The Green Pages
NEW FUELS GUIDE
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Plan for future of Grangemouth

Summary of Project Willow

Plans to secure a long-term industrial future for Grangemouth have been stepped up as a feasibility study sets out nine options for its future.

The plan, which is backed by £25 million from the Scottish Government and £200 million from the UK Government, will support jobs, unlock investment and drive growth. The £1.5m feasibility study follows the recent decision by Petroineos to decommission the oil refinery.

It has identified credible long-term industrial options for the Grangemouth site and explored how Grangemouth can build on its skilled workforce, local expertise and long heritage as a fuel leader in Scotland to forge a new path in low carbon energy production.

The report provides nine proposals likely to attract private investment, including plastics recycling, hydrogen production and other projects that could create up to 800 jobs by 2040.

The Grangemouth Just Transition Fund, which will support businesses and stakeholders to bring forward investible propositions for the site over the next 12 months.

Scotland's First Minister John Swinney said:

"We will leave no stone unturned in order to secure the future of the Grangemouth refinery site, and the Scottish Government has already committed or invested a total of £87 million to help do so.

"Grangemouth is home to over a century of industrial expertise and employs thousands of highly skilled workers, placing the site at a massive competitive advantage and creating a unique opportunity for investors.

"This report sets out a wide range of viable alternatives for the refinery site, demonstrating that a long term, new industrial future at Grangemouth is achievable. We will continue to work closely with the UK Government to realise these opportunities and Scottish Enterprise stands ready to support inward investors looking to progress any of these technologies."

UK Energy Minister Michael Shanks said:

"We committed to leaving no stone unturned in supporting an industrial future for Grangemouth delivering jobs and economic growth. This report and the £200 million investment by the UK Government demonstrates that commitment.

"We will build on Grangemouth's expertise and industrial heritage to attract investors, secure a long-term clean energy future, and deliver on our Plan for Change."

Alongside launching a search for investors, both governments have also committed to review the Project Willow policy recommendations and understand how government funding can be deployed to mature proposals from the private sector.

BACKGROUND

The nine projects include:

Waste: hydrothermal upgrading (breaking down hard to recycle plastics), chemical plastics recycling, ABE biorefining (breaking down waste material)

Bio-feedstock: breaking down Scottish timber into bioethanol, anaerobic digestion of bioresources and digestate pyrolysis, HEFA (conversion of Scottish cover crops into sustainable aviation fuel and renewable diesel using low carbon hydrogen).

petroineos
REFINING AND TRADING

Offshore wind conduit: Replacing natural gas with hydrogen, using low carbon hydrogen to produce methanol and convert it to SAF, producing low carbon ammonia from hydrogen for shipping and chemicals.

Any National Wealth Fund investment will be subject to investible propositions and the Fund's criteria – the proposition must deliver a positive return, drive regional and economic growth or support activity to tackle climate change, invest in key sectors, and crowd in private finance.

The £25 million Grangemouth Just Transition Fund and £200 million from the National Wealth Fund for co-investment are on top of existing investments to ensure the long-term economic future of the Grangemouth area and support the workforce.

Hydrogen – powered trains

Two centuries after the UK led the world by opening the first passenger railway between Stockton and Darlington, here is Britain's first hydrogen-powered train.

Called HydroFLEX, the concept is now ready to be incorporated in a new fleet. It could replace diesel trains on lines that are too costly to electrify and where batteries would not be viable.

The prototype could herald a new age of environmentally-friendly transport on Britain's railways and boost the nation's ambitions of being a green industrial powerhouse.

The experimental train, developed at a cost of £13million by leasing firm Porterbrook, is a former 1980s Thameslink commuter unit that, in its previous life, took commuters in and out of London. It can run at a top speed of 90mph, has passed stringent safety checks and clocked up 3,000 miles of test runs on main lines.

LOOKS THE SAME

From the outside, the train looks and sounds no different to any other, though it is fitted with a boardroom, so Porterbrook can hold meetings there. But what is different and groundbreaking though; instead of seats, two-thirds of the carriage is taken up with 36 giant canisters, each weighing more than a human being, in three banks of 12.

Because hydrogen is so flammable, they are coated in leak-proof and blast-proof Kevlar and stored in cages designed to withstand the G-force of a crash. Yet each contains hydrogen weighing just a few kilograms.

Extra beams have been added under the carriage to take the 18 tons of extra weight from the canisters, fuel cells and equipment. Each aluminium tank is 3.1 metres (10ft) long and weighs 150kg (nearly 24 stone) when empty.

When filled at 350 bars of pressure, the train contains 7.7kg (17lb) of hydrogen, giving 278kg in total, allowing it to travel 350 miles.

There are 12 sophisticated detectors that look like smoke alarms along the length of the carriage to monitor leakage. There is also temperature monitoring equipment. Fans at ceiling level – fitted to double the capacity needed for safety standards – are there to ventilate the carriage if a leak is detected.

Exterior windows have been replaced with vents, which send out the train's only emissions... puffs of steam, reminiscent of those regularly seen on mainline railways some 60 years ago.

By combining hydrogen and oxygen to form water using a catalyst, rather than directly burning the hydrogen, the fuel cells produce direct current (DC) electricity for the engines.

AC POWER STILL POSSIBLE

The train, a former British Rail Class 319 commuter unit, has retained its ability to pick up alternating current (AC) from overhead wires via a pantograph on its roof, or DC from a third rail, so it can use conventional electric power where it is available.

For the driver, the old dashboards are still in place, with the addition of indicator lights for any fault with the hydrogen system.

The HydroFLEX train was shown at the COP26 climate summit in Glasgow in 2021. At that point, it had only recently been built and had to be towed up the West Coast Main Line to Scotland by a conventional locomotive.

Mainline operation was approved in 2022 after the train met stringent requirements set by the Rail Safety Standards Board and Network Rail.

For chief executive Mary Grant, the project demonstrates the importance of private sector innovation. She says a decision to develop a hydrogen fleet, potentially with the new Government owned Great British Railways, would be part of a '30-year traction strategy'. She says:

"This shows our value as long-term investors. Our backers are not short-term private equity; they are pension funds. The approach that we're demonstrating at Porterbrook is long-term commitment."

A new hydrogen fleet could cost a quarter of a billion pounds.

DFT FINANCE

An initial concept version, developed at a cost of £2million from 2017 and trialled on the mainline in 2020, involved the University of Birmingham and was part-funded with £750,000 from the Department for Transport.

Now, rather than academics, 35 small and medium size businesses are involved in developing the larger-scale project. Porterbrook's hydrogen-powered train is the first produced by a British company. Continental rival Alstom has developed a model which is in use in Germany and soon to be introduced on remote rural lines in Italy.

Despite a manifesto commitment to renationalise train operating companies, Mary says the Labour Government has recognised the role of the private sector in owning, maintaining and financing the UK's fleet of passenger trains.

"The current system provides economic stability. Private investment reduces the burden on the taxpayer when the Government is in a very difficult space".

ACTIVE IN GERMANY

Alstom presented the Coradia iLint™ for the first time in 2016 in Berlin at a trade show. The launch of the regional train with, zero direct carbon emissions, represented a real alternative to diesel power. This placed the manufacturer us as the first in the world to develop a passenger train based on hydrogen technology. And just two years later, in 2018, the Coradia iLint™ entered into commercial service in Germany.

In line with our their to facilitate a global transition to a low-carbon transport system, Alstom has pioneered several sustainable mobility solutions. Coradia iLint™ is an illustration of their commitment to designing and delivering innovative and environmentally-friendly solutions.

Coradia iLint™ is the world's first passenger train powered by a hydrogen fuel cell, which produces electrical power for traction. In operation, this train emits no CO2 and exhausts only water.

This train is special for its combination of different innovative elements: clean energy conversion, flexible energy storage in batteries, and smart management of traction power and available energy. Specifically designed to non- or partially electrified lines up to 1,000 km, it enables clean, sustainable train operation while ensuring the highest levels of performance.

DESIGNED IN GERMANY AND FRANCE

Coradia iLint™ was designed by Alstom teams in Salzgitter (Germany), their Centre of Excellence for regional trains, and in Tarbes (France), centre of excellence for traction systems.

The project first benefitted from the support of the German Ministry of Economy and Mobility and the development of the Coradia iLint™ was funded by the German government as part of the National Innovation Program for Hydrogen and Fuel Cell Technology (NIP).

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Zero Emissions Vehicle (ZEV) mandate

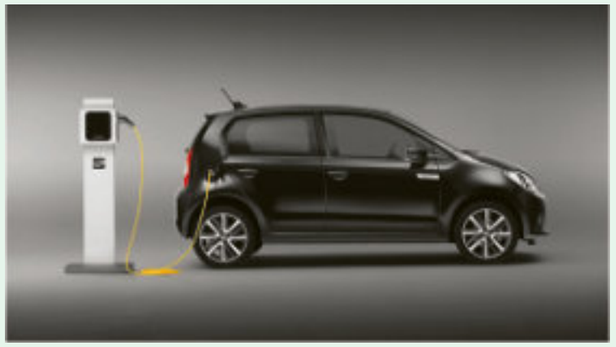
New electric car sales have stagnated recently, particularly private sales.

Figures from the Society of Motor Manufacturers and Traders (SMMT) show that more than three-quarters of new electric cars are being purchased by fleets and businesses, where more of the incentives are seen to be.

While 286,000 new electric cars have been registered in the UK in 2023 (up to November), this is a 16.3 per cent market share, which is only marginally above the 15.1 per cent share recorded during the same period in 2022.

From next year, however, manufacturers will have to meet targets of having a certain percentage of all their new car sales to be electric, which is known as the Zero Emissions Vehicle (ZEV) mandate.

But what is the ZEV mandate and what will its impact be? Let's investigate.



WHAT IS THE ZEV MANDATE?

The ZEV mandate is a scheme being introduced by the government to increase the number of electric cars on Britain's roads ahead of 2035 when all new car and van sales must be fully zero emissions.

It will be introduced in 2024 and will mandate a certain percentage of a manufacturer's sales are zero-emissions.

WHAT PERCENTAGE OF SALES ARE MANUFACTURERS REQUIRED TO MEET IN THE FUTURE YEARS?

The ZEV mandate kicks off in 2024, which is the first year manufacturers are required to meet the targets, though these can be delayed. If not, though, car and van firms face getting fines.

Annual ZEV targets have been set from 2024-2030, with the period up to 2035 being detailed later in the decade. The annual targets for ZEV sales can be seen below.

2024 – 22% ZEV mix

2025 – 28% ZEV mix

2026 – 33% ZEV mix

2027 – 38% ZEV mix

2028 – 52% ZEV mix

2029 – 66% ZEV mix

2030 – 80% ZEV mix

In the period between 2030 and 2035, it's expected there will be increments of 4% each to get to the 100% ZEV sales figure by 2035.

ARE ALL MANUFACTURERS INCLUDED IN THE ZEV MANDATE?

The government has acknowledged the importance of small-volume manufacturers in the transition period, and as a result, there are exemptions for manufacturers within the ZEV mandate.

Those selling fewer than 1,000 cars and vans in the UK – which are classed as 'micro-volume manufacturers' - aren't required to meet the ZEV mandate until the end of the decade and are automatically exempt. This is because the government says they might 'need more time', and includes firms such as Caterham and Morgan, for example.

Manufacturers registering fewer than 2,500 cars but more than 999 cars and vans a year can submit what's known as a derogation application, and if accepted, can make them eligible for not having to comply with the ZEV mandate until 2029 with a 'transitional year in 2030'. Based on current SMMT sales figures, this would include firms such as Alfa Romeo, Bentley and SsangYong.

Continued on GP6

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Continued from GP5

WHAT IF MANUFACTURERS DON'T CURRENTLY SELL ANY ELECTRIC CARS OR ARE UNABLE TO COMPLY WITH THE ZEV MANDATE?

While the majority of manufacturers currently sell at least one electric car, there are some quite significant exceptions. Dacia, Land Rover and Suzuki, for example, are well above the threshold and currently don't offer an electric car. A Range Rover EV and electric Dacia Spring are due in 2024, but Suzuki's first EV isn't expected until 2025.

For those firms that either don't sell an EV yet or are unlikely to meet the mandated ZEV sales mix – such as Ford and Toyota – there will be ways to still be compliant without facing fines.

The first is a scheme based on borrowing credits from other manufacturers with a far greater ZEV mix – such as those only selling EVs like Tesla. The other option manufacturers can use is banking credits for future years – such as firms that currently meet the ZEV mix but might struggle to do so on some occasions.

Manufacturers that have historically had lower CO2 emissions, such as Toyota, will receive 'short-term support' to help with the ZEV mandate too, while there will also be 'pooling' allowed within a group, such as Dacia being able to utilise Renault's higher EV sales mix to meet the ZEV mandate.

WHAT WILL THIS MEAN FOR NEW CAR SALES?

Manufacturers have already had to meet CO2 emissions targets, but this ZEV mandate does pose a challenge, particularly for manufacturers that currently sell no or few electric cars in relation to their overall sales.

Towards the end of 2023, it's already been observed that several manufacturers delayed registering their electric cars until 2024 so that they could get an early start. Across the board, manufacturers will be pushing their electric models hard – in terms of advertising, finance offers and general incentives – to try and persuade motorists to have them.

We will likely see a position where some manufacturers cap the number of non-electric cars they sell to secure the required ZEV mix. It's worth noting that in the UK, using year-to-date figures up until November 2023, only a handful of manufacturers were already at the 22 per cent EV sales mix required for 2024. These include BMW, Cupra, Genesis, Jaguar, Mercedes, MG and Porsche, along with electric-only firms BYD, GWM Ora, Polestar, Smart and Tesla.

WHAT IS THE POTENTIAL IMPACT ON USED CAR SALES?

It's no secret that used car prices continue to plummet, with steep depreciation across virtually all zero-emissions models. While there are signs of improvement, if there are even more used EVs coming to the market, and there aren't enough buyers out there, values are unlikely to improve.

We could see a situation where – if manufacturers are unable to sell the number of new non-electric cars to meet demand because of the mandate– buyers choose used cars instead, with the potential for nearly-new petrol, diesel and hybrid vehicles to be particularly in demand. This will likely continue to be the case up to 2035 unless there are more incentives in place for private buyers to choose an all-electric vehicle.