

Corporate for tomorrow

Roadmap to Decarbonisation



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

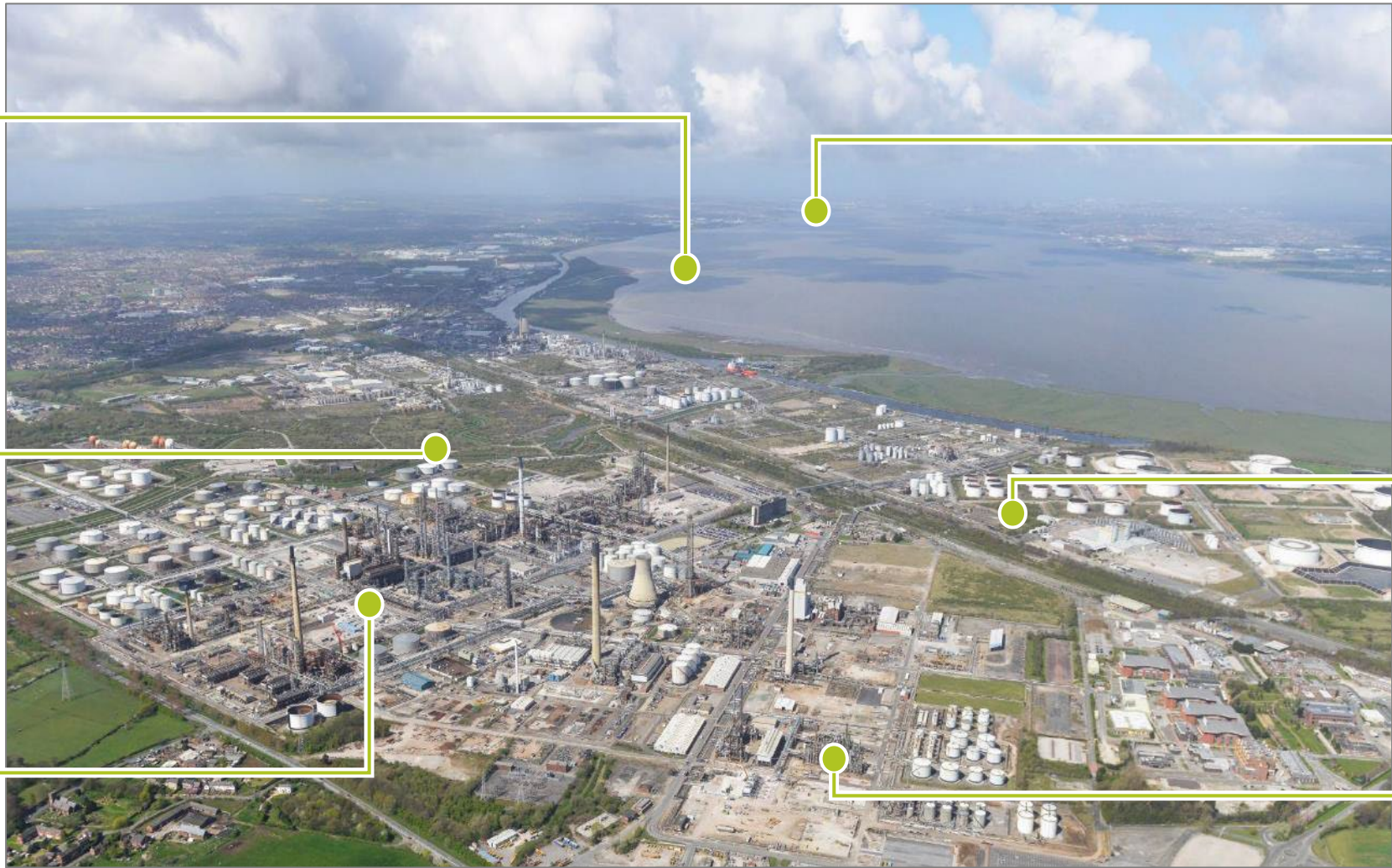
Green Ammonia¹



Biofuels



Essar / Refinery



STL/Storage Sites

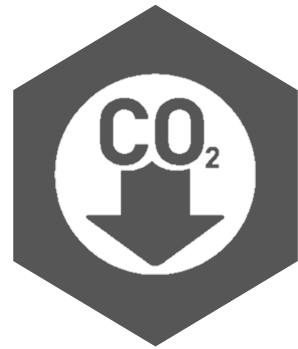


EET Hydrogen / Production



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 EET Hydrogen

Essar is the largest industrial CO₂ 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



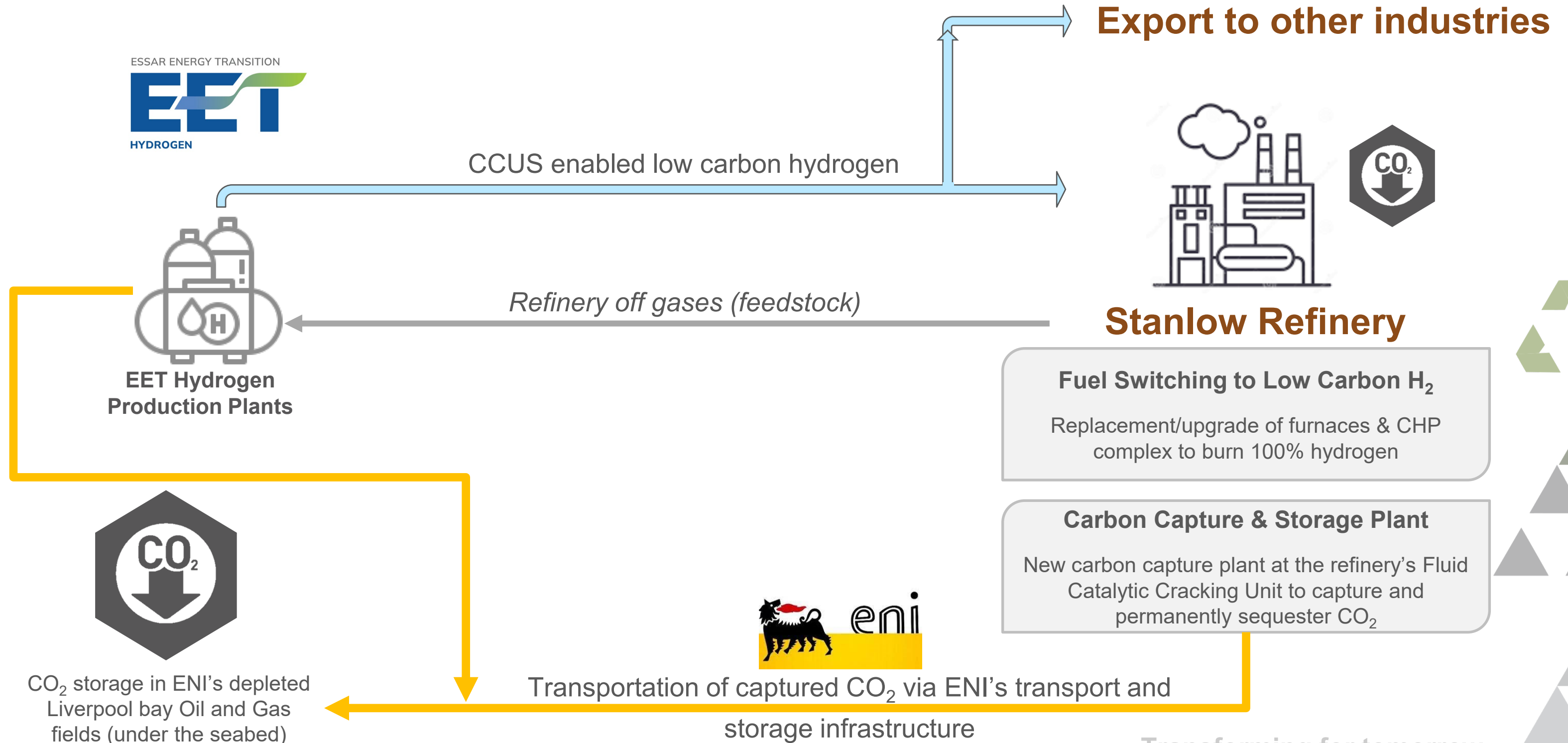
Delivering full decarbonisation



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



Transforming for tomorrow

Decarbonisation plans – our strategy

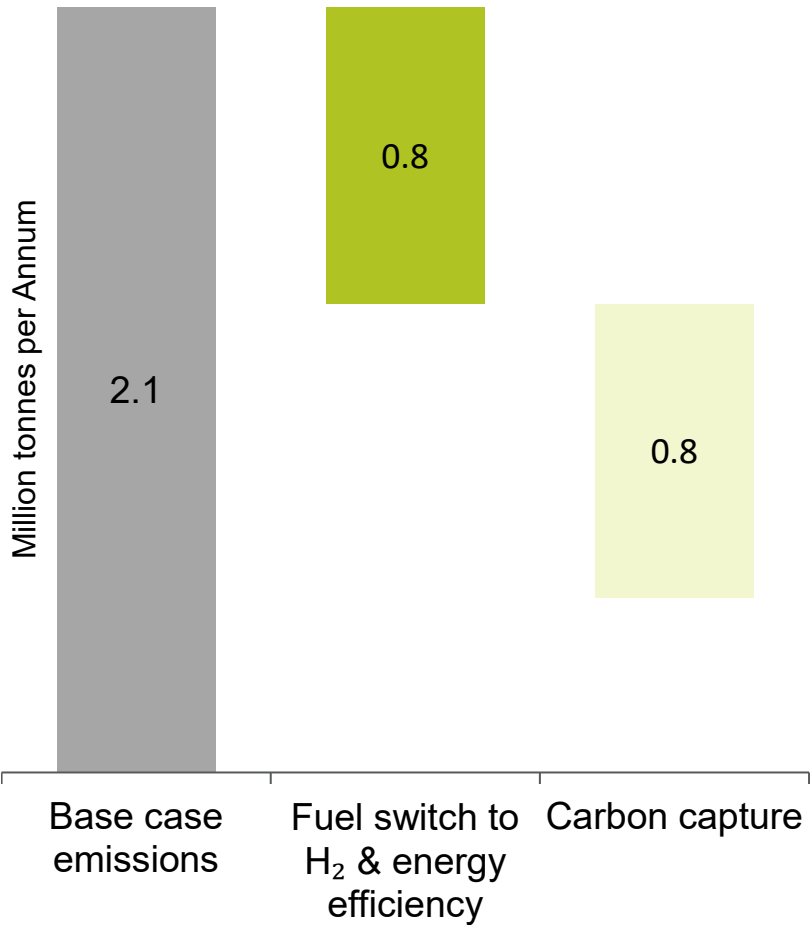


Essar Oil UK to deliver the first low carbon refinery in the UK

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

 <p>Hydrogen & Energy Efficiency 0.8 Mtpa of CO₂ savings</p>	<ul style="list-style-type: none"> Hydrogen from EET Hydrogen 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
 <p>Carbon Capture 0.8 Mtpa of CO₂ savings</p>	<ul style="list-style-type: none"> 43% contribution to total site’s CO₂ reduction Carbon capture project investment to be backed with Government support under the UK’s industrial carbon capture business model

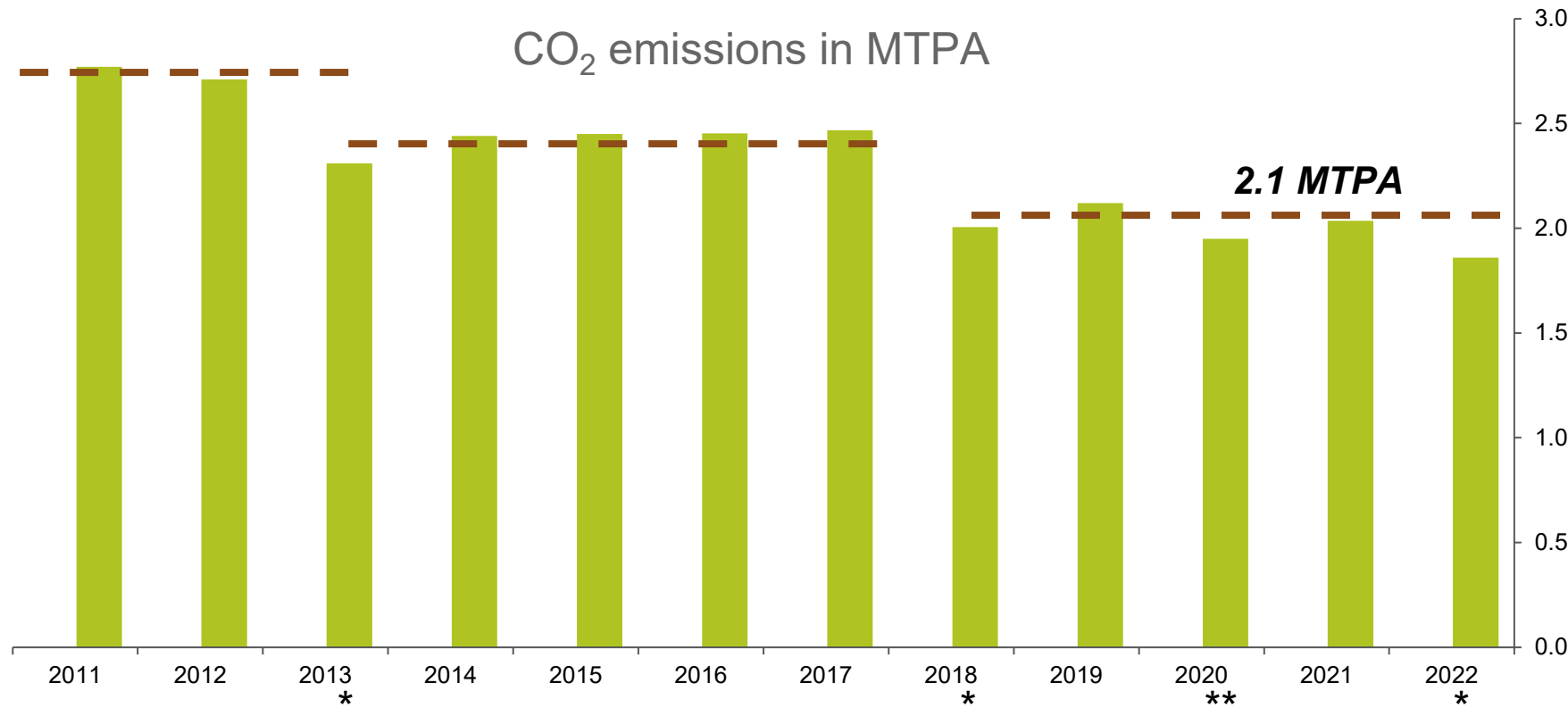
Carbon emissions to reduce from 2.1 MTPA to 0.5 MTPA



Source: Company information.
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 CO₂ for the same crude rate



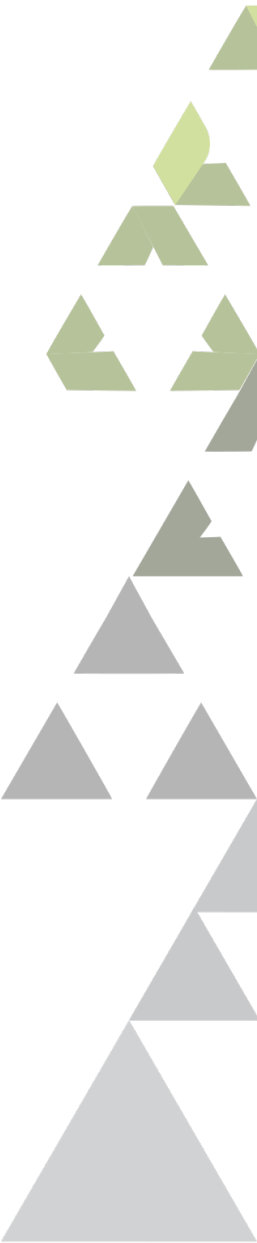
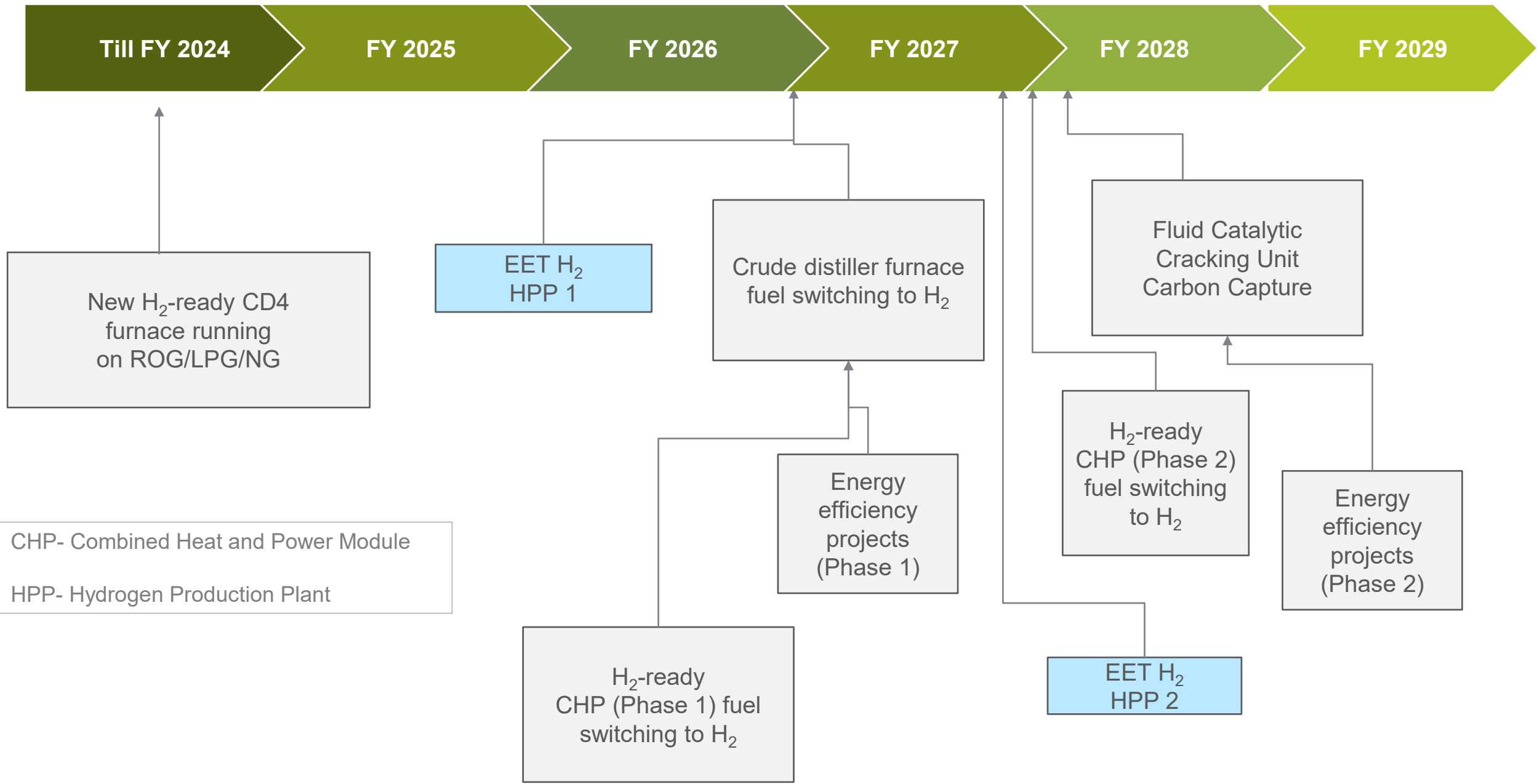
* *Planned Turnaround Year*
** *Low refining throughput due to Covid*

~ \$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

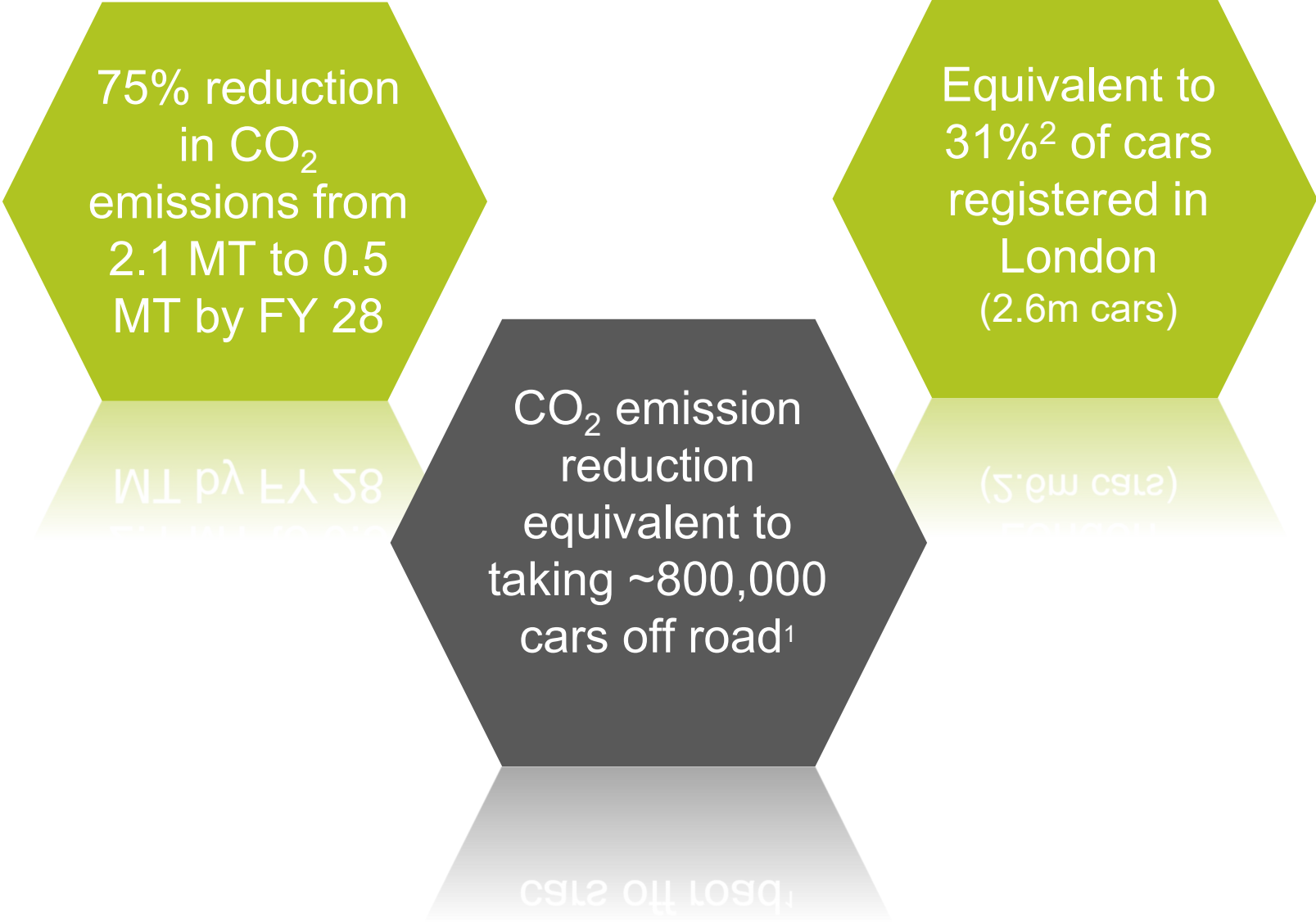


Decarbonisation plan for completion by FY 2028



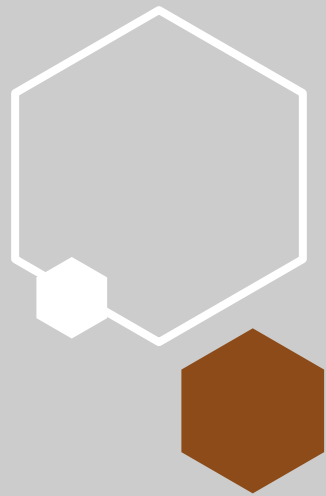
Committed to 1.5mt reduction in CO₂

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



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)

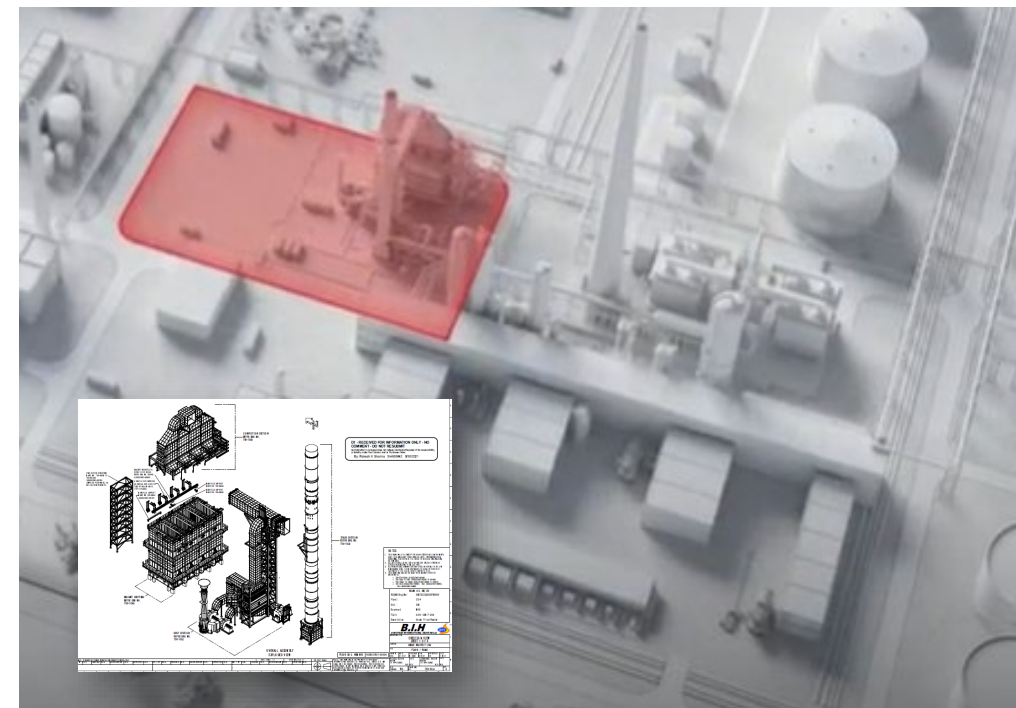
Project details



Crude distiller furnace switch to hydrogen fuel

First hydrogen-ready furnace installed at any UK refinery

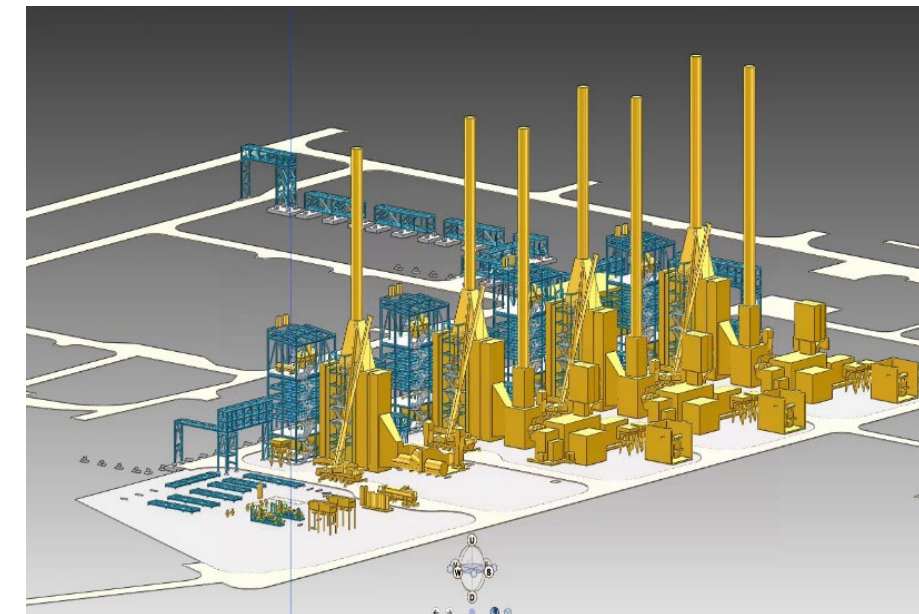
- Capable of running on 100% H₂ or a fuel gas mix; Reduced carbon emissions by 0.02 MTPA from existing furnaces
- Further reduction of CO₂ emissions by 0.2 MTPA, once running on H₂ from EET Hydrogen's Production Plant
- H₂ is then available to **enable the fuel switching** of all fired-heaters on site and the new set of H₂-ready CHPs
- Other process fired-heaters will require retrofit, but not replacement. Project saves an additional 0.2 MTPA of CO₂



CHP switch to hydrogen fuel

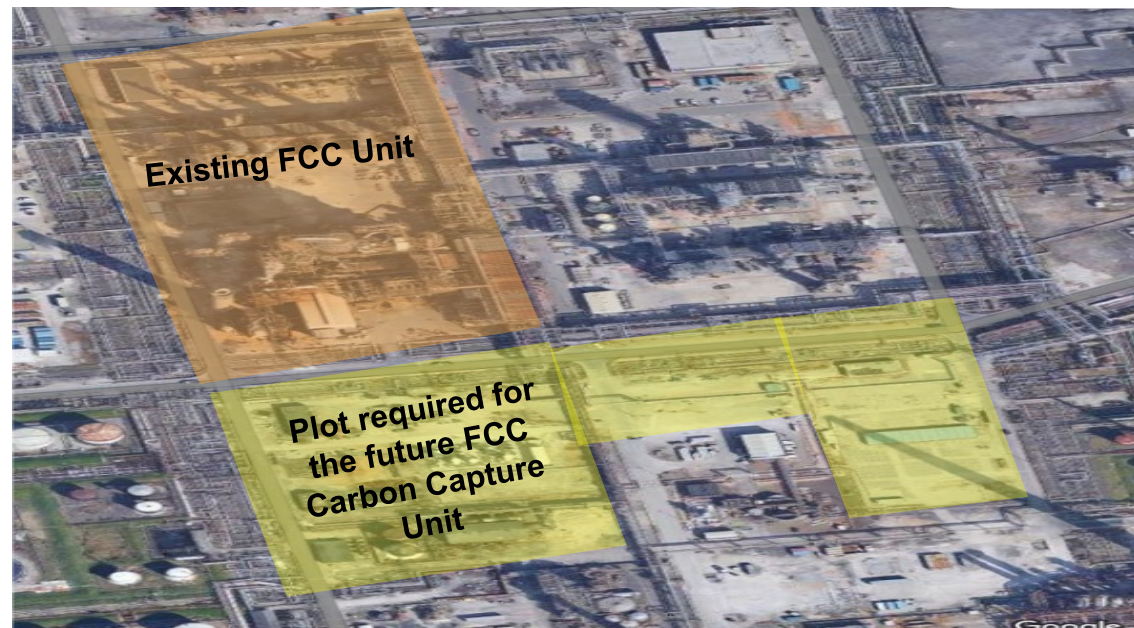
Low carbon CHP will replace existing CHP to rebalance steam & power needs

- 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 H₂-ready modules brought online
- Generation of power will come from high efficiency 100% H₂ gas turbines, instead of inefficient steam turbines
- CO₂ savings from CHP is 0.4 MTPA
- The first phase of the CHP project along with the new H₂-ready Crude Distiller Furnace will enable the full offtake of H₂ from the first EET Hydrogen HPP plus some energy efficiency projects

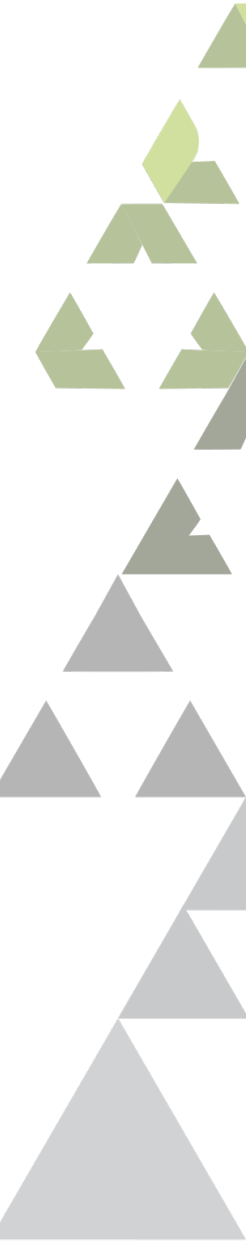


FCC and CCUS to reduce ~50% of total CO₂ emissions

- Stanlow has one of the largest Full Residue Fluid Catalytic Cracker (FCC) in Europe
- Now investing in a new Carbon Capture plant to capture CO₂ from FCC Unit
- CO₂ captured will be transported and stored through T&S infrastructure being developed by ENI
- Positive environmental impact (significant reduction in PM, SO_x and No_x 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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