

28 September 2007

Near-Zero Emissions Working Group  
Department of Primary Industries

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**re: Strategic Policy Framework for Near Zero Emissions from  
Latrobe Valley Brown Coal Issues Paper - Response**

First of all let me commend DPI for its initiative in seeking to prepare a strategic framework for the development of the Latrobe Valley coal industry, and to express my appreciation for the opportunity to comment on the Issues Paper of August 2007. Our submission is attached.

Monash Energy is itself a combination of the Government's desire to develop the coal in a sustainable manner, along with the private sector's capacity to bring forward technologies and develop commercial opportunities. The present situation of two major international resource and technology companies, Shell and Anglo American, jointly developing a project in the Latrobe Valley, can be traced directly to the Brown Coal Tender of 2001.

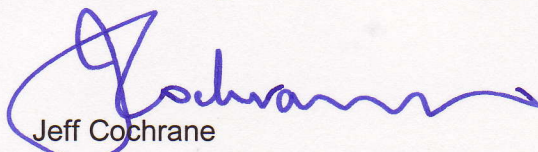
As we have said in many forums, the clean coal technologies we seek to apply have all been demonstrated in various places around the world, but the unique combination of energy resource and potential carbon sink provides a compelling argument – in principle - for Victoria to be a focus for the integration of these technologies into a clean coal-to-liquids project.

In the years since that tender much work on the project has been done, and much remains to be done. It is the fate of a "first-of-kind" project that so many of the parameters that guide our planning are in the lap of Government, hence our ongoing interest in policy issues such as carbon pricing, energy security, and technology strategies. More generally, we believe firmly that it is in our interest to support the ongoing development of a Latrobe Valley clean coal industry "hub" (in the broadest sense) through the introduction of new technologies, infrastructures and institutions, and the development of a strategic framework provides us with the opportunity to outline our view of the opportunities and challenges.

If the bulk of the submission is spent outlining challenges, please bear in mind that this reflects the outlook of a project team focussed very much on the means to de-risk a major capital investment. Meanwhile, our view of the underlying opportunity for the Latrobe Valley remains undiminished, and we look forward to working further with government and other stakeholders to bring it to fruition.

We would be pleased to elaborate on any aspect of this submission.

Yours sincerely



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Deputy Project Director

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## **Monash Energy Submission**

Strategic Policy Framework for Near Zero Emissions  
from Latrobe Valley Brown Coal

September 2007



## Contents

Introduction.....	3
Monash Energy.....	4
Global Energy and Emissions Abatement Context.....	5
Victorian Energy and Emissions Abatement Context .....	7
Response to strategic questions raised in issue paper .....	10
What is the role of Government in managing the coal resource? ....	11
What issues should the Government consider in developing policy and legislative framework? .....	12
What is the role of Government in facilitating CCS? .....	14
What is the role of Government in RD&D?.....	16
What should be the functions and role of the Clean Coal Authority? .....	17
Further References.....	18

## Introduction

This submission has been prepared in response to the Department of Primary Industries' *Issues Paper Strategic Policy Framework for Near Zero Emissions from Latrobe Valley Brown Coal* of August 2007.

The Issues Paper is focussed on producing a Strategic Framework and it follows that this submission is similarly pitched at the strategic level. Throughout its years of development Monash Energy has invested considerably in understanding the technical, environmental and commercial challenges of implementing a coal-to-liquids project which incorporates all the elements of a near zero emissions facility based upon Latrobe Valley brown coal.

This submission therefore reflects that investment in knowledge without necessarily recapitulating in detail the analysis which led to those viewpoints being formed. The diagrams and images used are principally for the purpose of document layout.

It could also be said that in considering the logistical challenges facing the development of a major coal project in the Latrobe Valley, the project team has by necessity cast its net wider than that of the issues paper, being concerned with issues such as infrastructure, investment facilitation, sourcing of trained personnel, construction methods etc. Where appropriate these issues are raised in the body of the submission as items which deserve ongoing attention from relevant government agencies as part of the strategic development of the Latrobe Valley coal sector.

On the other hand, there are policy issues such as coal allocation which given the history and status of the project are less directly relevant to the project and hence are not addressed by the submission.

There is also a complication in that a key current government issue - the form of CCS legislation covering offshore Victorian waters - is outside of Victoria's jurisdiction. Comments in this regard therefore seek to capture only the broad principles which should apply.

More generally, the capacity of the project to work through issues has very much benefited from the willingness of the Department of Primary Industries to engage in detailed discussion when necessary. Focussed work groups on particular topics have been very successful in clarifying issues and approaches and the practice will hopefully continue into the future.

For these reasons this submission is strategic level response but the project team would be pleased to delve more deeply into the key point during structured, ongoing discussions with DPI and other relevant government agencies.

## Monash Energy

Monash Energy is a joint development of two of the world's leading resource companies, Anglo American and Shell, to take forward a project which would advance and integrate a number of critical clean coal and low-emissions technologies.

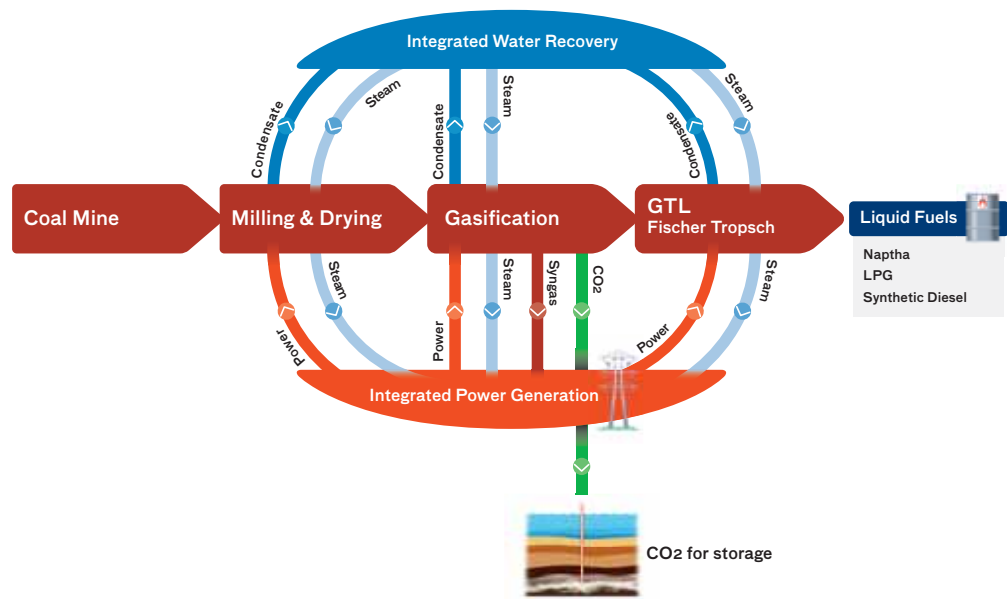


Figure 1. Indicative concept for Monash Energy CTL Plant

The concept being pursued is for a world-scale coal-to liquids plant incorporating brown coal drying, coal gasification, gas to liquids conversion, and carbon capture and storage. Further information is available at the project website [www.monashenergy.com.au](http://www.monashenergy.com.au)

## Global Energy and Emissions Abatement Context

Any policy development by the Victorian Government which seeks to support the achievement of energy and greenhouse gas emission goals must be informed by similar activities at the national and global levels. The majority of countries share the same concerns about energy security and the need to reduce emissions; they also share the same challenges in relation to technology and cost. Monash Energy shares the view of the International Energy Agency that these challenges are inextricably linked, as shown in Figure 2.

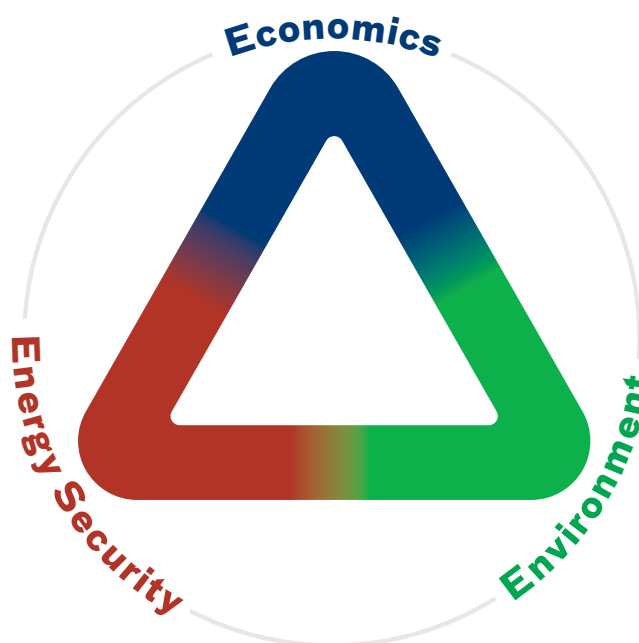


Figure 2. The three 'E's'

While some innovative work is being done in Victoria on technologies which might be part of the solution, the road to transformation of this activity into proven, commercial plant will be long and difficult. It remains the case that the core of the technologies which will be implemented in Victoria over the next 50 years are more likely to be developed and established globally. Development of primary technologies in Australia will mostly be focussed in areas where Australia has particular expertise or industry interest, while the major challenge lies in project developers adapting and integrating globally sourced technologies for specifically Australian contexts (energy sources, standards, etc).

The range of technologies that will become the mainstay of initially low emission, and ultimately fully sustainable energy generation will evolve progressively over the next few decades. It is to be expected that the range of such technologies will expand while the cost of those which are most favoured will decrease with time. As with any new technology push the 'early adopters' pay a much higher price than those who wait for the product to mature and for competition to have an impact.

Over time the relative attractiveness of particular technology options will shift as input costs change, technology matures, breakthroughs occur and even community attitudes change. Thus, what seems the likely best solution today, may, with time, become outmoded. For example, much of the analysis today is based upon paper studies of critical new technology components (e.g. post combustion capture, oxy-fuels, IGCC, CCS) based upon a limited experience base and essentially no commercial facilities. The uncertainty of this situation has been exacerbated in recent years by the rapid escalation in the capital costs of new plant caused by the global shortage of resources (both human and material).

With about 0.4% of the world's emissions, there is little to be gained by Victoria trying to pre-empt the exhaustive process of technology development at the global level and technology integration and proof-of-concept at the project level. Rather it should take an approach based upon patience, prudence and preparation. This is not an excuse for doing nothing but rather for prioritising action. Focusing on energy efficiency and conservation will always be beneficial regardless of how future events transpire. Working towards a fully effective Australian emissions trading scheme (ETS) is a critical foundation for moving forward. Ensuring that there is a framework to encourage and support a 'no regrets' approach to any major, emissions intensive investment proposal is another early action. Fortunately, Victoria does not have to make any major, near term decision on base-load power generating capacity, while having a clear, proven 'no regrets' option in the shape of a natural gas combined cycle (NGCC) plant available<sup>1</sup>.

In the medium-term, Victoria may well have the potential to be a world-leader in the implementation of clean coal technologies, particularly carbon capture and storage, but the roll-out will be on a firm foundation of technology selection, infrastructure provision, and effective policy frameworks.

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<sup>1</sup> An NGCC plant could be designed to be capture ready (post combustion) and fuel flexible (operate on synthesis gas or methane synthesised from coal). The extent of pre-investment is a decision to be taken at the time of the investment decision).

## Victorian Energy and Emissions Abatement Context

Victoria is also fortunate to have a world-scale energy resource in brown coal and a major adjacent depleting oil and gas province to store emissions. Given the accepted need to reduce emissions, these two resources must be seen as being strategically indivisible. If the strategic imperative and the necessary regulatory infrastructure existed today, there is no doubt (technically) that such a resource could be used to produce low emissions power, fuels, chemicals and fertilisers; indeed, all the energy sourced building blocks of a developed economy. However, there are many areas where current uncertainties create barriers to implementing this Clean Coal Technology (CCT)<sup>2</sup>, including:

- a. CCS legislation
- b. carbon pricing mechanism (e.g. ETS)
- c. infrastructure
- d. targeted incentives
- e. resource security
- f. environmental impact assessment process
- g. global investment competition equalisation mechanism
- h. human resources
- i. technology cost / performance.

The majority of these barriers can only be lowered through effective government action. Hence, they represent areas where government action, Federal, State or both, will be required.

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<sup>2</sup> In this Submission CCT should always be assumed to include CCS.

Monash Energy Submission



Figure 3. The 'indivisible' resources: coal and CO<sub>2</sub> storage options

Victorian investment opportunities in CCT will be characterised by scale (multi billion dollar), frequency (occasional), individuality (e.g. power and/or liquids and/or fertiliser) and competition (location, funding priority). Most investors with the capability to develop such facilities will have a global outlook and competing opportunities within their portfolios. While governments might prefer to leave all investment decisions to the market, the policy priority of reducing greenhouse gas emissions means they are already influencing the proverbial playing field. Setting the emissions abatement trajectory for Australia will have direct and potentially uncertain market consequences.

Once linked to a global ETS system the carbon price, and hence the domestic power price, is likely to be influenced by decisions made outside Victoria and Australia. While economic modelling has been used to predict the response of the economy to differing abatement scenarios these are only broadly accurate at a macro level. Uncertainties in the real technology costs, resource shortages, investor behaviour and competing government responses are just some of the factors which might result in real world outcomes which do not match predictions.



Figure 4. Shell Gasifier (2000 tpd) being installed at Yue Yang, China

While Australia's political stability has always been a source of competitive advantage, high labour costs and low productivity are clear areas of competitive disadvantage. This is particularly true for Victoria where no private investment in a greenfields world scale processing facility has occurred for about two decades. Energy prices are increasingly set on a global basis while the number and size of the economies which are open to global investment are rapidly growing. As a result the competition for global investment is likely to become much more intense. To win the contest for the global CCT investment dollar it will be necessary for governments to have well developed energy and greenhouse abatement strategies plus sufficient knowledge of the status of technology development and commercial markets to know when it might be strategic to assist a particular project over the line. The following box highlights a possible scenario for Victoria and some of the questions it raises.

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High global carbon prices – possibly caused by aggressive abatement in other jurisdictions – will feed high local power prices while at the same time triggering a global investment rush in low emitting technologies and demand for construction resources which exceeds supply:

- Will Victoria, currently with Australia's only substantial privatised generating industry, be seen as a priority investment destination?
- What incentive is there for an investor to make Victoria a priority investment destination?
- What are the broader consequences if such an outcome coincides with a tightening of power supply / demand hence leveraging electricity prices up to or beyond global levels?
- Will timely investment in low emissions generating plant occur given purely market incentives and the risk that any such investment lead to over supply and collapsing prices (i.e. the Pelican Point outcome)?
- Will strategic opportunities for investment in non-power CCT projects -which would pave the path for future investments – occur if left to the market?
- Will Victorian consumers accept that local electricity prices are now potentially hostage to decisions made outside Australia?

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## Response to strategic questions raised in issue paper

Monash Energy's responses to the Issues Paper are as follows. We have organised our response under the main strategic question headings of the Issues Paper.

## What is the role of Government in managing the coal resource?

The coal resource is a major, potentially high value community asset and the Government has an obligation to manage it in a way that maximises its benefit to current and future generations. However, unlike most mining activity where the ex-mine product is directly marketable (or is so following a limited degree of low cost transformation) the raw brown coal requires very major investment in processing plant before its value can be realised i.e. it is a means to an end. Therefore, it follows that the policy and practice for managing the resource should be a subset of that surrounding coal processing and should be informed by the need to facilitate the established economic, social and environmental coal processing objectives.

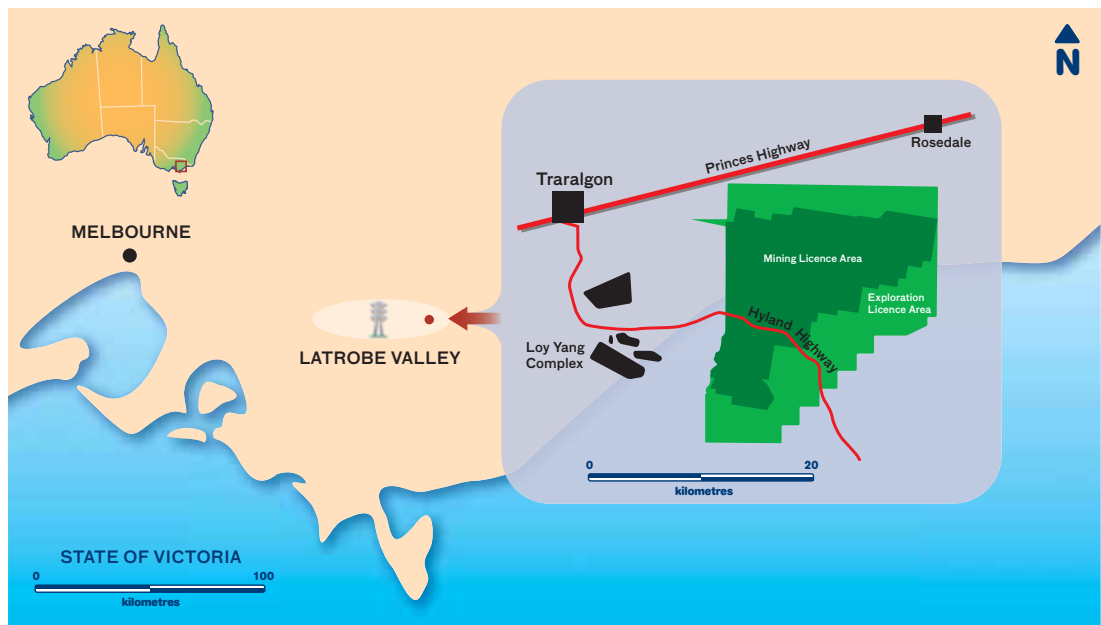


Figure 5. Location of ME Tenements

There has been a fundamental change in the perception of the form of and products from brown coal processing over the last decade. To support this change there needs to be a commensurate investment in analysis and planning for the future. The LV 2100 study was a start at analysing the coal resource and made many recommendations for follow up work to protect the resource. These recommendations need to be enacted. However, the study's coal use scenarios were necessarily, given the scope and funding available, preliminary. Much more analysis needs to be undertaken to ensure that the government has a full understanding of the resource, the practical limitations to its use, options for mine development and how these might play out under different technology development scenarios.

## What issues should the Government consider in developing policy and legislative framework?

Based upon Monash Energy's experience, analysis and perspective there are a number of key strategic considerations which should inform the Victorian Government's deliberations on the development of brown coal policy. These include:

- *The Near Zero Emissions from Latrobe Valley Brown Coal Issues Paper* is perhaps too narrowly focussed on the resource - by far the best understood and easily managed component of the challenge. The greatest challenges lie in, firstly, the cost effective processing of the coal into value added products and, secondly, the capture and storage of the resulting greenhouse gases. Thus, the focus might be better described as implementing Clean Coal Technology (CCT) where this is understood to include the resource, the processing technology and CCS. While the initial focus will undoubtedly be on Latrobe Valley coal there are coal deposits outside that area and their potential will need to be assessed at some stage
- Non-viability of the nuclear option in Victoria—for whatever reason—makes the successful implementation of CCT a necessity if future generations of Victorians are to continue to control their energy destiny. While Victoria's energy needs are likely to be met by a mix of imported oil, natural gas, renewables and coal for the foreseeable future, use of Victoria's significant coal deposits has distinct advantages in terms of price, availability and security
- Any CCT policy must be a fully integrated component of Victoria's overall industry, energy and greenhouse gas abatement strategies
- Key Australian Government initiatives, such as ETS and offshore CCS legislation, will be critical to achieving Victoria's CCT outcomes, and Victoria has a significant stake in the successful implementation of CCS in offshore waters. As such the State must work in partnership with the Federal Government in ensuring the effective design and implementation of these initiatives, and it is in the interests of the Commonwealth to take into account the State's unique perspective and expertise.

The modern world has become too complex to believe that we can predict with any certainty the shape of things even in the next decade. This is amply illustrated by the last attempt to plan out the future of Latrobe Valley coal use; undertaken by the former SECV during the 1980s. That view of the future envisaged over 20 power stations dotted over the Latrobe Valley supplying a seemingly exponential growth in electricity demand. The world on which it was predicated disappeared within a decade.

A preferable approach is outlined in the following points and developed in more detail below:

- a flexible, scenario based, strategic planning approach founded on a thorough analysis of the resource, technology and social, environmental and economic imperatives; periodically updated to keep it current
- a government funded capability to develop and maintain such a strategic plan, to work to identify and remove barriers and to generally facilitate the implementation of CCT
- a CCT R&D Strategy focussed on creating and maintaining the science and engineering capability needed to support the implementation of CCT
- preparedness by the Government to respond to the evolving real world developments as necessary to ensure that strategic opportunities are not lost and that the risk of adverse outcomes is mitigated
- a capacity and willingness to work with Commonwealth counterparts (and international bodies where relevant), supporting development of an integrated national approach to technology development which simplifies the range of programs, reducing conflicts and ensuring alignment.

In order to determine its role the government needs to maintain an up to date knowledge of the challenges and barriers to implementation of the processing technology component of CCT. Gaining an independent understanding of the key aspects of this area is an important element in the Government's ability to make informed policy choices and to be able to influence outcomes. As described above the key challenges in implementing Clean Coal Technology (CCT), include:

- a. CCS legislation and facilitation (see further below)
- b. carbon pricing mechanism (e.g. ETS): considered to be an essential part of the facilitation of future abatement investment but may not be sufficient, on its own, to ensure timely investment in key major facilities
- c. infrastructure: new technologies are likely to need enhancements to existing roads, railways, ports. New public infrastructure may be required to support CCS
- d. targeted incentives: may be required in addition to a carbon price to ensure that there is a timely investment in critical major facilities
- e. resource security: a critical issue covering access to both coal and CO<sub>2</sub> storage resources. Different strategies will be required to provide such security for a range of potentially different investment outcome scenarios
- f. environmental impact assessment process: CCT projects will be extremely complex and require assessment and authorisation under a large number of laws covering many

agencies as well as the Victorian and Australian Governments. Ensuring an effective, timely and integrated process for such authorisation is essential

- g. global investment competition equalisation mechanism: will be needed to ensure that Australia can compete for investment during the transition period when other nations may not have any carbon pricing mechanism. This could be part of the ETS design
- h. human resources: lack of skilled scientists / engineers to design new facilities and skilled trades people to build them has emerged as a major issue requiring early attention
- i. technology cost / performance: will remain a critical challenge until CCT matures through a sufficient level of global investment.

## What is the role of Government in facilitating CCS?

As a component of CCT, CCS shares the same challenges outlined above. However, it also contains a number of specific challenges, including:

- a. development of effective enabling legislation facilitating access to the required CO<sub>2</sub> storage volume
- b. finding the lowest cost model for delivering CO<sub>2</sub> transport and storage services (while meeting safety and storage security standards), including defining the roles of government and industry in delivering these services
- c. determining the issue of post-operational liability.

Monash Energy is aware of DPI's active involvement in the intergovernmental processes which developed the principles for the regulation of CCS. Given the importance of the legislative outcome to the future of CCT in Victoria it is imperative that proactive Federal / State cooperation is maintained until workable legislation is established. For the Victorian Government to be an active participant in this process it will need to have clearly identified the strategic needs of industry and the State. Monash Energy believes that it is essential that such legislation provide secure access rights within a flexible, practical framework which recognises the need to minimise the barriers to implementing CCS.

Similarly governments and industry are about to enter a process for the design of an Australian ETS. The outcome of this design will not only have a critical impact on Victoria's existing brown coal users but also the implementation of CCT. Again, the State will need to identify the strategic needs of industry and the State in deciding how it might seek to influence this design.

## Monash Energy Submission

From an industry perspective it is imperative that the cost of CO<sub>2</sub> transport and storage is minimised and the barriers to access are minimised for all potential users. Detailed analysis and understanding of the transport and storage components of CCS is required. This is particularly so as there is no established view as to what development model(s) might best facilitate the implementation of CCS. Models involving varying levels of Government involvement have been mooted and require proper consideration.



Figure 6. Conceptual CO<sub>2</sub> 'Hub' incorporating Monash Energy

The critical issue of liability for CCS should be seen within a framework of risk sharing. Governments, individuals and industry have historically evolved patterns of risk sharing for the various activities of a developed society. The underlying principle is that the parties accept the risk that they are best able to manage. Governments, as the only ongoing manifestation of society, remain the risk manager of last resort; accepting responsibility for events whose impact, scale, duration and rarity prevent them being cost effectively accepted by individuals and industry. All parties use insurance as a mechanism to share risk but this is only effective where experience enables the insurer and the insured to reach agreement on the price of the risk. Inevitably insurance policies are fixed term arrangements whose duration is limited by commercial considerations. Government may be viewed as accepting risks which are uninsurable e.g. wars, 'Acts of God', long term drought.

Analogous experience indicates that the long term risk of adverse consequences from properly selected, well managed CCS sites is low. However, the lack of direct experience and the duration of the exposure places it well beyond human experience and essentially uninsurable. Government is in the position of being able to mitigate the post closure risk through oversight of the site selection, operation and closure requirements. Ultimately, the key risk management decision is to balance the residual long term risk against the risks of not having access to CCS as an abatement strategy; only Government is in a position to make that judgement.

## What is the role of Government in RD&D?

Monash Energy has actively participated in a number of Government processes addressing this question over recent years. The background to our view is given in the context sections above. We are of the view that the priorities of any government support for RD&D should be:

- on training and maintaining skilled personnel with the scientific and engineering knowledge and experience to help implement CCT, principally through adaptation of the best global technology
- focused towards the Development stage of the cycle;
- built on the understanding that periodic larger scale funding is likely to be required to facilitate investment in CCT projects which are beyond the R&D stage but still not fully commercial (see Figure 7 below<sup>3</sup>). Such expenditure could be in supporting infrastructure or to overcome global competitive disadvantage.

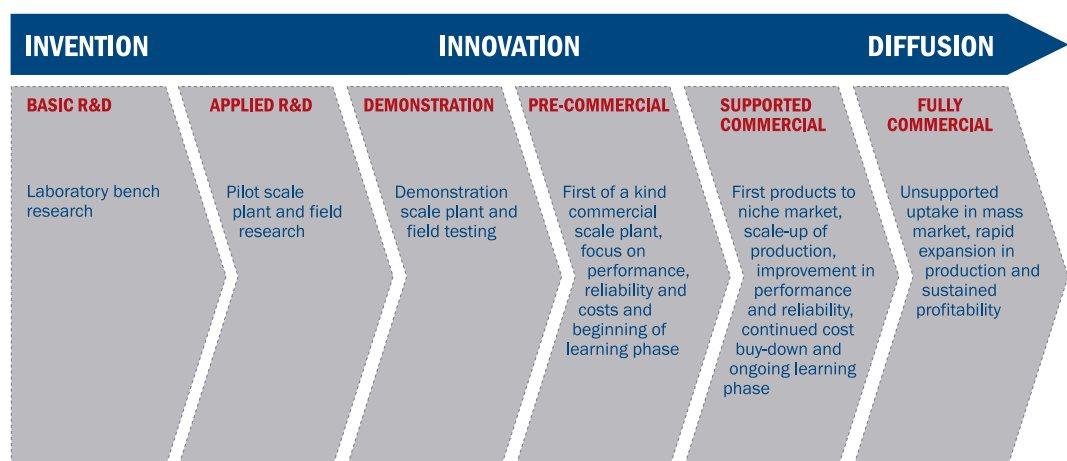


Figure 7. Technology Innovation Chain

<sup>3</sup> Extracted from *Stepping Up: Accelerating the Deployment of Low Emission Technology in Australia*, 2007, report of the Australian Business and Climate Group

## What should be the functions and role of the Clean Coal Authority?

Monash Energy does not have a fixed view on how the Government should organise its support for the implementation of CCT. As form should follow function and the function may evolve with time, it is possible that the organisation might be conceived of as evolving through the following broad, overlapping stages:

1. Analysis, Scenario Planning, Option Development; Integrated within Government
2. Implementation, Facilitation; Separate Agency
3. Construction and Operation (depending upon chosen options); State Owned Enterprise.

The most critical requirements are the provision of adequate financial resources, for the required tasks, recruitment of appropriately experienced staff and the development / maintenance of the necessary capability. Ability to offer competitive remuneration rates will be a key factor in securing the right staff and this may influence the form of the organisation.

In viewing the level of resourcing required to undertake the tasks, Government should be mindful of the potential added value of the processed coal – which is worth more than 250 times the total Victorian current annual agricultural production.

As suggested above the deliverable from a strategic planning stage, and hence the objectives of such an organisation, is not some fixed plan of action, rather it is a series of flexible, interrelated deliverables covering:

- a detailed understanding of all aspects of the components of CCT;
- a clear statement of the desired CCT strategic outcomes;
- an assessment of the options for Victorian Government action covering a range of potential scenarios;
- the capability and resources to periodically update the option assessment and to respond to changing circumstances and opportunities in a timely manner.

As described above there may only be a few opportunities over the next decades where the circumstances develop such that a major investment in commercial scale CCT is possible. Whether the investments go ahead will be determined in part by how well governments have prepared through understanding the issues, removing key barriers in advance and being able to identify those elements of the project which may meet public good criteria and justify targeted financial incentives.

## Further References

OECD/IEA, 2006, *Energy Technology Perspectives (in support of the G8 Plan of Action): Scenarios and Strategies to 2050*

IEA, 2007, *Energy Security and Climate Policy: Assessing Interactions*

IEA, 2006, *World Energy Outlook*