COUNTRY WOMEN'S ASSOCIATION OF NEW SOUTH WALES

SUBMISSION TO THE

HOUSE STANDING COMMITTEE ON SCIENCE AND INNOVATION

ON

THE INQUIRY INTO GEOSEQUESTRATION TECHNOLOGY

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15 August 2006

CAN WE BURY OUR GREENHOUSE GAS EMISSIONS?

The science underpinning geosequestration technology

Geosequestration is an 'end of pipe solution', a concept actively discouraged as a pollution control measure since the late 1970's. After being produced at a source, such as a power station, CO_2 will be removed from the flue gases and 'sequestered' in geologic formations. No other industry, producer, or manufacturer is encouraged to adopt 'end of pipe' solutions, rather they are encouraged to reduce resource use and prevent pollutants being generated.

The Sleipner gas field in the North Sea off Norway, the site of the first commercial scale trial of CO_2 geosequestration[1], is often cited as a 'working demonstration' that the technology is viable. Geological storage at this site has only been in operation since 1996. Ten years is no time at all in the context of the geological time scale, yet only a decade of data is relied on to demonstrate that the site is safe for storage for many thousands of years.

The potential environmental and economic benefits and risks of such technology

Geosequestration still involves use of fossil fuel and the well documented adverse environmental impacts associated with that. Carbon dioxide is not reduced, just moved. The environmental benefit is to the current population, but does not take into account intergenerational equity issues. The economic benefit will be to the energy intensive industries reliant on fossil fuel, particularly coal.

Capture & Compression

It is necessary to capture the emissions at the source, then separate and compress the CO_2 (approx. 15% of the emissions) to allow it to be transported for injection into a suitable geological structure for storage. The Australian Greenhouse Office has reported that the highest costs for CO_2 storage are associated with capture of the gas. Although additional energy use is required to compress the gas for transport, there is no readily available information regarding the relative amount of CO_2 generated during the compression process.

Transportation

Initial investigations have identified a number of potential viable geosequestration sites. However, as CO_2 sequestration is only feasible for point sources such as power stations, iron and steel plants, oil refineries and gas processing facilities, the only significant source of CO_2 in Australia within 100km of a viable injection site is in the region of the La Trobe Valley in Victoria. For the rest of the eastern Australia, sites are located at least 300km, and for Sydney, Newcastle and Wollongong over 500km, from the source.[2]

Options for transport of the compressed gas are:

- Pipeline – requiring the construction of 1000's of kilometres of pipelines, with associated environmental impacts. Ongoing use of energy to pump gas to destination. Impacts on affected landowners, sterilisation of easements. Need to guarantee infrastructure maintained after construction to reduce risk of leaks.

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[1] Co-operative Research Centre for Greenhouse Gas Technologies CO_2 Geosequestration Fact Sheet #5 "Storing CO_2". www.co2crc.com.au

[2] Davidson, S. (2003). Putting CO_2 back. ECOS 116 July –September 2003 p. 23. CSIRO Publishing Victoria.

- Road – additional use of petroleum & generation of greenhouse gases, over significant distances. Risk of traffic accidents causing release of CO_2. Costs and impacts related to need to upgrade roads. Most likely route from Sydney across the Blue Mountains, the Great Western Highway between Katoomba and Lithgow is the most dangerous stretch of road in Australia.
- Rail – as with roads, rail infrastructure would need to be created/upgraded/maintained, with associated impacts and costs.

<u>Injection, Storage & Monitoring</u>
To prevent leakage from storage, injected CO_2 needs to be stored deeply to be kept and maintained in a liquefied, rather than gaseous, state. This will be monitored using geophysical modelling techniques, which are still being developed. Regardless of the accuracy of the models, no matter how well a site is monitored, the occurrence or not of a geologic event or geomechanical effect, which would allow leakage from the storage site, is ultimately out of our control. The risk of such an event, while probably small, will never be zero.

Locking up areas for storage could also result in sterilisation of a future resource. Geologic structures suitable for storage include coal beds that can't be mined due to their depth, grade or other unsuitable characteristic. However, as technology progresses and efficiency of resource extraction increases, coal seams previously thought uneconomic or inaccessible have been mined. If used for geosequestration, this resource would be unavailable for future use.

<u>Closure</u>
There are significant economic risks associated with site closure – with the Government (tax – payers) being ultimately liable. Monitoring of sites is required indefinitely, possibly for thousands of years, and remedial action needs to be taken if required. We need to ensure ongoing costs are provided for; unfortunately Governments are not generally renowned for planning beyond the next term of office, let alone thousands of years into the future.

The skill base in Australia to advance the science of geosequestration technology
No comments

Regulatory and approval issues governing geosequestration technology and trials

- Intergenerational equity – shifting responsibility for management of today's problem to future generations
- Land use/sterilization issues – both the storage site and any associated pipelines and easements
- Compensation for existing landholders
- On-going responsibility & liability after injection site closure -
- Parallel development of renewable energy

How to best position Australian industry to capture possible market applications
No comments.

CONCLUSION

Can we bury our greenhouse gas emissions? Yes, the technology exists. Perhaps the more pertinent question is should we bury our greenhouse gas emissions?

As the technology is still developmental, it has been reported that geosequestration could not be commercially operational until 2015. What about the gas generated in the intervening nine years? Higher efficiency fossil fuel use, work on reducing emissions and development of renewable energy sources is required now.

What happens in 2015 if the trials do not produce expected results and geosequestration turns out to not be the panacea it is being promoted as? The $30 million to be spent on the Otway Basin geosequestration trial would fund an enormous amount of research and development into alternate forms of sequestration. For example, a 20-year study in the US into biofuels, which ended in 1996, demonstrated that algae could be used to metabolise carbon to produce biodiesel and feedstock[3]. As well as producing a useful end product, the process would not require separation of the gases, would recycle nutrient rich water, available in abundance from wastewater treatment plants, and ponds could be established in more accessible areas, not being limited to remote geologically suitable locations.

Agricultural & Environmental Committee
Country Women's Association of NSW
August 2006

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[3] Kirk, B. & Winkler, T. (2006). 'Biosequestration is the answer' *Civil Engineers Australia* 78(8):8-10.