

**Meeting Notes**

<b>Project Name</b>	<b>OFFSHORE WIND &amp; CCUS CO-LOCATION FORUM 2<sup>nd</sup> PLENARY MEETING</b>
<b>Meeting Venue</b>	Held online via Microsoft Teams
<b>Date &amp; Time of Meeting</b>	09:30 – 12:00 on Tuesday 16 <sup>th</sup> November 2021

<b>Chair of the Meeting</b>	Adrian Topham (The Crown Estate)
<b>Names of the Attendees</b>	<ul style="list-style-type: none"> <li>▪ Sam Robertson (OREC) – Secretary</li> <li>▪ Juliette Webb (Renewable UK) – Member</li> <li>▪ Olivia Powis (CCSA) – Member standing in for Chris Gent</li> <li>▪ Benj Sykes (OWIC) – Member</li> <li>▪ Andrew Russell (BEIS) – Member</li> <li>▪ Amar Khuttan (BEIS) – Member</li> <li>▪ Iain Harris (OGA) – Member standing in for Kristian Dahlstrom</li> <li>▪ Alana Finlayson (OGA) – Member standing in for Nick Richardson</li> <li>▪ Bronagh Byrne (The Crown Estate) – Member</li> <li>▪ Sian Wilson (CES) – Member</li> <li>▪ Sophia Northridge (BEIS) – Guest</li> <li>▪ Holly West (BEIS) – Guest</li> <li>▪ Trevor Raggatt (BEIS) – Guest</li> <li>▪ Adam Mollen (BEIS) – Guest</li> <li>▪ Ronnie Parr (OGA) – Guest</li> <li>▪ Ed Salter (ES) – Guest; Planning Manager; Marine Planning, TCE</li> <li>▪ Isabelle Grieveson (TCE) – Guest;</li> <li>▪ Tom Evans (TCE) – Guest</li> </ul>

Item	Notes
1.0	<p><b>WELCOME AND INTRODUCTION</b></p> <p>The Chair opened the plenary meeting by welcoming everyone and several new faces introduced themselves to each member of the forum, with a short explanation of their role in relation to offshore carbon storage and wind energy generation.</p>
2.0	<p><b>REVIEWING PREVIOUS ACTIONS &amp; MINUTES FROM LAST MEETING</b></p> <p><i>Action 1) Contact each Workstream Lead to ensure progress before next plenary.</i></p> <ul style="list-style-type: none"> <li>▪ The Chair confirmed the action was still a work in progress and voiced his hope that there would have been more collaboration on advancing it within the forum. He informed the group that the next plenary session would have more working sessions between the groups to communicate out to the forum. This would be updated in the communications plan.</li> <li>▪ The Crown Estate (TCE) confirmed that a discussion is needed to confirm the wording of the communications plan and once all parties had signed up to it, the process for information sharing would be easier.</li> </ul>

## Meeting Notes

*Action 2) Clarify how plenary and subgroups will communicate in communication policy. Define what information can be shared with any subgroup members that are not plenary members. Remove word "guidelines" in policy table as it refers to the whole document.*

- TCE confirmed the minor changes suggested were incorporated into the communications policy and could be circulated with the minutes.

*Action 3) Investigate opportunity for a single forum logo or use forum member logos.*

- TCE confirmed this action was ongoing.

*Action 4) Include OBN presentation from OGA with the minutes (attachment 1).*

- The Chair confirmed this was issued with previous MoM.

*Action 5) Issue 'NEW' worklist to reflect discussion (attachment 2).*

- The Chair issued with previous MoM.

*Action 6) Suggest dates for next plenary meeting to be held in November, agree and sent invite.*

- The Chair issued with previous MoM.

*Action 7) Present work schedule for workstream #4 'Co-location map' to forum in ad-hoc meeting to be arranged and seek forum agreement to start prior to next plenary.*

- The Chair confirmed an update would be provided on this action in the meeting. The Chair hoped that there would be more discussion and updates provided in intermediary meetings between now and the next plenary session.

*Action 8) Plan work schedules and any budget requests for forum if not covered by sub-group, send to Chair for Secretary to distribute for comment by all forum members. See 'CLF plan' sheet for summary of involvement and draft Gantt chart.*

- The Chair received feedback and information from most workstream leads on how TCE can assist with each workstream going forward and confirmed this would be discussed in detail during the meeting.

*Action 9) Workstream #6 to seek forum agreement to start prior to next plenary.*

- The Chair confirmed the OGA would provide an update on this action during the meeting.

*Action 10) OGA to confirm acceptance of communications policy, subject to above changes.*

- The OGA said they would like to see the communications policy before accepting it.

*Action 11) Present work on types of seismic streamer (traditional and short) for monitoring.*

- The Chair said the OGA would update the group at the end of the meeting.

## Meeting Notes

3.1	<p><b>UPDATE FROM ONGOING WORKSTREAMS</b></p> <p><b>Workstream 1: <i>Common OW/CCUS co-location oversight body</i></b></p> <p>The Chair said activity was ongoing throughout the Forum and welcomed any comments on governance and the terms of reference. The Chair noted the suggestions from members on sharing more information before plenary sessions about what will be covered. Members also suggested sharing document plans as well as achievements on the Forum website.</p>
3.2	<p><b>Workstream 2: <i>Cross industry operational alignment</i></b></p> <p>It was confirmed that the Forum is not aiming to focus on development liabilities, which may be solved on a case-by-case basis through commercial agreement. The Forum has a broader review of the issues and the OGA are looking at liabilities in terms of financial security element with BEIS, but not in terms of cross industry liabilities.</p> <p>The discussion of the leasing arrangement between the two sectors resulted in agreement for TCE/CES to revert with an opinion on this issue. Initial sites will be submitted to the OGA for approval, but there will be an area possibly covering multiple stores within the area. When a permit is issued that will be for the storage site and the immediate surrounding area.</p> <p>It was also confirmed that the impacts and opportunities of CCUS appraisal areas on OW leasing opportunities (and vice versa) is an active consideration and would be discussed in this forum.</p>
3.3	<p><b>Workstream 3: <i>Cross industry development liability</i></b></p> <p>This concerns dispute mediation where projects are unable to progress further but where DEVEX resources have been spent on a project.</p>
3.4	<p><b>Workstream 4: <i>Spatial characterisation of high value CCUS and OW sites</i></b></p> <p>TCE, OGA and BEIS have been working together since the last plenary meeting and TCE provided an update on the work done to date (slides attached for reference).</p> <p>Work is ongoing to look at carbon capture potential, which areas within the UK produce the most emissions, and in turn where the most carbon be captured. Overlaying work is highlighting which stores are more sought after, with an indication of the volumes that would be needed.</p> <p>Further refinement of the mapping of overlapping fixed and floating offshore wind (OW) with 'relatively high potential carbon storage' areas will be continued. The presentation highlighted licensed and operational fixed OW, and sites at varying stages of development, with proposed floating OW and CCUS sites.</p> <p>TCE, OGA and BEIS confirmed the next stages are to model the 'relatively high potential carbon storage' and subsurface uncertainties into the model to build up a more detailed picture of CCUS.</p> <p>TCE provided a view of the CCS GIS Viewer highlighting the stratigraphic layers. It was noted that this information for OW only looked at Northern Ireland, Wales and England. The Scottish data has not been uploaded yet. This work is based on the Carbon Budget 6 (CB6) targets, and the workstream plans to highlight the amount of CCUS and OW required to meet the budget and advise on ringfencing the best CCUS and OW locations to meet these targets.</p> <p>The OGA noted that the 'relatively high potential carbon storage' maps were a broad slice of the potential Carbon Storage Resource Areas, and that the areas needed additional work to rank them further and polarise them into high-graded areas (Key Resource and Feasible Areas). For example, legacy well integrity needs to be investigated as some wells will not be suitable for CCUS activity due to containment risks. Areas outside of the currently defined areas represent no/negligible carbon storage potential where OW can expect no significant interference - these 'non-prospective' CS areas will be expanded over time.</p> <p>There was discussion of the possibility to achieve the CB6 targets without any colocation issues, and it was noted that there are still plans to identify which areas exist without colocation issues. All</p>

Meeting Notes

	<p>of the current nominated areas are within the ‘relatively high potential’ areas.</p> <p>The storage capacity for the areas shown is a work in progress and being reviewed against the CB6 targets. It was noted that there will also be a need for contingent capacity to allow for redundancy. Projects and licenses being awarded show a capacity gap opening up after 2030-35 requiring the need for additional sites after 2035, many of which need appraisal in the near-ter.. Allowing for uncertainty/failures (e.g. technical reservoir and well) means that the sites proposed currently may not be able to deliver at the rates predicted and some sites might not progress at all.</p> <p>The targets for CCUS were noted to have increased with the Net Zero strategy, and it was agreed that the Forum will use the most current targets for OW and CCUS.</p> <p>Finally it was agreed that sub-groups will address these issues while progressing the workstream before the next plenary session.</p>
<p><b>3.5</b></p>	<p><b>Workstream 5: OW/CCUS planning using spatial characterisation</b></p> <p>Follows above in 3.4).</p>
<p><b>3.6</b></p>	<p><b>Workstream 6: Minimum requirements and technology development for MMV (Measurement, Monitoring, and Verification)</b></p> <p>The OGA gave an update on projects to investigate methods of seismic surveying for Carbon Storage with constraints in the presence of OW.</p> <p>Six project scopes were discussed, the first three are underway. A pre-existing OGA Colocation seismic monitoring project was completed in November 2021 and was presented at the end of the meeting. (Document to follow once released.)</p> <p>A second project investigating seismic monitoring detection thresholds for CO2 in the presence of saline water and residual gas is ongoing with anticipated completion March 2022. <i>[N.B Injecting a gas into a saline aquifer will usually provide a greater seismic response than injecting gas into a depleted gas reservoir due to the greater change in density contrast.]</i></p> <p>A third project to review developments and future trends of Ocean Bottom Nodes (OBN) is also ongoing anticipated for completion March 2022. It was confirmed that this will evaluate hybrid designs of OBN and short streamers.</p> <p>A fourth project investigating potential field trials of towed seismic acquisition within a confined (windfarm) environment is being scoped and may require Forum support.</p> <p>It was proposed to support post-doctoral research at Heriot Watt (request Forum supports this £35k+ VAT) as a fifth project to identify the level of windfarm acoustic noise, with completion also end of Mar’22.</p> <p>When queried whether the land-based research would be a suitable analogue for offshore wind farms due to them being in water and dampening the noise, the OGA replied that while blade noise will be diminished, vibrations coming through the foundation and into the seabed will probably have the same or similar effects on seismic response.</p> <p>Further discussion noted that side swiping noise of many turbines in close proximity tends to be an area for more concern but if the exact location is known this can probably be removed by processing algorithms and this has been done in real world scenarios from O&amp;G assets (with drilling noise). This is why real-world examples are being advanced to get an idea of what seismic data looks like when adjacent to a wind farm, it was added.</p> <p>Forum members were asked to consider if they knew of any wind farms or operators that would be willing to host a trial of gathering seismic data next to a wind farm.</p> <p>The question of whether there are set criteria for MMV plans submitted as part of the permitting processing, was clarified as involving a number of consultees but with the OGA having final sign-off. The considerations will be on a case-by-case basis, and decisions depend greatly on the nature of the reservoir, the depth, the permeability and hence velocity and extent of plume migration etc. There will also be reviews of the MMV plan throughout the project learning to</p>

**Meeting Notes**


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	<p>improve on results.</p> <p>Furthermore, with developers required to create a commercially viable CCUS project, there is little motivation to choose the more expensive OBN technology until costs come down. The Forum was asked how these costs can be encouraged to come down. It was confirmed that this would fall to the proposed CCUS economic regulator (OFGEM) and may be worked in their value for money calculation, that would be undertaken and be included as part of the OPEX costs.</p> <p>Discussion of consideration of the impact on a seabed lease for OW for an MMV area extending beyond the licensed storage area, considered whether there would be an opportunity if an OW development adjacent to a CCUS development to switch their MMV strategy from towed to OBN.</p> <p>The OGA noted that this would not necessarily be the preferred method since streamer-acquired seismic is typically higher definition than OBN and would ideally need to remain the same as the baseline case.</p>
<b>3.7</b>	<p><b>Workstream 7: CCUS and OW separation distances and additional traffic modelling</b></p> <p>RUK confirmed there has been no progress on workstreams 7 – 10 due to lack of resources and there were no responses once workstream leads went out to their memberships. It was agreed that an external project management company would be invited to lead on the project management side to convene other technical parties while workstream leads remain in place to evaluate the resulting technical deliverables.</p> <p>The Chair proposed, and it was agreed by RUK and the CCSA, that the ETA (comprising of the OREC and NZTC) could be approached to help lead on the PM activities and drive workstreams on.</p>
<b>3.8</b>	<p><b>Workstream 8: Fishing and leisure due to co-location</b></p> <p>This was discussed in 3.7</p>
<b>3.9</b>	<p><b>Workstream 8: Co-location opportunities for shared resources</b></p> <p>This was discussed in 3.7</p>
<b>3.9</b>	<p><b>Workstream 10: Surface deformation &amp; brine release corrosion modelling</b></p> <p>This was discussed in 3.7</p>
<b>3.10</b>	<p><b>Workstream 11: Wider marine engagement in co-location impacts</b></p> <p>Reporting on a meeting was carried out on the 4th of Nov'21 between TCE, CES, MMO, NRW/Welsh Government and Marine Scotland (latter apologies received). The aim of this subgroup is to receive relevant co-location information from the Forum, meeting quarterly.</p> <p>Additionally, the sub-group provides an opportunity to provide information to this Forum on spatial planning work and to understand the implications that this wider group may have on the workstreams and issues presented in the plenary meetings.</p> <p>CES suggested that a sub-workstream be added for Scottish spatial characterization work 4B and planning 5B for CES to separately catch up and engage with Marine Scotland on the issues presented.</p>

**Meeting Notes**


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<b>4.0</b>	<p><b>SPATIAL CO-LOCATION PROJECT OVERVIEW AND PRESENTATION</b></p> <p>OGA confirmed work and slides will be publicly available in the short term.</p> <p>In summary, the OGA noted:</p> <ul style="list-style-type: none"> <li>▪ Drilling rig access to an OW site has been highlighted as one of the key items of concern.</li> <li>▪ A huge amount of information is provided by towed seismic compared to other technologies.</li> <li>▪ There is possibility to reduce the size of streamers – this would require more passes but a smaller array.</li> <li>▪ There is need to consider the feather of streamers from currents and wind directions resulting in collision with wind turbines. It is very unlikely overall that towed streamer surveys would take place through a wind farm.</li> <li>▪ OBN are currently typically installed on a long rope onto the seabed and are in place for about a month. As the acquisition frequency of MMV is currently looking to be around 5 years, it is not cost effective to have them installed permanently.</li> <li>▪ With the short time the OBN are in location this is not severely affected by moving sands and tides during the survey, but can have an impact on reliable differencing between surveys.</li> <li>▪ In response to the question of survey repeatability, (timelapse 4D seismic surveys require the same locations over time) if the OBN are being removed after each survey, the OGA replied that sufficiently dense quantities of nodes could enable repeatability.</li> <li>▪ There is potential for unmanned surface vessels (USV).</li> </ul>
<b>5.0</b>	<p><b>CONFIRM ACTIONS ON PRIORITISED WORKSTREAMS</b></p> <p>The allocated time finished so the Chair brought an end to the meeting. The minutes would be issued along with the slides allowing for the Forum to provide comments once they had seen them.</p> <p>The Chair announced that Johnathan Love from the OREC will be taking over from Sam Robertson in the role of secretary. Thanks were expressed for Sam's work to date.</p>
<b>6.0</b>	<p><b>NEXT MEETING DATES (WORKSTREAMS, NEXT PLENARY, ETC.)</b></p> <p>Meetings to be arranged to move workstreams forward before the next plenary session. Secretary to issue dates for next plenary meeting to be held in February.</p>

**Meeting Notes**


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Owner	Action List
<b>Chair</b>	<ol style="list-style-type: none"> <li>1. Pre-reading to be circulated ahead of next plenary session.</li> <li>2. Organise meeting with ETA to discuss PM resources for workstreams 7 – 10.</li> <li>3. Set up interim meetings with relevant parties surrounding WP4 before the next plenary session.</li> </ol>
<b>Secretary</b>	<ol style="list-style-type: none"> <li>5. Suggest dates for next plenary meeting to be held in February, agree and send invite.</li> <li>6. Updated Communication Policy to be circulated with the minutes for review.</li> </ol>
<b>CES &amp; Chair</b>	<ol style="list-style-type: none"> <li>7. Set up a workstream 4B and 5B for the CES to actively reach out and discuss workstream activities with Marine Scotland.</li> </ol>
<b>OGA</b>	<ol style="list-style-type: none"> <li>8. OGA to make the forum aware when the slides on spatial co-location project overview are available.</li> </ol>
<b>All</b>	<ol style="list-style-type: none"> <li>9. Forum members to consider if there are any wind farms or operators that would be willing to host a trial of gathering seismic data next to a wind farm.</li> </ol>