



CO2 pull market analysis

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1 Introduction

1.1 Background

The main objective of work package "CO₂ clusters & value chain design" is the temporal and spatially optimal design and planning of CCUS clusters and networks.

In this respect the following objectives are identified:

- Two European CO₂ clusters (South-East/North-West) will be defined and analyzed for optimal value chain design.
- A value chain optimization framework will be developed to analyze how location, size and timing of investments are affected by alternative technologies and infrastructures using mixed integer linear programming models.
- Minimal cost for net-zero CO₂ configurations will be determined with detailed analysis of the novel technologies developed in WP2 and WP3 as components of the optimization framework.

This specific deliverable corresponds to the second task, which is the analysis of the push market for CO₂. Here the main aim is to outline CO₂ storage sites and CO₂ utilization sites in two regions: Northwest Europe (NL, UK and Denmark) and Southeast Europe (Greece, Bulgaria and Romania). These will be used as input for the cluster framework model to analyze different configurations and assess the potential of these industries to contribute to a CO₂ cluster.

1.2 Methodology

As an outcome of this task, a database has been prepared for use in cluster configurations. The sources of information for the CO₂ storage sites are from European CO₂ storage database ("CO2Stop") and company websites. The source for information of the CO₂ utilization sites are company websites on green hydrogen projects. It is expected that hydrogen produced from renewable energy is used in combination with CO₂ to form hydrocarbons, for example methanol, urea, or aviation fuel.

Main specifications of the database are as follows:

- The list covers six countries: Bulgaria, Denmark, Netherlands, Romania, United Kingdom and Greece
- For each CO₂ storage site the following information has been identified:
 - Geographical location.
 - Expected minimum, mean, and maximum reservoir capacity.
 - Expected minimum and maximum storage injection rate if announced. If not announced, the site is only an indication of potential CO₂ storage.
 - Expected year of operation if announced.
- For each potential CO₂ utilization site based on expected nearby hydrogen production, the following information has been identified:
 - Geographical location.
 - Expected capacity of electrolysis.
 - Expected year of operation.

It is important to highlight that the database is not fully comprehensive because it is based on public available information and the list can change rapidly as some projects may be matured or cancelled and new projects are announced.

2 Pull market

2.1 Potential CO₂ storage sites

Project	Company	Country	Area	Onshore/ Offshore	Type	Lat	Long	Expected reservoir capacity_mi n [Mill ton CO ₂]	Expected reservoir capacity_mea n [Mill ton CO ₂]	Expected reservoir capacity_ma x [Mill ton CO ₂]	Expected storage injection capacity_mi n [Mill ton CO ₂ /year]	Expected storage injection capacity_ma x [Mill ton CO ₂ /year]	Expected year of operatio n	Report ing year
GreenSand (phase1)	INEOS, Maersk Drilling and Wintershall Dea	Denmark	Danish North Sea	Offshore		56.94307133	4.833694679			2000	0.5	1	2025	2021
GreenSand (phase 2)	INEOS, Maersk Drilling and Wintershall Dea	Denmark	Danish North Sea	Offshore		56.94307133	4.833694679			2000	4	8	2030	2021
Northern Light (phase 1)	Equinor, Shell and TotalEnergies	Denmark	Northern Lights Carbon Capture Plant Site, Western Norway	Offshore		60.55466498	4.886592083				0.8	1.5	2024	2021
Northern Light (phase 2)	Equinor, Shell and TotalEnergies	Denmark	Northern Lights Carbon Capture Plant Site, Western Norway	Offshore		60.55466498	4.886592083				3.5	5	2021	
Bifrost	TotalEnergies, DUC, DTU, Ørsted	Denmark	Danish North Sea	Offshore		56.55714618	4.338945533					3	2027	2021
		Denmark	Gassym (Gassum formation)	Onshore		56.58095	9.997302				586			2021
		Denmark	Havnsø (Gassum formation)	Onshore		55.752912	1.132373				306			2020
		Denmark	Hanstholm (Gassum formation)	Offshore		57.115181	8.617232				1333			2020
		Denmark	Rødbø (Bunter formation)	Onshore		54.692884	11.389895				341			2020
		Denmark	Thisted	Onshore		56.962573	8.703749				2418			2020
		Denmark	Voldum	Onshore		56.367152	10.172827				854			2020
		Denmark	Tønder	Onshore		54.934638	8.869144				229			2020
		Denmark	Vedsted	Onshore		55.295734	8.669158				39			2020
		Denmark	Thorning	Onshore		56.301301	9.300788				296			2020
		Denmark	Røsnæs	Onshore		55.756293	10.872523				429			2020
		Denmark	Hanstholm (Skagerak formation)	Offshore		57.115181	8.617232				3441			2020

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Energean Plc	Denmark	Skagerak		Offshore		57.885657	9.846543				1000				2020
		Legin		Onshore		56.974176	8.475263		1619						2020
		Skive		Onshore		56.578397	8.987516		334						2020
		Helgenæs		Onshore		56.144784	10.522853		307						2020
	Greece	Stenlille		Onshore		55.541259	11.591094				51				2021
		Prinos-Kavala basin		Offshore		40.859525	24.460384		30						2020
		Mesohellenic Trough Eptachori		onshore		40.253329	21.18611		1277						2020
		Mesohellenic Trough Pentalofos		onshore		40.202477	21.119673		166						2020
		Evros - Northern Greece (studied)		onshore	Deposit of zeolite	41.676699	26.116487		24,5						2018
		Vourinos - Western Macedonia (studied)		onshore	Magnesium silicates site	40.173061	21.664625		70	500					2018
Porthos	Dutch government in partnership with Air Liquide, Air Products, ExxonMobil and Shell.	Epanomi Gas Fields - Thessaloniki		onshore	Depleted gas field	40.425557	22.918768		2						2020
		Greece	Thessaloniki basin	Offshore	Saline aquifers	40.425557	22.918768		640						2020
		Netherlands	North Sea	Offshore	Depleted oil and gas field	52.394039	3.591177		37			2.5		2030	2021
		Netherlands	Dutch North Sea Field K 14/15 #6	Offshore	Depleted oil and gas field	53.16401	3.37874		165			3			2012
		Netherlands	Dutch North Sea Field K04/05 #7	Offshore	Depleted oil and gas field	53.05444	2.64442		140			3			2012
		Netherlands	Dutch North Sea Field K07/08/10 #8	Offshore	Depleted oil and gas field	53.39971	3.45250		195			3	6		2012
		Netherlands	Dutch North Sea Field L10/K12 (#9)	Offshore	Depleted oil and gas field	53.23892	4.48522		175			6			2012
		Netherlands	Q1 - Lower Cretaceous (#1)	Offshore	Saline aquifier	52.87908	4.32620	110		225		10			2012
		Netherlands	P, Q - Lower Cretaceous (#2)	Offshore	Saline aquifier	52.33534	3.86420			360		10			2012
Acorn	UK and Scottish Government in partnership with Storegga, Shell and Harbour Energy	Netherlands	F15, F18 – Triassic (#3)	Offshore	Saline aquifier	54.08517	4.37847			650	1	3			2012
		Netherlands	L10, L13 – Upper Rotliegend (#4)	Offshore	Saline aquifier	53.39971	3.45250			60		5			2012
		Netherlands	Step graben – Triassic (#5)	Offshore	Saline aquifier	55.02173	4.63050			190	1	3			2012
		United Kingdom	North East of Scotland	Offshore	Sandstone rock	58.07788	1.39833			5	10	2030		2021	
		United Kingdom	Hamilton gas field, East Irish Sea	Offshore	Depleted oil and gas field	53.55975	-	3.44333				5			2016
		United Kingdom	Bunter Sandstone Formation	Offshore	SA w/ HC	54.01256145	1.270766915	2467	13294	41716					2012
		United Kingdom	Leman Sandstone	Offshore	SA w/ HC	53.41040451	1.662881162								2012

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United Kingdom		Frigg Sandstone Member		Offshore	SA w/o HC	60.26116714	1.787321754	190	370	584				2012
United Kingdom		Heimdal Sandstone Unit		Offshore	SA w/o HC	59.74385267	1.390364695	955	12220	35322				2012
United Kingdom		Tay Sandstone Member		Offshore	SA w/o HC	57.23100394	0.931104947	2	339	1954				2012
United Kingdom		Forties Sandstone Member		Offshore	SA w/ HC	57.40650591	1.333267513	1814	26132	94496				2012
United Kingdom		Cromarty Sandstone member		Offshore	SA w/o HC	57.65876976	0.483668425	130	372	739				2012
United Kingdom		Mousa Formation		Offshore	SA w/o HC	58.50572631	0.131068766	7015	14614	24691				2012
United Kingdom		Flugga Sandstone Unit		Offshore	SA w/ HC	58.88268307	1.241967256	90	427	1098				2012
United Kingdom		Hermod Sandstone Unit		Offshore	SA w/o HC	59.86254865	2.004044033	6	25	43				2012
United Kingdom		Skadan Sandstone Unit		Offshore	SA w/o HC	58.84081403	1.428697578	16	66	106				2012
United Kingdom		Teal Sandstone Member		Offshore	SA w/o HC	59.98602134	1.861474749	64	221	533				2012
United Kingdom		Skroo Sandstone Unit 1		Offshore	SA w/o HC	58.44589262	1.326676878							2012
United Kingdom		Skroo Sandstone Unit 2		Offshore	SA w/o HC	58.75346301	1.364000909							2012
United Kingdom		Skroo Sandstone Unit 3		Offshore	SA w/o HC	59.03577081	1.489534256	0	6	22				2012
United Kingdom		Ormskirk Sandstone Unit 1		Offshore	SA w/ HC	53.84996758	-3.591165477	317	1775	5201				2012
United Kingdom		Ormskirk Sandstone Unit 3		Offshore	SA w/o HC	54.61266974	-4.015058916	160	339	756				2012
United Kingdom		Ormskirk Sandstone Unit 2		Offshore	SA w/o HC	53.97813933	-4.322672571							2012
United Kingdom		Maureen Sandstone Unit		Offshore	SA w/ HC	58.21578772	0.79972593	576	4753	23814				2012
United Kingdom		Balder Sandstone Unit		Offshore	SA w/ HC	58.25739145	1.297052341	12	30	198				2012
United Kingdom		Collyhurst Sandstone Unit 1		Offshore	SA w/o HC	53.64289086	-3.495554679	176	2141	6381				2012
United Kingdom		Collyhurst Sandstone Unit 2		Offshore	SA w/o HC	54.18760934	-4.003390749	287	1221	1837				2012
United Kingdom		Collyhurst Sandstone Unit 3		Offshore	SA w/o HC	53.860338	-3.752542046	0	1	5				2012
United Kingdom		Otter Sandstone Formation		Offshore	SA w/ HC	50.48017971	-2.123035721	124	1266	3988				2012
United Kingdom		St Bees Sandstone Unit		Offshore	SA w/o HC	54.0491228	-3.782995749	1251	11099	39210				2012
United Kingdom		Plattendolomit Unit		Offshore	SA w/ HC	53.82348909	1.120746834	1822	5467	10691				2012
United Kingdom		Bridport Sands Unit		Offshore	SA w/o HC	50.43990744	-2.362225847	66	394	1206				2012
United Kingdom		Argyll Carbonate Member		Offshore	SA w/ HC	55.6156112	2.589332214	2	102	672				2013
United Kingdom		Bruce Sandstone Unit 2		Offshore	SA w/o HC	59.54083545	1.441588352	4	27	66				2013
United Kingdom		Bruce Sandstone Unit 3		Offshore	SA w/o HC	59.76576174	1.649075527	2	18	42				2013
United Kingdom		Coracle Sandstone Member		Offshore	SA w/o HC	58.2773093	-2.092944992							2013
United Kingdom		Punt Sandstone Member		Offshore	SA w/o HC	58.17110999	-2.212539743							2013
United Kingdom		Nansen Unit 1		Offshore	SA w/o HC	59.57500391	1.683197404	20	103	251				2013
United Kingdom		Nansen Unit 2		Offshore	SA w/o HC	61.025333	1.383647487	118	592	1448				2013
United Kingdom		Zechsteinalk Unit		Offshore	SA w/ HC	52.90913317	1.711234761	77	435	662				2013
United Kingdom		Mains Formation Unit		Offshore	SA w/o HC	58.02051505	-2.884392644							2013
United Kingdom		Ling Sandstone Unit		Offshore	SA w/o HC	58.71720275	1.369190691							2013
United Kingdom		Innes Carbonate Unit 1		Offshore	SA w/ HC	56.99690664	1.327078416							2013
United Kingdom		Innes Carbonate Unit 2		Offshore	SA w/ HC	59.46595965	1.447913884							2013
United Kingdom		Innes Carbonate Unit 3		Offshore	SA w/o HC	58.23877318	-2.19303777							2013
United Kingdom		Innes Carbonate Unit 4		Offshore	SA w/o HC	56.6739964	-1.616389278							2013
United Kingdom		Hugin Unit 1		Offshore	SA w/ HC	58.5903549	1.468365662							2013
United Kingdom		Hugin Unit 2		Offshore	SA w/o HC	59.57468641	1.721857234							2013
United Kingdom		Hugin Unit 3		Offshore	SA w/o HC	61.0451345	-0.042674323							2013
United Kingdom		Hopeman Sandstone Unit		Offshore	SA w/ HC	58.20706413	-2.662753417							2013
United Kingdom		Fulmar Sandstone Unit		Offshore	SA w/ HC	56.95215835	1.584457018	4284	13693	28350				2013

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United Kingdom	Brae Formation Unit 2	Offshore	SA w/ HC	58.3736002	1.257632749	1	9	20						2013
United Kingdom	Brae Formation Unit 3	Offshore	SA w/ HC	58.4818942	1.292376104	40	18	35						2013
United Kingdom	Firth Coal Unit 2	Offshore	SA w/o HC	57.68459839	0.283912465									2013
United Kingdom	Firth Coal Unit 3	Offshore	SA w/o HC	56.72668762	-1.611665486	3	12	94						2013
United Kingdom	Schooner Unit 2	Offshore	SA w/o HC	53.836905	1.102120261									2013
United Kingdom	Schooner Unit 3	Offshore	SA w/o HC	54.96733753	-1.260147436									2013
United Kingdom	Schooner Unit 4	Offshore	SA w/o HC	54.38312054	-0.11186769									2013
United Kingdom	Skagerrak Unit 2	Offshore	SA w/o HC	58.90608955	0.017911116	120	604	1466						2013
United Kingdom	Skagerrak Unit 3	Offshore	SA w/o HC	57.71737356	-0.189419286	16	79	192						2013
United Kingdom	Skagerrak Unit 4	Offshore	SA w/o HC	58.50505217	-0.26613468	46	233	566						2013
United Kingdom	Skagerrak Unit 5	Offshore	SA w/o HC	56.75116938	1.032836761	55	278	673						2013
United Kingdom	Skagerrak Unit 6	Offshore	SA w/o HC	57.11599325	0.464188844	41	206	500						2013
United Kingdom	Spilsby Sandstone Unit 4	Offshore	SA w/o HC	52.52674382	1.950839233									2013
United Kingdom	Stroma Member 2	Offshore	SA w/o HC	58.5892017	-0.109884202	2	28	68						2013
United Kingdom	Spilsby Sandstone Unit 1	Offshore	SA w/o HC	53.21527171	1.009234572									2012
United Kingdom	Spilsby Sandstone Unit 2	Offshore	SA w/o HC	52.98999584	2.972573917									2012
United Kingdom	Spilsby Sandstone Unit 3	Offshore	SA w/o HC	52.50611505	2.841529026									2012
United Kingdom	Hewett Sandstone	Offshore	SA w/ HC	52.75632078	2.098283704	73	431	1407						2012
United Kingdom	Westcoe Coal Unit	Offshore	SA w/ HC	53.41221623	1.949274719	11	193	1680						2012
United Kingdom	Millstone Grit Unit	Offshore	SA w/ HC	53.91525737	1.284855686									2012
United Kingdom	Schooner Unit 1	Offshore	SA w/ HC	54.02117382	2.289560211									2012
United Kingdom	Mey Sandstone Unit	Offshore	SA w/ HC	57.90681172	0.51003188	3602	21852	57369						2012
United Kingdom	Dornoch Formation	Offshore	SA w/o HC	58.78460513	0.117670578	2381	8037	20373						2012
United Kingdom	Grid Sandstone Member	Offshore	SA w/o HC	59.26360079	1.256975533	185	1389	10866						2012
United Kingdom	Cormorant Formation	Offshore	SA w/o HC	60.80170167	1.349299848	4405	16361	35891						2012
United Kingdom	Magnus Sandstone	Offshore	SA w/ HC	61.65806246	1.369053232									2013
United Kingdom	Alness Spiculite Member	Offshore	SA w/o HC	58.19647106	-2.24029356	67	209	395						2013
United Kingdom	Auk Formation Unit	Offshore	SA w/ HC	57.43753649	1.449261167	718	8845	23695						2013
United Kingdom	Beatrice Formation Unit	Offshore	SA w/ HC	58.13984112	-2.678307758	262	736	1447						2013
United Kingdom	Birch Sandstone Member	Offshore	SA w/ HC	58.57685531	1.31487553	6	16	24						2013
United Kingdom	Brae Formation Unit 1	Offshore	SA w/ HC	58.73056136	1.40228476	33	132	516						2013
United Kingdom	Brent Group	Offshore	SA w/ HC	61.11118902	1.351743902	945	2184	4722						2013
United Kingdom	Britannia Sandstone Formation	Offshore	SA w/ HC	57.98727746	0.958721089	31	193	441						2013
United Kingdom	Brora Coal Formation	Offshore	SA w/o HC	58.04728613	-3.173829178	9	77	451						2013
United Kingdom	Bruce Sandstone Unit 1	Offshore	SA w/ HC	59.40809981	1.622366693	1	5	11						2013
United Kingdom	Buchan Formation Unit	Offshore	SA w/ HC	57.62933247	0.991259851	9	105	15435						2013
United Kingdom	Burns Sandstone Member	Offshore	SA w/o HC	58.2444636	-1.713678204	175	1110	549						2013
United Kingdom	Claymore Sandstone Member	Offshore	SA w/ HC	58.37975515	0.05752686	76	508	1181						2013
United Kingdom	Emerald Formation	Offshore	SA w/ HC	60.63316206	1.046046327	11	22	38						2013
United Kingdom	Findhorn Formation	Offshore	SA w/o HC	58.32562213	-1.924522418	569	4742	13909						2013
United Kingdom	Firth Coal Unit 1	Offshore	SA w/o HC	58.46002239	0.191587784									2013
United Kingdom	Orcadia Formation Unit	Offshore	SA w/o HC	58.54806338	-1.116824114	12	228	4018						2013
United Kingdom	Orrin Formation	Offshore	SA w/o HC	58.11730823	-3.06978955	28	88	200						2013
United Kingdom	Piper Formation	Offshore	SA w/ HC	58.52308737	-0.099266889	625	2139	5156						2013

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		United Kingdom	Skagerrak Unit 1	Offshore	SA w/ HC	57.34975	1.622155763	1045	5266	12779				2013
		United Kingdom	Strath Rory Formation	Offshore	SA w/o HC	58.1750398	-1.689008596	3	56	1536				2013
		United Kingdom	Stroma Member 1	Offshore	SA w/o HC	57.91356717	-0.270813703	5	61	151				2013
		United Kingdom	Statfjord Unit 1	Offshore	SA w/ HC	59.57640308	1.691074468	168	390	914				2013
		United Kingdom	Statfjord Unit 2	Offshore	SA w/ HC	60.87245822	1.700831353	104	254	738				2013
		United Kingdom	Captain Sandstone Member	Offshore	SA w/ HC	58.31935923	-1.778747197	291	806	1710				2013
		Bulgaria	Pavlikeni zone	Onshore	SA w/o HC	43.24403	25.77506	400	460	550				2014
		Bulgaria	Pleven zone	Onshore	SA w/ HC	43.46492	24.94056	1600	1800	2000				2014
		Bulgaria	Marash	Onshore	SA w/o HC	43.19772	26.92565	15	17.5	25				2014
		Bulgaria	Totleben	Onshore	SA w/o HC	43.46492	24.94056	4	5.3	8				2014
		Bulgaria	Popovo zone	Onshore	SA w/o HC	43.3476	26.2264	18	21.6	25				2014
		Bulgaria	Yambol-south	Onshore	SA w/o HC	42.3541	26.5671	22	27	65				2014
		Bulgaria	Cherkovo	Onshore	SA w/o HC	42.476	26.9902	19	24	86				2014
		Bulgaria	Galata	Onshore	SA w/ HC	43.0458	28.1978	0	0	0				2014
		Bulgaria	Dolna Kamchia	Onshore	SA w/ HC	42.98744	27.84644	45	56.16	65				2014
		Bulgaria	Galabovo	Onshore	SA w/o HC	42.241	25.6906	80	85	105				2014
		Bulgaria	Maritsa	Onshore	SA w/o HC	42.2362	24.9271	70	72	90				2014
		Romania	Meotian Formation from Getic Depression SU	Onshore	SA w/ HC	44.87263479	24.04848311	335	400	1343				2014
		Romania	Meotian Formation from Mio-Pliocene Subzone in Muntenia SU	Onshore	SA w/ HC	45.03638914	26.05275693	994.3	1000	2485.6				2014
		Romania	Middle Devonian Formation from Moesian Platform SU	Onshore	SA w/ HC	44.567963	25.57064	1674.8	1800	6699.4				2014
		Romania	Middle Jurassic Formation from Moesian Platform SU	Onshore	SA w/ HC	44.4504134	25.38886967	1325	1500	2208				2014
		Romania	Miocene from Pannonian Depression SU	Onshore	SA w/ HC	46.5285927	21.76499826	2194.4	2400	4388.8				2014
		Romania	Pliocene Formation from Pannonian Depression SU	Onshore	SA w/ HC	46.40186444	21.55043564	676.4	800	2705.6				2014
		Romania	Pontian Formation from Moesian Platform SU	Onshore	SA w/ HC	44.52785048	25.33697915	1355.7	1500	12906.3				2014
		Romania	Sarmatian Formation from Moesian Platform SU	Onshore	SA w/ HC	0	0	912.4	1000	1459.8				2014
		Romania	Sarmatian Formation from North-Dobroudjan Promontory SU	Onshore	SA w/ HC	45.89314946	27.64581375	6319.8	800	1239.6				2014
		Romania	Sarmatian Formation from Getic Depression SU	Onshore	SA w/ HC	44.7331554	23.67256645	810.2	1000	3240.6				2014
		Romania	Sarmatian Formation from Transylvanian Depression SU	Onshore	SA w/ HC	46.3955961	24.58135046	2696.8	3000	5393.5				2014
		Romania	Upper Burdigalian from Mio-Pliocene Subzone in Muntenia SU	Onshore	SA w/ HC	45.028576	25.960891	234.4	300	937.7				2014
		Romania	Silurian Formation from Moldavian Platform SU	Onshore	SA w/o HC	47.18069735	27.24906213	1234.9	1400	4939.8				2014
		Romania	Sarmatian Formation from Moldavian Platform SU	Onshore	SA w/ HC	46.99168013	26.82930242	603.2	700	2412.8				2014
		Romania	Tescani Beds	Onshore	SA w/ HC	47.071928	26.331536	242.3	400	969.3				2014

SA w/ HC: Saline Aquifer with hydrocarbon fields

SA w/o HC: Saline Aquifer without hydrocarbon fields

2.2 Potential CO₂ end users – renewable energy projects

Project	Company	Country	City	Lat	Long	Expected end product	Expected capacity of electrolysis [MW]	Expected year of operation	Reference	Year of reference
Green Fuels for Denmark	Ørsted, Copenhagen Airports, A. P. Moller-Maersk, DSV, DFDS, SAS, Everfuel, NEL, Molslinjen, Haldor Topsøe, COWI, Københavns Kommune, Region Hovedstaden	Denmark	Copenhagen	55.6748	12.63969	Sustainable aviation fuel	1300	2030	https://orsted.com/en/media/newsroom/news/2020/05/485023045545315	2021
Green Hydrogen Hub	Green Hydrogen Hub Denmark	Denmark	Viborg	56.4481	9.389887	Hydrogen	1000	2030	https://greenhydrogenhub.dk/about/	2021
GreenLab Skive	GreenLab, Everfuel, Eurowind Energy, Green Hydrogen Systems, Norlys Holding, RE:Integrate, Energinet, Danish Gas Technology Center, E.on Denmark, DTU Energy, EA Energy Analyses	Denmark	Skive	56.646	8.974627	Methanol	100	2026	https://www.greenlab.dk/knowledge/from-good-intentions-to-great-reductions/	2021
HySynergy	Crossbridge Energy, Everfuel, Aktive Energi Anlæg, Trefor Elnet, Energinet, TVIS, EWII	Denmark	Fredericia	55.569	9.748656	Hydrogen	1000	2030	https://www.everfuel.com/projects-archive/hysynergy/	2021
HyBalance	Air liquide, Hydrogenics, Ludwig-Bölkow-Systemtechnik, Centrica and Hydrogen Valley.	Denmark	Hobro	56.6262	9.824565	Hydrogen	1200	2030		
Nordjyllands-værket	Copenhagen Infrastructure Partners, RenoNord, Aalborg Forsyning	Denmark	Aalborg	57.0725	10.04216	Methanol	300-400	2028	https://aalborgforsyning.dk/privat/nyheder-og-presse/seneste-nyheder/6-december-2021-power-to-x-anlaeg-i-aalborg-skal-indfange-co2-og-bruge-det-til-gront-braendstof/	2021
e-Fuels Vordingborg	Arcadia eFuels	Denmark	Vordingborg	54.9949	11.87599	eKerosene and eNaphtha	-	2024	https://www.arcadiaefuels.com/arcadia-efuels-announces-its-first-efuels-plant-location-in-vordingborg-denmark	2022
Hydrogen Delta	Institute for Sustainable Process Technology (ISPT), Nouryon, Shell, Yara, OCI Nitrogen, Gasunie, DOW Chemical, Ørsted, Frames, ECN part of TNO, Utrecht University and Imperial College London	Netherlands	North Sea Port	multiple locations		Hydrogen	1000	2030	https://www.smartdeltaresources.com/en/hydrogen-delta	2021
Djewels	Nouryon, BioMCN, DeNora, Gasunie, Hinicio, and McPhy	Netherlands	Delfzijl	53.3342	6.919937	Methanol	20		https://djewels.eu/	2021
H2.50	BP, Port of Rotterdam, Nouryon	Netherlands	Rotterdam	51.9278	4.476586	Hydrogen	250	2025	https://www.portofrotterdam.com/en/news-and-press-releases/hydrogen-plants-provide-new-source-renewable-heat-south-holland	2021

Project	Company	Country	City	Lat	Long	Expected end product	Expected capacity of electrolysis [MW]	Expected year of operation	Reference	Year of reference
Westereems	RWE, Innogy	Netherlands	Eemshaven	53.4549	6.830406	Hydrogen	100		https://www.rwe.com/-/media/RWE/documents/07-presse/rwe-generation-se/2019-06-18-rwe-and-innogy-investigate-production-of-green-hydrogen-in-the-netherlands.pdf	2021
Hemweg hub Amsterdam	Vattenfall, Metropool Regio Amsterdam, Port of Amsterdam	Netherlands	Amsterdam Metropool Region			Hydrogen	100		https://www.topsectorennergie.nl/sites/default/files/uploads/TKI%20Gas/publicaties/Overview%20Hydrogen%20projects%20in%20the%20Netherlands%20versie%20mei2020.pdf	2020
H2ermes	Port of Amsterdam, TATA steel, Nouryon	Netherlands	Amsterdam	52.379	4.915007	Sustainable fuels	100		https://www.topsectorennergie.nl/sites/default/files/uploads/TKI%20Gas/publicaties/Overview%20Hydrogen%20projects%20in%20the%20Netherlands%20versie%20mei2020.pdf	2020
North2 (phase 1)	Gasunie, Groningen Seaports, Shell Nederland, Equinor and RWE	Netherlands	Eemshaven	53.4549	6.830406	Hydrogen	4000	2030	https://www.north2.eu/en/	2021
North2 (phase 2)	Gasunie, Groningen Seaports, Shell Nederland, Equinor and RWE	Netherlands	Eemshaven	53.4549	6.830406	Hydrogen	10000	2040	https://www.north2.eu/en/	2021
HyNetherlands	Gasunie, Engie	Netherlands	Eemshaven	53.4549	6.830406	Hydrogen	100	2025	https://tractebel-engie.com/en/news/2021/hynetherlands-one-of-europe-s-largest-green-hydrogen-plants-to-accelerate-the-journey-to-carbon-neutrality	2021
HYFIVE	GREATER LONDON AUTHORITY	United Kingdom	LONDON	51.5056	-0.08001	hydrogen for transport	?			
Shoreham port	Getech, h2green	United Kingdom	Brighton			hydrogen for transport	5		https://www.h2green.co.uk/news/agreement-to-develop-clean-energy-hub-for-shoreham-port-sussex/	2021
Inverness	Getech, h2green, SGN	United Kingdom	Inverness			hydrogen for transport and heating	?		https://www.h2green.co.uk/news/sgn-and-h2-green-launch-inverness-hydrogen-hub-plan-to-cut-transport-emissions/	2021
Gigastack	ITM Power Trading Ltd	United Kingdom	at Philips 66 Humber Refinery	53.6317	-0.244064	hydrogen	100	2025	https://gigastack.co.uk/	
Dolphyn	Environmental Resources Management Limited (ERM)	United Kingdom	North sea			hydrogen	2 (2020), 100-300 (2030), 1000 (2035)		https://ermdolphyn.erm.com/p/1	2022
HyGreen	BP	United Kingdom	Teesside area			hydrogen	500	2030	https://www.bp.com/en/global/corporate/what-we-do/gas-and-low-carbon-energy/h2teesside.html	2021

Project	Company	Country	City	Lat	Long	Expected end product	Expected capacity of electrolysis [MW]	Expected year of operation	Reference	Year of reference
Port of Cromarty Firth	ScottishPower, Pale Blue Dot (A Storegga Group Company), Port of Cromarty Firth, Glenmorangie, Whyte & Mackay and Diageo.	United Kingdom	Port of Cromarty Firth	57.6861	-4.173391	hydrogen	35	2024	https://pocf.co.uk/hydrogen/	2021
WHITELEE SOLAR / HYDROGEN / BESS	ScottishPower, BOC and ITM Power	United Kingdom	Whitelee	55.6956	-4.339347	hydrogen	20	2023	https://www.scottishpowerrenewables.com/pages/whitelee_solar_hydrogen_bess_.aspx	2021
H100 Fife	SGN, Cadent, Northern Gas Network, Wales&West Utilities, ofgem, Scottish government	United Kingdom	Levenmouth			hydrogen	5	2023	https://h100fife.co.uk/about-h100/	
Port of Immingham	Associated British Ports (ABP), Siemens Energy UK (SEU), Toyota Tsusho UK (TTUK), Uniper Technologies UK (UTL), Uniper Hydrogen UK (UHU)	United Kingdom	Humber cluster			hydrogen	20	2025	https://www.toyota-tsusho.com/english/press/detail/211005_004900.html#:~:text=Under%20the%20Project%20plan%2C%20feasibility,Port%20of%20Immingham%20by%202025.	2021
	Trafford Green Hydrogen	United Kingdom	Manchester	53.4342	-2.412358	hydrogen	10 (2023), 200		https://www.edie.net/news/8/Plans-filed-for-green-hydrogen-production-hub-near-Manchester/42567/	2021
Surf'n'turf		United Kingdom	Orkney: Eday & Mainland			hydrogen		0.5	https://www.surfturf.org.uk/	
		United Kingdom	Orkney			hydrogen	?		https://www.edie.net/news/10/Green-hydrogen-facility-planned-for-oil-terminal-in-Orkney-Total-Energies-Scotland--/	2021

3 Conclusions

This task has contributed to the identification of potential large CO₂ users in two regions in South-East and North-West Europe. Emitters identified in deliverable 8.1 together with the potential end users and storage sites identified here will provide the necessary input for assessing the cluster configurations.