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Who's talking CCS?

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Abstract

This article presents research conducted on recent media coverage of 'carbon dioxide capture and storage' (CCS) technology in Australia. Recognising the significant impact of print, radio and television media in shaping public perceptions and attitudes, the purpose of the research is to inform policy makers on current media debate on CCS and make recommendations on ways to communicate and engage with the journalism/media profession. A total of 390 media articles were sourced from an indexing database (*ProQuest ANZ Newsstand*) and content analysed according to several criteria. Results were that there was roughly an even split between articles that were pro-CCS and those against. In all, six emergent themes were identified – three affirmative and three negative arguments – which covered 70% of articles analysed. The data also revealed that the term 'clean coal' was most often associated with CCS technology, and that technical explanations were not often provided. Implications for energy policy, particularly in relation to communication and public engagement are discussed.

Keywords: carbon capture and storage, media, clean coal, emerging technologies, attitudes, perceptions

1. Introduction

Similar to most countries, public awareness and understanding of carbon dioxide capture and storage (CCS) in Australia is currently low [1]. As a result, public opinions about CCS are less likely to be strongly formed and are therefore open to influence from a variety of sources. Given that many Australians access some form of media through news, radio or television. And as the media's role in influencing the debate around CCS is potentially

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substantial, an analysis of how CCS is being portrayed by the Australian media was identified as critical to national policy makers, researchers and industry representatives who have an active interest in CCS.

This article presents a discussion on the role of media influence on public attitudes. It then describes the methodology used for the 20 month media analysis of Australian articles which was the focus of this research. The main results are presented including more descriptive characteristics of the media analysis. The article highlights the major announcements that impacted on the coverage of CCS and the major themes identified from the content analysis of the articles. Finally, conclusions and recommendations are made on the implications of this media analysis for policy makers and those working in CCS projects.

2. The influence of the media

Previous research has noted the significant role for the media to influence public attitudes towards new and emerging technologies (e.g. biotechnology and nanotechnology), showing how it provides people with cognitive short-cuts or heuristics in the absence of information [2,3]. Research on media coverage of new and controversial technology has demonstrated that the impact from media may not be in the valence of content, but in how information is 'framed' [4,5].

Media framing is the process of constructing meaning through subtle communication features - visual or terminological [6,7]. Effective frames access widely held and often unconscious assumptions or schemata, and may be effective in shaping opinion based on heuristics rather than direct information about an issue or policy [8]. This aligns with the view that people, by nature, are 'cognitive misers' or 'satisficers' who minimise cognitive effort by gathering as little information on an issue as they think necessary to make judgements and decisions [9].

In this way individuals can use the media to both manage the heavy information processing demands of daily life, and make judgements on complex policy debates [10,11]. For example, Scheufele and Lewenstein (2005) found some evidence for the heuristic value of media for informing public attitudes. They explored the influence of mass media on American public perceptions of nanotechnology. Noting that American media tended to emphasise benefits of the technology, they found that attention to mass media was among the strongest predictors of attitudes to nanotechnology, while knowledge of the technology was not a significant predictor.

Other recent research, however, suggests the impact of media on public opinion may be moderated by knowledge and value predisposition. The idea that long-term values that people hold are used as filters to try to understand scientific knowledge is interesting, because it results in informed citizens forming attitudes dependent on their more long-term value predispositions such as ideological views [12]. As such the researchers were interested to examine the information being portrayed in the Australia media.

3. Methodology

Australian media coverage of CCS was sourced from the *ProQuest ANZ Newsstand* database, which consists of 73 urban and regional print news publications[2], and radio and television news programs[3] in Australia and New Zealand. A thorough search was conducted using various CCS-related search terms that appeared in the 'citation and abstract' field. These terms included: (carbon or carbon dioxide) capture and storage, (carbon or carbon dioxide) capture and sequestration, clean coal, low emission coal, geosequestration and NewGenCoal (an Australian Coal Association term).

Initially the reference library was 'cleaned' of duplicate records, and records scrutinised for their relevance to CCS, with unrelated articles being eliminated in the process. A total of 790 articles were removed, leaving 390 articles in the final CCS library. The main analysis covered 390 articles from 1 September 2007 to 30 April 2009 (20 months). Each article was coded in EndNote according to the criteria below, with emergent themes being noted during the coding process.

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[2] This was not exhaustive, and excluded publications like the Australian Financial Review.

[3] Radio and television titles appear limited to Australian Broadcasting Corporation (ABC) programs.

3.1. Coding of media articles and content analysis

In all, nine areas of coding and analysis were completed for each article.

1. Article length which was measured by word count.
2. Media type identifying whether the article was from news print sources, or transcribed from radio and television.
3. Focal topic which was a short phrase summarizing the article's main area of discussion.
4. The extent to which CCS was a focus of the article was classified into three levels that included primary, secondary, or incidental/peripheral.
5. Listing of the terminology used to describe or refer to CCS technologies. For example terms such as geosequestration and clean coal.
6. A broad assessment of the extent to which the author explained or defined the technology was broken into three levels that were none, basic or detailed.
7. An assessment of the technical accuracy of the explanation was made using three levels – limited, fair, accurate.
8. The extent to which the article's position was positive, balanced, negative or neutral toward CCS technology.
9. Finally, the views and arguments put forward within each article about CCS and related technologies were recorded. This was developed into emergent themes, which represented 'broad' categories of arguments for the purpose of synthesizing the CCS debate. A 'working list' of themes was then 'tested' for coverage on the original set of statements from the articles. This content analysis process categorized articles into a given theme if they presented with one or more aspects of that theme. Percent coverage for each theme was then calculated. Themes with around 10% and upwards were reported in the final list of themes.

4. Results

An examination of the news source and number of articles found in each source was made, with the highest number of articles featured in The Australian (n=98, 25%) and The Weekend Australian (n=36, 9.2%) the national broadsheet newspaper. These were closely followed by The Age (a Melbourne-based newspaper in Victoria) and The Courier-Mail (a Brisbane based newspaper in Queensland), both of which featured 33 (8.5%) articles. These two states are most proactive in pursuing CCS mainly because of their heavy reliance on coal for power generation as well as export. Further analysis of the 390 articles found that the vast majority of news articles were sourced from urban publications (n=312). This compared with only 40 articles from regional papers. 'Urban' publications were defined as those circulated in state and territory capital cities, while all other publications were defined as 'regional.'

In total 176 journalists, or pairs of journalists, were found to have written about CCS in some form. Nine journalists were found to write frequently about the topic with a minimum of six articles and the most prolific writing 16 articles in the 20-month period. Detailed examination of the content of these authors' articles reveals a number of key arguments which may provide insight into relevant focal areas for future CCS communication strategies. Arguments raised within the articles tend to focus on the cost of CCS, the infrastructure required, and the fact that CCS is still a relatively unproven technology and therefore unlikely to ready in the near future to mitigate the impacts of climate change. For those who seem opposed to the technology, there was also a strong feeling that CCS should not be publicly funded. This in many ways relates to governments not being seen to be unnecessarily supporting the fossil fuel industry – therefore picking winners.

The most frequently occurring term used for the technology was 'clean coal' which occurred in 277 articles, followed by 'carbon capture and storage' (n=165). Other terms included geosequestration, carbon capture and sequestration, low emission coal and carbon sequestration; however, these were much less frequently occurring.

4.1. Article focus, tone and technical knowledge

Examination of each article to understand the extent to which CCS was a focus revealed that of the 390 there was a fairly even split across the three categories – primary, secondary, and incidental. In 143 (36.7%) articles, CCS was only mentioned once or twice and these were classified as having an incidental focus. One hundred and thirty-two (132, 33.8%) were of a secondary focus, where the article primarily focused on a related topic with substantial reference to CCS. Finally, 115 (29.5%) had CCS as the primary focus of the article, and further analysis was

undertaken of these articles. This analysis revealed a relatively even split between headlines that were either positive (38%, n = 44) or negative (37%, n = 43) about CCS, while 24% (n=28) were neutral.

Secondly, the articles were assessed for their tone, that is, were they balanced, negative, neutral or positive. A balanced article was classified as such for presenting both sides of the debate. Whereas neutral articles are non-argumentative or the journalist is not concerned with identifying a position in relation to CCS, but is communicating factual information relating to the technology. For example, amount of government funding, number of current or proposed projects, industry activity etcetera. Eighteen percent (18%, n=69) appeared to be balanced in their reporting, and a further 21% (n=82) were neutral where the journalist was less concerned with identifying a position and mainly focused on communicating factual information about the technology. Twenty seven percent (27%, n=107) were negative towards CCS while 34% (n=132) were positive about CCS. This was slightly different for urban papers. Our analysis showed that when CCS is mentioned in regional papers, the story is more likely to feature CCS as a primary or secondary focus.

In terms of conveying accurate technical knowledge of CCS, only about one in five articles (n=77) attempted to define or outline CCS for the reader. Of these 77 articles, the majority provided only a brief outline (n=64), while 13 articles explored CCS and related technologies in more depth. The more detailed articles were more likely to present accurate technical information about the technology compared with articles that only provided the brief outline.

4.2. Significant events and their impact on media coverage

The graph below shows the spread of newspaper articles over the 20 months included in this media analysis as well as their focus. In each year there is less coverage over the December/January holiday period when most Australians in employment take leave. Figure 1 below shows various peaks in media coverage analysed across the 20-month review period. The majority of these appeared to relate to a significant event or announcement that occurred at the same time. Not surprisingly, when these peaks occurred, CCS was more likely to be mentioned as the primary or secondary focus.

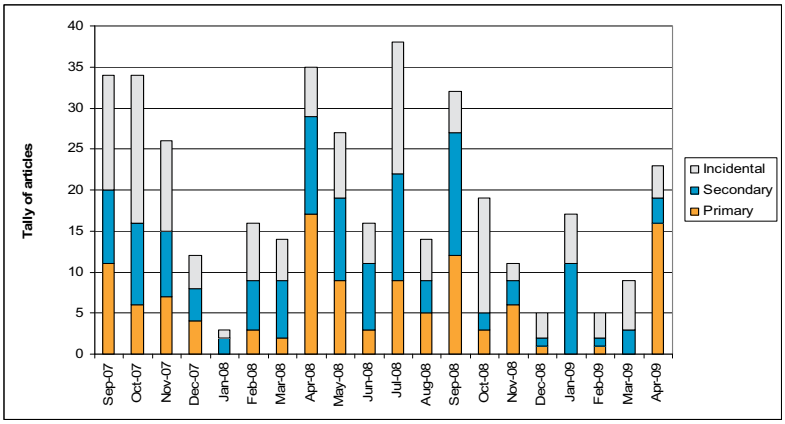

Figure 1 Frequency of articles appearing in each month

Significant events which seemed to promote the clustering of more articles are detailed in the table below. The majority of these relate to government announcements or releases of particular reports. It is interesting to note the increased coverage around the United States Government's withdrawal of funding for the FutureGen project. This reinforces the international focus around the technology and therefore why it is important to ensure that all demonstration projects, regardless of country, are managed well and communicated successfully. Because the world

is so well interconnected through the internet and media, any negative experiences surrounding CCS overseas are likely to have a negative effect in Australia as well.

Table 1 Timeline of significant events related to CCS

Date	Event/Announcement
24 Sept 07	Prime Minister John Howard announces Clean Energy Target policy
1 Nov 07	Dr Karl's a well known media scientist negative comments on CCS
22 Nov 07	Australian Federal election
29 Jan 08	United States Government's 'withdrawal' from FutureGen
2 Apr 08	Otway Project opening
5 May 08	Release of Greenpeace report on CCS entitled "False Hope"
13 May 08	Federal budget announcement (mention of alternative energy)
3 July 08	Announcement of new brown coal-fired power plant in the Latrobe Valley
4 July 08	Draft Garnaut review on climate change released
4 July 08	Carbon Pollution Reduction Scheme Green paper released
19 Sept 08	Announcement of Global Carbon Capture and Storage Institute (GCCSI)
30 Sept 08	Final Garnaut Report on climate change released
15 Dec 08	Carbon Pollution Reduction Scheme White Paper released
16 April 09	GCCSI official launch

Main 'for' and 'against' arguments

Content analysis of the articles identified six emergent themes or arguments in the CCS debate. They included three affirmative and three negative arguments which are described in more detail below. Together, these themes covered over two thirds (n=273, 70%) of the analysed articles (Key themes arising from content analyses of news articles). The other 30% covered a subset of less dominant themes, typically issues relating to safety, specific technologies, facts and political debate. The content analysis process counted articles into a given theme if they presented with one or more aspects of that theme. The themes therefore represent 'broad' categories of arguments for the purpose of synthesising the CCS debate into concise messages.

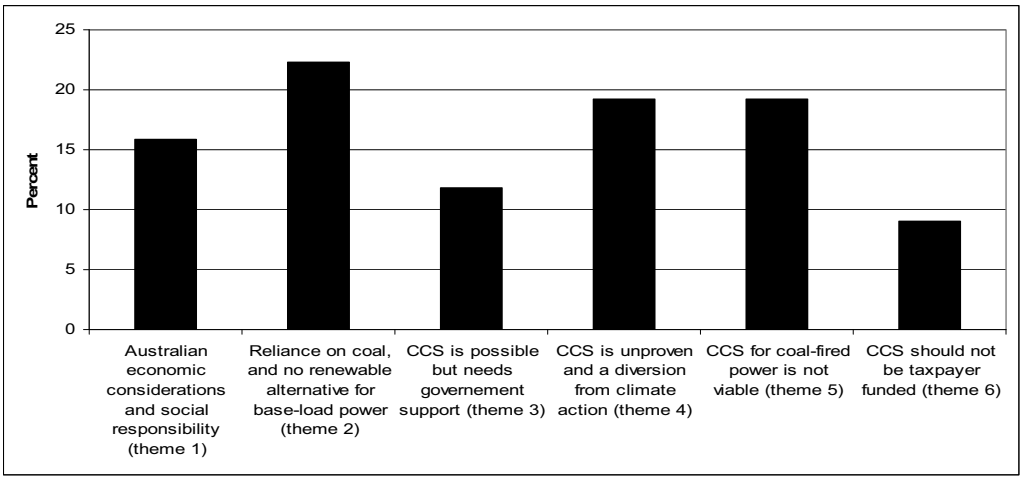

Figure 2 Key themes arising from content analyses of news articles

4.2.1. Affirmative themes

1. Australian economic considerations and social responsibility – this theme focused on the significant role that the coal industry plays in the Australian economy. It suggests that as the world's largest coal exporter, it is Australia's responsibility to invest in this technology to reduce coal's impact on climate change. The other argument is that such investment also positions Australia to earn export dollars from the technology. This theme was present in 15.9% of articles (n=62).
2. Reliance on coal and no renewable alternative for base-load power - this theme underlined society's reliance on coal (nationally and globally) as the cheapest source for base-load power generation, and noted that this is unlikely to cease in the foreseeable future. The world's emerging economies are investing heavily in coal-fired power, and therefore cleaning this energy source was seen as vital to a global climate change response. Another aspect of this argument is the suggestion that there are currently no renewable energy sources that can supply the world with base-load power. This theme was present in 22.3% (n=87) of articles.
3. CCS is possible but needs government support – this theme states that clean coal will not develop without broader government support, including more funding/concessions, an emissions trading scheme with a high carbon price, a mandatory energy target, and other legal/regulatory frameworks. Many articles representing this theme raise the issue of the proposed Carbon Pollution Reduction Scheme (CPRS) disadvantaging CCS in the current regime. This theme was present in 11.8% (n=46) of articles.

4.2.2. Negative themes

1. CCS is unproven and a diversion from climate action - this theme highlights the fact that the technology has not been proven, and is not expected to be deployed at scale for at least 10-15 years, adding that scientists advise that CO_2 emissions must peak by 2015, and then decline to avoid dangerous climate change. Supporters of this concept argued that any investment in CCS is diverting funds from urgent climate change mitigation. This theme was present in 19.2% (n=75) of articles.
2. CCS for coal-fired power is not viable - This theme deals with the assertion that even if proven viable by 2020 (the date commonly cited as the best case scenario); CCS technology requires extreme investment in infrastructure and is energy intensive. Otherwise it is argued, that CCS is likely to be superseded by other more cost competitive energy sources, such as gas, nuclear, geothermal and other renewable technologies. This theme was present in 19.2% (n=75) of articles.
3. CCS should not be tax payer funded - This theme deals with the idea that government funding of CCS means that there was a perception that taxpayers are propping up the coal industry, which is already seen as an industry that is wealthy and heavily subsidized, therefore not requiring any further government support. In particular,

proponents of this argument noted that the coal industry has profited significantly in recent years, and thus argued that the coal industry itself should shoulder the full costs of developing this technology suggesting that the coal industry's current investment commitments amount to very little in proportion to the profits from the sale of coal. This theme was present in 9% (n=35) of articles.

5. Discussion

The results of the media analysis provide some useful insights into how CCS is currently perceived by journalists across Australia. One of the most telling findings in the strong link between CCS and the term 'clean coal', which often has very negative associations. Given Australia's strong reliance on coal for power generation, this link is not surprising. However, it is envisaged by technology developers that CCS may be used with other applications, and advocates of CCS may want to consider raising the profile of the alternative uses for CCS. For example, CCS is already being used by the oil and gas industry and is likely to be used with other heavy industries. There is also the possibility of co-firing with biomass, including algae, that has the potential to remove large amounts of CO_2 from the atmosphere. This in itself can be a positive argument to reinforce the need for using the coal industry's technology and infrastructure in the future. This should help to counteract the perception that the sole reason for CCS is to extend the use of coal in Australia. In addition, providing information in relation to energy poverty and what access to energy can mean to those in developing countries may help to raise the awareness of why this technology needs to be considered in its early stages to confirm the role it can play in mitigating CO_2 emissions from coal

This research also found that only nine journalists in Australia tend to write often about CCS. Some of these nine appear to have a positive view towards CCS while some appear to be negative. Ideally, if CCS advocates, including researchers and policy makers, could provide time to engage with these nine journalists it may help to raise the profile and accurate reporting of CCS. By bringing together a group of journalists to discuss the issues surrounding CCS and allowing them time to challenge existing research, industry and policy assumptions, there may be potential to assist in dispelling some of the myths associated with the technology; or at least to highlight the current issues being faced and to debate the potential of CCS.

One missing link in the analysis is to understand how the general public, the target audience, perceive the information presented in the various media. Earlier studies conducted by the Tyndall Centre, suggest that the majority of individuals who read articles on CCS from beginning to end have an established interest in the topic [13]. Research to analyse how Australian individuals read and interpret articles about CCS in various newspapers would be helpful in deciding the most appropriate way to position CCS in the media. This should also be extended to an analysis of reactions to radio and television programs. Based on the media analysis so far, it appears that the majority of reporting appears in the mainstream large newspapers, radio and television stations.

As such, part of a communications strategy for CCS could consider targeting more mainstream publications, particularly women's magazines. The risk communication literature often points to women as more likely to be concerned about risks to their family [14] and so educating women through media articles may help to dispel myths associated with the uncertainties of CCS.

6. Recommendations

The findings from this media analysis point to a number of recommendations for those working in the CCS-related fields in Australia which are also applicable to other countries keen to deploy CCS. These include:

1. Proactively engage with all journalists in both urban and regional areas alike, including those who write infrequently on CCS, to ensure that they have the appropriate information base to write about the technology.
2. Be mindful of the terminology that is being used to describe CCS technologies by reducing the use of the term 'clean coal' and moving to the term 'low emission'.
3. Promote the alternative ways in which CCS can assist in mitigating greenhouse gas emissions besides applications attached to coal. For example, promote other industries that are using CCS to remove large amounts of CO_2 such as the oil and gas industries, or the potential to combine biomass with CCS to produce low emissions.

4. Target mainstream media targeting various demographics including women's magazines (e.g. Vanity Fair, Women's Weekly, etc.) and commercial television programs and stations so as to better target a wider audience and demographic.
5. Enlist the use of trusted experts including scientists and non-government organisations to ensure more balanced arguments for the technology are promoted within the media.

7. Conclusions

In conclusion, the media analysis suggests that certain trends are emerging in relation to the way journalists and other media sources frame information about CCS. These trends confirm that formulating strategies to proactively engage journalists, particularly those that write more frequently about the technology, may help to raise the profile of CCS. It may also be worth considering conducting awareness raising campaigns in the mass media and promoting alternative ways that CCS can be used aside from coal to move away from the negative attribution of the term 'clean coal'. Additional research on how audiences comprehend and perceive the information presented to them, within the various media formats, would be helpful in understanding more clearly how the portrayal of the information impacts on public perceptions and attitudes towards CCS. The results of this research would help to inform ways to more accurately target messages and news releases across the various forms of media in relation to CCS.

It is also evident that worldwide events and announcements in relation to CCS, or related technologies, can significantly stimulate the production of articles in the mass media. Globally, this is an important factor to be aware of as it reinforces the international focus around the technology. Because the world is so well connected today through the internet and media, any negative or positive experiences surrounding a CCS announcement or project within one country are likely to have a similar impact internationally.

References

1. Ashworth, P, Boughen, N, Mayhew, M, Millar, F. From research to action: Now we have to move on CCS communication. *International Journal of Greenhouse Gas Control* 2010; 4:426–433.
2. Nisbet, MC, Brossard, D, Kroepsch, A. Framing science – the stem cell controversy in an age of press/politics. *Harvard International Journal of Press-Politics* 2003; *8*(2):36–70.
3. Scheufele, DA, Lewenstein, BV. The public and nanotechnology: How citizens make sense of emerging technologies. *Journal of Nanoparticle Research* 2005; *7*:659-667
4. Scheufele, DA. Framing as a theory of media effects. *Journal of Communication*. 1999; *49*(1):103–122.
5. Scheufele, DA. Agenda-setting, priming, and framing revisited: Another look at cognitive effects of political communication. *Mass Communication & Society* 2000; *3*(2 & 3):297–316.
6. Scheufele, DA. Framing as a theory of media effects. *Journal of Communication*. 1999; *49*(1):103–122.
7. Scheufele, DA, Lewenstein, BV. The public and nanotechnology: How citizens make sense of emerging technologies. *Journal of Nanoparticle Research* 2005; *7*:659-667
8. Chong, D, Druckman, JN. Framing theory. *Annual Review of Political Science* 2007; 10(1):103-126
9. Fiske, ST, Taylor, SE. *Social Cognition (2nd Ed.)* 1991. New York:McGraw-Hill
10. Brossard, D, Nisbet, MC. Deference to scientific authority among a low information public: Understanding the US opinion on agricultural biotechnology. *International Journal of Public Opinion Research.* 2006; 19(1):24-52
11. Popkin, SL. *The reasoning voter:communcation and persuasion in presidential campaigns.* 1991; Chicago:University of Chicago Press.
12. Ho,S. Brossard, D, Scheufele, D. Effects of value predispositions, mass media use, and knowledge on public attitudes toward embryonic stem cell research. *International Journal of Public Opinion Research* 2008; 20(2):171-192.
13. Mander, S, Gough, C. Media framing of new technology:the case of carbon capture and storage. *Eighth International Conference on Greenhouse Gas Control Technologies (GHGT8)* 2006. Trondheim, Norway.
14. Slovic.P. T*he percetion of Risk* 2000. London:Earthscan