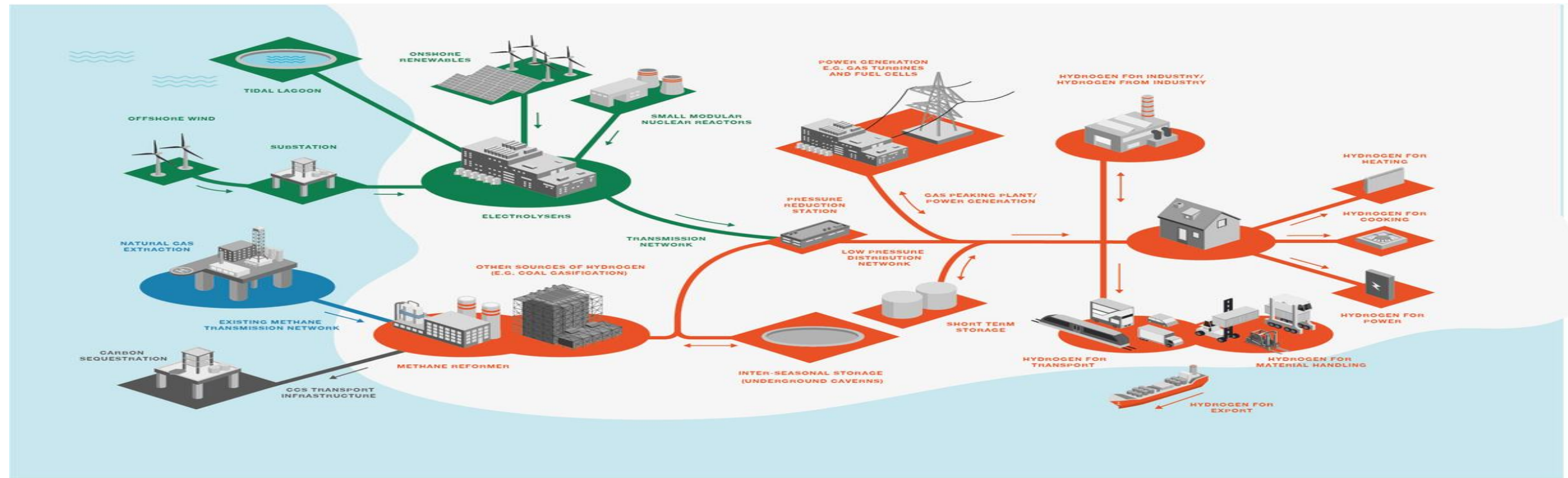


All-Energy Dcarbonise Week 2021 - Virtual Sustainability Summit

A Hydrogen Vision for Teesside

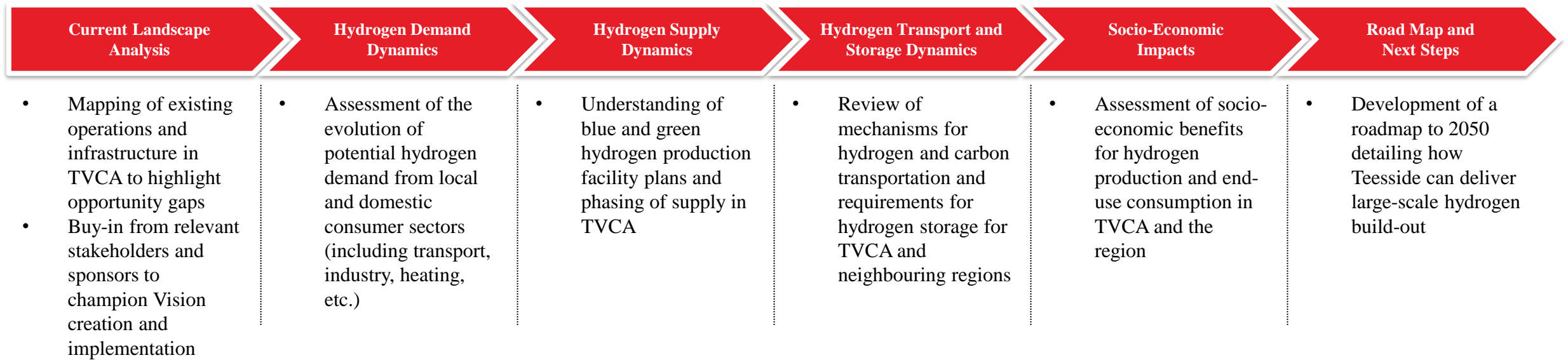
6th October 2021



Teesside has tremendous potential to achieve national ‘SuperPlace’ status by accelerating the deployment of hydrogen technologies and establishing a hydrogen economy in the cluster

A multi-step approach is essential to develop a roadmap which articulates Teesside’s most effective pathway to decarbonisation through a clear vision for hydrogen

Teesside Hydrogen Vision Methodology

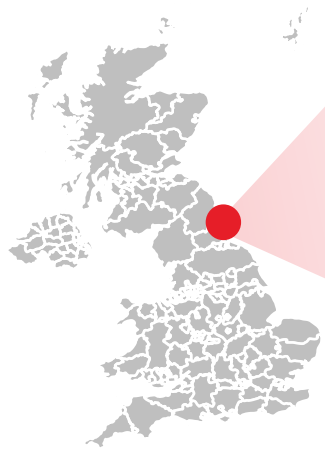
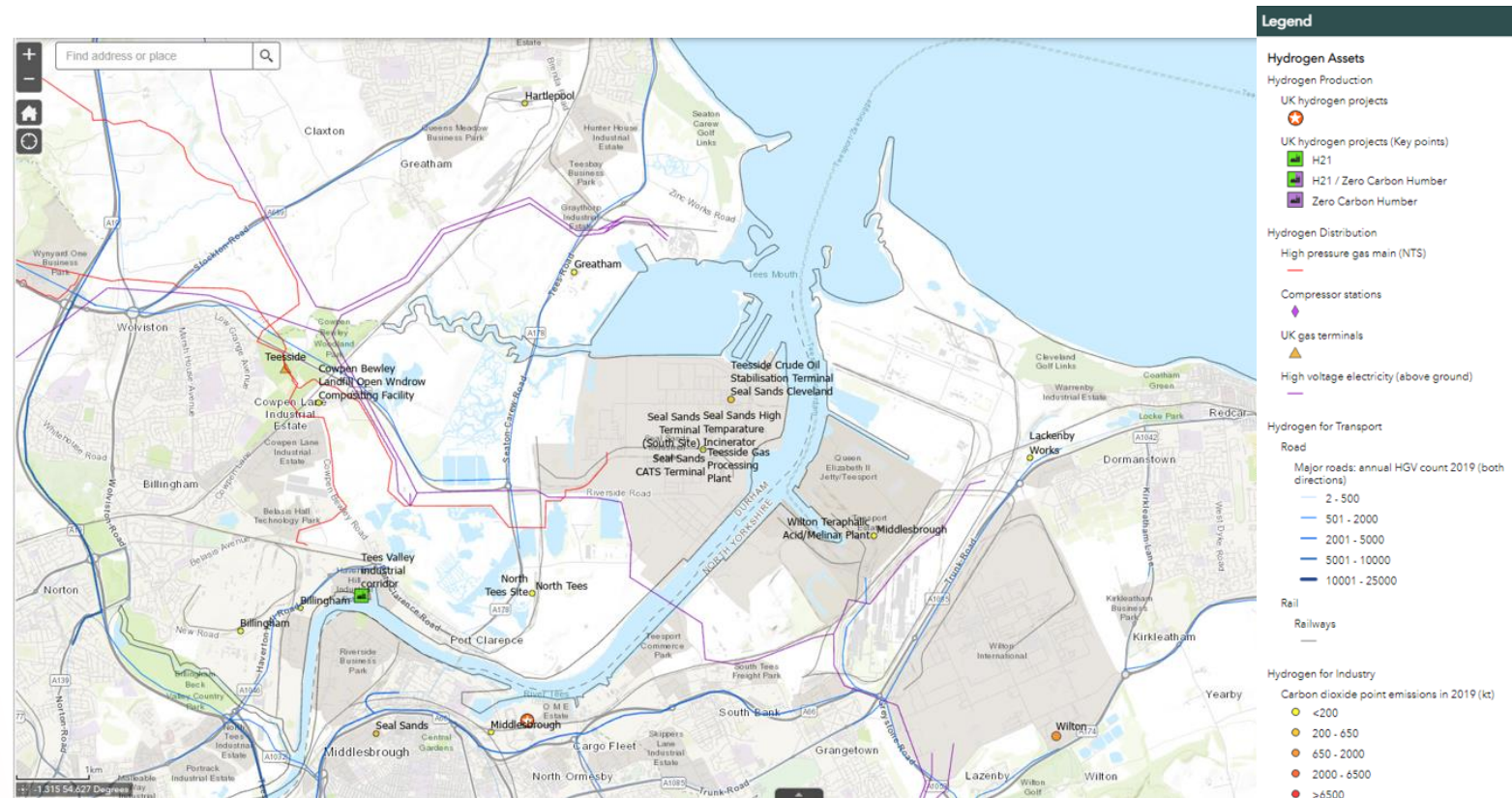
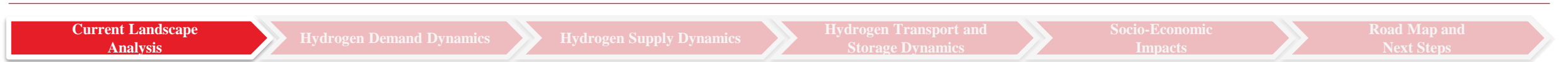


The development of a valuable Hydrogen Vision for Teesside will require collaboration between different sponsors, supporters and experts

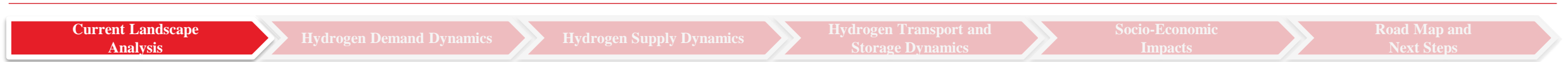


A Hydrogen Vision will set out an ambitious roadmap to materialise opportunities in the industry and develop a concrete action plan to achieve these targets

There are already ongoing ambitious plans to deploy large-scale hydrogen production facilities in TVCA which will cater to growing end-use demand in the region



Engagements with different stakeholders within the Teesside region are required to understand their ongoing work in the area and draw on existing information and their plans and aspirations

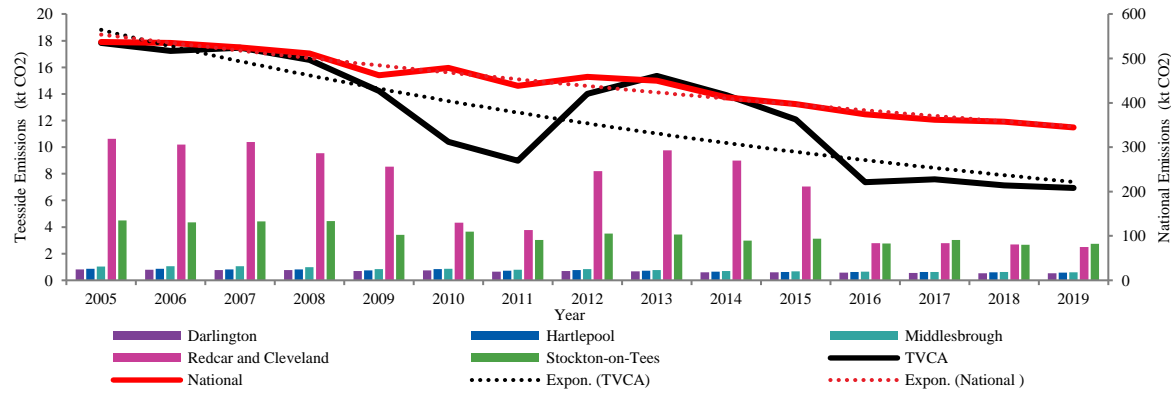


Consumer Group	Role in the Vision	Example Stakeholders
Hydrogen Producers	Key players involved in the production of blue and green hydrogen in the cluster	
Hydrogen Offtakers	Potential consumers of hydrogen in the region within and beyond the industrial cluster	
Transport and Storage	Key players involved in transporting and storing hydrogen and/or Carbon from production to end use/storage	
Key Local Authorities and Government Bodies	Important stakeholders shaping the regions strategy, involved in planning and approvals and responsible for allocating funding	

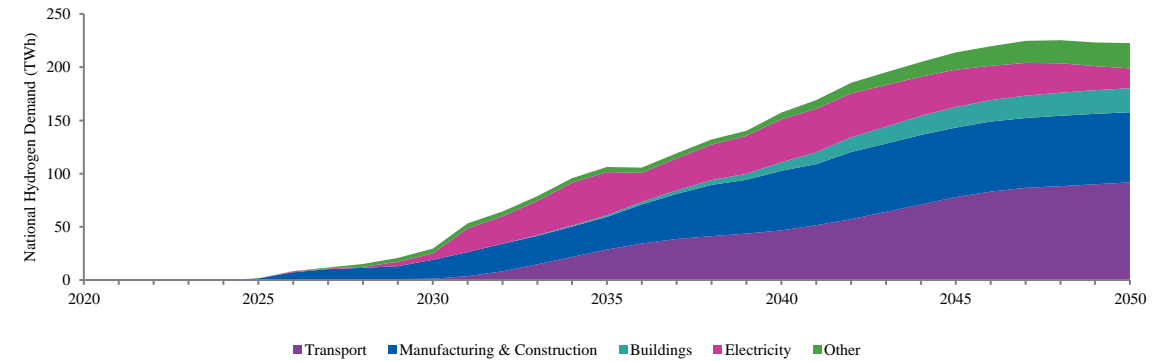
The decarbonisation of the Teesside Industrial Cluster will have a significant impact on UK energy systems transitioning towards green alternatives and achieving net zero



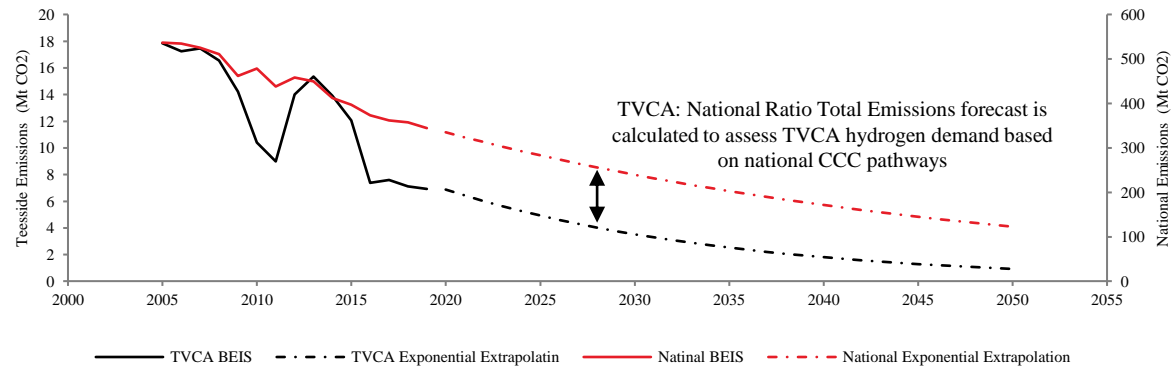
Teesside and National Total Emissions¹



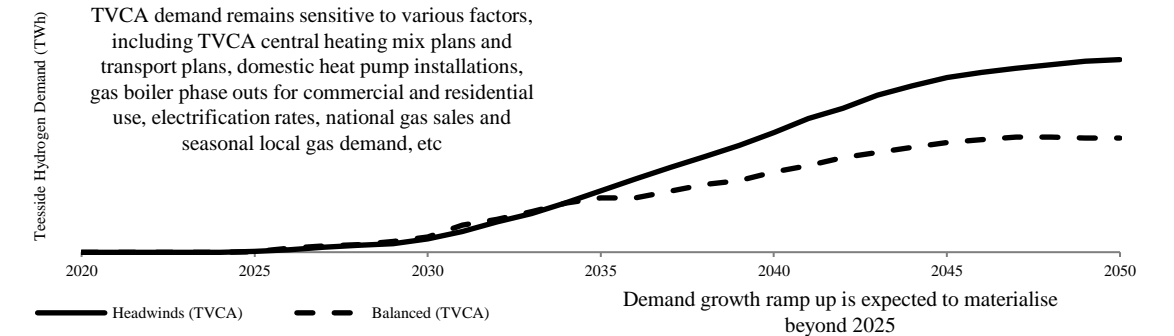
National Low Carbon Hydrogen Demand²



Recorded and Extrapolated Total Emissions



Teesside Low Carbon Hydrogen Demand Scenarios²



Source: 1 – BEIS (Updated energy and emissions projections 2019); national BEIS emissions exponential trendline has been applied to derive TVCA total emissions forecast

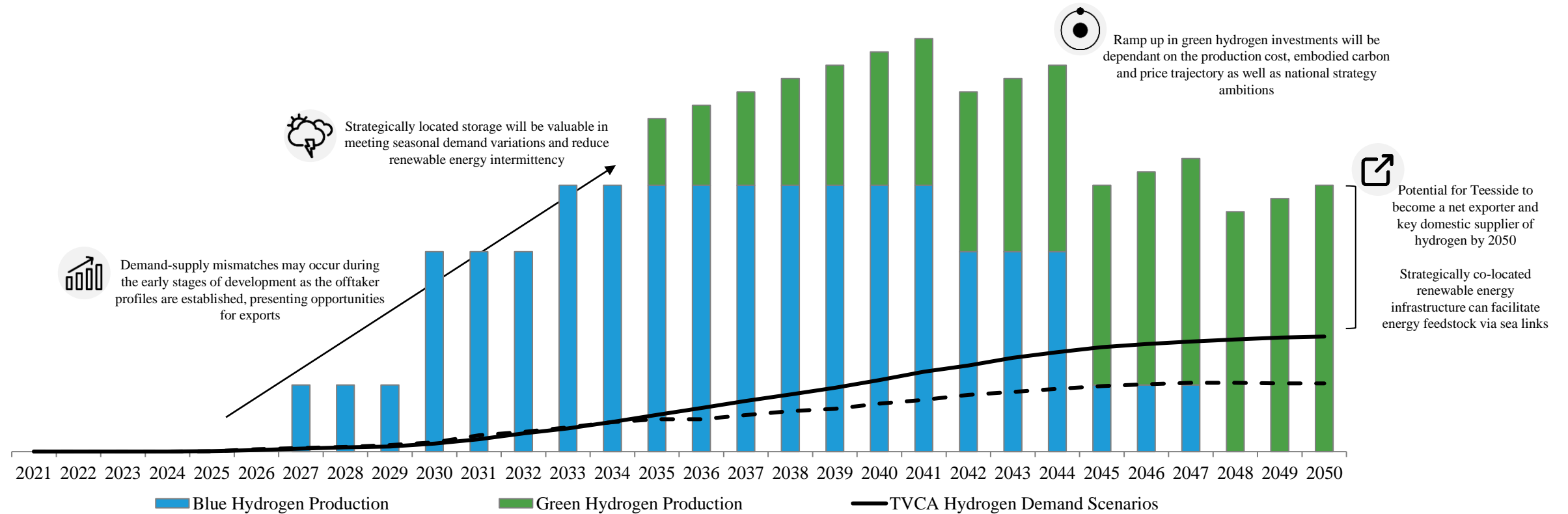
2 – CCC (Sixth Carbon Budget, Balanced Net Zero Pathway); Balanced pathway assumes moderate behavioural change and innovation, hybrid hydrogen scenarios in homes and a balance of electrification and blue hydrogen facilities. Headwinds pathway assumes higher blue hydrogen uptake than electrification with wider use of CCS. National CCC pathways are scaled to TVCA by total TVCA:National ratios (BEIS Updated energy and emissions projections 2019)

Future hydrogen demand in TVCA can be fully met through a combination of planned blue and green hydrogen supply sources which also present opportunities for export

The ramp up of various hydrogen production facilities in Teesside will indicate the requirement for energy storage and carbon capture and storage infrastructure

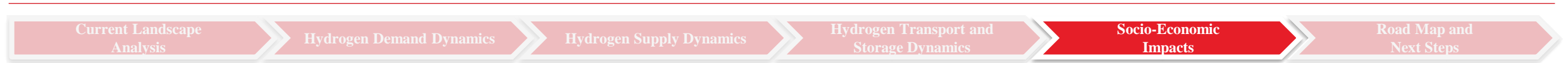


Teesside Hydrogen Demand and Supply Forecast



Source: TVCA; CCC (Sixth Carbon Budget, Balanced Net Zero Pathway); Balanced pathway assumes moderate behavioural change and innovation, hybrid hydrogen scenarios in homes and a balance of electrification and blue hydrogen facilities. Headwinds pathway assumes higher blue hydrogen uptake than electrification with wider use of CCS. National CCC pathways are scaled to TVCA by total TVCA:National ratios (BEIS Updated energy and emissions projections 2019)

The deployment of hydrogen production in TVCA can pose direct benefits for the region and the UK and unlock long-term economic, social and environmental benefits



Increase educational attainment to fill labour and skills shortages and develop a fit for purpose labour force to cater to existing sub-sectors and emerging sectors

- Safeguard jobs in emissions-intensive and trade-exposed sectors by enabling low carbon production and improving competitiveness in international markets
- Ensure residents are able to access primary education with direct links to local employment opportunities
- Position the region as a leader in the industry allowing the UK to capture significant global market share



Boost levels of economic activity and diversify revenue streams by supporting business growth and inward investment companies

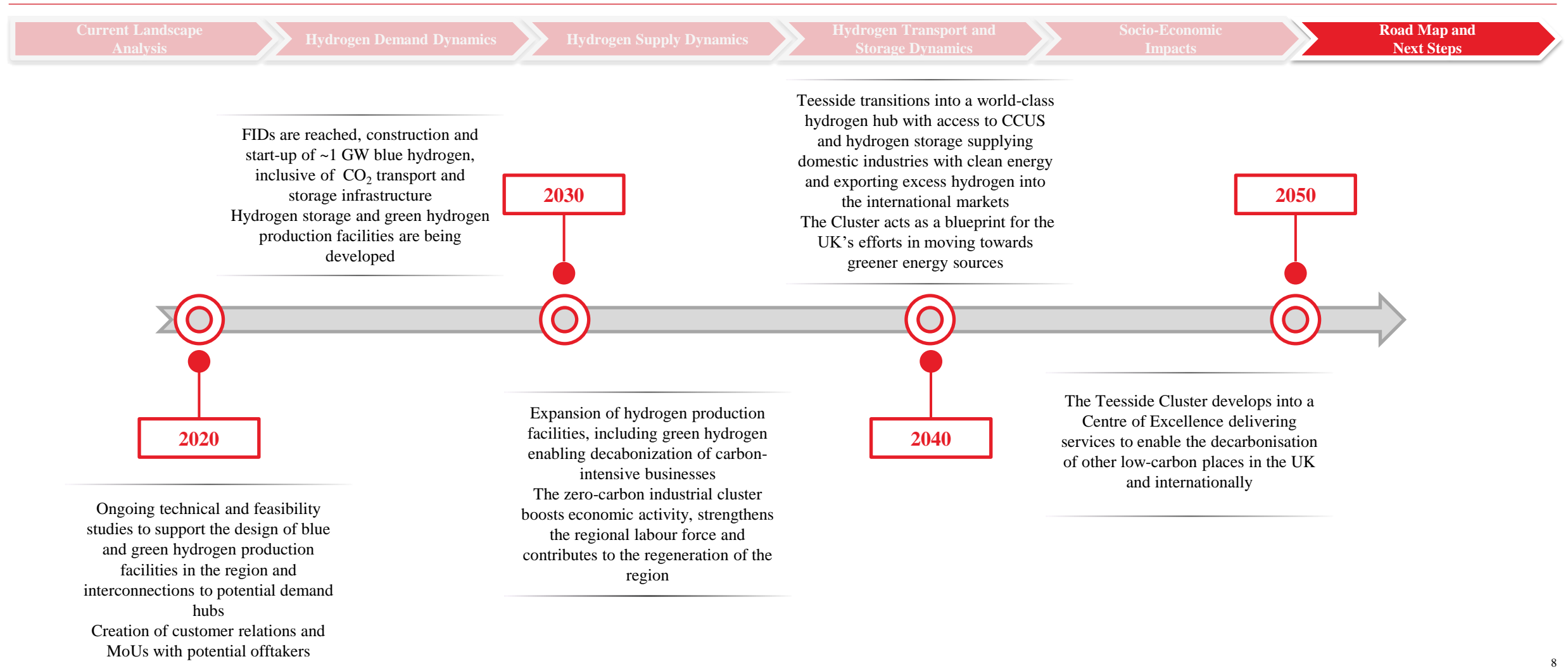
- Expenditure increase during the development and construction of retrofits and new build hydrogen + CCUS infrastructure projects, including manufacturing of required components
- Unlock potential future import and export markets for services (engineering, installation, operation of facilities), energy exports and carbon imports from heavily industrialised areas in Europe



Improve supply chain sustainability and promote low-carbon fuel production

- Decarbonise proximate carbon-intensive business (targets to capture up to 10 Mt CO₂ emissions each year)
- Significant contributions made to the UK Government's targets to develop 5GW hydrogen production by 2030

A roadmap for the delivery of the Teesside Hydrogen Vision will require timescales and indicative private and public sector enabling actions for the delivery of large-scale hydrogen production build-out and other related opportunities



ARUP