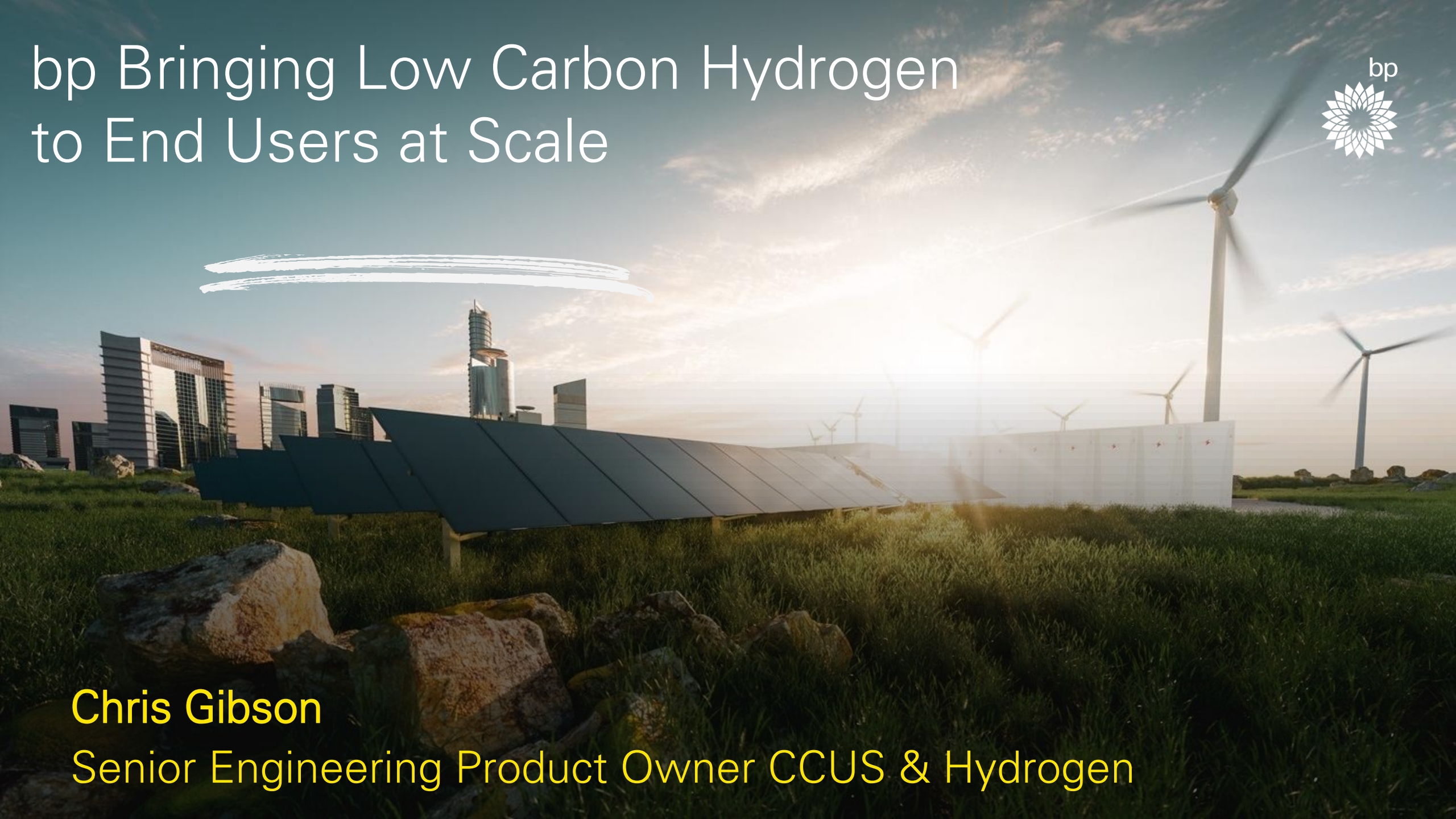
bp Bringing Low Carbon Hydrogen to End Users at Scale



Chris Gibson
Senior Engineering Product Owner CCUS & Hydrogen


our ambition
to become a
Net Zero company
by 2050 or sooner and to help
the world reach that goal
bp

The different types of Hydrogen

Green

Electrolysis of water using renewable power

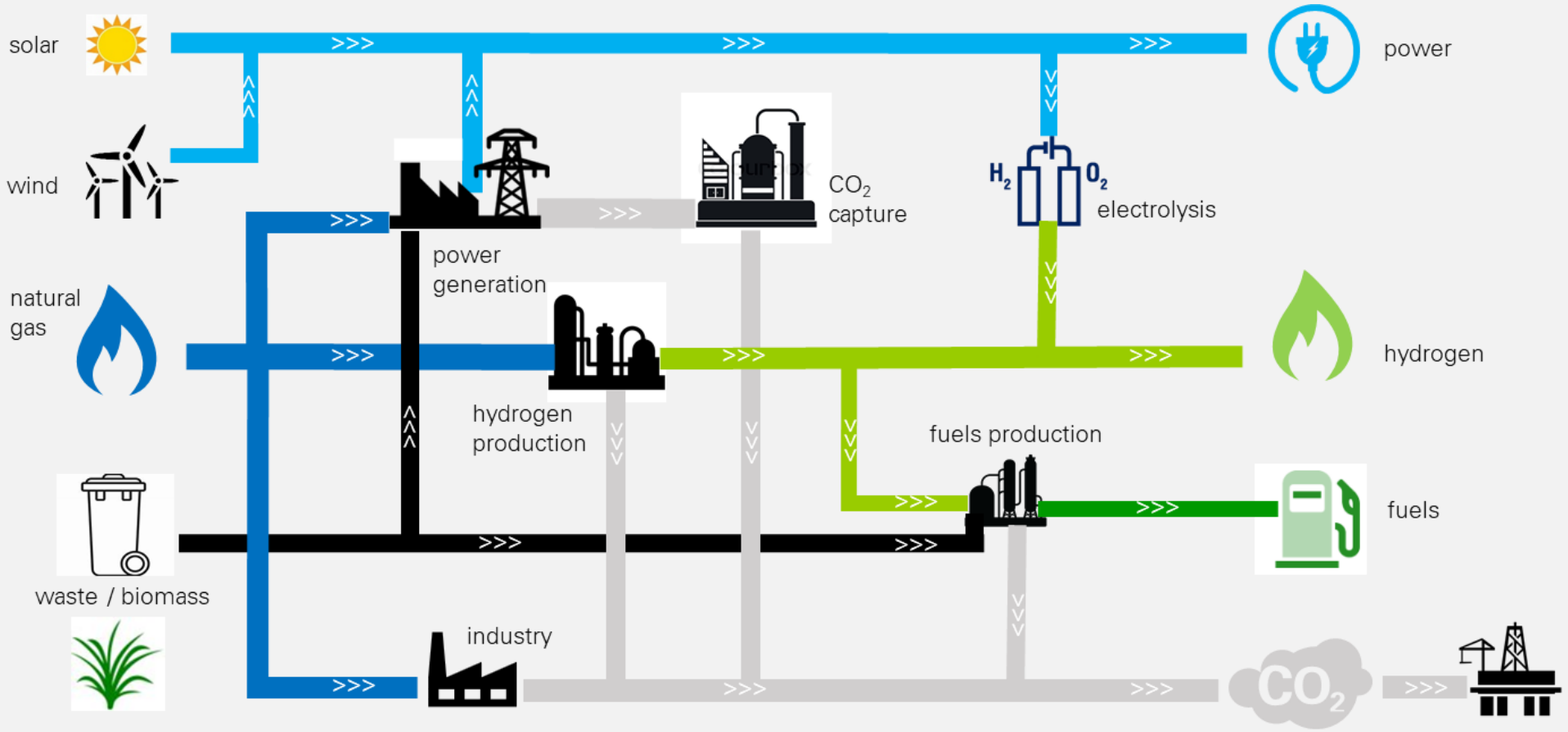
Blue

When natural gas is reformed and CO2 is captured and stored (CCUS)

Grey

Produced typically via natural gas without CCUS

Hydrogen in a low carbon energy system (Industrial Cluster)



Hydrogen can provide heat to homes and industries, and fuel for power and transportation.

Hydrogen is a feedstock for low-carbon liquid fuels which can be used in aviation and other transport applications and for chemicals.

With CCUS, blue hydrogen can be done at scale today. Infrastructure associated with blue hydrogen can also help to facilitate future green hydrogen and other low carbon industries.

Blue hydrogen via CCUS can facilitate other low carbon solutions such as post combustion capture.

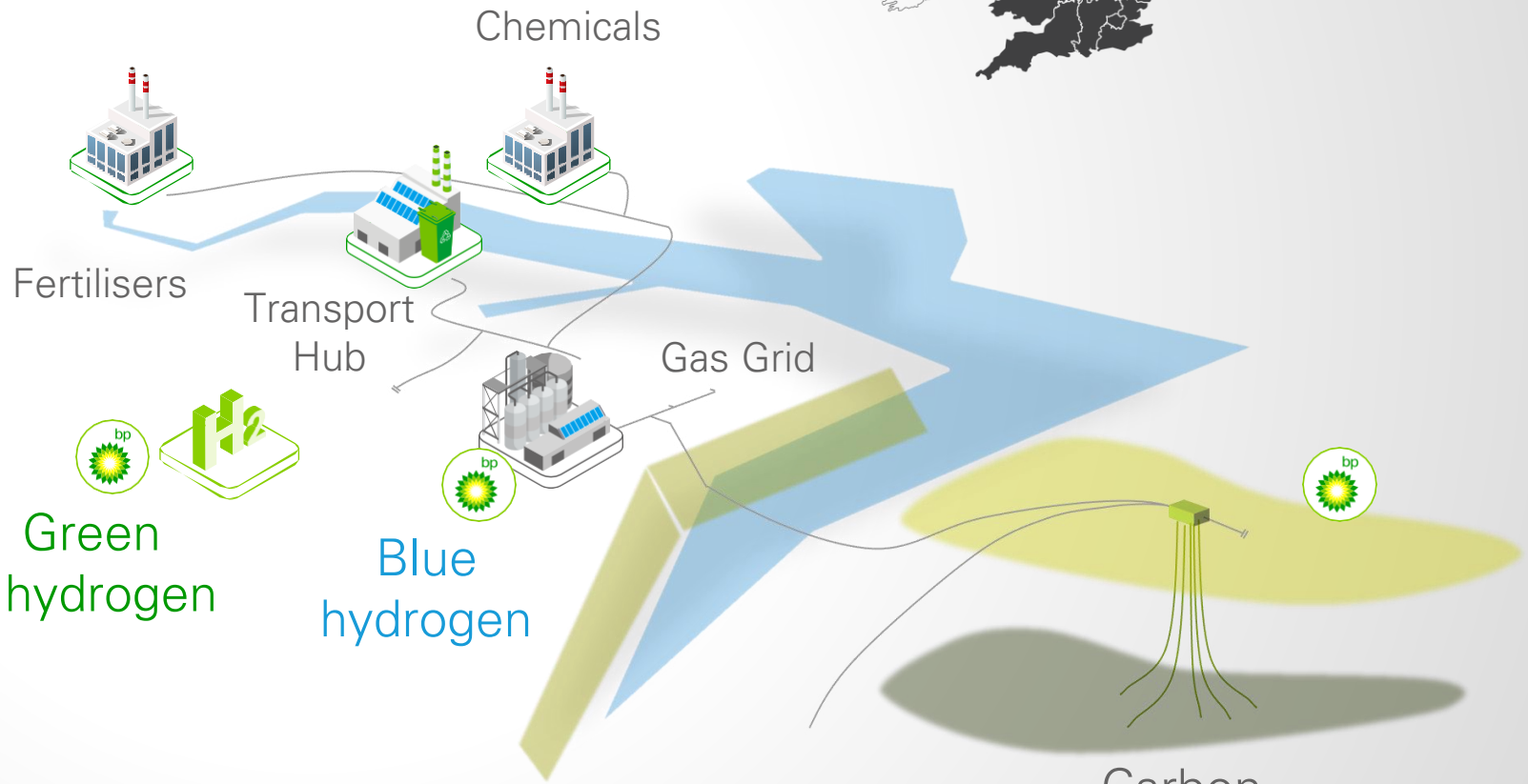
Scaling up Green Hydrogen: Lingen, Germany

- Partnership: **bp & Ørsted**
- 50MWe electrolyser initially, 2024
- North Sea offshore wind
- Decarbonizing Refinery – by replacing 20% grey hydrogen production, equivalent to saving of 80ktpa CO2 equivalent emissions per year
- Growth phase to 500MW - to meet all refinery needs and feedstock for potential future synthetic fuel production.

Decarbonisation at Scale: H2Teesside, UK

H2Teesside example…and where might we see others?

- Scale:
  - 1 GW blue hydrogen by 2030
  - 20% of UK target (5 GW by 2030)
- Decarbonisation impact:
  - 2 million tonnes per year of CO_2 captured and stored
  - Heating 1 million homes equivalent
- Broader impact
  - Future–proof existing jobs by creating sustainable low carbon industry
  - New industry development
  - Low carbon hydrogen for industrial sectors and households



EAST CO_2AST CLUSTER

The link to CCUS

..the perfect partnership?

Northern Endurance Partnership

ENDURANCE

145km

103km

MIDDLESBROUGH

DARLINGTON

YORK

LEEDS

SHEFFIELD

HULL

GRIMSBY

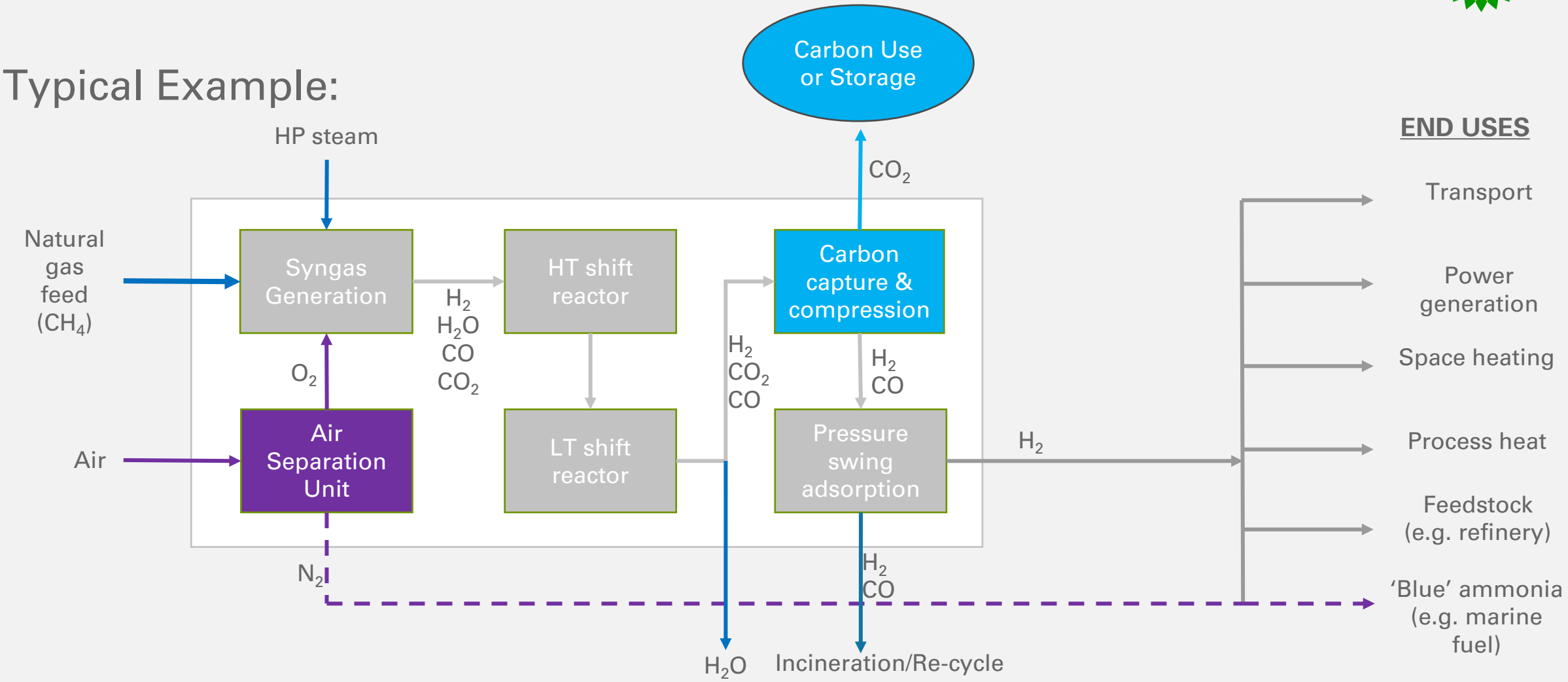
SCUNTHORPE

PROJECTS IN TEESSIDE
INCLUDING
Net Zero Teesside
BOC · bp · CF Industries · Kellas Midstream · NZT Power · Suez · TV ERF · 8 Rivers
UP TO 10 $MTCO_2E$ CAPTURED

PROJECTS IN THE HUMBER
INCLUDING
ZEROCARBON HUMBER
drax · equinor · Mitsubishi Power · sse Thermal · Triton Power · uniper · Velocys
17+ $MTCO_2E$ CAPTURED

Hydrogen Production from Natural Gas with Carbon Capture and Storage (Blue Hydrogen)

A Typical Example:



First Steps in the Hydrogen Revolution - conclusions

- How big could it be?
  - Hydrogen – *as big as gas is today*
  - Blue and green – *broadly balanced, location dependent*
- What can we learn about the future of hydrogen from our experiences today?
  - What does a successful project look like? – *Scale, Decarbonisation, Community impact*
  - What is blue hydrogen being used for? – *industrial heating, chemicals, power, transport, clean fuels*
  - The link to CCUS? – *CCUS is a key part of our future, natural partner for blue hydrogen*


bp
We are committed to bringing
hydrogen
at scale
Thank you