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BACKGROUND NOTE

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Emissions trading—has it worked?

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Introduction

Emissions trading gets a lot of bad press. James Hansen, a leading advocate for climate change legislation, has rejected emissions trading altogether in favour of a carbon tax. In an open letter delivered on 29 December 2008 to then President-Elect Obama, Dr Hansen described cap-and-trade schemes as 'ineffectual and not commensurate with the climate threat'.[1] He is not alone in expressing doubts about whether emissions trading is an effective approach to reducing the amount of greenhouse gases (GHG) in the atmosphere.[2]

The proposed Australian Carbon Pollution Reduction Scheme (CPRS) is a 'cap-and-trade' style emissions trading scheme. The legislation required to implement this approach is to be reconsidered by the Australian Senate during November 2009, following its failure to pass through that chamber on 13 August 2009.[3] Before implementing this type of scheme, it is important to understand whether this approach has been successful in reducing GHG emissions in areas where it has been implemented.

To date, the accepted way of assessing whether an emission trading scheme could work (that is, actually reduce emissions) is to construct detailed economic models of the scheme in question. Unfortunately, while economic models of the CPRS abound, no two models give anywhere near the same results. Indeed, many CPRS models do not address the central question of whether the scheme will actually reduce GHG emissions, preferring instead to highlight employment effects, cost impacts or the possibility of carbon leakage.[4] Somewhat

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1. J and A Hansen, *Open letter to President Elect Obama, 28 December 2008*, viewed 26 August 2009, http://www.columbia.edu/~jeh1/mailings/20081229_DearMichelleAndBarack.pdf

2. For critical comment on the CPRS see D Spratt, 'Time for a Plan B on climate?', *Dissent*, Yarralumla, ACT, Spring 2009, p. 34 and following. See also C W Schmidt, 'Carbon offsets, Growing pains in a growing market', *Environmental health perspective*, v.117(2), February 2009, viewed 26 August 2009, http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2649246 for the views of James Lovelock, a noted environmentalist as well as those of Mr and Mrs Hansen. Recently, Robert Shapiro, former US Under Secretary of Commerce during the US Clinton Administration has written against emissions trading in favour of a carbon tax. See R Shapiro, 'Cooling to the cap-and-trade push', *Australian financial review*, 11 September 2009, p. 56.

3. P. Wong, Minister for Climate Change and Water, Second reading Speech: Carbon Pollution Reduction Scheme Bill 2009 (and associated Bills), Senate, *Debates*, 13 August 2009, p. 4842, viewed 7 September 2009, http://parlinfo.aph.gov.au/parlInfo/search/display/display.w3p;adv=yes;db=;group=;holdingType=;id=;orderBy=customrank;page=0;query=AuthorSpeakerReporter%3AWong%20Date%3A13%2F08%2F2009%20Dataset%3Ahansards;querytype=;rec=2;resCount=Default

4. For example, see B Fisher, S Bare, S Szakiel (Concept Economics), *The employment effects in the Australian minerals industry from the proposed carbon pollution reduction scheme in Australia*, 21 May 2009, viewed 31 August 2009, http://www.qrc.org.au/_dbase_upl/MCA_jobs_displacement_21May09.pdf

cynically, a journalist specialising in this field recently noted that 'no participant in the debate has ever released economic modelling which doesn't support their agenda'.[5] Decision-makers could be excused in this environment for distrusting the results of economic modelling.

Another approach is to examine currently operating cap-and-trade schemes and assess their emissions reduction performance. While non-Australian schemes will be different to the CPRS, their operation will give some guidance on whether the concept works. This background note identifies two currently operating cap-and-trade schemes, that have a wide geographical coverage and some operating histories; and asks whether they have been successful in reducing emissions in the area under their control.

What is a cap-and-trade scheme?

A cap-and-trade approach to controlling emissions generally has the following basic ingredients:

- an overall limit – the cap – for emissions is set for a particular geographic area, and a specified set of participants, covered by the scheme. This limit reduces over time to achieve the desired environmental effect

- an annual number of permits is issued that corresponds with the above mentioned emissions limits. For example, if the desired annual limit was 100 000 tonnes of emissions then 100 000 emissions permits would be issued, if each permit covered one tonne of emissions (as it usually does). These permits may be either sold at a fixed price, or by auction or can be allocated free of charge by the issuing authority to scheme participants, and

- scheme participants have to surrender enough emissions permits by a certain date to cover their annual emissions. Participants that have surplus permits can sell them to those participants that need them

  - if participants do not surrender sufficient permits to cover their liability they are subject to a penalty[6]

5. J Breusch, 'Great minds don't always think alike', *Australian financial review*, 27 August 2009, Green Business Special Report, p. 2.

6. In the proposed CPRS the penalty after the first year will be no more than 110 per cent of average auction price for permits multiplied by the number of required permits not surrendered. In the European Union Emissions Trading Scheme (EU ETS) the penalty is €100 multiplied by the number of required European emissions Allowances (EUA) not surrendered between 2008 and 2012. Under the provisions of the US Acid Rain Program excess emissions that are not acquitted by the purchase of additional sulphur dioxide ($SO_{2)}$ emissions permits are subject to a penalty of $2000 per ton, adjusted for inflation.

– alternatively, scheme participants can reduce their need for emissions permits by reducing their emissions in any way they can, usually by the most cost effective way available.

Over time, reducing the number of annual emission permits issued drives the reduction in annual emissions.[7]

The majority of current and proposed emissions trading schemes are cap-and-trade schemes.[8] The two largest schemes, that have an operating history and wide geographic coverage, are:

- the US Acid Rain Program, and
- the European Emissions Trading Scheme.

US Acid Rain Program

Background

The US 1990 Clean Air Act Amendments established the U.S. Acid Rain Program for the reduction of emissions of sulphur oxides (mainly sulphur dioxide, SO_2) and nitrogen oxides (NO and NO_2, known collectively as NOx) emissions.[9] When large amounts of these particular gases are released, a weak acid solution is formed with the water in the atmosphere, which falls as acidic precipitation causing significant environmental damage. Both gases also have significant human health effects. The US government considered it essential to reduce the extent of these problems and introduced the Acid Rain Program. This program has two separate components dealing with these two gases.

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7. Further details on how cap-and-trade schemes work can be found at Australian Government, Department of Climate Change, *Emissions trading – how it works*, Fact sheet, December 2008, viewed 26 August 2009, http://www.climatechange.gov.au/whitepaper/factsheets/pubs/010-emissions-trading-how-it-works.pdf and US Government, Environmental Protection Agency, Clean Air Market Programs, *Cap-and-trade: essentials*, Fact sheet, viewed 26 August 2009, http://www.epa.gov/captrade/documents/ctessentials.pdf also Pew Centre on Climate Change, *Climate Change 101 – Cap-and-trade*, Fact sheet, viewed 26 August 2009, http://www.pewclimate.org/docUploads/Cap&Trade.pdf

8. L Nielson, *Emissions – who is trading what?*, Background Note, Parliamentary Library, Canberra, 15 August 2008, viewed 26 August 2009, http://www.aph.gov.au/library/pubs/BN/2008-09/emissions.htm Major proposed cap-and-trade schemes as at the date of writing are the US national scheme in the American Clean Energy and Security Bill of 2009 (HR 2454) now before the US Senate and the Australian CPRS in the Carbon Pollution Reduction Scheme Bill 2009 and associated Bills.

9. US Environmental Protection Agency, 'Clean Air Markets, Acid Rain Program, Phases and Reductions', *website*, viewed 26 August 2009, http://www.epa.gov/airmarkets/progsregs/arp/basic.html

The centrepiece of the SO_2 component is the establishment of a cap-and-trade scheme for emissions of this gas. Phase I of the SO_2 component began in 1995 and affected 263 generating units at 110 mostly coal-burning electric utility plants located in 21 eastern and mid-western US states. An additional 182 generating units joined the Program bringing the total of Phase I affected units to 445. Phase II, which began in the year 2000, tightened the annual emissions limits imposed on these large, higher emitting plants and also set restrictions on smaller, cleaner plants fired by coal, oil, and gas, encompassing over 2000 generating units in all. The program affects existing utility units serving generators with an output capacity of greater than 25 megawatts and all new electricity generation facilities.[10]

The NOx component of the Program was also implemented in two phases (1996 and 2000) and embodies many of the principles of the SO_2 trading system; but does not adopt the cap and trade model (i.e. no cap on NOx emissions is set and no allowance trading scheme was implemented). Rather, each generating unit is permitted to emit only so much NOx. These limits are progressively reduced. Data on NOx emissions is included in this survey to show how a cap-and-trade scheme for the control of one gas can co-exist with a command and control regulatory scheme for the control of the emissions of another gas.

Of course, it must be made clear that the Acid Rain Program was not established as a response to the build-up of GHG in the atmosphere; SO_2 is not a GHG. Nor are the nitrogen oxides released from the combustion of fuel, which consist of nitric oxide (NO) and nitrogen dioxide (NO_2). However, this Program is of relevance to Australia because:

- it provides a long running example of a cap-and–trade scheme applied to a wide geographical area, and
- it concentrates on the power generation sector.[11] A significant amount of Australia's GHG emissions comes from this sector and assistance given to it has been a contentious part of the overall CPRS debate.

Emissions performance

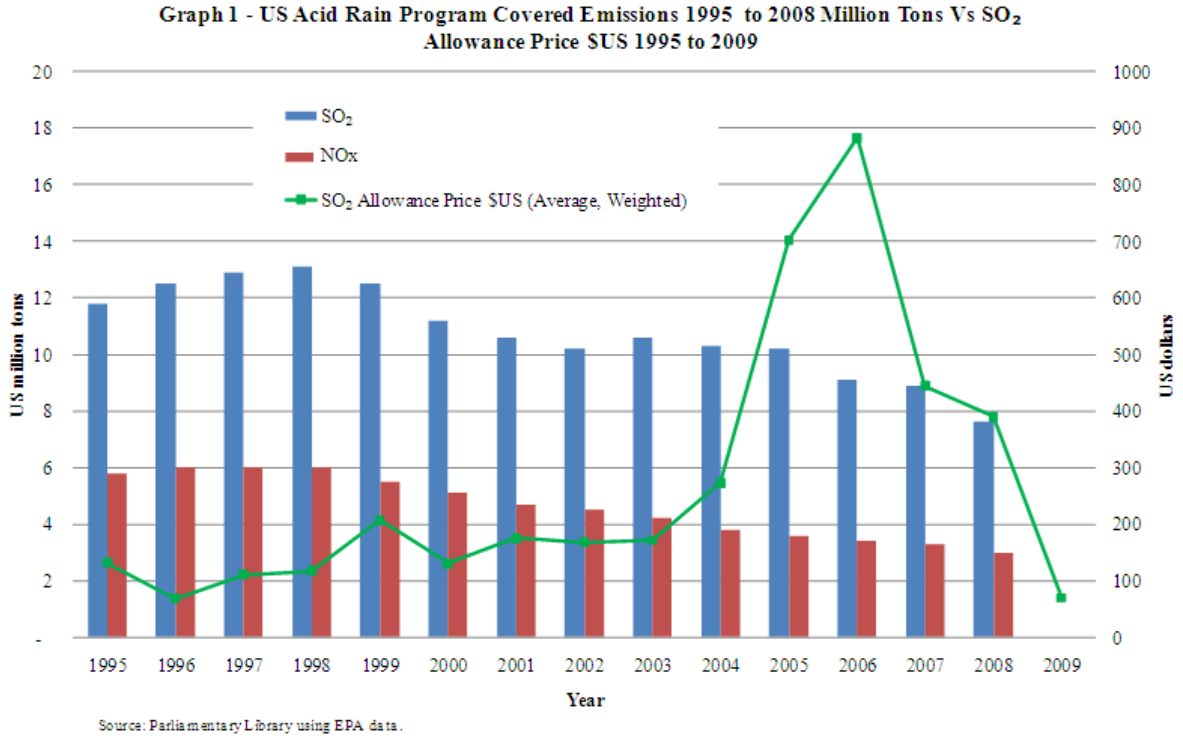
Since 1995 annual emissions of both SO_2 and NOx from facilities covered by the Acid Rain Program have declined by 64 and 51 per cent respectively.[12] Graph One shows this decline,

10. US Environmental Protection Agency, 'Clean Air Markets, Acid Rain Program, Phases and Reductions', *website*, viewed 26 August 2009, http://www.epa.gov/airmarkets/progsregs/arp/basic.html

11. In 2007 some 34 per cent of Australia's GHG emissions came from the electricity, gas and water industries collectively. Australian Government, Department of Climate Change, *Australia's national greenhouse accounts, national inventory by economic sector 2007*, Canberra, May 2009, p. 1, viewed 11 September 2009, http://www.climatechange.gov.au/inventory/2007/pubs/NIES.pdf

12. Figures based on US Environmental Protection Agency (EPA) emissions data. Data sourced from EPA, Clean Air Markets Division, Maps and Data, *website*, viewed 16 September 2009,

as well as the US Environmental Protection Agency (EPA) average SO_2 emissions permit price in each year.[13]



The most dramatic reductions appear to have occurred after the permit price rose sharply during 2004 and 2006. In percentage terms the most substantial annual declines were:

- for SO_2 between 2007 and 2008 a fall of 15 per cent and between 2005 and 2006 a fall of 8 per cent, and
- for NOx, between 2003 and 2004 a fall of 9.7 per cent and between 2007 and 2008 a fall 8.7 per cent.[14]

This suggests that substantial emissions reductions arising from a trading scheme lag rising or high permit prices. This is not an unexpected outcome, as it takes time to install a newer, more efficient, plant at existing facilities, or new generating facilities. Whether the rate in

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http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=allowances.wizard&AQW_datasetSelection=

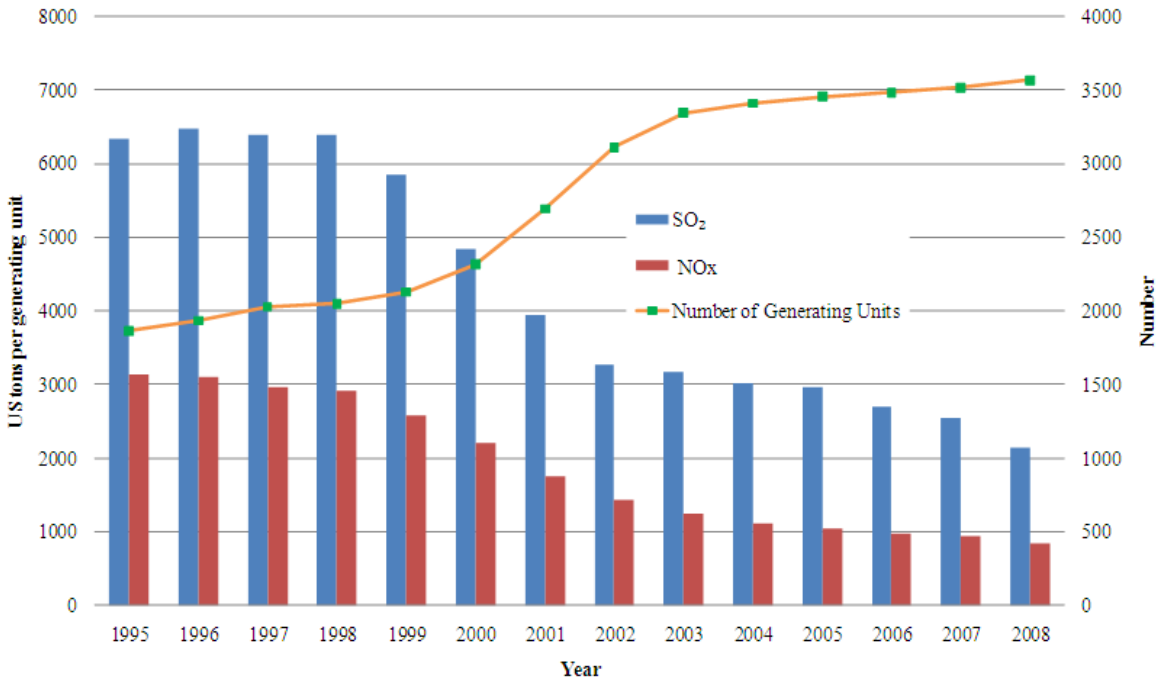
13. Prices are in nominal $US, and are the average EPA Acid Rain Program Permit price for a particular year weighted by the number of permits in each successful bid.

14. Calculations by author based on EPA data.

emissions reduction illustrated in the above graph continues, in view of the comparatively low permit price for 2009, remains to be seen.

Graph One does not illustrate whether any efficiency gains were achieved by the Acid Rain Program. Graph Two shows the decline in emissions per individual generating unit covered by the scheme and the increase in the number of individual generating units between 1995 and 2008.

Graph 2 - US Acid Rain Program Emissions and Generating Unit 1995 to 2008



Source: Parliamentary Library using EPA data.

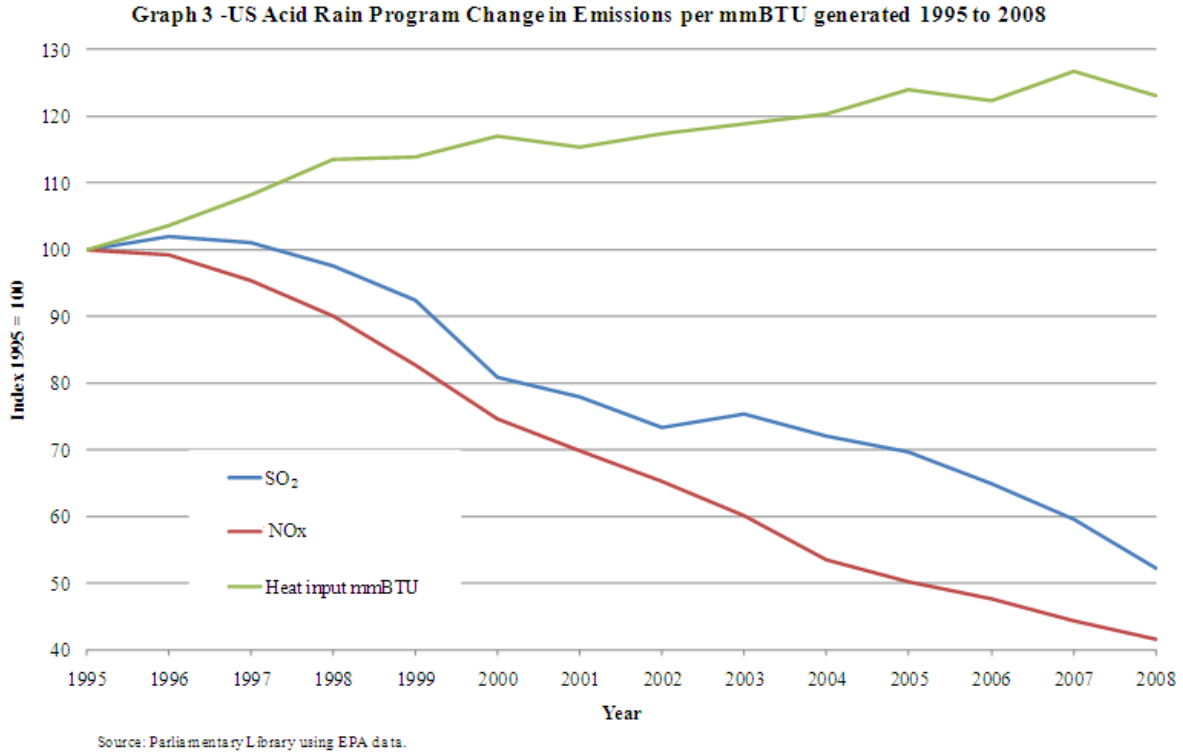
The remarkable point arising from Graph Two is that emissions per individual generating unit continue to decline as the number of individual units increase. This suggests that large efficiency gains are being made from the deployment of newer generating units. Another source of declining emissions was the shift to low sulphur coal and petroleum/natural gas fuels.[15]

Substantial gains in efficiency appear to have occurred during a period of relative permit price stability (that is, between 1999 and 2003). Further gains occur during the period of comparatively high nominal permit prices (2005 to 2007). This suggests that other aspects of the Acid Rain Program leading to the deployment of newer generating units with more efficient combustion methods (and associated emissions scrubbing technology) and fuel

15. D Burtraw, D Evans, A Krupnick, K Palmer & R Toth (2005) *Economics of pollution trading for SO_2 and NO_X*, Discussion Paper, Resources for the Future, Washington DC, pp. 22 and following, viewed 11 September 2009, http://www.rff.org/documents/RFF-DP-05-05.pdf

substitution may be causing these efficiency gains. However, high permit prices also have an impact in this area as the rate at which new generating units and associated emissions control technology are deployed flattens out.

It could be argued that these declines in emissions are being realised by simply burning less fuel. That is, as the energy intensity of the US economy declines reductions in emissions are being realised simply by burning less fuel.[16] Graph Three illustrates the decline in emissions per million British Thermal Units (mmBTU) of heat input in power generation between 1995 and 2008.



The above graph is based on the percentage rates of change in these outcomes between 1995 and 2008. The top line indicates that, overall, increasing amounts of heat are being produced in the increasing number of generating units covered by the Acid Rain Program. More, not less, fuel was burnt. However, the SO_2 and NOx emissions per mmBTU produced decline significantly over the period in question.

16. The energy intensity of the United States, measured by energy consumed per unit of gross domestic product, has been steadily falling. Between 1973 and 2005, and is projected to continue to fall. International Energy Agency, *Energy policies of IEA countries, The United States 2007 Review*, Paris 2008, p. 57, viewed 11 September 2009, http://www.iea.org/textbase/nppdf/free/2007/us2007.pdf

What about CO_2?

Most of the public attention in relation to global warming has been on the effect of carbon dioxide (CO_2) emissions. The control of CO_2 emissions was not the objective of the Acid Rain Program, but the importance of this GHG requires that this program's performance in this area at least receive a comment. How then have CO_2 emissions fared under the Acid Rain Program?

Between 1995 and 2008 CO_2 emissions increased by 16 per cent from the generation units covered by the Program. However, over this period, CO_2 emissions:

- fell by 39 per cent per generation unit deployed, and
- fell by 0.5 per cent per mmBTU.

Given the increasing number of generation units, and increasing amount of fuel burnt over this period, these are still very good results for a programme that was aimed only at SO_2 and NOx emissions reduction.[17]

A wider application?

An EPA review of the Program found that it had been an overwhelming success in reducing SO_2 and NOx emissions.[18] But it concentrated on emissions from just one industrial sector. How applicable is its success in considering the wider application of the cap-and-trade schemes to the emissions of an entire economy? A comprehensive 2005 academic review of the Program found that:

- cap-and-trade programs have proven to be an effective way to protect the environment
- the SO_2 cap-and-trade program has generated sizable cost savings over command and control approaches and there is evidence that they have also induced technological improvement
- the SO_2 allowance market appears reasonably efficient but not all of the potential cost savings available from trading have been realized, and
- the efficiency of allowance trading would be increased if emission allowances were distributed initially through a revenue-raising auction.

With regard to lessons for using the cap-and-trade approach to regulate other pollutants the paper suggests that:

17. Percentage change figures calculated by author using EPA data.

18. US EPA, *Acid rain program 2004 progress report*, Washington, October 2005, viewed 11 September 2009, http://www.epa.gov/airmarkets/progress/docs/2004report.pdf

- all of its conclusions regarding the use of cap and trade for SO_2 generally hold for CO_2, and
- an important difference between CO_2 and the other pollutants is the issue of allowance allocation. The costs of CO_2 reductions may be much larger than previous programs, and inefficiency created by a free distribution of allowances may be much more significant.

The paper also notes that the cap-and-trade approach to environmental regulation is not one-size-fits-all because the approach gives individual facilities the opportunity to tailor compliance activities to minimize cost while achieving society's environmental goals. Moreover, the paper acknowledges that the cap-and-trade approach is not suited to all types of environmental problems but, with regard to air emissions from large sources, cap-and-trade may now be the default approach.[19]

European Emissions Trading Scheme (EU ETS)

Background

The 'default status' of the cap-and-trade approach was significantly increased by the establishment of the EU ETS. European Union (EU) members have agreed to jointly fulfil their commitments to reduce greenhouse gas emissions caused by human activity under the Kyoto Protocol. [20] The overall aim of the EU ETS is to reduce greenhouse gas emissions in an economically efficient manner.

Commencing in 2005 the EU ETS covers all of the EU countries (currently some 27 in all), with coverage expanding when Phase III commences in 2013. During Phase I (2005 to 2007) it covered about 50 per cent of the European emissions of just one GHG – CO_2. From 2008 onwards it also covers the emission of nitrous oxide (N_2O) from nitric acid production in the Netherlands and Norway. The range of gases covered is to expand in Phase III of the scheme.

Currently, the scheme covers a large number of industries (about 11,300 facilities in 2008), though not agriculture or the general transport sector. During Phase I the scheme's objective was to gather operational experience, to 'learn by doing'. Phase II (2008–2012) implements the lessons of the first phase.[21]

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19. D Burtraw, D Evans, A Krupnick, K Palmer & R Toth (2005) *Economics of pollution trading for SO_2 and NO_X*, Discussion Paper, Resources for the Future, Washington DC, p. 44 and following, viewed 11 September 2009, http://www.rff.org/documents/RFF-DP-05-05.pdf

20. Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003, establishing a scheme for greenhouse gas emission allowance trading within the community and amending Council Directive 96/61/EC, Official Journal of the European Union, L 275/32, 25 October 2003.

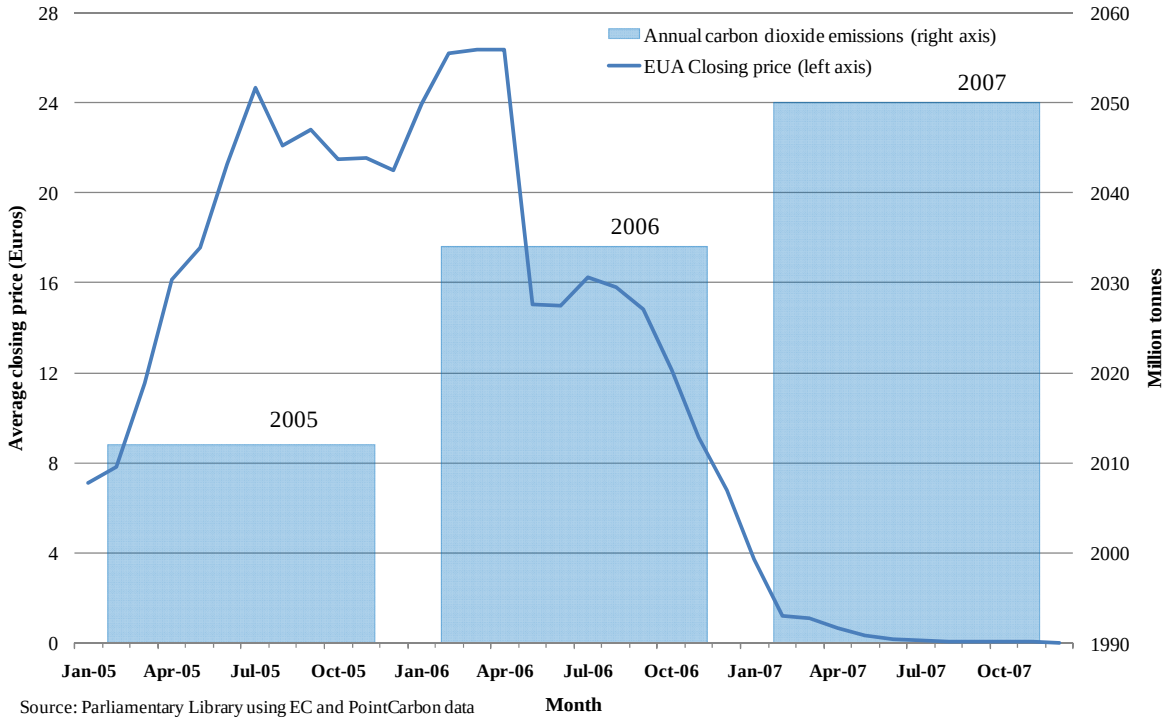
21. For further discussion on the EU ETS details and outline of Phase 2 see L Nielson, *The European Emissions Trading System – Lessons for Australia*, Research Paper, no. 3, 2007–08,

By any measure, the scheme can only be regarded as a work in progress, with its final design only being progressively implemented. In these circumstances any failure of the EU ETS to reduce emissions cannot be proof that the cap-and-trade concept is ineffective. However, any reduction in emission due to the scheme is a powerful vindication of the concept; for if it produces these results when only half formed – what could it achieve when fully implemented?

Emissions performance

The EU ETS' records in its first Phase are for emissions of CO_2 only. Graph Four shows the verified CO_2 emissions between 2005 and 2007 and the average monthly price of the European Emissions Allowances (EUA) traded under that scheme.[22]

Graph 4 EU ETS Covered CO_2 Emissions and EUA prices 2005 – 2007



Source: Parliamentary Library using EC and PointCarbon data

Parliamentary Library, Canberra, 20 August 2008, viewed 27 August 2009, http://www.aph.gov.au/library/pubs/rp/2008-09/09rp03.pdf

22. Emissions data comes from European Commission, *Emissions trading: 2007 verified emission from EU ETS business*, media release, Brussels, IP/08/787, 23 May 2008. Monthly price data based mainly on spot EUA prices for EUAs for delivery in that year. That is, the price data is for allowances for surrender by 31 December 2005, 2006 and 2007 data based on the average monthly spot prices for these allowances in each year. The author gratefully acknowledges the assistance of PointCarbon for providing the daily prices on which these monthly prices were based. EUAs are emissions allowances. Each EUA equals one tonne of CO_2 emitted.

There was an estimated fall in CO_2 emissions between 2004 and 2005.[23] However, emissions rose strongly throughout the first trading period; with the rise in 2006 and 2007 being associated with a sustained collapse in the average EUA price.

Briefly, the collapse in European Union Allowance (EUA) prices came about due to the market being oversupplied with allowances, in comparison to the emissions they were meant to cover. Further, as unused EUA could not be surrendered to the Commission after 2007, they were 'dumped' on the European EUA market further adding to the oversupply. Added to this was the sustained period of economic growth during this period. Emissions could rise because there was no effective sanction, in the form of a high EUA price, to prevent it occurring. The high rates of European economic growth suggests that the rewards for increasing emissions far outweighed any associated penalties. All of which only emphasises the importance of maintaining an effective balance between demand and supply of emissions permits.[24]

As noted above, from 2008 the EU ETS covered some N_2O emissions from Norway and the Netherlands. In order to include these emissions in is statistics, the European Commission commenced to measure overall emissions in terms of carbon dioxide equivalent (CO_2-e).[25] Graph Five shows the verified CO_2-e emissions in 2007 and 2008 and the average monthly price of the EUA traded under that scheme between January 2008 and August 2009.[26]

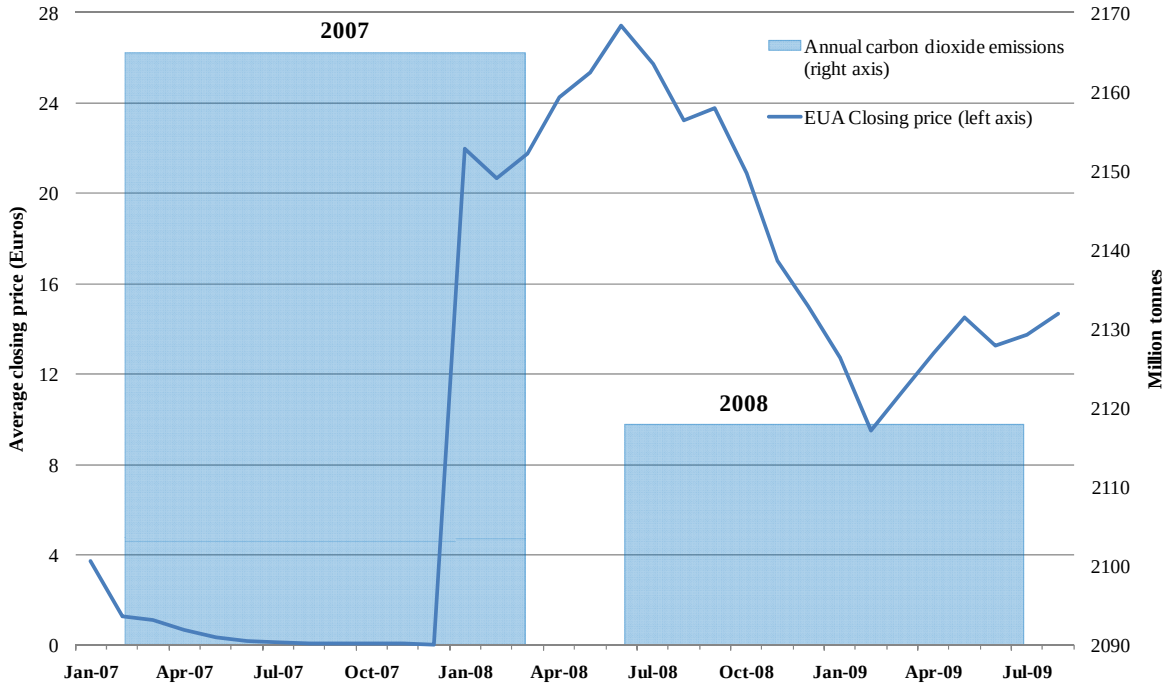
23. A Ellerman & B Buchner, 'Over-Allocation or Abatement? – A preliminary analysis of the EU Emissions trading scheme based on the 2006 emission data', MIT Joint Program on Science and Policy of Global Change, *Report No. 141*, Cambridge MA, December 2006, p.1.

24. For further discussion of this period see L Nielson, *The European Emissions Trading System – Lessons for Australia*, Research Paper, no. 3, 2007–08, Parliamentary Library, Canberra, 20 August 2008, viewed 27 August 2009, http://www.aph.gov.au/library/pubs/rp/2008-09/09rp03.pdf

25. Carbon dioxide equivalent is the amount of CO_2 and non–CO_2 GHGs that equal the global warming potential (GWP) of an equivalent amount carbon dioxide. See footnote 10 above.

26. Data from European Commission, *Emissions trading: EU ETS emissions fall 3% in 2008*, media release, Brussels, IP/09/794, 15 May 2009. Data excluded emissions data from Bulgaria, Liechtenstein and Norway. Price data from PointCarbon as above.

Graph 5 EU ETS covered CO_2-e Emissions 2007-2008 and EUA Spot Prices 2007 – 2009



Source: Parliamentary Library using EC and PointCarbon data

The strong lagging relationship between the fall in emissions and the increase in the allowance price is evident in Graph Five. This fall occurred despite a slight rise in the EU gross domestic product of 0.8 per cent in 2008. It is interesting to note that at the beginning of 2008 the European Commission reduced the number of EUAs issued by 6.5 per cent for Phase II and represented a significant reduction in the supply of such allowances.[27] Further, Phase II of the scheme allowed unused allowances from any one year to be saved for use in later years, including into Phase III commencing in 2013. This eliminates the need to dump unused allowances on the European allowance market to extract some value from them.

27. European Commission, *Emissions trading: EU ETS emissions fall 3% in 2008.* From 2013 the reduction in the number of EUAs is mandated at a rate of at least 1.74% per year compared to the average annual total quantity of allowances issued by member states in Phase II. See Article 9, *Directive 2009/29/EC of the European parliament and of the council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community*, 23 April 2009, Official Journal of the European Union, L 140/63, 5 June 2009, viewed 14 September 2009 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0063:0087:EN:PDF

Some complicating factors

The above results have to be viewed in the context of the number of facilities that were covered by the EU ETS. The following table shows the number of such facilities between 2005 and 2008.

Table 1: Number of emitting facilities covered by the EU ETS 2005–2008

Year	2005	2006	2007	2008
Number	10 282	10 605	11 572	11 359

Source: European Commission[28]

Looking at Table 1, in conjunction with the above graphs, an observer could be forgiven for noting that the rise and fall in emissions coincided with the rise and then slight fall in the number of emitting facilities covered by the scheme. Under a rule that allowed smaller emitters to opt out of the trading scheme, about 213 small facilities were no longer covered by EU ETS in 2008, compared to 2007. A condition of these smaller facilities opting out of the scheme in 2008 was that they undertake other measures to deal with their emissions.[29] All other things being equal, this opting out should not lead to a higher overall level of European GHG emissions.

The amount of GHG emissions covered by the EU ETS actually expanded by 50 million tonnes of CO_2-e in 2008 This expansion was caused by a number of factors, the initial participation of additional countries, the coverage of an additional GHG and a more harmonised approach by member states in assessing economic activities covered by the scheme.[30] Given this expansion, the fall in the number of covered facilities is not significant in interpreting the fall in emissions between 2007 and 2008.

A second possible explanation for the fall in emissions between 2007 and 2008 is that this was a period of global economic recession, leading to lesser demand for industrial products and a consequent lower level of fossil fuel use. One commentator has calculated that about 60 per cent in the fall in the EU's emissions was due to the recent economic downturn with the remaining 40 per cent reduction due to the operation of the EU ETS.[31]

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28. European Commission, *Emissions trading: 2007 verified emission from EU ETS business* and *emissions trading: EU ETS emissions fall 3% in 2008.*

29. European Commission, 'Questions and Answers on the Commission's proposal to revise the EU Emissions Trading Scheme', MEMO/08/35, 23 January 2008.

30. European Commission, *Emissions trading: 2007 verified emission from EU ETS business* and *emissions trading: EU ETS emissions fall 3%in 2008.*

31. Maïté Jaureguy-Naudin , French Institute of International Relations [IFRI] – *The EU ETS – The big baby in the bathwater* – March 2009, viewed 26 May 2009

The European Environmental Agency acknowledges that the global economic recession has indeed played a role in this outcome, but also observes that a broad range of European GHG emissions fell, not just emissions of CO_2.[32] The important point here is that a reduction in fuel use was not the only source for the fall in overall emissions between 2007 and 2008.

It is important to note that economic growth, as measured by the growth rate of European gross domestic product, did not cease during 2008. The European economy did not go backwards. The point that European GHG emissions fell while the region's economy grew (albeit modestly), is a strong indication that the link between economic growth and GHG emissions is being modified. The role of the EU ETS (particularly the fall in the number of emissions permits issued compared to 2007) should not be underestimated.

Emissions trading is but one arm of overall climate change policy. The European Union in particular has extensive renewable energy and energy efficiency programs in place. Further, individual countries apply (or are planing to apply) emissions taxes.[33] All these programs may also make contributions to the reduction in this region's GHG emissions.

But the important point is the contribution they may have made to date in reducing the EU's GHG emissions. In 2006, only 7.3 per cent of the EU's total energy consumption came from renewable sources.[34] It has a goal of generating 12 per cent of overall energy requirements from renewable sources by 2010, but is only making patchy progress towards this goal.[35] The rate at which renewable energy is being deployed is not all that rapid. Further, though environmental taxes have been in place for some time in Europe they are not overly severe and have not had a significant impact in reducing emissions.[36] If anything, these factors form a background against which the impact of the EU ETS can be gauged. Their presence does not necessarily explain fluctuations in emissions over a comparatively short time frame.

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http://www.ifri.org/frontDispatcher/ifri/publications/actuelles_de_l_ifri_1197584475485/publi_P_actuelle_edito_mars___1236871836303 .

32. European Environmental Agency, *New estimates confirm the declining trend in EU greenhouse gas emissions*, media release, 31 August 2009, viewed 8 September 2009, http://www.eea.europa.eu/highlights/new-estimates-confirm-the-declining-trend-in-eu-greenhouse-gas-emissions

33. BBC World News, 'France set to impose carbon tax', BBC.co.uk, 10 September 2009, viewed 11 September 2009, http://news.bbc.co.uk/2/hi/europe/8248392.stm

34. Latest available figures from International Energy Agency for EU27 countries, viewed 14 September 2009, http://www.iea.org/Textbase/stats/balancetable.asp?COUNTRY_CODE=30

35. EuroActive, 'Enforcement or EU Renewable Law faltering', euractive.com, 30 April 2009, viewed 14 September 2009, http://www.euractiv.com/en/energy/enforcement-eu-renewables-law-faltering/article-181863

36. T Barker, S Junanker, H Pollitt and P Summerton, 'Carbon leakage from unilateral environmental tax reforms in Europe 1995–2000', *Energy policy*, No. 35, 2007, p. 629.

Points of comparison

It is interesting to note that in the early years of the Acid Rain Program, SO_2 emissions rose rather than fell. The comparison with the EU ETS is obvious, for in its early years European CO_2 emissions rose and have now commenced falling. A possible conclusion from this comparison is that emissions trading schemes are complex and need time to be adjusted once they are set up before worthwhile results become apparent.

Further, substantial emissions falls under the Acid Rain Program occurred over time. A recent article has strongly criticized the EU ETS for not producing significant results over its first trading period and advocating that the current efforts to craft an emissions control regime in the United States not adopt the cap-and-trade model.[37] If the progress of the US Acid Rain Program can be taken as a guide perhaps the EU ETS can be allowed further time to demonstrate its potential to reduce Europe's GHG emissions.

Does it work?

If emissions appear to respond to prices over a comparatively short time frame this is an indication that the cap-and-trade schemes surveyed in this paper are effective. Generally emissions rise, or stay at a comparatively high level, when prices are low. Emissions appear to reduce after the price of emissions permits rise to higher levels.

This pattern is beginning to emerge in the case of the EU ETS. Though the effect of the EU's renewable energy policy (increasing overall energy sourced from renewable sources to 20 per cent by 2020[38]), will have an increasing effect, progress is slow and the effect to date is likely to have been minor. Likewise with environmental taxes, their presence cannot explain either the rise in emissions or their subsequent fall between 2007 and 2008. Nor is the recent 'slowdown' in economic growth in itself an adequate explanation for this fall in European emissions. Against this background the EU ETS has been effective in bringing about part of this outcome.

This link is more pronounced in the case of the US Acid Rain Program. Currently, US environmental policy does not contain the same types of renewable energy and energy

37. Peter Fairley, 'Carbon Trading on the Cheap', *Technology review*, July/August 2009, p. 72 and following. The US House of Representatives recently passed the *American Clean Energy and Security Act of 2009* which legislates to establish a US cap-and-trade scheme (amongst other things). This Act is now before the US Senate.

38. European Commission, *Directive 2009/28/EC of the European parliament and of the council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC* (Text with EEA relevance), 23 April 2009, viewed 1 September 2009, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0028:EN:NOT

efficiency measures as applied in Europe. This makes the success of the US Acid Rain Program more instructive due to the relative absence of these complicating factors.

So overall, emissions trading, specifically a cap-and-trade style schemes, appears capable of making substantial cuts in emissions. But as with any policy, such schemes have to be carefully designed to achieve the intended outcome.