Carbon Capture and Storage Network Code

Fuels Industry UK Response

1. **Do you agree with the approach to Code governance as set out in the Heads of Terms?**

   Fuels Industry UK broadly agrees with the approach to Code governance as set out in the Heads of Terms outlined in the consultation.

   The UK government should be clear that this version of the code has been developed for deployment of Track 1 and that it recognises that the code will need to change for future projects. There should be a recognition that a more flexible and modular approach will be needed for projects deploying as part of the transition to a self-sustaining market-based model; for example, this could include separation of the technical and commercial elements to facilitate future updates.

   We note that a dispute process is available and would suggest that the Secretary of State (SoS) has the authority to make the final decision in the event that an expert determination or mediation do not produce a satisfactory outcome. Judicial Reviews can be expensive and lengthy and a measure such as SoS intervention may reduce the requirement for these. This is also in line with the dispute process for Connection Disputes as outlined in the consultation document.

   Bearing in mind the nascent nature of the CCUS industry, we also ask that the approach to code governance has a set review timetable, including consultation and SoS approvals to ensure that it remains fit for purpose as the industry develops including the need to develop beyond the Track 1 needs as discussed above.

2. **Do you agree that the approach set out affords appropriate pathways for Users and prospective Users to obtain a new or modified connection, either with or without UK government support being sought?**

   Fuels Industry UK broadly agrees that the approach set out affords appropriate pathways for Users and prospective users to obtain a new or modified connection to existing pipeline networks, either with or without UK government support being sought.

   We note that this approach is similar to the one currently used for the connection of new connections into the existing natural gas grid.

   However, this is potentially overly restrictive for a nascent industry and does not recognise that all users will not have direct access to a pipeline network. There are a significant number of small CO_2 producers such as breweries, distilleries and smaller stationary combustion units which will look to access CCS technology through other means.

   The proposed approach only allows large scale users onto the network and actively excludes those existing facilities which are either remote or small (where the cost of a

piped connection is prohibitive). In addition, in order to develop future big users, pilot and demonstration plants need immediate access and these heads of terms allude to future options (section Annex E 2.2.1) but there is no guidance provided.

Therefore, it is recommended that an additional framework is created to allow smaller scale inputs (such as those supplying around 25-50te/day of CO_2) into the system, such as delivery by road tanker. Similar issues exist for the transport of CO_2 by shipping to delivery into a suitable CCS storage point.

This is important for these small future operators as it will provide a revenue stream to help pay for the technology development and future deployment.

3. **Do you agree with the proposals set out in Section D?**

We agree with the proposals set out in Section D.

However, we would ask that in order to keep the operation of the CCUS network as a whole as straightforward as possible that a pragmatic approach is taken to align the needs of the onshore system and offshore systems as far as practical within the regulatory framework.

4. **Do you agree with the proposed approach to Registered Capacity?**

Fuels Industry UK broadly agrees with the proposed approach to Registered Capacity; this seems a pragmatic approach given the nature of the industry.

However, we would suggest that a review mechanism would be beneficial including powers for the SoS to intervene if required to ensure that both CCUS capacity is being effectively utilised and there are no undue barriers to entry for new participants as the industry develops in the future.

Further, in our view the ability of users to supply a 20-year, non-binding forecast for demand may not be realistic or achievable, given the significant business uncertainties over that period. Factors creating uncertainty can be future energy policies, the availability of developing alternative technologies, or wider socio-economic factors such as UK economic growth. A 3- or 5-year look-ahead is a more realistic expectation of what would be realistic or achievable.

5. **Would an approach that allowed aggregate Registered Capacity to be greater than Obligated Network Capacity be beneficial, and would the associated risk be manageable for early projects?**

Fuels Industry UK agrees that the allowed aggregate Registered Capacity can be greater than the Obligated Network Capacity would be beneficial.

Industry experience of past projects suggests that start-up delays, process re-designs and other major operating issues often cause significant under-performance of plant during their first years, especially delays in start-up. Consequently, during the first several years of operation, significant under-utilisation is likely to occur. At some point

that gap is likely to close, but that will depend upon factors that cannot currently be foreseen.

Similar capacity issues have existed in infrastructure projects before, such as North Sea oil pipelines or gas supply networks. It may be prudent for DESNZ to look at the structure of these, including the capacity provisions for existing and new entrants with a view to establishing if similar mechanisms can be put in place for CCUS. We recognise that DESNZ may already have done this.

Additionally, as with any plant or infrastructure, debottlenecking opportunities will probably present themselves in future, so the system capacity is unlikely to be a completely fixed number and may present future opportunities should registered capacity exceed obligated capacity.

The proposed terms place significant benefit on the pipeline operator (effectively making it the customer) whereas it has an obligation to supply capacity to the user. In other words, potentially the terms are the wrong way around in the supplier / customer relationship.

As the CO_2 network is effectively a means to transport CO_2 produced as a by-product of user operations to long term storage only, the terms need to be written such that the pipeline operator has the obligation to accept everything that can be sent to it, provided key safety requirements are managed. There also needs to be the option, but not the right, for suppliers of CO_2 to be able to over-supply the system if they need to, subject to nominations, for example if there is known spare capacity within the system.

6. **Do you agree that the proposed approach to Nominations and Renominations will support efficient and responsive operation of a cluster, balancing the needs of both Users and T&S Co?**

Fuels Industry UK broadly agrees that the proposed approach to Nominations and Renominations will support the efficient and responsive operation of a cluster.

In the future as the industry is established, then one option may be to include under-supply or over-supply penalties in contracts to ensure that actual volumes are in line with Nominations or Renominations, when based on a longer-term average.

However, particularly in the early years of a project and recognising the nature of the industry there may be higher degrees of variation of CO_2 that would be expected as the project develops. Therefore, a pragmatic approach should be taken by the T&S Co operator to avoid undue non-conformity Notices that are out with the control of the CO_2 supplier.

One example to consider is a gas turbine producing power (Refineries often operate such units). Its primary product is power as nominated by the national grid Electricity System Operator (ESO) (for example in response to renewable power generation levels). The gas turbine does not choose when it wants to run, it is runs only when required (otherwise gas plants would run continuously.) The way in which the head of terms are currently written assumes that CO_2 production is the primary output rather than a by-product and nominations need to be accurate and known. As the gas fired generator will not know by more than a few minutes (typically less than 30 minutes

ahead) then the nominations and renominations procedure here is unduly prescriptive and so inappropriate for such a business. Therefore, considerable re-thinking is required to manage the detail necessary for the heads of terms to effectively operate in a practical environment.

It should be recognised that the intention of the business models and heads of terms is to incentivise companies put their CO_2 into a pipe. If the system is too inflexible (as written it arguably is very inflexible relative to user needs), then this will generate a significant barrier to use, which is counter-productive particularly in the early years.

The heads of terms document reads as though it is providing capacity to move a primary product rather than effectively a by-product of user operations. This approach is appropriate for the gas main or the national grid. However, the CO_2 network is effectively a means to transport CO_2 produced as a by-product of user operations to long term storage. Therefore, there is an inappropriate focus and with too many penalties built in for non-compliance with the forecast capacity.

This inappropriate focus fails to take account of the practical dynamics within the network. The use of registered capacity and daily forecasts may be appropriate, although weekly forecasts are probably more suitable. User plants, such as gas fired power stations are not run to plan the CO_2 emissions, thus will have no clue to the daily usage in advance (as these may be subject to external factors such as renewable power generation) yet may be able to accurately predict their typical average usage over a weekly basis.

If there is more demand than the network can manage, the pressure in the pipe will rise, naturally preventing further addition through fluid dynamics. Isolations would then be placed in automatically above a certain pressure to prevent pipework failure. However, in this case the system will naturally balance itself, so much of the boiler plate terms in the heads of terms document could be considered to be unnecessary.

Again, consider a gas fired power plant. It could be forced to set its registered capacity to the maximum amount of CO_2, but fully aware that it will only ever run at 50% duty cycle to back-up renewable power production. This penalises the plant by having to pay for overcapacity that it will never use. It would be logical to set its forecast between 50% and 100% and accept that at times it would exceed its forecast capacity. The system needs to be able to allow for this, otherwise the CO_2 disposal route is setting the duty cycle on the power plant and thus the ability of the power plant to support the grid., which is contrary to the intent in terms of priorities in a practical application.

The clause E.5.5.4 and 5.6 of not exceeding the forecast is not appropriate or useful in establishing a UK CCS system. Instead, the nominations process should be used to allow said user to purchase additional capacity on an ad-hoc basis, especially if capacity still exists on the network. The key point is that if CO_2 disposal is desired, then the network operator needs to provide every opportunity to flexibly accept that capacity when it is presented, not turn it away just because of a potentially inaccurate forecast (which may have been made in good faith on the basis of available information).

7. **Do you have any information or evidence that would support calibration of the "material" and "persistent" thresholds used to assess deviation between actual flows and Nominations?**

   Fuels Industry UK does not have any detailed information or information on the calibration of material and persistent thresholds used to assess deviations.

   However, as we suggest in our response to Q6, the thresholds may be higher in the early years of a CO_2 delivery project, and tightened as the project is established with consistent operation.

   We would also suggest that the thresholds may be T&S Co specific rather than applicable across the UK – for example one T&S Co may be more constrained and need tighter tolerance requirements than another with more spare capacity; however, we recognise that equipment constraints such as compressors or pumps may have a bearing on the required tolerances as well.

   For CO_2 demand driven by power providers, the pipeline operator will be able to predict such demand quite accurately by accessing the data from the ESO, to whom the generators respond. However, users are unable to meet the demands of two competing requirements, where their CO_2 production is driven by the needs of the ESO, yet the CO_2 disposal curtails operating rates.

   Flexibility is required in one system and given the ESO's priority, it will need to be the CO_2 system which is flexible. A cursory review of the supply fluctuations of gas power plants at Gridwatch.co.uk will demonstrate the level of flexibility to which the system must be maintained.

   Therefore the 3% which defines "persistently" and the 5% per day which defines "materially" could potentially be overly restrictive for some industries. While the failure to comply with 2 non-conformity notices does require further sanctions to be applied (such as the registered capacity to be expanded and charged for) the non-delivery notice constitutes a policy failure and is an inappropriate action.

   Instead, curtailment of service to the registered capacity is the appropriate action until said dispute can be resolved. This can readily be managed using a control valve on the input pipeline under the control of the pipeline operator, linked to either pressure or flow feedback.

8. **Do you agree with the pro rata approach being a fair and equitable default mechanism to manage constraints within the network (noting the exceptions listed above)?**

   Fuels Industry UK does not agree with this approach.

   The pro rata approach would be a fair and equitable approach to manage constraints, if all affected businesses supplying CO_2 were of equal impact to the UK and the wider economy. However, this is not always the case.

Given the resilience element to CCUS, there needs to be a recognition of the wider impact of the allocations. For example, refineries supplying fuels into the UK market are critical to the UK economy and so constraints on their operation due to CCUS restrictions are likely to have wider and significant societal impacts.

The supply of CO_2 may also not be linear – for example operating plants have minimum operating limits below which they cannot operate. So, the amount of CO_2 could be reduced by a certain point, below which the operating plant will have to shut down. So, a linear approach necessitated by the pro-rata approach may not operate as intended.

We suggest that this approach is considered in more detail; we would also be happy to discuss this in more detail with DESNZ officials.

9. Do you consider that the process and timelines proposed for maintenance are acceptable?

Fuels Industry UK considers that the process and timelines proposed for maintenance are acceptable.

Refineries typically plan significant maintenance events on their process units well in advance and have a rolling multi-year programme for these (often over a 5-year cycle).

We would also suggest that there should also be a process to notify the T&S operator if maintenance events are required at shorter notice (for example to replace catalyst or to rectify plant integrity issues). However, this could equally be through the Nomination or Renomination process previously described.

10. Do you have any feedback on the proposed approach the Code will take to CO_2 _metering? Please provide justification in your answer.

The proposed approach to CO_2 metering seems a pragmatic approach at this stage.

We note the draft annex to metering published in December 2023 and welcome the clarity that this provides.

We note that there is no requirement on calibration frequencies for these instruments in the Heads of Terms; however, we recognise that this could be included indirectly to ensure the required operating precision requirements. Oil product meters such as those used to load retail fuels into tankers at refineries and terminals are required to be calibrated at least every 6 months by HMRC. It would be useful to clarify the calibration frequency for CO_2 metering particularly if required to be at a fiscal equivalent level.

However, it is also recognised that CO_2 is a low value product intended for long term storage and that the fiscal obligation for overall emissions has already been met by the supplier companies when they report CO_2 emissions to government. The need for tight fiscal level calibration and compliance on the CO_2 network meters is probably unnecessary apart from ensuring accurate expenditure of public funds for business support. Annual calibration may therefore be an appropriate compromise, as is typical of many company-to company transfer meters.

11. Are the proposed CO_2 _specifications and measurement requirements appropriate?

The current specifications as written are overly restrictive and not based on sound science. The CO_2 being placed into the pipe is a by-product of user operations intended for long term storage. Therefore, outside of key safety requirements, the specifications should be relaxed as far as possible.

The minimum 95% CO_2 composition is fully supported, yet having explicit limits on each of the major sulphur components is not. There is no safety requirement on sulphur compounds for the pipeline, (provided it is dry, as determined by a maximum water content as discussed below) therefore such specifications should be set to high values commensurate with welcoming as much user capacity into the system as possible, or even removed.

The specifications as written look far more like product specifications to an end user rather than input specifications for a disposal route to long term storage. Meeting the current specs will add too much cost and regulatory burden upon the CO_2 supplier to make it an attractive option to connect.

One significant exception is water as outlined above. Water provides carbonic acid with the CO_2 which is corrosive. Similarly, if NOx, SOx or NH3 are present (carbamic acid) again water will create corrosive components. However, all of these components in the absence of water confer no greater risk to steelwork than the CO_2. For example, SO_2 and SO_3 (for sulphuric acid production) are both handled safely in carbon steel pipework provided no water is present.

As a result, the specification should be simplified to critical elements such as water below 10ppm and CO_2>95% rather than being an overly restrictive set of requirements that do not incentivise access to long term storage.

Since the main function of the pipeline is transmission of carbon dioxide produced as a by-product of user operations to long term storage, rather than re-use of the CO_2, then the input specification should be set to accept as much CO_2 at as low a price as possible.

Consequently, the analysis terms presented in section F, 2.6 are significantly in excess of what would be expected. A continuously monitored water meter should be sufficient and the rest managed passively by engineering standards. For example, if CO_2 is held in a tank in advance of entry into a pipeline and only liquid CO_2 is drawn from the base, then excess water floats and permanent gases such as air, argon, NO as well as H_2S, methane, ethane and hydrogen reside in the headspace above the liquid. Accepting that 100ppm of water will remain soluble, to be polished out by the CO_2 provider, backed by a moisture meter, there should be no need for additional ongoing analysis. Since even excess water floats (Liquid CO_2 has a density of ~2.2 and has properties similar to liquid butane i.e. is water shedding) this is a reliable way of rejecting most impurities and it naturally forces CO_2 suppliers to buffer (almost batch CO_2 supplies) thus smoothing the delivery of CO_2 into the system, alleviating many of the capacity constraints listed previously. Clearly it does force the pipeline to maintain a minimum

working pressure at all times of 10 barg, but that will not be onerous and is in common with the requirements of many existing pipelines.

It might be appropriate to have a weekly or daily sample for quality, taken on a manual basis to check for gross impurities (all of the items listed in Annex B) yet perform minimal measurement online. For cost reasons, it may be advantageous for the pipeline operator to manage such analyses centrally and back charge the CO_2 suppliers, but this would be very much more efficient than individual monitoring as is currently suggested. CO_2 is a very different molecule that natural gas and so such analysis and engineering systems should be designed to take advantage of its properties.

An additional and critical point clearly missed by the theoretical approach taken to setting the CO_2 specification published here: collected CO_2 is invariably formed using a basic solution which absorbs acidic components. Therefore, there is little need to measure these components as the protection mechanism *is* the working solution inherent in the process. On other words, the amine or potassium carbonate absorption solvent typically retains strongly acidic materials such as SO_2, SO_3, NO_2. As a result, there is no need to analyse for these materials in the CO_2, as they form what are known as heat-stable salts in the working solution and thus being involatile, are retained.

In terms of costs, analysis of all of the components in the specification as per annex B would require expenditure on 2 or more on-line gas chromatography units (assuming Maxum 3) or in excess of 6 units if using an ABB analyser. This amounts to around the £1M region of capex for these analyses which is not justified or a low value stream product such as CO_2.

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A very noticeable absence is a waiver policy towards the input specifications. For example, while gross water would never be waivered, if one supplier slipped excess H_2O occasionally, such as 12ppm, yet on balance across the network the average was within acceptable limits, then there should be some mechanism for ongoing acceptance of CO_2 provided that the temporary nature of the deviation was being remedied. Again, flexibility to accept CO_2 except for all but safety / stability critical issues should be the focus of service provision and virtually all of the specifications listed are not safety critical if the pipeline is appropriately managed.

In conclusion, in our view there needs to be significant re-evaluation of the proposed specifications in order to ensure they are fit for purpose while incentivising CCS development.

12. Is the proposed approach on the CO_2 _Re-use Service appropriate?

This needs to be carefully considered to avoid being overly bureaucratic and becoming a disincentive to CCS development.

There should be safeguards in place to ensure that the quantity of CO_2 returned to the network is the same as that withdrawn from it (within appropriate tolerances). There should also be a structure of financial penalties in place should this not be the case. These safeguards would act to ensure that the mechanism operates as intended (for example not used as a means of supplying CO_2 for other uses and then subsequently released to atmosphere)

However, to avoid unnecessary bureaucracy, if a company wants to purchase CO_2 back out of the pipeline system, such as to pre-pressurise their own equipment, then this need be nothing more than a purchase agreement and an invoice.

There is also a significant risk of the pipeline putting existing CO_2 suppliers out of business. Today plants such as CF fertilisers sell CO2 to raise additional revenue, recognising the structure of the UK ETS in terms of net emissions. However, if they were connected to a pipeline for disposal, the costs of maintaining the CO_2 polishing plant to meet the stringent quality requirements probably do not justify the expenditure, as the pipeline disposal route will have undermined the business case for CO_2 sales. There therefore needs to be consideration of how the requirements will impact existing business supplying CO_2.

13. Is the proposed approach on Industrial Procedures (including the list of proposed Industrial Procedures and the Terms of Reference for each) adequate?

Fuels Industry UK agrees that the proposed approach on Industrial Procedures (including the list of proposed Industrial Procedures and the Terms of Reference for each) is adequate as an initial view.

The list should be reviewed once the networks are established and amended to include new requirements (or exclude ones that are not required to simplify requirements).

14. How should the proposed Terms of Reference for each listed Industrial Procedure be further developed ahead of the Code being implemented, to ensure sufficient and relevant detail?

Prudent operators would have robust procedures in place to cover the Industrial Procedures outlined in the consultation. We would expect that these procedures would also be required under the respective Competent Authority (such as the Health and Safety Executive or HSE) approvals for prior to operation.

We would therefore ask DESNZ to consider the potential for duplication of requirements in this area; for example, does the Heads of Terms place obligations on CO_2 suppliers that are already required by Competent Authorities such as the HSE prior to operation. If so, we would ask that any such duplication be removed to simplify the process in a pragmatic manner.

15. Do you agree with the proposed charging structure, Charges and associated definitions?

Fuels Industry UK agrees with the proposed charging structure, Charges and associated definitions presented in the consultation document. These seem to be a pragmatic and sensible way of ensuring that the T&S Co recovers the costs incurred and providing certainty for users in the early phases of CCUS project development.

Similar to our response to Question 1, and also applying to other areas where specific arrangements are made in relation to charging and the wider commercial relationship between T&SCos and the Users, we believe there should be a signal from Government for future flexibility to accommodate the changes to the economic model that will be necessary to enable the transition to a market based self-sustaining model. Many of the elements captured in proposed charging structure could be resolved through freely negotiated commercial agreements, and as such there should be sufficient scope, flexibility and modularity to allow for those alternative arrangements.

There is however a serious omission: connection and use of the network offsets current carbon credit obligations; rather than paying for carbon credits, the CO_2 provider pays network fees and CO_2 delivery charges instead. Because of this, the buy-out of current obligations needs to be stated clearly.

16. Do you agree with the use of a Mutualisation Cap to limit Users' exposure to mutualisation?

Fuels Industry UK broadly agrees with the use of a Mutualisation Cap to limit Users exposure to mutualisation. This helps to ensure that the scheme operates to limit Users costs above those of emitting the CO_2, meeting the overall intent of the scheme.

However, there is no indication in the consultation of which entity picks up the shortfall in the event that the Mutualisation Cap is brought into effect. This could be for example, the T&S Co, who would then not be able to meet their operating and capital costs. The UK Government should pick up these outstanding costs, at least in the early years of CCUS introduction. This would help improve investor confidence in CCUS technology in the UK and should be clarified through in the consultation response.

17. Do you agree with the proposed calculation of the Mutualisation Cap?

Fuels Industry UK does not agree with the proposed calculation of the Mutualisation Cap.

The use of forward pricing as outlined in the consultation introduces a pricing exposure for the T&S Co and Users that is not addressed in a "true up" process at the end of the financial year. As the UK ETS market is relatively small, compared to the EU market, it can be more volatile due to lower trading activity.

This approach can increase the financial risks to the T&S Co, reducing investor confidence, at least in the early years of CCUS introduction. If the UK government were to underwrite cost shortfalls, at least in the early years of the CCUS schemes as

outlined in our response to Q16, then this would go some way to addressing these concerns. An alternative approach may be to "true-up" the costs at the end of the year, although this does not necessarily clarify which entity is responsible for any shortfall.

18. Are the proposals on invoicing and payment appropriate?

Fuels Industry UK agrees that the proposals on invoicing and payment are appropriate at this time.

However, they should be reviewed as projects and the industry develops in order to ensure that they remain adequate and fit for purpose.

19. How far in advance of the Commercial Operations Date should the Draft Data Annexures be developed?

Given the length of time required to install and commission the plants required, we would suggest that the Draft Data Annexures could be developed 3 years in advance of the Commercial Operations date. These can provide sufficient clarity for the T&S Co to perform its duties as outlined, while still allowing flexibility as installation and commissioning progresses. The Draft Data Annexes could then be finalised three months before the Commercial Operations Date,

20. Are the wider data provisions appropriate?

Fuels Industry UK's view is that the wider data provisions are appropriate.

21. Is the proposed CDS proportionate to meeting the minimum requirements of managing the delivery of public funding?

Fuels Industry UK's view is that this ultimately a matter for Government, rather than Industry to answer as it relates to their control of public funding.

However, we would suggest that the proposed CDS is a proportionate approach to meeting these requirements in a pragmatic manner.

22. Do you agree with the scope of financial liability which is allowed for in Section J of the Code?

Fuels Industry UK cannot comment on this question as we believe it is a commercial matter for the T&S Co to resolve directly with its users.

23. Do you agree that financial liability between Users and T&S Co should be driven by the concepts of property damage and third-party liability as they exist in law, rather than allowing for any agreement to be made directly between the Parties?

Fuels Industry UK cannot comment on this question as we believe it is a commercial matter for the T&S Co to resolve directly with its users.

24. **Are you supportive of the liability caps proposed above? If not, please explain your reasoning, with supporting technical documentation where possible.**

Fuels Industry UK cannot comment on this question as we believe it is a commercial matter for the T&S Co to resolve directly with its users.

25. **Is the proposed Code Accession Agreement adequate?**

Given the legal nature of the document we cannot comment on this question in detail. We believe that this is a commercial matter for the T&S Co to resolve directly with its users.

26. **Is the proposed structure and content of the Construction Agreement appropriate?**

Given the legal nature of the document we cannot comment on this question in detail. We believe that this is a commercial matter for the T&S Co to resolve directly with its users.

27. **Is the proposed structure and content of the Connection Agreement Appropriate?**

Given the legal nature of the document we cannot comment on this question in detail. We believe that this is a commercial matter for the T&S Co to resolve directly with its users.

28. **Is the CDS Accession Agreement adequate?**

Given the legal nature of the document we cannot comment on this question in detail. We believe that this is a commercial matter for the T&S Co to resolve directly with its users.