

System Development Statement



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Acronyms and Definitions

AGI	Above Ground Installation;
APDP	Approved Project Development Plan
BVS	Block Valve Station
CCS	Carbon Capture and Storage
Douglas CCS Platform	The surface facilities providing heating, pressure control and distribution of the full CO_2 flow and utilities support to Hamilton Main, Hamilton North and Lennox
FEED	Front End Engineering and Design
Hamilton Main (HM)	The offshore wellhead platform receiving CO ₂ for injection into the Hamilton Carbon Store (of which the jacket is repurposed);
Hamilton North (HN)	The offshore wellhead platform receiving CO ₂ for injection into the Hamilton North Carbon store (of which the jacket is repurposed);
Lennox (LD)	The offshore wellhead platform receiving CO ₂ for injection into the Lennox Carbon Store (of which the jacket is repurposed);
MTPA	Million Tonnes Per Annum
NESO	National Energy System Operator Limited
NSTA	North Sea Transition Authority
ONC	Obligated Network Capacity, being the network capacity that must be made available to the Users on aggregate
Padeswood Spurline	The new \mbox{CO}_2 pipeline connecting the Padeswood AGI to Northop Hall AGI
PoA Terminal (PoA)	The compression plant that exports the CO_2 offshore to the Douglas CCS Platform distribution hub (of which the gas reception terminal is repurposed)
Runcorn Spurline	The new CO_2 pipeline connecting the Runcorn AGI to the Ince AGI
SPEN	Scottish Power Energy Networks
T&S Network	Transportation & Storage Network

1. Introduction

Liverpool Bay CCS Limited (LBCCS) is the owner and operator of the Liverpool Bay Carbon Dioxide (CO₂) Transportation & Storage (T&S) system which is being developed to serve the HyNet Northwest full-chain CCS industrial decarbonisation and hydrogen project. The LBCCS T&S system offers the opportunity for CO₂ emissions from industrial entities to be captured and permanently stored in.in three depleted Liverpool Bay stores previously used for hydrocarbon production.

The development project has been designed for an initial CO₂ storage capacity of 4.5 Million Tonnes per Annum (MTPA) and permitted store capacity of 109 MT of CO2, with a long term expansion capability of up to 10MTPA and store capacity of up to ~190 MT.

Shorter term options for expansions of the system are actively being studied, aiming to exploit the total store capacity, exploring to increase the injection rate and the transportation capacity, thus facilitating early connection of additional Users.

The project will be delivered in Phases, the first of which commenced execution in April 2025 and aims to reach readiness for commercial operations by 2028.



CO₂ captured and metered by the Users will be transported to the PoA Terminal through an onshore transportation system that includes a main trunkline and spur lines, as necessary, from approved Users.

From the PoA Terminal, the CO2 will be transported offshore through the repurposing of the offshore pipeline infrastructure and distributed, via the Douglas hub platform, to the three stores of Hamilton North, Hamilton Main and Lennox, for injection into the depleted gas reservoirs.

There are four planned Initial Users, located in Cheshire or Northeast Wales, anticipated to deliver, in aggregate, an annual average CO2 stream of approximately 3.14 MTPA. Additional Users, selected by DESNZ under the Track-1 expansion process, will aim to fill the system design capacity of 4.5 MTPA.

2. **Purpose of this Document**

This System Development Statement has been prepared and published in accordance with Standard Condition B2 of the Economic Licence issued to Liverpool Bay CCS Limited on 22 April 2025 (the "Licence"). The Licence grants approval to LBCCS Ltd to develop, maintain and operate the T&S Network in accordance with the Approved Project Development Plan (APDP).

3. System Description

The transportation and storage system will be constructed and commissioned across two phases.

3.1 Phase 1

Phase 1 consists of the following infrastructure and capability.

- Onshore Transportation System:
 - 36" pipeline from Stanlow AGI to Flint AGI with a nominal capacity of 10.50 MTPA (332.95 kg/s);
 - 20" pipeline from Ince AGI to Stanlow AGI with a nominal capacity of 2.50 MTPA (79.27 kg/s);
 - 20" pipeline from Protos AGI to Ince AGI with a nominal capacity of 2.50 MTPA (79.27 kg/s);
 - 24" pipeline from Flint AGI to PoA Terminal with a nominal capacity of 4.74 MTPA (150.30 kg/s) (P852 repurposed and extended)
 - o fibre optic cable along the 36" and 20" pipelines;
 - o five AGIs at Ince, Stanlow, Northop, Flint and Protos
 - three BVSs in the pipeline between Stanlow AGI and Northop AGI
 - o three BVSs in the pipeline between Flint AGI and PoA Terminal, and
 - support elements infrastructure providing support to Encyclis Protos pipelines that connect to LB CCS's AGI.
- Point of Ayr (PoA) Terminal
 - gas filtration, metering, three electrically driven two-stage centrifugal gas compressor, a control room and integrated control and safety system, venting system; utilities (including emergency power generation, and compressor instrument air package); and electrical substation and new 33kV connection from SPEN;
- Repurposed offshore pipelines:
 - 20" PoA Terminal to Douglas CCS Platform repurposed with confirmed achievable flow of 4.74 MTPA (and achievable flow of 10.53 MTPA in dense phase operation subject to the appropriate compression at PoA);
 - 20" Douglas CCS Platform to HM (PL1039) repurposed with confirmed achievable flow of 4.25 MTPA; and
 - 14" Douglas CCS Platform to HN (PL1041) repurposed with confirmed achievable flow of 2.00 MTPA;

- New subsea power and communications cables from PoA Terminal to the offshore platforms
- Three offshore platforms
 - Douglas CCS Platform surface facility with helideck; two heaters; pressure control; power transformers and electrical distribution; and risers;
 - Hamilton Main repurposed jacket with new topsides (with helideck; two heaters, filtration; metering; power transformers and electrical distribution and riser); four injection wells and one monitoring well;
 - Hamilton North repurposed jacket with new topsides (with helideck, one heater, filtration, metering, power transformers and electrical distribution, and riser); two injection wells, one monitoring well and one sentinel well and network-wide leak detection system

Phase 1 infrastructure is expected to be delivered by Year End 2028 and commissioned with the CO_2 from one or two of the selected Users, in early 2029, when the project is expected to become operational.

The network has been designed and will be constructed to allow for potential future expansion in the HyNet area. Ince, Stanlow, Flint and Protos AGIs are all equipped with additional expansion capability and the tie-in of additional spurlines.

3.2 Phase 2

Phase 2 will complete the infrastructure to secure the 4.5 MTPA long term capacity of the system and will be delivered in Tranches, with the following infrastructure and capability.

<u>Phase 2 Tranche A</u> - is related to the addition of the third carbon store, Lennox, and consist of:

- Lennox offshore platform including new topside (with helideck; two heaters, filtration, metering, power transformers and electrical distribution; and riser); two injection wells, one sentinel well and one monitoring well
- New subsea power and communications cable from Douglas CCS Platform to Lennox;
- Repurposed offshore pipelines:
 - o 16" Douglas CCS Platform to Lennox (PL1035); and
 - o 12" Douglas CCS Platform to Lennox (PL1036A);

<u>Phase 2 Tranche B</u> - is related to connecting Padeswood / *Heidelberg* User and consists of:

- Onshore 16" pipeline from Padeswood AGI to Northop AGI, including a fibre optic cable along the route;
- Padeswood AGI and ancillary support systems; and upgrades of Northop AGI.

<u>Phase 2 Tranche C</u> - is related to connecting Runcorn / *Viridor* User and consists of:

- Onshore 20" pipeline from Runcorn AGI to Ince AGI, including a fibre optic cable along the route;
- Runcorn AGI and ancillary support systems; and upgrades of Ince AGI.

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The store development philosophy is premised on an equal re-pressurisation of three stores over the Project operational life. CO_2 will initially flow directly into the reservoirs until intermediary compression at PoA is required. The cumulative quantity of CO_2 injected will later result in an increase of the reservoir pressure up to a point where the offshore transportation system will be upgraded to operate in dense phase conditions. The three stores will always operate within the parameters defined in their respective Storage Permits.

<u>Phase 2 Tranche D</u> - is related to the conversion of the offshore transportation and storage system to operate in *dense phase* at 4.74 MTPA design capacity. This conversion, which is not expected to be required until after a number of years of operation, will consist of the following infrastructure:

- PoA Terminal upgrade to dense phase operation, including: third stage compressors; upgrade of utility system; new vent package; and power connection upgrade to 132 kV;
- Offshore pipelines, including:
 - New 16" flowline from Douglas CCS Platform to Hamilton Main specified for dense phase flow with a design capacity of 4.25 MTPA;
 - New 12" flowline from Douglas CCS Platform to Hamilton North specified for dense phase flow with a confirmed capacity of 2.00 MTPA; and
 - Repurposed 12" flowline from Douglas CCS Platform to Lennox (PL1036A) with a design capacity of 1.66 MTPA;
- Offshore platforms upgrades, including riser connections and piping connections required for the new offshore pipelines; upgrade of metering instrumentation for dense phase flow; and downhole fixed orifice chokes (or such other technology as it may be appropriate to use in their place) in each of the wells to provide backpressure to maintain dense phase flow.

<u>Phase 2 Tranche E</u> - is related to connecting the one of the two Phase 1 Users that may not be ready to connect at system start-up.

The map of LBCCS T&S Network, the offshore and onshore system with new and existing infrastructure being repurposed, is shown below.



4. System Use and Capacity

4.1 Store and Obligated Network Capacity

Storage Permits have been granted to allow injection of up to a total of 109 million-tonnes (Mt) of CO₂ across the three stores at an average rate of 4.5 million tonnes per annum (MTPA)

Obligated Network Capacity (ONC) is the T&S network capacity that will be made available to the Users on aggregate. The ONC has the following components:

	Obligated Network Capacity
Maximum Flow Rates	Maximum Instantaneous Flow Rate:
	150.30 kg/s
	(4.74 MTPA instantaneous)
	Maximum Annual Cumulative Flow:
	4.50 MtCO ₂
Minimum Flow Rate	Minimum Instantaneous Flow Rate:
	6.34 kg/s
	(0.20 MTPA instantaneous)
Overall Store Capacity	109 MtCO ₂

4.2 Users

Four Users were selected to be Initial Users, as outlined in the table below. Two Users will connect to the T&S infrastructure developed in Phase 1, while the other 2 Users will connect via the two spurlines built in Phase 2. Additional Users will be selected by the Government under Track-1 expansion process to fill up the capacity of the system.

	Planned Initial User	Connection Location
1.	Viridor (Runcorn)	Runcorn AGI
2.	Encyclis Protos ERF	Protos AGI
3.	Heidelberg (Hanson Padeswood)	Padeswood AGI
4.	EET HPPI	Stanlow AGI

5. **Development and Expansion**

Whilst there are ongoing studies exploring the expansion options, there are currently no approved development activities to facilitate the expansion of the network. It is envisaged that once the Track-1 Expansion Users are announced by the Government, development

activities will commence. The changes to the network required to accommodate additional selected Users will require a scope change approval and an amendment to the APDP.

6. System Modification Plans

There are currently no plans for modification of the system described in Section 3

7. System Remediation Plan

There are currently no plans for remediation of the system described in Section 3

8. System Decommissioning Plan

As required under the Licence, Standard Conditions C2 and D2, 18 months prior to the Commercial Operations Date, LBCCS will submit information relating to decommissioning to Ofgem, the economic regulator, including:

- Onshore decommissioning plans.
- Estimated decommissioning fund costs for onshore and offshore.
- Proposed structure and investment strategy for the decommissioning fund.

Following approval by the regulator, LBCCS will calculate the Onshore Decommissioning Fund Allowance and Offshore Decommissioning Fund Allowance for each charging year. LBCCS will commence monthly payments into these funds in line with the Decommissioning Fund Allowances after the Commercial Operations Date.