

The scale of the carbon problem

To the Editor — The December 2009 issue of *Nature Geoscience* included a focused set of Progress Articles, Commentaries, Correspondences and an Editorial discussing the issue of carbon emissions. But I note two important omissions: none of the articles provide an overview of the projects that are underway at present, and none make a serious attempt to address the issue of scale.

There is plenty of practical experience on sequestration projects managed by the petroleum industry^{1–4}. Weyburn (Saskatchewan, Canada) and Sleipner (off the coast of Norway) are the two most important of the half dozen or so projects underway worldwide, with about five million tonnes of carbon dioxide per year being captured and stored underground between them.

But the problem of sequestration is truly enormous. The current level of anthropogenic emissions is in the range of ten billion tonnes per year, which means

we would need to sequester about 2,000 times as much carbon dioxide as at present just to keep up with current emissions. Even if subsurface carbon sequestration is to be relied on for only, say, 20% of the problem, this still means we would need to find and fill an equivalent of 67 Weyburn sites every year.

The resources required to make carbon capture and storage happen include special scrubbing equipment at coal-fired plants and elsewhere (or air-extraction devices); pipelines to transport the carbon dioxide to burial sites; drilling of new wells or reconditioning of old ones to accept the carbon dioxide; compression and burial equipment at burial sites; and monitoring and legal costs. The sums involved are enormous — comparable to the costs that have already been incurred in constructing the existing petroleum-based distribution systems — and their construction will require huge expenditures of energy, raw

materials and other resources, all of which will add to the existing carbon dioxide content of the atmosphere.

These are not trivial issues. They imply huge societal costs, because to divert such energy and resources to carbon sequestration involves diverting them from other human endeavours. Given the impending issue of 'peak oil' and its implications for energy use, I would have thought that the scale problem needed to be addressed directly and at length. □

References

1. http://www.co2captureandstorage.info/project_specific.php?project_id=98
2. http://www.netl.doe.gov/technologies/carbon_seq/index.html
3. <https://www.llnl.gov/str/Johnson.html>
4. http://sequestration.mit.edu/technology_overview/index.html

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