Transforming for tomorrow

Roadmap to Decarbonisation

Ju23

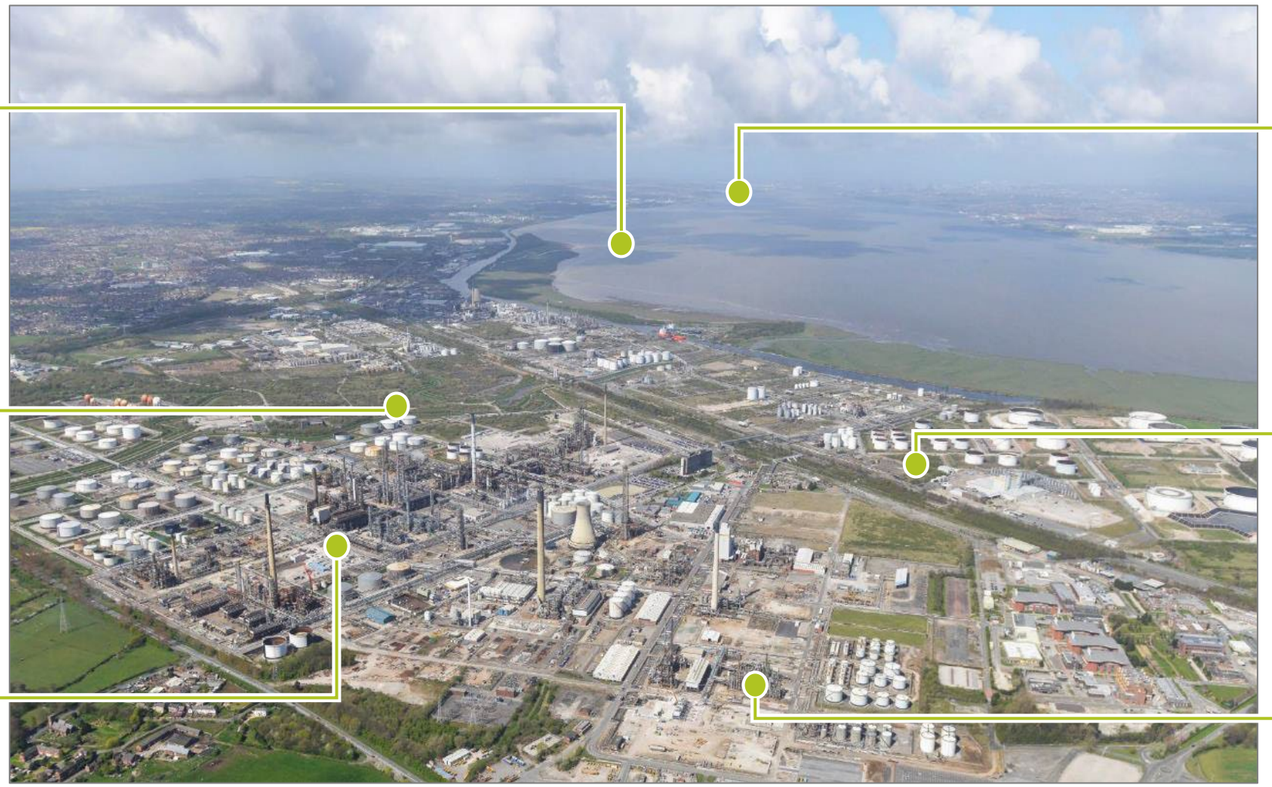
Essar Oil UK will host one of the largest energy transition hubs in Europe

- Essar is a leading player in the decarbonisation of the UK economy and is transforming its Stanlow Manufacturing Complex into one of Europe's largest energy transition hubs
- The combination of hydrogen, refinery decarbonisation and biofuels with unrivalled infrastructure, expertise and Essar's large land bank (c.900 acres) will facilitate the process

Green Ammonia[1]

Biofuels

Essar / Refinery



STL/Storage Sites

Vertex / Hydrogen Production

Source: Company information.
1 Green ammonia produced in India and imported in the UK.

At the heart of HyNet, one of the two Track-1 UK CCUS clusters selected by UK Government to progress to negotiation phase

Essar is the only supplier of large-scale low carbon hydrogen within the cluster through its subsidiary Vertex Hydrogen Ltd

Essar is the largest industrial CO_2 emitter in the region decarbonising its operations through energy efficiency, fuel switching and carbon capture

HyNet provides a carbon **capture & storage network,** and a **low carbon hydrogen transport & storage eco-system** across the NW of England and North Wales

ESSAR — Delivering full decarbonisation

VERTEXHYDROGEN — UK's first large-scale low carbon hydrogen production facility

Decarbonisation plans – our strategy

Export to other industries

VERTEXHYDROGEN

CCUS enabled low carbon hydrogen

Refinery off gases (feedstock)

Vertex Hydrogen Production Plants

Stanlow Refinery

Fuel Switching to Low Carbon H_2

Replacement/upgrade of furnaces & CHP complex to burn 100% hydrogen

Carbon Capture & Storage Plant

New carbon capture plant at the refinery's Fluid Catalytic Cracking Unit to capture and permanently sequester CO_2

eni

Transportation of captured CO_2 via ENI's transport and storage infrastructure

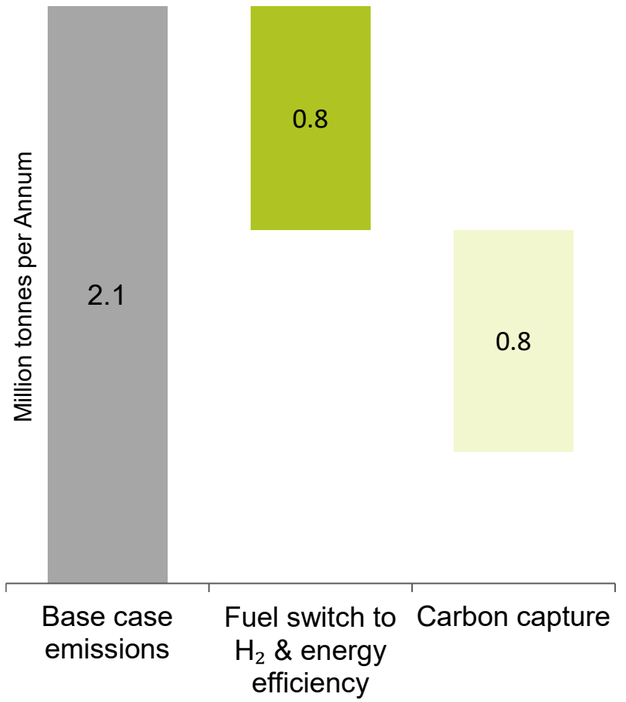
CO_2 storage in ENI's depleted Liverpool bay Oil and Gas fields (under the seabed)

Essar Oil UK to deliver the first low carbon refinery in the UK

- Leading decarbonisation plans amongst global refiners, will achieve a 75% reduction on emissions by FY28

Hydrogen & Energy Efficiency **0.8 Mtpa of CO_2 savings**	• Hydrogen from Vertex to replace fossil hydrocarbons across Essar Oil UK's furnaces and combined heat and power (CHP) plant • More low carbon power enables "electrification based" energy efficiency projects • Investments are already underway with the hydrogen-ready crude distiller furnace being commissioned in 2023
Carbon Capture **0.8 Mtpa of CO_2 savings**	• 43% contribution to total site's CO_2 reduction • Carbon capture project investment to be backed with Government support under the UK's industrial carbon capture business model

Carbon emissions to reduce from 2.1 MTPA to 0.5 MTPA



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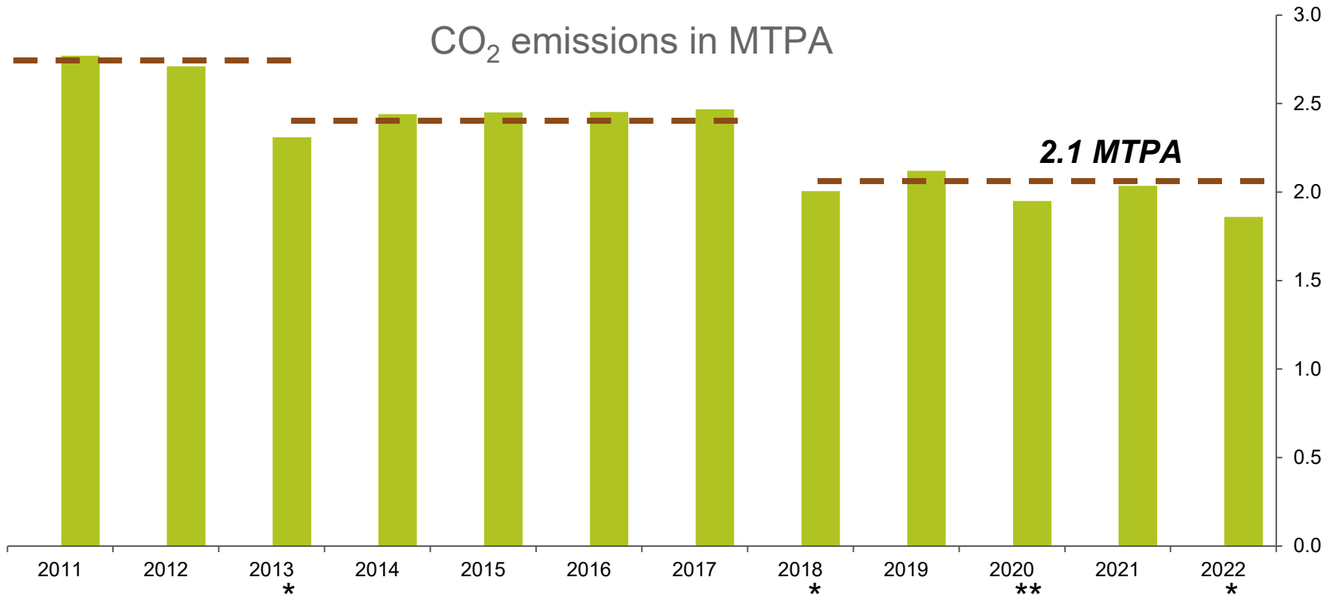
1. Green ammonia produced in India and imported in the UK.

Decarbonisation progress

- Decarbonisation progress since acquiring Stanlow in 2011 – achieving a 22% reduction in CO_2 for the same crude rate

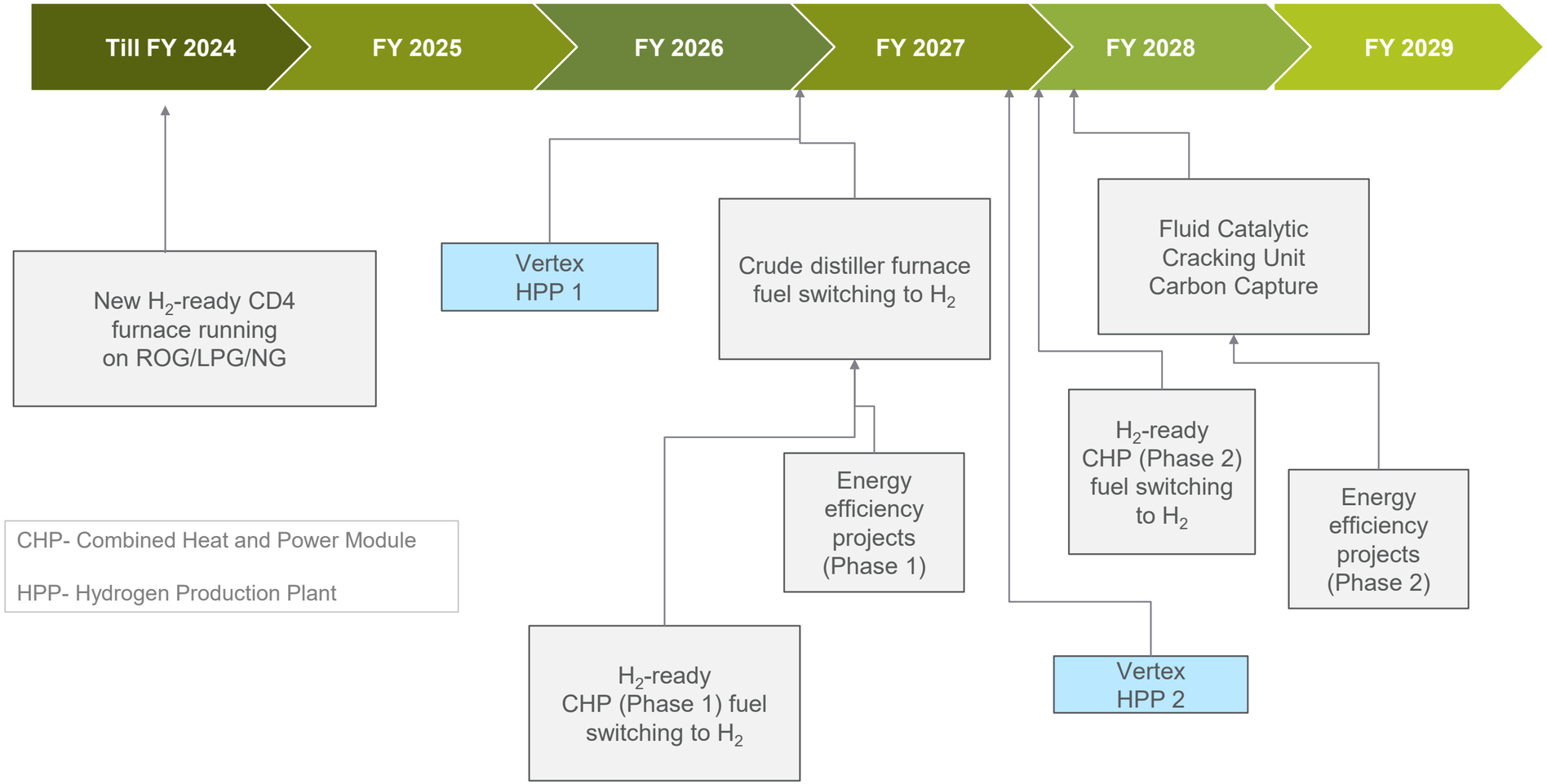


** Planned Turnaround Year*
*** Low refining throughput due to Covid*

~ $100m invested in refinery decarbonisation projects over the last 4 years and estimated ~US$800m by FY2028

- Hydrogen fuel switching projects
- Targeted energy efficiency projects
- Hydrogen-ready CHP project
- Carbon capture project

Decarbonisation plan for completion by FY 2028



Committed to 1.5mt reduction in CO_2

- Equivalent to taking a third of all cars off London roads

75% reduction in CO_2 emissions from 2.1 MT to 0.5 MT by FY 28

CO_2 emission reduction equivalent to taking ~800,000 cars off road[1]

Equivalent to 31%[2] of cars registered in London (2.6m cars)

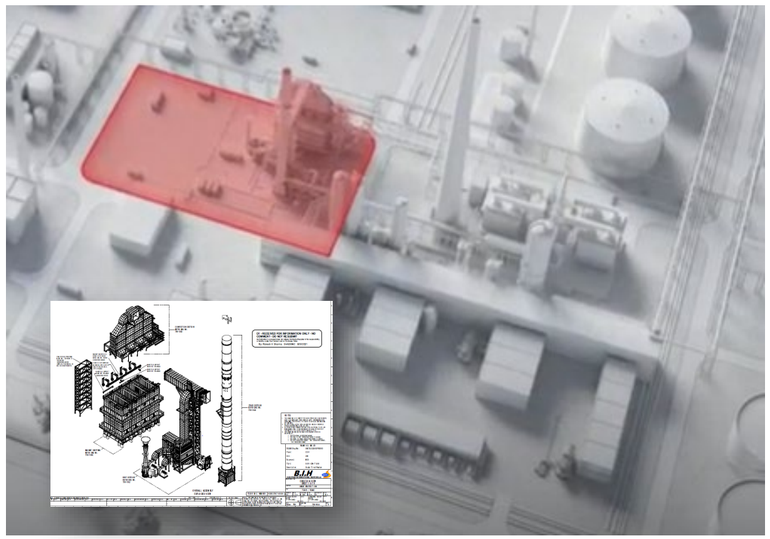
1. One car emits ~2 tonnes of greenhouse gases per annum (assuming average travel 11,500km) (Source: BEIS/Defra Greenhouse Gas Conversion factors 2019
2. 2.6m cars are registered in London as on Sep 22 (Source: Transport for London – gov.uk)

Project details

Crude distiller furnace switch to hydrogen fuel

First hydrogen-ready furnace installed at any UK refinery

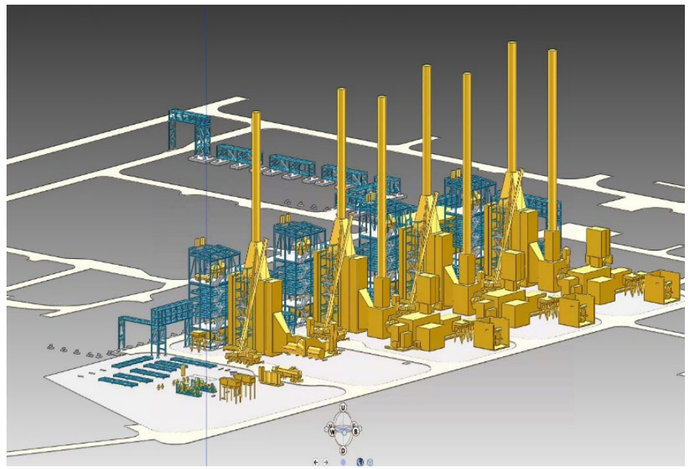
- Capable of running on 100% H_2 or a fuel gas mix; Reduced carbon emissions by 0.02 MTPA from existing furnaces
- Further reduction of CO_2 emissions by 0.2 MTPA, once running on H_2 from Vertex's Production Plant
- H_2 is then available to **enable the fuel switching** of all fired-heaters on site and the new set of H_2-ready CHPs
- Other process fired-heaters will require retrofit, but not replacement. Project saves an additional 0.2 MTPA of CO_2



CHP switch to hydrogen fuel

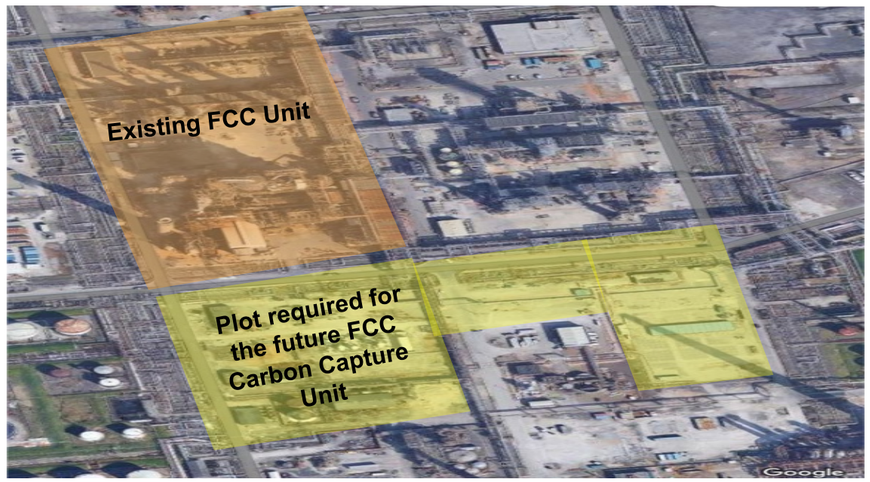
Low carbon CHP will replace existing CHP to rebalance steam & power needs

- Stanlow refinery generates its own steam & power from its existing CHP, but imports a small amount of grid power
- Existing CHP modules are to be phased out and new H_2-ready modules brought online
- Generation of power will come from high efficiency 100% H_2 gas turbines, instead of inefficient steam turbines
- CO_2 savings from CHP is 0.4 MTPA
- The first phase of the CHP project along with the new H_2-ready Crude Distiller Furnace will enable the full offtake of H_2 from the first Vertex HPP plus some energy efficiency projects



FCC and CCUS to reduce ~50% of total CO_2 emissions

- Stanlow has one of the largest Full Residue Fluid Catalytic Cracker (FCC) in Europe
- Now investing in a new Carbon Capture plant to capture CO_2 from FCC Unit
- CO_2 captured will be transported and stored through T&S infrastructure being developed by ENI
- Positive environmental impact (significant reduction in PM, SOx and Nox to single digit ppm levels)
- Project scouting completed, pre-FEED (licensor selection) has been completed. Now progressing to FEED in 2H/24.
- FID expected in Q4/24



Large land parcel required for the FCC Carbon Capture plant has been identified within Stanlow refinery complex

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