Cluster Mapping Report: Hynet Northwest (NW Industrial Cluster)

Dr Diarmaid Clery and Dr Clair Gough,
Tyndall Centre for Climate Change Research, University of Manchester

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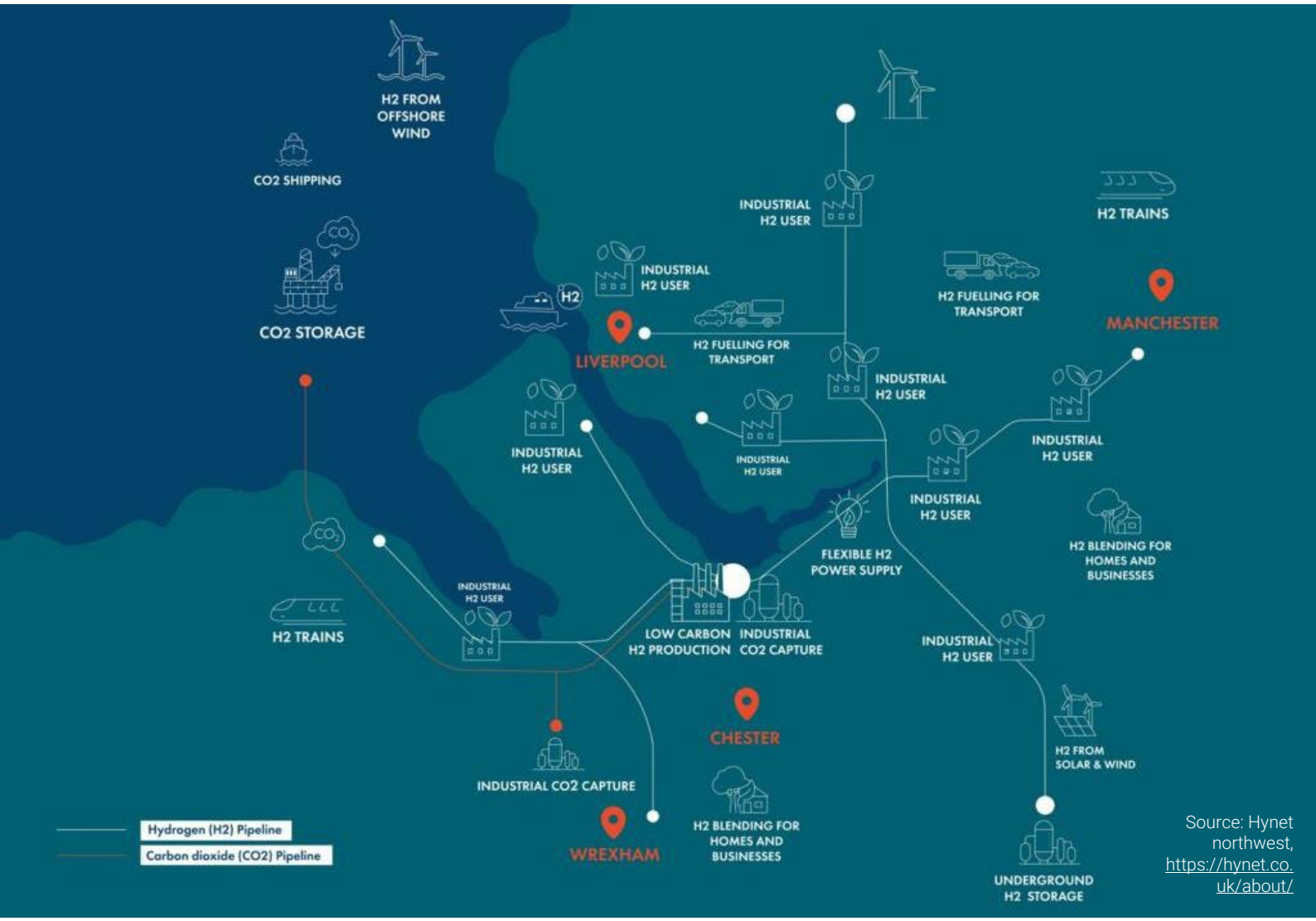

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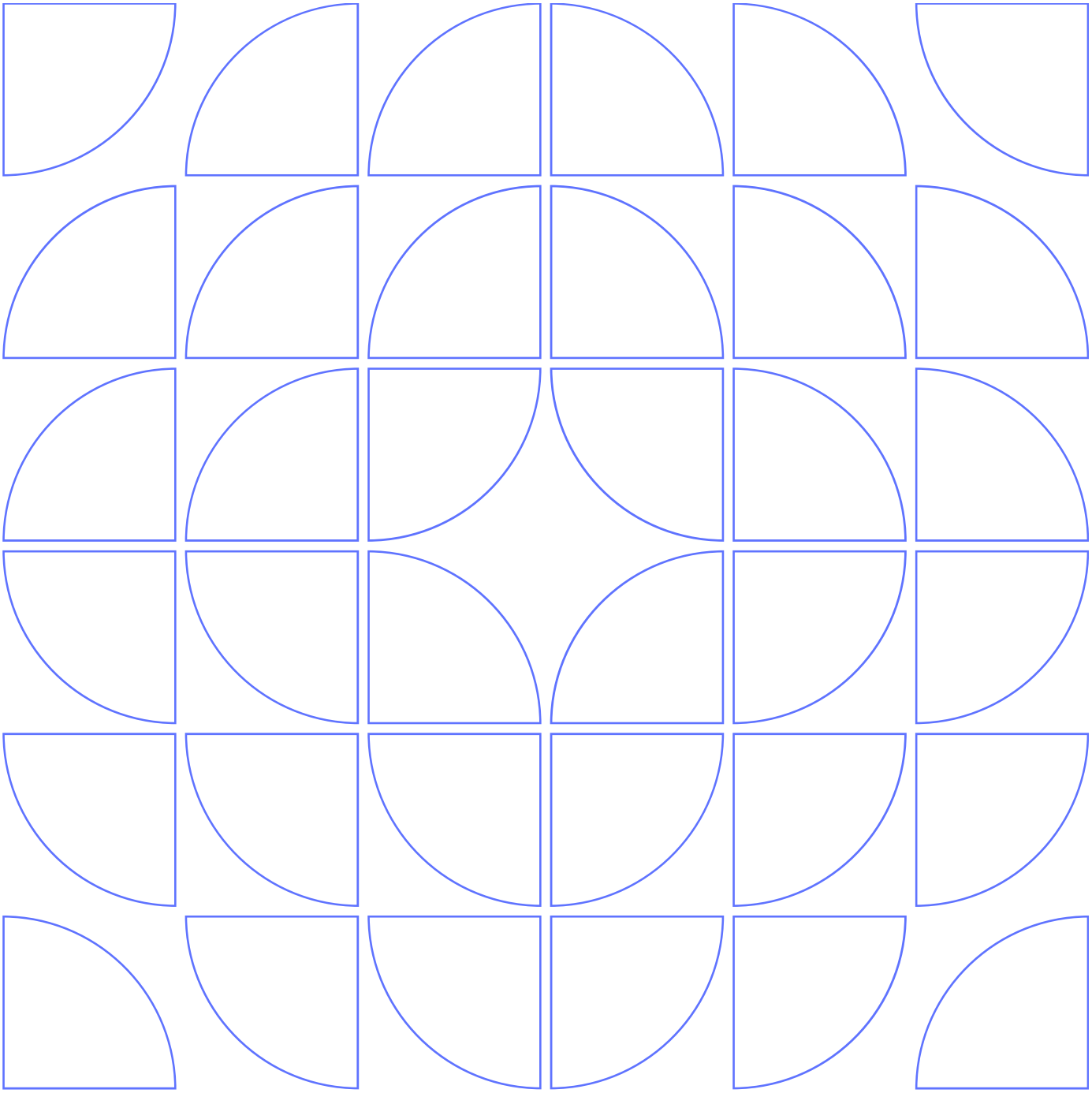

Introduction

This report provides a brief summary of the NW Industrial Cluster, accounting for the unique configurations of industries, geographies, historical and environmental factors. The purpose of this report is to set out the broader context for building a social licence to operate (SLO) for the region's industrial decarbonisation, as a resource for stakeholders across academic, industrial, NGO and policy communities. It should be seen as a 'living document' which will be reviewed and updated over the course of the project, informed by a series of deliberative workshops with stakeholders and citizens from across the region. A summary of the first of these workshops can be found in the Appendix to this document.

To accelerate industrial decarbonisation at scale, low carbon technologies (including carbon capture usage and storage (CCUS) and Hydrogen production) require a strong social licence to operate (SLO). SLO refers to the level of support for projects and technologies assembled to deliver industrial decarbonisation in the region. A very low level of social licence may be enough for a development to proceed and be tolerated but fragile support may signal risks to developers and societal stakeholders alike. Better outcomes will be achieved with higher levels of social licence, whereby projects are identified as credible and legitimate approaches to delivering decarbonisation, and dependent on establishing trust between societal actors and those responsible for developing, delivering and regulating projects. It is thus important to understand specific contexts and past events which will influence the evolving social licence.

The IDRIC project 'protective spaces and social licence to operate industrial decarbonisation in the clusters' aims to develop a blueprint setting out the cluster-specific conditions and challenges associated with developing a social licence in the HyNet NW and Humber clusters respectively. This report marks the first phase in this process and presents the backdrop to plans for a zero-carbon cluster.

The UK Industrial Decarbonisation Challenge

The UK Industrial Decarbonisation Research and Innovation Centre (IDRIC) is the national focal point and international gateway for UK industrial decarbonisation research and innovation. The project 'protective spaces and social licence to operate industrial decarbonisation' is part of IDRIC's extensive multidisciplinary integrated research programme. As part of the '10 point plan for a green industrial revolution[1]' (2020) within the Net Zero Strategy (2021), the UK Government has committed to establish two low carbon industrial clusters by mid-2020s and four by 2030, with a national target of 20-30 $MtCO_2$ captured per year by 2030[2].

Since 2019, the UK Research and Innovation (UKRI) Industrial Decarbonisation Challenge Fund (IDCF) is investing £170m, across a two-stage process, with a further £261m matched by projects' industrial partners. Six industrial clusters across the UK have received funding for cluster plans and roadmaps (Phase 1) and nine deployment projects (Phase 2) developed by consortia of industrial and local and regional government. The BEIS Cluster Sequencing Process has awarded 'Track 1' status to two of these clusters: the East Coast Cluster (comprising the Humber and Teesside) and the HyNet cluster in the Northwest (NW), to proceed with developing 'Front End Engineering and Designs (FEED)' studies for carbon dioxide and hydrogen transport and storage infrastructure and bid into the CCS Infrastructure Fund[3]. During 2022, Phase 2 of the UK cluster sequencing programme will identify emitters (power, industry or hydrogen) that may connect to the Track 1 clusters.

In 2020, the NW secured Stage 1 funding for a short feasibility study for **HyNet CCUS** and the **North West Hydrogen and Energy Cluster: Route to Net Zero** to begin developing the cluster plan for the transition to net zero for industry in the North West of England and North East Wales. The Hynet NW project aims to support 6000 jobs locally.

In 2021, Stage 2 of the ISCF provided additional funding for cluster plan and deployment projects. In the NW, the **Net zero NW Cluster Plan**[4] project aims to identify the technology, infrastructure and investment needed for industry in NW England and north east Wales to become net zero by 2040. The plan aims to create 33,000 jobs and store 10 $MtCO_2$ by 2030. The **HyNet Onshore and Offshore projects for hydrogen production and**

CCUS will develop the hydrogen and CO_2 transport network to connect production to demand and storage sites.

North West England (NW) Cluster Overview

The NW cluster region spans Cheshire, Lancashire, Merseyside and northeast Wales with several major conurbations including Manchester and Liverpool; the region is well-connected by road, rail, and the Manchester Ship Canal inland waterway, with international airports at Manchester and Liverpool. Two estuaries, the Dee and the Mersey (served by the Port of Liverpool) feed into Liverpool Bay and the East Irish Sea beyond. There are three Local Enterprise Partnerships (LEPs), Manchester, Liverpool and Cheshire, bringing together businesses and local authorities, and the region includes the two Combined Authorities, Greater Manchester and Liverpool City Region, each with an elected Metropolitan Mayor.

The Hynet NW cluster focuses on building a **low carbon hydrogen economy**, supplying hydrogen to industry and into the existing natural gas network. The deployment project is mostly located within the Cheshire West and Chester Local Authority and Liverpool City Region Combined Authority (LCRCA) who have net zero targets of 2045 and 2040, respectively.

The region has a long-held strategic importance for national energy supply and industrial processing and the cluster hosts significant **heavy industry** and **power generation facilities**, including one of the largest oil refineries in the UK (the Stanlow refinery in Ellesmere Port), several gas turbines, biomass and energy from waste facilities and more than 30 large manufacturing facilities (including glass, cement, fertilisers and chemicals); 341,000 people are currently employed in the manufacturing sector in the NW[5]. Estimates by Net Zero North West[6] suggest that by 2040 economic investment in industrial decarbonisation and clean growth could support 660,000 jobs across the NW, the majority being within the cluster.

There is also significant **offshore wind** capacity in the Liverpool Bay Area, including the UK's first major offshore renewable power project (at North Hoyle) and extension projects at Burbo Bank Offshore Wind Farm. Proposals for a new **nuclear** plant at Wylfa in north Wales (which ceased generating in 2015) were withdrawn in 2021, although, the location is identified in the UK's Net Zero Strategy as a potential site for new nuclear generation.

The Cheshire energy innovation district encompasses the region's energy production, energy-intensive industry and associated supply chains, with an R&D site at Thornton Science park, which sits within the Enterprise Zone of the **Chester Science Corridor** and includes the Cheshire Geoscience observatory (operated by the British Geological Survey), which from 2022 will provide experimental infrastructure for research and testing of geoenergy technologies, including CO_2, hydrogen and energy storage.

The region's long-term **Cluster Plan** is led by its industrial partners through the Net Zero North West consortium, supported by the region's three LEPs and two Metro-Mayors for Liverpool and Manchester. Within the plan, HyNet NW cluster includes the development of a **Hydrogen Production Plant** (HPP) in Ellesmere Port, producing 'blue' Hydrogen from natural gas with carbon capture, connected to **new CO_2 and hydrogen pipelines**. Hydrogen can enable nearby industrial processes (e.g. glass production) to decarbonise by switching fuels and as part of a wider hydrogen economy. The CO_2 pipeline will enable CO_2 captured from hydrogen production, fertilisers, cement and oil refining in the region to be transported through the Point of Ayr gas terminal, for storage in depleted gas fields in Liverpool Bay. The **CO_2 storage** site in the Hamilton & Lennox gas field is relatively close to shore and enables the repurposing of existing on- and offshore infrastructure which may reduce costs, risks and complexity of decarbonisation projects. Salt caverns in Cheshire have been exploited for salt extraction since before roman times[7], and for gas storage since the 1980s, and provide the potential for onshore **hydrogen storage**.

Other projects are also exploring the potential to use hydrogen as part of a wider hydrogen economy in the NW including its use in road and rail transport (e.g. HyMotion; Project Vanguard) and within the existing natural gas network for use in homes (HyDeploy). Longer term possibilities to link facilities to the Hynet CO_2

and hydrogen pipeline networks and offshore transport and storage infrastructure, include potential carbon negative bio-hydrogen and 'green' hydrogen production (with renewable energy from Mersey Tidal Power for example).

Partnerships and stakeholder networks

The NW has built a strong regional identity across its industry and business communities, with a variety of consortia focused on supporting different priorities. These include:

- **Net Zero NW (NZNW)**, led by industry and supported by the city regions, LEPs and local academia, established in 2019 to develop the industrial cluster. It launched a NZNW manifesto[8] in 2021, setting out its vision for HyNet, and other hydrogen production and storage facilities, CCS, renewable energy (including biomass, solar, wind tidal).
- **Hynet NW** brings together 8 core partners, supported by 24 industrial partners interested in the connecting to the region's proposed low carbon hydrogen production and distribution networks.
- A founding member of NZNW, the **North West Business Leadership Team** (NWBLT) brings together businesses across the region to promote investment in innovation and economic development.
- The **NW Hydrogen Alliance** of industrial members supporting the promotion of the region as an industrial hydrogen cluster in the North West and is a NZNW consortium partner.
- **Cheshire Energy Hub** is an industry funded organisation supporting the strategic development of the county's energy sector, launched the Energy Innovation district and is a NZNW consortium partner.
- **Invest net zero Cheshire** is an initiative developed by Cheshire and Warrington LEP and the Cheshire energy hub to identify investment projects that can contribute to achieving net zero energy in Cheshire
- The **Industrial Decarbonisation Research and Innovation Centre (IDRIC)** is leading a large research programme associated with the UK clusters. The Hynet NW cluster also collaborates with several UK universities, and the **University of Chester** is a partner of the cluster development consortia.
- **E-port Energy Consortium** has developed a ten-year investment plan[9] for low carbon energy in the industrial area around Ellesmere Port.
- The **Mersey Dee Alliance** of local and regional government and higher education across north east Wales and NW England, to promote strategic economic growth, including support for Hynet.
- **Chester Sustainability Forum** of environmental campaign groups, local businesses, cross-party local government representatives, and is chaired by the local MP.

Public engagement with energy or industrial infrastructure

Past campaigns

The social licence for industrial decarbonisation projects will be influenced by earlier industrial and energy developments in the region. Previous interactions between actors involved with advocating, governance and regulation, and campaigning may shape trust and attitudes between all parties for many years, even in relation to plans associated with different technologies and rationales. Energy developments in the region have attracted significant levels of local opposition in recent years. The most high-profile of these relate to shale gas exploration (fracking), which ultimately failed to establish a social licence to operate. From 2010, until a moratorium in 2019, developers faced campaigns from local and national opposition groups, alongside political disagreement between Lancashire County Council, local MPs and national government. Primary concerns related to groundwater pollution, noise and traffic impacts, increased seismicity (earthquakes) and climate impacts of expanding gas production against arguments from proponents citing economic and energy security benefits. Operational since 2013, the construction of underground salt caverns for a gas storage facility at Byley in Cheshire started in 2008 following a lengthy planning process for the development including a public inquiry in 2002. Opposition to other facilities in the region include current plans to expand the Gwynt y Môr offshore wind farm facing renewed opposition from a campaign group which objected to the original development in 2015 on grounds of visual impacts to the landscape. The campaign group 'People

Against Wylfa-B' (PAWB), established in 1988, remains active in the region, opposing any further nuclear development at the site.

Public engagement with the cluster plans and projects

BEIS and UKRI recently commissioned a public dialogue[10] to explore opinions relating to carbon capture usage and storage (CCUS) across four of the industrial clusters. Participants in each region attended seven online workshops in 2020, expressing conditional support for a role for CCUS in achieving net zero emissions. In the NW region, citizens were drawn from Liverpool, some of whom expressed concerns over the safety of CO_2 transport and storage and possible leaks to the marine environment, seen as a counter-intuitive way of tackling climate change (a view also expressed in relation to biomass CCS). A few members of the Liverpool group were strongly opposed to CCUS, concerned that oil and gas companies would profit from the approach and considered other issues (such as Covid recovery, child poverty) to be a higher priority for investment. The potential for regional jobs is a key narrative across all cluster plans, and participants across the study expressed concern that jobs should benefit local communities. A set of ten criteria were developed during the BEIS dialogue process to guide the future deployment of CCUS technologies:

The entire CCUS process must be safe.	Guaranteed contribution to net zero
Independent oversight and regulation.	Cost effective and timely.
Clear benefits for local communities.	One of several measures to reaching net zero
Meaningful local engagement.	Limit damage to wildlife and the natural environment.
Minimise disrupt to local residents.	Transparency in funding and awarding contracts

Cluster plan projects have conducted formal consultations as part of the planning application process, with participation and information coordinated through a web-based consultation hub[11]. As a nationally significant infrastructure project, the HyNet North West carbon dioxide pipeline requires a Development Consent Order from the planning inspectorate and the Hynet Hydrogen Production Plant at Stanlow has applied to Cheshire West and Chester Council for planning permission.

A consultancy report[12] on the pipeline for the HyNet North West project revealed some opposition to the development of a pipeline to transport CO_2 from industries in Stanlow and Ince to Liverpool Bay, with only 26% of respondents supporting the pipeline, highlighting the safety of CO_2 transport and storage as a key issue in securing a SLO.

Comments received during the Hynet 'Hydrogen Production Plant' consultation[13] related to environmental impacts, health and safety, traffic and economic benefits. Specific concerns were raised about impacts on the nearby village of Elton, as well as others including CO_2 leakage (with comparisons to fracking) and the continuing use of fossil fuels, including a comment citing academic research that blue hydrogen does not support the transition to a net zero economy. Some comments were also registered in support of the project.

In addition to the formal consultation process, many of the region's industrial facilities have their own ongoing community engagement programmes via newsletters, dedicated websites or through local representatives at forum meetings.

Conclusion

This report aims to summarise the context for industrial decarbonisation in the Northwest region in a way that is useful to a variety of stakeholders in the region. The unique configuration of industry, geography, historical, cultural and environmental factors in the industrial cluster is critical to the deployment of technology-based initiatives which must be seen as credible and legitimate climate change solutions, as part of a social licence to operate (SLO). The Hynet cluster has developed a strong identity around building a hydrogen economy in the region and beyond, supported by a well-connected network of diverse stakeholders. Previous controversies around fracking, for example, may impact trust in future proposed

developments but, unlike fracking, industrial decarbonisation initiatives benefit from cross-party support from local, regional and national governments.

The aim of this project is to assess the status of the SLO in the Humber and Hynet NW clusters, including an examination of key issues relating to low carbon technology deployment in the cluster from the perspectives of both stakeholders and lay publics. This report should be seen as a 'living document' which will be reviewed and updated over the course of the project, informed by a series of workshops with stakeholders and citizens in the region.

Summary

- This report provides a brief summary of the NW Industrial Cluster and the broader context for building a social licence to operate (SLO) for the region's industrial decarbonisation
- The NW cluster spans Cheshire, Lancashire, Merseyside and northeast Wales
- The region's **strategic importance** in national energy supply and industrial processing, includes one of the largest oil refineries in the UK (Stanlow in Ellesmere Port), several gas turbines, biomass and energy from waste facilities and large manufacturing facilities (including glass, cement, fertilisers and chemicals)
- The Hynet NW cluster has developed a strong identity around building a **low carbon hydrogen economy**, supported by a well-connected network of diverse stakeholders
- The region's long-term **Cluster Plan** is led by its industrial partners through the Net Zero North West consortium, supported by the region's three LEPs and two Metro-Mayors for Liverpool and Manchester
- With **Track 1** status, HyNet NW aims to secure funding from the CCS Infrastructure Fund to become operational by 2025
- HyNet NW includes the development of a **Hydrogen Production Plant** (HPP) in Ellesmere Port, producing 'blue' Hydrogen from natural gas with carbon capture, connected to **new CO_2 and hydrogen pipelines** providing the opportunity for fuel switching in local industrial processes
- The **CO_2 pipeline** may take CO_2 from hydrogen production, fertilisers, cement and oil refining to storage in depleted gas fields in Liverpool Bay, including the use of **repurposed on- and offshore infrastructure**
- Salt caverns in Cheshire provide the potential for onshore **hydrogen storage**
- **Previous controversies** around shale gas exploration (fracking), for example, may impact trust in future proposed developments. However, unlike fracking, industrial decarbonisation initiatives have cross-party support from local, regional and national governments and the potential economic and decarbonisation benefits to the region are more apparent
- **Formal consultations** on cluster plan projects have been conducted as part of the planning process for HyNet North West carbon dioxide pipeline and the Hynet Hydrogen Production Plant at Stanlow
- **Emerging issues** in securing a SLO include the safety of CO_2 transport and storage, the role of fossil fuels and their industries and the debate about the role of blue hydrogen in the transition to net zero

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Appendix: Stakeholder workshop summary

A participatory workshops was held on 3rd February 2022, attended online by stakeholders from the HyNet region. 11 participants attended representing industry, cluster consortia (e.g. LEPs), local government, and academia. Working in two separate breakout groups, participants provided feedback on the first draft of this report and contributed to facilitated discussions, summarised below. The outputs from this workshop will be analysed as part of the IDRIC project on Social Licence to Operate.

Session 1: Industrial decarbonisation in the NW

This session identified the key attributes needed to support industrial decarbonisation of the cluster, identifying particular strengths and challenges for the region. The NW region was considered to benefit from a strong industrial heritage, with existing physical infrastructure (such as pipelines, ports, storage sites etc) supported by a common shared vision held by region's stakeholders. Gaps were identified around a skilled workforce, good existing relations with communities and a need for wider understanding of what is proposed (e.g. infrastructure) amongst the public. Additional issues raised as potential challenges to the region's decarbonisation included: greater clarity on national policy for decarbonising sectors e.g. heat, hydrogen, business models; the uneven distribution of the benefits of decarbonisation across the region; the need to establish a timeline for the project that delivers both urgency and longevity; communication with stakeholders in other political geographies. Other factors flagged as important but identified as either strengths or challenges by different participants respectively, included: investment from industry and central government, industrial desire to change, consistent strong voice from the region to government and outside world.

Session 2 phrases and narratives

Session 2 explored some of the phrases and narratives relating to industrial decarbonisation in the region. Both groups discussed the use of terms '*Superplaces* and '*levelling up'*, then each group discussed other themes based on their inputs at the start of the session. The term *Superplaces* was first used in the Government's '10 point plan' to describe locations with significant renewable energy and infrastructure for industrial decarbonisation but was not considered to resonate outside of Government. Although noting that industry uses the terms that government uses when seeking funding, which can inflate the use of some terminologies, it was noted that Government appeared to be reverting back to the preferred industrial clusters terminology. However, some concern was raised that this could in turn exclude UK industry outside the clusters and unable to access funding. The '*levelling-up*' narrative was also met with scepticism, seen as another Government political 'buzzword', rather than a useful movement that would deliver any real change. The current strong emphasis on the term by Government was also linked to its use as a way to improve traction for funding. Mixed reflections on its meaning for the region identified the multiple types of levelling up, covering different sectors for example, and that it could be a horizontal rather than a vertical transition involving a change in skills - seen as 'making the north more like the south'. However, concerns were raised about how the costs would be met and whether it would benefit the more disadvantaged areas of the NW region.

The *net zero* concept was identified as being understood by wider publics in relation to mitigating climate change and fundamental to industrial decarbonisation, which is linked to positive associations with renewable energy and the need for a wider range of low carbon technologies. However, tensions relating to the broadness of the term were also identified, such as whether a broader definition of net zero and industrial decarbonisation linked to sustainability (e.g. jobs, being a profitable company) with implications for 'financial sustainability' aspects being contested as part of the term.

The cluster's identity and branding was discussed and the relative merits of Hynet, Hynet NW or Net Zero NW (NZNW). As a legacy name for the 'project', Hynet has come to represent multiple partners working as a collective. Although noted that it is a strong brand, its reach now extends beyond the NW England into north Wales. However, it can be difficult for people to initially understand what HyNet does and the implications for them – which is crucial to gain public support. Moving towards a net zero framing could take the focus away from blue hydrogen, which has attracted strong arguments, and widens the scope for multiple solutions. Some discussion around hydrogen sources – the use of *blue, green or low carbon hydrogen* was considered potentially confusing and polarising, with some environmental NGOs opposed to blue hydrogen.

Session 3 Key topics

Session 3 identified key topics relating to specific elements of hydrogen and CCUS supply chains, alongside more general issues relating to industrial decarbonisation, summarised in Table A1. For *hydrogen*, topics covered production, industry use, transport, storage; for CCS these included CCS for power, CCS for industry, CO_2 transport, CO_2 storage.

Hydrogen	CCUS	Industrial Decarbonisation
• Making the case for hydrogen • Use in different sectors • Challenges • Cost • Safety • Scale • Green/blue • Storage • Planning • Repurposing existing assets	• The history of CCS projects • Complementary to renewables • Benefits of repurposing existing assets • U of CCUS • Costs • Decarbonisation alternatives • BECCS • Shipping CO_2 • Storage (safety, leakage, capacity) • CO_2 transport • CO_2 storage concerns • Different to fracking	• What is it? • Benefits • Industry led • What is driving CCUS? Financial or regulatory? • Is it a vote winner for Government? • Understanding the scale of the problem

Table A1. Summary of key topics

Session 4 Trust and Confidence

In Session 4 participants considered factors affecting trust between, and confidence in, different sectors in the region, summarised below:

Local/regional government can be stepping stones in raising public awareness, mayors can also play a role, particularly for the high level context (e.g. jobs, why here etc). Net zero has accelerated local and regional ambitions that are ahead of national government ambitions but historically have been against many new industrial developments - attributed to the jobs gain being less than any vote loss from 'NIMBYs'. Local and regional government bring an understanding of who the actors are and their corporate history and roles and can build trust by playing an active role in local fora and building effective and transparent partnerships. However, a tension was identified between whether there is a lack of power in local government, which may affect public confidence or whether central government is used as an excuse for inaction, with potential for conflict arising through party politics which was identified as the critical factor in trust between local, regional and central governments.

In the relationship between *industry* and *central government*, trust is re-building following the previous CCS competitions, although there was criticism over the pseudo competitive process working against this. A current role of government was seen as stimulating investment from the private sector – with companies that are prepared to participate and constructively support pathways, e.g. in defining business models, gaining trust from government. Improvements in leadership, long-term strategy commitments and support for open collaboration were identified as needed from Government to deliver net zero, supported by multiple departments coming together to support cross-cutting projects. It was noted that public trust in central Government is lacking.

A lack of public trust in industry was considered to be linked to the pursuit of profit or other vested interests and viewed as being the cause of the problem - particularly in the case of the oil and gas industry, noting that not all industry is viewed in the same light and certain brands may be trusted by the public where a parent company might not be. Regulators were also attached to this distrust from the *public*, for being too 'soft' on industry. This lack of trust in *Industry* was also believed to be the case from *NGOs*, due to the historical lobbying against the IPCC and climate science. The public were perceived to have trust in *NGOs*, however recognising that they may not hold enough power to influence key decisions. *Academics* were noted as being potentially out of touch with the commercial reality of the real world.

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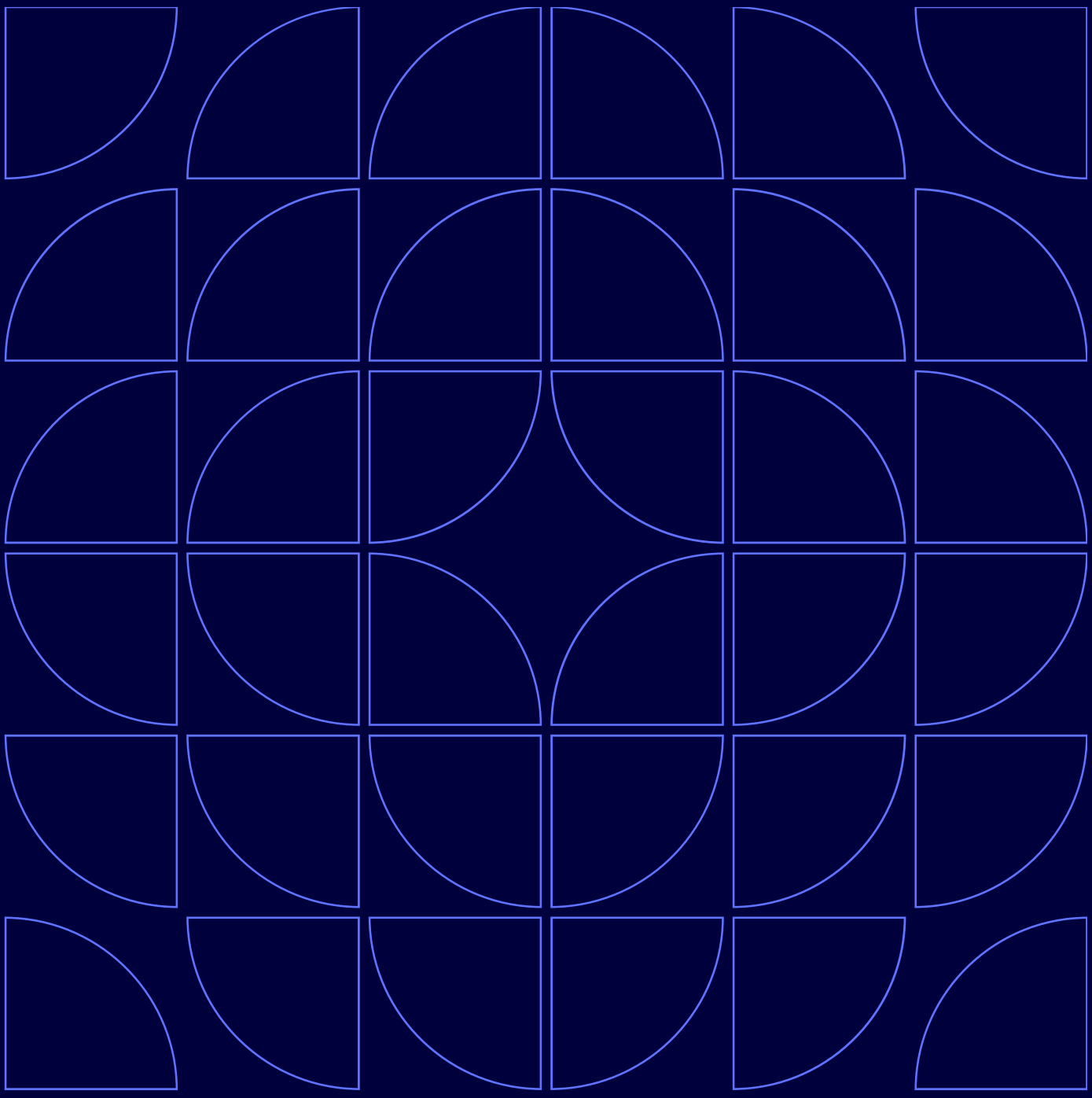
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