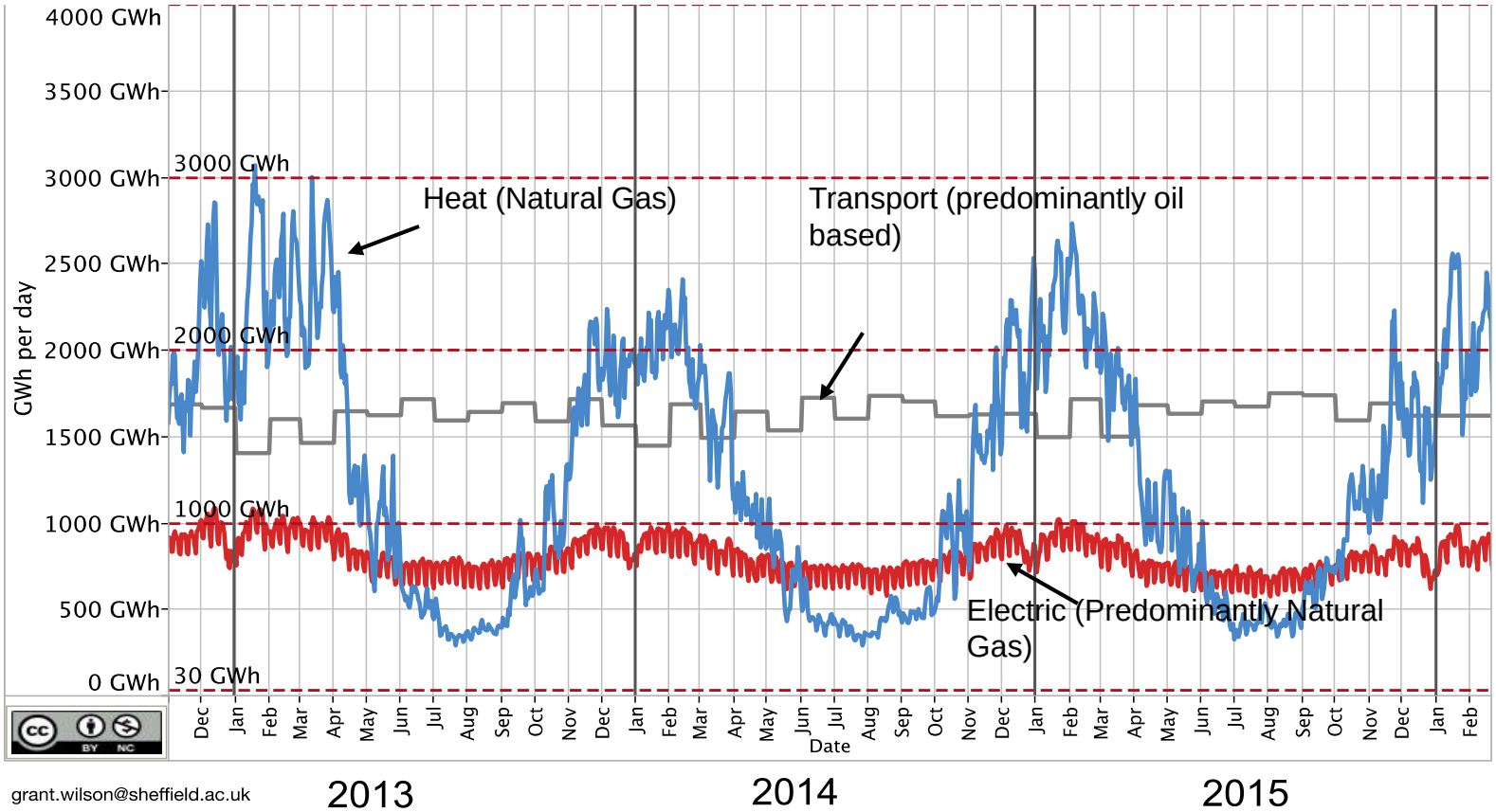
Dan Sadler, H21 Programme Director

@DanSadlerH21

May 2018

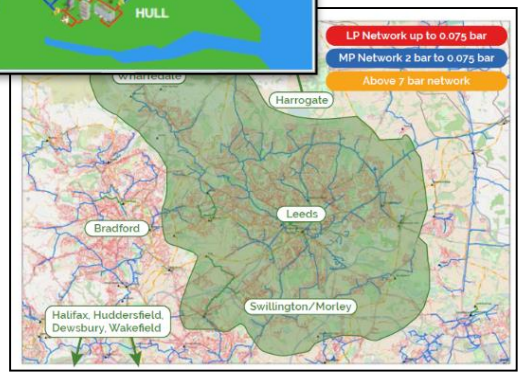
The Context: Current UK Energy Requirements



grant.wilson@sheffield.ac.uk

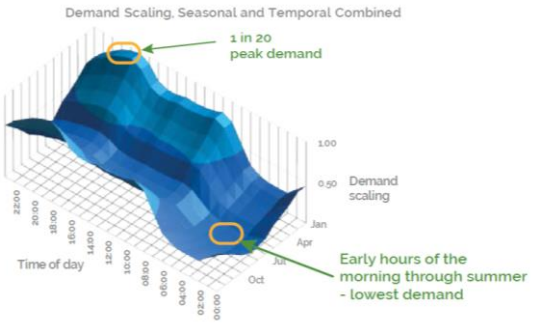
The challenge is to decarbonise all of the above!

H21 Leeds City Gate – The Headlines



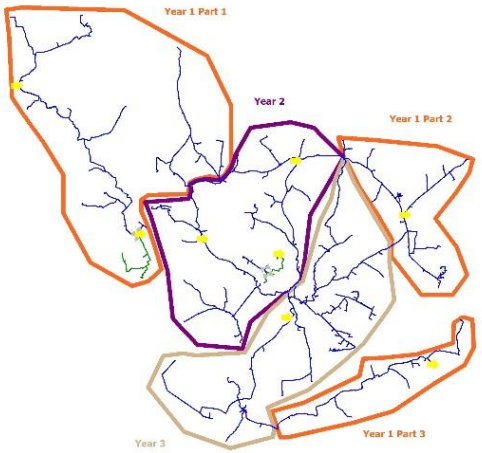
- 265,000 meter points
- 6Twh per annum, 3180MW peak
- 1% of UK population

DEMAND



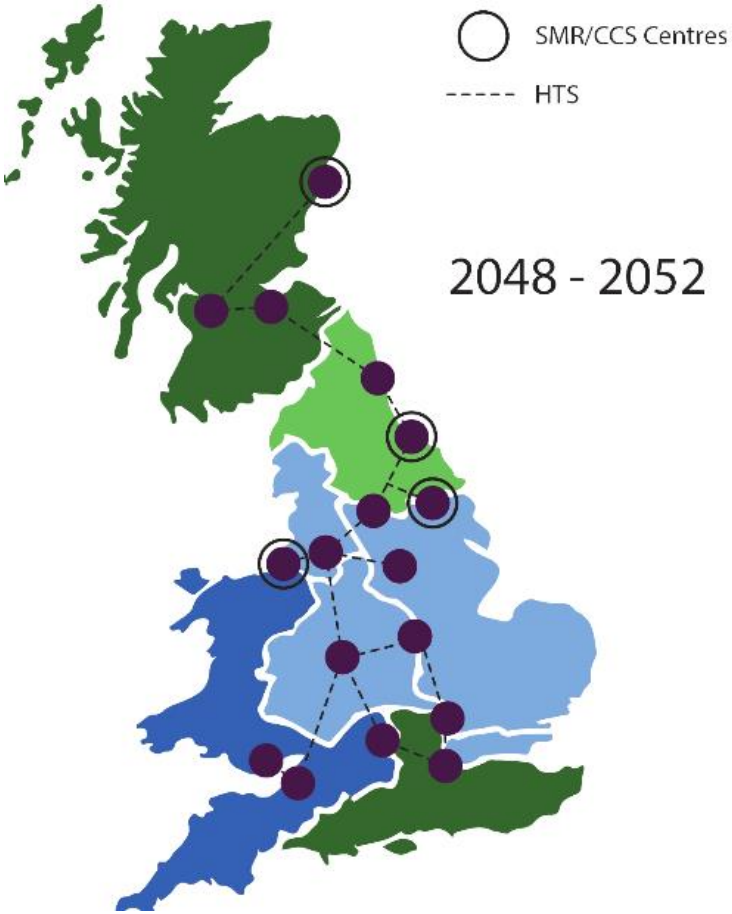
1025WM
X4 256MW
Steam Methane
Reformers

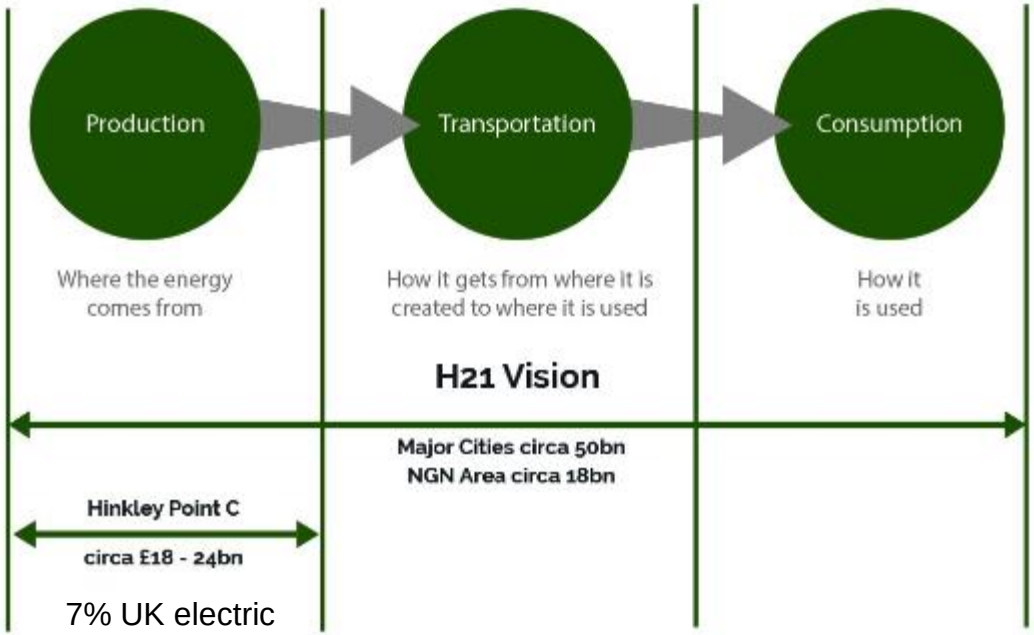
SUPPLY



CONVERSION

H21 Leeds City Gate: The H21 Vision





7% UK electric demand), 1% net UK energy

'Do Nothing is not an option'

100% H_2 - H21 / Political Timeline

2012

October 2014 Formulated Idea for H21 Leeds City Gate **£300K**

May 2015 Kickoff meeting for H21 LCG project

Jan 2016 Dan Sadler seconded to UK government as Technical Advisor Future of the Gas Networks

11 July 2016 H21 Leeds City gate Official Launch – IMechE London

Aug/Oct 2016

Jan 2017 - H21 Strategic Modelling Major Urban centers **(£440K)**

Jan 2017 – H21 North Of England **(£1m)**

Jan 2017 – H21 Domestic and Commercial metering **(£360K)**

Jan 2017 – H21 Keighley and Spade Adam Design **(£280K)**

April 2017 – BEIS Announce **£25m** Downstream of the Meter Programme

Oct 2017

Nov 2017 Ofgem Award H21 NIC **£10.3m**

March 2018 H21 – Field Trials Design **(£550K)**

March 2018 H21 – East London **(£400K)**

Sept 2018 H21 – North or England Launch

2012

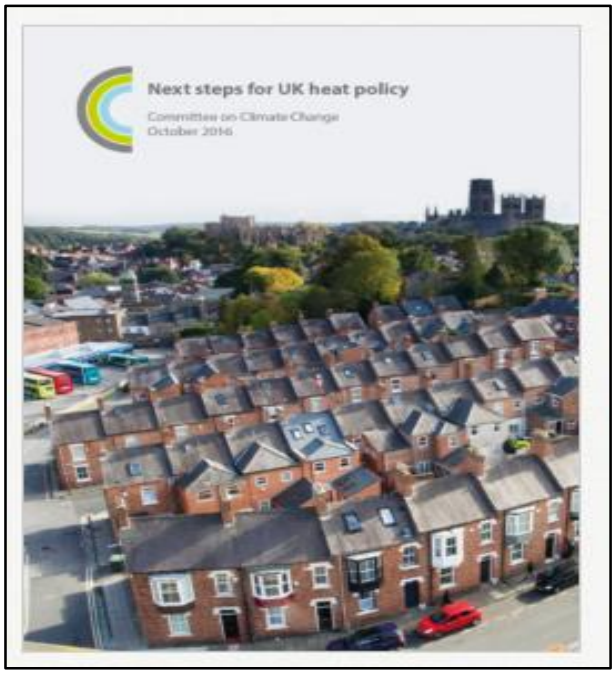
Aug 2016

Oct 2016

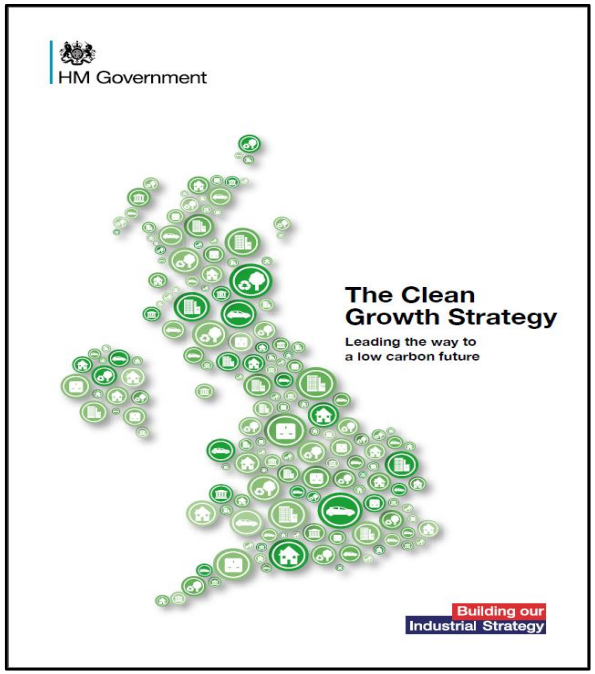
Oct 2016

Oct 2017

The UK Government is setting strategic direction



October 2016

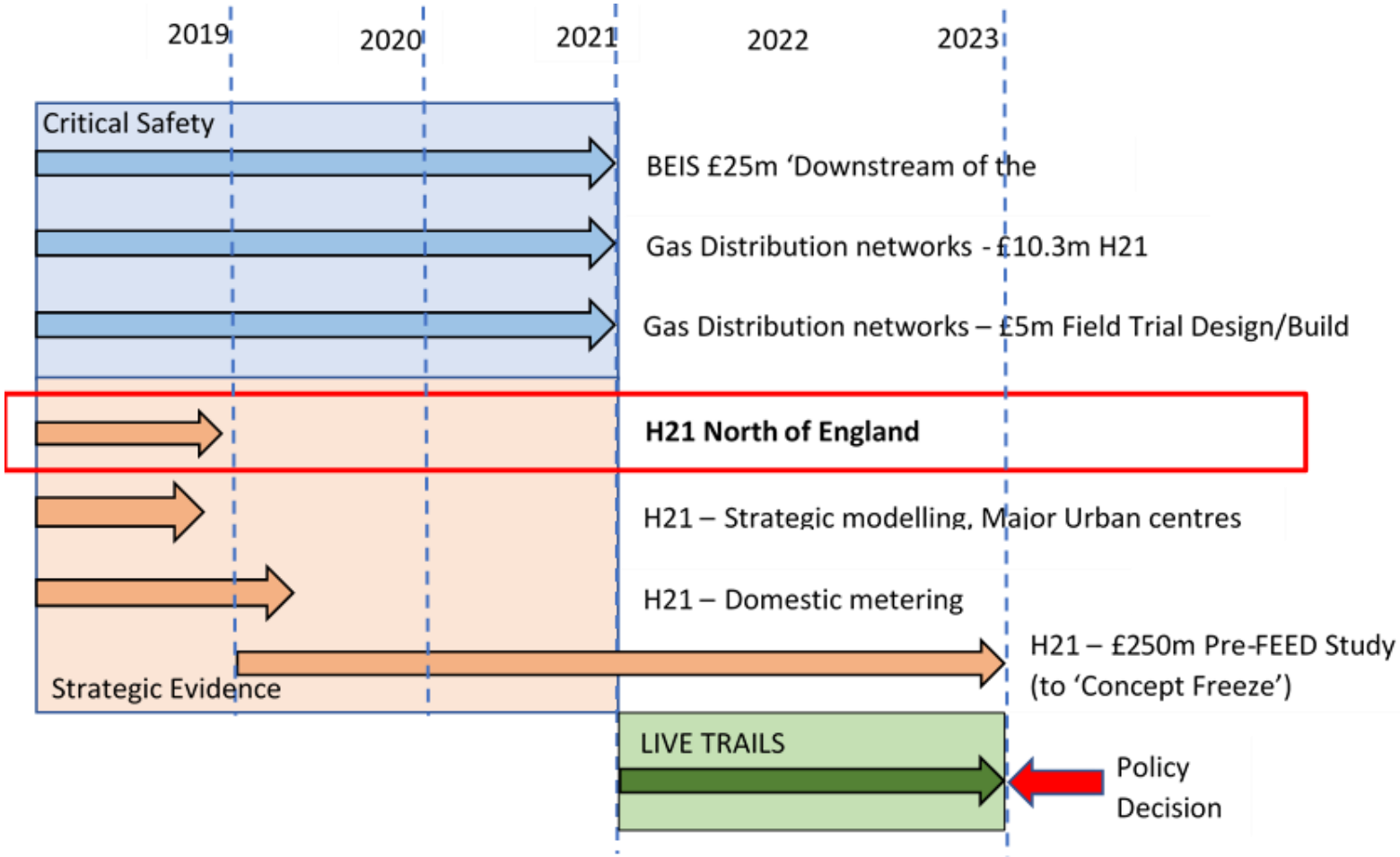


October 2017

Hydrogen pathway: …'**we use hydrogen to heat our homes and buildings, as well as to fuel many of the vehicles we drive in 2050 and power the UK's industry**. We adapt existing gas infrastructure to deliver hydrogen for heating and a national network of hydrogen fuelling stations supports the use of hydrogen vehicles. A large new industry supports hydrogen production using natural gas and capturing the emissions with CCUS.' (clean Growth Plan)

"We will also continue to explore the long-term options for clean heating and the many potential uses of low carbon hydrogen" (page 45, Industrial Strategy)

Timeline to a Potential UK Policy & Conversion



A Remaining Obstacle: Critical Evidence

Government Programme - £25m
(Hy4Heat) Downstream of the meter

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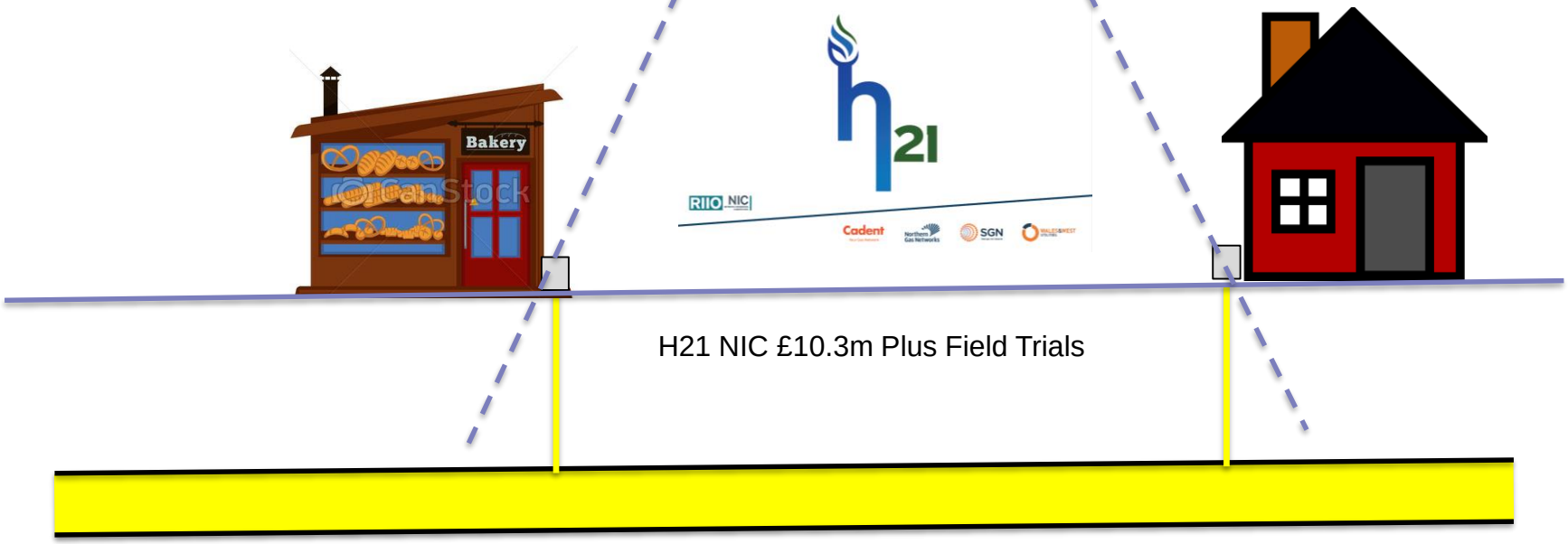
(Hy4Heat) Downstream of the meter

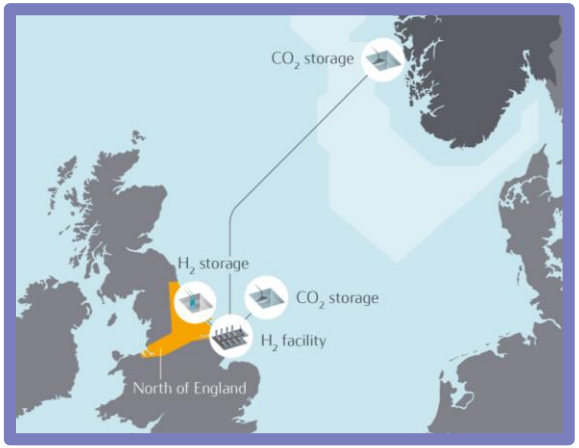
- Safety evidence
- Capital Stimulus to the Appliance Market



A Collaborative Project Involving all the Experts

H21 North of England Hydrogen Supply Concept

based on proven and referenced technology



Key Features

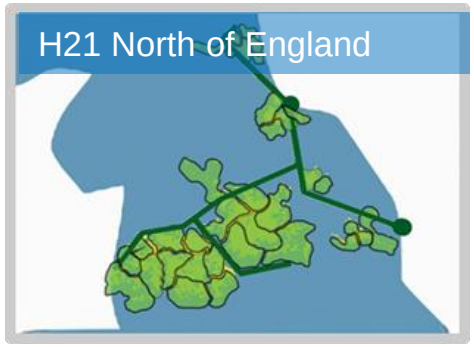
- Conversion between 2028 and 2035,12.5% of UK population covered by one project.
- Design capacity of 85 TWh, Decarbonising heat using existing infrastructure.
- Production in UK based on reforming of natural gas and CCS (17-18 million CO2 per year avoided)
- Equivalent security of supply during peak winter (the beast from the east).
- Offshore CO2 storage in either UK or Norway
- Supporting decarbonization of transport with hydrogen fueling stations
- Supporting decarbonisation of electric decentralized and centralized generation.
- Facilitating unlimited system coupling between gas and electricity.

Energy Flexibity in Europe

Gas provides (Currently Natural Gas) Europe with more than 1500 TWh of flexible energy. A proven resilient, robust system developed over more than 80 years

What is 1500 TWh ?

Circa 50 x

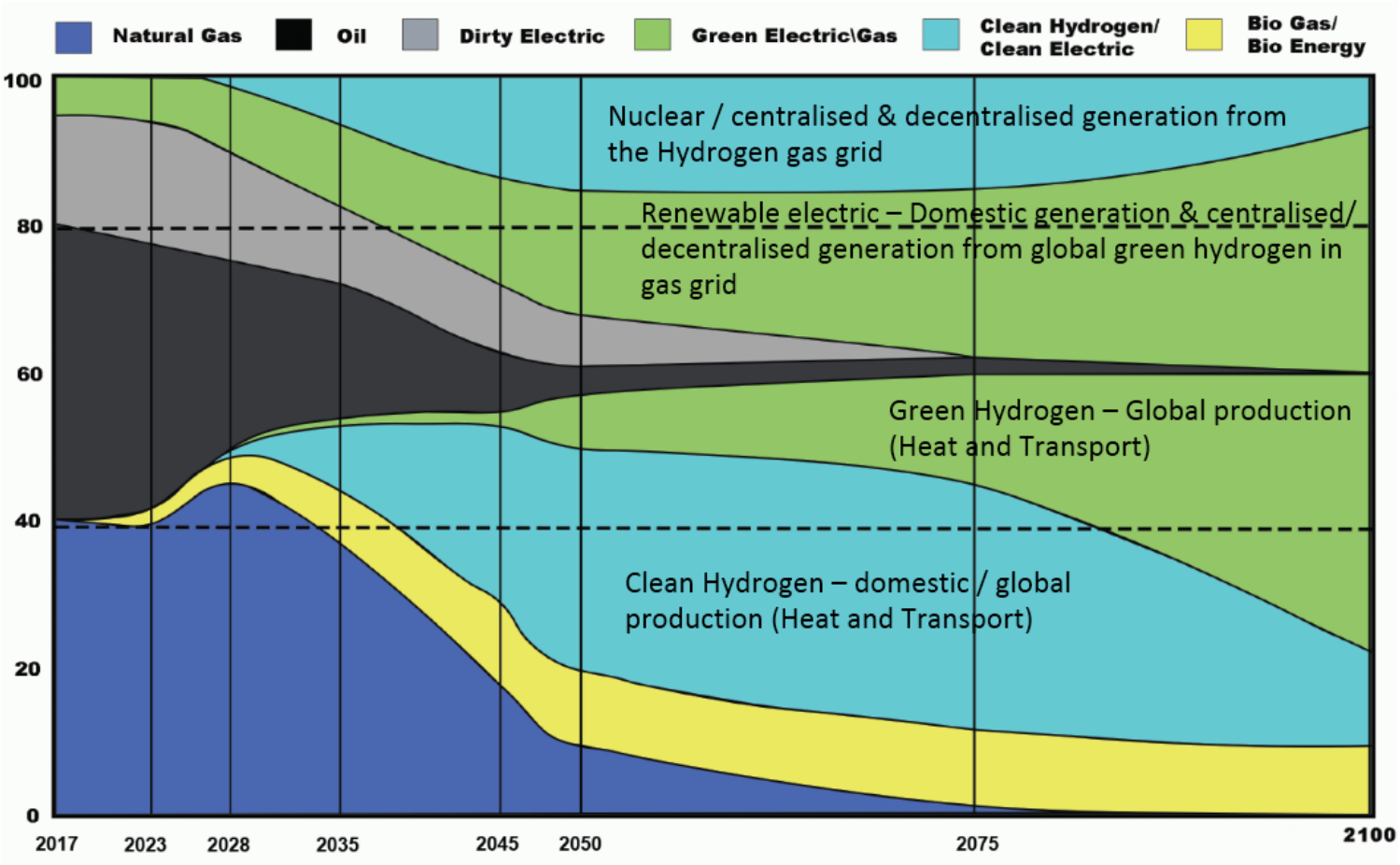


11,600,000 x

20,000,000,000 x

200 x

The Clean to Green Ambition



Policy Decision

Sadler's Graph; The onset of the UK/Global hydrogen economy (illustration Only)

h21