

Carbon Capture and Storage Association CCUS Supply Chain Good Practice Guidance Document



Foreword

In this document the Carbon Capture, Utilisation and Storage (CCUS) industry has set out its own strategy to build a domestic supply chain and ensure it can support the deployment of the first Track-1 CCUS Clusters as well as shape the direction of subsequent CCUS Clusters.

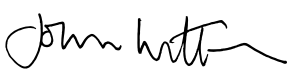
There is a huge opportunity for the UK to access a multi-billion-pound global supply chain requirement in CCUS equipment, manufactured items and services. By significantly enhancing the capacity and technological capability of our industrial base, we have the opportunity to create a much larger and higher-tech industrial base. We will need to do this through consortia, investment support, contracting strategies and large-scale collaborative arrangements involving both project owners and the supply chains.

Ministers have indicated their support for the Government and industry to work together to develop a credible plan to maximise economic benefits and domestic jobs through delivery of CCUS, its supply chains and resulting local low carbon products, in compliance with World Trade Organisation rules.

We are keen to learn from other industries (including offshore wind, nuclear and oil & gas), and this Good Practice Guidance builds on existing commitments and progress towards local content on CCUS within the North Sea Transition Deal (NSTD). It mirrors processes in other sectors, in particular, the successes of the offshore wind Supply Chain Plan and Implementation Statement.

This Guidance is aimed at supporting developers and contractors to build local supply chains by improving supply chain planning and engagement at an early stage and throughout the procurement process. The approach will provide knowledge sharing and information needed for the design of both incentives and levers, which will result in local investment, and an understanding of where interventions could be best placed for the CCUS sector to broaden its supply base. This Guidance allows for this improvement, whilst simultaneously supporting the Track-1 projects that are already underway. We believe that the standardised and comprehensive approach to engagement set out in the guidance will provide the supply chain with the necessary confidence and ability to invest in building UK supply chains.

We commend industry for taking the lead in developing this Guidance and believe that if the projects reflect this voluntary agreement and the Government provides strong support, then a reliable, high quality and secure domestic supply chain can be achieved.



Lord Hutton
Chair CCUS Council Supply
Chain Working Group



Ruth Herbert
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Table of Contents

Foreword.....	2
Table of Contents.....	3
1. Introduction.....	4
2. Document Ambition.....	6
3. Use and benefits of the Good Practice Guidance.....	7
4. Implementation Plan.....	8
5. Industry Commitments.....	11
A - Approach to a percentage of UK content.....	12
B - Approach to supporting UK technology & Innovation.....	14
C - Approach to the number and quality of jobs created/protected.....	16
D - Approach to Investment in skills and training.....	18
E - Transparency of the Supply Chain process.....	20
F - Wider economic benefits.....	22
6. Benchmarking and Tracking.....	24
7. Supply Chain Common Taxonomy.....	28
Arup Equipment Taxonomy.....	29
Arup Services Taxonomy.....	34
8. High Value Opportunities.....	41
9. Recommendations.....	44
10. Glossary.....	47
Appendix A – High Value Assessment - Equipment.....	49
Appendix B – High Value Assessment - Services.....	50
Appendix C – Other Energy Sector Good Practice Materials.....	51
Appendix D – Acknowledgements.....	58

1. Introduction

As the UK strives towards its ambition of building a domestic CCUS supply chain, the industry must set, measure and benchmark against granular but achievable targets. These are designed to enhance the capacity and technological capability of our industrial base. The ambition of the CCUS sector is an overall UK content target meeting or exceeding 50 per cent by 2030, in line with existing targets set by the NSTD.

In line with the NSTD, **UK Content** is defined as:

Agreed definition that a product (component) or service can be considered as having been delivered within the UK.

- in respect of services, those services provided by a company carrying on business in the UK; and,
- in respect of goods, those goods which are being made, changed or improved in the UK (using the same definition as goods eligible for a UK country of origin certificate).

In order to achieve this percentage UK content target, the CCUS industry needs the Government to provide:

- i. a committed forward allocation programme for capture projects to drive confidence and raise the profile of the sector
- ii. flexibility in bilateral negotiations on cost and delivery dates where there is an opportunity to secure higher UK content
- iii. targeted financial support for building capacity and transitioning existing supply chain businesses to serve the CCUS programme.

In combination with these industry needs, this Good Practice Guidance Document sets out a mix of qualitative and quantitative targets that, when taken together, create a pathway for an industry UK content ambition to be launched. The targets cover six key areas of focus, each with unique achievable goals, that set a clear ambition for 2030.



It is important to note that, recognising the infancy of the sector, the industry is focusing on achieving and reporting good practice in our supply chains to allow us to work towards identifying and achieving best practice over time. This needs to be done without constraining the current Track-1 clusters, or disincentivising future development, alongside identifying and developing UK capability and capacity in domestic supply chains and high value opportunities. Moreover, protecting and embedding existing capacity must be viewed as equally important as developing new capacities and capabilities.

The Good Practice Guidance Document provides four sections to define and enable the achievement of the defined goals:

- **Definitions and documentation of stretching targets across the industry-led commitments** - An agreed terminology and set of commitments for defining supply chain good practice across the CCUS sector.
- **Benchmarking and tracking methodology** - Ensuring the commitments are measured and reported in a robust manner and projects report data consistently. This data can be used on a project basis or aggregated across the CCUS sector to incentivise future Good and Best Practice.
- **Supply chain common taxonomy** - A common standardised taxonomy/nomenclature across goods, works and services of energy transition supply chains, which is understood and agreed to by all operators and EPCs. This would provide transparency on the CCUS Programme and key milestones, a common view of supply and demand and inform on training requirements.
- **Mapping high value item opportunities** - The identification of the high value item opportunities across UK equipment and services. Ensuring the key sectors have the capacity and capability through support arrangements and could develop exportable capabilities for high value items before the opportunity is lost.

Together these four areas will clearly lay out the expectation and level playing field necessary for the sector to work collaboratively in order to develop and improve the UK CCUS supply chain.

2. Document Ambition

Developing the CCUS Supply Chain industry is vital to safeguard the supply of components needed for the UK to continue to lead the world in Carbon Capture as other nations catch up and compete for the necessary apparatus.

The UK already has significant capabilities that could service the CCUS supply chain, and it should be a strong ambition to build in new capacities alongside protecting what is already available and established. Equally as a nation we need to ensure that a significant proportion of our investment in this new technology ends up supporting the capability, skills and education required to run, maintain, and expand this vital industry in the future. This guidance also brings CCUS into alignment with the NSTD and Offshore Wind sectors.

A Good Practice Guidance Document agreed with industry and the Government sets the expectations across the industry-led commitment areas and the publishing of achieved results allows the CCUS projects to self-assess their current situation and drive their ambition to achieve best in class. By having well-defined measures, CCUS projects will be able to commit to and achieve stretching targets, whilst knowing that competitors are reflecting the same standards and that their efforts will be recorded and recognised.

These targets will not necessarily remain static but will be reviewed when necessary to ensure they are still relevant and stretching. Currently our ambition for built-in-Britain is greater than what is practically possible due to the infancy of the sector, leading to a lack of capability and capacity, especially in the manufacturing supply chain.

In order to not slow down the current Track-1 Clusters or to introduce artificial barriers for subsequent clusters, a proportionate target for UK content in CCUS projects will at first be achieved by a combination of:

- I. Targeting the proportion (by value) of UK companies in the supply chain, (including low value contracts), combined with;
- II. The proportion of the project employing UK individuals, by phase of the project.

Together these will document the investment and jobs created within the UK by CCUS, highlighting the areas where improvement can be made.

Over the medium term, these targets can be augmented by a single voluntary target, so that the projects have a minimum local UK content across their lifecycle, as has been achieved by the Offshore Wind and Oil and Gas industries. Of paramount importance is that no project or organisation is disadvantaged or held back by the monitoring and reporting process. The commitments and process has been designed to provide the sector with the intelligence to make well timed and meaningful interventions. For this reason, it is imperative that the reporting is done in a constructive manner, ensuring anonymity and displaying data in a balanced manner with explanation.

3. Use and Benefits of the Good Practice Guidance

Individual projects will be able to download the input sheet and provide quantitative and qualitative explanations of good practice, with evidence where possible, allowing self-assessment against the provided criteria. Projects are encouraged to use any existing data from other reporting mechanisms (e.g. the Dispatchable Power Agreement from DESNZ) as a basis for ease and consistency. This will inform and support the intended supply chain ambition and once submitted to the CCSA, will allow industry to gauge the level of attainment across the sector and signal areas where a whole industry improvement effort is required with government backing.

What are the benefits for industry?

- Applying industry good practice will drive positive behaviours throughout the whole supply chain, improving efficiency through use of standard terminology and sharing a level playing field.
- As the number of UK manufacturers increases over time, there will be easier access to suppliers. This will reduce transport time and provide a more secure supply chain.
- A sector standard will improve efficiency of reporting and support the tendering process.
- Use of formal expectations and the issuing/receiving of meaningful feedback ensures all companies improve service and gain repeat business.
- Sharing envisaged ‘Future Workplans’ ensures an organised approach to tendering and a greater choice of suppliers.
- Timely payment of invoices, prompt payment of the undisputed part of a disputed invoice and feedback on the quality of invoices all ensure better business performance and working relationships.

Referenced Supply Chain Legislation and Guidance

There are several documents and tools that guide the treatment of supply chains across the energy sector and have an influence on CCUS. This Guidance has referenced several of them, see Appendix D. The below diagram outlines some of the key documents.



Diagram 1: Energy Sector Supply Chain legislation and good practice

4. Implementation Plan

The CCUS industry is in the initial stages of building UK Content ambition and first needs to establish a baseline and then increase its ambitions, by encouraging transparency and behavioural change before moving to a comprehensive reporting mechanism. By learning from the offshore and wider energy industry and building on the NSTA's Pathfinder and Supply Chain Action Plan (SCAP) tools, the industry can see where we need to get to with an ambition of fully aligned reporting in time.

This initial phase of work will set the CCUS industry on its journey, by getting the process up and running in a light touch manner, based on a combination of stated intentions and early data, reflecting an industry that is in its infancy. Appointing an independent assessor will be critical to providing transparency and trust in the reporting mechanism. As the industry matures and begins to deliver tangible outcomes, the tone can change from aspirational to a more data driven model. At this point how data is collected and reported could be standardised with other sectors' reporting.

The implementation plan will be fully developed and agreed in collaboration with Developers, the Supply Chain, Industry bodies who are driving the uptake of new technology, and Regulators, resulting in ongoing improvements and updates to how the process will work. It will also work to provide further detail on how the Taxonomy work will evolve over the coming months (see recommendation 4 on page 45).

Stage 1 – Short Term

Industry proposes to carry out an initial Supply Chain Good Practice reporting round in 2023 to act as a baseline for future improvement. Whilst components are some years away from manufacture, this reporting will include services purchased as well as the location of the proposed manufacturers, fabricators, and construction firms. This will give the sector valuable information on how to make a real difference to UK Content at the earliest possible point. Track-1 clusters began their procurement process, prior to the suggestion or setting of UK Content targets. Voluntary adoption of these targets and early reporting will provide valuable 'first mover' insight into the supply chain gaps and opportunities.

Stage 2 - Medium Term

In the medium term (2-5 years), the sector, encouraged by positive early progress against these targets, will build effective supply chain delivery mechanisms and increase pace. Reported data will help to frame any potential amendments to the commitments laid out in this document, as well as inform government policy, determining policy interventions and providing valuable feedback and insight for Track-2 and beyond.

Stage 3 - Long Term

In the longer term (2030 and beyond) these targets will enable the sector to achieve delivery of a UK Content of 50 per cent, or more, across the CCUS Sector. An initial roadmap of the primary aims and objectives and focus of each annual reporting round is set out below. This roadmap is of course subject to unforeseen changes to the development of CCUS in the UK, however it is highlighted to provide further clarity to how the industry can develop, react to developments, and fulfil these targets on an annual basis.

Key Aims and Objectives of each reporting round from 2023-2030.	
2023	<ul style="list-style-type: none"> • Integrate an initial ‘core group’ of CCUS projects and clusters to commit to the reporting process. • Identify the status of the UK CCUS supply chain landscape through the initial benchmarking process. • Develop ‘first insight’ policy strategies.
2024	<ul style="list-style-type: none"> • Refine and implement early policy strategies identified from the initial benchmarking process. • Build awareness of this reporting process and integrate further prospective projects and clusters. • Align reporting with existing requirements e.g. Task Force on Climate-related Financial Disclosures (TCFD) & International Sustainability Standards Board (ISSB). • Refine commitments laid out in the Strategy Document.
2025	<ul style="list-style-type: none"> • Raise international awareness of this reporting process, align with carbon border adjustment mechanisms and integrate further prospective projects and clusters. • Refine commitments laid out in the Strategy Document.
2026	<ul style="list-style-type: none"> • Review the status of UK CCUS supply chains in relation to Track-1 clusters moving towards their proposed operational phase. • Refine policy interventions with ‘Lessons Learned’ from the initial projects perspective on UK CCUS supply chains. • Refine commitments laid out in the Strategy Document.
2027	<ul style="list-style-type: none"> • Review the status of UK CCUS supply chain in relation to Track-1 clusters moving towards their proposed operational phase. • Drive policy interventions with ‘Lessons Learned’ from the initial projects perspectives on UK CCUS supply chains. • Propose timelines and scope of commitments beyond 2030 with perspectives from the cluster sequencing programme. • Refine commitments laid out in the Strategy Document.
2028	<ul style="list-style-type: none"> • Refine timelines and scope of commitments beyond 2030 with perspectives from the cluster sequencing programme. • Refine commitments laid out in the Strategy Document.

Key Aims and Objectives of each reporting round from 2023-2030.	
2029	<ul style="list-style-type: none">• Review the status of UK CCUS supply chains in relation to Track-2 clusters moving towards their proposed operational phase.• Drive policy interventions with these ‘Lessons Learned’ from the established projects perspectives on UK CCUS supply chains.• Refine commitments laid out in the Strategy Document.
2030	<ul style="list-style-type: none">• Review UK CCUS supply chain achievements in relation to the aspirations and commitments set out at the start of the process.• Implement plan for UK CCUS supply chain commitments beyond 2030.

5. Industry Commitments

Industry will need to self-assess across the six commitment areas using a custom-made input sheet to assist them. Organisations will be encouraged to provide feedback and evidence to reflect their good practice attainment and a space will be provided in the input sheet, however for this document, these have been omitted.

The commitments have been designed and chosen so that developers have maximum flexibility to demonstrate the various manners in which they support and collaborate with their supply chains and industry stakeholders. The good practice descriptors in the 'Fair, Good, Excellent & Best' columns are for guidance - other activities of the same or higher value to the supply chain are just as valid.

Each Industry Commitment area has its own separate section. Some good practice examples may be applicable to more than one section; however, unnecessary repetition should be avoided. The sections are as follows:



It is recognised that not all initiatives are enduring or always successful. If activity has been implemented but the outcome has been unsuccessful for whatever reason, then the addition of this information may still be relevant. Equally, some activity occurs unexpectedly and so positive or negative outcomes from actions that were not originally considered are equally relevant when reporting achievement of Good Practice criteria. The open nature of the Good Practice reporting format allows all activity whether planned/unplanned, successful/unsuccessful, large/small or completed/yet to be commenced to be included in the input sheet when reporting achievement of Good Practice criteria.

A. Approach to a percentage of UK content

4 pages to cover A1-A5, additional evidence can be attached if required

No.	Commitment			
A1	We commit to provide the percentage of overall project spend allocated to UK based supply chain companies for (Products/Components) [Aligned to NSTD]			
	Fair	Good	Excellent	Best
	20% in UK, Reporting over £25m [aligned to NSTA]	30% in UK, Reporting over £5m	40% in UK, Reporting over £1m	50% in UK [aligned to NSTA], Reporting below £1m
A2	We commit to provide the percentage of overall project spend allocated to UK based supply chain companies for (Services) [Aligned to NSTD]			
	Fair	Good	Excellent	Best
	20% in UK, Reporting over £25m [aligned to NSTA]	30% in UK, Reporting over £5m	40% in UK, Reporting over £1m	50% in UK [aligned to NSTA], Reporting below £1m
A3	We commit to provide the names, value and delivery location of contracts over the next 5 years			
	Fair	Good	Excellent	Best
	Provide names and total contract values for key components [see glossary for definition]	Provide names and total & annualised contract values for key components. Some indication of delivery location	Provide total & annualised contract values for key components and total values for smaller components. Country of Origin supplied	Provide total & annualised contract values for key components and total & annualised values for smaller components. Country of Origin supplied
A4	We commit to provide who were the alternatives considered, where was their location and why they were discounted [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	No information provided	Information on alternatives considered for key components only	Information on alternatives considered for key components and the reason they were discounted	Information on alternatives considered for most components and the reason they were discounted

A. Approach to a percentage of UK content

4 pages to cover A1-A5, additional evidence can be attached if required

No.	Commitment			
A5	We commit to support the development of the UK Supply Chain at an Energy Sector level			
	Fair	Good	Excellent	Best
	No information provided	Corporate commitment to sector level supply chain development initiatives	Support to a specific cross sector collaboration initiative	Lead on and raise the profile of a cross sector collaboration initiative.

B - Approach to supporting UK technology & innovation

4 pages to cover B1-B5, additional evidence can be attached if required

No.	Commitment			
B1	We commit to increasing current supply chain capacity [Aligned to CfD AR5] (complement the 30% technology target from the NSTD)			
	Fair	Good	Excellent	Best
	Understand what is the current UK industry capacity	Giving the supply chain an idea of the project’s future requirements 3-5 years ahead of FID	Giving the supply chain an idea of the Cluster’s future requirements	Giving the supply chain an idea of the Cluster’s future requirements
B2	We commit to provide how we are / will invest in R&D that relates to the challenges faced by the project [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	One initiative giving a technology support outcome, but little other information	One initiative giving a technology support outcome, their level of involvement, expected timescales but no assurance for delivery or working with a University on a new innovation	Two initiatives giving a technology support outcome, their level of involvement, expected timescales but no assurance for delivery or working with a University on a number of new innovations	Three initiatives giving a technology support outcome, their level of involvement, expected timescales and assurance for delivery or working with a number of Universities on new innovations
B3	We commit to provide how we are/will take action to introduce / demonstrate innovations or novel technology [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	Only using known technology	One innovation giving a tech improvement outcome, which is slightly more ambitious than existing standards, expected timescales and assurance for delivery	One innovation giving a tech improvement outcome, which is more ambitious than existing standards, expected timescales and assurance for delivery	Two innovations giving a tech improvement outcome, which are significantly more ambitious than existing standards, expected timescales and assurance for delivery

B - Approach to supporting UK technology & innovation

4 pages to cover B1-B5, additional evidence can be attached if required

No.	Commitment			
B4	We commit to provide how we are/will take action to promote new companies into the CCUS Supply Chain from other sectors [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	Engagement with new players [see Glossary for definition]	A single new player being part of the project, their role and assurance for delivery	New Players being part of the project, their role and assurance for delivery	As Good, plus support to a needs-based and focused intervention to selected supply chain companies
B5	We commit to provide how they are/will use new or upgraded manufacture infrastructure for the main components [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	Project is using manufacturing facilities that have undergone little improvement in the last three years.	Project is using a manufacturing facility that has undergone a significant upgrade in the last three years or project is using a small amount of collaborative infrastructure from other sectors	Project is using several manufacturing facilities that have undergone a significant upgrade in the last three years or project is using a medium amount of collaborative infrastructure from other sectors	Project is using several manufacturing facilities that have undergone a significant upgrade in the last three years due in part to the demand created by your project or project is using a new manufacturing facility or project is using a large amount of collaborative infrastructure from other sectors or project is working across a number of manufacturing facilities to encourage collaboration and work on a common pipeline of projects which allows them to all invest in their capability

C. Approach to the number and quality of jobs created/protected

5 pages to cover C1-C5, additional evidence can be attached if required. * For definitions see Glossary

No.	Commitment			
C1	We commit to provide workforce volumes and data employed by the Project Directly (including temporary and agency workers) [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	Incomplete volumes provided	Workforce volumes provided, including temporary and permanent	Workforce volumes provided by location, including temporary and permanent	Workforce volumes provided by location, including temporary and permanently aligned to Cluster volumes
C2	We commit to provide supply chain employer workforce volumes and locations [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	No volumes provided	Incomplete volumes provided	Workforce volumes provided by employer but no locations	Workforce volumes provided by employer and location
C3	We commit to provide UK employment figures as a percentage of the total (direct and supply chain) employment by project stage. (Manufacture is off project site, Construction is on the project site or in nearby assembly yards) [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	Design* – 40% Manufacture* – 10% Construction* – 50% Operations & Maintenance*- 60%	Design 50% Manufacture 20% Construction 60% Operations & Maintenance 70%	Design 60% Manufacture 30% Construction 70% Operations & Maintenance 80%	Design 70% Manufacture 40% Construction 80% Operations & Maintenance 90%

C. Approach to the number and quality of jobs created/protected

5 pages to cover C1-C5, additional evidence can be attached if required. * For definitions see Glossary

No.	Commitment			
C4	We commit to provide employment and skills data to a national energy industry survey of employment and skills (See Glossary) [Alignment to NSTD]			
	Fair	Good	Excellent	Best
	Job descriptions, age and gender provided	Job descriptions, age, gender, and work location provided	Job descriptions, age, gender, work location and ethnicity provided	Job descriptions, age, gender, work location, ethnicity and social mobility data provided
C5	We commit to provide opportunities for workers transitioning from other industries [Aligned to NSTD]			
	Fair	Good	Excellent	Best
	No information provided	Online information	Run 2 transition workshops* and reserved a role for a transition from another sector	Run 4 transition workshops and reserved 2 roles for a transition from another sector

D. Approach to investment in skills and training

5 pages to cover D1-D6, additional evidence can be attached if required, including details of size of company relative to commitment

No.	Commitment			
D1	We commit to take action to address skills gaps or skills shortages in the sector (Current) [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	Internal initiatives to upskill employees	Internal initiatives to upskill employees and Support to Cluster efforts to upskill	Internal initiatives to upskill employees and reskill new employees from other sectors	As Excellent plus engaging with /leading Cluster initiatives to increase current skills levels
D2	We commit to take action to address skills gaps or skills shortages in the sector (Future) [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	Host a school visit or Support to Cluster efforts to engage new entrants	Working with 3rd party organisation to support local skills improvement and Support to Cluster efforts to engage new entrants	Provided a £5,000 grant for STEM in local schools and Support to Cluster efforts to engage new entrants	Provided a £5,000 grant for STEM in local schools, host a school visit and support local skills improvement organisations
D3	We commit to sponsor Higher Education Scholarships (University) [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	No information provided	One University maintenance grant	One University scholarship	Two University scholarships
D4	We commit to sponsor Further Education Scholarships/Technical Skills Training (Colleges or local training provider)			
	Fair	Good	Excellent	Best
	No information provided	Three Maintenance grants	Five Maintenance grants	Ten Maintenance grants

D. Approach to investment in skills and training

5 pages to cover D1-D6, additional evidence can be attached if required, including details of size of company relative to commitment

No.	Commitment			
D5	We commit to employ Apprenticeship positions [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	No information provided	2.5% of employees are Apprentices	2.5% of employees by hours worked are Apprentices	5% of employees by hours worked are Apprentices
D6	We commit to provide Traineeships / T-Level placements [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	1 Traineeship	3 Traineeships	5 Traineeships, 5 T-Level Placements	10 Traineeships, 10 T-Level Placements

E. Transparency of the supply chain process

3 pages to cover E1-E4, additional evidence can be attached if required

No.	Commitment			
E1	We commit to deliver/have delivered supply chain engagement events or other manners to communicate opportunities to the supply chain in a timely manner that allows the supply chain to prepare [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	Project is uploading information on to Energy Pathfinder or use of a pre-qualification system.	One event with outline of the expected work package contracts available. Use of Energy Pathfinder or use of a pre-qualification system.	One event with summary of desired outcomes, planned follow up actions and where relevant evidence of sub-contractor involvement. Use of Energy Pathfinder or use of a pre-qualification system.	Three events with summary of desired outcomes, planned follow up actions and where relevant evidence of sub-contractor involvement. Use of Energy Pathfinder or use of a pre-qualification system avoiding requesting information in tenders that is already available in the prequalification system. Regular feedback shared with supplier through the prequalification system.
E2	We commit to ensure open and fair opportunities for as many supply chain firms as possible in our contracting strategies [Aligned to OEUK Supply Chain Principles and CfD AR5]			
	Fair	Good	Excellent	Best
	Contracts that do not prohibit market access for UK companies.	As Fair plus dates for coming to market are widely publicised and pre-qualification criteria are clear.	As Good plus ITT documents are clear and unambiguous, there is a clear procedure for tender evaluation, with a published criteria for assessment and any clarification answers/changes are published to all bidders.	As Excellent plus regular feedback on evaluation progress and feedback for unsuccessful bidders.

E. Transparency of the supply chain process

3 pages to cover E1-E4, additional evidence can be attached if required

No.	Commitment			
E3	We commit to provide feedback to unsuccessful suppliers [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	No feedback provided	Limited feedback when requested	Significant feedback when requested	Feedback provided to all applicants as a matter of course
E4	We commit to give a weighting to non-cost factors e.g. Social Value, when choosing supply chain companies [Aligned to OEUK Supply Chain Principles and good ESG/CSR practice and CfD AR5]			
	Fair	Good	Excellent	Best
	No Weighting given	Weighting given to one of; - actively managing waste, emissions, and consumption of natural resources, - EDI initiatives and Corporate social initiatives (the OEUK D&I Tools or other EDI support resource can be used)	Weighting given to two of; - actively managing waste, emissions, and consumption of natural resources, - EDI initiatives and Corporate social initiatives (the OEUK D&I Tools or other EDI support resource can be used)	Weighting given to all of; - actively managing waste, emissions, and consumption of natural resources, - EDI initiatives and Corporate social initiatives (the OEUK D&I Tools or other EDI support resource can be used)

F. Wider economic benefits

4 pages to cover A1-A5, additional evidence can be attached if required

No.	Commitment			
F1	We commit to provide how we will/have engaged the local community to ensure benefit for the local community offsets any detriment they experience due to the project [Aligned to CfD AR5]			
	Fair	Good	Excellent	Best
	No engagement or local support	Commitment to improve the local supply chain capacity and capability, resulting in increased employment and greater local prosperity.	Good commitment to engage with local authorities, community groups and chambers of commerce to identify impacts of the project and actions to mitigate them. Actions to improve the local supply chain capacity and capability.	Ambitious commitment to engage with local authorities, community groups and chambers of commerce to identify impacts of the project and actions to mitigate them. Actions to improve the local supply chain capacity and capability.
F2	We will engage in cross energy sector leadership groups to share good practice and provide a forum for Supply Chain Feedback			
	Fair	Good	Excellent	Best
	Attend a Supply Chain Forum	Attend a cross energy sector group and engage with supply chain members. Implement changes as a result.	Attend a cross energy sector group. Actively share good practice knowledge and experience. Engage with supply chain members and implement changes as a result.	Convene/co-chair a cross-sector group. Actively share good practice knowledge and experience. Engage with supply chain members and implement changes as a result.

F. Wider economic benefits

4 pages to cover A1-A5, additional evidence can be attached if required

No.	Commitment			
F3	We commit to fair and timely payment of suppliers [Aligned to OEUK Supply Chain Principles]			
	Fair	Good	Excellent	Best
	Policy commitment to pay on time	As Fair plus clear and simple process for invoicing	As Good plus total payment process completed in 30 days	As Excellent plus Payment ensuring neutral cash flow for supplier
F4	We commit to retain good industrial relations			
	Fair	Good	Excellent	Best
	Legislative commitment	Limited accommodation provided	Project Industrial Relations Framework	Adoption of a National framework, e.g. National Agreement for the Engineering Construction Industry
F5	We commit to supply suitable accommodation facilities for the workforce at all stages of the project			
	Fair	Good	Excellent	Best
	No provision	Limited accommodation provided	Sufficient accommodation provided	Sufficient accommodation provided with coach transport between accommodation and site

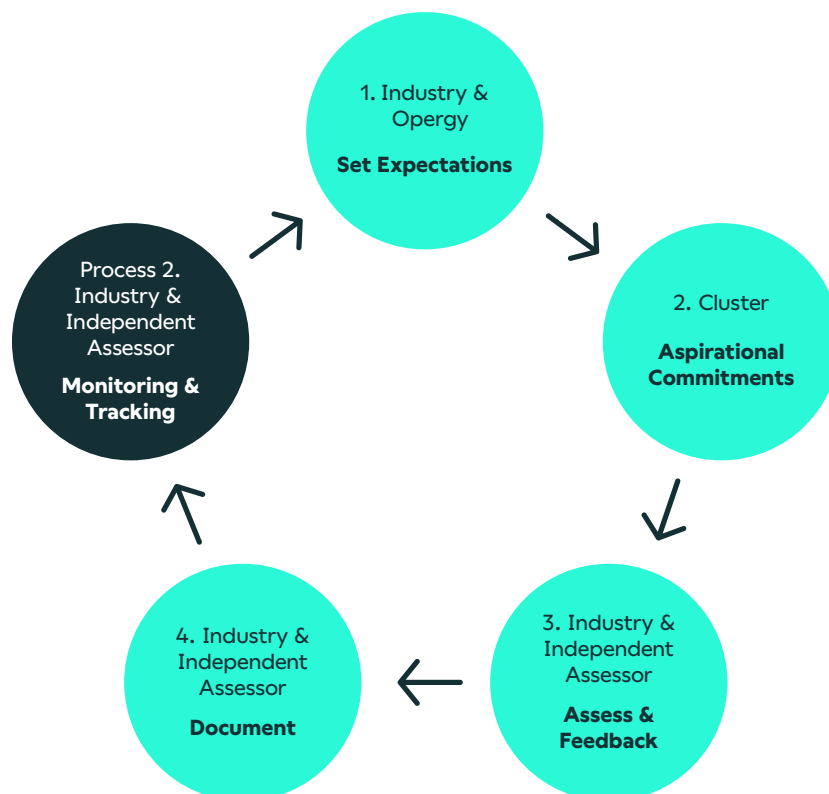
6. Benchmarking and Tracking

The process for Initial Benchmarking of Project Aspirations (turquoise in diagrams) and regular Tracking of achievements (dark green in diagrams) against those initial aspirations are two separate processes.

Track-1 Clusters and Projects have already started engaging their supply chains before this Guidance Document and so they will need to benchmark their project aspirations retrospectively. Future Tracks will be able to go through the full process of making aspirational commitments, having them independently benchmarked and then gaining feedback on how stretching their aspirations are.

The Benchmarking process

The benchmarking process is outlined in the diagram below and detailed thereafter.



Step 1 - Current expectations have been framed and set by industry and facilitated by Opergy. As the supply chain develops and with maturing views on good practice, it would be wise to revisit the expectations, when necessary, for instance before a new cluster sequencing process is launched, on an annual basis, or when requested by a majority of responders. Currently the sector has shown a preference for every other year to provide stability. This does not however mean the expectations need to be changed if they are still fit for purpose.

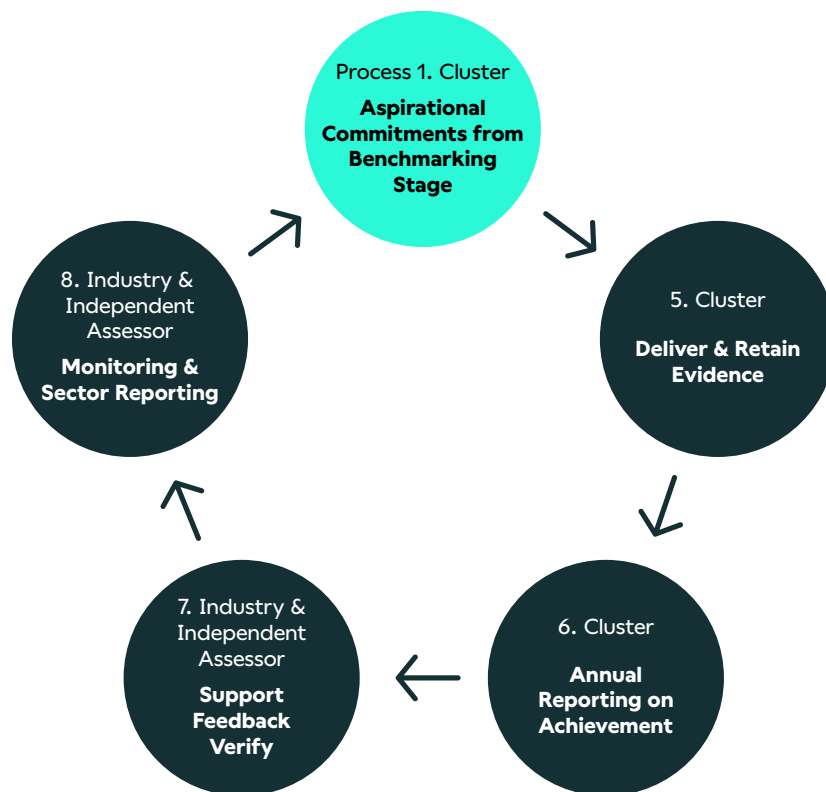
Step 2 - Once the expectations are set, Clusters and Projects can make aspirational commitments depending on their supply chain plan and the capability and capacity of their engaged supply chain.

Step 3 - These aspirational commitments should be submitted and assessed by an independent third party nominated by the CCSA. Once complete, a feedback report can be provided to the applicant during a feedback meeting in order for the applicant to be aware of how they compare across the sector. This will allow for the identification of areas of improvement and the reassurance gained from acknowledgement of high attainment in other areas.

Step 4 - The commitments, either original or revised can be documented as a base line of expectation, to inform the Monitoring and Tracking Process (Process 2 in dark green).

Monitoring and Tracking Process

The monitoring and tracking process is outlined in the diagram below and detailed thereafter.



The Clusters or Projects will have made aspirational commitments in Process 1 (turquoise circle). It is likely that the Cluster or Project will have a number of activities to deliver any commitments in the manner that they already operate.

Step 5 - These commitments will need to be worked towards and evidence collected to demonstrate the achievement of them or towards them.

Step 6 - Annually these should be reported on by the provision of evidence and other manners of demonstration to an independent party.

Step 7 - An independent party nominated by the CCSA can feedback on this reporting, again providing support in terms of giving the applicant an understanding of how they compare to the wider sector. The achievements can also be independently verified if this is felt necessary.

Step 8 - Once the independent assessor is happy with the individual reporting, the achievements and level of improvement can be aggregated across the sector. These can be checked to ensure anonymisation and then reported upon as sector wide progress by the independent assessor. This report can be used by the leadership organisations in the sector, the Government, and other stakeholders to plan and provide initiatives to further improve and develop the supply chains capability and capacity.

The tool or system for reporting is currently envisaged to be a simple flexible spreadsheet with a view to possibly convert this into a web-based reporting tool once the process has embedded and less change is envisaged.

Roles and Responsibilities

Clearly defining the roles and responsibilities of each of the involved parties is essential to ensure continued confidence in the reporting and monitoring process.

- **Industry** – timely and comprehensive reporting of supply chain plans through self-assessment.
- **Independent Assessor** – collection of the data from industry, collation, anonymisation to maintain confidentiality, and feedback to industry on individual progress and vs sector-wide trends.
- **CCSA** – responsibility to develop supply chain insights of the collated anonymised data from the Independent Assessor and develop policy and intervention strategies.
- **Government** – where appropriate, respond to the insights from the supply chain reporting rounds as summarised by the CCSA and other complementary work.

Provision to maintain confidentiality

The CCSA, in collaboration with the nominated **Independent Assessor**, will continue to engage with industry to ensure confidence in the monitoring and tracking process. Provision can be made to ensure industry reserves the right to the data that is supplied, and any reports or supply chain insights which are published thereafter will need to have industry agreement prior to publication. Data confidentiality and proprietary information is paramount to ensure industry confidence in this process.

The **Independent Assessor** can, and most likely will, change throughout the life of the sector as the process goes from one of support and nurture of a fledgling sector towards one that is more hard data driven which would better suite an Authority or Regulator.

7. Supply Chain Common Taxonomy

The aim of this Taxonomy was to develop a complete list of components required across the CCUS chain, covering CO₂ capture, transport, and storage. To ensure a comprehensive list of components across the supply chain, it has been structured across the following levels:

1. Level 1: Full Value-chain – The high-level division of capture, transport, and storage.
2. Level 2: Technology Type – Reflecting the methodology used within the function.
3. Level 3: Engineering package – A collection of components required to deliver a process within the chain. An additional note is included below in relation to this.
4. Level 4: Major components – Individual, but significant components within an engineering package.

The list of components was split into an Equipment Taxonomy and separately a Services Taxonomy.

Engineering Packages

Carbon capture projects will require manufactured components, such as column vessels, heat exchangers and compressors etc, and in addition companies to perform the assembly of these components into the plant, either onsite or via a ‘skid’ or module. On a carbon capture project, there may be a number of sub-packages required to operate the whole plant, e.g. CO₂ capture and CO₂ conditioning. Several companies offer delivery and installation of these packages, comprising of an assembly of manufactured components. Engineering packages have therefore been included as an intermediate Level 3.

The Taxonomies can be seen below.

The full report covering: an introduction to CCUS processes and technologies, the methodology, taxonomy, full high value assessment and conclusions can be found at – ‘A Remarkable New Infrastructure System’, Opportunities for economic growth in the UK’s Carbon Capture & Storage Industry – Ove Arup & Partners Ltd. – 25 May 2023.

Arup Equipment Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref	Component
Capture	1	Post-Combustion Solvent	1.3	Flue gas collection/pre treatment	1.1.1	Skimmer	1.1.1.1	Skimmer
						Catalytic Reduction Package	1.1.1.2	Sub package
						Filter	1.1.1.3	Filter
						Cooler	1.1.1.4	Heat exchanger/fan
						Pump	1.1.1.5	Pump
						Fan	1.1.1.6	Fan
						Flue gas blower	1.1.1.7	Gas blower
						NOX removal (SCR) package	1.1.1.8	Sun package
						Desulfurisation package	1.1.1.9	Sub package
				Capture	1.1.2	Direct contact cooler	1.1.2.1	Column vessel
						Absorber column	1.1.2.2	Column vessel
						Water wash	1.1.2.3	Sub package
						Absorber wash column	1.1.2.4	Column vessel
						Rich/lean heat exchanger	1.1.2.5	Heat exchanger
						Stripper column	1.1.2.6	Column vessel
						Reboiler	1.1.2.7	Heat exchanger
						Condensor	1.1.2.8	Heat exchanger
						Stripper wash column	1.1.2.9	Column vessel
						Solvent (MEA)	1.1.2.10	Chemical
						Solvent tank	1.1.2.11	Tank
						Pumps	1.1.2.12	Pump
				CO2 conditioning (molecular sieve de-hydration assumed)	1.1.3	CO2 compressor	1.1.3.1	Compressor
						Compressor KO drums	1.1.3.2	Tank
						Coolers	1.1.3.3	Heat exchanger/fan
						Lube oil unit	1.1.3.4	Sub package
						Motor	1.1.3.5	Sub package
						Knock out drum (de-hydration unit)	1.1.3.6	Column vessel
						Coalescer filter	1.1.3.7	Filter
						Adsorber column	1.1.3.8	Column vessel
						Regeneration column	1.1.3.9	Column vessel
						Regeneration gas steam heater	1.1.3.10	Heater
						Regeneration gas electric heater	1.1.3.11	Heater
						Regeneration gas cooler	1.1.3.12	Heat exchanger/fan
						Regeneration gas seperator	1.1.3.13	Column vessel
						Dust fliters	1.1.3.14	Filter
						Condensate vessel	1.1.3.15	Tank
Regeneration gas blower	1.1.3.16	Gas blower						

Arup Equipment Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref	Component
Capture	1	Post-Combustion Solvent	1.1	Balance of plan (integration)	1.1.4	Demineralised water supply package	1.1.4.1	Sub package
						Waste water treatment	1.1.4.2	Sub package
						Cooling water supply	1.1.4.3	Sub package
						Steam supply	1.1.4.4	Sub package
						Valves	1.1.4.5	Valve
						Pipes	1.1.4.6	Pipe
						Flue gas pre-capture meter	1.1.4.7	Sub package
						CO2 exit meter	1.1.4.8	Sub package
						Housing	1.1.4.9	Sub package
						Controls	1.1.4.10	Sub package
						Monitoring	1.1.4.11	Sub package
						Instrumentation	1.1.4.12	Sub package
						Power supply/connections/switchgear	1.1.4.13	Sub package
		Pre-combustion solvent	1.2	Flue gas pre-treatment	1.2.1	Skimmer	1.2.1.1	Skimmer
						Catalytic reduction package	1.2.1.2	Sub package
						Filter	1.2.1.3	Filter
						Cooler	1.2.1.4	Cooler
						Pump	1.2.1.5	Pump
						Fan	1.2.1.6	Fan
						Flue gas blower	1.2.1.7	Gas blower
						NOX removal (SCR) package	1.2.1.8	Sub package
						Desulfurisation package	1.2.1.9	Sub package
						Capture	1.2.2	Capture
Absorber column	1.2.2.2	Column vessel						
Water wash	1.2.2.3							
Absorber wash column	1.2.2.4	Column vessel						
Rich/lean heat exchanger	1.2.2.5	Heat exchanger						
Stripper column	1.2.2.6	Column vessel						
Reboiler	1.2.2.7	Heat exchanger						
Condensor	1.2.2.8	Heat exchanger						
Stripper wash column	1.2.2.9	Column vessel						
Solvent (MDEA)	1.2.2.10	Chemical						
Solvent tank	1.2.2.11	Tank						
Pumps	1.2.2.12	Pumps						

Arup Equipment Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref	Component
Capture	1	Pre-combustion solvent	1.2	Post-capture CO2 conditioning (molecular sieve de-hydration assumed)	1.2.3	CO2 compressor	1.2.3.1	Compressor
						Compressor KO drums	1.2.3.2	Column vessel/ separator
						Coolers	1.2.3.3	Heat exchanger/ fan?
						Lube oil unit	1.2.3.4	Sub package
						Motor	1.2.3.5	Sub package
						Knock out drum (de-hydration unit)	1.2.3.6	Column vessel/ separator
						Coalescer filter	1.2.3.7	Filter
						Adsorber column	1.2.3.8	Column vessel
						Regeneration column	1.2.3.9	Column vessel
						Regeneration gas steam heater	1.2.3.10	Heater
						Regeneration gas electric heater	1.2.3.11	Heater
						Regeneration gas cooler	1.2.3.12	Heat exchanger/ fan
						Regeneration gas separator	1.2.3.13	Column vessel
						Dust filters	1.2.3.14	Filter
						Condensate vessel	1.2.3.15	Tank
						Regeneration gas blower	1.2.3.16	Gas blower
				Balance of plant (integration)	1.2.4	Demineralised water supply package	1.2.4.1	Sub package
						Waste water treatment	1.2.4.2	Sub package
						Cooling water supply	1.2.4.3	Sub package
						Steam supply	1.2.4.4	Sub package
						Valves	1.2.4.5	Valve
						Pipes	1.2.4.6	Pipe
						Housing, base plates, mounts	1.2.4.7	Sub package
						Flue gas pre-capture meter	1.2.4.8	Sub package
						CO2 exit meter	1.2.4.9	Sub package
						Power supply/connections/ switchgear	1.2.4.10	Sub package
						Monitoring	1.2.4.11	Sub package
Controls	1.2.4.12	Sub package						
Instrumentation	1.2.4.13	Sub package						
Fittings and seals	1.2.4.14	Sub package						

Arup Equipment Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref	Component
Transport	2	Transportation conditioning	2.1	Liquefaction (cryogenic transport only)	2.1.1	Distillation column	2.1.1.1	Column vessel
						Condensor	2.1.1.2	Heat exchanger
						Reflux pump	2.1.1.3	Pump
						Reflux drum	2.1.1.4	Column vessel
						Compressor KO drum	2.1.1.5	Column vessel
						Refrigerant compressor	2.1.1.6	Compressor
						Scrubbing column	2.1.1.7	Column vessel
						Absorbtion column	2.1.1.8	Column vessel
						Refrigerant compressor	2.1.1.9	Chemical
						Cooler column	2.1.1.10	Column vessel
						Pumps	2.1.1.11	Pump
		Regasification (cryogenic transport only)	2.1.2	Electric heater	2.1.2.1	Heater		
				Heat exchanger	2.1.2.2	Heat exchanger		
				Gasification pump	2.1.2.3	Pump		
				Manifold	2.1.2.4			
				Control valve	2.1.2.5	Valve		
		Land	2.2	Pipeline	2.2.1	Pipe fabrication	2.2.1.1	Pipes
						Insulation/casing	2.2.1.2	Insulation
						Valves	2.2.1.3	Valves
						Coatings	2.2.1.4	Coatings
						Compressors	2.2.1.5	Compressor
						Meter points	2.2.1.6	Sub package
						Leakage detectors	2.2.1.7	Sub package
						Pig launcher/receiver	2.2.1.8	Sub package
						Fibre optic cabling (telemetry)	2.2.1.9	Sub package
						Chemical injection package	2.2.1.10	Chemical/sub package
Cathodic protection	2.2.1.11					Sub package (if included)		
Rail	2.2.2			Rolling stock	2.2.2.1	Wagons		
				ISO tanks for wagons (incld)	2.2.2.2	Tanks		
				Cryogenic CO2 filling connections	2.2.2.3	Sub package		
				Cryogenic CO2 emptying	2.2.2.4	Sub package		
Road	2.2.3			ISO tanks	2.2.3.1	Tanks		
				Tractors	2.2.3.2	Tractor		
				Cryogenic CO2 filling connections	2.2.3.3	Sub package		
				Cryogenic CO2 emptying	2.2.3.4	Sub package		

Arup Equipment Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref	Component		
Transport	2	Marine	2.3	Port loading/unloading infrastructure cryogenic	2.3.1	CO2 pressurised storage tanks	2.3.1.1	Tank		
						Cryogenic loading/unloading arms	2.3.1.2	Sub package		
						Pumps	2.3.1.3	Pump		
						Boil-off vent	2.3.1.4	Valve		
						Insulated pipeline	2.3.1.5	Pipe		
						Re-circulation loop	2.3.1.6	Sub package		
				Port loading/unloading infrastructure pressurised gas	2.3.2	CO2 pressurised storage tanks	2.3.2.1	Tank		
						Pumps	2.3.2.2	Pump		
						Pressurised loading/unloading arms	2.3.2.3	Sub package		
						Pipeline	2.3.2.4	Pipe		
				Ships - retrofit (cryogenic assumed)	2.3.3	Retrofitting of existing ships (LNG)	2.3.3.1	Sub package		
						Storage tanks	2.3.3.2	Tanks		
						Pumps	2.3.3.3	Pumps		
				Ships - new build (cryogenic assumed)	2.3.4	Onboard storage (pressurised/cryogenic)	2.3.4.1	Tanks		
						Topsides	2.3.4.2	Structure		
						Loading/offloading equipment	2.3.4.3	Sub package		
Direct offshore injection equipment	2.3.4.4	Sub package								
Storage	3	Depleted oil/gas field	3.1	Structures	3.1.1	Subsea pipeline	3.1.1.1	Pipe		
						Offshore platform	3.1.1.2	Structure		
						Subsea distribution unit	3.1.1.3	Sub package		
						Subsea umbilicals	3.1.1.4	Sub package		
						Risers	3.1.1.5	Sub package		
						Flowlines - with insulation or direct electric heating (DEH)	3.1.1.6	Sub package		
						Compressors	3.1.1.7	Compressors		
						Pumps	3.1.1.8	Pumps		
						Store	3.1.2	Christmas tree	3.1.2.1	Sub package
								Wellhead	3.1.2.2	Structure
				Manifold	3.1.2.3			Structure		
				Drilling rig	3.1.2.4			Structure		
				Asset management equipment	3.1.3	Inhibitors	3.1.3.1	Sub package		
						Leakage detection	3.1.3.2	Sub package		
						pH monitoring instruments	3.1.3.3	Sub package		
						Seismic monitoring instruments	3.1.3.4	Sub package		
						Metering, detection/monitoring	3.1.3.5	Sub package		
						Pressure monitor	3.1.3.6	Sub package		

Arup Services Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref
Essential Functions	1	Essential Functions	1.1	Industry organisations	1.1.1	Development of safety standards	1.1.1.1
						Development of quality standards	1.1.1.2
						Development of environmental standards	1.1.1.3
						Procurement planning tools	1.1.1.4
						Supply chain action plans	1.1.1.5
				Hospitality and accomodation	1.1.2	Hotels	1.1.2.1
						Serviced apartments/other temporary housing	1.1.2.2
				HR and recruitment services	1.1.3	HR/admin	1.1.3.1
						Recruitment	1.1.3.2
						Training	1.1.3.3
				Legal and IP services	1.1.4	Legal services	1.1.4.1
						IP services	1.1.4.2
				Financial services	1.1.5	Financial services	1.1.5.1
						Insurance	1.1.5.2
				IT/Digital services	1.1.6	IT consultancy	1.1.6.1
						Software developer/engineer	1.1.6.2
						IT infrastructure	1.1.6.3
						Data/cyber security	1.1.6.4
						AI/ML	1.1.6.5

Arup Services Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref								
Capture	2	Initiation - concept	2.1	Engineering & design	2.1.1	Feasibility study	2.1.1.1								
				Management	2.1.2	Project management	2.1.2.1								
		Development - pre FID	2.2	Engineering & design	2.2.1	Pre FEED	2.2.1.1	FEED	2.2.1.2						
						Management	2.2.2	Consenting	2.2.2.1	Funding acquisition	2.2.2.2				
				Wider stakeholder engagement	2.2.2.3			Project management	2.2.2.4						
				Development, post FID	2.3			Engineering & design	2.3.1	Detailed design	2.3.1.1	Owners engineer	2.3.1.2		
										EPCm	2.3.1.3	Management	2.3.2	Project management	2.3.2.1
										Wider stakeholder engagement	2.3.2.2			Land acquisition	2.3.2.3
				Construction	2.4	Fabrication of key equipment	2.4.1	Machine assembly	2.4.1.1	Welding	2.4.1.2				
		Manufacturing	2.4.2					Machining, casting & moulding	2.4.2.1	Component quality checks	2.4.2.2				
						Logistics	2.4.3	Long distance transport	2.4.3.1	Cargo handling/heavy lifting	2.4.3.2				
		Construction, installation & site services	2.4.4					Site studies	2.4.4.1	Plant housing	2.4.4.2				
						Installation of components	2.4.4.3	Connections and integration	2.4.4.4						
						Commissioning	2.5	Testing & inspection	2.5.1	Electrical testing	2.5.1.1	Quality testing/NDT	2.5.1.2		
										Safety inspections	2.5.1.3	Construction, installation & site services	2.5.2	Security	2.5.2.1
		Waste management	2.5.2.2			Communications	2.5.2.3								

Arup Services Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref
Capture	2	Operations & maintenance	2.6	Testing & inspection	2.6.1	Safety	2.6.1.1
						Quality	2.6.1.2
				Monitoring/data collection	2.6.2	Leakages	2.6.2.1
						Predictive maintenance	2.6.2.2
						Metering	2.6.2.3
				Construction, installation & site services	2.6.3	Security	2.6.3.1
		Waste management	2.6.3.2				
		Communications	2.6.3.3				
		Operations	2.6.4	Shutdown/turnaround services	2.6.4.1		
				Process operators	2.6.4.2		
		Maintenance	2.6.5	On-site maintenance services	2.6.5.1		
		Decommissioning	2.7	Testing & inspection	2.7.1	Quantity surveying	2.7.1.1
						Safety	2.7.1.2
Management	2.7.2			Project management	2.7.2.1		
				Project planning	2.7.2.2		

Arup Services Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref				
Transport	3	Pipeline	3.1	Engineering & Design	3.1.1	Engineering contractors (concept, pre-FEED/FEED)	3.1.1.1				
						Engineering support	3.1.1.2				
						CAD/Modelling	3.1.1.3				
		Marine	3.2	Logistics	3.2.1	Freight services	3.2.1	Freight services	3.2.1.1		
								Construction, installation & site services	3.2.2	Subsea cable contractors	3.2.2.1
										Offshore scaffolding & rigging	3.2.2.2
		Construction	3.3	Fabrication of key equipment	3.3.1	Machine assembly	3.3.1	Machine assembly	3.3.1.1		
								Welding	3.3.1.2		
				Manufacturing	3.3.2	Machining, casting & moulding	3.3.2	Component quality checks	3.3.2	Machining, casting & moulding	3.3.2.1
										Component quality checks	3.3.2.2
				Logistics	3.3.3	Long distance transport	3.3.3	Cargo handling/heavy lifting	3.3.3	Long distance transport	3.3.3.1
										Cargo handling/heavy lifting	3.3.3.2
				Construction installation & site services	3.3.4	Installation of components (i.e. pipeline)	3.3.4	Installation of components (i.e. pipeline)	3.3.4	Installation of components (i.e. pipeline)	3.3.4.1
										Connections and integration	3.3.4.2
										Site studies	3.3.4.3
										Plant housing	3.3.4.4
				Commissioning	3.4	Testing & inspection	3.4.1	Electrical testing	3.4.1	Electrical testing	3.4.1.1
										Quality testing/NDT	3.4.1.2
		Safety inspections	3.4.1.3								
		Construction installation & site services	3.4.2			Security	3.4.2	Security	3.4.2	Security	3.4.2.1
										Waste management	3.4.2.2
										Communications	3.4.2.3
		Operations & maintenance	3.5	Testing & inspection	3.5.1	Safety	3.5.1	Safety	3.5.1.1		
								Quality	3.5.1.2		
				Monitoring & data collection	3.5.2	Leakages	3.5.2	Leakages	3.5.2	Leakages	3.5.2.1
										Metering	3.5.2.2
										Predictive maintenance	3.5.2.3
Construction installation & site services	3.5.3			Security	3.5.3	Security	3.5.3	Security	3.5.3.1		
								Waste management	3.5.3.2		
								Communications	3.5.3.3		
Operations	3.5.4			Shutdown/turnaround services	3.5.4	Shutdown/turnaround services	3.5.4	Shutdown/turnaround services	3.5.4.1		
								Process operators	3.5.4.2		
Maintenance	3.5.5	On-site maintenance services	3.5.5	On-site maintenance services	3.5.5	On-site maintenance services	3.5.5.1				
Decommissioning	3.6	Testing & inspection	3.6.1	Quantity surveying	3.6.1	Quantity surveying	3.6.1.1				
						Safety	3.6.1.2				
		Management	3.6.2	Project management	3.6.2	Project management	3.6.2	Project management	3.6.2.1		
								Project planning	3.6.2.2		

Arup Services Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref
Loading/ offloading	4	Initiation	4.1	Subsea, wells and exploration	4.1.1	Geotechnical services	4.1.1.1
						Well selection	4.1.1.2
						Drilling contractors	4.1.1.3
		Development	4.2	Engineering & design	4.2.1	Engineering contractors (concept, pre-FEED/FEED)	4.2.1.1
						Pipeline engineering support	4.2.1.2
						Pipeline CAD/Modelling	4.2.1.3
		Construction	4.3	Fabrication of key equipment	4.3.1	Machine assembly	4.3.1.1
						Welding	4.3.1.2
				Manufacturing	4.3.2	Machining, casting & moulding	4.3.2.1
						Component quality checks	4.3.2.2
				Logistics	4.3.3	Long distance transport	4.3.3.1
						Cargo handling/heavy lifting	4.3.3.2
				Construction installation & site services	4.3.4	Installation of components (i.e. pipeline)	4.3.4.1
						Connections and integration	4.3.4.2
						Subsea cable contractors	4.3.4.3
						Offshore scaffolding & rigging	4.3.4.4
						Site studies	4.3.4.5
						Plant housing	4.3.4.6
				Commissioning	4.4	Testing & inspection	4.4.1
		Quality testing/NDT	4.4.1.2				
		Safety inspections	4.4.1.3				
		Construction installation & site services	4.4.2			Security	4.4.2.1
						Waste management	4.4.2.2
		Communications	4.4.2.3				
		Operations & maintenance	4.5	Testing & inspection	4.5.1	Safety	4.5.1.1
						Quality	4.5.1.2
				Monitoring & data collection	4.5.2	Leakages	4.5.2.1
						Metering	4.5.2.2
Predictive maintenance	4.5.2.3						
Construction installation & site services	4.5.3			Security	4.5.3.1		
				Waste management	4.5.3.2		
				Communications	4.5.3.3		
Operations	4.5.4			Shutdown/turnaround services	4.5.4.1		
		Process operators	4.5.4.2				
Maintenance	4.5.5	On-site maintenance services	4.5.5.1				
Decommissioning	4.6	Testing & inspection	4.6.1	Quantity surveying	4.6.1.1		
				Safety	4.6.1.2		
		Management	4.6.2	Project management	4.6.2.1		
				Project planning	4.6.2.2		

Arup Services Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref
Storage	5	Initiation - concept	5.1	Subsea, wells and exploration	5.1.1	Geotechnical services	5.1.1.1
						Well selection	5.1.1.2
						Drilling contractors	5.1.1.3
						Seismic scanning contractors	5.1.1.4
				Engineering & design	5.1.2	Feasibility study	5.1.2.1
				Management	5.1.3	Project management	5.1.3.1
				Project planning	5.1.3.2		
		Development pre-FID	5.2	Engineering & design	5.2.1	pre-FEED	5.2.1.1
						FEED	5.2.1.2
				Management	5.2.2	Consenting	5.2.2.1
						Funding acquisition	5.2.2.2
						Wider stakeholder engagement	5.2.2.3
						Project management	5.2.2.4
		Development post-FID	5.3	Engineering & design	5.3.1	Detailed design	5.3.1.1
						Owners engineer	5.3.1.2
						EPCm	5.3.1.3
				Management	5.3.2	Project management	5.3.2.1
						Wider stakeholder engagement	5.3.2.2
						Land acquisition	5.3.2.3
		Construction	5.4	Fabrication of key equipment	5.4.1	Machine assembly	5.4.1.1
						Welding	5.4.1.2
				Manufacturing	5.4.2	Machining, casting & moulding	5.4.2.1
						Component quality checks	5.4.2.2
				Shipping & delivery	5.4.3	Long distance transport	5.4.3.1
Cargo handling/heavy lifting	5.4.3.2						
Construction, installation & site services	5.4.4			Site studies	5.4.4.1		
				Plant housing	5.4.4.2		
				Installation of components	5.4.4.3		
				Connections and integration	5.4.4.4		
		Offshore scaffolding & rigging	5.4.4.5				
		Subsea cable contractors	5.4.4.6				

Arup Services Taxonomy

Level 1	Ref	Level 2	Ref	Level 3	Ref	Level 4	Ref
Storage	5	Commissioning	5.5	Testing & inspection	5.5.1	Electrical testing	5.5.1.1
						Quality testing/NDT	5.5.1.2
						Safety inspections	5.5.1.3
				Construction, installation & site services	5.5.2	Security	5.5.2.1
						Waste management	5.5.2.2
						Communications	5.5.2.3
		Operations & Maintenance	5.6	Testing & inspection	5.6.1	Safety	5.6.1.1
						Quality	5.6.1.2
						Monitoring/data collection	5.6.2
				Leakages	5.6.2.2		
				Metering	5.6.2.3		
				Subsea monitoring/inspection	5.6.2.4		
				Predictive maintenance	5.6.2.5		
				Construction, installation & site services	5.6.3	Security	5.6.3.1
						Waste management	5.6.3.2
						Communications	5.6.3.3
				Operations	5.6.4	Shutdown/turnaround services	5.6.4.1
						Process operators	5.6.4.2
		Maintenance	5.6.5	On-site maintenance services	5.6.5.1		
				Subsea maintenance	5.6.5.2		
Decommissioning	5.7	Testing & inspection	5.7.1	Quantity surveying	5.7.1.1		
				Safety	5.7.1.2		
		Management	5.7.2	Project management	5.7.2.1		
				Project planning	5.7.2.2		

8. High Value Opportunities

Section Objectives

The outcome of this section is to provide insight into the “high value” opportunities within the CCUS supply chain that UK industry is well placed to take advantage of in creating or growing capacity.

Definition of High Value Assets

Arup are confident that the resulting analysis combines the wide range of available information types to provide as clear as possible a summary of the current range of critical opportunities for the UK.

High Value Opportunities (HVO) – The Recommendations from the in-depth HVO work package

HVO Recommendation 1: Mitigate risk of EPC & engineering design constraints (Industry and Policy Makers)

- Construction & construction management services are identified by this study as ‘high value’ to the UK and to the CCS supply chain. Engineering design is a major economic opportunity for the UK, playing to a nationwide strength in high-value technical design, building on our active domestic onshore and offshore energy industries and drawing on the skills of the estimated 5.6 million people employed in the UK engineering sector. Furthermore, these services are anticipated to present a potentially major constraint, due to availability of workforce, to the UK CCUS sector and wider UK Energy Transition. Increased coordination across UK sectors, and the construction (and wider EPC) sector, is recommended in order to mitigate this risk and to ensure that demand can be met ahead of 2030. This unprecedented cross-sector effort must be coordinated by policy makers and industry associations in order to improve demand forecasts and potentially even to prioritise projects in order to achieve legally binding Net Zero commitments.
- It is important to increase communication and collaboration between developers, enabled and supported by industry and industry associations, when commissioning services from the construction sector. This is in order to de-bottleneck this critical service group and enable the achievement of national CCS targets, as well as securing jobs and growth opportunities for UK companies. Industry associations and regulatory bodies who are well-positioned to improve communication, transparency and shared planning across this new infrastructure sector may include Offshore Energies UK (OEUK), the North Sea Transition Authority (NSTA), the Infrastructure Projects Authority (IPA), the Institute for Civil Engineers (ICE), The Crown Estate (TCE), and the Carbon Capture and Storage Association (CCSA).

HVO Recommendation 2: Develop UK column assembly & heat exchanger supply chains (Industry and Policy Makers)

- Column vessel manufacture, assembly and internals are identified as ‘high value’ items identified in this study and represent the major single source of opportunity for UK companies of the equipment needed to serve the UK CCUS sector. Column vessels are typically the largest item in a capture plant by both physical size and capital expenditure. This presents both an opportunity and a constraint in terms of UK fabrication yard capacity and leads us to recommend an early and wide-ranging consultation with existing UK fabrication yards in order to establish the possibilities for their expansion in strategic locations.
- There is significant UK capability and capacity in heat exchanger manufacture and assembly in the UK. Given the range of sizes of heat exchangers required across industrial carbon capture, processing, compression, and transport, we consider that heat exchanger production also presents a significant potential growth area for the UK and one in which the UK could gain competitive advantage in the light of the emergence of new UK CCUS infrastructure. We recommend that policy makers engage with a wide range of UK fabrication yards and heat exchanger manufacturers at different levels of maturity in order to establish best available means of expanding capacity for assembly and storage of columns.
- Industry and policy makers should pro-actively evaluate the possibility of increased fabrication and equipment storage at port facilities. This will help to ensure that UK yards benefit from the capital expenditure on the largest single equipment item in a capture plant, as well as potentially enabling increased use of UK steel and manufacturing in the production of column vessels and internals.
- Regulators and policy makers should ensure that UK heat exchanger suppliers and manufacturers have access to procurement opportunities and supplier pre-qualification for UK CCUS.
- In conjunction with targeted entities, policy makers should further evaluate options for targeted financial support, tax relief and/or other incentives to further develop both UK fabrication yard and heat exchanger capability and capacity.

HVO Recommendation 3: Ensure procurement opportunities are accessible and transparent to UK companies, including SMEs (Industry, Regulators and Policy makers)

- Developers should advertise UK procurement opportunities for the full CCUS value chain in a central site similar to the NSTA’s Pathfinder tool for North Sea opportunities. Ensure the tool is free to access and easily searchable, well indexed, and easily provides alerts to relevant providers of upcoming opportunities.
- Developers should set payment terms for cascade down the supply chain which enable smaller market participants to compete, such as short (30-day) guaranteed payment terms, as well as facilitating streamlined pre-qualification procedures for UK SMEs where feasible (in line with OEUK Supply Chain Principles).
- Process controls, including controls interfaces and dashboards, as well as connected infrastructure control system monitoring technologies present a UK opportunity area due to the importance of balancing demands across the emerging CCUS infrastructure system and communication across the networked assets, as well as the sensitivity and variability across store types. Policy makers should engage companies in this industry to establish a means of facilitating UK advantage in this space.

HVO Recommendation 4: Development of monitoring & controls system capabilities for CCS (Industry and Policy makers), identified as ‘high value’ and an area of UK capability as well as presenting strategic opportunity for the new infrastructure system

- Encourage UK providers of monitoring and controls for linear infrastructure to support the development of CCUS infrastructure monitoring technologies through the provision of demand forecasts envisaging the monitoring and system operation needs of the connected new infrastructure service.
- Enable IP (intellectual property) development in this area where possible through support to universities, colleges, and research centres. Facilitate research and development of associated software capabilities for infrastructure monitoring and control including artificial intelligence (AI) and machine learning techniques for risk-based maintenance, as well as advanced communication protocols.

HVO Recommendation 5: Planning represents a constraint in the UK system which can be mitigated via coordination across industry (Industry with Policy maker enablement and support)

- Project developers can seek to establish planning coordination including consenting corridors for combined infrastructure development in industrial hubs and along pipeline corridors. Coordination between industry and power emitters and CCS infrastructure providers on planning must be industry-led and is essential to make the regional and national case for joint planning facilitation. The Government can further facilitate and encourage this effort.
- Regulators may decide to support and accelerate efforts using more accelerated infrastructure development packages such as the one announced by Ofgem for Accelerated Strategic Transmission Investments (ASTI) in December 2022 (in support of the infrastructure construction programme now described by National Grid Plc as ‘The Great Grid Upgrade’).
- Developers and fabricators may combine efforts and seek further assistance to secure land and development rights for CO₂ capture plant at major emitter hubs for both 2030 and beyond (The UK’s major emitter hubs are Humber, Northwest, South Wales, Scotland, Teesside, Solent, Black Country in order of cluster emissions in mtCO₂pa).

The High Value Opportunities are represented in more detail at Appendix A (Equipment and Appendix B (Services)).

The full report covering: an introduction to CCUS processes and technologies, the methodology, taxonomy, full high value assessment and conclusions can be found at – ‘A Remarkable New Infrastructure System’, Opportunities for economic growth in the UK’s Carbon Capture & Storage Industry – Ove Arup & Partners Ltd. – 25 May 2023.

9. Recommendations

As part of the Good Practice Guidance, it is important to outline next steps in the process and create a roadmap for industry, the Government, and key stakeholders to work towards. As a result, the following recommendations are noted:

Overarching Recommendations	Owner
<p>1. The processes for making good practice commitments should commence soon after publication of this report with a clear time frame for reporting, Commitments, and progress towards them, to the CCSA in November 2023.</p> <ul style="list-style-type: none"> This will allow analysis of the submissions with feedback to the Projects in January 2024. More importantly it will provide DESNZ and CCSA the information and intelligence they need to implement supportive initiatives and to channel funding in early 2024. 	Industry
<p>2. Responsibility for the annual supply chain good practice in CCUS process for measuring and reporting, should be assigned and funds made available for its ongoing management. Agreement to have been gained by August 2023.</p> <ul style="list-style-type: none"> This will include an annual (or other appropriate duration) update of the sector aspirations, result collection, feedback to Clusters and Sector reporting. All efforts should be made to ensure the definitions, descriptions, and framework mirror as much as possible the other reporting methods across the Energy Sector. 	Industry
<p>3. A Government Strategy, building on the CCSA Skills Positioning Paper and the first round of the supply chain good practice reporting as soon as practicably possible, to outline meaningful activities that can be made to increase the advantage the UK receives by the ongoing adoption of and investment in the CCUS Industry.</p> <ul style="list-style-type: none"> This should outline meaningful activities that can be made to increase the advantage the UK receives by the ongoing adoption of and investment in the CCUS Industry. It should include the Government commitments on the visibility of the CCUS targets so that a reliable pipeline can be developed. This will provide a higher level of confidence to manufacturers and developers that their investment in the UK CCUS industry will be supported. 	Government

Taxonomy Recommendation	Owner
<p>4. The UK CCUS industry should look to align their equipment purchasing requirements to the Arup Taxonomy, detailed in this document, and subsequently to UNSPSC codes by early 2024.</p> <ul style="list-style-type: none"> Using a common Taxonomy and numerical coding system to simplify the detail of components and parts will enable labeling and tracking across multiple projects and plants and can be aligned to automated systems. Not only will this have the potential to standardise High Value and other procured items but will also help standardise UK manufacture to international needs. This will increase the potential market for UK manufactures increasing their ability to gain export contracts. A first step will be to align the agreed Taxonomy in this document with a numerical code, either UK specific or other e.g. UNSPSC. 	Industry
High Value Item Opportunity Recommendations	Owner
<p>5. A Government strategy of targeted support to drive investment to embed high value item opportunities in the UK supply chain should be considered and implemented as soon as practically possible, recognising the window of opportunity for success is narrow.</p> <ul style="list-style-type: none"> A clear statement of intent of the UK's strengths and our commitment to back companies who are willing to invest in these opportunities in the UK could help to realise the opportunities. Export potential should also be aided by this strategy. In conjunction with targeted entities, policy makers should further evaluate options for targeted financial support, tax relief and/or other incentives to further develop UK capability and capacity for design, fabrication, maintenance, and storage of high value components such as columns (vessels and internals) and heat exchangers. 	Government
<p>6. Prompt engagement with UK fabrication yards to establish the possibilities for their expansion in strategic locations. To be completed by the end of 2023.</p> <ul style="list-style-type: none"> Column vessel manufacture, assembly and internals present the major single source of opportunity for UK companies of the equipment needed to serve the UK CCUS sector. Column vessels are the largest item in a capture plant by both physical size and capital expenditure. This presents both an opportunity and a constraint in terms of UK fabrication yard capacity. 	Government
<p>7. High Value Item Opportunities (Additional Recommendations)</p> <ul style="list-style-type: none"> HVO 1: Mitigate risk of EPC & engineering design constraints HVO 2: Develop UK column assembly & heat exchanger supply chains HVO 3: Ensure procurement opportunities are accessible and transparent to UK companies, including SMEs HVO 4: Development of monitoring & controls system capabilities for CCS identified as 'high value' and an area of UK capability as well as presenting strategic opportunity for the new infrastructure system HVO 5: Mitigate risk of EPC & engineering design constraints 	Industry and Policy Makers

High Value Item Opportunity Recommendations	Owner
<p>8. Relevant stakeholders could consider proposing a similar high value investigation to other countries who are developing CCUS supply chains and work collaboratively on this process. A report should be completed by Summer 2024.</p> <ul style="list-style-type: none"> Standardised reports which highlight the high value opportunities, from the different competing countries in the CCUS space, could help to build awareness of global supply chain opportunities and geographically define the areas of expertise as well as gaps in the global market for components of CCUS supply chains. Moreover, this could enable the UK to show global leadership by driving international cooperation to fulfil the challenge of net zero enabled through CCUS. 	Government
Enabling Recommendations	Owner
<p>9. Sector wide targets should be made for Apprenticeships and other educational products so that cross sector initiatives are implemented that join up the independent Cluster efforts, by as soon as practicable in 2024.</p> <ul style="list-style-type: none"> Refinements to the Apprenticeship levy and policy changes noted in the CCSA Skills position paper could be taken forward. 	Government and Devolved Administrations
<p>10. Maximise potential for custom packages on dispersed sites by focusing efforts on developing a suitable policy environment for non-pipeline transport (NPT). Policy Guidance should be published by Spring 2025.</p> <ul style="list-style-type: none"> Packaged CCS provisions are an emerging area with UK companies offering unique capture packages for industrial customers. Dispersed sites, connected to storage infrastructure, via NPT could benefit significantly from these custom packages and unlock the potential to capture emissions from sites outside of industrial clusters. 	Government and Industry

The full Opergy and Arup reports can be found digitally at:

<https://www.ccsassociation.org/all-news/ccsa-news/ccsa-launches-new-ccus-supply-chain-strategy/>

<https://www.gov.uk/government/publications/opportunities-for-economic-growth-in-the-uks-ccus-industry>

10. Glossary

Construction - means all site-based assembly and includes all support services such as construction temporary facilities and provision of construction equipment. If nearby assembly yards are required for logistical reasons, then this would also be deemed as construction. This phase covers up to Commissioning.

Component - is a manufactured or completed unit used in the fabrication or construction of the final CCUS plant or collector, or a constituent of a fabricated module used in the final CCUS Plant or Collector.

CfD AR5 - refers to Contract for Difference Allocation Round 5.

Design - The pre-Final Investment Decision period that includes financing, design, planning and approvals.

Direct Jobs - Those employed or hired by the project developer or 1st tier suppliers of labour, goods, or services wholly for the purpose of project development and/or operations.

Energy Sector Leadership Organisation - An energy sector leadership organisation that is engaged with initiatives and interventions that support the development of the supply chain, encourage the sharing of good practice between organisations, and endeavours to influence other organisation in the pursuit of improved operating conditions for the supply chain companies.

Fabrication means preassembly of manufactured items into a module or preassembly for transport in a more complete state to site (to remove work from the construction site). Fabrication also typically includes pipe spool fabrication. For ease and simplicity fabrication is included in Construction.

Indirect Jobs - Those employed or hired by 2nd and lower tier sub-contractors providing labour, goods, or services wholly for the purpose of project development and/or operations.

Key Component - Single item of equipment or service which must be completed or purchased for the project to advance. Often those that are essential to the running of the plant and are likely to require special fabrication.

National Energy Survey of Employment and Skills - a cross energy survey of current employment and skills which facilitates the future mapping of energy skills demands. Supported by Section 5 of the NSTD, Strategic Priority 18 of the NSTD People and Skills Strategy and the People and Skills Section of the Offshore Wind Sector Deal.

Manufacturing – fabrication and assembly of a delivered component such as:

- Bulk materials: concrete foundation prefabrication, steel sections, cable, pipe and fittings, valves, instruments, etc.
- Equipment: Transformers and electrical equipment, heat exchangers, pumps, compressors, and vessels/columns etc.

New Player – a supply chain company that has not previously operated in the CCUS sector directly.

NSTA – North Sea Transition Authority

NSTD – North Sea Transition Deal

OEUK D&I Tools – Set of diversity and inclusion support tools

Operations and Maintenance – the phase post commissioning concerning the running of the Plant and any minor improvement or maintenance activity required to keep the plant running effectively.

Product – a part, component or other tangible object that is manufactured or refined for sale.

Service – the intangible delivery of work conducted by one or more individuals.

Transition Workshop – A formal briefing, training or awareness session that gives the information required for individuals to better understand the CCUS Sector, the skills required and the opportunities presented by the sector for individuals from sectors in decline.

UK Content – Agreed definition that a product (component) or service can be considered as having been delivered within the UK.

- in respect of services, those services provided by a company carrying on business in the UK; and,
- in respect of goods, those goods which are being made, changed or improved in the UK (using the same definition as goods eligible for a UK country of origin certificate).

Appendix A – High Value Assessment - Equipment

This is a list of the high value opportunities in equipment manufacture:

Equipment Category	High Value Assessment Summary
Column Vessels	High - Column vessels are a significant opportunity for the UK due to the size & specificity, of CCS columns. Retrofitting CO ₂ capture equipment to existing emitter plants will require bespoke turnkey solutions, which is well suited to the UK manufacturing sector capabilities for key components such as column vessels. There will be challenges in the logistics or the largest columns (which can be over 100m), but this could be an upskilling and growth opportunity for UK industry, subject to capacity. However, large volume orders without advanced notice could create bottlenecks for the UK supply chain and existence of a limited number of UK fabrication yards with already constrained order books. UK fabrication yards have demonstrated adaptability in the last decade transitioning operations away from oil and gas work to the rapidly growing offshore wind industry. This adaptability could be valuable for the UK CCS sector.
Basic Process Control System (BPCS)	High - A critical opportunity area due to 1) the central importance of monitoring across the Capture, Transport and Storage value chain, 2) the importance of balancing the demands on the system and communication across the networked assets and 3) the sensitivity and variability across store types.
Heat Exchangers	High - A variety of heat exchanger technologies are needed in carbon capture plants. Manufacturers note the optimal technology selection varies between plants (e.g. plate and frame for the lean/rich heat exchanger and shell and tube for the reboiler). The UK has a number of companies now designing manufacturing and installing high quality products, again offering turnkey solutions. This could be well tailored to the retrofit of Carbon capture technology to existing plants.
Capture – Pre & Post combustion package	High - There are several smaller newer-market entrants developing capture package offerings, including capture 'as-a-service'. These face challenges from competing with more established companies with experience built up in enhanced oil recovery. However, there is great opportunity with new technologies getting closer to commercial readiness. Smaller companies may offer an advantage in the UK CCS sector, being able to adapt and move more quickly, but they may need support. Initial evidence from Track-1 emitter capture technology providers shows more established players being selected for first projects.

Appendix B – High Value Assessment - Services

This is a list of the high value opportunities in services:

Service Category	High Value Assessment
Engineering & Design	High - We have vast experience in executing engineering projects in the UK. We have an established workforce, with the opportunity to create exportable IP through rolling out successful CCS projects. The biggest challenge to realising the value opportunity of Engineering & Design will be the anticipated constraint in the available workforce. The UK Government and industry leaders are already working to encourage students to choose STEM subjects, making apprenticeships more accessible and to ensure that education is affordable and available to all, and this work must continue. There is potential for government and industry associations further to help mitigate this bottleneck further through facilitating coordination of demands on the EPC sector across UK sectors ranging from Water and Nuclear through to Hydrogen and CCS.
Management	High - Alongside Engineering & Design, there is opportunity to export our project expertise internationally, as well as to continue to grow and upskill our national engineering management and project and programme management workforces, as the CCS and related energy transition industries continue rapidly to develop across the UK.
Construction, Installation & Site Services	High - As advised in preceding reports including those by the CCSA, Nuclear Catapult and WSP, and raised in several industry engagements undertaken as part of this study, open communication and collaboration with industry and ensuring consistency across government departments will ensure the value of installation and specialist construction jobs as part of the CCUS supply chain. This will help to ease expected bottlenecks in this part of our engineering workforce as construction is one of the key constraints to CCS, its value lies in being an enabler to CCS projects. A significant portion of the capital expenditure for CCS projects will be in construction, so it is important that this money goes to UK companies where possible.
Monitoring & Data Collection	High - Subsurface and reservoir management services have been carried out extensively for oil and gas, and the capability is well established in the UK and capable of pivoting to CCS. There is significant potential for growth of UK capability in this area in response to the demand from the CCS market.
Subsea, Wells & Exploration	High - A percentage of the existing workforce from Oil & Gas projects may be ideally positioned to work on new CCS projects, as OEUK and other studies have emphasised. Opergy estimations for CCS job creation highlighted that, other than in Engineering & Design, there would be more jobs created in Subsea, Wells & Exploration than in any other job area. This may lead to a developed service model specific to CCS in these industry areas that has scope for global export, bringing in additional revenue to the UK.
Fabrication of Key Equipment	High - UK Fabrication yards can operate effectively alongside the development of international supply chains for CCS, by providing assembly hubs close to UK capture and storage plants.

Appendix C – Other Energy Sector Good Practice Materials

A. Offshore Wind

Supply Chain Plan Questionnaire – Contracts for Difference – Allocation Round 5 – Contracts for Difference (CfD) Allocation Round 5 -

Contracts for Difference (CfD) Allocation Round 5: Supply Chain Plan questionnaire and guidance - GOV. UK (www.gov.uk)

This questionnaire uses a series of scored and unscored questions to assess the Offshore wind submissions for approval towards gaining a Contract for Difference.

Unscored Section:

UK Content

Job Creation – Direct Jobs

Job Creation – Indirect Jobs

Green Growth

- 1.1 Supply Chain Competition
- 1.2 Supply Chain visibility: routine actions
- 1.3 Supply Chain visibility: further actions
- 1.4 Procurement value drivers
- 1.5 Contracting Strategy

Infrastructure

- 2.1 Decarbonisation: monitoring
- 2.2 Decarbonisation: implementation
- 2.3 Minimisation of local impacts
- 2.4 Supply Chain infrastructure: major investments
- 2.5 Supply Chain infrastructure: other investments

Innovation

- 3.1 Investment in R&D
- 3.2 Investment in new technologies
- 3.3 Bringing in new players

Skills

- 4.1 Skill gaps and shortages
- 4.2 Apprenticeships, scholarships and trainees
- 4.3 Disability gap
- 4.4 Health and Safety
- 4.5 Modern Slavery

B. Offshore Energies UK

OEUK have a suite of Supply Chain Code of Management tools, events and workstreams - SeQual, LOGIC (standardised contracts), Share Fair, Supply Chain Principles Awards.

LOGIC

LOGIC (Leading Offshore Energy Industry Competitiveness) is the not-for-profit subsidiary of Offshore Energies UK (OEUK), established for the promotion, development, governance, support and management of cross-industry 'tools' to enhance the competitiveness of the UK's offshore energy sector.

The suite of tools operated by LOGIC includes:

- Vantage POB, for personnel logistics;
- Helimet, to provide offshore weather information for safe navigation;
- Flightshare, to facilitate sharing of seat capacity on helicopter flights;
- SEQual, for supplier pre-qualification;
- Standard Contracts, adopted industry-wide for a broad range of offshore activities;
- Master Deed, for transacting interests in offshore licences and
- The Industry Mutual Hold Harmless (IMHH) scheme, which addresses gaps in contractor liability in an offshore environment.

For further details, follow: <https://logic-energy.org/>

SeQual

Industry led and industry focused, SEQual enables efficient supply chain management of risk, quality, and much more. SEQual is operated by LOGIC, a wholly owned, not-for-profit subsidiary of Offshore Energies UK.

Launched in 2021 in response to industry demand, SEQual was developed to enable better procurement practices. With an easy-to-use pre-qualification portal for the energy sector, SEQual ensures Suppliers are exposed to a range of Buyers, and by using tailored Desktop Assessments and On-site Assessments, also ensures they are ready to work for them.

SEQual members have direct engagement and influence in improving our evolving services to best reflect their needs. Flexible, independent, and transparent, SEQual offers Buyers peace of mind and Suppliers total confidence in compliance.

For further details, follow: <https://sequal.co.uk/>

Share Fair

To further support supply chain companies in developing their businesses, OEUK holds its annual Share Fair event in Aberdeen. The event focuses on giving supply chain companies and technology innovators access to invaluable market intelligence plus opportunities to network with key industry buyers. For operators and major contractors looking to issue contracts for projects Share Fair aims to raise awareness of the expertise, innovative products and specialised services offered by suppliers across the UK.

With the UK offshore energy industry focused on delivering the UK's net zero carbon emissions goal, Share Fair includes organisations with an interest not only in oil and gas but also offshore wind, carbon capture and storage and hydrogen.

OEUK Supply Chain Principles

Supply Chain Principles (oeuk.org.uk)



The infographic features the OEUK logo at the top center, with the text 'Supply Chain Principles' below it. Below the logo are ten numbered items, each with an icon and a text box:

-  Risks and costs should be borne appropriately, proportional to the work scope and the opportunity for good performance should benefit everyone.
-  Contractual terms and conditions will seek to utilise industry standards including mutual payment terms. Buyers shall strive towards supporting the Government Prompt Payment Code and 30-day payment terms.
-  All parties should ensure they have the competence and skills to deliver the work being tendered.
-  Contract cancellations should not be without good reason or cause. If buyers and suppliers must have the ability to terminate a contract, the circumstance or risk should be outlined, explained and understood.
-  Purchasers shall endeavour to optimise their tendering and audit requirements to respect the supplier's time and resources.
-  Tender processes and evaluation should be based on value-added rather than unit rates and be flexible to evaluate alternative offers as part of the bidding process.
-  An alternate bid (either technical or commercial) which a buyer sees as a winning proposition should be selected for award on its merit.
-  Buyers and suppliers should discourage the practice of "low-ball" bidding which will lead to contracts being renegotiated early on.
-  Buyers should agree clear rate escalation mechanisms and move away from the practice of fixing labour rates for several years.
-  Where a supplier (or potential supplier) feels unfairly treated, it should notify the buyer's CEO to ensure that speaking up is not held against it.

OEUK's Supply Chain Principles were written by industry for industry and describe what good procurement practice looks like.

Working as One survey

The Working as One survey (<https://oeuk.org.uk/product/working-as-one-survey/>) is a bi-annual survey which measures how companies are adhering to the Supply Chain Principles. It provides a unique opportunity for purchasing organisations to gain valuable feedback from their supply chain, supporting continuous improvement and the development of good procurement practice.

For good procurement practice publications, follow: <https://oeuk.org.uk/oeuk-publications/>

Supply Chain Principles Awards

The Supply Chain Principles Awards, based on results from our Working as One survey, celebrate companies who are committed to good procurement practice and who show positive collaborative behaviour. Purchasing organisations are presented with a Gold, Silver, or Bronze award dependent on the feedback from their supply chain who evaluate their adherence to the supply chain principles.

C. North Sea Transition Authority

The below details the criteria in the NSTA Supply Chain Action Plans - <https://www.nstauthority.co.uk/media/8359/scap-guidance-august-2022.pdf>

7. North Sea Transition Deal

The NSTD includes provision for a voluntary industry target of 50% local UK content and 30% for locally provided technology across the lifecycle for all related new energy transition projects by 2030, as well as in oil and gas decommissioning. In line with the NSTD please include percentage of overall project spend allocated to UK based supply chain companies.

8. Contractor SCAP

Only contracts over £25MM should apply. For contracts covering multiple projects, the estimated value of the work being performed on the relevant project should be used. If this value is not greater than £25MM, then a SCAP is not required. It is the operator's obligation to request this information and provide it to the NSTA. Drilling contracts do not require a contractor SCAP.

9. Assessment matrix

The evidence provided in the assessment matrix below will be used to determine the final mark of the SCAP and at least one example should be provided for each of the 11 line items. Should any of the areas not apply to the project then please identify and offer a brief explanation. This will be managed on a case-by-case basis.

Criteria	Below expectations	Meets expectations	Commendable	Evidence
Engagement	ITTs issued without prior discussion.	Pre-ITT discussion held with suppliers to present scope and expectations.	Engagement session held where functional requirements were presented and integrated solutions sought.	
	Operators hold bespoke supply chain forums where they present to their key suppliers.	Operator personnel are available at industry events to share technical challenges and upcoming activity.	Operators openly share expected challenges and opportunities and request support from industry to provide solutions.	
	Operators look to their own requirements that need bespoke solutions.	Operators input project details into Energy Pathfinder.	Operators openly communicate project opportunities on Energy Pathfinder and are receptive to solutions and ideas. They also enter contract award details and comprehensive project information.	
Trust	Operator requires extensive inspection team to oversee activity. Contracting model stifles supplier incentive to deliver increased value (e.g. by claiming 100% of savings).	Operators are open to supplier initiatives to reduce cost and are willing to share in savings.	All parties are actively incentivised to benefit from successful project performance – proportionate to the level of exposed risk/responsibility. Potential win-win provision included in contract.	

Criteria	Below expectations	Meets expectations	Commendable	Evidence
Trust	Operator dictates grades of labour to be used and compensates based on hourly rate plus mark up.	Contractors are empowered to deliver contract requirements and retain responsibility for quality of work. Contractors are encouraged to seek improved value from alternative providers, subject to operator approval.	Contractors responsible for the quality of the work and trusted to deliver contract requirements. Where appropriate, contract scope and / or terms allow the development of new skills. Contractors are encouraged to meet functional requirements, delivering best value possible. Any change in vendor is notified to operator who can challenge in exceptional circumstances.	
Innovation	ITT issued and technical non-compliance leads to disqualification.	Alternative solutions requested as part of ITT process and considered where appropriate.	Suppliers encouraged to provide alternative technical solutions for discussion prior to ITT release.	
	Operator not receptive to innovative ideas and solutions.	Operator receptive to supply chain company's innovative ideas, practices, solutions and commercial methods but none adopted in this instance.	Operator adopts supply chain company's innovative ideas, solutions and commercial methods.	
	Contractual terms and strategy set out clearly within ITT.	Contractual terms and strategy set out clearly within the ITT with alternative proposals included for company consideration.	Contractual terms reflect responsibility and do not penalise innovative models. Mutually beneficial contract agreement in place incentivising efficiency and value creation through project lifecycle leading to potential upside for all parties.	

Criteria	Below expectations	Meets expectations	Commendable	Evidence
Quality	ITT respondent list compiled via internal approved vendor list.	Industry tool (SQS) used to develop ITT list, in addition to companies previously known to buyer. All selected vendors required to complete a supplier audit assessment.	Industry audit tool trusted to identify competent suppliers without additional pre-qual information.	
	No lessons learned included in SCAP document.	Lessons learned section completed in SCAP but general lessons learned used.	Lessons learned section completed and focused on upcoming project.	

Appendix D – Acknowledgements

Many thanks to the groups and individuals who have provided their time and knowledge to the study:

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