Carbon Capture and Storage (CCS) Techno-advertising

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The document under examination, CCS Networks Report 2 (CCSN2), (1), is concerned with the logistics and estimated costs involved in the collection, compression, pipework-bound transport, and storage of captured carbon dioxide (CO2) emissions which would otherwise be discharged to the atmosphere as part of a particular industrial activity. The transportation route is from sources, such as gas wells, to underground or under water basins which could store the CO2 as part of a carbon capture and storage (CCS) method of intercepting CO2 before it enters the atmosphere.

The Report, assuming that it was peer reviewed, presents comprehensive and well-presented tables of costings of pipework systems and some useful network analysis, including a useful worked example, to optimise pipe capacities between several sources and one or more sinks (1) pp. 28-38. However, CCSN2 is part pseudo-technical manual and part promotional material for CCS. It is evidently not scoped to adequately address environmental, social or governance (ESG) issues. It is a pseudo-technical document because it is not transparent about some calculations, and fails to address at least two other significant factors of the CCS process.

Firstly, although the Report states that it has used Aspen HYSYS© software to estimate compression energy (1) Table 1, p.31, it lumps the capital and operational costs of an entire system of compressors, pipework and energy into a rate in USD/tCO2 for three pressure ranges. Using the stated USD80/MWh for a CO2 flow rate of 1.0 Mtpa from 1 to 150 bar states a cost of 15.9 USD/t from Table 1. A necessary calculation reveals a total energy of 0.2 MWh/t of CO2 under those conditions. This next step in the Table would help clarify the compressor energy needed for CCS as a point of focus for comparison with other non-carbon energy sources.

Secondly, it leaves out estimates of the tons of CO2 which are bound to escape due to system component leakage in each step of the process, what would be termed “fugitive emissions” in the oil and gas industries. By comparison, Figure 9.1 on page 368 of reference (2) shows an IPCC diagram clearly illustrating a number of emission paths which have been ignored by the CCSN2 report.

Thirdly, it leaves out any assessment of the security and stability of the sunken CO2 over any particular timeframe, and what measures are needed to quantify that risk. The evidence that CCSN2 does not address or reference those three critical technical aspects of CCS, namely, compressive energy, fugitive emissions and long-term security, casts serious doubt on the document’s worth as a technical paper. It may have worth, and, in fact, may have been written, only as an internal, self-promotional paper for its institution, The Global CCS Institute.

While much of the data provided in the CCSN2 document can be corroborated with other documents, for example the maps showing potential sinks and basins, Figure 7, page 10 of Ref (3), it is the biased or inadequate discussion, or total omission, of ESG issues and of the three technical aspects which demands further comment.

Bias has no place in a technical paper, yet CCSN2, despite its substantial technical content, shows significant bias in favour of the CCS process and its consultants. For example, (1) page 4 paragraph 1, declares that “emissions-intensive industries have few options” to decarbonise other than carbon capture and storage. This statement appears to corral the emissions-intensive industries towards CCS without any offering any financially-proven benefits of CCS compared with using low carbon fuels. Furthermore, this statement completely ignores the globally-accepted move to net zero CO2 equivalent by 2050. Another example of bias in the report appears on page 1 in paragraph 10, (1) in which the authors admit that “inadequate characterisation of geologic[al] storage is a critical limiting factor to CCS network development”. While admitting this, the authors fail to point out how this “limiting factor” can be overcome, that is, by rejection of CCS altogether and going to zero carbon fuels, thereby removing all need for geological storage of waste CO2. This is bias by omission, and further weakens the credibility of the document.

Possibly more serious that bias, in this case, could be CSSN2’s failure to address environmental, social and governance issues which should be front and centre of all credible and responsible industry planning and procedural documents, especially for new technologies.

A 2018 report by the Intergovernmental Panel on Climate Change (IPCC), (2), includes a Summary for Policymakers, Clauses numbered 1-34. Clauses 21 and 22 raise issues of local health, safety and environmental risks, stating that CO2 pipelines need to be treated with the same caution as high pressure fuel gas pipelines, with similar regulations and risks, and similar precautions with respect to locations and

routes as high pressure fuel gas. Clause 29 draws attention to the lack of legal and regulatory frameworks for long-term CO2 storage, and, Clause, 32, to the observation that there is limited experience with monitoring and verification of leakage rates in current installations.

Recalling Clauses 29 and 32, lack of regulation and limited monitoring experience, raises the issue of governance, and, it seems, self-regulation in the absence of effective Government Regulation. If the recent destruction of ancient caves by Rio Tinto is a demonstration of how badly self-regulation is applied in Australia's big resource companies, we may well call into question the will or ability of big polluters to self-regulate in current and future CCS processes.

We already have an example of the failure of self-regulation, governance and transparency in the Australian CCS industry. While the largest CCS project in the world, Chevron's Gorgon plant in Northwest Australia, positively advertised its milestone sequestration figure in this promotion sheet (4), the well-respected news outlet, the Sydney Morning Herald, exposed Chevron's failure to deliver on previous commitments (5).

The CCSN2 report under consideration in this article, (1), has sounded alarm bells for all of us who are concerned about the environmental soundness of the looming CCS industry. It raises the alarms that CCS industry mouthpieces may be downplaying the risks of the CCS process. It uses a reasonable semblance of technology to hide the paucity of ethical, environmental, social and governance management in the CCS industry. All such techno-advertising should be recognised for what it is.

References

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2. IPCC report - https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_wholereport-1.pdf
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4. Chevron's Gorgon LNG and CCS plant - https://australia.chevron.com/news/2021/CO2-injection-milestone
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