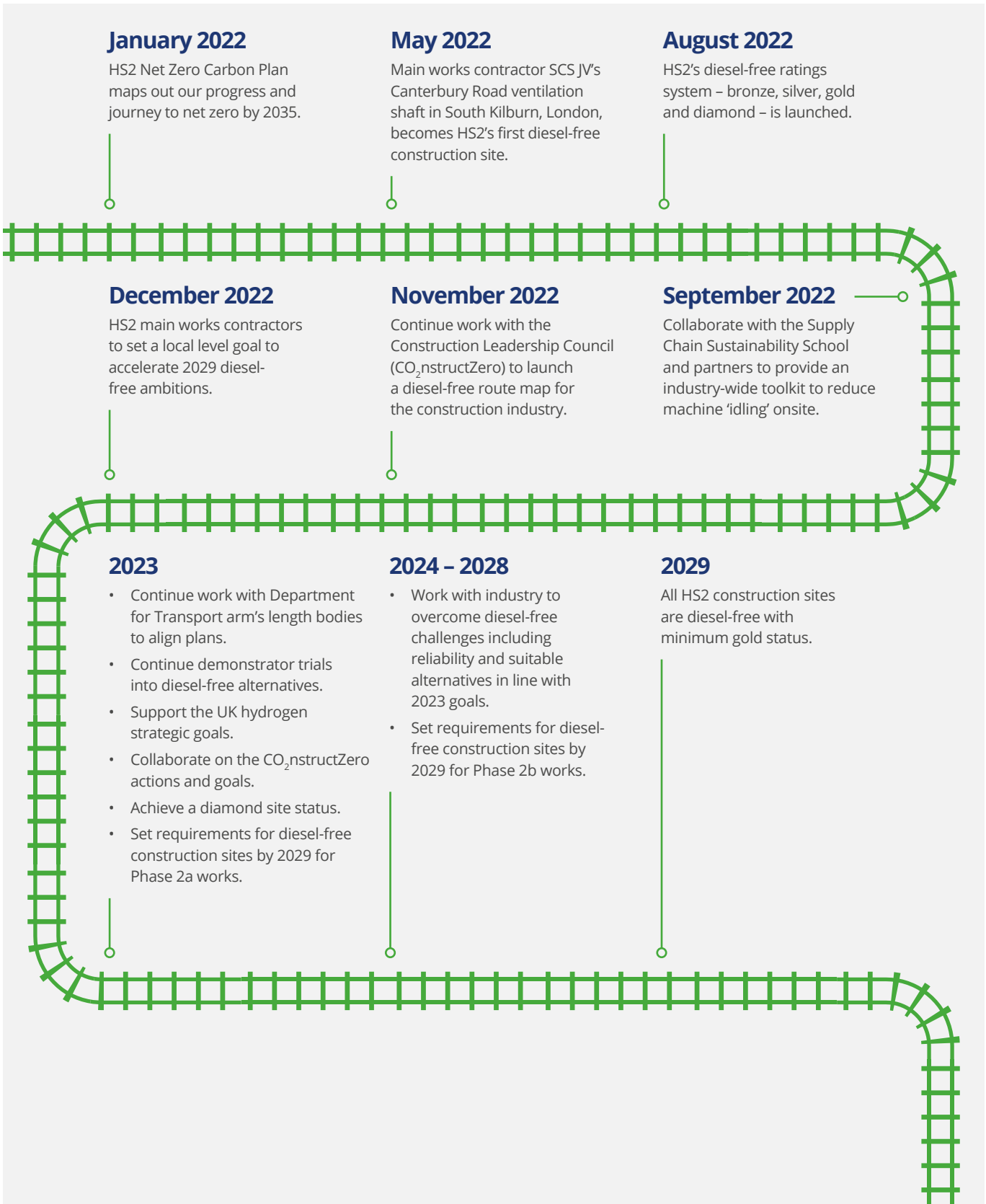
Ranking all HS2 sites for diesel use

We've introduced a new diesel-free rating system for all our construction sites, awarding them bronze, silver or gold. We only award gold to sites that don't use any diesel at all. The rating system allows us to work with our contractors, track our progress and support improvements across the hundreds of sites on our journey to destination diesel-free by 2029.

Our ultimate goal is for HS2 sites to achieve diamond status. They will not only be diesel-free; they will also use a range of zero emission technologies, setting new standards for environmental sustainability in global construction.



On track for destination diesel-free



HS2

High Speed Two (HS2) Limited

Two Snowhill

Snow Hill Queensway

Birmingham B4 6GA

Freephone: 08081 434 434

Email: HS2enquiries@hs2.org.uk

www.hs2.org.uk

CS1763a