

Santos

**Submission by Santos in Response to the
Invitation by the Garnaut Climate Change
Review**

**Emissions Trading Scheme & Low Emission
Discussion Papers**

18 April 2008

Executive Summary

Santos is committed to working with government, the community and other industry to address climate change and assist Australia transition to a lower carbon economy.

Santos believes that Australia's contribution to the global response would be best managed through the development of an integrated national climate change response, which recognises five key drivers; global action, emissions trading, complimentary policy measures, the development and deployment of low emission technology and adaptation strategies.

This submission addresses two key components of a national climate change response, specifically emissions trading and a transformational energy technology strategy.

A market mechanism such as emissions trading, if well designed, provides a clear medium to long-term abatement pathway and an explicit carbon price. Establishing a clear price signal in Australia now, will minimise the long-term adverse economic impact on the Australian economy as we seek to meet challenging greenhouse gas abatement goals.

Santos has provided feedback on a range of recommended design outcomes in this submission and has highlighted a few key points below which it considers vitally important to the success of any future climate change response action. In summary, Santos supports:

- the introduction of an emissions trading scheme on a national basis, designed with the inherent flexibility to link internationally to other schemes, whilst protecting the Australia's economic interests.
- the streamlining of climate change policy to phase out adverse policy which would distort the Australian Emissions Trading Scheme. Specifically, Santos has reservations regarding the effectiveness of an expanded MRET to drive the uptake of the lowest cost carbon reduction technologies/projects by example it could depress the carbon price thereby suppressing the price signals for the covered sectors to respond otherwise.
- permit allocation to strongly affected companies who can demonstrate disproportionate loss associated with its assets.
- permit allocation to existing and future emissions intensive trade exposed assets with consideration of an appropriate transition timeframe.
- the inclusion of offsets in a scheme broadens the scope of the scheme by providing an incentive to undertake projects that would not otherwise have been influenced by a permit price. Santos supports no limitations on offsets.
- a private/public partnership approach to develop step change technological breakthrough to meet medium to long term emission reduction targets.

1 Santos

Santos is a major Australian-based oil and gas exploration and production company operating internationally. Santos has exploration interests or production operations in every major Australian petroleum province and in Indonesia, Papua New Guinea, Vietnam, India, Bangladesh, Kyrgyzstan and Egypt.

We are Australia's largest domestic gas producer, supplying sales gas to all mainland Australian states and territories, ethane to Sydney, and oil and liquids to domestic and international customers. Through our interest in the Darwin LNG project, we are a producer of liquefied natural gas (LNG) which is exported to customers in Japan. Santos has more than 1,750 employees and produced 59.1 million barrels of oil equivalent (mboe) in 2007.

Santos has the largest Australian exploration and production portfolio by area of any company – 192,000 square kilometres – and is pursuing new venture opportunities in Asia. A range of significant development projects have been delivered, and others underway, contributing to Santos' growth, such as:

- Bayu-Undan Liquids & LNG projects in the Australia Timor-Leste Joint Pet. Development Area
- Oyong oil and gas field and Maleo gas field offshore East Java
- PNG LNG project
- Gladstone LNG project, and
- Moomba Carbon Storage (MCS).

Santos Ltd is quoted on the official list of the Australian Stock Exchange Ltd. At year end 2007 Santos had a market capitalisation of approximately \$8 billion, making it one of Australia's top 50 companies.

At Santos, we are committed to working with government, the community and other industry to address climate change with specific focus on addressing energy efficiency, education, adaptation strategies, good policy, the transition to lower emission technologies and reporting transparency.

Via the Australian Petroleum Production and Exploration Association (APPEA) report, Santos has reported its greenhouse gas emissions to the Australian Government's Greenhouse Challenge program since 1998. Santos became an individual Challenge Plus member in 2007, publishing annual Challenge Plus emission inventories dating back to 2005.

Santos furthered its commitment to transparency of greenhouse gas emissions reporting with the publication of its emissions in annual sustainability reporting since 2004.

1.1 Australian Business & Climate Group

Santos is also a member of the Australian Business & Climate Group¹ which released its report *Stepping Up – Accelerating the Deployment of Low Emission Technology in Australia* in August 2007. This report highlighted Australia's contribution to the global response would be best managed through the urgent development of an integrated national climate change response.

The Australian Business & Climate Group outlined five elements of a national climate change response:

- Global Action
- Emissions Trading
- Complementary Measures
- Low Emission Technology Strategy, and
- Adaptation Strategy.

¹ Members include Anglo Coal, BP Australia, Deloitte, Mirvac, Rio Tinto, Santos, Swiss Re, VicSuper and Westpac.
www.businessandclimate.com

Transforming the way Australia produces and uses energy must be a cornerstone of this Response.

In this submission, we will focus on two of these five elements:

- Emissions Trading, and
- A Low Emission Technology Strategy.

1.2 Santos Submissions on AETS Design

In addition to this submission, reference can be made to our submissions to the National Emissions Trading Taskforce - NETT (16/11/2005 and 19/12/2006) and to the Task Group on Emissions Trading - TGET (8/3/2007). Santos is also a signatory to the Australian Industry Greenhouse Network (AIGN) and Australian Petroleum Production and Exploration Association (APPEA) submissions to these former processes and the current Review.

In addition to this submission to the Garnaut Review, Santos has also prepared a specific submission on the Moomba Carbon Storage project (MCS).

The MCS submission provides extensive detail on Santos' proposed low emission technology geosequestration project for central Australia. This project can play a significant role in assisting Australia transition to a lower emission profile creating a low-emission-technology-hub, which could potentially link geothermal energy development, carbon dioxide storage and carbon dioxide capture from the east-coast of Australia.

This large scale transformational project has the potential to create a centre of excellence to demonstrate this technology and build capacity to transfer knowledge/technology to other countries in the region.

2 Market Mechanism to drive Greenhouse Abatement

A market mechanism such as emissions trading is a key component of a national climate change response. A well designed emissions trading scheme will provide a clear medium-long term abatement pathway and an explicit carbon price.

Santos is of the view that establishing a clear price signal in Australia now will minimise the long term adverse economic impact on the Australian economy as we seek to meet challenging greenhouse gas abatement goals.

Santos supports the introduction of an emissions trading scheme on a national basis, designed with the inherent flexibility to link internationally to other schemes, whilst recognising the need to protect the Australian economy. This constellation approach of different emissions trading regimes will enable industry to pursue lowest cost emission abatement. Any proposed scheme must accommodate the dual objectives of reducing global greenhouse gas emissions and maintaining Australia's economic prosperity.

In providing an explicit price signal on greenhouse gas emissions the scheme will provide greater certainty for investment decision-making and will promote further deployment of low-emission technologies.

Knowing the likely trajectory of future emission prices is necessary for public and private sector decision-makers to rationally plan their research and development and capital investment decisions. As the carbon price increases, low emission projects appear relatively more commercially attractive to energy suppliers, private investors and consumers.

3 Proposed Australian Emissions Trading Scheme Design Elements

The design of an Australian Emissions Trading Scheme (ETS) will have significant impacts on:

- Market demand to increase energy efficiency and reduce emissions intensity
- The level of uptake of existing low emission technologies
- Market confidence and pricing of risk into market decisions, and
- The confidence of private investors to support research and development of new technologies and their willingness to bring first-of-a-kind technologies to commercial scale in Australia.

There are a number of key design parameters for energy suppliers and developers of low emission technologies such as Santos.

3.1 Greenhouse gas emissions targets (caps)

In setting the scheme caps, it is necessary to consider the overall emission reduction target, expected technological developments, the nature of investment within covered sectors and a trajectory that allows smooth transitioning to a carbon-constrained economy.

Santos supports the concept of 10-year fixed targets with extended gateways to give expected boundaries for the second decade of trading. This level of certainty will assist in planning for the introductions of low emission technologies.

3.2 Point of Acquittal

The design of the scheme should aim to provide a transparent, administratively simple and robust system for permit acquittal which maximises the use of existing systems.

The objective of the scheme should be to provide incentives for emitters to manage and reduce their direct emissions.

It is expected that embedded emissions within products would be transferred at the point of sale.

By way of example, Santos supports the following principles for points of acquittal for natural gas:

- Gas producer liability up to the point of sale (i.e. custody transfer point from gas processing plant to a gas transmission pipeline)
- Transmission pipeline owner liability up to point of sale (i.e. transmission pipeline to a gas retailer distribution system or other major gas consumer)
- Gas consumer liability where the consumer is designated by the regulator to be above the emission threshold. The gas consumer above this threshold may transfer liability to a retailer with the agreement of the retailer and the regulator. An equally effective alternative approach would be for the retailer to be liable for all consumers, but liability may be transferred to a consumer at the request of the consumer, and agreement of the retailer and regulator
- Gas retailer having liability for all other non-exempt gas consumers, and
- Liability only arising where gas usage results in greenhouse gas emissions. No liability arises where gas is used as a feedstock, for example in the manufacture of petrochemicals.

3.3 Allocation

3.3.1 Strongly affected industries

Some existing assets are intrinsically more emissions-intensive and are substantially unable to pass cost of emissions through to customers because the price of the commodity or goods is pre-determined or is in direct competition against other assets with lower carbon intensity.

Careful consideration should also be given to the specific attributes of the sources of emissions, such as drawing a distinction between major point sources of emissions and the aggregation of disparate sources and the capability of these to change within technological, geographical or contractual constraints.

Whilst the goal will be to phase out the higher carbon intensive energy processes, the ETS design should recognise the transition processes to facilitate this, whilst preserving the resilience of the Australian economy.

The design of the Australian emissions trading scheme should consider provision for strongly affected industries where there is a material impact to invested capital, and particularly if the industry or asset is both material and one of national strategic significance. Fundamentally this would involve an allocation of permits which would phase out over a defined transitional period.

3.3.2 Emissions Intensive Trade Exposed (EITEs)

Santos supports administrative allocation of permits for existing operations and new investment in trade exposed emissions intensive industry, for as long as is necessary to offset the erosion of competitiveness.

To achieve this all operations/assets within the EITE industry should be eligible to apply for permits. Careful consideration will be needed to appropriately define the complete boundary of the operations and assets that are eligible, covering the process flow from raw feedstock extraction, transportation to, and processing at the plant to produce the finished export product. With reference to the liquefied natural gas (LNG) export industry this would include emissions from gas field development and processing to develop LNG product for export.

The Task Group on Emissions Trading (TGET) also suggested that the emissions cap under the AETS could be adjusted upwards to account for emissions as a result of new investments in the EITE. Their reasoning was that given the time lags involved between decisions to invest and initial production, it is likely that there would be sufficient room to accommodate these upward adjustments within the gateways or emissions bands. Santos supports this approach for new EITI.

To secure investment in new EITE assets permits would need to be guaranteed for the first 25 years, with allocation to commence when production commences and adjustments to permit allocation made based on actual production to avoid over allocation.

It is understood that the allocation of permits for EITE assets is a transitional measure to readdress competitiveness issues and that with the subsequent broadening of emissions trading to include competitor nations thereby realising an equitable carbon price that the allocation of these permits would be phased out.

3.4 Auction issues

Getting the auction process right will be a crucial step in the design of an ETS. In the United States of America (USA), five states (Connecticut, Maine, Maryland, Massachusetts and New York) have all indicated that they plan to auction 100 per cent of their permits under Regional Greenhouse Gas Initiative (RGGI). However, the USA model only makes provision for 4 year-periods, which is unlikely to provide the certainty required for long-term investment decisions e.g. gas fired power stations or research development and deployment programs.

More recently, the European Commission announced that 60 per cent of permits (including 100 per cent to the powergen sector) would be auctioned in Phase-3 of the European Union (EU) ETS. Australia has not announced what proportion of its permits will be auctioned.

Santos supports auctioning as the general rule but with transitional free allocation, phased out by 2020. This could help smooth out implementation of ETS and is consistent with the transitioning approach adopted by the EU ETS.

In designing the auction process several key criteria should be considered:

- Low administrative costs, low transaction costs for bidders.
- Perceived as fair, transparent, and understandable to participants and the public.
- Economically efficient, that is, getting allowances to those who value them the most.
- Avoiding collusive behaviour by bidders and providing good signals about market prices.
- Helping to minimise price volatility.
- Raising reasonable revenues from the sale of a valuable public asset; and
- Compatible with existing electricity and energy markets.

3.5 Offsets

The inclusion of offsets in a scheme broadens the scope of the scheme by providing an incentive to undertake projects that would not otherwise have been influenced by a permit price. The inclusion of offsets will increase market liquidity, reduce the marginal cost of abatement and reduce the costs of scheme compliance.

The AETS should recognise a wide range of credible domestic and international carbon offset regimes.

Domestically, inclusion of offsets from sectors not covered by the emissions trading scheme will reduce the cost of meeting the scheme cap, and assist in preparing those sectors for eventual inclusion in the scheme. Santos supports the early confirmation of rules for domestic offsets.

At the global level, the recognition of offsets created in developing countries, through Kyoto Protocol based Clean Development Mechanism (CDM), can be an effective way of promoting their involvement in global efforts to limit emissions and offer least cost abatement opportunities.

Issues regarding international linkages:

- Linkages between different emerging schemes should ultimately result in the development of a liquid, fungible and global market for carbon emissions. This would provide benefits such as an expanded pool of potential abatement options and a lower overall cost of achieving the required reductions.
- It will be important to ensure that the AETS is internationally compatible to the greatest extent possible while still maintaining any domestic policy objectives.
- Emphasis should be placed on consistency of design elements of the scheme with other international schemes and standards, particularly in the early phases of development of the scheme.
- As the EUETS does not recognise forestry, this could also present a challenge if the AETS does include forestry offsets.

3.6 Cost pass through

The objective of an ETS is to drive a carbon price that flows through to end-use prices, thereby increasing the economic attraction of energy efficiency measures. This will be achieved when the marginal carbon price is incorporated into the wholesale price of electricity.

Many of the industry sectors proposed to be covered by the ETS are underpinned by long term contracts, often with fixed price provisions.

Therefore, in order for the AETS to meet its objectives, it is critical that costs can be passed through to end users and that the design of the AETS facilitates this outcome.

3.7 Penalty

In the event that a liable party cannot acquit sufficient permits to cover its emissions during a compliance period, it will be required to pay a penalty. In setting the penalty, consideration should be given to encouraging compliance to ensure the ongoing integrity of the scheme whilst minimising the costs of scheme compliance.

The level of penalty must be set at least as high as the future marginal cost of abatement estimated at a point in time. Setting a sufficiently high penalty will be necessary to ensure scheme compliance and will further encourage investment in abatement technologies. It will also improve investment certainty (that is, with a high penalty established from the outset the likelihood of future unplanned increases in the penalty will be reduced).

Santos also believes that the introduction of a tiered penalty will introduce unnecessary complexity into the scheme and therefore reiterates a preference for a single penalty set high enough to maximise compliance with a trading scheme.

However, Santos recognises that Government policy will need to be developed to ensure the environmental integrity of the scheme.

A make good provision would require scheme participants to purchase permits to make up any shortfall in addition to paying a penalty. Santos believes that establishing a sufficiently high penalty (i.e. one that attracts a supportable premium over the permit price) will provide the necessary incentive for participants to comply with the scheme, substantially reducing the likelihood of a shortfall. The EU ETS has adopted this approach and therefore international linking to this scheme will need to take this into consideration.

Consideration should be given to reputational and tax implications associated with terminology for penalties/non-compliance.

3.8 Encouraging investment in low emission technologies

In the early stages of emissions trading, there are strong reasons to support complementary policies for research, development, demonstration and first-of-a-kind large-scale commercialisation of technologies.

Reasons for support include:

- the need to lower the cost of breakthrough technologies
- risk sharing to accelerate the availability of breakthrough technologies
- creating opportunities to export know-how of proven new energy technologies, and
- the demonstration will boost confidence of international markets, which in turn will accelerate deployment.

Incremental improvements in technology will not by themselves lead to stabilisation; more is required, that is step-changes in cost, scale and emissions performance – well beyond the usual framework of commercial development.

Transformational technology development and deployment takes substantial and sustained investment in research, development and demonstration and first-of-a-kind deployment. Australia cannot be a leader in all relevant technologies, so it will be important to focus on options to leverage our national comparative advantage and strategic competitiveness while continuing to generate value through international partnerships for a wider range of technologies.

A transformational low emission energy technology strategy is therefore an integral component of international and national climate change response frameworks. A technology strategy will provide value by reducing the costs of meeting future GHG reduction goals.

Transformational technologies require both 'technology push' and 'market pull' policies to drive development through the innovation cycle towards commercialisation and market diffusion.

3.9 Revenue recycling

Revenue recycling from the AETS could potentially be directed to the following areas:

- measures to address significant market failures that impede the transition to a lower emissions intensity economy
- energy efficiency assistance particularly to low-income households
- funding co-operative action on climate change with developing countries, and
- managing the overall business tax burden by recycling revenues to reduce other business taxes.

However, the TGET suggested that revenue from permits and fees be used, in the first instance, to support investment into research and development and pre-commercial demonstration of low emissions technologies. Santos strongly supports this view.

3.10 Complementary policies

A well designed ETS will address the central market failure relating to climate change by pricing greenhouse emissions. It is, however, only one part of the solution and complementary policies will be required to effectively reduce emissions over time. As highlighted by the Australian Business & Climate Group, NETT and the TGET reports, policies targeting pre-commercial activities, including research, development, and demonstration of low emissions technologies are also required.

There will also be a continuing role for public education policies that improve information, awareness and adoption of energy-efficient vehicles, appliances and buildings. If necessary, disadvantaged low-income households could be assisted to manage better the impact of increased power and fuel costs.

In the short to medium term, abatement will be available from energy efficiency projects and through adjustments to production techniques using existing technology (e.g. fuel switching) at relatively low costs.

The introduction of complimentary climate change policies needs to support the development of a broad range of low emission technologies to assist Australia meet its emission reduction objectives.

However, Santos supports the statement in the *Garnaut Emissions Trading Scheme Discussion Paper*, which states that the case for a Mandatory Renewable Energy Target (MRET) is much stronger prior to the establishment of a credible ETS with a carbon price that is high enough to drive structural change.

The objective of an ETS is to drive the uptake of the lowest cost low emission technologies. Careful consideration should be given to policies that may be counterproductive to this objective.

Santos believes that the ongoing MRET policy will distort the carbon market, specifically:

- The MRET will mandate a quantity of renewable energy into the market, potentially displacing lower cost low emission alternatives, and
- The MRET is also likely to be detrimental to the ETS, potentially depressing the carbon price and deferring investment in lower emissions technologies and energy efficiency projects i.e. deferring the transition from higher greenhouse emitting energy sources to less intensive sources.

Santos agrees with the Garnaut Discussion Paper that at least in the medium-term, the implementation of the MRET is likely to require a higher cost to achieve the same level of overall carbon constraint than would have been achieved in the absence of the MRET.

Santos would ask the Government to carefully consider the development of complimentary policies to support the commencement of ETS, to create a level playing field and drive investment in break through technologies, rather than preferentially supporting an industry sector. It is worth noting that currently there is no scheme in place for emerging low emission technologies.

Policy developed in the absence of an ETS needs to be reviewed and streamlined to remove administrative burden and be objective based outcome to drive the uptake of low emission technologies and lower Australia's greenhouse gas emission profile and provide opportunities to develop technologies and build capacity.

Santos would strongly support the phasing out of the *Energy Efficiency Opportunities Act* for companies included in the ETS. However, Santos would support the continuation of the program for non-covered companies or aspects of a company/industry that would be eligible for permit allocation.

Santos has strongly supported the introduction of mandatory greenhouse gas emissions reporting and an Australian ETS, however the effectiveness of these schemes for industry is premised on the removal of overlapping or adverse climate change policies at a federal and particular at a state level.

A comprehensive response will involve complementary measures that address market failures not corrected by the emissions trading scheme.

In the longer term, achieving sustained abatement without dramatic impacts on living standards will require a significant rethink of current production techniques and the diffusion of low emissions technologies.

4 Low Emission Technology Strategy

This section of the submission focuses on issues associated with a low emission technology strategy as a complementary policy to the Australian Emissions Trading Scheme (ETS).

Santos has used some of the questions from the Garnaut Review discussion paper on low emissions technologies to develop this section of the submission.

4.1 The role of an Australian Emissions Trading Scheme

What is the role of an emissions trading scheme in driving innovation?

An important component of an emissions trading scheme are the forward targets. Understanding the likely trajectory of future emission prices is necessary for public and private sector decision-makers to rationally plan their research and development and capital investment decisions. An explicit carbon price should immediately drive the uptake of mature and some near-commercial low emission technologies but more will be required to drive breakthrough technologies which are today priced well above the market.

4.2 The role of policy

How can Australian governments improve policy clarity, continuity and coherence for businesses for looking to invest in new energy technologies, or in other sectors with the potential to contribute to mitigation or adaptation?

It is expected that climate change science will drive modifications to long-term goals over time, so the critical issue is to set an aspirational goal as soon as possible with a mechanism to recalibrate this as technologies, markets and knowledge of climate science develop.

A clear long-term goal would provide the vision and clarity needed to deliver greater regulatory certainty and to guide the scope, development and deployment of technology over the long times associated with major energy infrastructure.

The Australian Business & Climate Group stated that an emissions trajectory, with interim targets, needs to be established in line with the long-term aspirational goal to provide an explicit guide for business investment and community engagement. It is expected that such an overall emissions

trajectory would commence moderately and progressively stabilise and then reduce significantly over time as breakthrough technologies become available at scale and acceptable cost.

4.3 ETS and complimentary policies

How will this be improved with the implementation of an Australian emissions trading scheme? What areas of uncertainty might remain?

Santos recommends that consideration be given to the introduction of a national low emission technology strategy comprising a range of policies that reduce uncertainty and allow business to capture the opportunities and manage the risks created by the policy framework.

The strategy should recognise that while a carbon price is essential, it alone will not drive the required level of investment to transform Australia's energy landscape. An aspirational emissions reduction target and a range of technology push and demand pull measures are essential. Importantly, a national low emission technology strategy should focus on technologies in which Australia has a comparative advantage to ultimately drive economic growth and social well-being.

These measures should sit within a broader framework that is driven by climate science and incorporates international cooperation, a national risk assessment, a national energy security policy, forestry, water and land policies, adaptation requirements and ongoing monitoring and review.

Through sensible policy frameworks Australia has the opportunity to create centres of excellence to demonstrate low emission technology solutions and build capacity to transfer knowledge/technology to other countries in the region.

4.4 Picking winners

How can the Australian Governments avoid 'picking winners' while encouraging increased innovation? What is current best practice for technology neutral innovation policy?

The preferred approach is to create the conditions in which the market can find how best to make low emissions technologies succeed in the shortest possible time.

It is important that the Government adopt broad strategic goals then provide the right environment and the right incentives to encourage low emission technology innovation to meet these goals. The ETS should be completely unconstrained ETS so as encourage abatement opportunities at the lowest cost to the community

The Government should avoid 'picking winners' in terms of low carbon technologies, while recognising that technologies at different stages in the innovation cycle may need different degrees of support (e.g. technologies at the demonstration or early commercialisation phase may need greater support and more targeted incentives than technologies at the diffusion stage).

Further discussion on adverse policy is discussed in Section 3.10 – complimentary policies.

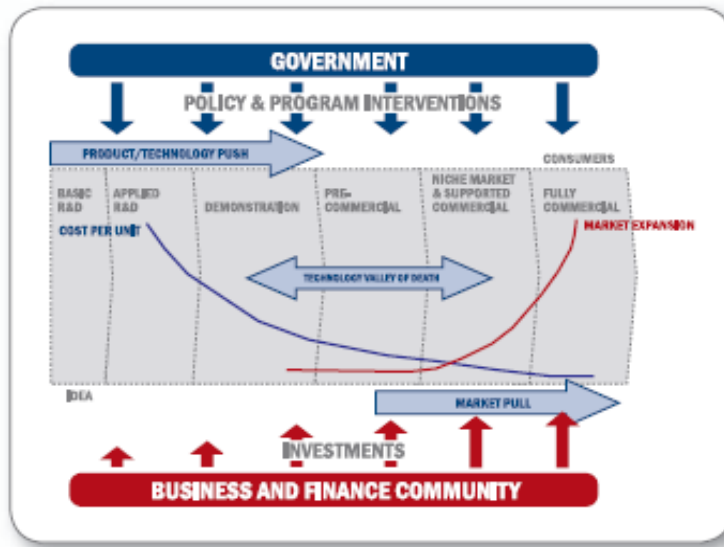
4.5 Barriers to entry

What are the barriers to entry that create uncompetitive incumbency advantages in Australia?

What are the appropriate policies for minimising barriers to market entry without undermining the competitive advantage of established firms?

Being locked in to traditional fossil fuel based energy systems results in persistent market barriers where existing technologies benefit from incumbency advantages while new technologies face costly and inefficient barriers to entry. In the energy sector, lock-in of existing technologies may arise from regulatory certainty and established institutional arrangements; Government support systems, and access to capital.

First mover barriers are quite specific to initial development and deployment, and are not experienced in the subsequent stages of widespread deployment. Failure to overcome these barriers will stifle the leadership and innovation needed to move these low emissions technologies to full commercialisation.



First mover barriers include:

- Low levels of community acceptance and understanding
- Regulatory uncertainty
- Insufficient funding for technology demonstration
- Lack of public/private partnership framework for initial commercial deployment
- Insufficient funding for infrastructure requirements, and
- Skills deficit.

Figure 1: Technology innovation chain

4.5.1 Low levels of community acceptance and understanding

Engaging with the community is a joint responsibility for government and business. It should be a phased approach and incorporate the following:

- wide dissemination of technology information through a range of communication streams
- public consultations to increase awareness of the new technologies
- provision of specific and targeted education on the necessity of breakthrough technologies to mitigate the worst impacts of climate change, and
- detailed stakeholder engagement for specific projects.

4.5.2 Regulatory uncertainty

Government, business and broader stakeholders must work together to examine current regulation, its application and in addition identify new regulation e.g. technologies such as carbon capture and storage (CCS) require a clear regulatory framework. Key requirements of legislative regime for CCS:

- Preservation of CO₂ injection rights for existing petroleum licence holders. In jurisdictions including SA and QLD, injection of CO₂ is permitted under existing legislation. Preservation of this right is important to continued hydrocarbon production and a critical fiscal enabler for a large scale demonstration project.
- Avoidance of a collision of operating requirements with current operators. Granting of injection rights to new CCS operators proposed to operate in concert with existing hydrocarbon producers will lead to an unworkable risk management and liability environment. Existing petroleum permit holders should have a right of first refusal to conduct injection activities. Acreage should only be made available to new CCS operators upon a lapsing or waiving of that right.
- Long term security of access to rock volume. Unlike oil and gas production, geosequestration of carbon dioxide needs to take place in a time frame which allows maximum value to be obtained from infrastructure investment. Proponents need certainty that rock volume in particular areas will be available in say, 15 years when reservoirs currently in operation are full. Work programme obligations need to be similarly geared to the project time frames.

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- Suitable long term risk management. A long term risk management strategy needs to be resolved. Ultimately, the only entity that can appropriately manage long term risk is government. To do otherwise will encourage short term opportunity seeking and disadvantage substantial and longstanding operators. However, it is accepted that until geosequestration is complete in a particular area and site closure requirements met, liability should rest with the proponent. The standards of management and reporting to be met and any contribution to a compensation fund must be reasonable having regard to the risks and likely exposure.
 - Fiscal certainty. The treatment of projects from an emissions trading, tax and royalty perspective needs to be clear. This will be crucial in making the investment decisions that underpin project viability.

Carbon capture & storage is a high-cost activity. Publicly available information would put the cost of the CCS activity chain (capture + transport + storage) at between \$35-70 per tonne.

The commercialisation path for Moomba Carbon Storage envisages that, Phase 1 & 2 will be supported by enhanced oil recovery and technology grants, Phase 3 will need to be entirely underpinned by a carbon price, which in turn will come out of a well-designed carbon emissions trading scheme.

To secure investment in these technology breakthrough projects, proponents require a strong investment signal (e.g. credible ETS) and regulatory certainty.

Existing South Australian petroleum legislation includes carbon dioxide (CO₂) as a defined substance, allowing Santos to store CO₂ and/ or utilise CO₂ for enhanced hydrocarbon recovery. Importantly this enables Santos, and its joint venture parties, to commence Phase 1 of the Moomba Carbon Storage project immediately. Santos is working with the South Australian Government to ensure clarity around the long term liability of the stored CO₂, and clarity around access to existing reservoirs.

4.5.3 Insufficient funding for technology demonstration

A national low emission technology strategy should define Australia's objectives and priorities for low emission technology demonstrations.

The 2007 Report of the TGET² suggests that "there is a case for government involvement in sharing the high risks involved in demonstrating low-emission technologies, particularly in the early stages of a trading scheme".

Such support is justified on the basis that market demonstration of technologies shows potential purchasers and users that the technology works in real-world application under Australian conditions and promotes market potential.

4.5.4 Lack of public/private partnership framework for initial commercial deployment

Some inefficiencies in first-of-a-kind commercial-scale plants can only be overcome by experience. These learnings ultimately deliver lower costs and higher efficiencies in subsequent plants, which can be recovered only in part as intellectual property.

This issue has been addressed on a case by case basis by governments in Australia. The next step is to develop an appropriate framework to define the relative share of public and private funding and other mechanisms needed to support the commercialisation of first-of-a-kind low emission technologies.

² Task Group on Emissions Trading (2007), *Report of the Task Group on Emissions Trading*, The Department of the Prime Minister and Cabinet, Barton, Australia, pp. 130.

4.5.5 Insufficient funding for infrastructure requirements

Low emission power generation on the scale required to meaningfully impact on greenhouse gas emissions requires substantial amounts of new infrastructure such as pipelines for CO₂ storage technology or electricity transmission in the case of geothermal or other renewable resources.

Initial over-sizing of capacity incurs short-term costs but should facilitate future, larger-scale developments by spreading the cost over a larger energy production base, for example the use of carbon dioxide pipeline hubs. Public funding may be required initially and then decline over time, once the initial infrastructure is in place and the carbon dioxide market is mature.

The development of these large scale low emission technology infrastructure projects will deliver many positive benefits back to the community, through emission reduction, employment, capacity building, and the potential to share learnings with the region.

4.5.6 Skills deficit

Australia must also place a great emphasis on developing a skilled workforce to meet the requirements of these specialised new technology projects.

The current skills deficit in Australia, specifically related to technical expertise, is a barrier for first-of-a-kind projects as the investment is higher than would be expected for following projects.

Government has an important role to play in providing the right framework and to work with employer organisations and trade unions to ensure that education and training is delivering the right skills.

Skills gaps in the energy sector are also increasing because the workforce is faced with unfamiliar processes and technologies. Skills shortages are also likely to increase as the workforce profile is older than the population profile and many workers will retire in the coming decade.

Internationally, while Australia remains attractive to workers from overseas, there are also rewarding opportunities for our own workers in other countries. Australia must continue to be an attractive investment option for the companies currently operating here, who have a key role in skills development and to new companies seeking to invest.

4.6 What criteria, processes and institutional structures are most desirable for allocating funding to public good research?

Santos acknowledges government support given to date, however governments need to contribute additional funds directly or indirectly over the long term and within a strategic framework to support technologies through the valley of death within the required timeframe.

Non-commercial expenditure on demonstration projects undertaken to gain global community acceptance of the technology is clearly not recoverable by the project proponents. The requirement for such projects suggests not only a need for public funding, but also the need for development under international collaborative programs designed to avoid unnecessary duplication and costs.

Government support could include capital grants, tax incentives and accelerated depreciation, as well as other assistance mechanisms. A research and development fund for new technologies and a parallel fund to finance first-of-a-kind demonstration/ commercial plants are also needed. These initiatives should complement existing approaches such as the Federal Government's Innovation Investment Fund. Public investment in infrastructure that supports emerging technologies, such as refuelling infrastructure for alternative-fuel vehicles or pipeline infrastructure for new CCS technologies, is also needed.

4.7 In what areas would coordinated international public good research be warranted?

The accelerated development of breakthrough technologies such as CCS, electric vehicles, hydrogen systems will benefit from collaborative international programs.

The paradigm shift required to bring about rapid and large scale change within the power and transport sector is considerable. The objective of commercial scale, low cost breakthrough technologies is unlikely to emerge in the timeframes required without international collaboration.

4.8 What are the appropriate institutional arrangements for shared public good research that will ensure the best outcomes at minimal administrative costs?

In the report, *Stepping Up - Accelerating the Deployment of Low Emission Technology in Australia*, the Australian Business & Climate Group highlighted two European Government examples that outline options for shared public good research, development and deployment³. The Norwegian example demonstrated the value of governments taking a high level of upfront equity in first-of-a kind projects to reduce the overall project risk and to induce private investment. As the project moves through the initial high risk stages and the technology is more developed, the plan is for the Norwegian Government to reduce its equity.

This approach counters concerns that government support is just a hand-out to large investors; by taking equity in the project, the public also can earn value on the investment.

The United Kingdom example outlines the proposal to fund a domestic CCS project integrated with a commercial scale power station but it also requires the successful project developer to disseminate the learning to third parties, including in the developing world. If successful, this approach will reduce the overall compliance costs for global abatement targets through the commercial deployment of breakthrough technologies.

4.9 What are the weaknesses of capital markets in Australia?

The key element determining decisions around private capital deployment is risk, and more specifically the risk/return relationship. In simple terms, the more uncertainty exists, the higher the risk, the more scarce and expensive the capital.

Aligned to the technological development pathway explored above, leading from invention to commercial deployment, there is a parallel financial pathway from speculative to mature finance. In the early 'speculative' stages of financing, that is venture capital, there is a high degree of uncertainty and a steep risk landscape, arising from the inability to accurately assess the duration of risk exposure, the fruits of success, or the ultimate cost of failure. Revenue streams are generally small or non-existent.

As a result, investors in this developmental phase apply strongly speculative strategies, typically deploying small amounts of capital in a broad range of opportunities, with a high required rate of return. This is a particular problem for investments in clean energy, which is highly capital intensive. Those with sufficient capital, that is the debt markets, do not normally operate in the venture capital space.

Hence capital for these projects is scarce, fragmented and expensive, usually with a short-term investment horizon.

³ <http://www.businessandclimate.com/report.htm>

Financing low emission technologies, whether in the research and development phase or throughout the commercialisation process, involves careful balancing of a number of risks other than the core financial and technology risks. A clear regulatory framework governing each investment area is essential in determining risk. This would need to address key questions around how the new technology would be regulated, what the costs of compliance would be and any other constraints on economic outcomes.

Attracting sufficient capital to finance low emission technology development and deployment in Australia is a significant challenge. The venture capital sector in Australia is small relative to countries such as the United States of America (USA). It does not have the scale to fund substantial pre-commercial development of breakthrough low-emissions technologies⁴. By way of contrast, the USA between 1998 and 2005 had 52 times the number of new venture capital funds than Australia, with average fund sizes roughly double those of Australian funds⁵.

As a result, there is much more reliance in Australia on government support to bring forward new technologies to a point where private capital will be attracted. Policy enablers are therefore needed to bring forward this entry point, lower the investment risk and help bridge the technology 'valley of death'.

⁴ Chapman, P (2001), *Stimulating economic growth: flow through investment structures for venture capital*, Australian Venture Capital Association Limited, Sydney, Australia.

⁵ Sources: Venture Source (US); GBS, Quay Partners, Access Economics (Australia) as referenced in lecture material *Financing Entrepreneurial Ventures*, University of Melbourne Business School