
Welcome to Net Zero Teesside

11th November 2020

Dr Colin McGill – Net Zero Teesside Project Director



NZT: critical to climate change

- CCUS is required to meet climate targets (IPCC estimate 5-10 bn tonnes per year by 2050 to reach Paris Agreement goal of $< 2^{\circ}\text{C}$)
- Developing new business models will be the most important NZT product
 - Previous attempts at CCUS have failed because of lack of Govt. support
 - Business models will allow CCUS to be applied at scale
 - UK has led the way with Contract for Difference (CfD) power pricing for offshore wind and could lead the way in CCUS
- 50% of world's GDP has plans to be net zero by 2050
 - CCUS will be required to decarbonise any hydrocarbons produced by 2050

The UK net zero energy system in 2050

Table 2.1 Summary of net-zero implications for energy system infrastructure

System-wide aggregation	Implications	Assessment of feasibility
Electricity use in 2050: 594 TWh (300 TWh in 2017)	<ul style="list-style-type: none"> • Generation required: 645 TWh • Peak demand: up to 150 GW • Generation capacity build rate: 9-12 GW p.a. 	Requires increase in deployment of baseload and variable low-carbon power, and development of CCS and hydrogen infrastructure.
Hydrogen use in 2050: 270 TWh (27 TWh in 2017)	<ul style="list-style-type: none"> • Production capacity in 2050: 29 GW of advanced methane reformation plant and 6-17 GW of electrolyser capacity (depending on load factor). • Production capacity build rate: 2-3 GW p.a. 	Requires low-carbon hydrogen production at scale from advanced methane reformation, as well as some electrolysis. Will also require hydrogen gas grids, or alternative transportation infrastructure, and development of CCS infrastructure.
Carbon captured and stored in 2050: 176 MtCO ₂ (0 in 2017)	CCS infrastructure required for decarbonisation across the economy: <ul style="list-style-type: none"> • Hydrogen production: 46 Mt • Power generation: 57 Mt • BECCS: 35 Mt • Industry: 24 Mt • Biofuel production: 9 Mt 	Requires CCS transportation and storage infrastructure at scale by the 2030s.

Source: UK Committee on Climate Change (CCC) Report May 2019

- Electricity demand doubles to power Electric Vehicles and hybrid heat pumps – mostly from renewables
- Hydrocarbon use significantly reduced, minimal oil demand and natural gas demand 75% of today's use (5.5bcf/d in 2050 v. 7.6bcf/d in 2018)
 - Gas power generation ~15GW ~2.5bcf/d
 - Blue hydrogen ~2bcf/d
 - Industry ~1bcfd
- Significant requirement for CCUS: 176mtpa CO₂ (9bcf/d) abated through CCUS
 - 57mtpa CO₂ from gas power generation
 - 46mtpa CO₂ from Hydrogen
 - 44mtpa CO₂ from BECCS and Biofuel
 - 24mtpa CO₂ from Industry

Conditions for UK CCUS are positive

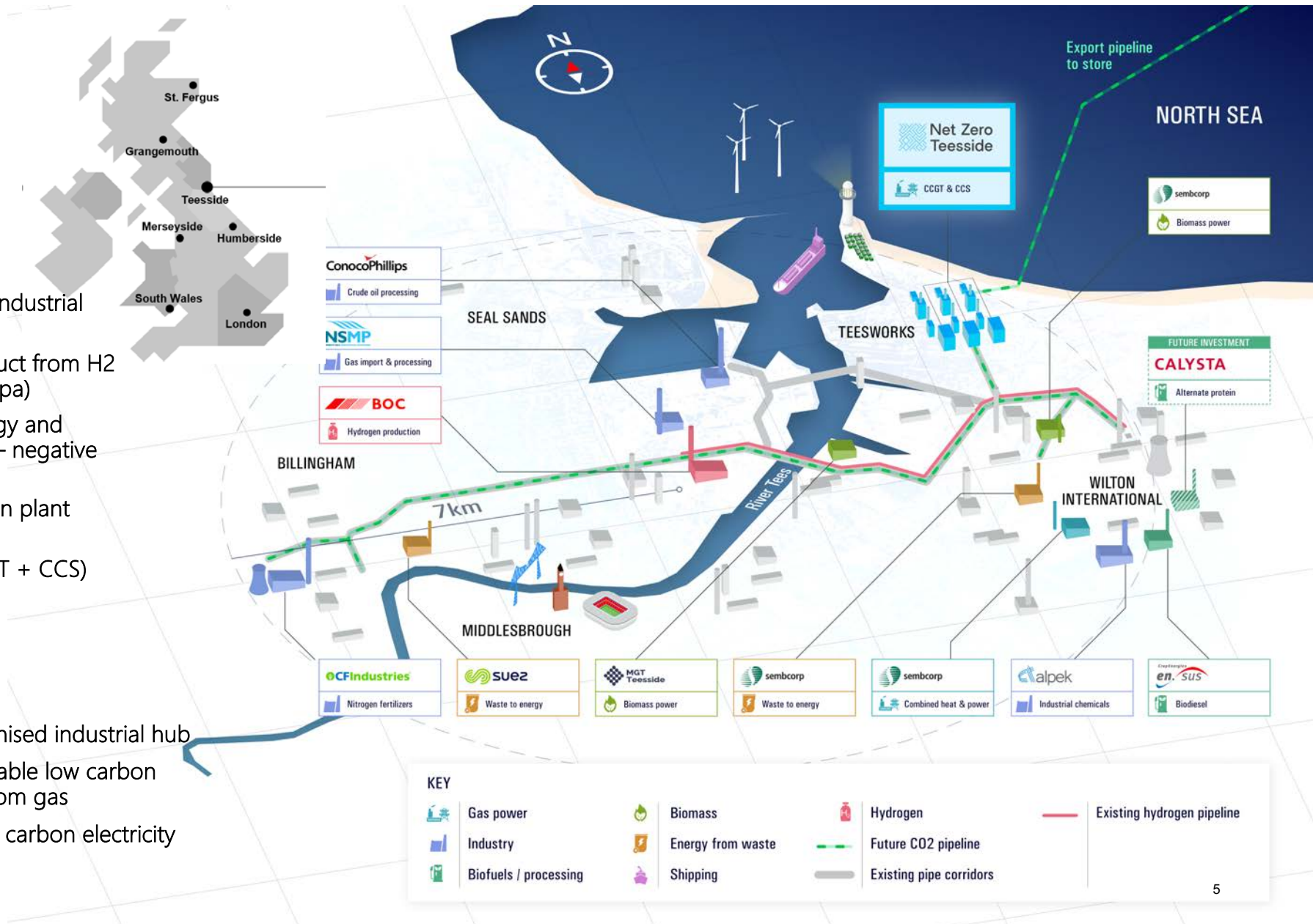
- The UK committed to achieve Net Zero by 2050 in May 2019
- Budget of “at least £800mm” included in March 2020 budget for CCUS projects
- March budget also included support for a “gas fired power station supported by consumer subsidies”
- NZT and other projects support “Levelling Up” agenda for UK
- Desire for green infrastructure projects to kick start economy after Covid-19 pandemic

Why Teesside?

- Compact site
- Strong local political and industrial support
- CO₂ available as by-product from H₂ and fertiliser plants (0.7mtpa)
- 3mtpa CO₂ from bioenergy and power from waste plants – negative carbon electricity
- Spare capacity in hydrogen plant (0.2mtpa) and Billingham
- Dispatchable power (CCGT + CCS) 2mtpa CO₂

First:...

- ✓ Decarbonised industrial hub
- ✓ Dispatchable low carbon power from gas
- ✓ Negative carbon electricity





Net Zero
Teesside

&

ZEROCARBON
HUMBER

Northern Endurance Partnership



NORTH SEA

POTENTIAL FUTURE
EXPANSION

POTENTIAL FUTURE
EXPANSION

ENDURANCE

145km

85km

TEESIDE

MIDDLESBOROUGH

SCARBOROUGH

YORK

HULL

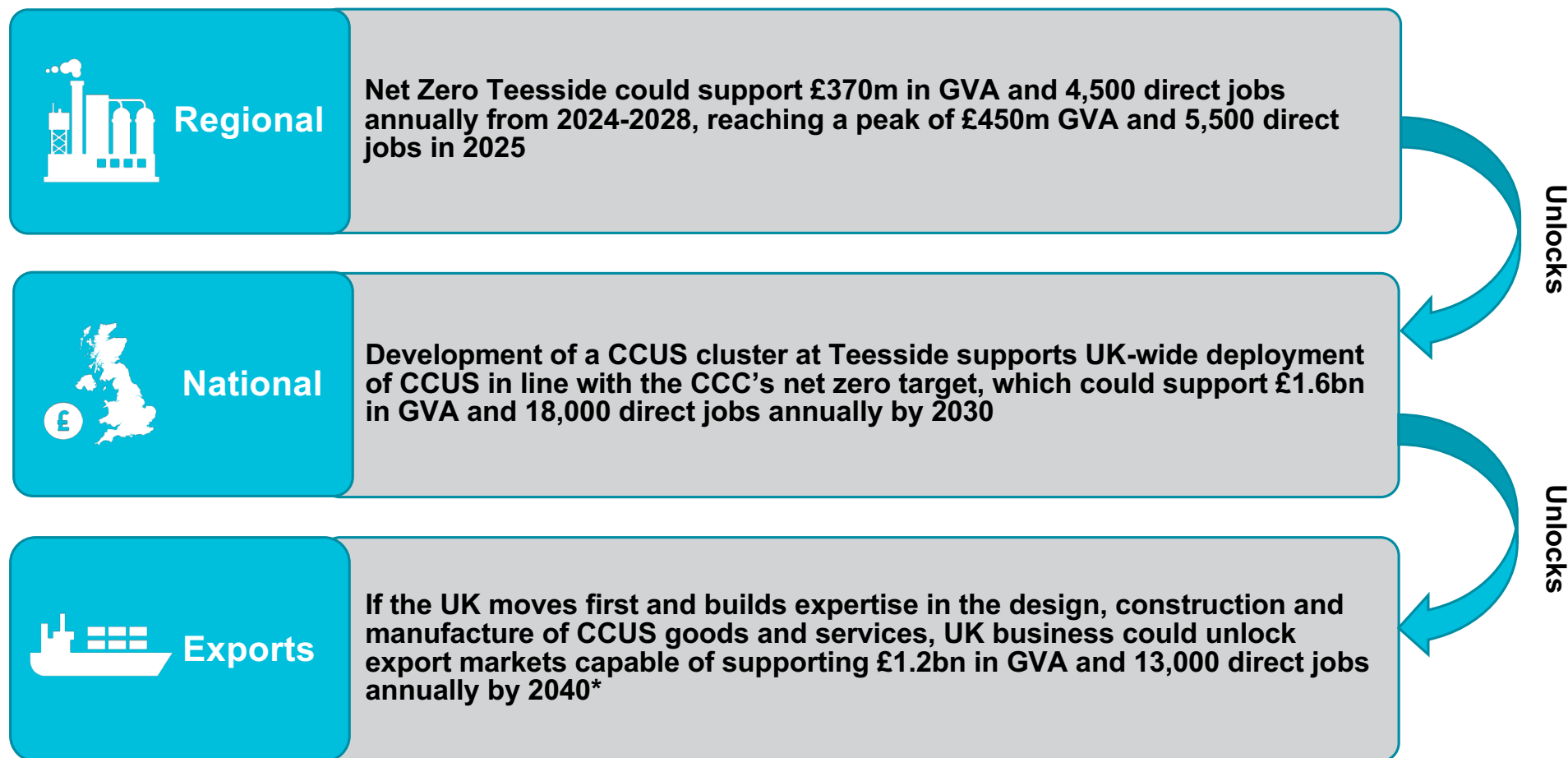
GRIMSBY

SCUNTHORPE

HUMBER



Direct economic impact



Note: Undiscounted GVA. Gross Value Added (GVA) is the value of goods and services produced less the cost of all inputs and raw materials used in production

*Exports could support £1.1bn in GVA and 12,500 jobs by 2030

Thank you