LNG: THE KEY FUEL IN PROGRESSING TO A SUSTAINABLE ENERGY FUTURE

A REVIEW OF WHY AND HOW AUSTRALIA'S LNG PRODUCTION AND EXPORT INDUSTRY SHOULD BE SHIELDED UNDER THE CARBON POLLUTION REDUCTION SCHEME.

THIS REVIEW WAS COMMISSIONED BY WOODSIDE ENERGY LTD BUT REPRESENTS THE INDEPENDENT VIEWS OF RESOURCESLAW INTERNATIONAL.

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EXECUTIVE SUMMARY

The only solution to the climate change problem is a global one. Limiting Australia's mitigation response to domestic policy measures is sub-optimal and will cause collateral damage to Australian industry, deterring investment and employment growth.

Natural gas offers the most immediate method of transitioning to a lower-emissions global economy.

Liquefied natural gas (LNG) is the key fuel in progressing to a sustainable energy future. It is a major source of safe, cleaner energy, offering the lowest emissions of any fossil fuel. The LNG industry actually reduces global carbon pollution by displacing higher emissions fuels. It also alleviates the energy security concerns of importing countries.

Over the next 10 – 15 years, Australian LNG exports could reduce global emissions by up to as much as 140 million tonnes per annum, equivalent to 20% of Australia's 2006 emissions.

LNG has a pivotal long-term role as the balancing and back-up fuel in electricity systems that rely on renewable energy. Therefore, alongside carbon capture and storage, LNG merits immediate policy priority.

Under Australia's proposed Carbon Pollution Reduction Scheme (CPRS), the LNG industry is a likely casualty. Diminishment of Australian LNG exports will increase, not decrease, global greenhouse gas emissions and result in irreversible impacts on the Australian economy for no environmental gain. This constitutes a serious policy failure.

The Australian Government has a choice of four measures to remedy policy failure with respect to the treatment of LNG under the CPRS: (i) scheme exemption, (ii) acknowledging overseas emission reductions, (iii) full allocation of emission permits or (iv) tax relief.

LNG projects are highly capital intensive. A recent report by Concept Economics has highlighted that changes in costs, such as those imposed by an ETS, are enough to make many LNG projects unviable. Even with a 60% level of permit allocation, output of the Australian LNG industry would still be between 16 and 37% below the reference case level in 2020 and between 39 and 54% down on what it would otherwise be by 2030.

The purpose of this paper is to review the efficacy of Australia's climate change policy as promulgated by the Government, not to question what the policy should be.

26 February 2009

1. REDUCING EMISSIONS FASTEST

KEY POINTS

Natural gas offers the fastest and most feasible method of transitioning to a lower-emissions global economy.

Over the next 10 – 15 years, Australian LNG exports could reduce global emissions by up to as much as 140 million tonnes per annum, equivalent to 20% of Australia's 2006 emissions.

When used as a fuel in electricity generation, LNG is more energy and emissions-efficient than all other fossil fuels, more than offsetting the emissions from the earlier production and transportation stages.

The displacement of a single coal-fired power station by installing a natural gas-fired power station of the same electricity generation capacity will more than halve the volume of emissions produced from the displaced installation.

Unlike other industries that the CPRS may be targeting, LNG is embryonic and with the right policy settings has potential for substantial growth. The national interest will not be served by constraining its future growth.

There is considerable unexploited potential for further uptake of Australian LNG exports to displace coal in China, Japan, Korea and Taiwan.

Natural gas is of increasing importance to the powering of the global economy and LNG technology makes natural gas available throughout the world.

LNG's life-cycle carbon footprint requires to be evaluated at all stages: production, transportation, regasification and end-use. When used as a fuel in electricity generation, LNG is more energy and emissions-efficient than all other fossil fuels, more than offsetting the emissions from the earlier production and transportation stages.

The displacement of a single coal-fired power station by installing a natural gas-fired power station of the same electricity generation capacity will more than halve the volume of emissions produced from the displaced installation. [1]

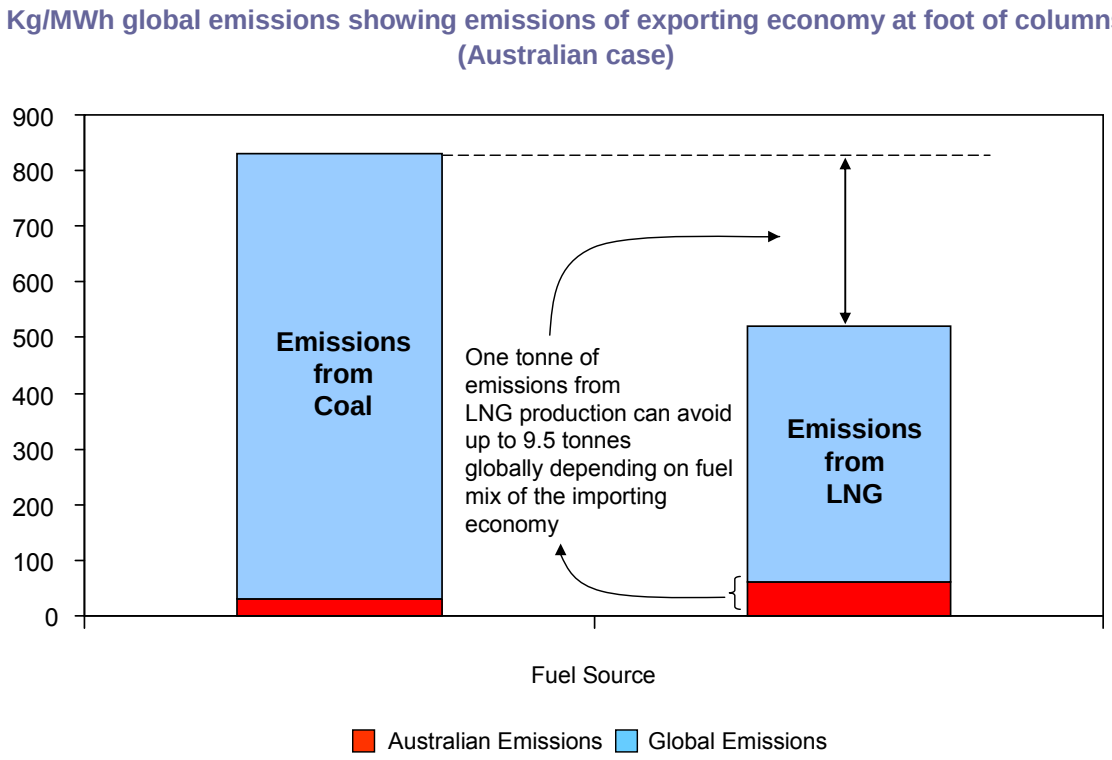
Although LNG production requires energy and is itself emissions-intensive, for every tonne of greenhouse gas emitted in the production of Australian LNG, between 4 and 9.5 tonnes of

[1] Center for Liquefied Natural Gas, "Life Cycle Assessment of GHG Emissions from LNG and Coal Fired Generation Scenarios: Assumptions and Results", PACE, Fairfax, Virginia, US, 3 February 2009.

greenhouse gas emissions are avoided in customer countries if LNG is used to displace higher-emission fuels in electricity generation.[2] This is depicted in Figure 1.

The level of global reduction will depend on the fuel mix of each importing economy's power system. The emission reductions are highest where LNG displaces coal.

Figure 1: Displacement of Coal by LNG



For at least the next two decades, natural gas offers the most immediate method of transitioning to a lower emissions global economy. Over time, this may be matched by gains made in renewable technologies and in clean coal, including carbon capture and storage (CCS).

The LNG industry brings with it advanced technological skills, including those needed to support CCS. Many of the challenges facing clean coal technology will be supported by the knowledge and skills available through the LNG industry.

If Australian LNG exports are able to grow in line with industry forecasts of up to 50 to 60 million tonnes per annum over the next 10 – 15 years [3], global emissions could be reduced by as much as 140 million tonnes per annum.[4]

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[2] CSIRO, "Lifecycle Emissions and Energy Analysis", 1996 and Worley Parsons, "Greenhouse Gas Emissions Study of Australian LNG", Woodside Energy Ltd, 2008

[3] APPEA, "Platform for Prosperity", Australian Upstream Oil and Gas Industry Strategy, April 2007.

[4] Worley Parsons, footnote 2 above. This level of emissions reduction can be achieved without harming Australia's coal industry, which can be expected to maintain its role as the world's leading exporter for as long as

This potential reduction is equivalent to 20% of Australia's 2006 emissions.

Unlike other industries that the CPRS may be targeting, LNG is embryonic and with the right policy settings has potential for substantial growth. These are not the characteristics of a mature or decaying Australian industry. The national interest will not be served by constraining its future growth.

The unexploited potential for further uptake of LNG in Australia's main customer countries of Japan, Korea and Taiwan is indicated by the information provided in Appendix A. Australia is still a minority player in these markets and faces keen international competition, both from higher-emissions fuels and from rival LNG suppliers from Indonesia, Malaysia, Papua New Guinea, Russia and the Middle East.

As discussed in Section 3, constraining competition in global LNG trade by placing carbon costs on only Australian LNG will deliver a most undesirable outcome – investment will be directed away from Australia's underdeveloped gas resources toward competitor LNG projects. Of even greater concern, the use of higher-emissions fuels will increase at the expense of cleaner natural gas.

global energy demand continues to grow. The International Energy Agency projects that the global share of coal as a fuel in power generation will continue to rise, accounting for more than a third of projected incremental demand to 2030: IEA, "World Energy Outlook 2008", Paris, France, November 2008.

2. LNG'S LONG-TERM ROLE IN SUSTAINABLE ELECTRICITY SYSTEMS

KEY POINTS

LNG is the key fuel in progressing to a sustainable energy future. It is a major source of safe, cleaner energy, offering the lowest emissions of any fossil fuel. The LNG industry actually reduces global carbon pollution when it displaces higher emissions fuels.

LNG is the only energy export, other than nuclear fuel, that is available today and can both reduce the rate of growth of global emissions and alleviate the energy security concerns of importing countries, by providing them with diversification of their supply sources.

Natural gas supplied as LNG also has a pivotal long-term role as the balancing and back-up fuel in sustainable electricity systems that will increasingly rely on intermittent forms of renewable energy, such as wind power and solar energy.

(a) The World Must Move to a Sustainable Energy Future

As the International Energy Agency (IEA) has emphasised:

> *"… our energy system remains at a crossroads and … current trends in energy supply and consumption are unsustainable, environmentally, economically, and socially."*[5]

According to the Intergovernmental Panel on Climate Change (IPCC), a transition to zero and low-carbon technologies is required."[6] For the reasons outlined in this review, LNG is the key low-carbon technology to achieve this.

Growth in global energy demand, driven by emerging economies such as China, makes an urgent increase in international LNG trade imperative. With the right government policies in place, Australian LNG producers can respond by developing new export projects and accelerating the supply of substantial volumes of LNG to countries that are prepared to increase the share of natural gas in their energy mix, displacing coal and other higher-emissions fuels.

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[5] Nobuo Tanaka, Executive Director, IEA, speech at the 50th anniversary of the Nuclear Energy Agency on 16 October 2008.

[6] *"Global dependence on fossil fuels has led to the release of over 1100 G CO_2 into the atmosphere since the mid-19th century. Currently, energy-related greenhouse gas emissions, mainly from fossil fuel combustion for heat supply, electricity generation and transport, account for around 70% of total emissions … the world is not on course to achieve a sustainable energy future. The global energy supply will continue to be dominated by fossil fuel for several decades. To reduce the resultant greenhouse gas emissions will require a transition to zero and low-carbon technologies",* IPCC Fourth Assessment Report, 2007.

(b) LNG is the Key Fuel in Progressing to a Sustainable Energy Future

LNG is unique. It is a major source of safe, cleaner energy, offering the lowest greenhouse gas emissions of any fossil fuel. LNG is the key fuel in enabling the world to progress to a sustainable energy future because LNG is able to contribute immediately to global emissions reduction. The LNG industry should not be characterised as a polluting industry; it is actually a carbon pollution reduction industry.

The LNG industry was brought into existence for the very purpose of supplying cleaner energy to countries with insufficient natural gas resources of their own and who wished to diversify their energy portfolios.[7]

LNG is the only energy export, other than nuclear fuel, that is available today and can both reduce the rate of growth of global emissions and alleviate the energy security concerns of importing countries, by providing them with diversification of their supply sources.

LNG does not require any new technology – it is available now – and it has clear and well-established pricing mechanisms in place.

The key role of natural gas has been acknowledged by the IPCC[8] as well as by interested Non-Governmental Organisations. For example, WWF International has recommended the scale-up of natural gas use in the short-term to avoid locking in higher emissions from coal. [9]

[7] Natural gas liquefaction dates back to the 19th century when British chemist and physicist Michael Faraday experimented with liquefying gases. The first commercial liquefaction plant was built in Cleveland, Ohio, in 1941, raising the possibility of its transportation to distant destinations. In January 1959, the world's first LNG tanker carried an LNG cargo from Lake Charles, Louisiana to Canvey island, United Kingdom. This demonstrated that large quantities of LNG could be transported safely across the oceans. In 1964, Algeria became the world's first LNG exporter and the United Kingdom became the world's first LNG importer.

With the development of the North West Shelf Project in 1989, Australia joined the ranks of competing LNG exporters.

[8] *"Innovative supply-side technologies, on becoming fully commercial, may enhance access to clear energy, improve energy security and promote environmental protection at local, regional and global levels. They include thermal power plant designs based on gasification; combined cycle and super-critical boilers using natural gas as a bridging fuel; the further development and uptake of CCS; second-generation renewable energy systems; and advanced nuclear technologies.",* IPCC Fourth Assessment Report, 2007.

[9] *"In the short term, an increase in the use of natural gas as a "transition fuel" can play a significant part in avoiding the locking in of higher emissions from coal, thereby buying more development time for other energy solutions to grow. While this is more applicable in some countries than others, gas should be scaled up in the short term (where it can avoid coal use),without bringing any harmful biodiversity impacts. The even lower carbon emissions for gas used with carbon capture and storage technology are also taken into account. WWF therefore sees natural gas as a bridging fuel with important applications, provided that energy security issues can be resolved. The scenario includes a provision of natural gas displacing coal which peaks in supply at about 52EJ in 2023. It is assumed that this can then become sequestered within the CCS wedge as technology comes on line",* WWF International, "Climate Solutions: The WWF Vision for 2050", Gland, Switzerland, 2007, p 21.

(c) LNG Has a Pivotal Long-Term Role

Natural gas supplied as LNG is not just a bridging fuel - it has a pivotal long-term role as the balancing and back-up fuel in electricity generating systems that will increasingly rely on intermittent forms of renewable energy, such as wind power and solar energy. [10] According to the Australian Clean Energy Council, gas can serve as *"the perfect complement to increasing levels of renewable energy in our electricity supply"*.[11]

Increased utilisation of natural gas is one of the key strategies of oil-dependent importing countries that wish to minimise their energy security risks. Electricity grids, including the new type of "smart grids" currently being developed, must supply electricity to consumers on a continuous basis, most importantly at peak times. Natural gas-fired power plants start up quickly and provide "peaking" capacity. As such, natural gas is increasingly indispensable in the fuel mix for electricity systems. Coal-fired and nuclear base-load plants require longer periods to ramp up to full capacity. The immediate availability of natural gas therefore has an economic value to electricity systems above the energy produced.

The most ardent campaigners for renewable energy, including Greenpeace, acknowledge the role of natural gas as a back-up source of energy and as the fuel that enables cogeneration of both heat and power.[12] The economic and technical flexibility of gas-fired power generation by contrast with coal has long been recognised, with its role extending from baseload through intermediate to peaking capacity.

On a broader level, the integration of natural gas supply systems and electricity systems carries a range of economic and environmental benefits and the prospect of building a sustainable energy future.[13]

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[10] *"Electricity systems must supply power in close balance to demand. The average load varies in predictable daily and seasonal patterns, but there is an unpredictable component due to random load variations and unforeseen events. To compensate for these variations, additional generation capacity is needed to provide regulation or set aside as reserves. Generators within an electrical system have varying operating characteristics: some are base-load plants; others, such as hydro or combustion turbines, are more agile in terms of response to fluctuations and start-up times. There is an economic value above the energy produced to a generator that can provide these ancillary services. Introducing wind generation can increase the regulation burden and need for reserves, due to its natural intermittency. The impact of the wind plant variability may range from negligible to significant depending on the level of penetration and intermittency of the wind resource", D Justus*," International Energy Technology Collaboration and Climate Change Mitigation, Case Study 5: Wind Power Integration into Electricity Systems", OECD/IEA, Paris, France, 2005.

[11] According to the Australian Clean Energy Council: *"Both natural and coal-seam gas can deliver dramatic improvements in Australia's electricity greenhouse emissions very quickly and cost-effectively. The technology is here today, being used in Australia and in widespread use around the world where gas is typically the default technology for power generation. Gas can also serve as the perfect complement to increasing levels of renewable energy in our electricity supply. Gas power generation is highly flexible in its ability to ramp-up and down, vastly superior to coal-fired power stations that tend to be very sluggish and inflexible in their output. In fact, gas already plays a critical role in maintaining the security of current electricity supplies by rapidly altering its output to cope with sudden changes in demand and the sudden breakdowns of large coal-fired power stations."* Clean Energy Council, "Clean Energy Fact Sheets: All About Gas," Melbourne, Australia, 2008.

[12] Greenpeace International and European Renewable Energy Council, "Energy Revolution: A Sustainable Global Energy Outlook", Brussels, Belgium, October 2008, pp 12, 30.

[13] See the recent findings of the World Energy Council, "Regional Energy Integration in Latin America and the Caribbean", London, UK, December 2008.

3. THE IMPACT OF THE CPRS ON LNG CONSTITUTES A POLICY FAILURE

KEY POINTS

The only solution to the climate change problem is a global one. Limiting the response to domestic policy measures is sub-optimal and will cause collateral damage to the Australian economy, deterring investment and employment growth.

Under Australia's proposed Carbon Pollution Reduction Scheme (CPRS), the LNG industry is a likely casualty. Diminishment of Australian LNG exports will increase, not decrease, global greenhouse gas emissions and result in irreversible impacts on the Australian economy for no environmental gain. This constitutes a serious policy failure.

The purpose of this paper is to review the efficacy of Australia's climate change policy as promulgated by the Government, not to question what the policy should be.

Because of LNG's lower emissions intensity and its pivotal long-term role as the balancing and back-up fuel in electricity systems that rely on intermittent energy forms, LNG merits immediate policy priority alongside carbon capture and storage.

LNG projects are highly capital intensive. A recent report by Concept Economics has highlighted that changes in costs, such as those imposed by an ETS, are enough to make many LNG projects unviable. Even with a 60% level of permit allocation, output of the Australian LNG industry would still be between 16 and 37% below the reference case level in 2020 and between 39 and 54% down on what it would otherwise be by 2030. [see reference source: footnote 17]

(a) Policy Solutions for a Global Environmental Problem

Climate change is a global environmental problem and, as such, the solution must transcend political boundaries. Around the world, countries are moving to impose different policy solutions at very different speeds. In order to be effective in environmental terms, policy solutions must be uniform across groups of countries or industry sectors.

Given the scale of investment involved and LNG's key role in reducing global emissions, LNG projects will be particularly sensitive to such policy solutions.

(b) The Australian Government's Climate Change Policy

On 15 December 2008, the Prime Minister released the Government's CPRS White Paper, emphasising the Government's commitment to *"make Australia part of the global climate change solution – not just part of the global climate change problem".*

Policy, as distinct from law, is not binding on government and is subject to discretionary, unpredictable change. It is therefore best left as uncomplicated as possible. With a subject as complex as global climate change, this is difficult, as is readily apparent from the White Paper.

The White Paper spells out three policy pillars of the Government's climate change strategy. The first pillar is to reduce Australia's own greenhouse gas emissions, which the White Paper terms "the domestic mitigation strategy"; the second is to adapt to climate change that we cannot avoid; and the third is to help shape a global solution to climate change.

The structure of the Government's climate change policy is depicted in Table 1 below. The White Paper does not claim to be the end point of policy development, although it purports to be the foundation on which an ongoing response will be built.

Table 1: The Structure of Australia's Climate Change Policy

POLICY GOAL **CONTRIBUTE TO THE GLOBAL SOLUTION TO A GLOBAL PROBLEM**	
Policy Pillar	**Policy Measures**
First pillar: reduce Australia's emissions ("the domestic mitigation strategy")	(1) The CPRS ("the primary mitigation measure") to commence on 1 July 2010 with emissions caps to be progressively lowered and various assistance measures to be administered, including the Climate Change Action Fund (2) A Renewable Energy Target (RET) of 20% by 2020 (3) Carbon Capture and Storage (CCS) (4) Energy Efficiency
Second pillar: adapt to climate change that we cannot avoid	(1) National Adaptation Framework (2) Water for the Future Fund
Third pillar: help shape a global solution	(1) Negotiation of the post-Kyoto international framework (2) Other international initiatives, such as: - Global CCS Institute - International Forest Carbon Initiative - Asia-Pacific Partnership on Clean Development and Climate

With a global problem, and the community sentiment surrounding it, it is a natural expectation that the Government would give priority to the third pillar. If it had, the risk of policy discord would have been reduced. As the White Paper itself emphasises, *"the only solution to the climate change problem is a global one."*[14]

In addition to the CPRS, which, under the first policy pillar, is the Government's primary mitigation measure, the White Paper affords exceptional policy treatment to three other measures, namely the Renewable Energy Target (RET), Carbon Capture and Storage (CCS) and Energy Efficiency.[15] Exceptional policy treatment aimed at maintaining a level playing field or improving the economics of Australia's LNG export industry should be a priority.

The purpose of this paper is to review the efficacy of Australia's climate change policy as promulgated by the Government, not to question what the policy should be.[16]

(c) A Serious Policy Failure in Relation to the LNG Industry

We emphatically agree with the emphasis in the White Paper that the only solution to the climate change problem is a global one. Limiting the mitigation response to domestic policy measures is sub-optimal and will cause collateral damage to particular industries, which can in turn perpetuate or aggravate problems in other areas, such as energy security. While it is imperative that global energy demand is met by cleaner fuels like LNG, importing countries that are vulnerable to energy supply disruptions must have a diverse range of fuels and a diversity of supply sources available to them.

By limiting the mitigation response to domestic measures, the likely consequence of the CPRS will be to increase, not reduce, global emissions and cause collateral damage to the Australian LNG sector by dampening investment in LNG export projects for no environmental gain. This constitutes a serious policy failure, illustrative of an inability of a policy measure to bring about an intended result.

If an adverse policy consequence for the LNG industry is actually intended, it would be completely irrational in climate change terms.

As highlighted in a recent report by Concept Economics,[17] LNG projects are highly capital intensive and changes in costs, such as those imposed by an ETS, are enough to make many projects unviable. The report confirms that even with a 60% level of permit allocation, *"output of the Australian*

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[14] White Paper, p 3-1.

[15] *"The [RET] measure will help ensure that renewable energy technologies can be readily deployed when the price signal under the Scheme makes those technologies more competitive … CCS will be a key component of the global solution to climate change and is a foundation element of the Government's emissions reduction strategy,"* White Paper p 19-4.

[16] Questions could nonetheless be asked, for example, whether the creation of an artificial market in carbon credits at a domestic level is really the most efficient way of participating in a global environmental solution; whether it is good policy to expose investors in any export-dependent industry to the burden of carbon costs while Australia's international competitors remain unburdened; or whether complementary domestic mitigation measures such as the RET would be necessary if the CPRS were to be effective as the primary mitigation measure.

[17] Brian Fisher, "A Peer Review of the Treasury Modelling of the Economic Impacts of Reducing Emissions, prepared for Senate Select Committee on Fuel and Energy", Concept Economics, Canberra, 30 January 2009.

LNG industry would still be between 16 and 37% below the reference case level in 2020 and between 39 and 54% down on what it would otherwise be by 2030".

There is a need to amend the CPRS so that it does not inhibit progress towards a global solution to climate change and does not diminish the contribution of Australia's LNG exports to the global environmental good.

(d) LNG Merits Immediate Policy Priority Alongside Technologies under Development Such as Carbon Capture and Storage (CCS)

The Government's third policy pillar of helping to shape a global solution should not be subordinated to the domestic mitigation strategy. Policy priority to accelerate LNG exports would be consistent with shaping a global solution.

As an existing, established, lower-emissions technology, the acceleration of LNG exports can have an immediate effect on global emissions reduction. For this reason alone, LNG merits immediate policy priority.

Unlike LNG technology, CCS and other low-emissions technologies are still in the course of development. When fully proven and installed, CCS is likely to be of great environmental benefit. At this stage, however, considerable uncertainty remains about the cost and practicality of CCS on a broad scale within a realistic time frame, including the increased water requirements associated with the carbon capture stage of the process.[18]

[18] See US National Energy Technology Laboratory, "Water Requirements for Existing and Emerging Thermoelectric Plant Technologies", August 2008.

4. REMEDYING THE POLICY FAILURE

KEY POINTS

Many countries are moving at greatly different speeds to reduce emissions and some countries are scarcely moving at all.

Any domestic emission reduction scheme that has the effect of diminishing LNG exports risks increasing, not decreasing, global emissions. The CPRS, by limiting the response to domestic measures, increases the likelihood of diminishing LNG exports, of distorting international LNG trade and of raising competitiveness concerns for investors.

The Government has a choice of measures to remedy its policy failure with respect to the treatment of LNG under the CPRS: (i) scheme exemption, (ii) acknowledging overseas emission reductions, (iii) full allocation of emission permits or (iv) tax relief.

In addition, a future international sectoral agreement could allow for a small proportion of the overseas emission reductions to be credited against emissions in the exporting country and provide a bridge towards achieving an eventual global solution to the climate change problem. This is elaborated in Appendix B.

The goal of climate policy is to reduce global greenhouse gas emissions.[19] However, many countries are moving at greatly different speeds and some countries are scarcely moving at all. The CPRS, by limiting the response to domestic measures, carries the risk of diminishing LNG exports and distorting international LNG trade. It also raises competitiveness concerns for investors.

By accelerating its exports of LNG, Australia can contribute directly and immediately to the global climate change solution. In effect, Australia can thereby speed up global emission reductions.

Without the development of additional Australian LNG projects, increasing international demand for energy is likely to be met by higher emissions fuels and by LNG suppliers who do not face a carbon cost. Both outcomes will inflict economic loss on Australia for no environmental gain. Global emissions would be likely to rise as a consequence of constraining the growth of the LNG industry in Australia.

[19] *"There is negligible climate change benefit from Australia acting alone, so any unilateral action should be transitional, temporary, and directed at developing an effective global agreement."* Ross Garnaut, "Climate Change and the Australian Agricultural and Resource Industries", paper to the 53rd annual conference of the Australian Agricultural and Resource Economics Society, Cairns, 11 February 2009.

In a global economy, there is an increasing tendency of industry to move towards low-cost producing regions. It is therefore desirable for comparable, if not uniform, emissions pricing to be applied to all LNG producers. [20]

In marked contrast with other international proposals, the White Paper does not contemplate a phased approach but proposes full auctioning of emissions permits, with partial assistance to trade-exposed industries. Citing the International Emissions Trading Association, the Minerals Council of Australia noted in their submission to the Green Paper: *"No existing emissions trading scheme has utilised auctioning to any level that provides ready lessons for the minimum level contemplated in the Garnaut Review, let alone an initial auction of 100 per cent of allowances."* This highlights the potentially damaging impact of the CPRS on all trade-exposed industries. Even more harmful to Australian LNG is that, within the global community of rival LNG suppliers, no others will face a carbon cost in the near future.

Policy failure in relation to the LNG industry may be remedied by any of the following measures:

(i) by exempting LNG from the operation of domestic emissions reduction schemes, whether they are tax-based or cap-and-trade schemes;

(ii) by allocating emission permits to LNG producers for the whole of their emissions attributable to their production and export of LNG;

(iii) by tax relief or similar compensatory measures; or

(iv) by crediting emissions reduced in importing countries against emissions arising from LNG production in exporting countries.

Remedial policy treatment for LNG as outlined above would be fully in accordance with the White Paper's stipulated principles of efficiency, effectiveness, equity and administrative simplicity.[21]

Measures (i) – (iii) above are domestic measures that may be adopted unilaterally by any country with an emissions reduction scheme. They may be phased out if the world moves towards uniform climate policies.

Measure (iv) can also be a unilateral domestic measure. However, it may be facilitated via an international sectoral approach. This would underpin the environmental effectiveness and speed of LNG utilisation, as well as providing energy security benefits to importing countries by reducing the risk of future supply disruptions, by diversifying suppliers and by increasing the versatility of supply by ships instead of pipelines. International sectoral arrangements may be bilateral or multilateral, and are explained more fully in Appendix B.

We should emphasise that we cannot find any case for remedial policy treatment for natural gas produced for domestic consumption – only for natural gas that is produced for export as LNG.

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[20] *"To avoid the need for potentially distorting domestic and trade solutions in response to the carbon leakage problem, comparable emissions pricing needs to apply to most or all of the main producers in trade-exposed, emissions-intensive industries"*, Ross Garnaut, "The Garnaut Climate Change Review", Cambridge University Press, Melbourne, 2008 p 231.

[21] White Paper, p 19-2.

5. CONCLUSION

The LNG industry was brought into existence for the very purpose of supplying cleaner energy to countries with insufficient natural gas resources of their own and who wished to diversify their energy portfolios.

Any increase in global emissions caused by the CPRS diminishing Australia's LNG exports would constitute a serious policy failure by reducing Australia's contribution to the global environmental good, in both the short and long term. It would also cause collateral damage to the Australian LNG industry, deterring investment and employment growth.

The Australian Government has a choice of measures to remedy this policy failure. This review recommends that remedial action be taken to shield LNG under the CPRS.

This review also recommends that the Government give consideration to the initiation of an international sectoral agreement for the LNG industry to speed up global emission reductions and provide energy security benefits for energy-importing countries as elaborated in Appendix B.

Robert Pritchard
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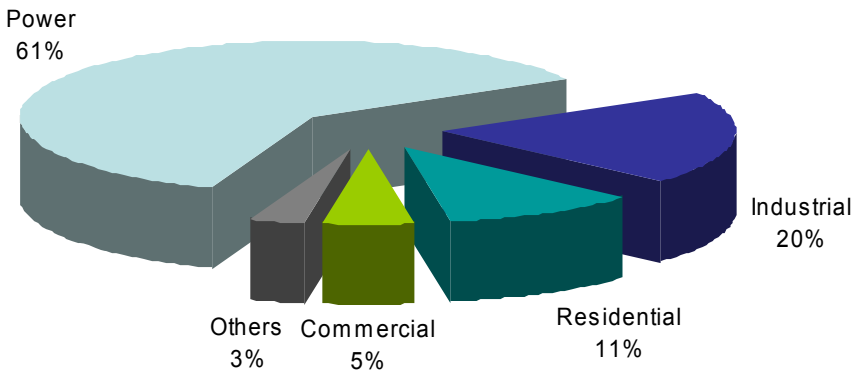
APPENDIX A

INFORMATION ABOUT AUSTRALIA'S MAIN LNG CUSTOMERS

JAPAN

- The world's largest importer of LNG – currently accounts for about 40 percent of global LNG imports.
- In 2007, Japan imported 67 mt of LNG, an increase of 8% from 2006.
- Japan overwhelmingly depends on LNG for its gas supply

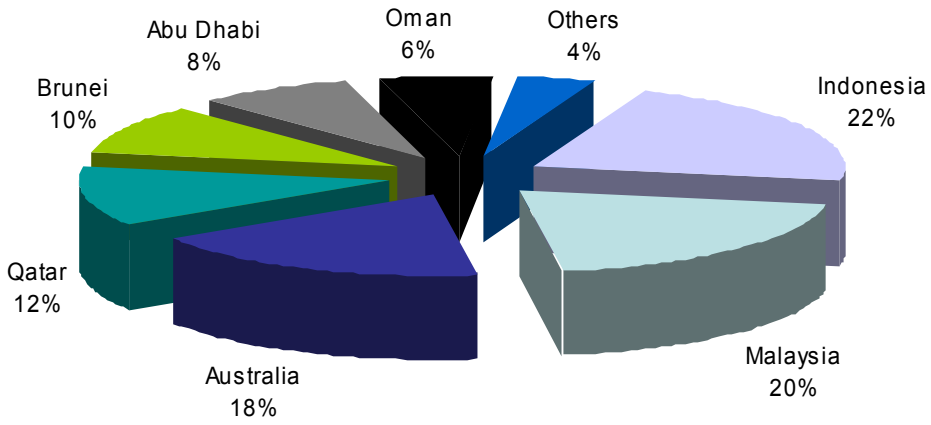
LNG Consumption by Sector in 2007 (67 mt)



Source: IEA 2008

- The power sector is the largest consumer of LNG with 61% of consumption (41.25 mt), followed by the industrial sector with another 20%.
- Natural gas-fired power stations are increasing in Japan and about 24% of electricity is natural gas-fired.
- Japan's largest LNG supplier is currently Indonesia, followed by Malaysia and Australia.

Japan's LNG imports by Source (2007)



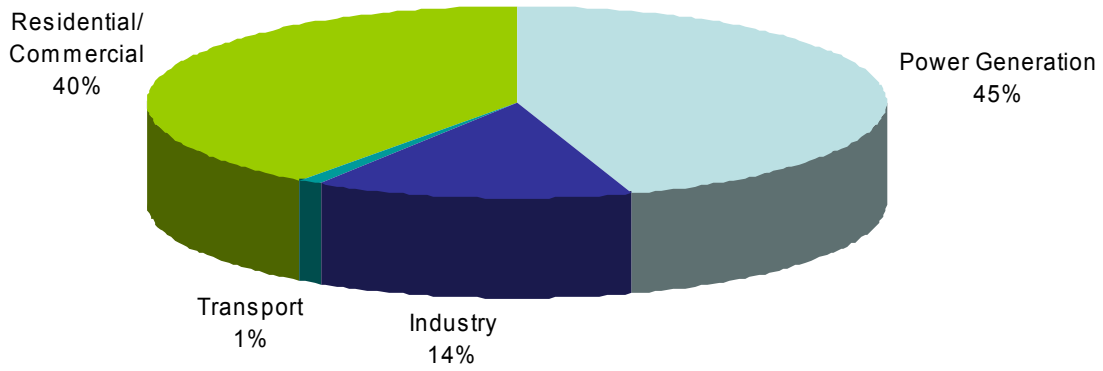
Source: BP Statistical Review 2008

SOUTH KOREA

- The world's second largest importer of LNG after Japan: 24 mt per annum.
- South Korea is only 1.3% self sufficient in gas production, therefore is 98.7% reliant on gas imports, at present completely in the form of LNG.
- Gas is utilised primarily for power generation (45%).
- In power generation overall, gas composes nearly 18% of all fuel sources.

Gas Demand by Sector – 2007

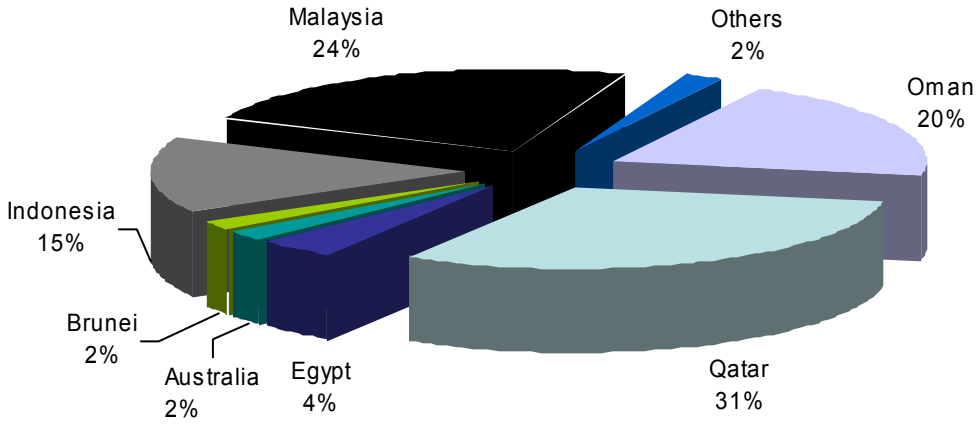
South Korea



Source: Wood Mackenzie

- Qatar supplies nearly 31% of South Korea's LNG. Malaysia (24%), Oman (20%) and Indonesia (15%) are also key suppliers. Australia supplies only 2%.

South Korea LNG Imports - 2007

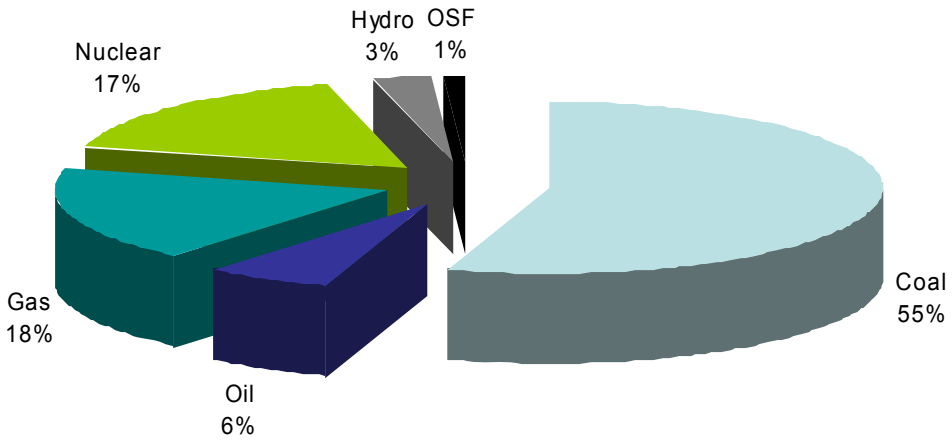


Source: BP Statistical Review of Energy 2008

TAIWAN

- World's sixth largest importer of LNG (after Japan, South Korea, Spain, US and France): 8 mt per annum.
- Taiwan is 4% self-sufficient in gas production and 96% reliant on imports, at present completely in the form of LNG.
- Over three-quarters of gas in Taiwan is utilised for power generation.
- In terms of power generation overall, gas composes nearly 18% of all fuel sources, with nuclear at a similar share. The main form of generation is coal-fired (55%).

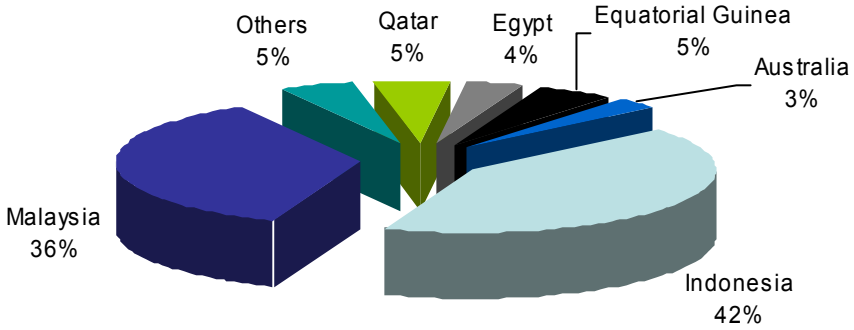
Taiwan – Electricity Production by Energy Source - 2006



Source: Wood Mackenzie

- Indonesia (42%) and Malaysia (36%) are the main suppliers of LNG to Taiwan. Australia supplies only 3%.

Taiwan LNG Imports – 2007



Source: BP Statistical Review of Energy 2008

APPENDIX B

INTERNATIONAL SECTORAL ARRANGEMENTS TO RECOGNISE GLOBAL EMISSION REDUCTIONS ATTRIBUTABLE TO LNG AND TO ACCELERATE THE TAKE-UP OF LNG

(a) The Benefits of Sectoral Arrangements

The reduction of emissions in importing countries (by displacing high-emissions fuels in electricity generation with natural gas) can be accelerated by international sectoral arrangements.

The key advantages of international sectoral arrangements are:

(i) environmental effectiveness;

(ii) speed;

(iii) compatibility with both international trade rules and domestic emission reduction schemes; and

(iv) energy security benefits.

Moreover, developing countries can participate in sectoral arrangements.

(b) Sectoral Commitments of All Parties under the UNFCCC

The United Nations Framework Convention on Climate Change (UNFCCC) specifies that all Parties must cooperate in technology transfer in energy and all other relevant sectors.[22]

The major focus of the international climate negotiations to date has been to seek the commitment of developed country parties to economy-wide emission reduction targets ("country caps"). From the time that the UNFCCC entered into force in 1994, sectoral approaches to the reduction of greenhouse gas emissions have also been on the agenda but their unfulfilled potential is now better appreciated.

The merits of a sectoral approach to greenhouse gas reductions were recognised in the Garnaut Review[23] and have been canvassed at UNFCCC meetings, and in a number of studies. [24] Developing countries without country caps can also participate. [25]

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[22] *"All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall:… (c) promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors …",* Article 4, paragraph 1(c) of the Convention.

[23] *"Effective economy-wide emissions pricing commitments for all relevant countries would be the best solution, but not all relevant countries will take on such commitments for some time. The next most straightforward mechanism to achieve a comparable carbon price is sectoral agreements that cause each government to subject the main producers in each industry producing emissions-intensive tradable goods to a carbon tax, until the country has an effective national emissions limit",* Garnaut Review, footnote 20 above (emphasis provided).

(c) The Bali Action Plan

At the UNFCCC Conference of Parties held in Bali in December 2007 (COP13), the Conference launched the Bali Action Plan, a comprehensive negotiation road map aimed at reaching a secure climate future.

The Bali Action Plan requires sectoral approaches to be addressed by the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA).[26] The UNFCCC workshop held by the AWG-LCA in Accra, Ghana in August 2008 acknowledged that sectoral approaches were complementary to action at national level[27] but "*[sectoral] approaches and actions could be used as offset mechanisms …"*

Recently, the European Commission proposed the gradual replacement of the Kyoto Clean Development Mechanism by a crediting mechanism covering whole sectors.[28]

(d) Need for Coordination with Trade Policies

The international climate negotiations in Copenhagen will hopefully bring an optimal outcome but, irrespective of what develops in Copenhagen, there will be an urgent, practical need to go beyond the complex politics of climate change and to coordinate climate and trade policies to prevent future trade disruptions over climate issues. Sectoral agreements can facilitate this.[29]

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[24] See, for example, Richard Baron et al, *"Sectoral Approaches to Greenhouse Gas Mitigation: Exploring Issues for Heavy Industry"*, IEA Information Paper, International Energy Agency, Paris, France, November 2007; Richard Baron et al, *"Options for Integrating Sectoral Approaches into the UNFCCC,"* OECD/IEA, Paris, France, November 2008.

[25] *"It is easier for developing countries to participate in the sector-by-sector approach for the following reasons:*

- *It is easier for developing countries to take measures because technologies and methods to be introduced are clearly identified.*
- *The direction of sector-by-sector approach is the same as that of the domestic policies (settings of sector-by-sector energy saving targets and others) that are already actively promoted by China, India and other countries on their own.*
- *The sector-by-sector approach allows each country to set its realistic targets in consideration of the circumstances in each country, and can be compatible with economic growth.",* Government of Japan, Annual Energy Report, 2007

[26] The purpose of the Working Group was: *"to enable the full, effective and sustained implementation of the Convention through long-term cooperative action now, up to and beyond 2012 … by addressing, inter alia … cooperative sectoral approaches and sector-specific actions, in order to enhance implementation of Article 4, paragraph 1 (c) of the Convention … ",* Document reference FCCC/CP/2007/6/Add 1.

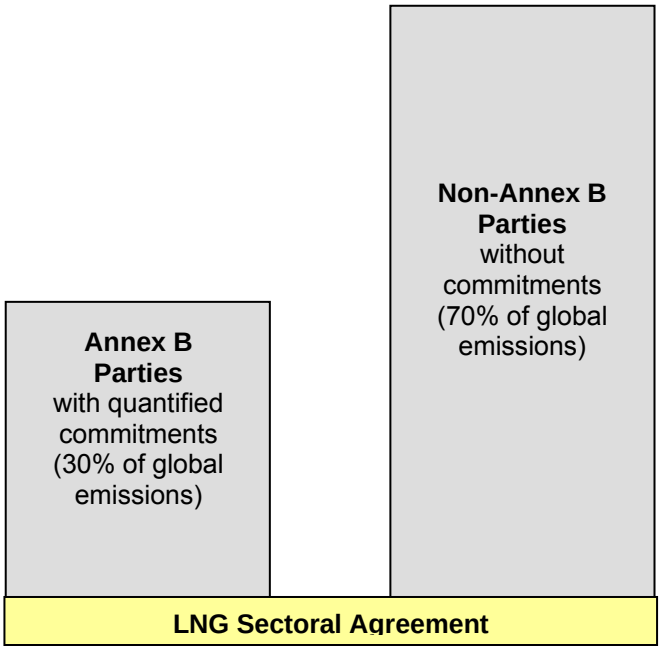
[27] *"… cooperative sectoral approaches and sector-specific actions would involve cooperation and action at the sector level, as opposed to action that is defined for the national level. It was generally agreed that these approaches and actions should not replace emission reduction targets of developed countries nor form the basis of proposals for sectoral mitigation commitments or international technology benchmarks",* Document reference FCCC/AWGLCA/2008/CRP.4

[28] European Commission, "Towards a Comprehensive Climate Change Agreement in Copenhagen", Document COM (2009) 39, 28 January 2009.

[29] *"Sectoral climate-trade agreements may offer opportunities to coordinate climate and trade policies, or perhaps even to integrate them institutionally. … Such product-based and industry-based structuring could bode well from attempts to develop sectoral climate agreements as part of the post-2012 multilateral climate regime. If interest in globally-applicable, industry-specific sectoral climate agreements continues to spread, it is inevitable that those*

(e) How Would A Sectoral Agreement Relate to Economy-Wide Commitments?

How a sectoral agreement for LNG would complement economy-wide emissions commitments under the Kyoto Protocol[30] is illustrated below:



(f) The Main Benefits of A Sectoral Agreement for LNG

The main benefit of a sectoral agreement is environmental effectiveness. Many energy-hungry countries, such as China, India, Japan and the US, lack adequate indigenous resources of natural gas whilst other countries, including Australia, have substantial resources that are surplus to their own requirements.

Another main benefit is speed. [31] For the LNG industry, the purpose of a sectoral agreement is to accelerate the reduction of emissions in importing countries by displacing high-emissions fuels, such as coal and diesel, with natural gas.

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discussions will involve international trade and investment issues; for international competitive concerns have become integral to the international dialogue about the future of the international climate regime", Thomas Brewer, "The Trade and Climate Change Joint Agenda", CEPS Working Document No 295, Centre for European Policy Studies, Brussels, June 2008.

[30] Under the Kyoto Protocol, the Annex B Parties with quantified emission reduction commitments that have ratified the Protocol are: Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, European Community, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine and the UK.

[31] *"Effective sectoral agreements could and should be struck quickly, as they are relatively straightforward and are important to help facilitate strong mitigation policies in many countries including Australia. A 2013 start date for sectoral agreements should be the goal, directly following the Kyoto Protocol's first commitment period. If coordination among candidate countries begins immediately, there is a good chance to have some agreements in place by then.",* Garnaut Review, footnote 20 above, p 232.

A level global playing field must be maintained for this purpose, undistorted by domestic emissions penalties. Uniform treatment at the global level will alleviate competitive concerns and will be cost-effective.

A summary of the benefits of a sectoral agreement for LNG is provided the table below. The Australian coal industry can be expected to maintain its role as the world's leading coal exporter for as long as global energy demand continues to grow and we do not consider that the industry would be adversely affected by any sectoral agreement relating to LNG.

SUMMARY OF BENEFITS OF A SECTORAL AGREEMENT FOR THE LNG INDUSTRY	
BENEFIT	**EXPLANATION**
Environmental effectiveness	Any mechanism that facilitates the displacement of coal by natural gas as a fuel in global electricity generation will be beneficial for global emissions reduction.
Speed	An LNG sectoral agreement can proceed independently of the Copenhagen negotiations and would speed up global emission reduction efforts.
Practicality of negotiations	It is not necessary to have unanimity amongst all countries at the beginning. A start can be made by only two countries (one exporter and one importer), with others joining at their own pace. Only a small number of countries need be involved in the negotiations to achieve global coverage of the LNG industry.
Opportunity for developing countries	A sectoral agreement will also provide the opportunity for developing countries to participate in global emissions reduction efforts.
Energy security	Participation by the importing countries will reduce their future supply risks and enhance their energy security. By its greater versatility, and avoiding the need to go through transit countries, LNG transportation by ships provides a much more secure transportation system for natural gas than pipelines. A sectoral agreement will also reduce investment risk in both exporting and importing countries, further enhancing the energy security of the importing countries. The more LNG projects that are developed, the more secure the LNG transportation system will become.

Avoidance of trade distortion	Trade distortion in the LNG industry is likely to both increase global emissions and cause 'carbon leakage'.
Complementarity with economy-wide commitments	There are two basic mechanisms for the control of carbon pricing: economy-wide and sectoral. The sectoral mechanism is more realistic for LNG and can be complementary with future economy-wide commitments. Uniform emissions pricing for LNG will not distort the optimal economic location of LNG production. If production moves from one country to another because doing so is cheaper after carbon is uniformly priced, this is economically and environmentally efficient.
Coordination with trade policies	If the Copenhagen climate negotiations result in an agreed outcome, there will still be a need to coordinate climate and trade policies to prevent future trade difficulties over climate issues. Sectoral agreements can facilitate this.
LNG technology already exists	Unlike other energy technologies under development, such as Carbon Capture and Storage (CCS), LNG technology already exists and is immediately available. There are many competing LNG technology suppliers and many LNG plant construction companies.
Best practice benchmarking	For LNG developers, financial imperatives drive efficiency. Emissions from the liquefaction process are directly proportional to energy use. All producers have a powerful incentive to minimise their costs by maximising energy efficiency. The energy efficiency of an LNG processing facility is effectively determined at the date the project is designed. Apart from minor enhancements, its emissions performance is pre-determined for its 20 to 30 year operating life. Sectoral agreements can nonetheless provide for "best practice" benchmarking and can underpin industry-wide efforts to make further technical breakthroughs.
Non-binding	A sectoral agreement for LNG can be non-binding in the early stages to allow countries to experience how it would work.