

**Deadline 5a submission****BP'S RESPONSE TO DEADLINE 5  
COVER NOTE**

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**1. BP'S RESPONSE TO ORSTED'S DEADLINE 5 SUBMISSIONS**

1.1 BP Exploration Operating Company Limited ("bp") has prepared this submission in response to Orsted Hornsea Project Four Limited's ("Orsted") submissions at Deadline 5.

1.2 In particular, bp has responded to:

1.2.1 Orsted's submissions in respect of bp's technical evidence ([REP5-075](#)) in Annex 1 to this response (including as Appendix 1, the responses to the requests for additional information); and

1.2.2 Orsted's comments on bp's legal submissions ([REP5-076](#)) in Annex 2 to this response.

1.3 bp is happy to address any queries the ExA may have in respect of these responses in the upcoming hearings later this month and then in writing at Deadline 6 as appropriate, where bp also intends to provide a further version of its protective provisions (Version 3 having previously submitted as Appendix 1 to its Deadline 4 response ([REP4-059](#))) to incorporate elements of its submissions as referenced in Annex 2 to this response.

**ANNEX 1**  
**RESPONSE TO ORSTED'S SUBMISSIONS ON BP'S TECHNICAL EVIDENCE**



## BP'S RESPONSE TO XODUS TECHNICAL REPORT COMMISSIONED BY ORSTED

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### 1. INTRODUCTION

- 1.1 At Deadline 5, Orsted submitted a report prepared by Mr Andrew Sewell of Xodus Group Limited ("Sewell Report") which is presented by Orsted as a 'independent report' commenting upon the technical submissions made by bp and Orsted to date in relation to the possibility of seismic monitoring in any overlap zone between the Northern Endurance Partnership carbon capture use and storage project ("NEP project") and Hornsea Project Four ("HP4").
- 1.2 Detailed technical points and questions are raised by Mr Sewell in the report. Given the limited time available, the bp technical team has responded to the specific "Request to bp for additional information" set out at in Section 4.1 of the report (see Appendix to this submission). However, bp intends to submit a further technical response to wider issues raised by the report at Deadline 6.
- 1.3 The purpose of this submission is to summarise bp's position in relation to the Sewell Report's conclusion and recommendations, in terms of their implications for the cases being put forward by Orsted and bp. It has been prepared by Herbert Smith Freehills LLP in close collaboration with bp technical personnel including subsurface geophysicists and reservoir engineers involved in the NEP project and bp's global Seismic Delivery Manager. We hope that this submission will assist the Examining Authority ("ExA") in focusing on the key issues it may wish to discuss during the hearings scheduled for week commencing 18 July 2022.
- 1.4 While it is not presented as such by Orsted, we consider that the report in fact supports the case that bp has put forward for the need for an Exclusion Area.
- 1.5 Moreover, the report does not tackle bp's concerns with regard to rig access, helicopter access or relief well access, each of which also necessitates the imposition of an Exclusion Area.
- 1.6 This response also comments on a number of fundamental points in relation to the commissioning of the report, its scope and approach, which bear upon the weight it should be given by the ExA. The relevance of the cost of OBN, and the precedents set by the Sleipner and Snohvit projects, are discussed at a high-level in this context insofar as necessary to expose the flaws in seeking to use these arguments to support Orsted's case.
- 1.7 The Sewell Report suggests that OBN and P-cable monitoring is a solution which would enable the development of the NEP project and HP4, thus delivering Government aspirations. The opposite is in fact true. If the Government wishes the ECC plan and HP4 both to be delivered then only protective provisions in the HP4 DCO which exclude wind development in the Exclusion Area will achieve this – enabling the full development of the NEP project, and the development of HP4 adjacent to it. Orsted is offering no solution to the risks accepted by the Sewell Report, or the risks relating to access which are not tackled by the report.

### 2. THE APPOINTMENT OF MR SEWELL

- 2.1 Orsted's Deadline 5 submission states that: Andrew Sewell "*was instructed to provide independent advice, on the evidence submitted to the Examination to date, by the Applicant and bp, in so far as it relates to the monitoring of the Endurance aquifer, with and without the*



*proposed authorised development collocating the area of seabed referred to in this Examination as the overlap zone". The claim is made by Orsted that "Mr Sewell's advice can give the ExA and Secretary of State confidence that it is not necessary to adopt bp's position and exclude Hornsea Four from the overlap zone at the point of determining the DCO application."*

- 2.2 Mr Sewell states in the Introduction to his report that: *"I am aware that evidence has already been submitted to the examination by both parties. I have considered all of that and the purpose of this report is to provide an independent, desk-top review of the available evidence to assist the Examining Authority in its understanding of it. I have adopted a position of policy and technology neutrality and opined only on matters of a technical nature relating to seismic surveying and the requirements of MMV for CCUS projects."*
- 2.3 As the ExA will be aware, Orsted has previously commissioned and submitted to the ExA an 'independent report' by OREC ("OREC Report") on the technical feasibility of co-location and monitoring ([REP1-057](#), Appendix 1.1, electronic page 22). It is notable that:
- 2.3.1 The Sewell Report confirms (p31, section 2.6.3, second paragraph) that the OREC Report was 'largely completed' before bp's Technical Assessment<sup>1</sup> was provided to Orsted. This is despite the fact that the OREC Report was issued to bp after bp's Technical Assessment was provided to Orsted. bp provided its Technical Assessment to Orsted, BEIS, The Crown Estate ("TCE") and the Oil and Gas Authority (now known as the North Sea Transition Authority ("NSTA")) on 3 December 2021. The OREC Report is dated 24 January 2022 and was not submitted to the ExA until early March when Orsted made its Deadline 1 submission, which was three months after Orsted had received bp's Technical Assessment.
- It seems therefore that OREC was not asked by Orsted to review and revisit the analysis and conclusions in the then draft OREC Report before it was finalised (in January) to take into account all of the detailed information presented in bp's Technical Assessment in relation to the specific challenges of co-location in the Endurance location. As Mr Sewell states: *"it does not refer or respond to it in any way."* No explanation has been provided for that very surprising and critical omission, either by OREC or Orsted. Mr Sewell's subsequent report does not shed any light on the matter. In failing to ensure that OREC took into account and engaged with the material in bp's Technical Assessment, Orsted clearly undermined the balance and utility of the OREC Report and contributed to its failure to provide an accurate and reliable assessment of the issues with co-location. In Mr Sewell words, this might have resolved some of the *"inconsistency that bp is questioning"* (p31, section 2.6.3, second paragraph);
- 2.3.2 It is notable that Orsted, without explanation, has chosen not to seek an updated view from OREC in light of bp's submissions to the examination, but instead to instruct a new 'independent expert', Mr Sewell;
- 2.3.3 While Orsted suggests that the ExA should have confidence in the conclusion of the Sewell Report on the basis that it is an 'independent report', it is striking that the OREC Report was also provided by Orsted as an 'independent report', and commended at the point of submission to the ExA as providing *"a more realistic overview on risks and opportunities of co-existence"* than that provided by bp

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<sup>1</sup> "A Technical Assessment of the Endurance Reservoir and Hornsea Four Project Four Wind Farm" ("bp Technical Assessment") ([REP1-057](#), Annex 1 to bp's Position Statement submitted at Deadline 1, electronic page 147)



([REP1-057](#), Appendix 1, paragraph 5.7, electronic page 22). Mr Sewell does not himself describe the OREC Report in those terms, and indeed it is clear that Mr Sewell does not agree with some of the key findings of that report. bp will comment in more detail on this at Deadline 6, but in particular Mr Sewell takes the view that ocean bottom nodes ("OBNs") used in conjunction with short streamers (P-cables) are the only feasible solution to monitoring any overlap area, in contrast to the position taken by OREC that there are, or could be in future, many different technical solutions. Mr Sewell states categorically that: "*OBN is going to be the only realistic way to acquire data in a wind farm, probably in combination with short streamers (P-cables)*" (section 2.3, p23, fifth paragraph). He does not believe that the alternative technologies referenced in 3.3.1 of the OREC Report will provide a replacement technology for 3D seismic "*for a long time*" (p11, section 2.1, fourth and fifth paragraph). Similarly, in the final paragraph on page 27, where Mr Sewell discusses bp's Position Statement, he states that: "*In section 8, bp states that the seismic technology described in the second OREC-NZTC report is immature and not suitable for the CCUS 4D. Also that the report agrees with bp's view and supports its case. As discussed elsewhere, I would agree with bp that some of the options suggested in the OREC-NZTC report would not be suitable, however the use of OBN is potentially suitable and further work to demonstrate this is required.*" This is helpful to bp and the Examination in narrowing the focus of bp's technical response to the suitability or otherwise of non-towed streamer solutions, but the rapid abandonment by Orsted of its first independent consultant's report on the difficult technical issues that arise here, presented to the ExA and to bp with such initial confidence, is important in itself. It underlines the need for the ExA and the Secretary of State to subject the latest such report to keen scrutiny;

2.3.4 Orsted did not invite bp to jointly select and instruct an independent expert to compile a report. bp was not in fact aware that such a report had been commissioned until it received it shortly before Deadline 5. Had the purpose of this report been to set out a full and unbiased view for the ExA of the challenges and potential solutions to monitoring, we would have expected bp to have been involved in the selection of the expert and (at the very least) to have been invited to participate in a dialogue (alongside Orsted) with the expert to address queries as they arose during his consideration of the issues; and

2.3.5 The reference documents Mr Sewell identifies in Section 5 of his report do not constitute a full set of the materials relevant to the issues discussed in his report, including various presentations shared with Orsted. Notably, Mr Sewell does not refer in Section 5 to an "Endurance 4D Seismic Feasibility" presentation made in December 2021 during a workshop involving bp and Orsted. That presentation, which discussed the feasibility of potentially using P-cables and OBN, is highly relevant to items 4 and 5 in Section 4.1 of the Sewell Report (his "Request for additional information from bp"). The fact that Mr Sewell refers in Section 5 to an October 2021 presentation (see item 7 listed in Section 5) but does not refer to the December 2021 presentation is surprising as bp would have expected Orsted to provide the document to Mr Sewell, particularly when Orsted saw the requests set out in Section 4.1 of the Sewell Report.

2.4 For all of the above reasons we respectfully ask the ExA to be circumspect in its consideration of the Sewell Report, and to ensure that its analysis and findings are subject to careful scrutiny in light of bp's technical responses to its contents.

2.5 As a major international energy company bp and its technical personnel have deep experience and expertise in seismic acquisition, including designing and executing seismic acquisition programmes that satisfy the requirements of relevant regulators and ensure



seismic data is acquired in as safe and reliable a manner as possible. Its work with third party seismic companies and vessel owners and operators means bp also has a deep understanding of the many operational and logistical issues involved in designing and acquiring seismic data in an offshore environment as well as various practical issues that arise (e.g. the number of vessels, nodes and crews available globally at a given time). Importantly, bp pioneered the use of OBN for industrial applications and carried out the first major OBN field trial in 2005 and in 2011 it pioneered the use of nodal seismic for 4D in the Gulf of Mexico. Additionally, bp was one of the first companies to embrace 4D streamer seismic in the North Sea during the late 1990s, and in 2003 it was the first to install a permanent seismic monitoring array (over the Valhall field in the Norwegian section of the North Sea). bp has acquired many 4D seismic surveys over the years.

2.6 bp also is able to draw on the seismic acquisition experiences and expertise of its partners in NEP, and together they have unparalleled experience in managing operational risk for CO2 storage monitoring.

2.7 The extensive work undertaken on the NEP project during the last few years also means that bp and its technical personnel have a much more detailed understanding of the Endurance aquifer and the seabed conditions in question than either Mr Sewell or OREC.

### 3. THE FRAMING OF THE QUESTION ADDRESSED BY MR SEWELL

3.1 It is also important to note the framing of the question which Mr Sewell answers within his report. That question appears to be, essentially: assuming that there is a need for wind farms to co-exist in the same location as CCUS, how might the CCUS facility be monitored?

3.2 This is evident from various statements throughout the report, including:

3.2.1 In the Executive Summary on page 8: "*...if it is necessary to find a way for wind farms and CCUS to co-exist, then conventional towed streamer (with cables longer than 1km) is not possible and OBN is the only viable technology, probably combined with a system such as a P-cable. This latter option may be more expensive in terms of seismic costs, but the overall economic and environmental value of having both a wind farm and a CCUS project operating in the same area could outweigh this additional cost.*" This statement is largely repeated in the Conclusion of the report;

3.2.2 Mr Sewell's concluding thoughts in respect of bp's Technical Assessment (p26), where, in the context of setting out the challenges with OBN, he nevertheless states: "*However, if towed streamer cannot be used in a wind farm, and both CCUS and wind farm projects are approved, then OBN/OBC will be the only option for acquiring 3D seismic*"; and

3.2.3 "*Referring back to the frames I described in the Introduction, if one determines that it is important to find a way for the two projects to co-exist then the task is to show through modelling, and/or field trials, that adequate seismic data can be acquired for the given turbine spacing*" (p29, section 2.5, second paragraph).

3.3 It is clear that Mr Sewell has misdirected himself (or been misdirected by Orsted), and thereby misunderstood the 'task' or question that arises as a result of bp's technical evidence and objection.

3.4 No matter how strong the public interest in the development of both CCUS and wind farms, and the desirability therefore of both being able to be co-located, it must be recognised that:

3.4.1 NEP is a commercial entity whose Directors have legal duties to act in the best



interests of the company and who will not make a financial investment decision in June next year to fund the development of the project unless they are satisfied that the risks of so doing are commercially acceptable; and

- 3.4.2 The NSTA, who is the regulator of offshore carbon dioxide storage, will not approach the question of what is acceptable in terms of safe and effective monitoring, and what constitutes the "best available technology" for monitoring based on what is the best available technology given the constraints imposed by the existence of a wind farm above Endurance. This misconception is made plain in Mr Sewell's statement that "*if BEIS decides that co-existence is compulsory then the NSTA will take account of the limited options (ie no towed streamer, greater than 1km)*" (emphasis added). Firstly, BEIS cannot 'compel' commercial entities to develop projects in particular locations which would deliver co-existence if those commercial entities do not consider the risks created as a result to be commercially acceptable. A decision by the Secretary of State to allow Orsted to place wind turbines in the Exclusion Area would not therefore make co-existence 'compulsory' in any meaningful sense. Nor would it remove the obstacles to co-existence that bp's evidence has identified and explained. Secondly there is no evidence that the regulator either will or should be willing to compromise its standards for this first of a kind development in order to consent the Endurance store on the basis of uncertain or sub-optimal monitoring technology.
- 3.5 Moreover, Mr Sewell's approach fails to take account of the fact that the protective provisions that NEP is seeking would not prevent the development of Hornsea 4 wind turbines in the area adjacent to the Exclusion Area. In other words, this is not the "either wind or CCUS, but not both" scenario upon which Mr Sewell premises his analysis and comments.
- 3.6 Therefore the questions which the ExA and Secretary of State must consider (based on evidence provided during this Examination) are:
- 3.6.1 Firstly, whether monitoring technology exists which the evidence demonstrates is likely to give sufficient confidence to the NEP partners to take a financial investment decision in June next year to fund the NEP project assuming Orsted is permitted by the HP4 DCO to construct a wind farm in the Exclusion Area; and
- 3.6.2 Secondly, whether a monitoring solution exists which the evidence demonstrates is likely to satisfy the NSTA when bp seeks the Endurance store permit, and throughout its lifetime, assuming Orsted is permitted by the HP4 DCO to construct a wind farm in the Exclusion Area<sup>2</sup>. This second question is, of course, directly linked to the first, as it will be a key part of the weighing of risks by the NEP directors.
- 3.7 The need to take the final investment decision in June 2023 is not an arbitrary date agreed between the NEP partners. It is driven by the Government's timetable to deliver the NEP project as part of the ECC plan and the commitments that the NEP partners have made to Government in securing the role of delivering the ECC plan. BEIS selected the ECC, supported by the NEP project, as one of two Track-1 clusters for delivery by the mid-2020s in October 2021 after commencing the Cluster Sequencing Process in February 2021. The NEP investors will need to take a final investment decision in June 2023 to progress through to detailed engineering construction, commissioning and start-up in order to meet the

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<sup>2</sup> Furthermore, the evidence would need to demonstrate that there is a monitoring solution likely to be satisfactory to BEIS, Ofgem and the Treasury, because if storage needed to be stopped because of monitoring issues in an area of overlap, industry would not be able to store the Co2 and taxpayers would bear the significant cost of a redundant project.





commercial operations date and support the Government's strategic ambition of 20-30MTPA of CCUS capacity by 2023<sup>3</sup>.

- 3.8 The ExA and Secretary of State must deal with the reality of how decisions by the NEP partners and regulators allowing the project to be delivered will be taken. Orsted's submissions and evidence to date simply fail to grapple with that reality, and the suggested 'solutions' advanced are fundamentally flawed as a result.
- 3.9 Given that Mr Sewell states that in his view the only possible technology which might enable monitoring of Endurance with a wind farm in situ is OBN plus P-cables, the question Mr Sewell should be asking is whether the consequences of having to rely on the use of OBN plus P-cables would put at risk the ability of the NEP partners and the NSTA to make positive decisions with regard to development of the NEP project next year, in circumstances where the HP4 DCO authorises turbines to be located in the Exclusion Area. If the evidence shows (as it plainly does) that the ability to make such positive decisions is put at risk, a solution needs to be identified which addresses that risk and ensures that the ability to achieve the objectives underlying the ECC plan is not jeopardised by the approval of the HP4 DCO.
- 3.10 Mr Sewell states that: "*Currently the regulator's view on seismic technology to use for CCUS is not fixed yet and one would hope that they would be open to any method that can be shown to have a high chance of succeeding through suitable modelling and field trials*" (p28, third paragraph). bp and the other NEP partners will not be willing to take a financial investment decision in June next year to progress the project based on this 'hope', which they consider entirely unrealistic. The role of modelling, survey designs and field trials is discussed specifically in section 8 below and the Appendix to this Submission, however, bp believes these are not activities that would assist or be feasible to undertake given relevant time constraints.

#### 4. REFERENCES TO SLEIPNER AND SNOHVIT

- 4.1 The Sewell Report accepts that there are currently only two offshore saline aquifer CCS projects globally, Sleipner and Snohvit, and that both use towed streamers to obtain 3D/4D seismic data.
- 4.2 Mr Sewell makes the point repeatedly that:
- 4.2.1 "*that does not mean that all future CCS projects need to use towed streamers*" (fifth paragraph on p32, in section 2.6.3: bp's response to the Jan 2022 OREC/NZTC report)
- 4.2.2 "*bp is essentially recommending that future projects have to follow the Sleipner model. This is quite a restrictive approach*" (fourth paragraph on p28, in section headed: bp's position paper (summary); and
- 4.2.3 "*While these provide valuable insights, they cannot be said to define how CO2 storage should be done offshore in all future cases*" (p34, paragraph immediately

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[https://eur03.safelinks.protection.outlook.com/?url=https%3A%2F%2Fassets.publishing.service.gov.uk%2Fgovernment%2Fuploads%2Fsystem%2Fuploads%2Fattachment\\_data%2Ffile%2F1033990%2Fnet-zero-strategy-beis.pdf&data=05%7C01%7CMaxwell.Harrison%40uk.bp.com%7Cd9c34798ceca438a4c0208da58e65d38%7Cea80952ea47642d4aaf45457852b0f7e%7C0%7C0%7C637920043668313139%7CUnknown%7CTWFpbGZsb3d8eyJWlQljoic4wLjAwMDAiLCJQljoicV2luZmZlcnQlcnVudCJBTiIl6k1haWw%7CJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=04l72pkt7ZSHUdiZWl%2BTPkPqynLVDcKQHExS0E8pGt0%3D&reserved=0](https://eur03.safelinks.protection.outlook.com/?url=https%3A%2F%2Fassets.publishing.service.gov.uk%2Fgovernment%2Fuploads%2Fsystem%2Fuploads%2Fattachment_data%2Ffile%2F1033990%2Fnet-zero-strategy-beis.pdf&data=05%7C01%7CMaxwell.Harrison%40uk.bp.com%7Cd9c34798ceca438a4c0208da58e65d38%7Cea80952ea47642d4aaf45457852b0f7e%7C0%7C0%7C637920043668313139%7CUnknown%7CTWFpbGZsb3d8eyJWlQljoic4wLjAwMDAiLCJQljoicV2luZmZlcnQlcnVudCJBTiIl6k1haWw%7CJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=04l72pkt7ZSHUdiZWl%2BTPkPqynLVDcKQHExS0E8pGt0%3D&reserved=0)





below table in section 3: Conclusion).

- 4.3 These statements, taken as a criticism of bp's position, suggest a naive mis-understanding of the realities of how decisions will be taken with respect to the NEP project by investors and regulators. As explained above, there are two crucial decisions to be made – one by the NEP partners as investors, and the other by the NSTA as the regulator of offshore carbon dioxide storage. Both will want a high degree of certainty that the monitoring technology to be used will lead to high quality data, sufficient to accurately monitor the CO2 plume (even if it starts to behave in an unexpected manner).
- 4.4 NEP partners must demonstrate to the NSTA in their applications for consents (store permit) in relation to the Endurance store that the proposed approach to monitoring constitutes the 'best available technology'. As set out in bp's Position Statement submitted at Deadline 1 ([REP1-057](#), Appendix 2, section 9.6, electronic page 133), even if trials of dense OBN and P-cables were implemented today, it would take a number of years to obtain the requisite data to ensure the NEP project could be progressed in reliance on using them to acquire seismic data at Endurance (see section 8).
- 4.5 Until such time as that sort of field study is funded and carried out (perhaps with grant funding from the Offshore Wind and CCUS Co-location Forum or similar) and the results are positive, the tried and tested techniques used at Sleipner and Snohvit will remain the 'best available technology' – and the technology which investors will wish to be able to use in order to commit to fund the NEP project.
- 4.6 Mr Sewell may regard this as an unfortunate restriction on the potential deployment of alternative technologies which would enable co-location with wind farms, but both bp, the ExA and the Secretary of State must deal with the realities of the state of scientific understanding today and with the barriers to any immediate leaps in the development of alternative technologies. Within the timeframe necessary to deliver the ECC plan no such technologies could be sufficiently tested, as explained further in section 8.

## 5. THE APPROACH TO THE BURDEN OF PROOF

- 5.1 The Sewell Report suggests throughout that the burden of proof is on bp – to prove that OBN and P-cables will not provide adequate data. The following statements are made, for example:
- 5.1.1 *"bp has not yet presented clear evidence via modelling and design work that OBN (plus P-cable) will not provide an acceptable solution for Endurance"; and*
- 5.1.2 *"While I agree that there is a potential problem for ocean bottom systems at present bp's opinion is not supported with evidence" (p30, section 2.6.2, fourth paragraph).*
- 5.2 With these and other similar statements, the Sewell Report seeks to suggest that it is for bp to prove that OBN plus P-cable will not provide a solution which will be acceptable to the NSTA. The implication is that if bp cannot provide this evidence to the ExA then the ExA should grant the HP4 DCO without any Exclusion Area.
- 5.3 This is misconceived. As explained above, the correct test should be whether having regard to the available evidence there is a significant risk that the ECC plan will not be delivered in the event that the Exclusion Area is not imposed on the HP4 DCO, by reason of the lack of confidence of investors linked to the risk that the regulator would not approve use of OBN plus P-cable, and that monitoring would be insufficient for liability handover at the end of the life of the CCS facility. If the Secretary of State believes this to be the case then he should impose the Exclusion Area in the HP4 DCO if he wishes to ensure the ECC plan is delivered.



## 6. COST AS A FACTOR

- 6.1 The Sewell Report repeatedly suggests that cost is an over-riding factor in any concerns bp has about the use of OBN and P-cable as opposed to towed streamers. The suggestion is made that if OBNs were situated sufficiently densely then the data obtained (in combination with data from P-cables) might be of sufficient quality. The point is made that this "*may be more expensive in terms of seismic costs, but the overall economic and environmental value of having both a wind farm and a CCUS project operating in the same area could outweigh this additional cost*" (Executive Summary, second paragraph, p8).
- 6.2 The Sewell Report states that: "*The actual cost comparison between OBN and towed streamer will depend on the survey designs used and can be calculated more accurately[...] during detailed survey evaluation and design study*" (p14, section 2.2, second paragraph); and that "*There is always a trade-off between cost and data quality when designing a seismic survey. Unless modelled, it cannot be quantified*" (p14, section 2.2, final paragraph on p14).
- 6.3 As explained in bp's Position Statement submitted at Deadline 1 ([REP1-057](#), Appendix 2, section 9.8, electronic page 133), the cost of technologies other than towed streamers is likely to be much greater. Accordingly, if NEP invested on the basis that in future it would be able to deploy some sort of new and as yet unproven approach of using dense OBN and P-cables to acquire seismic and monitor CO<sub>2</sub> within a wind farm, NEP would be taking the risk that any extra costs arising from the use of such an approach would be 'disallowed' by the regulator under the TRI model (on the basis that these costs are excessive compared with existing proven technologies and monitoring techniques). If disallowed such costs would end up being borne entirely by the NEP partners. This is not a risk which any responsible investor would take.
- 6.4 Orsted's first 'independent report' (the OREC report) states in its conclusions ([REP1-057](#), Appendix 1.1, paragraph 6.1, electronic pages 88-90) that: "*Ocean bottom nodes do not have the same issues as towed streamer acquisition but the cost of acquiring the data is high, potentially up to ten times that of surface seismic, and image quality of the seabed and shallow subsurface can be significantly affected depending on the spatial sampling of the nodes.*"
- 6.5 As part of bp's engagement with Orsted, BEIS, TCE and the NSTA over the past year, bp has considered in some detail the potential cost of OBN-based monitoring versus towed streamers. In June 2021, bp co-created with Orsted a presentation to TCE, NSTA and BEIS on the possibility of overlap scenarios and their impacts on both projects. As part of this, the cost of OBN was estimated to be £130m<sup>4</sup> over the lifetime of the development (assuming node receiver spacing of 200 x 50m). bp subsequently, during an October 2021 presentation focussed on OBN, provided to Orsted, TCE, NSTA and BEIS estimated costs of between £260m to £315m, based on assumed receiver spacing of 50 x 100m and source spacing of 25 x 25m (reflecting the shallow water depth of circa 60m at the Endurance aquifer). These estimated costs prepared in May/June 2021 and October 2021 were based on current pricing and the number of surveys envisaged at the time the estimates were made. The estimated costs would need to be updated to reflect the number of surveys in the MMV plan that forms part of the process whereby the NSTA grants the Endurance store permit. In the meantime, it is clear that the cost of OBN would undoubtedly be substantially larger than the estimated total cost of towed streamer surveys over the lifetime of the project, estimated to be £17m (as also set out in bp's October 2021 presentation).
- 6.6 The latest version of Orsted's protective provisions suggests that a component of the co-existence and proximity agreement to be entered into between bp and Orsted might cover

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<sup>4</sup> Uninflated and undiscounted



"an allocation between [Orsted] and/or [bp] of the cost of monitoring based on an objective and independently verified assessment of the difference in cost between monitoring undertaken with and without the authorised development in the overlap zone." However, there is no suggestion about the basis on which the significant cost of OBN and P-cable monitoring might be shared and this is not something which Orsted has previously raised as a possibility with bp. The working assumption of all meetings between the above-named parties in relation to use of any monitoring technology has always been that whatever technology is used the cost (like all other project costs) must be as low as possible in order for the TRI regulator to justify 'allowing' the cost as a pass through to emitters, where there is a potential requirement for Government support through the Industrial Carbon Capture and Dispatchable Power Agreement business models.

- 6.7 However, it should be clear from this submission and from bp's previous submissions that cost is by no means the only important factor supporting bp's view that towed streamers are the appropriate means of monitoring Endurance.
- 6.8 Bp accepts that in a 'blue water' situation (ie where there is no impediment due to a wind farm) then dense OBN could create an image as good as towed streamers (albeit at much greater cost and still with operational challenges and so would not be a technique that would be used for Endurance). In a situation where monitoring of Endurance is constrained by a wind farm however, all of the technical problems identified in this submission and previous bp submissions come into play, regardless of cost.
- 7. MR SEWELL'S CONCLUSION AND RECOMMENDATIONS AND ORSTED'S PROTECTIVE PROVISIONS**
- 7.1 While Orsted does not put them forward as such, Mr Sewell's Conclusion and Recommendations are in fact supportive of bp's position.
- 7.2 One of the main challenges that bp has identified in relation to the deployment of OBN is seabed conditions. Mr Sewell acknowledges these concerns:
- 7.2.1 *"I agree that these sand waves on the seabed could be a challenge for OBN"* (p14, section 2.2, fifth paragraph); and
- 7.2.2 *"In 2.19 to 2.24 bp makes the argument that ocean bottom systems, and OBN in particular, will be susceptible to the receivers being moved around by the sand waves on the seabed in the Endurance area. In my opinion this is likely to be the main technical challenge for the use of nodes in this area. If too many nodes change position during the acquisition of the survey then it will degrade the 3D imaging and the utility of the data for the 4D monitoring"* (p32, section 2.6.3, second paragraph).
- 7.3 Mr Sewell's central contention is, however, that bp needs to do more studies and modelling before coming to the conclusion that OBN (in combination with P-cables) will not provide adequate data quality. The first two paragraphs of his Recommendations state:
- 7.3.1 *"The key recommendation is that comprehensive evaluation of different seismic acquisition processing techniques and survey designs, using an approach such as forward modelling is needed to investigate the impact on imaging from the seabed to Bunter, and thus the ability to monitor the spread of the CO2 plume. Part of this evaluation should include field trials investigating, for example, if the sand waves on the sea bed at the Endurance site will cause a significant problem for the use of ocean bottom systems. The modelling work undertaken prior to 2016 as part of the White Rose project planning, as described in the K42 report could be used as a basis and refreshed."*



*The modelling would also be able to investigate the potential acoustic noise of an operating wind farm and its impact on the quality of seismic data recorded during 3D surveys."*

- 7.4 Orsted suggests that their revised form of protective provisions, submitted at Deadline 5, address the need for further studies and surveys as recommended by Mr Sewell. It is said by Orsted that their protective provisions: *"provide a mechanism for the necessary preparatory work to be undertaken between the two projects. If agreement cannot be reached, then it is for the Secretary of State to determine following arbitration"*. Orsted further suggests that their *protective provisions "provide adequate protection for the NEP Project. They also offer the Secretary of State the opportunity to grant consent without having to decide whether offshore wind should trump CCUS, or vice versa"*.
- 7.5 This is not in any way an accurate description of the protective provisions as drafted by Orsted.
- 7.6 Orsted's protective provisions now include a definition of an "evaluation", which is defined to mean modelling and field studies of different seismic monitoring approaches including the impact of noise from the wind turbines, an evaluation of the financial feasibility of carrying out both towed streamer and OBN baseline surveys, and *"field trials to determine the appropriate size of exclusion zone required in respect of vessels deployed on the NEP Project"*.
- 7.7 Assuming the studies that Mr Sewell envisages were carried out, one realistic possible outcome must be that those studies show that OBN and P-cables will not in fact be suitable for use. However, Orsted's protective provisions do not appear to cater for that outcome, or address its adverse consequences for the public interest. The "evaluation" is only referenced in paragraph 2(c) of the protective provisions, which states that in the event that, among other things, bp *"has not undertaken and completed the evaluation and shared that with [Orsted]"*, the schedule of protective provisions no longer has effect.
- 7.8 We do not see how this in any way protects the NEP project, or gives the Secretary of State the opportunity to provide for an Exclusion Area at a later date should it be shown via the "evaluation" that one is needed. The Secretary of State's only role in the provisions as drafted is to determine *"the outstanding matters in dispute"* in relation to the negotiation of a co-existence and proximity agreement in the event that *"no co-existence and proximity agreement is concluded"* (paragraph 11). It may be that Orsted is assuming that if bp refuses to enter into such an agreement on the basis that the proposed form of agreement allows for co-existence in an area of overlap, then the arbitrator appointed by the Secretary of State could make a determination in relation to this fundamental issue under paragraph 11 (ie requiring the co-existence and proximity agreement to provide for an exclusion area). However, if this is the intention then the protective provisions drafting would need to make consideration of this matter a much clearer, and separate, part of the post-consent process.
- 7.9 In any event, however, any version of the protective provisions which attempts to defer until a later date the decision on whether co-existence in the Exclusion Area is possible based on further studies is unworkable for the reasons set out in section 8 below. In particular, it should be noted that the timescales envisaged by Mr Sewell for modelling and field studies leading up to a final investment decision in June 2023 (as shown in the diagram accompanying Mr Sewell's Recommendations, on page 36) are entirely unrealistic for the reasons explained.

## 8. **FLAWS WITH THE SUGGESTION THAT MODELLING AND FIELD STUDIES CAN DEFER THE DECISION**

- 8.1 As explained above, Orsted's current drafting of the protective provisions does not expressly provide for a decision point post-grant of the DCO as to whether OBN plus P-cable (or similar



technology) is feasible based on further modelling and studies. However, clearly such drafting could be provided for. It is therefore important to explain why any such proposal would not be workable in any event. The response to the Sewell Report which bp intends to submit at Deadline 6 will elaborate upon the problems with this suggestion, but we summarise various fundamental flaws with this proposal below.

### **Fundamental problems with creating any meaningful model**

- 8.2 There are no real world examples of OBN plus P-cable surveys occurring within the boundaries of a wind farm. For any model to be meaningful, it must therefore be based on assumptions about how seismic acquisition in respect of Endurance might be carried out with that constraint. In other words, the inputs to the model must be robust. This immediately poses a problem for the following reasons:
- 8.2.1 Mr Sewell suggests that P-cables might be able to be used as close as 100m from wind turbines. However, bp does not consider such an assumption to be plausible. Given issues of safety and practicality (including the concerns of vessel operators who have their own requirements for safe operations), bp would not consider it safe to model use of P-cables based on less than 500m distance from turbines;
  - 8.2.2 What assumption should bp make about the ability to place and retrieve nodes in specific locations near to turbines, given the variable currents and seabed conditions?
  - 8.2.3 Over what timeframe should the model assume that a dense array of OBNs can be laid? bp does not consider that dense OBN within a wind farm could be laid in a single season. Apparently this is not something Mr Sewell has considered or addressed, despite bp having told this to Orsted in November 2021 in a document listed in Section 5 of the Sewell Report (see bp's response in the Appendix to this submission to Request 6 in Section 4.1 of the Sewell Report);
  - 8.2.4 What assumption should be made about the ability to source sufficient nodes and crew from a finite global pool? The availability of large numbers of nodes required for a dense OBN survey of this size and the crew required to execute the survey is far from guaranteed<sup>5</sup>, particularly at a time of high oil prices. These challenges also would exist for any small field trial;
  - 8.2.5 What assumptions should the model make about the ability to repeat all of the above consistently around turbine obstructions over the lifetime of the project (4D modelling)?
  - 8.2.6 What assumptions should be made about noise from turbines and seismic reflections in the water column? This is very hard to characterise in a model; and
  - 8.2.7 Turbine locations would need to be assumed in the model, yet Orsted will not be able to confirm to bp at this point in time where their turbines would be located. This is partly because, as set out in the bp Technical Assessment ([REP1-057](#), Annex 1 to Appendix 2, section 6.4, electronic page 170), the NEP project must be developed on a 'appraise while develop model' such that NEP will not be able to tell Orsted in advance where its wells will be drilled and therefore where Orsted may locate its turbines to be compatible with NEP's evolving needs.

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<sup>5</sup> See bp's response in the Appendix to this submission to Requests 2 and 6 in Section 4.1 of the Sewell Report





- 8.3 For all of the above reasons, the creation of inputs to any model is likely to contain a large degree of uncertainty, lacking validated data, and the approach bp would wish to adopt to such assumptions may itself be something which would be capable of much challenge and debate.

**The need for pre-modelling field trial(s) to establish operational limitations**

- 8.4 bp's technical team considers that it would be essential to carry out pre-modelling field trial(s) in order to inform the modelling assumptions about operational constraints, followed by more extensive field trial(s) post-modelling to look at the impact on 3D/4D imaging/modelling. The pre-modelling trial(s) would include engagement with the contractors who would carry out the surveys, in order to understand the practical operational constraints and risks, such as whether it is possible to find vessel owners/operators willing to sail as close as 100m to wind turbines.

**The need for field trials following modelling**

- 8.5 As Mr Sewell suggests, modelling alone of OBN and P-cables could not demonstrate that it would be possible to acquire 3D and 4D data of sufficient quality within a wind farm. Modelling is indicative only and illustrative of a likely 'best-case' scenario of what is theoretically possible. As explained above, a model is also only useful to the extent that its inputs represent accurately all likely limitations, including operational constraints.
- 8.6 Modelling does not prove operational or real-life feasibility and data quality in the presence of predictable (let alone unexpected) complexities of real seismic acquisition operations and real data characteristics. Even field trial results would be subject to uncertainty if they were not conducted within a similar wind farm (or equivalent obstructions), or in the context of similar seabed conditions and bathymetry as exist over Endurance.
- 8.7 For the reasons set out below, the time it would take to conduct pre-modelling field trial(s), plan and carry out reliable modelling and conduct post-modelling 3D and 4D field trial(s) which would provide the necessary confidence (assuming they were successful) is clearly incompatible with the NEP partners' need to take a financial investment decision in June 2023 in order to deliver the ECC plan.

**Timing and cost of modelling**

- 8.8 bp estimates that carrying out a basic modelling exercise for OBN plus P-cables would take approximately 4-5 months. If a more detailed model were to be created, seeking to illustrate the movement of sand waves and other sensitivities, the total cost would quickly escalate to an estimate in the region of \$4m, and the time taken would be closer to 9 – 10 months. However, even a model of this type would still only cover a very basic set of assumptions with regard to operational limitations.

**Timing and cost of any field trials**

- 8.9 To provide robust conclusions about the ability to use OBN and P-cable monitoring around a wind farm, field trials would need to be carried out over an extended period of time. In particular, having measured sand waves at a particular point in time, there would be a need to do repeat surveys at intervals of approximately a year in order to show how far they move and change shape over time. It would not be sufficient to carry out a single repeat survey at a one year interval, as it is possible that that single year is not representative of how the sand waves will behave over a longer period. There could be inconsistency in how they behave from one year to the next. In other words, it would not be sufficient to simply carry out a single survey field trial (a 3D data acquisition) but rather it is necessary to study data acquisition over a number of years (4D acquisition).
- 8.10 The cost of such a field trial is impossible to quantify precisely, as assumptions about the





nature and scale are highly theoretical, however bp would expect any such trial to take a number of weeks and be costly. For example, a single trial taking between 6-8 weeks is likely to cost ~\$10-15m. Furthermore, this (and the cost of modelling) is a cost which the TRI regulator could seek to reasonably 'disallow' and therefore represents an unacceptable cost risk to NEP investors unless funded by a third party.

#### **Incompatibility with FID timeline**

- 8.11 It is clear from the above that there is no possibility of the necessary modelling and field testing (pre and post modelling) being carried out before the scheduled date for NEP's investment decision in June 2023. In any event bp would not be willing to put forward this monitoring approach for approval by the NSTA because of insufficient certainty that it would provide a workable solution in practice either (i) for predicted conditions or (ii) for unexpected circumstances where critical corrective measures are required or additional monitoring is needed (see below).

#### **Unexpected circumstances where corrective measures are required**

- 8.12 Even if a field trial involving several years of survey data were to suggest that using OBN plus P-cables within a wind farm and with conditions like Endurance could generate time lapse high quality data, bp would still have concerns about being forced to rely on this technology in circumstances where:

8.12.1 Corrective measures (e.g. the drilling of a relief well) may be needed in locations which cannot be predicted in advance; or

8.12.2 The need for a localised seismic survey were to be triggered, due to suspected non-containment or non-conformance of the CO2 plume.

- 8.13 If such relief wells or localised additional monitoring are needed to be drilled/carried out directly beneath or in the immediate vicinity of a wind turbine, such operations would be severely compromised if not impossible.

- 8.14 In addition, even in the best case scenario of minimal exclusion zones of 100m around the wind turbines (which as explained above bp does not consider realistic), the data obtained from surveys conducted using OBN and P-cables will have significant "gaps" around the turbines.

#### **Mr Sewell's timeline for modelling and field studies is unrealistic**

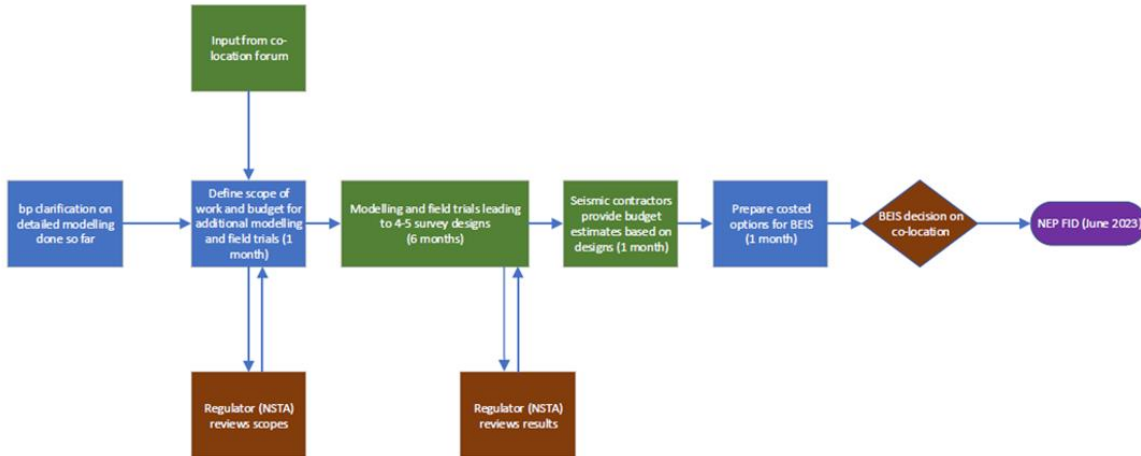
- 8.15 Mr Sewell sets out a flow chart in his Recommendations illustrating "*the process for how investigations could progress to enable a fully informed decision to be made on the feasibility of co-location from a seismic data acquisition perspective*". For ease of reference, we provide Mr Sewell's flow chart below.

- 8.16 It should be clear from our explanation of the complexity of modelling and field trials that it would be unrealistic even to conduct the necessary modelling and one single field study in the pre-FID period, let alone the pre-modelling field trial and post-modelling repeat field studies over a number of years which would be necessary to obtain the level of certainty which would be required by investors.

- 8.17 In addition to the general points made above in relation to the time required to undertake meaningful modelling and field trials, we note that the diagram assumes that within one month it would be possible to not only "Define scope of work and budget for additional



modelling and field trials”, but to also receive “Input from co-location forum” and for the NSTA to “review scopes”. That is entirely unrealistic.



9. **OTHER REASONS WHY AN EXCLUSION AREA IS NECESSARY ARE NOT ADDRESSED BY THE SEWELL REPORT OR ORSTED**

9.1 Finally, it is important for the ExA to note that the Sewell Report deals only with the question of monitoring.

9.2 It offers no comment or solutions in relation to any of the other substantial problems concerning co-location in the Exclusion Area as identified in bp's Position Statement submitted at Deadline 1 ([REP1-057](#), Appendix 2, section 7(iii), electronic page 129) – specifically the issues identified in relation to:

- 9.2.1 relief well access;
- 9.2.2 helicopter access; and
- 9.2.3 drilling rig access.

9.3 As described in bp's Position Statement submitted at Deadline 1 ([REP1-057](#), Appendix 2, section 8(iii), electronic page 131 (Regulatory Requirements in relation to Relief Wells, Helicopter and Rig Access)) there are regulatory requirements which necessitate uninhibited access to construct relief wells, and corridors for helicopter access and rig access. bp does not consider it would be able to meet the relevant requirements of regulation and expectations of regulators in relation to the NEP project if access were to be hindered by the co-location of a wind farm in the Exclusion Area. The absence of satisfactory answers to these issues, in addition to the points raised by bp in relation to monitoring, mean that an Exclusion Area must be imposed if the NEP project is to be delivered to enable the ECC plan.

**Herbert Smith Freehills LLP**



HERBERT  
SMITH  
FREEHILLS

## APPENDIX

### RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION IN 4.1 OF THE SEWELL REPORT

## RESPONSES BY BP TO THE REQUESTS FOR ADDITIONAL INFORMATION SET OUT IN SECTION 4.1 OF THE SEWELL REPORT

Annex 1 of bp's submission to Deadline 5a summarises bp's position (on behalf of NEP) in relation to the conclusion and recommendations set out in the report by Andrew Sewell of Xodus Group Limited ("Sewell Report"). The information in this Appendix to Annex 1 addresses some aspects of the "Request to bp for additional information" set out in Section 4.1 of the Sewell Report (the "Requests"), and bp has set out below the Requests and its specific responses to the Requests. These responses should be read collectively with Annex 1.

### QUESTION 1

1. *Ref Section 2.27 of [26] bp's Response to the Jan 2022 OREC/NZTC report, slides 8 and 11 of the OBN workshop pre-read [7], and answer to Q9 in the OBN Q&A document [8]:*

*Has bp undertaken detailed 3D/4D finite difference forward modelling survey design projects for different possible acquisition schemes, including different densities of OBN/OBC vs towed streamer, and with/without wind turbines? If so, please can it provide the reports on this exercise.*

### BP'S RESPONSE

- 1.1 The work that bp has undertaken concerning finite difference forward modelling of full wavefields for multiple survey designs for acquiring seismic in an area with wind turbines has shown that:
  - numerous operational and logistical challenges exist in terms of carrying out an OBN survey within a windfarm;
  - these challenges are particularly acute in terms of using OBN for 4D seismic acquisition for Endurance; and
  - given the fact that there has never been an OBN survey conducted within a windfarm and the number and nature of assumptions concerning operational constraints that would need to be made about using OBN at Endurance (examples of which are set out in Section 8 of Annex 1), pre-modelling field trials would need to occur before any meaningful and reliable forward modelling of possible acquisition schemes using OBN at Endurance could occur.
- 1.2 Pre-modelling fields trials are required in order to provide data and information that is needed to: (i) address numerous uncertainties and difficulties that exist concerning inputs for forward modelling the use of OBN at Endurance; and (ii) inform the modelling assumptions. For example, it is not known how to accurately model the potential extra noise sources (the vibrations of the turbines on the seabed, the backscatter of energy from the infrastructure in the water column (equivalent to multiple episodes of "rig noise" – P.26-27 OREC report)) or the degree of 'misplacement' of sources and sensors that would occur due to practicalities of operations around infrastructure.
- 1.3 As explained in Annex 1, modelling is only indicative and illustrative of a likely "best-case" scenario of what is theoretically possible and does not prove operational or real-life feasibility, and once a reliable modelling exercise occurred, there still would need to be extensive post-modelling field trial(s) before it could be

demonstrated that 3D and 4D seismic data of sufficient quality could be acquired at Endurance using OBN or a hybrid of OBN and P-cables and with wind turbines in the Exclusion Area.

- 1.4 The significant costs and time involved in carrying out pre-modelling field trial(s), undertaking detailed forward modelling of using OBN at Endurance in the presence of wind turbines and conducting post-modelling field trial(s) would not be practical or justified.

## QUESTION 2

2. *Ref the same as request 1, and the table in Section 7.0 on page 28 of bp's Technical Assessment [5]:*

*Has bp modelled the relative cost vs image quality at different depths for a range of densities of OBN? Please share if available.*

## BP'S RESPONSE

- 2.1 For the reasons explained above in bp's response to Request 1, detailed modelling of multiple different OBN survey parameters for seismic acquisition at Endurance has not been done. However, based on bp's extensive experience with and knowledge of OBN and work carried out to date, bp has assessed estimated costs for different densities of OBN.
- 2.2 As shared with Orsted for purposes of the first workshop held in May 2021, and subsequently presented to the OGA, BEIS and The Crown Estate during a presentation co-ordinated by bp and Orsted and held in June 2021, bp determined that if OBN was used for MMV of the Endurance aquifer, it would (assuming receiver spacing of 200m x 50m) add an estimated £130m over the project life, and if wind turbines were present in the Exclusion Area the seismic acquired by OBN would be poorer data quality than what would be acquired using towed streamers without the obstruction of wind turbines.
- 2.3 bp subsequently, during an October 2021 presentation provided to Orsted, TCE, BEIS and the NSTA and focussed on OBN, estimated costs at between £260m - £315m, based on assumed receiver spacing of 50x100m and source spacing of 25x25m (reflecting the shallow water depth of ~60 m at the Endurance aquifer).
- 2.4 The estimated costs prepared in May/June 2021 and October 2021 were based on current pricing and the number of surveys envisaged at the time the estimates were made. The estimated costs will need to be updated to reflect the number of surveys in the MMV plan that forms part of the process whereby the NSTA grants the Endurance store permit.
- 2.5 Orsted has the presentation documents in question.
- 2.6 The estimated costs of using OBN depend on a number of factors. These include the number of planned surveys and assumed receiver spacing. Additionally, there are practical considerations that affect both the timing and costs of carrying out a dense OBN survey. For example, a dense array of 100 x 100m nodes would require approximately 25,000 nodes to be deployed, and there are a limited number of nodes available (with a typical vessel and crew currently having ~5,000 nodes available). Additionally, the use of remotely operated vehicles (ROVs) for

placement of nodes around obstructions (e.g. wind turbines) would require deep water crews, and currently there are ~4 such crews operating in the world.

### QUESTION 3

3. *Ref slides 6 and 9 of the OBN workshop pre-read [7]:*

*Does any survey design work undertaken by bp also model the degree to which differences in acquisition parameters between baseline and repeat surveys impacts the ability to detect fluid differences over time?*

### BP'S RESPONSE

- 3.1 Although bp has not, in relation to the Endurance aquifer, modelled the impact of changing survey design on 4D repeatability, bp's extensive global seismic acquisition experience has demonstrated that 4D surveys that do not replicate the acquisition of the original survey do not produce reliable results with sufficiently high confidence that the 4D time-lapse signals due to fluid changes in the reservoir can be identified and quantified appropriately. This is true for both towed streamer, as well as ocean bottom surveys.
- 3.2 Places where changes have been made to acquisition parameters in a 4D setting have either been put in place to improve source and receiver repeatability or because confidence in the 4D signal has been built over time to such a level that a (usually minor) change in parameters can be tested, with the option to revert back if the results are not as expected. The "back-up to old design" approach would not be an option at Endurance if wind turbines were present in the Exclusion Area.

### QUESTION 4

4. *Ref section 2.28.1 of [26] bp's Response to the Jan 2022 OREC/NZTC report:*

*bp states that it has investigated in detail the possibility of using a short streamer system such as P-cable for 4D monitoring down to the Bunter reservoir (TVDSS > 1000m) and concluded that it won't be suitable. But has bp modelled how well P-cable can image the near surface (<500m TVDSS) and provide CO2 monitoring for those depths? Please share the results if so.*

### BP'S RESPONSE

- 4.1 bp has not modelled P-cable for the 0-500 m shallow section. However, P-cable is not proven for 4D in shallow water and based on the work bp carried out in relation to the potential use of P-cables, if Orsted erected wind turbines in the Exclusion Area, bp estimates that P-cable could only be acquired in swaths ~420 m wide with 380 m gaps along the lines of turbines. The resulting lack of data around the wind turbines would create significant gaps in coverage of the Endurance aquifer, particularly in the shallow section, and means that the coverage provided by using P-cables in the 0-500 m shallow section would be akin to enhanced 2D seismic rather than 3D seismic. This would not provide the confidence in containment or conformance that is required in order to satisfy monitoring requirements. This information was shared with Orsted during the Session 3 workshop held in December 2021. Orsted has the presentation document in question, and also see pages 48-49 of bp's Technical Assessment (submitted as Annex 1 to its Deadline 1 submission, [REP1-057](#), electronic page 194).



- 4.2 A P-cable survey carried out in open water would (per its design) image the shallow section of the subsurface. However, given the characteristics of the Endurance aquifer and seabed, it would not be appropriate to use P-cable for monitoring the shallow section of the Endurance aquifer (even if wind turbines were not located in the Exclusion Area).

#### QUESTION 5

5. *Ref section 2.27 of [26] bp's Response to the Jan 2022 OREC/NZTC report: bp implies that it has studied combinations of OBN and P-cable as potential hybrid solutions for 4D monitoring to cover the range for depths from seabed to base Bunter as part of its "significant work and assessments undertaken .... during 2019-2021". Is there a report on this work that can be provided that goes into more detail than what has been provided so far in bp's submissions?*

#### BP'S RESPONSE

- 5.1 bp has studied many options for monitoring (see pages 48-49 of bp's Technical Assessment (Annex 1 to its Deadline 1 submission, [REP1-057](#), electronic page 194)), including the hybrid sparse OBN and P-cable option that was presented by an Orsted consultant, and subsequently investigated in detail by bp. Although there is no written "report" per se, bp's technical conclusion was presented during the Session 3 Workshop held in December 2021 (and Orsted has the presentation document in question). In particular, bp advised that for the Endurance aquifer sparse OBN would not provide the resolution required at reservoir depth, nor would it provide coverage of the shallow overburden (full-waveform inversion (FWI) velocity imaging is not proven for 4D). Additionally, P-cable does not image reservoir depths, and as explained above in response to Request 4, P-cable within wind turbines in the Exclusion Area would have significant gaps in the shallow section due to the 380m wide gaps in the data. Accordingly, bp previously advised Orsted that using a combination of sparse OBN and P-cables would not be a feasible solution for monitoring the Endurance aquifer if there were wind turbines in the Exclusion Area.

#### QUESTION 6

6. *Ref the answer to Q7 in the OBN Q&A document [8]: bp has stated that a dense layout of nodes is not possible in a wind farm. What experience or modelling is this statement based on and can it be shared with us?*

#### BP'S RESPONSE

- 6.1 bp pioneered the use of OBN for industrial applications and carried out the first major field trial in 2005. It has extensive experience and knowledge concerning OBN, which is typically used at scale for deep oil and gas reservoirs, and for a number of years bp has been involved in work to develop technologies that may improve OBN efficiency and help acquire seismic within windfarms. This includes working on and funding Blue Ocean autonomous nodes. However, such technologies are still in early development, with no certainty of improving data quality or being commercially viable. In the meantime, no OBN survey has ever been conducted within a windfarm and a hybrid of OBN (whether sparse or dense) and P-cables has not been used for 4D monitoring inside or outside of a windfarm.

- 6.2 In terms of a dense layout of OBN nodes, bp did not state in its answer to Q7 in the OBN Q&A document that “*a dense layout of nodes is not possible in a windfarm*”. bp stated that it is not physically possible to use dense OBN **at all locations in a windfarm** (emphasis added). For example, bp determined that at Endurance source spacing would need to be about 25m, and with the exclusion zones around the turbines (100m radius for safety for a vessel towing a source) this means that at those locations there would be gaps in the shallow data. Additionally, a dense layout of OBN nodes at Endurance raises various practical challenges and in November 2021 bp advised Orsted that assuming there was no windfarm in the Exclusion Area and 2 node vessels were used, it would take several months to acquire data using a 50 m x 100 m node grid (see answer to FQ4). There would be even more challenges using dense OBN nodes at Endurance if there were wind turbines in the Exclusion Area. Taking account of the safety restrictions that would be needed for working within the windfarm, the limited number of nodes and crews available and other weather and safety downtime for acquisition, bp believes that it is unlikely that carrying out a survey using dense OBN nodes with wind turbines present in the Exclusion Area would be able to be completed in one North Sea season, and bp advised Orsted in November 2021 that if wind turbines were in the Exclusion Area acquisition within a single season was not guaranteed.

#### QUESTION 7

7. *Ref sections 7.3.1 and 7.3.3 of bp’s Technical Assessment [5], slide 7 of the OBN workshop pre-read [7], and the answers to Q9 and FQ7 in the OBN Q&A document [8]:*

*Has bp investigated the size/shape of air gun array and source vessel that would be appropriate for the relatively shallow Bunter sandstone target at Endurance? Please share any data on this.*

#### BP’S RESPONSE

- 7.1 In carrying out a 3D towed streamer acquisition over Endurance during 2022 bp has used a source volume (400 cubic inches) significantly less than typical 3D towed streamer surveys. bp will continue to try to optimise the size/shape of air gun array and source vessel appropriate for the relatively shallow Bunter sandstone target at Endurance, taking account of relevant factors including weather conditions and environmental impacts including the Southern North Sea special area of conservation and minimising impacts on marine mammals, particularly the harbour porpoise.

#### QUESTION 8

8. *Ref section 10, third paragraph of page 8 of bp’s Technical Assessment [5]:*  
*bp states that only 30% of storage capacity can be used if there are no brine production wells. Is the work that underpins this estimate available for review? The 2016 White Rose reports do not cover this.*

#### BP’S RESPONSE

- 8.1 Whereas White Rose planned for 54 MT of storage (about 12% of the total storage volume), NEP plans to utilise the full storage capacity of approximately 450 MT of

CO<sub>2</sub>, which is accessed in two stages progressively. The first stage is reliant on the maximum pressure allowable by the seal rock to contain CO<sub>2</sub> without any brine production. The second stage relies on brine production at the uniform periphery of the store to free up further pore space within the Endurance store, whilst staying within the maximum pressure allowable as a safety limit. NEP's models have shown that the storage capacity for the Endurance store is approximately 150 MT for the first stage and a further approximately 300 MT for the second stage, thus making up the approximately 450 MT total in bp's Technical Assessment. Therefore, without brine production approximately 150 MT or 30% of storage capacity at Endurance can be safely accessed. Further information in this respect was shared in a presentation co-created with Orsted and presented to the NSTA and TCE in June 2021. Orsted has the presentation document in question.

## QUESTION 9

9. *Ref section 2.9 of [26] bp's Response to the Jan 2022 OREC/NZTC report:*

*bp has stated that the CCS project is now significantly different from when it was White Rose and will require many more CO<sub>2</sub> injection wells for example. However it has not made clear how the MMV plan is different from that which is described in the K42 White Rose report for example. Please can bp explain what are the significant changes in MMV plan with regards to surface seismic.*

## BP'S RESPONSE

- 9.1 Aspects of the Measurement, Monitoring and Verification (MMV) plan for the White Rose Project described in the K42 document are similar to NEP's current MMV plan. For example, the K42 document (made public in 2016) described the full extent of the complex and identified towed streamer seismic as the primary component of the MMV plan for the Endurance Store.
- 9.2 However, there are a number of differences between the MMV in the K42 document and NEP's MMV plan, reflecting the fact that a key difference between the White Rose CCS project and NEP is the overall size of the project. Specifically, the White Rose project was based on an injected volume of 54 MT of CO<sub>2</sub>, whereas NEP's plan for Endurance has a full-field development of 450 MT when pressure is managed with brine production, and increasing the stored volume involves an increase in monitoring frequency in NEP's MMV plan (see bp's response below to Request 10).
- 9.3 Another difference with the K42 MMV plan is that NEP currently is not planning to use microseismic monitoring in its base-case MMV plan, as the mobile seabed conditions make the deployment of a seabed array challenging and the cost/benefit is relatively low (it may be hard to detect microseismic scale events above the noise floor). Additionally, tests NEP carried out in November 2020 showed that the repeatability of 2D seismic is poor and therefore NEP has discounted 2D seismic (see page 48 of bp's Technical Assessment submitted as Annex 1 to its Deadline 1 submission).
- 9.4 Another important difference between the White Rose Project MMV plan as described in the K42 report and NEP's current MMV plan for Endurance is the fact that following review of the 2013 Polarcus seismic data, bp determined that the data are not suitable for use as a baseline. For example, the acquisition

parameters of the Polarcus data mean it is not possible to use shallow water noise-removal techniques on the data. Additionally, the Polarcus data do not have the higher resolution required to be able to detect CO<sub>2</sub> away from the main plume. Accordingly, a new towed streamer 3D acquisition programme designed to optimise imaging at the Endurance store was carried out earlier this year and will be used by NEP to create a new baseline.

#### QUESTION 10

10. *Ref section 2.9 of [26] bp's Response to the Jan 2022 OREC/NZTC report:*

*What schedule of repeat seismic surveys does bp now envisage for Endurance, or is it still the same as in the White Rose plan?*

#### BP'S RESPONSE

10.1 The White Rose Project MMV plan set out in the K42 White Rose report (page 132) indicates that after injection, repeat surveys would occur after 4 years, 8 years, 12 years and 18 years, with one more survey occurring 3 years after cessation of injection. In contrast, NEP currently plans for there to be an initial time-lapse survey 3 years after initial injection and another survey 6 years after injection, followed by further surveys during the injection phase, the timing of which will be based upon the conformance that is observed after injection and the full integrated analysis of all MMV data. NEP's current expectation is that these additional surveys will occur at 5-year intervals (see bp's submission to Deadline 1, [REP1-057](#), electronic page 126). Additionally, two surveys are currently envisaged after the injection phase is completed in order to ensure the stability of the plume. Additional phases of development may trigger revisions to the timing of monitoring surveys.

#### QUESTION 11

11. *Ref section 2.28.2 of [26] bp's Response to the Jan 2022 OREC/NZTC report:*

*bp states that it has carried out seismic rock property modelling of CO<sub>2</sub> replacing brine to understand what resolution of seismic data is required for the Endurance store. We have been shown a very brief summary of this. Is there a more detailed report that can be provided?*

#### BP'S RESPONSE

11.1 bp has undertaken multiple stages of seismic rock property modelling to investigate the detectability of CO<sub>2</sub> on seismic. This work has been an iterative process as bp has developed CO<sub>2</sub>-specific fluid substitution workflows within its software, and there is no report which describes the entirety of the seismic rock property modelling of CO<sub>2</sub> replacing brine. Additionally, the North Sea Transition Authority and The Crown Estate commissioned Ikon Science to study seismic rock property modelling of CO<sub>2</sub> which is ongoing and this raises some additional parameters for modelling which may reduce detectability at low CO<sub>2</sub> levels. bp is investigating this further.

#### QUESTION 12

12. *Ref section 2.40 of [26] bp's Response to the Jan 2022 OREC/NZTC report:*

*What has bp learnt from the use of OBC and now OBN for 4D imaging at the Valhall field?*

## **BP'S RESPONSE**

- 12.1 Valhall, an oilfield in the Norwegian sector of the North Sea, was operated by bp until 2017 when Aker bp became the operator.
- 12.2 The main reservoir at Valhall is deep (~2.5 km), and the field originally had a permanent seabed seismic monitoring array (45 sqkm) using trenched ocean bottom cables (OBC) and a much smaller, high-density, ocean bottom cable (OBC) array (0.6 sqkm) used for shallow hazard imaging around the production platform.
- 12.3 The fixed array linked to dense sampling on the source side resulted in good 4D images of the reservoir and regular (<1yr) 4D contributed to understanding the reservoir. However, the lifetime of the array was overestimated, and maintenance underestimated, and larger array has not been in operation since ~2015 and was replaced by OBN to acquire 4D seismic data.
- 12.4 For various reasons the use of OBC and OBN at Valhall to acquire seismic data does not assist in determining how to acquire seismic data for Endurance. For example, the fact that the main reservoir at Valhall is at the crest of the structures so much deeper (~2.5 km) than at Endurance (~1 km), means that a relatively coarse line spacing (350 m) of the OBC array is sufficient for time-lapse imaging of the reservoir at Valhall. However, neither a sparse OBC array, nor use of sparse OBN nodes, is suitable for Endurance. Critically, as there is no windfarm over Valhall, it does not have to deal with the numerous challenges of operating a 3D/4D seismic survey in a windfarm and the fact that OBC and OBN have been used successfully at Valhall, an oilfield where acquisition occurs around a platform/production facilities, does not mean that OBC or OBN could be used to acquire seismic within a windfarm.

**ANNEX 2**  
**RESPONSE TO ORSTED'S COMMENTS ON BP'S LEGAL SUBMISSIONS**





## BP'S RESPONSE TO ORSTED'S LEGAL SUBMISSIONS SUBMITTED AT DEADLINE 5

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### 1. OVERVIEW

- 1.1 As part of their response to Deadline 5, Orsted Hornsea Project Four Limited ("Orsted") included legal submissions prepared by James Maurici QC regarding the lawfulness and appropriateness of bp's proposed disapplication of the Interface Agreement (the "IA") within the protective provisions bp has proposed be included within the Hornsea Project Four DCO (most recently in [REP4-059](#), Appendix 1, paragraph 6, electronic page 10).
  - 1.2 Orsted's legal submissions are divided into the following sections:
    - 1.2.1 the proper legal characterisation of what bp seeks;
    - 1.2.2 the proper interpretation of the scope of s120(3) of the Planning Act 2008 ("PA 2008"); and
    - 1.2.3 why bp's disapplication should not be included in the DCO even assuming there is power to do so.
  - 1.3 The submissions advocate why the provisions proposed by bp should be rejected.
  - 1.4 bp has provided responses to these submissions in the same order below. Whilst bp considers (for the reasons set out further in section 3 below) that it would be legitimate to continue to seek to disapply the IA without providing for any accompanying compensation to Orsted, bp acknowledges the counter submissions made by Orsted and The Crown Estate ("TCE") (including in relation to s135(2) of the PA 2008) and the potential difficulties for the ExA and SoS in considering such competing submissions.
  - 1.5 As such, bp proposes to revise its approach to offer the ExA and, in turn, the SoS a constructive, complete solution to the interface issues between the respective projects. This is in contrast, as explained in section 5 below, to the practical effect of the approach advocated by Orsted within its submissions and accompanying protective provisions.
  - 1.6 bp's revised approach is described in section 6 below; however, to briefly summarise what is now proposed:
    - 1.6.1 rather than seeking to disapply the effect of the IA, the protective provisions would preserve the rights and obligations as exist under the IA, save that they would remove bp's liability to Orsted under it; and
    - 1.6.2 in lieu of such liability, the protective provisions would provide for bp (on behalf of NEP) to make a compensation payment to Orsted.
  - 1.7 bp are considering appropriate drafting to make provision within the DCO for the payment of such compensation, taking account of the various considerations that would be relevant in determining quantum, but will be in a position to address the ExA on these issues in the hearing scheduled to commence later this month. bp intends to submit an updated version of the protective provisions (version 4) at Deadline 6.
  - 1.8 As a result of this revised approach, bp does not consider the terms of s135(2) of the PA 2008 to be engaged as TCE's rights under the IA (as described in their Deadline 5 submission ([REP5-123](#))) will be unaffected.
- ### 2. THE PROPER LEGAL CHARACTERISATION OF WHAT BP SEEKS
- 2.1 Orsted make a number of different submissions under this section, including a number of initial points in the introduction section to which bp repeats and responds below for the ExA's ease of cross-reference.



*"First, as set out above, there is agreement between BP and Orsted as to the nature of the IA. It is an agreement that governs their "commercial relationship". It being a commercial agreement it can in the ordinary way be waived or varied by renegotiation and agreement between the parties."*

- 2.2 The theoretical ability to renegotiate the IA is not disputed and indeed bp has been engaged in discussions with Orsted for a considerable period to seek to reach a solution to the interface issues which would, in effect, achieve such variation to the terms to the IA and mirror what bp has proposed to date under their protective provisions. bp will continue to engage with Orsted in an effort to reach an agreed outcome, including in relation to any necessary compensation as a result; however, as explained in previous submissions, there is no certainty that such agreement would be reached between the parties in the necessary timeframe, and particularly prior to the close of the Hornsea Project Four DCO examination, and so it is therefore necessary to provide for a solution within the Hornsea Project Four DCO to apply in circumstances where no commercial resolution is reached.

*"Second, the effect of the provisions sought by BP is to exclude Orsted from the Overlap Zone and also, crucially for these purposes, to deprive them of their contractual rights to compensation in respect of this. Compensation in this regard is something explicitly provided for in the IA. The IA was, of course, freely entered into and has been in force since 2013. BP acceded to the IA as recently as 2021 without any variation of the compensations (or other) provisions. What BP seeks, via the provisions it proposes are included in the DCO, is to wholly circumvent its commercial obligations. Obligations which it freely, and only very recently, took on. It seeks to do so to the detriment of Orsted which is left without either access to the Overlap Zone or any contractual (or other) rights to compensation."*

- 2.3 There are different elements to this submission, some of which are responded to in more detail in section 3 below (in relation to the deprivation of Orsted's contractual rights under the IA and their entitlement to compensation in relation to the same).
- 2.4 In terms of the comments noting that the IA was voluntarily entered into and has subsequently been varied and acceded to by bp (most recently February 2021), this again is not disputed; however, the implication appears to be that this precludes bp's proposed approach now. This clearly does not follow and bp has addressed this point in previous submissions ([REP2-062](#), Annex 2, paragraph 4.6, electronic page 18).
- 2.5 As explained in previous submissions, the IA was entered into at a time when it was considered that co-existence in the entirety of the Overlap Zone would be possible. Following its completion, the relevant parties to the IA met quarterly, until early 2020 when the frequency of the meetings increased to monthly, and fortnightly since Q1 2021 (following bp's accession to the IA, as operator on behalf of NEP) due to increasing project development activity for both the NEP project and Hornsea Project Four. It was through this detailed engagement that bp, in December 2021, shared a technical assessment report (submitted as Annex 1 in bp's Deadline 1 submission, [REP1-057](#), electronic page 146) with Orsted, TCE, BEIS and the Oil and Gas Authority (now known as the North Sea Transition Authority (NSTA)) which summarised NEP's position on the feasibility and limitations of co-existence between the respective projects in the Overlap Zone. As the ExA will be aware, the report concluded that locating wind turbines on top of and near to the Endurance Store would not be feasible. The conclusions of this report were not known, by the White Rose promoters (as the original "Carbon Entity" under the IA) when the agreement was entered into, nor by bp when it acceded to the IA in early 2021.

*"Third, despite carrying out extensive legal research, there does not appear to be any precedent, in terms of previous DCOs, to support the inclusion of provisions, the effect of which is described as the disapplication of a private commercial agreement. There is no jurisprudence either which supports this. By their own admission, neither have BP found any precedent (as per their Deadline 2 submission): "We recognise that seeking to disapply a commercial agreement of this sort via provision in a DCO is unusual and possibly unprecedented"."*



- 2.6 Again, this is not disputed; however, the absence of precedent drafting does not preclude new drafting being proposed within the DCO (indeed, it is noted Orsted's Explanatory Memorandum to their DCO explains in para 5.10 that Article 5 of their DCO includes drafting they consider to be not supported by precedent, but necessary in the context of their DCO application ([APP-204](#))). The key is whether there is *vires* to include the provision and, if so, whether it is appropriate to do so in the circumstances. bp considers both components are satisfied in the present circumstances, as elaborated upon in the submission below.

*"Fourth, where under the PA 2008 there is provision for the abrogation or modification of existing land agreements, through the compulsory acquisition regime, then this is accompanied by compensation mechanisms to ensure the affected party is compensated for loss of its private rights. In this case, however, BP is seeking to remove all of the Applicant's private contractual rights without the availability of any statutory right to compensation. Indeed, to make matters worse, BP is seeking specifically to remove the rights to compensation which Orsted currently has under the IA."*

- 2.7 As above, whilst bp considers (for the reasons set out further in section 3 below) that it would be legitimate to continue to seek to disapply the IA without providing for any accompanying compensation to Orsted, bp is now proposing to put forward a revised approach within its protective provisions. This will preserve the rights and obligations under the IA, save that it will remove bp's liability to Orsted from under it and instead provide for a compensation payment to be paid to Orsted in order to address the significant adverse public interest impacts which could otherwise arise. This is described in more detail in section 6 below.

### 3. THE HUMAN RIGHTS ACT 1998 IMPLICATIONS

- 3.1 As part of their submissions, Orsted allege that the disapplication of the IA would interfere with a possession of Orsted, contrary to Article 1 Protocol 1 ("A1P1") of the European Convention on Human Rights ("ECHR").
- 3.2 Much of the substance of these submissions will now be addressed (and is largely overtaken) by bp's revised approach to the protective provisions; however, for completeness, bp has set out its position in response to its original submissions below.
- 3.3 A1P1 provides that:

*"Every natural or legal person is entitled to the peaceful enjoyment of his possessions. No one shall be deprived of his possessions except in the public interest and subject to the conditions provided for by law and by the general principles of international law.*

*The preceding provisions shall not, however, in any way impair the right of a State to enforce such laws as it deems necessary to control the use of property in accordance with the general interest or to secure the payment of taxes or other contributions or penalties."*

- 3.4 Orsted suggest that, in compliance with the obligation in s.3(1) of the Human Rights Act 1998 ("HRA"), the power in s.120(3) of the PA 2008 should be read down to ensure compatibility of the DCO with A1P1 and therefore to prevent the inclusion of provisions which disapply the IA. They further suggest that the Secretary of State may act contrary to s.6(1) of the HRA should he decide to include such provisions in the DCO.
- 3.5 However, these provisions only take effect if Orsted establishes that it can invoke the A1P1 right.
- 3.6 For A1P1 to apply to the disapplication of the IA, it must be shown that:
- 3.6.1 the IA is a "*possession*"; and
  - 3.6.2 Orsted was deprived of this possession or its use of it was controlled; and
  - 3.6.3 if deprived, the deprivation was disproportionate to the public interest or, if controlled, the control was disproportionate to the general interest.



- 3.7 bp's position is, in summary, that:
- 3.7.1 the IA does not constitute a "*possession*" as it is not freely assignable in the sense articulated in the case law, and does not have a present economic value in its own right;
- 3.7.2 even if the IA were found to be a "*possession*", its disapplication (even if considered to be deprivation rather than control) is proportionate to the public interest in facilitating the viability of the East Coast Cluster ("ECC") plan and maximising the capacity for CO<sub>2</sub> storage in the Endurance Store, particularly given the significant importance of the Endurance Store to the UK's wider carbon, net zero and sustainability targets (as detailed in bp's Deadline 1 submission, [REP1-057](#), section 14, electronic page 139); and
- 3.7.3 Therefore, A1P1 does not apply to the disapplication of the IA and the scope of s.120(3) of the PA 2008 is not subject to any narrowing by operation of s.3(1) HRA.
- 3.8 These submissions are elaborated on sequentially below, with reference to the relevant case law as appropriate.
- Possessions**
- 3.9 Case law, both of the European Court of Human Rights ("ECtHR") and the domestic courts, has confirmed that contracts can be "*possessions*" for the purpose of A1P1 and bp does not seek to challenge that conclusion, on which Orsted's submissions provide significant detail.
- 3.10 However, this case law clearly shows that not all contracts are "*possessions*" and bp's position is that the nature and provisions of the IA mean that it is of such a character that it cannot be classified as a "*possession*". As Sedley LJ held in ***Murungaru v Home Secretary***<sup>1</sup> (discussed below):
- "The fact that all possessions can include contracts does not mean that all contracts are possessions"* [30]
- 3.11 In ***Murungaru***, referenced but not discussed in Orsted's submissions, the Claimant's UK visa was revoked, preventing him from continuing private medical treatment for which he had contracted in the UK. Alongside other grounds, he claimed that the visa decision interfered with the enjoyment of his possessions (his contractual right to receive medical services) in breach of A1P1.
- 3.12 The Court of Appeal held that Dr Murungaru's contractual right to private medical treatment did not engage A1P1 as it had none of what Lewison J termed the "*indicia of possessions*" [58], these being that a right is tangible, assignable, transmissible, realisable and of present economic value. Lewison J considered the touchstone of whether a contract was a possession for the purposes of A1P1 to be whether the contract can realistically be described as an "asset", on the basis of these indicia.
- 3.13 In ***Breyer Group plc and others v Department of Energy and Climate Change***<sup>2</sup>, the Claimants claimed that the Department's decision to launch a consultation on proposals to cut smaller scale solar photovoltaic feed-in tariffs ("FITs") (a decision which caused orders to be cancelled and projects to be abandoned) breached A1P1 by depriving them of the enjoyment of their possessions, these being the solar installation, supply and generation contracts they had entered into (and some they had yet to execute).
- 3.14 At first instance, the Court struggled with the concept of "*possessions*" but concluded that the signed or concluded contracts were "*possessions*" for the purpose of A1P1. However, Coulson J reached this conclusion by applying *Murungaru* and its "*indicia of possessions*" assessment. Here, the contracts were largely contracts to procure, install and register solar panel systems in return for either a fee or receipt of monetary FIT payments. They were

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<sup>1</sup> [2008] EWCA Civ 1015

<sup>2</sup> [2014] EWHC 2257, affirmed on appeal in [2015] EWCA Civ 408



- therefore tangible, assignable and, on their face, had present economic value. The conclusion as regards concluded contracts was not challenged on appeal, where discussion centred on whether a wider category of contracts (including contracts that were contemplated but not executed) were also possessions, which they were held not to be.
- 3.15 In ***Solaria Energy UK Ltd v Department for Business, Energy and Industrial Strategy***<sup>3</sup>, on similar facts to ***Breyer***, the Claimant had entered into a sub-contract to supply solar panels to a company. Solaria claimed that, as a result of the Department's proposal, they were obliged to renegotiate the sub-contract and lower the contractual rate of payment, which they claimed was an interference with their possessions under A1P1.
- 3.16 At first instance, the Court held that Solaria's sub-contract rights fell short of the ***Murungaru*** criteria. While they had value to Solaria, that value was not readily realisable or marketable because the sub-contract could not be assigned.
- 3.17 The Court of Appeal acknowledged that "*not all contracts are possessions*", though noted that "*the starting point must be that a signed and part-performed commercial contract is, prima facie, a possession*" [34]. Here, the Solaria contract was a possession because it was "*of value to Solaria*" and "*had a value in monetary terms without the need for it having first been converted into money*" [34].
- 3.18 The CoA held that assignability is "*one of many factors which must be applied to test whether a contract was a possession*", though not being a "*black and white test*" [38] for possessions. This was ultimately of less relevance to the Court's conclusion because it found that the Solaria contract actually could be assigned (just with the counterparty's prior consent).
- 3.19 The above case law shows a pattern of contracts being found to be "*possessions*" under A1P1 only where they are of a specific character – these are likely to be principally contracts with present economic value, which are assignable and in the nature of an "*asset*" to their holder.
- 3.20 The IA is not of such a character to any of the parties thereto. On the IA's own terms it is merely a "*mechanism to seek to ensure successful co-existence of wind and carbon storage projects*" and is intended to "*provide a framework within which both the Carbon Entity and the Wind Entity are incentivised to work together*" (clause 2.1). In particular:
- 3.20.1 The IA is not assignable in the way in which that concept is discussed and employed in the judgments in ***Murungaru***, ***Breyer*** and ***Solaria***. While clause 8 of the IA requires the Wind Entity or Carbon Entity (as defined therein – currently Orsted and bp respectively) to procure that their successors enter into a deed of covenant to perform and observe the obligations contained within the IA, this is exclusively triggered by a transfer of the Carbon or Wind Agreements for Lease ("AFL") or the grant of the Carbon or Wind Leases to a new entity. Indeed, this is the only scenario in which succession makes sense or is practicable. bp could not go out into the marketplace and assign the IA to any willing recipient – the IA is solely designed to regulate the interface and co-existence between the Carbon and Wind projects (further to the terms of their respective AFLs and Leases) and has no wider relevance or value. It would be meaningless to any party other than the beneficiaries of the Carbon and Wind AFLs and Leases.
- 3.20.2 Further, the IA has nil present economic value. No consideration was exchanged under the IA other than the respective contractual commitments and there are no provisions requiring the exchange of money or items of monetary value, with the exception of the provisions for compensation in the event of a Material Adverse Effect. While a transfer of an AFL or Lease relating to the projects would be expected to attract monetary consideration due to their intrinsic value, a transfer of solely the IA (on a hypothetical basis, given the practical impossibility of this as discussed above) would not, as it has no value of its own accord.

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<sup>3</sup> [2019] EWHC 2188 (TCC), overturned on the possessions point on appeal in [2020] EWCA Civ 1625





- 3.20.3 It may be argued that the possibility of compensation for a Material Adverse Effect under the IA imbues it with present economic value. However, this is not a sound conclusion. A right to compensation under the IA would only arise in circumstances where Orsted claimed a Material Adverse Effect in response to actions taken by bp (e.g. pursuant to clause 3.4 where bp became the Notifying Entity and provided Orsted with details of its proposed infrastructure/programme of activities). bp therefore has effective control over when (and whether at all) a Material Adverse Effect arises. If bp were to only develop the Endurance Store outside of the Overlap Zone, there would be no Material Adverse Effect on Orsted and no right to compensation. The IA is therefore of no present economic value because bp controls whether any compensation will ever arise pursuant to it.
- 3.21 For all the above reasons, bp submits the IA is not a "*possession*" under A1P1 and A1P1 does not have any bearing on its disapplication. The Secretary of State therefore has the power pursuant to s. 120(3) of the PA 2008 to provide for bp's protective provisions in the DCO, even without compensation (notwithstanding the revised approach to its protective provisions put forward in this submission).
- Interference and justification**
- 3.22 In the event that the position in the above paragraphs and the conclusions set out in paragraph 3.20 were not accepted and the IA was considered to be a "*possession*", Orsted would still need to show that bp's protective provisions (i) deprived Orsted of this possession or controlled Orsted's use of it and that (ii) this deprivation or control was disproportionate to the public interest or general interest (respectively).
- 3.23 In *Lithgow & Others v UK*<sup>4</sup>, the ECtHR held that a fair balance has to be struck between the demands of the public interest of the community and the protection of the individual's fundamental rights.
- 3.24 It is not conceded that disapplication of the IA by bp's proposed protective provisions amounts to deprivation, and Orsted would need to prove this to establish an A1P1 right. However, adopting this as an assumption, and thereby addressing the most stringent requirements imposed by A1P1, such deprivation remains justifiable in the public interest given the exceptional present circumstances.
- 3.25 In circumstances where the risk of significant compensation under the IA remained extant, it is likely that NEP would elect not to propose utilising the part of the Endurance Store within the Exclusion Area so as to avoid the potential for Orsted to allege that a 'Material Adverse Effect' existed and seek to be awarded such significant compensation. This would limit the Endurance Store to approximately 30% of its capacity, so rendering the ECC plan unviable and would represent a reduction of 10-11MTPA of CO<sub>2</sub> storage capacity, equivalent to greater than 50% of the Government's minimum CCUS capacity target for 2030.
- 3.26 It is submitted that the public interest in preventing this potential outcome, and the resultant significant hindrance to the Government's wider net zero and sustainability objectives, would render the disapplication of the IA without compensation proportionate. However, as explained above, bp is now proposing to adjust its protective provisions to provide comfort to the ExA/SoS on this point by no longer seeking to disapply the effect of the IA, but rather remove bp's liability from under it and instead provide for bp (on behalf of NEP) to make a compensation payment to Orsted.
- 3.27 As explained above, bp will put forward an appropriate compensation provision in updated protective provisions at Deadline 6. This will include consideration as to the basis for determining an appropriate and proportionate quantum of compensation, having regard to the public interest considerations underlying bp's proposed protective provisions. bp has provided some initial submissions as to the issue of the quantum of compensation in the context of A1P1 below.

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<sup>4</sup> [1986] 8 EHRR 329





- 3.28 In the seminal case of *Lithgow & Oths v UK*, the applicants had certain of their aircraft and shipbuilding interests nationalised under a new statutory scheme. They claimed that the compensation they received under this scheme was (i) grossly inadequate, as it only represented a fraction of the property's value, and (ii) arbitrary, because it bore no relationship to that value. They therefore claimed a breach of A1P1.
- 3.29 The ECtHR outlined some key principles on the matter of quantum of compensation:
- 3.29.1 Firstly, compensation need not be full market value where there are countervailing objectives of public interest. The ECtHR held that *"Article 1 does not, however, guarantee a right to full compensation in all circumstances, since legitimate objectives of 'public interest', such as pursued in measures of economic reform or measures designed to achieve greater social justice, may call for less than reimbursement of the full market value"* [121]. Similarly, in *Scordino v Italy*<sup>5</sup>, it was suggested that less than reimbursement of the market value is justified if the appropriation is carried out *"as part of a process of economic, social or political reform"* or *"linked to any other specific circumstances"* [102].
- 3.29.2 The required compensation varies depending on (i) the nature of the property being taken and (ii) the circumstances of the taking. The ECtHR held that *"Both the nature of the property taken and the circumstances of the taking in these two categories of cases give rise to different considerations which may legitimately be taken into account in determining a fair balance between the public interest and the private interests concerned"* [121]. In *Lithgow*, the assets being nationalised were shares in ship and aircraft-building companies, assets which are far-removed from the nature of the *"possession"* of the IA (if found to be a possession contrary to bp's position described above). It is appropriate that the distinct nature of the IA as compared to the usual, more tangible, assets subject to the ECtHR case law should be factored into consideration of the quantum of compensation and would, if necessary, support a conclusion that an amount less than market value could be awarded if found necessary in the public interest.
- 3.29.3 The state decision-maker is to be given a wide margin of appreciation. The ECtHR in *James v UK*<sup>6</sup> held that *"the Court's power of review is limited to ascertaining whether the choice of compensation terms falls outside the State's wide margin of appreciation in this domain"* [54]. Given any compensation provision included in the final DCO would have been scrutinised by the Secretary of State, it is likely that any court, European or domestic, should show significant deference to this reasoned and considered conclusion.
- 3.30 Those principles will be reflected in the provision for the payment of compensation in bp's revised protective provisions.
4. **THE PROPER INTERPRETATION OF THE SCOPE OF S120(3) OF THE PA 2008**
- 4.1 bp does not consider that any of the arguments made by Orsted in this section of their submission meaningfully rebut the justifications put forward by bp previously as to the lawfulness of its protective provisions ([REP2-062](#), Annex 2, paragraphs 4.2 to 4.4, electronic page 18).
- 4.2 Both the previous drafting and the new construct proposed in relation to the IA (described in section 6 below) are, as a matter of law, clearly within the *vires* of the Secretary of State's powers under section 120(3) of the PA 2008, which authorises the Secretary of State to include any provision *"relating to, or matters ancillary to, the development for which consent is granted"*. The impact of an agreement which governs the relationship between Hornsea Project Four and the Endurance Store is clearly related to the proposed DCO development.
- 4.3 Notwithstanding the breadth of the wording, Orsted suggest that s120(3) should be interpreted narrowly so as not to authorise the disapplication of their contractual rights

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<sup>5</sup> (2007) 45 E.H.R.R. 7

<sup>6</sup> [1986] ECHR 2



without compensation in suggested breach of their A1P1 rights (para 48 of their submissions). bp has responded to the human rights submissions in section 3 above and consider that the revised approach put forward in this response so as to provide for the payment of proportionate compensation provides a complete answer to Orsted's submissions about 'reading down' s120(3) of the PA 2008.

**5. WHY BP'S DISAPPLICATION SHOULD NOT BE INCLUDED IN THE DCO EVEN ASSUMING THERE IS A POWER TO DO SO**

- 5.1 Orsted's submissions contend that disapplying the IA would not be appropriate, even assuming there was *vires* to do so, for the following reasons:
- 5.1.1 what is proposed is wholly unprecedented;
  - 5.1.2 it is contrary to public policy to interfere with an existing commercial relationship in the way proposed;
  - 5.1.3 because the effect of the provisions would be to deprive Orsted of its contractual rights, rights which are a "*possession*" for A1P1 purposes, there is a requirement for bp to establish that it would be in the public interest and it has not done so; and
  - 5.1.4 the Crown Estate's consent would be required and has not been obtained.
- 5.2 bp has responded to the substance of most of these submissions in the text above already. However, before explaining the revised approach bp proposes to put forward in the protective provisions, and principally the proposed payment of a specified compensation figure in lieu of liability under the IA, bp also wishes to juxtapose the positions and solutions being advocated by Orsted and bp in this examination.
- 5.3 Setting aside, temporarily, the merits of the technical submissions put forward by both parties regarding the interface between their respective projects in the "Overlap Zone" (as previously described) and the ability for both to co-exist with one another, it is clear there is an existing issue. The disagreement revolves around the feasibility of a solution coming forward to such issue, its timescales and the consequences of the same. bp's proposed approach offers a constructive, composite solution to the interface issues in circumstances where the SoS agrees with bp's assessment of the technical issues; Orsted's approach offers no such solution, only a further delay and no clear means by which a solution could be reached. This is elaborated upon further below.
- bp's approach**
- 5.4 In summary, bp's position is that co-existence is not possible, and will not be possible in the foreseeable future, for the various reasons reiterated in Annex 1 of its response to Deadline 5a. In consequence of this, it has advocated for (and included within its protective provisions) the need for an Exclusion Area within the Overlap Zone, within which Hornsea Project Four cannot be constructed.
- 5.5 bp has further explained, however, that the inclusion of the Exclusion Area by itself is insufficient to safeguard the deliverability of the full extent of the Endurance Store and so preserve the viability of the ECC plan. In its Deadline 5 submission ([REP5-091](#), paragraphs 3.12 to 3.21, electronic page 3), bp explained how the existence of the IA could give rise to a significant potential compensation liability – the potential for which, would in all likelihood, mean that NEP would not elect to utilise the part of the Endurance Store within the Exclusion Area. This would in turn then prevent the full development of the Endurance Store, delivery of the ECC plan and realisation of the important public benefits of ensuring delivery of the same (as set out above).
- 5.6 As such, to remove this risk, bp previously proposed to disapply the IA.
- 5.7 The alternative approach now proposed by bp achieves the same basic objective so as to protect the public interest, by removing the scope for liability to be claimed by Orsted from bp under the IA, but instead providing for a specific payment to be paid to them in lieu of the same.



- 5.8 The inclusion of both the Exclusion Area and provision addressing the risk of a significant compensation claim from being triggered under the IA would collectively preserve both the deliverability and viability of the full extent of the Endurance Store and, by consequence, the ECC plan and their associated public interest benefits.
- 5.9 In circumstances where the Secretary of State was satisfied by the technical arguments put forward by bp as to the need to preserve the viability of the full extent of the Endurance Store by precluding wind turbines from being constructed in the area, then bp's protective provisions provide a complete solution to achieve this, and it is lawful for the Secretary of State to impose them based on the public interest arguments set out in this submission and elsewhere by bp.

**Orsted's approach**

- 5.10 Conversely, Orsted's protective provisions and position adopted in the examination do not constructively engage with the issues at hand, nor offer workable solutions in practice.
- 5.11 bp has previously commented on Orsted's draft protective provisions ([REP2-062](#), section 6, electronic page 9) and note that Orsted proposed an updated version as part of their Deadline 5 submission ([REP5-075](#), electronic page 50).
- 5.12 bp has explained the practical limitations and ineffectiveness of the updates to these provisions in section 7 of Annex 1 to its Deadline 5a response, and specifically their failure to protect the NEP project, or give the SoS the opportunity to provide for an Exclusion Area at a later date should it be shown that one is required via the 'evaluation' process stipulated by those provisions.
- 5.13 Further and as fundamentally, Orsted's provisions do not deal with the question of scheme viability in circumstances where the SoS is minded to agree with bp's technical submissions and the need for the Exclusion Area. Under Orsted's proposed protective provisions, the IA remains extant with no limitation on the liability that could be claimed under it. bp has explained above why this would, in all likelihood, result in NEP electing not to utilise the part of the Endurance Store within the Exclusion Area, so rendering the ECC plan unviable and ensuring the corresponding loss to the UK's CCUS targets outlined above. Orsted's protective provisions make no attempt whatsoever to address this issue.
- 5.14 As a result, in circumstances where the SoS were persuaded by bp's technical submissions and the public benefit interest in preserving the full extent of the Endurance Store, he would not have the ability to safeguard its delivery under Orsted's protective provisions. They are therefore fundamentally flawed and incapable of addressing the important public interest considerations raised by bp's representations.

**6. REVISED APPROACH UNDER BP'S PROTECTIVE PROVISIONS**

- 6.1 As bp has set out above, whilst in principle it would be legitimate to maintain the approach advocated in its previous version of the protective provisions to disapply the effect of the IA without providing for any accompanying compensation to Orsted, bp is prepared to adjust the drafting to address the submissions made by Orsted and TCE in response. bp's protective provisions would provide the ExA, and in turn, the SoS with an effective, fair and proportionate solution to the interface issues.
- 6.2 Under the revised approach, rather than seeking to disapply the effect of the IA, bp proposes that the protective provisions would confirm that they do not affect any rights or obligations under the IA, but would instead stipulate that bp would have no liability to Orsted under its terms.
- 6.3 The anticipated drafting of such provision (to be inserted in place of the existing drafting under bp's protective provisions which presently disapply the effect of the IA (see para 6 of bp's protective provisions (version 3), [REP4-059](#), Appendix 1, electronic page 10)) is set out below:

*"Nothing in this Part of this Schedule shall affect any rights or obligations as exist under the terms of the Interface Agreement, save that the Carbon Entity shall have no liability to the*



*Wind Entity under that agreement due to the imposition of the provisions of this Part of this Schedule or its impact upon the authorised project and no claim may be made by, nor award granted to, the Wind Entity for any damages as a result of any alleged antecedent breach of the Interface Agreement prior to the date of this Order."*

- 6.4 In place of the potential for liability to accrue under its terms, it is intended that the protective provisions would provide for bp (on behalf of NEP) to make a compensation payment to Orsted upon a specified trigger. bp are considering how best to frame such a provision in the drafting in order to reflect and address the various considerations that would be relevant in determining quantum, but will be in a position to address the ExA on these issues in the hearing scheduled to commence later this month and would then intend to submit an updated version of the protective provisions (version 4) at Deadline 6.
- 6.5 As part of this further consideration, bp will also take into account how such payment links to the inclusion of a 'Longstop Date' within the provisions (previously included on a 'without prejudice' basis within version 3 of bp's protective provision, [REP4-059](#), Appendix 1, electronic page 8) and in view of Orsted's comments on the relevance of such a trigger to their project programme.
7. **SECTION 135(2) OF THE PA 2008**
- 7.1 Finally, in view of the proposed revisions to its protective provisions and the express confirmation that none of the rights or obligations under the IA are affected (save for the removal of bp's liability to Orsted under it), bp does not consider the terms of s135(2) of the PA 2008 to be engaged as TCE's rights under the IA (as described in their Deadline 5 submission ([REP5-123](#))) will be unaffected.