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26 September 2011

Ms Anna Burke, MP
Chair, Joint Select Committee on Australia's Clean Energy Future Legislation
Parliament House
CANBERRA ACT 2600

Dear Ms Burke

Inquiry into the Clean Energy Future (CEF) Legislative Package

The Australian Coal Association welcomes the opportunity to provide a submission to the Joint Select Committee and appear before it. The key points made in the attached submission are:

- The scheme represents an $18 billion tax over the first ten years. That means the black coal industry will be paying for about two-thirds of the estimated $25 billion wealth transfer to households, renewables and agriculture:

Carbon Tax (on fugitive emissions)	$14.6 billion
17 % increase in fuel excise	$ 1.7 billion
Increase in electricity cost	$ 1.9 billion
Total new impost	**$18.2 billion**
less coal industry assistance	*($ 1.3 billion)*
Net impost	**$16.9 billion**

- Section 143 (3) of the main CEF Bill unfairly excludes the coal industry from transitional assistance to maintain coal industry international competitiveness.
- The Coal Sector Jobs Package is not adequate to prevent significant adverse impacts of the CEF scheme on industry competitiveness. Preliminary advice from ACIL Tasman is that the Package only delays four mine closures during its five-year operation. The package has no impact on potential new mine developments, which by definition are ineligible for assistance.
- Two simple changes to the legislation would have a significant impact on the trade-exposed coal industry and would have widespread community support are:
  1. adopting a phased approach to the auctioning of emissions permits for all trade-exposed industries; and
  2. phasing in the inclusion of coal mine fugitives emissions in-step with Australia's coal export competitors and over a time frame consistent with the development of fugitive abatement technologies from their current experimental stages to safe, reliable, deployable equipment and processes at commercial scale.

The coal industry would be pleased to work constructively with the Committee to assist it in its work and develop a better and less economically damaging approach to pricing greenhouse gas emissions.

Yours sincerely
for the Members of the Australian Coal Association Ltd

John Pegler
Chairman

Submission to the Joint Select Committee on Australia's Clean Energy Future Legislation
Inquiry into the Clean Energy Future (CEF) Legislative Package

Introduction

The Australian Coal Association (ACA) accepts the scientific evidence on climate change and recognises that coordinated international action to reduce global greenhouse gas emissions is necessary. The ACA supports a carbon price as a means of reducing emissions provided it is consistent with sound policy principles, particularly relating to economic efficiency, fairness and maintaining coal industry competitiveness.

The industry has serious concerns about the efficiency, fairness and competitiveness impacts of the CEF legislation. The net impact of the proposed carbon tax will be to crimp coal industry jobs and investment. Because this is not a cost our coal competitors will face the outcome will have minimal impact on global emissions as coal production, and the associated jobs, will simply move offshore.

There are two simple changes that could be made to the legislation that would have a significant impact on the trade-exposed coal industry and would also have widespread community support. These are:

1. adopting a phased approach to the auctioning of emissions permits for all trade-exposed industries; and
2. phasing in the inclusion of coal mine fugitives emissions in-step with Australia's coal export competitors and over a time frame consistent with the development of fugitive abatement technologies from their current experimental stages to safe, reliable, deployable equipment and processes at commercial scale.

$18 Billion impost on the coal industry

Given the fragility of international negotiations on climate change and uncertainty about global economic growth it is vital that the Australian Government is careful about experimenting with the Australian economy. Australia's coal industry already faces various imposts not confronted by its competitors. The CEF scheme will introduce a new tax on fugitive emissions from coal mining as well as on key inputs to production not imposed by any of our coal competitors. The scheme represents an $18 billion tax over the first ten years. That means the black coal industry will be paying for about two-thirds of the estimated $25 billion wealth transfer to households, renewables and agriculture:

Carbon Tax (on fugitive emissions)	$14.6 billion
17 % increase in fuel excise	$ 1.7 billion
Increase in electricity cost	$ 1.9 billion
Total new impost	**$18.2 billion**
less coal industry assistance	*($ 1.3 billion)*
Net impost	**$16.9 billion**

Unfair treatment of the coal industry

The Government acknowledges that coal is one of the most trade-exposed industries in Australia. In fact, under the earlier Carbon Pollution Reduction Scheme (CPRS) legislation coal was eligible for emissions-intensive, trade-exposed (EITE) transitional assistance using the Government's own rules. Nonetheless it was unfairly excluded from such assistance although there remained the possibility for a later review to include it in the EITE arrangements.

The industry is deeply concerned to see blatant discrimination against the coal industry enshrined in the legislation before Parliament. The main bill contains the following egregious clause that has the effect of permanently locking coal mining out of the transitional assistance arrangements regardless of

future market conditions or the outcome of any Productivity Commission Reviews of the effectiveness and scope of the EITE arrangements:

Section 145 (3) *The Jobs and Competitiveness Program must not provide that the extraction of coal is an activity that, under the program, is taken to be an emissions-intensive trade-exposed activity.*

This is a dramatic shift from the previous CPRS legislation, which left open the inclusion of coal mining at a future date should conditions in the industry change. If passed it would inhibit a subsequent Government including coal in the EITE arrangements.

EITE status should not be a once-for-all decision. Transitional assistance arrangements for coal should be considered as part of the planned reviews of the scheme arrangements. This would enable the effects of international action to put a price on carbon in coal competitor nations, of a rise in domestic relative to overseas carbon prices and of any fall in commodity prices to all be taken into account in assessing the adequacy of the transitional assistance arrangements.

Undermining international competitiveness

Critical investment decisions in the coal industry require an attractive environment in which to operate. The industry requires large volumes to be mined and transported to customers to make projects viable. The operating environment is complex and challenging. Long term investments, not only in mines but also in major supporting infrastructure and regional development, must be carefully examined over a 20 to 40 year timeframe.

In this environment, the Government's carbon tax is another impost that will undermine business confidence and the coal industry's international competitiveness.

The impacts of the proposed scheme include:

- a permanent reduction in margins across the commodity cycle risking premature mine closures and job losses in regional areas
- a competitive disadvantage relative to producers in Indonesia, Columbia, USA, Canada, Russia and South Africa and emerging competitors such as Mozambique and Mongolia
- reduced new project investment certainty
- uncertainty about committing sustaining investment at existing operations
- impacts on project valuation and business decisions forcing companies to re-order the ranking of Australian projects in their investment pipelines.

The carbon tax will be applied to fugitive emissions from coal mining in addition to other mining inputs such as fuel, transport and electricity. The lack of technologies to abate the fugitive emissions from mining – particularly methane from ventilation air and from surface mining – means that there is little the industry can do to avoid paying the tax and the only way to significantly reduce emissions is to close mines. (Please refer to Attachments 1 and 2 for further details).

Coal jobs package doesn't add up

In June 2011 independent, mine-by-mine modelling by consultants ACIL Tasman concluded there would be important adverse consequences for production, employment and investment in coal mining from the Government's proposed carbon pricing scheme. The results were provided in an interim study, *Impact of the Proposed Carbon Price on Black Coal Mining*, which was made public.

Following the release of the Australian Government's policy document, *Securing a Clean Energy Future*, and accompanying Treasury modelling, the ACA asked ACIL Tasman to include the actual

carbon pricing scheme proposed by the Government and assess the impact of its Coal Industry Jobs Package.

Preliminary advice from ACIL Tasman is that the Coal Sector Jobs Package achieves only a deferral of four mines (out of a total of 21 premature mine projected closures in the first 10 years of the carbon tax). In each case the deferment would be for only one year. Moreover, the Package covers only a portion of the carbon costs of a relatively small number of existing 'gassy' mines and only for a short period. Due to this limited coverage the Package will not avoid the negative effects of the carbon price on other existing trade-exposed coal mines and prospective new projects.

The Package has no impact on potential new mine developments, which by definition are ineligible. ACIL Tasman's preliminary advice also suggests new mining development job opportunities will be reduced by 27%. This reduction also represents over $25 billion in lost revenue for Australia over the next ten years.

ACIL Tasman further advises that adverse effects on coal production and employment result from effects at the margin of extraction and the margin of investment. Consequently assessing the effects of carbon pricing based on average cost per tonne is highly misleading and inaccurate. Unfortunately, the Government has based its policies on such estimates.

In the context of an $18 billion tax then the transitional assistance of only $1.3 billion over only five years is neither a fair nor proportionate treatment of the coal industry.

Global action is patchy and inconsistent

Australia's efforts to put a price on carbon and reduce emissions make sense only if there is substantial progress towards global action by both our trade partners and trade competitors. But that is manifestly not the case.

Since the Copenhagen Conference in December 2009 there has been growing and justifiable pessimism about achieving consensus on global abatement targets post 2012. Indeed this is clearly proving very difficult to achieve.

Yet the CEF legislation proposes to introduce a price on carbon well above the current forward price for Clean Development Mechanism units making Australia's starting price punitive. It also proposes the scheme will transform into internationally-integrated emissions trading from 2016 – less than five years away.

The business critical element of predictability can only be delivered if the long-term price is reasonably predictable, going beyond the near-term 2020 target of five per cent. After the scheme is legislated only 15 per cent of global emissions will be covered by nations with trading schemes.

Given that countries worth 85 per cent of global emissions have other plans it is hard to see how our scheme will provide business with sufficient confidence in the direction of a global carbon price. Predictability comes via calibration of Australian effort with that of our competitors and trade partners and also by internal scheme design that is inherently robust. In short, unless there is credible comprehensive action on a global scale, it is difficult to see why we would impose such a tax.

Decisions based on incomplete modelling

Clearly Australia should have a proper assessment of the desirability of imposing the proposed carbon tax. It is of deep concern that the non-transparent or "black box" Treasury modelling on which the scheme is based does not undertake any sensitivity analysis based on realistic assumptions about international abatement action. Such analysis should have been undertaken both to asses if the

Government's proposal is in fact efficient or least cost and whether it is desirable for Australia to impose such a tax if many other countries, including the world's largest emitters and our coal export competitors, do not.

ACIL Tasman has advised ACA that Treasury has modelled two scenarios in which the rest of the world adopts coordinated carbon pricing and concurrently with Australia. But Treasury has not modelled, or if it has it has not released, the most relevant scenario, which is the one in which government imposes such a scheme and Australia's major resource competitors do not. Moreover, Treasury's modelling is based on a range of assumptions that need to be tested.

It is important to undertake sensitivity analysis to assess the implications of more abatement being required in Australia and/or international permits costing more. There are sound reasons for considering that likely, including: continued widespread use of inefficient abatement policies internationally, as reported by the Productivity Commission; quantitative restrictions by the Australian Government on access to foreign permits; restrictions by other countries on their sales of permits; and restrictions placed by Australia on the acceptability of international units due to concerns about verification, monitoring and enforcement. Moving away from Treasury's carbon pricing assumptions risks higher job losses and less investment in the coal industry.

The Committee should assess such risks by commissioning systematic and transparent modelling of alternative policy scenarios by the Productivity Commission. This modelling should address questions such as:

- what are the costs to Australia of a unilateral carbon pricing scheme operating with patchy and uncoordinated international abatement action until 2020 rather than credible, comprehensive action on a global scale?
- what is the risk of a unilateral tax on Australian resource exports encouraging our coal and other resource competitors to stay out of any global agreement?
- what are the risks on taxpayers of implementing the proposed scheme before the global outlook is clear?
- is the proposed scheme the most efficient way of meeting Australia's Copenhagen Accord pledge given the structure of Australia's economy and the nature of its export profile?
- is imposing a unilateral tax on our main source of comparative advantage the most efficient way of meeting the environmental goal of the CEF legislation?
- what would be the implications of alternate carbon price trajectories?
- what would be the implications if a large proportion of international abatement was not available or if international abatement proved to be more costly than expected? (Please refer to Attachment 3 for further details).

Careful consideration of such questions will enable the Committee to assess whether it make sense for Australia to implement the CEF carbon pricing mechanism at a time of manifest and continuing uncertainty about the extent and nature of the international abatement effort and the global economic outlook. That assessment is crucial to Australia because its prosperity is based on coal, other mining and agricultural endowments that are highly carbon-intensive. Moreover, in the case of coal mining this carbon intensity is not amenable to speedy or hastily-contrived technology solutions that are commercially proven and inherently safe.

There is a simpler, fairer alternative

The industry has recommended to Government that a different approach is required. We should follow the example of other nations in phasing in the auctioning of permits and treating fugitive emissions in the same way as our international competitors.

It is obvious that the Europeans had a keen eye to their economic wellbeing and the competitiveness of their industries when they designed their emissions trading scheme. Drawing on that experience in designing a carbon tax – there are three key lessons.

First, a carbon tax should be introduced with phased-in auctioning for Australia to make the transition to a low carbon economy in the long term without reducing job opportunities in the short term.

Second, we should not give our competitors an unfair advantage. The EU's approach here is to shield trade exposed and energy intensive industries.

Third, Australia should act in step with, not ahead of, our major trade competitors and partners. This includes the treatment of coal mine fugitive emissions. (Please refer to Attachment 4).

Technical attachments to this submission

To assist the Committee in its work the following information is attached at the page number shown:

1. ACA Submission on the Government's Climate Change Framework, 11 May
2. Supplementary submission on the Government's Climate Change Framework, 18 May
3. Centre for International Economics, *Alternative carbon prices for sensitivity analysis*, August 2011
4. Centre for International Economics, *Coverage of coal mining fugitive emissions in climate policies of major coal exporting countries*, June 2011

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11 May 2011

The Hon Greg Combet AM MP
Minister for Climate Change and Energy Efficiency
Parliament House
CANBERRA ACT 2600

Dear Minister

Coal Industry – Interim Response

Thank you for the invitation at a meeting with the Australian black coal industry on 19 April 2011 to comment on the Government's proposed carbon pricing framework.

We appreciate that this has been an opportunity for genuine consultation. While we have a range of concerns which are expressed in this letter, we believe there are two simple changes that could be made to the scheme which will have a significant impact on the trade-exposed coal industry and which will also have widespread community support.

These are

1. *adopting a phased approach to the auctioning of emissions permits for trade-exposed industries,*
2. *phasing in the inclusion of coal mine fugitives in step with Australia's coal export competitors and over a time frame consistent with the development of fugitive abatement technologies from their current experimental stages to reliable, deployable equipment at commercial scale,*

The black coal industry welcomes real consultation over the coming months on real alternatives to the current Government proposals.

It is perplexing that the Government has arrived at variations on its old proposals previously shown to deter investment, reduce Australian competitiveness and destroy Australian jobs in favour of enhanced opportunities for overseas competitors for no environmental gain. It is also perplexing that the Government proposes to decide the allocation of revenues from a carbon tax/emissions trading scheme (ETS) before resolving critical structural shortcomings in its current proposal.

In the absence of well-reasoned alternatives to consider, this interim response to the Government proposals is provided. It should be read in conjunction with other submissions from black coal industry participants and their industry associations.

In summary, the Government's proposed framework would, if implemented

- fail to satisfy the carbon pricing principles established by the Multi Party Committee for Climate Change,
- ignore the sound advice contained in the principles proffered in the Minerals Sector Statement of Principles on Climate Change Policy,
- subject Australian trade-exposed industries to substantial carbon penalties ahead of their international competitors,
- fail to address the impact of pricing carbon on coal mines that face contractual rigidities preventing them passing on costs of emission permits to power station customers,
- cause a loss of investment, growth and employment,
- further exacerbate these effects by the proposed inclusion of mine fugitive emissions in the scheme,

- ignore international practice which recognises that these fugitive emissions for the most part are impractical to measure and abate without a massive, rapid evolution of technology, and
- result in mine closures and job losses as the only way to meaningfully reduce Australia's fugitive emissions from coal mining between now and 2020.

These deficiencies could be fixed without lessening the scheme's environmental effectiveness by

- overturning and replacing the flawed architecture of the proposed carbon tax and CPRS,
- adopting a phased approach to the auctioning of emissions permits for trade-exposed industries,
- phasing in the inclusion of coal mine fugitives in step with Australia's coal export competitors and over a time frame consistent with the development of fugitive abatement technologies from their current experimental stages to reliable, deployable equipment at commercial scale,
- taking a measured approach that tailors these aspects to the progress of Australia's overseas competitors in adopting meaningful, binding emissions limits,
- ensuring that Australia's international competiveness is preserved during the transition to global carbon pricing,
- ensuring that the coal industry's growth and employment prospects are preserved, and
- continuing policies which support technology evolutions which advance low emission utilisation of Australia's black coal endowment.

Set out below are six central issues that need to be addressed in the consultation process in light of the limited progress in international climate change negotiations.

1. Adopting a principled approach

The black coal industry supports introduction of a carbon price as part of the efforts to reduce Australia's greenhouse gas emissions, provided this is consistent with sound policy principles and the national interest.

The coal industry, in conjunction with others, has submitted principles that focus on Australia's part in a measured transition to a low emissions global economy. These principles require the alignment of three key policy pillars: global agreement on binding emissions reductions, efficient market-based policy measures and substantial investment in a broad range of low emissions policy measures (see **Attachment A**).

The Multi Party Climate Change Committee has also proposed similar principles. Based on the Government's own criteria, the proposed climate change policy framework fails to achieve these desirable outcomes (see **Attachment B**).

The coal industry would welcome a genuine opportunity to assist the Government in developing an alternative framework that is consistent with shared principles, and we touch on this in the final section of this submission.

2. Australia must act in step with, not ahead of, our major trade competitors and partners

The regrettable reality is that Australia can expect only slow progress by other developed and developing countries in adopting binding emission reduction targets over the next decade.

The Government's proposed carbon pricing timetable will have Australia moving ahead of its competitors, involving significant risks to our economy. Australian action on climate change too far ahead of global action, particularly by competitors in developing countries, would be costly and without benefit to the global climate. For example, coal not produced here as a result of the carbon price would simply be replaced with production by overseas competitors none of whom have or plan to have a similar tax on coal mining.

It follows that whatever the carbon price policy mechanism adopted, it must include measures to preserve the competitiveness of Australia's trade-exposed industries, including coal mining.

These measures should also address the impact of pricing carbon on coal mines that face contractual rigidities preventing them passing on costs of emission permits to power station customers.

It has been suggested that many coal producing countries are implementing direct carbon pricing policies (such as carbon taxes or trading schemes) or have in place other policies specifically designed to abate greenhouse gas emissions. Examples cited include the US Regional Greenhouse Gas Initiative and suggestions that the US Environment Protection Agency is about to implement emission regulations on coal mining; the European Union's Emissions Trading Scheme; Chinese Government taxes and regulations; and proposals in South Africa and Indonesia to place a tax on coal production. However, as summarised in **Attachment C**, no other export competitor has in place or has committed to introduce a tax on coal mine fugitive emissions.

Government comments at the meeting with the coal industry on 19 April 2011 indicate that the Government is committed to reintroducing the deeply flawed Carbon Pollution Reduction Scheme (CPRS) legislation.

This approach does not address the competitiveness impacts on trade-exposed industries, including coal. Nor does it address the contractual rigidities preventing passing-through by mines of costs of emission permits to power station customers in Australia.

3. Policy should be effective over the long term

Climate change is a long-term challenge for which global mitigating policies must remain effective in perpetuity.

The design of the proposed carbon tax assumes that current, historically high resource prices will persist in the future and avert any major deleterious impacts on mining investment and employment. However, coming as it would on top of the Mineral Resource Rent Tax and recent increases in state coal royalties, and given the cyclical nature of commodities markets, this is an erroneous assumption.

It is certain that current extraordinary coal prices will not be sustained in the medium-to long-term. Further, the cost of production of Australian coal has increased significantly in recent years and is expected to rise further due to increases in energy costs (even before a carbon price), labour costs, input costs, development costs, etc, and generally less favourable mining conditions.

By way of illustration, one needs only to consider the very different position of the Australian steel industry today compared to 2009. In two short years, the CPRS design has failed the steel industry due primarily to the rise in the Australian dollar. The lesson here is that it is not possible to predict with certainty future commercial conditions, so any carbon policy must be designed to accommodate the full cycle of these conditions.

As proposed, the CPRS-based carbon tax would fail this test and, inevitably, fail other export and import competing industries.

4. Constraints to measurement and abatement of coal mining fugitive emissions

Coal mine fugitive emissions cannot be reliably measured. The "default" state-wide formulae for open cut mine fugitive emissions, on which the Government proposes the industry relies in the absence of a direct estimation methodology, are out-dated, crude and inequitable in their effects. While current underground mine gas monitoring technologies exist for monitoring gas concentrations for safety purposes in underground mine atmospheres, these are inadequate for measuring gas quantities on a consistent and reliable basis for taxing that segment of the industry. Coal industry research in the last three years has identified improved underground emissions measurement practices, but before these can be implemented, monitoring equipment will need to be redesigned and approved by the state

regulatory bodies for safe use underground. Unavoidably, this will be a costly, lengthy but absolutely vital process.

One of the basic tenets of any carbon pricing arrangement should be that emission sources are taxed only if they can be measured with reasonable certainty. This is not the case with coal mine fugitive emissions.

It was indicated at the meeting on 19 April 2011 that the Government viewed fugitive emissions from coal mining as needing to be reduced to contribute to the achievement of Australia's 2020 5% reduction target. Concern was expressed that one of the largest areas of growth in Australia's greenhouse gas emissions are fugitive emissions from coal and other industries and that inclusion of these in Australia's carbon pricing mechanism will be essential to meeting Australia's 2020 reduction target.

The coal industry's present ability to abate fugitive emissions beyond current practice is very limited. Technologies to abate emissions from open cut mines have not been commercially proven and, at any rate, would not lead to any reduction in reported emissions under the "default" approach as that approach does not permit netting out or offsetting abatement activities. With regard to underground mine fugitives, more than 60% are emitted through ventilation air for which abatement options are complex, costly, limited in their application and unproven. The most likely options for potentially abating these emissions require the ventilation air to be heated to about $1,000^0$ Celsius. Before widespread deployment of such apparatus can be contemplated, time must first be taken to identify, design and test the protections required to mitigate the intolerable risk of catastrophic incident arising from a potential flashback explosion. (Refer to **Attachment D**).

The notion that there is potential for substantial step-changes in coal fugitive emissions due to the availability of some relatively low-cost abatement technologies, which will be incentivised by exposure to a unique Australian carbon price, is simply wrong. The gas content of any coal resource is a natural attribute usually related to biology of the original plant life from which coal originates as well as the geological processes involved in the formation of the coal seam and the depth and long term containment of coal seam gases. These natural coal attributes are unavoidable., Therefore, unless and until the industry is allowed adequate time to develop suitable technologies from their current experimental stages to reliable, deployable equipment at commercial scale, the only way to meaningfully reduce Australia's fugitive emissions from coal mining between now and 2020 would be to close mines.

Despite these difficulties, and in the absence of a carbon price, Australia is leading the world in research into the measurement and abatement of coal mine fugitive emissions. More time is essential to continue the task of development and assessment of safe and effective designs and to trial these improvements. During that adjustment period, it is vital that the industry has full access to transitional measures to prevent the erosion of its international competitiveness.

This is not news for the Government of course - the coal industry has made these points clearly and cogently on numerous occasions in the last two years. Therefore, if they continue to be ignored, the coal industry can only conclude that Government has decided to specifically single out this industry for a revenue raising tax on production, rather than a genuine environmental levy designed to modify behaviour.

5. Reduced investment in coal mining and the risk of sterilisation of coal resources

Australia faces increasing cost disadvantages compared with its international competitors. Analysis of trends in cash costs by country reveals Australia's coal mining costs have been rising faster than our overseas competitors in recent years. Both the MRRT and the proposed carbon tax will exacerbate this trend as they involve taxes that our international competitors do not face.

The CPRS will impose an $18 billion tax on coal mining by 2020 – a cost our competitors in North America, China, Europe, Indonesia, Russia, Colombia, South Africa, Kazakhstan, Vietnam, Mozambique and elsewhere would not face. In their report *"Economic Assessment of CPRS' Treatment*

of Coal Mining – May 2009" consultants ACIL Tasman showed that the CPRS would result in premature mine closures and significant job losses, without any detectable benefit to the global environment. Those results are consistent with results modelled by the Federal Treasury and by Access Economics for the Council of Australian Federation, which projected job losses compared to business as usual – particularly in regional Australia.

Given the trend to more emissions-intensive coal production, and the overlay of the carbon tax on the MRRT on coal, it is unlikely that this outlook has improved in the last two years.

6. There is a simpler, better alternative

A comprehensive cap-and-trade ETS can achieve environmental and economic objectives with administrative allocation of emission allowances. This follows because total emissions are capped and thus the allocation of allowances does not affect the environmental integrity of the scheme.

With that in mind, many industry concerns about the Government's approach could be addressed with a single, simple change. This involves phasing in the auctioning of permits for trade-exposed industries at a sufficiently gradual rate to enable Australia to make the transition to a low-carbon economy in the long term without destroying jobs in the short term.

Under a phased approach, all trade-exposed firms would be required to purchase a small percentage of their permits from year 1 of the scheme, with this proportion gradually rising if and when other developed and developing nations adopt binding emission reduction targets. Under this approach there would be no arbitrary emissions-intensity thresholds or complicated formulae for determining eligibility for transitional "assistance".

In addition to the phase-in arrangements the treatment of fugitive emissions under Australia's proposed carbon pricing mechanism must be in step with other international jurisdictions including the EU ETS (where fugitive emissions are excluded) and Australia's major coal export competitors (eg Indonesia, Russian Federation, South Africa, Colombia, Canada, USA, China and Mozambique), all of whom face similar difficulties associated with the measurement and mitigation of these emissions.

The measured transition we propose would still enable Australia to play its role in shaping the international debate while limiting the initial cost impact of the scheme on Australian consumers, protecting jobs in trade-exposed sectors, and ensuring greater opportunity for industry to invest in reducing emissions. This approach will address both trade competitiveness concerns and the inability of captive mines to pass on a carbon price under long term contracts with Australian generators where that price is not defined as a tax.

The converse of this is an approach that risks destroying jobs in the coal mining industry. That is how the coal industry viewed the CPRS two years ago, and why we are perplexed now by the Government's apparent intention to resurrect that flawed approach through its proposed carbon pricing framework.

Senior industry participants would be pleased to expand on this submission in further meetings with you and your ministerial colleagues. Given their interest in this matter I am sending a copy of this letter to the Prime Minister, the Minister for Resources, Energy and Tourism, the Minister for Trade and the Parliamentary Secretary for Climate Change and Energy Efficiency.

Yours sincerely
for the Members of **Australian Coal Association Ltd**

John Pegler
Chair

Attachment A

Minerals Sector Statement of Principles on Climate Change Policy

The minerals industry acknowledges that sustained global action is required to reduce the scale of human induced climate change.

A measured transition to a low emissions global economy will require the alignment of three key policy pillars:

a global agreement for greenhouse gas emission abatement that includes emissions reduction commitments from all major emitting nations;

market-based policy measures that promote the abatement of greenhouse gas emissions at the lowest cost, while minimising adverse social and economic impacts, including on the competitiveness of the internationally traded sector;

substantial investment in a broad range of low emissions technologies and adaptation measures.

In the absence of a global agreement in the near term, the imperative for all nations is to sustainably reduce the production and consumption of greenhouse gas emissions without compromising international competitiveness, energy security and economic growth, improved living standards and poverty alleviation.

A measured transition to a low carbon economy can be accomplished by a variety of policy mechanisms that integrate all of the following design features:

Clear, predictable and long-term price signal – ensure that carbon price signals influence producers and consumers such that emissions and carbon consumption are reduced, and the focus on low carbon technologies is increased

Broad based – cover the broadest possible range of greenhouse gas emission sources, sinks and low carbon energy options.

Internationally competitive –progressively reduce emissions without distorting trade and investment flows or compromising the international trade competitiveness of Australian industry.

Revenue neutral – the objective is to establish a carbon price signal to change behaviour not raise revenues – if revenues are raised, they should be used to provide assistance to individuals and firms adversely affected by the policy measures, not be diverted into general revenue.

Simple and effective – to achieve sustainable emissions reductions at least economic cost, and be simple to implement.

Measured, equitable transition –to avoid adverse economic and social consequences, ensure continued energy security and provide equitable treatment of existing investment and greater certainty to new investment. Transitional measures to maintain trade competitiveness should be non-discriminatory.

Technology – encourage the adoption of the most efficient low emissions technologies through a carbon price signal, and fiscal measures where market failure can be demonstrated.

Consultation on these policy measures should be conducted in an open and transparent way, and include genuine consultation with all stakeholders.

February 2001

Attachment B

WHAT IS PROPOSED DOESN'T WORK FOR COAL

Various Multi-Party Climate Change Committee Principle	Consistency with principle
1. **Environmental effectiveness**: The mechanism should be capable of delivering reductions in carbon pollution that are informed by the climate science, to ensure that Australia contributes to the global mitigation task and to help transform our economy by driving investment and innovation in clean energy and low emissions technologies and processes.	The proposed policy will result in substantial carbon leakage and job losses. Australia represents less than 1.4% or global emissions. To reduce global emissions requires concerted international action. There is no environmental benefit to Australia going it alone. Imposing a price on carbon here not imposed by our trade competitors (not just trade partners) simply leads to leakage of emissions-intensive activity overseas. *FAIL. Without concerted global action in place the proposed scheme would weaken the trade competitiveness of Australian export and import competing industry and result in carbon leakage. Market share would shift to overseas producers resulting in a decrease in investment and jobs here with no reduction in global emissions.*
4. **Competitiveness of Australian industries**: The overall package of carbon price design and associated assistance measures should take appropriate account of impacts on the competitiveness of all Australian industries, having regard to carbon prices in other countries, while maintaining incentives to reduce pollution.	Why penalise what we do best? Compared to the 1970s Australia now has an open economy with minimal barriers to trade and investments. Mining and related processing exports are driving wealth creation. A domestic carbon price will directly impact industry costs and indirectly raise input costs generally. These impacts will combine to lead to a loss in trade competitiveness while competitors do not do the same. *FAIL. If the new scheme is based on the CPRS model it will damage the competitiveness of trade-exposed industries and including Australia's largest export industry, coal. The CPRS EITE measures covered less than 20 per cent of exports. In contrast, the EU scheme covers 73 per cent of EU exports. Investment planned for Australian coal projects will shift to competitor countries. This will lead to a decrease in income and lost jobs.*
5. **Energy security**: Introduction of the carbon price should be accompanied by measures that are necessary for maintaining energy security.	The policy increases investment uncertainty and energy security risks. *FAIL.* The scheme as currently proposed will not address investment uncertainty in the power industry and poses a risk for captive mines unable to pass on the CPRS prices in their long term contracts. This remains the case with mine closure and electricity provision a risk. NB if the carbon pricing mechanism were defined as a tax this would not be an issue.
6. **Investment certainty**: A mechanism to price carbon should provide businesses with the confidence needed to undertake long-term investments in low emissions technology and infrastructure, which will reduce costs for households and businesses in the long-term. It should keep our industries at the forefront of the research, development and deployment of new clean technologies, attracting global investment flows and creating new jobs.	Future investment is vital for Australia's continued prosperity, growth and job creation. *FAIL. Significant uncertainty surrounding the actual 2020 target is having adverse consequences for investment right across industry including coal. Failure properly to address the competitiveness issues means that future projects (ie stay-in-the-business capital at existing mines; replacement of existing mines as resources/reserves deplete; and expansion of production) will be impacted with significant flow-on implications for job creation. Proper measures to address international competitiveness issues are the best way to limit this for export industries.*
7. **Fairness**: The introduction of a carbon price will affect Australian households and communities. Assistance should be provided to those households and communities most needing help to adjust to a carbon price, while striving to maintain incentives to change behaviour and reduce pollution.	EITEs coverage was too narrow. The CPRS is inherently unfair in that its EITE test excluded many sectors and enterprises whose competitiveness would be negatively impacted. Also it did not apply the criteria objectively or consistently and arbitrarily excluded coal. *FAIL. The fairness test must apply equally to all workers and owners of assets in export and import-competing sectors. A scheme that compromises the competitiveness of Australia's trade-exposed industries, including coal – our largest export industry, will cost thousands of jobs especially in regional Australia.*

CARBON PRICE ON COAL MINE FUGITIVE EMMISIONS IN MAJOR COAL COMPETING NATIONS

Country (ranked by coal export sales)	**Coal fugitive emission-carbon pricing policies in place**	**Coal fugitive emission-carbon pricing policies committed to** [(a)]
Indonesia [(b)]	✘	✘
Russian Federation	✘	✘
South Africa [(c)]	✘	✘
Colombia	✘	✘
USA	✘	✘
Canada	(d)	✘
Vietnam	✘	✘
Kazakhstan	✘	✘
European Union – Poland	✘ EU ETS excludes coal fugitives	✘ Methane not included in stage 3 of ETS and coal mining classed as trade-exposed

Notes (a) Committed to by government means they have a high probability of being implemented — ie, they are in the process of being or have been enacted.

(b) Coal producers in Australia's largest competitor country, Indonesia, face no direct carbon price. This is likely to remain the case for some considerable time. The Indonesian Ministry of Finance *Green Paper on Economic and Fiscal Strategies for Climate Change Mitigation in Indonesia* only goes as far as noting that introducing carbon pricing "in the medium to long term is necessary".

(c) There is currently no carbon price in South Africa however South Africa is considering implementation of a carbon tax. Very little information is available with the carbon price and trajectory being considered well below that being suggested in Australia. Questions on the extent and duration of transitional exemptions from the tax and the treatment of fugitive methane emissions remain unresolved.

(d) Alberta and British Columbia, Canada's coal producing provinces, have introduced climate change related legislation. Alberta's Specified Gas Emitters Program involves 12% of emissions attracting a liability of C$15 (AUD14.90) Alberta's effective carbon price is thus less than A$2 and in British Columbia coal mine fugitive emissions are excluded.

Attachment D

COAL MINING FUGITIVE EMISSIONS ABATEMENT TECHNOLOGIES

A. OVERVIEW

All coal contains some level of methane (CH_4) and CO_2 as a consequence of the biological and geological processes involved in the genesis of coal from the natural forests from which it originates.. The amount of coal seam gas in coal is highly variable and this too is a consequence of these processes. Some of this gas is inevitably released when coal is mined.

Methane in air is explosive in concentrations between 5% and 15% so it is imperative that methane levels in underground mines are kept well below this level, eg less than 1%. In gassy underground mines the methane is pre-drained prior to mining and there are existing commercial technologies for the abatement of this methane. A significant proportion of the drainage gas from Australian underground coal mines is already committed for use in one or other of these technologies. The residual gas after pre-drainage is kept below the safety limit by diluting it with a sufficient volume of ventilation air. This safety measure leads to very large volumes of ventilation air with extremely low methane content.

Given the extremely low methane content (eg <1%) the only currently available technologies for abatement of methane in underground mine ventilation air involve high-temperature, thermal systems such as the MEGTEC™ VOCSIDIZER™ and Biothermica's VAMOX™ and similar technologies. Such technologies have been installed at pilot scale at a very limited number of coal mine operations.

In assessing the viability of these technologies for ventilation air methane reduction, individual mines in consultation with regulators will have to make their own assessment of the safety case as well as the technical, environmental, land access and economic feasibility of apparatus to be installed and systems of operation to be used. Currently this choice is severely constrained because the integration by direct ductwork connection of any of the known high temperature VAM mitigation technologies to an underground mine ventilation system introduces a significant safety hazard (ie potential flashback mine explosion) that cannot be eliminated with existing protocols for isolating ignition sources such as flameproof enclosures.

Fugitive gas emissions from open cut mines cannot be reliably estimated yet and the state-wide 'default' formulae on which the Government proposes that the industry rely under the CPRS are out-dated, crude and inequitable. While current underground mine gas monitoring technologies exist for monitoring gas concentrations for safety purposes in underground mine atmospheres, these are inadequate for measuring gas quantities on a consistent and reliable basis for taxing that segment of the industry. To achieve accurate estimations of emissions from ventilation air and gas drainage requires reliable sampling at frequent intervals. Over the past three years research has been sponsored in this area by the coal industry. Before this research can be commercialised, prototype apparatus at industrial scale has to be redesigned and approved by the regulatory bodies for safe use in Australian coal mines. The approval process is vital but also costly and time consuming.

There is no known means for abatement of methane emissions from operating open cut mines where coal and associated strata are broken and distributed as part of the mining process. Pre-drainage in advance of mining may be applicable in some cases but this will depend on local conditions – eg depth, gas content and drainage characteristics of the coal (as not all coals drain easily) – and ultimately its financial viability. The coal industry's present ability to abate fugitive emissions beyond current practice is very limited. Technologies to abate emissions from open cut mines have not been commercially proven and, at any rate, would not lead to any reduction in reported emissions under the "default" approach as that approach does not permit netting out or offsetting abatement activities.

B. UNDERGROUND MINING

(a) Measurement/estimation

The Australian Coal Association Research Program (ACARP) has focussed primarily on developing procedures for estimating greenhouse gas (GHG) emissions based on instrumentation currently used to monitor methane gas levels for safety reasons, supplemented by flow measurement. This includes the use of equipment certified as intrinsically safe for use in underground mines.

(b) Abatement

Gassy u/g mines

Methane is pre-drained from gassy underground mines to prevent accumulation to dangerous levels in the underground workings. This can be achieved by either drilling from the surface to the seam prior to developing the mine (surface to seam drainage), or by drilling directly into the coal blocks that have been prepared for mining (in-situ drainage). Both these options may yield gas close to the in-situ concentration provided the drainage system is maintained adequately to prevent air ingress. There is always a residual gas content after conclusion of the gas pre-drainage process which may remove up to 40% of the total methane in a gassy underground mine. The residual gas is managed during mine operation by maintaining sufficient ventilation air flow to ensure the methane level remains below the designated safety threshold for flammable gases in the working areas of a mine.

Once a coal block has been mined and the area is no longer being swept by the ventilation air, gas can still be released from the surrounding strata into the worked out area (the goaf). This gas can be removed by drilling from the surface into the goaf area and draining the gas (goaf drainage). Gas released into the goaf is generally diluted and hence has much lower methane concentration than surface to seam or in-situ drainage gas. There are some exceptions. For example, some goaf areas are quite rich in methane (~ 90%) once they fill and reach a steady state. Some borehole pre-drainage gas can be quite dilute in methane. In some instances across the same mine drained gas may vary from predominantly CO_2 to predominantly CH_4. In other mines, the potential for spontaneous combustion releasing further flammable gases from the coal also must be considered and managed.

Various ACARP projects aimed at improving gas drainage have been conducted primarily to improve mine safety. However emissions abatement is a useful secondary benefit.

The drained gas, being in a relatively concentrated form, can be consumed in a number of commercially available technologies. These include reciprocating engines or gas turbines for power generation, or flaring for abatement without power generation. Other technologies have been mooted for beneficial use of drainage gas, eg sale to the natural gas grid, use as a feedstock for chemical production. ACARP scoping studies have shown these to be niche opportunities at best and their development is a matter for the proponents to consider. The existing commercially available technologies are considered sufficient for the management and utilisation of drainage gas.

Options for Mine Ventilation Air Methane (VAM) abatement

The removal of methane from VAM is technically very challenging due to its high volumetric flow rate and extremely low methane concentration. VAM methane levels are deliberately kept below around 1% for safety reasons, however due to the high flow rates VAM can represent over 60% of mine GHG emissions, especially for gassy underground mines.

There are a number of proprietary technologies available for mitigating VAM. Mainly, these are all design variations on the same theme; passing the ventilation air through a large bed of inert material maintained above the auto-ignition temperature for methane (approximately $1,000^0$C) to oxidise methane to CO_2 gas. This entails conversion of one form of greenhouse gas (methane) to another less potent greenhouse gas (CO_2). While some are promoted as being available on a commercial

scale, deployment depends on feasible arrangements to harvest the ventilation air and deliver it to the methane oxidation unit.

None of these technologies has been deployed at an operating coal mine in a manner that treats the full ventilation air flow. There has been a limited number of demonstrations treating part of the flow with one well known example being the WestVAMP project at West Cliff Mine. Two issues have arisen:

1. First, the integration by direct ductwork connection of any of the known high temperature VAM mitigation technologies to an underground mine ventilation system introduces a new hazard (ie potential flashback mine explosion) that cannot be eliminated with existing protocols for isolating ignition sources such as flameproof enclosures. The demonstration projects to date have employed systems incorporating features that allow safe treatment of part of the ventilation air flow. These features, while entirely appropriate for demonstration purposes, cannot be scaled for use in a system capturing and treating the full ventilation air flow.

2. Secondly, there is potential that impurities such as dust in the ventilation air cause significant long term operational problems that may require a cleaning system.

The Australian coal industry is assessing these two issues.

There are some alternative technologies under development. These include a catalytic version of the reactor described above, in which the inert bed is replaced with a catalyst that consumes methane at lower temperatures. This concept is not as well advanced and it cannot be considered market ready. Another concept uses microbial action to consume methane in mine ventilation air but this is in the early stages of research and is some decades from market readiness.

There are also some technologies that use mine ventilation air as the combustion air in a system with a primary fuel such as natural gas or mine drainage gas. While these have some promise they have not achieved significant market penetration to date and are limited to those mines with ready access to a suitable primary fuel.

Other technologies appear in the technical literature asserting potential for abatement of VAM. However all of these are either niche opportunities, rely on a second source of fuel, are at a very early stage of development or are highly unlikely to ever be commercially viable due to the size and cost of equipment required.

Non-gassy u/g mines

The relatively minor amounts of methane in non-gassy mines are effectively managed by the ventilation air flow without the need for pre-drainage. Therefore non-gassy mines have VAM only and in virtually all cases at very low methane levels, eg less than 0.1%. The proprietary technologies for VAM abatement described above require methane levels at least 0.2 - 0.3% for stable operation and could only be used for abatement of VAM in non-gassy mines if a supplementary energy source is used, eg electrical heating elements to maintain bed temperature.

C. OPEN CUT MINING

(a) Measurement/estimation

Currently, there is no accepted means of reliably measuring fugitive emissions from open cut mining. The ‘default’ average emission factors that would apply upon commencement of a carbon tax/ETS are based on old, crude estimates that almost certainly will bear no discernable relationship to most mines’ actual emissions. Development of enhanced measurement and prediction technologies are the essential first step.

Currently the mandatory National Greenhouse and Energy Reporting System (NGERS) regulations allow two approaches to estimation of open cut fugitive emissions:

(i) use of default or "safe harbour" factors;[1] and

(ii) from 2010-11 an approach developed under an ACARP project by CSIRO that provides a methodology for estimation of emissions based on in-situ gas content. Currently no mine is using this approach but a number aim to utilise it once industry guidelines have been developed that are acceptable to the regulator and to third-party auditors. The estimated cost for the coal industry to move to use this direct estimation approach is over $60m and it will take years to complete.

The aim is to develop good practice measurement guidelines that will be world-leading and provide a sound, internationally recognised and applicable basis for the eventual inclusion of open-cut fugitives in emissions trading schemes in the longer term.

In 2009 the coal industry undertook to promote industry-wide implementation of the CSIRO methodology and it was accepted that this will take some years to complete. It will require extensive drilling and gas testing of borehole core samples across the open cut sector, in the context of strict limitations on the availability of drilling equipment and laboratory services.

(b) Abatement

Historically, there has never been a safety requirement to pre-drain from open cut mines as methane released to the open air cannot accumulate and to date has not represented a safety hazard given the relatively low methane contents in open cut reserves.
There is currently no commercially available means for abatement of methane emissions from operating open cut mines once mining has commenced. Pre-drainage in advance of mining may be applicable in some cases but this will depend on site-specific conditions, eg depth, gas content and drainage characteristics of the coal and project economics.

A recently completed ACARP project established there may be potential for enhanced gas drainage using nitrogen as a purge gas for some open cut operations. This was based on laboratory core analysis and desk top economic studies. A field trial drawing on these results will be conducted at an Xstrata open cut mine, funded by the NSW Clean Coal Council and ACARP.

D. CONCLUSION

Unless and until the coal industry is allowed adequate time to develop suitable technologies from their current experimental stages to reliable, deployable equipment at commercial scale, the only way to meaningfully reduce Australia's fugitive emissions from coal mining between now and 2020 would be to close mines.

[1] The NGERS regulations no longer have a default for underground mine fugitive emission reporting as all underground mines directly measure emissions for reporting purposes.

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18 May 2011

The Hon Greg Combet AM MP
Minister for Climate Change and Energy Efficiency
Parliament House
CANBERRA ACT 2600

Dear Minister

Coal Industry – Further Response

Thank you for the opportunity to meet with you and officers from the Department of Climate Change and Energy Efficiency (DCCEE) in Canberra on Thursday 12 May 2011.

May we re-iterate to you our appreciation that the meeting was an opportunity for genuine consultation. We look forward to further opportunities for constructive discussions.

While we have a range of concerns which are expressed in this letter and in our letter dated 11 May 2011, we believe there are two fundamental, yet straightforward changes that could be made to the Government's proposed scheme which would have a significant impact on the trade-exposed coal industry and which should also have widespread community support.

These are:

1. **adopting a phased approach to the auctioning of emissions permits for trade-exposed industries,**
2. **phasing in the inclusion of coal mine fugitives in step with Australia's coal export competitors and over a time frame consistent with the development of fugitive abatement technologies from their current experimental stages to safe, reliable, deployable equipment and processes at commercial scale.**

This letter deals with the second of these issues, and responds specifically to the assertions by DCCEE representatives at the Thursday 12 May 2011 meeting that:

- the marginal cost of fugitive emissions abatement in Australian coal mines was low at around $10 to $15 a tonne of CO_2-e, and therefore,
- significant fugitive emissions abatement activity would occur simply by establishing a carbon price commencing in the vicinity of $20 a tonne of CO_2-e.

This conclusion is simply wrong and any aspect of the Government's carbon pricing policy that is predicated on it also will be wrong.

There was some confusion at the meeting about whether DCCEE assertions as to abatement costs in fact related to Ventilation Air Methane (VAM), or, drained mine methane sometimes described as "rich gas". Also, DCCEE cited ACARP and CSIRO reports which, while technically comprehensive, do not support the abatement cost propositions put by DCCEE.

Members of the Australian Coal Association are concerned that this subject is proving to be an area of persistent, wide misunderstanding between the industry and the DCCEE. If left unchanged, and the foreshadowed carbon pricing policies and frameworks are implemented, then adverse impacts on the competitiveness of the Australian coal industry and therefore on investment and jobs, are inevitable.

ACA would welcome the opportunity to discuss the issue further with the DCCEE and offers the attached paper to inform those discussions.

To summarise the paper:

- There is no evidence of technology being applied at commercial scale anywhere in the world to mitigate fugitive emissions from coal mine VAM. Nor can we find independent third party substantiation to support the abatement cost figures asserted by DCCEE for a commercial scale plant in which the safety and operability risks have been satisfactorily resolved and for which solutions have been designed.
- VAM fugitive abatement is at the research and development stage, with ready-to-implement commercial scale technologies and systems still being, we estimate, ten or more years away.
- The best prospects for VAM abatement appear to lie with the Regenerative Thermal Oxidation (RTO) technologies but so far there have only been some six experimental trials of this technology globally.
- Before widespread deployment of RTO technologies can be contemplated, a range of issues relating to safety, process stability, process control, and operability will have to be successfully addressed.
- It is of fundamental importance to overcome the currently intolerable risk of catastrophic incidents arising from the connection of this technology to an operating underground coal mine. The coal industry needs time to identify and articulate in detail these risks, then design and trial the protections and systems required to adequately mitigate them, then subject the arrangements to review by the relevant safety regulators.
- Viable technologies for pre- and post-drainage of rich coal seam gas have been developed by the coal industry and utilised in gassy mines to improve mine safety and efficiency and to reduce fugitive emissions.
- However, it does not follow that increased gas drainage could significantly reduce fugitive emissions from coal mines generally, beyond the levels of abatement already achieved. The industry is continuing to undertake research and development of enhanced gas recovery, but additional abatement will have to meet economic and technical tests of feasibility, safety and operability.

As noted in our letter to you dated 11 May 2011, the Government's proposed framework would, if implemented, result in mine closures and job losses as the only way to meaningfully reduce Australia's fugitive emissions from coal mining between now and 2020.

Senior industry participants would be pleased to expand on this submission in further meetings with you and your ministerial colleagues and DCCEE officers.

Given their interest in this matter, we are again sending a copy of this letter to the Prime Minister, the Minister for Resources, Energy and Tourism, the Minister for Trade and the Parliamentary Secretary for Climate Change and Energy Efficiency.

Yours sincerely
for the Members of the **Australian Coal Association Ltd**

John Pegler
Chairman

Attachment A

Supporting information to ACA letter dated 18 May 2011 to
Hon Greg Combet AM MP, Minister for Climate Change and Energy Efficiency

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This paper provides further detailed information to assist the DCCEE in clarifying the issues that have been previously discussed with coal industry, specifically:

1. There is no authoritative evidence advanced by DCCEE nor discovered by ACA of technology being applied at commercial scale anywhere in the world to mitigate fugitive emissions from Ventilation Air Methane,
2. There no evidence advanced by DCCE that the cost of abatement figures asserted by DCCEE have any authoritative basis sufficient for the design of a carbon pricing scheme in Australia,
3. It would be misleading and deceptive for DCCEE to represent the current state of research and development as having delivered current, ready-to-implement technology and systems for VAM fugitive mitigation which need only an economic incentive to stimulate widespread adoption,
4. Experts opine that among the alternatives available, the best prospects of VAM fugitive mitigation lie with the Regenerative Thermal Oxidation (RTO) technologies, subject to overcoming the issues of safety risks, process stability, process control, and operability,
5. Global interest in RTO technologies for VAM mitigation has brought about only some six experimental trials around the world over ten years,
6. Before widespread deployment of RTO technology can be contemplated, time must first be taken to identify and articulate in detail the risks involved, then design and trial the protections and systems required to mitigate the intolerable risks of catastrophic incidents arising from the connection of this technology to an operating underground coal mine, then subject the arrangements to review by the relevant safety regulators.
7. The estimated 10 year timeframe for development of VAM fugitive mitigation technology is not unreasonable and may be ambitious,
8. The coal industry has developed and utilised commercially proven, viable technologies for pre- and post-drainage of gas (sometimes called “rich gas”) from coal seams in gassy mines in Australia to a level within the capability of the technology and the limitations of the natural characteristics of the individual coals,
9. These high cost techniques are well established and have been applied in gassy mines to improve safety, efficiency and reduce coal mine fugitive emissions,
10. There is no authoritative basis to assert that increased pre- and post-drainage can significantly reduce fugitive emissions from coal mines generally, beyond the reductions which have already been achieved through the technology development efforts of ACA Member Companies,
11. The coal industry is continuing further research and development to explore enhanced recovery of rich gas but additional abatement must meet both economic and technical tests of feasibility, safety and operability,
12. As noted in our letter to you dated 11 May 2011, the Government’s proposed carbon pricing framework would, if implemented, result in mine closures and job losses as the only way to meaningfully reduce Australia's fugitive emissions from coal mining between now and 2020.

A. Distinguishing between ventilation air methane (VAM) abatement technologies and rich gas abatement technologies

Ventilation Air Methane (VAM) refers to the quantities of methane given off by the coal seam and the strata above and below a coal seam during the operations of a mine and which enter the mine ventilation airflow. The quantity of ventilation airflow is set, among other things, by the air quantity

required to safely dilute methane in the mine atmosphere to very low concentrations, typically less than 1%. Other factors such as airborne dust dilution and dispersal and control of temperatures in working places also have an influence on airflow quantities. Clearly, there is an incentive to reduce the quantities of methane carried by the ventilation airflow. As well as forming undesirable additions to fugitive emissions of greenhouse gases, VAM also inhibits the safe and efficient operation of a mine. For these reasons, "gas drainage" of "rich gas" has become widespread practice in many gassy mines.

As stated at the meeting on 12 May 2011 the coal industry has already brought into existence commercially proven, viable technologies that it can apply to "rich gas" abatement in gassy mines.

For clarity all round, it is worthwhile to deal briefly with the challenges which have been addressed in developing the now well-established technologies which enable improvements to underground mine ventilation conditions by extracting "rich gas".

Usually, this activity involves "pre-drainage" of gas prior to mining operations in a part of a mine. In special circumstances, "post-drainage" of gas after mining operations may also be undertaken. The methane content of a rich gas stream "drained" under vacuum from a mine varies markedly between mines and between parts of a mine for reasons which include the natural variations in

- coal composition,
- mixture of different gases occluded gases within the coal seam and adjacent rock strata,
- microstructure of the coal,
- permeability and porosity of the coal,
- the "decay rate" of gas extraction ie the reduction in gas flow over time from a hole,
- structural features bounding the coal resource,
- regional geological structures and their histories,
- the size of the coal resource,
- changes in atmospheric pressure.

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These circumstances combine to provide a "technical limit" to the "rich gas" which can be removed by the gas drainage vacuum apparatus used for this purpose. This "technical limit" will vary from place to place due to the natural characteristics of the coal, as already described. There is always residual gas tightly held within the coal which is not released until the coal is broken up in the mining process, or, is released only very slowly.

It is this proportion of the gas which ultimately becomes VAM.

Notwithstanding the impediments, considerable progress has been made over the last 15 years or more in the extraction of "rich gas" from gassy mines in the quest to

- improve mine safety,
- reduce ventilation requirements by reducing VAM, and,
- capture and use the rich gas where it is technically and commercially warranted and State laws permit.

"Rich gas" may be vented, flared or used for a beneficial purpose such as power generation. This choice depends on the already described natural features affecting composition, consistency and quantity of the gas flow. Note that rich gas from drainage activities may include other natural coal seam gases including carbon dioxide and water and these will affect the choice of utilisation and fate of the gas. Difficult gas compositions may preclude all but venting or simple combustion or flaring of the rich gas. Despite the difficulties, the coal industry has invested substantially to abate rich gas over the past 15 years or more.

It is with this experience in drainage and utilisation of "rich gas" from gassy mines in mind that the coal industry believes that achieving VAM abatement over a 10 year period will be a very ambitious undertaking. Nevertheless, the coal industry also believes that it has the research and development track record necessary for such a goal.

B. DCCEE assertion: Information collected by DCCEE on VAM abatement technologies suggests they are much closer to being commercially viable than a 10 year timeframe would indicate.

We refer you to Attachment D which formed part of our letter to you dated 11 May 2011 and which partly addresses the matters raised.

There is limited evidence of successful VAM mitigation technology in the world. There is only a few demonstration scale trials of Regenerative Thermal Oxidisers (RTOs) – ie MEGTEC's VOCSIDIZER^{TM} and Biothermica's VAMOX^{TM} coal mine methane abatement systems. None of these units operates at full or near full mine ventilation airflow. Typically only 5% to 10% of the ventilation airflow can be treated by these early pilot installations.

Two American trials at Consol's Windsor Mine operate on a closed and sealed mine partly as a result of the concern about applying this technology to an operating mine. In China MEGTEC has announced plans to build a 6 unit RTO installation capable of handling approximately 100m^3/sec of ventilation air flow or about 25% of the airflow typical Australian underground mines. It is unknown what safety systems have been employed. Further study is required to ascertain how or whether the Chinese have resolved the safety risks in the application of their chosen technology to Chinese coal mines in a manner which would be acceptable to operators and safety regulators in Australia.

The VOCSIDIZER technology was applied at an Australian operating coal mine on a pilot scale in 2001~2002. Four VOCSIDIZERs have been installed at another Australian operating coal mine providing abatement and limited power generation from a small proportion of the total VAM airflow. These units remain in a very early stage of development of the application of this technology to the underground coal mining industry.

In assessing this type of technology for Australia two key issues have been identified:

First and foremost, these RTO technologies rely on operating temperature of approximately 1,000^{0}C, which is well above the auto-ignition temperature of an explosive mixture of methane in air of approximately 500^{0}C. The auto-ignition temperature is the temperature at which a gas mixture becomes unstable, that is, it is capable of spontaneous ignition without energy from a flame or a spark. Obviously, risk assessment principles require that circumstances and combinations of circumstances, including unexpected conditions following an accident which could give rise to auto-ignition conditions must be identified and mitigated. These include the potential conditions for an enriched gas mixture to auto-ignite and explode in an RTO apparatus and for such an explosion to pass from the apparatus and propagate through the ductwork back into the mine. Clearly, the potential consequence of such an event on those working in the mine would be intolerable and the likelihood of such an occurrence must be reduced to infinitesimal levels.

Underground incidents which must be considered as possibilities which could result in a temporary enrichment of VAM gas content include:

- sudden goaf fall,
- sudden release of rich gas such as a methane outburst from a part of the seam,
- accidental failure of whole or part of the ventilation system,
- accidental release of rich gas from a rich gas drainage system,

- accidents resulting in a fire underground, associated distillation of flammable rich gases and disruption of the ventilation system.

In turn, when the enriched VAM arrives at the RTO, risks include

- auto-ignition and explosion in the RTO apparatus,
- malfunction of the RTO,
- flashback from the apparatus to the mine, leading to,
- potential for explosion or ventilation disruption within the mine, and,
- intolerable levels of risk to the wellbeing of persons working in a mine and to the mine itself.

The demonstration projects to date have employed systems incorporating features that capture only a small proportion of the ventilation air flow, with the bulk of the flow vented freely to atmosphere. These features include an open gap between the mine ventilation air outlet and the RTO inlet, allowing the small scale demonstration of RTO technology without exposing the underground mine operation to the risks described above. However the capture and treatment of the full ventilation air flow will require a fully enclosed ducting system that will unavoidably be exposed to these risks. A design standard must be developed that would manage this risk.

As a second order issue, there is the risk that dust impurities in the ventilation airflow will cause significant long term diminution in capacity of the RTO technology to oxidise methane. This may require the development, design and testing of a cleaning system to support effective operation. This effect is associated chiefly with the fusing of calcium onto the thermal media in the RTO eventually blocking the media. Calcium arises from the statutory routine application of limestone dust (calcium carbonate) to the roof, floor and sides of an underground roadway which is intended to act as a flame retardant in the event of gas or coaldust explosion at an underground mine.

Both these issues are the subject of research by the Australian coal industry. Before widespread deployment of RTO technology can be contemplated, time must first be taken to identify and articulate in detail the risks involved then design and trial the protections required to mitigate the intolerable risk of catastrophic incidents arising from the connection of this technology to an operating underground coal mine. The time estimates given by ACA representatives of 10 years are not unreasonable and if anything, are ambitious.

The steps along a pathway to full scale deployment of RTO technology would include:

- Desktop study and explosion simulation modelling,
- Risk assessment of equipment operability including participation by specialist technical advisors, safety regulators and workforce representatives,
- Construction and testing of a pilot gas collection system and development and demonstration of safety systems using simulated VAM,
- Development of control systems capable of
    - responding to variations in VAM composition arising from mining operations,
    - managing process responses and process stability by a number of parallel RTO units,
    - providing failsafe protection which avoids the risks identified in the risk assessment processes.
- Independent review of the process and control system design and of the veracity of outcomes of the risk assessment processes used,
- Design, construction and testing of a full size gas collection and oxidation system and demonstration of safety systems using simulated VAM,

- Review and certification of systems by safety regulators and development and implementation of a design standard,
- Full scale deployment at an operating mine and testing under actual VAM conditions, monitoring for contamination and operability
- Report and review to industry and Governments,
- Further review by safety regulators,
- Widespread full scale deployment.

The development process must also overcome other hurdles including:

- Planning Approvals.

  Preliminary design studies indicate that an RTO unit to treat VAM from a gassy mine will have a large footprint. The surface arrangement will have approximate dimensions of 100m by 60m and 16m high and will also include a 20 m high discharge stack. Community acceptance and regulatory approval must be obtained.

- Power Consumption

  An RTO facility is estimated to have electrical power requirements of 4 to 6 MW. Adequate grid capacity must be installed to enable multiple mines each to install and operate such a facility.

C. DCCEE assertion: Technologies already exist which are proven and viable to increase pre-drainage of methane from coal seams beyond levels currently required for safety needs

At our 12 May 2011 meeting, DCCEE suggested that information collected indicated to them that technologies already exist which are proven and viable to increase pre-drainage of methane from coal seams beyond levels currently required for safety needs, thereby significantly reducing fugitive methane emissions from gassy coal mines.

Techniques to pre-drain coal seam gas are used in gassy mines to ensure safety and reduce its greenhouse emissions. They are not universally applicable to all coal seams nor all mines for reasons set out in Part A above. Under very favourable conditions and where it is possible to apply these techniques, pre-mining gas content in some gassy coal seams may be reduced from around $15m^3$/tonne to about $3m^3$/tonne, facilitating safe underground mining.

The target seam is not the only source of gas liberated during the mining process. Large quantities of gas are released from adjacent seams and rock strata (both above and below) as a result of the structure breaking up as a result of mine operations. This breakage results in a caved region behind the mining operation known as the goaf. In some circumstances these adjacent seams can be pre-drained but in others, such as multiple and thin seams, this is not possible with conventional drainage techniques. In favourable conditions, management of this gas may be undertaken through a goaf drainage system (or post mining drainage system) which extracts gas from the goaf area. It is not always safe or feasible to do this. The edge of the goaf area is by necessity swept by the ventilation airflow, allowing some gas to migrate and become part of the VAM fugitive emissions.

Where feasible, a number of Australian mines utilise this pre- and post-mining drainage gas for power generation. These facilities and those required for gas drainage and extraction require permanently installed drainage facilities on the surface. The facilities are high visual impact and many local communities are strongly opposed to them.

Some individual coal companies have been developing horizontal post drainage, in which holes are drilled from the surface and follow the coal seam horizontally for some distance rather than relying on vertical holes. This technique is in its infancy and, while showing some promising results, has many technical hurdles to overcome, including:

- Hole design and location

- The drilling technology in this area is still in the early stages of development and therefore carries significant technical and financial risks.

- The technique cannot currently be used in mines with restricted access

Enhanced gas recovery, in which an inert gas is pumped through the coal seam to flush out seam gas, is at an early stage of development. A scoping study funded by ACARP is showing that there is a lot of science yet to be understood before EGR can be applied reliably to Australian coal mines.

D. CONCLUSION

Research and development on these various facets of capture of coal mine fugitive emissions are underway and will continue over at least the next decade. In relation to VAM fugitives, it would be misleading and deceptive to represent the state of technology as providing current, ready-to-implement systems which need only an economic incentive to stimulate installation. In relation to drainage and capture of rich gas, it is simply not correct to assert that there are no obstacles to increased pre- and/or post- drainage nor to assert that fugitive emissions can be significantly and readily reduced from coal mines generally by these techniques.

BRIEFING

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Alternative carbon prices for sensitivity analysis

Prepared for Australian Coal Association

Centre for International Economics
Canberra & Sydney

August 2010

The Centre for International Economics is a private economic research agency that provides professional, independent and timely analysis of international and domestic events and policies.

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Contents

Boxes, charts and tables

Background

The recent Treasury modelling of an Australian carbon price[1] sets outs one scenario for the future price of carbon facing Australia[2]. In the Treasury modelling, the price facing Australia (after an initial fixed price period) is determined by the international price of carbon. Because this price is lower than Australia's cost of abatement, a significant proportion of Australia's abatement task (over 60 percent in most years) is achieved through the purchase of international permits (rather than through domestic abatement).

This high reliance on international permits leads to the question of what the implications would be if such a large proportion of international abatement was not available or if international abatement proved to be more costly than expected.

This question provides a basis for constructing alternative price series that can serve as a basis for sensitivity analysis around the core Treasury prices.

Such sensitivity analysis highlights the importance of the level of international trade in abatement available under Australia's carbon pricing arrangements. As Australia's abatement costs are likely to be higher than in many other countries (given the availability of low-cost fossil fuels here and the influence this has had on the structure of the Australian economy) the purchase of international abatement is likely to be crucial to minimise overall costs.

Constructing estimates for sensitivity analysis

Ideally, the sensitivity analysis would be undertaken using the full global model originally used by Treasury. In the absence of access to this model, we use an indirect technique to assess the implications of reduced access to international permits. This involves three core steps:

- First, estimate the 'marginal cost of abatement' (MCA) for Australia using the published Treasury results[3].

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1 *Strong Growth, Low Pollution: Modelling a Carbon Price* Australian Government, The Treasury, 2011

2 Here we refer to the 'core policy scenario' reported by Treasury (rather than the 'high price scenario').

3 Technically, this is derived by applying a log linear model to the published Treasury results for Australian abatement under different prices. The model is of the form *Ln(Price) = a +b*Ln(Abatement)* where Ln is the natural logarithm. This model provides a good fit with an R^2 of 0.96, and an estimate of *b* (the marginal cost of abatement) of 0.717 with a standard error of 0.02.

- Second, assume that fewer international permits are available so that a greater proportion of domestic abatement needs to be undertaken than reported in the Treasury analysis. In particular we assume
  - (i) that Australia's entire abatement target must be met domestically and
  - (ii) that only 50 per cent of the international permits reported by Treasury are available.
- Third, use the estimated MCA for Australia to calculate the new Australian carbon price required to achieve the new implied target for *domestic* abatement.

Rationale

The logic behind this sensitivity analysis is to note that the Treasury results draw on one particular scenario for outcomes in the international market for abatement. These outcomes may not arise for a variety of reasons including:

- restrictions on the sale or use of international permits (from either the buyer or seller perspective) — for example, Australia may restrict domestic purchases of international abatement, or country sellers may restrict the quantities available for international sale.
- distortions in the international market for abatement which mean that country costs of abatement may not be reflected in outcomes on the world market. This may include, for example, difficulties in verification, monitoring and enforcement of particular forms of abatement — particularly in offset markets;
- inefficiencies in country policies (such as those recently noted by the Productivity Commission[4]) so that true costs of abatement are not reflected on international markets. Abatement policies will not necessarily be implemented in a way that generates a supply of abatement for sale (for example, policies targeted at energy efficiency will not necessarily generate saleable abatement). Alternatively, policies may be inefficient, so that the price of abatement available for sale is higher than the true marginal cost of abatement (and therefore higher than that implicit in the Treasury analysis). This could occur, for example, through inefficient mandating of renewable or performance targets.
- uncertainties in the cost of abatement in key selling countries. If these turn out to be higher than expected in the Treasury modelling, then the global price will also be higher.

Because the sensitivity analysis proposed here is very much reduced form, it is consistent with a variety of possible alternate market outcomes that effectively result in a greater reliance on domestic abatement.

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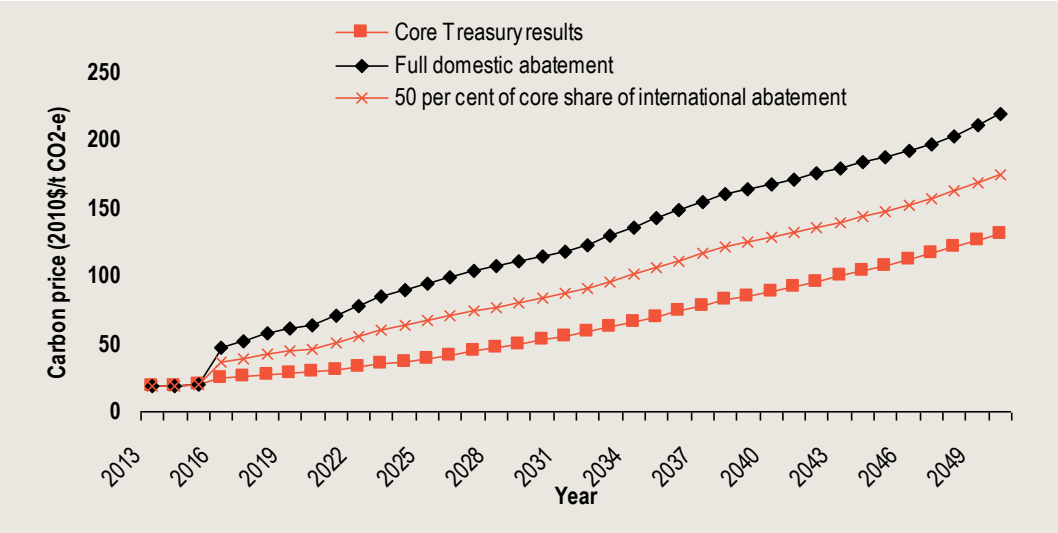
4 *Carbon Emission Policies in Key Economies* Productivity Commission Research Report, May 2011.

Estimates

Chart 1 presents the alternative price estimates generated according to the procedure outlined above.

1 **Estimates of carbon prices for sensitivity analysis**



Data source: CIE estimates based around reported Treasury results

Caveats

These estimates should not be interpreted as forecasts of the permit price. Rather, they represent sensitivity analysis around some of the core implications of the Treasury results and can be used to form a basis for undertaking upper sensitivity analysis around the core carbon price results presented by Treasury.

BRIEFING

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Coverage of coal mining fugitive emissions in climate policies of major coal exporting countries

Prepared for Australian Coal Association

Centre for International Economics
Canberra & Sydney

June 2011

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Contents

Boxes, charts and tables

Summary

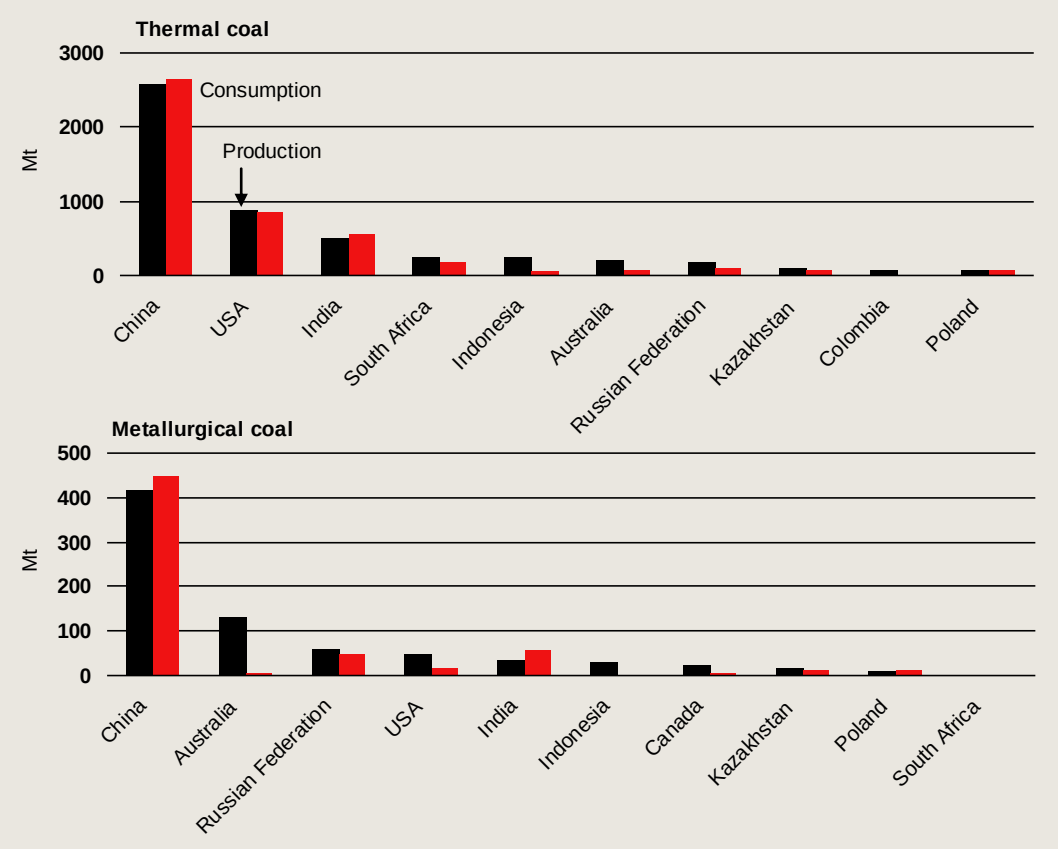
This report

- **No major coal producing country currently imposes a direct climate policy constraint on fugitive coal mining emissions.**
- **This report considers in detail the extent to which key coal (sea borne) exporting countries have either imposed, or plan to impose, a constraint on fugitive emissions from coal mining as part of their overall approach to greenhouse gas mitigation policy.**

The global context

- **Chart 1 summarises the global context for Australian coal production.**

1 **Coal production and consumption** Top 10 producing countries 2009



Data source: International Energy Agency *Coal Information 2010*, OECD/IEA, Paris.

- **Total global production of black thermal and metallurgical coal is approximately six billion tonnes, of which around 950 million tonnes is traded internationally. The remaining five billion tonnes is produced for domestic consumption — competing with imports for domestic market share.**
- **Table 2 summarises information on coal reserves, the majority of which are located in China, the United States and Other Asia**

2 **Proved recoverable coal reserves** 2008

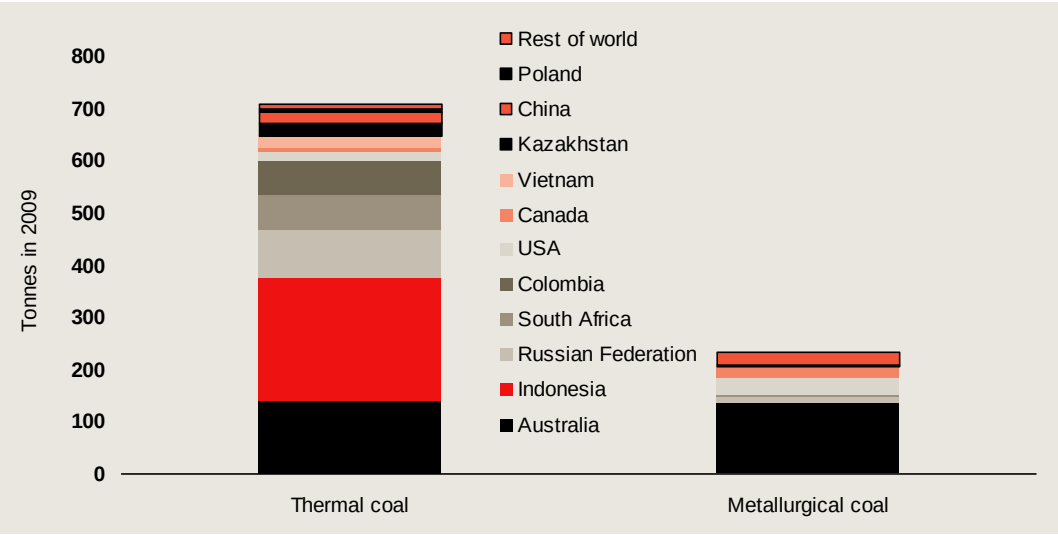
Country/Region	*Mt*	*Share of world (%)*
Europe	18 447	2.5
North America	237 607	32.4
Pacific (mostly Australia)	41 111	5.6
Russian Federation	69 496	9.5
Other transition economies	54 195	7.4
China	180 600	24.6
Other Asia	90 076	12.3
Colombia	5 298	0.7
Other Latin America	3 734	0.5
Africa and Middle East	33 123	4.5
Total	733 687	100.0

Source: Source: International Energy Agency *Coal Information 2010*, OECD/IEA, Paris.

Coal trade

- **Chart 3 summarises the exports of key (sea borne) exporting countries.**

3 **Coal exports by major country** 2009



Note: The descriptors 'thermal' and 'metallurgical' coals are somewhat arbitrary. There is a range of differing types of hard coal produced some of which are interchangeable between these two general coal markets. The global financial crisis saw a shift of some 'metallurgical' coal product into the thermal coal market thus increasing thermal and reducing metallurgical coal exports.

Data sources: ABARES *Minerals and Energy Commodities 2010*, Table 252 and IEA, *Coal Information*, 2010

Fugitive emission policies

- **Table 4 summarises key elements of exporting country policies relating to fugitive emissions**
- **Based on currently available information, none of the major coal exporting countries either currently, or has concrete plans to, impose a direct or indirect constraint on fugitive emissions from coal mining. In some cases, coal miners may face an increase in energy costs, however this is very modest given current prices.**

4 **Coal fugitive emission mitigation policies in place or proposed** Major exporting countries

Country	*Coal fugitive emissions mitigation policies in place*	*Coal fugitive emissions policies proposed*
Indonesia	None.	None. Potential carbon tax in the long term, but considerable policy development required. Given attitudes to energy security, coverage of fugitive emissions unlikely.
Russian Federation	None.	None. Broad possible development of ETS, but details to be decided,
South Africa	None.	Potential coverage under national scheme, details to be finalised
Colombia	None.	None proposed
USA	None.	Nothing specific proposed. Emissions must now be reported which is a foundation for potential action.
Canada	No federal scheme. Small carbon price for operations in Alberta.	No specific additional proposals.
Vietnam	None.	Overall policy in early stages of development.
European Union – Poland	None — fugitive emissions not covered by EU ETS.	None proposed. Third phase of EU ETS does not cover fugitive emissions. Potential for fugitive emissions to be covered by Poland outside the EU ETS.

Source: Various

Caveats

- **The results presented here are based on information currently available in the public domain.**

Summary of trading country policies

Indonesia

Indonesia is one of the largest greenhouse gas emitters in the world with up to 85 per cent of its emissions resulting from deforestation or the destruction of peatlands[1].

As a consequence, the major focus of climate policy in Indonesia inevitably has a substantive focus on peat, forestry and land use. For example, Indonesia's voluntary actions under the Copenhagen Accord[2] involve an emission reduction of 26 per cent by 2020 achieved through:

- sustainable peat land management;
- reduction in the rate of deforestation and land degradation;
- development of carbon sequestration projects in forestry and agriculture;
- promoting energy efficiency;
- development of alternative and renewable energy sources;
- reduction in solid and liquid waste; and
- shifting to low emission transportation modes.

Indonesian climate change mitigation ambitions, as outlined in the *National Climate Change Action Plan*, include energy diversification and conservation efforts and forestry related activities such as preventing illegal logging, land rehabilitation and increasing plantation forestry.

Indonesia currently has no policies or regulations that apply to fugitive emissions from coal mines. Around 90 per cent of Indonesian coal mines are open cut mines making measurement and regulation of fugitive emissions difficult.

As a consequence, coal producers in Indonesia do not currently face a carbon price or a constraint on fugitive emissions. The Indonesian Ministry of Finance *Green Paper on*

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[1] See, for example, *From Reformasi to Institutional Transformation*, Harvard Kennedy School for Democratic Governance and Innovation, http://ash.harvard.edu/extension/ash/docs/indonesia.pdf

[2] http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/indonesiacphaccord_app2.pdf.

Economic and Fiscal Strategies for Climate Change Mitigation in Indonesia [3] discusses a number of options for climate policy in Indonesia, noting the importance of carbon pricing as a cost effective policy tool. Overall, the Green Paper recommends four broad strategies:

- ***Energy***: work towards the implementation of a carbon tax on fossil fuel *combustion* along with the removal of energy subsidies and introduce complementary measures to encourage energy efficiency and deployment of low emissions technologies.
- ***Land use change and forestry***: support carbon abatement measures by regional governments and work with Ministries to bring fiscal policy setting in line with abatement objectives.
- ***International carbon finance***: support the creation of broad based carbon market mechanisms.
- ***Institutional development***: strengthen the capacity for climate policy analysis at the Ministry of Finance.

As an illustration, the Green Paper considers the effect of a Rp 80 000 per tonne carbon tax (around $8.75) increasing at 5 per cent per year. By implication, this is only proposed for fossil fuel combustion, and not fugitive emission from coal mining. Indeed, given that there are currently not reporting requirements for fugitive emissions, it seems unlikely that the carbon tax could be applied to fugitives in the near term.

An important developing policy issue in Indonesia is a proposed regulation of coal export quality[4]. The object of this policy appears to be to secure more coal to for domestic use and to maintain a low price for domestic generators.

While not explicitly a carbon abatement measure, this policy will clearly have implications for international trade in coal.

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3 http://www.fiskal.depkeu.go.id/webbkf/siaranpers/siaranpdf%5CGreen%20Paper%20Final.pdf

4 See for example http://www.bloomberg.com/news/2011-01-20/indonesia-may-ban-low-quality-coal-exports-from-2014-update1-.html and http://www.thejakartaglobe.com/business/energy-advisory-council-mulls-coal-export-ban/354079

Russian Federation

In April 2011, the Russian Government introduced a decree to implement the 'Russian Federation's Climate Doctrine'[5]. The available information suggests that the major measures to be implemented include a particular focus on energy efficiency (consistent, for example with a recent McKinsey report on abatement options for Russia[6]).

As has recently been observed, an important component of climate policy in Russia is the linking of mitigation policy with Russia's economic interests in terms of improving the overall efficiency of the economy, including achieving economic gains through energy efficiency[7].

The April 2011 decree also hints at the development of an emissions trading scheme. The precise nature and coverage of this scheme is not currently known, but possibly under development by the Ministry for Economic Development.

These possibilities need to be considered in the light of Russia's overall abatement targets. Russia's target as part of the Copenhagen accord is for a 15 to 20 per cent reduction in emissions relative to 1990, conditional on appropriate recognition of the potential of Russia's forestry as well as legally binding obligations by all major emitters. This target represents an increase in emissions relative to 2000 of between 15 and 31 per cent[8].

Russian coal producers do not currently face a fugitive emissions constraint and it seems unlikely that they will do so in the near future.

South Africa

The first carbon tax introduced in South Africa was an electricity generation levy of 2c/kWh introduced in 2008.

The South African government announced at Copenhagen an intention to reduce emissions by 34 per cent by 2020 and 42 per cent by 2025 compared to projected BAU emissions.

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[5] See http://www.bellona.org/articles/articles_2011/climate_plan_enforcement and http://government.ru/gov/results/15045/

[6] See *Pathways to an energy and carbon efficient Russia*, McKinsey and Company, 2009.

[7] See for example, Finnish Institute of International Affairs summary of Russian climate policies at: http://www.fiia.fi/assets/news/ieta_korppoo.pdf.

[8] See Garnaut Climate Change Review update paper 2 at http://www.garnautreview.org.au/update-2011/update-papers/up2-key-points.html

South Africa will host COP 17 in Durban in December 2011. In the lead up to COP 17 the South African government is looking to determine its climate policy. A carbon tax, with the tax rate starting low and gradually increasing is the preferred policy at this stage.

In late 2010 the government released a Green Paper and a Carbon Tax Discussion Paper. A final White Paper is expected to be released in mid-2011 and legislation to be ready for implementation by late 2012.

The *Green Paper*[9] outlines South Africa's intention to contribute to stabilising global greenhouse gas emissions at a level that will prevent dangerous anthropogenic interference with the climate system. This will be done through a range of adaptation and mitigation strategies. Mitigation strategies that also result in job creation, poverty alleviation and positive economic impacts will be prioritised. These may include stimulating new industries and improving efficiency. Key mitigation sectors identified are energy, industry and transport.

Process emissions from the coal to liquids industry is a policy focus – will be the subject of a carbon tax and also CCS for the industry will be an area for research and development. Fugitive emissions from coal mining is another area highlighted in the paper. South Africa will develop a strategy to reduce fugitive emissions by 42 per cent relative to BAU by 2025. Coal fired power stations will be subject to more stringent thermal efficiency and emission standards.

The *Carbon Tax Discussion Paper*[10] discusses the economics of climate change, the role of a carbon tax, compares market based policy with regulation and compares taxes with emissions trading.

Three options were considered:

1. carbon tax on measured CO_2
2. upstream tax on fossil fuel inputs
3. downstream tax on outputs such as fuels and electricity

The discussion paper notes that a tax has advantages and suits the SA context because:

- it can be managed by the existing revenue administration authority
- it involves fewer players, therefore lower costs

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9 http://us-cdn.creamermedia.co.za/assets/articles/attachments/30766_climate_change_greenpaper.pdf

10 http://www.treasury.gov.za/public%20comments/Discussion%20Paper%20Carbon%20Taxes%2081210.pdf

- the structure is simpler, therefore minimises abuse and risk within the system
- it is less of a administrative burden compared with a new accounting scheme for carbon allowances
- it minimises lobbying

While it is noted that a tax based on measured and verified emissions is preferred, it seems that the focus is on a proxy tax base such as the carbon content of fuel inputs.

The paper concludes that gradual phasing in of a carbon tax will be the best way to address competitiveness. Other conclusions from the paper are:

- the tax should be phased in to provide certainty and incentives to adjust
- tax rate should be equivalent to the marginal external damage of CO_2
- distributional concerns need to be dealt with transparently and targeted
- tax should cover all sectors as far as possible
- any measures to address competitiveness should be temporary

Colombia

It is unlikely that strong policies (carbon tax) on methane fugitive emissions from coal mining would arise in Colombia in the near future:

- the typical approach for tackling environmental issues is passive (seeking compensation for environmental damage) rather than active (changing behaviour);
- coal mining in Colombia is mainly open cut ;
- other issues in regards to the management of methane in coal mining require more urgent attention/regulation such as the OHS issues;
- other sectors are seen as the major emitters and therefore any rising sectoral climate change policies are likely to target them first ;
- Colombian agenda on climate change strategies does not have a deadline for formulating and implementing actions/policies to reduce GHG emissions in general and methane fugitive emissions in particular; and
- the potential initiatives to come forward on methane emissions focus on voluntary actions and those that can attract remuneration (such as the CDM or the utilization of methane as a source of energy) rather than enforced actions.

GHG emissions and the climate change in Colombia

Colombia is a relatively minor GHG emitter in the world mainly because most of the energy is source from hydro power. The main concern and attention in terms of GHG emissions in Colombia is centred in agriculture/ land use change activities. Most of the debate is also focused on climate change adaptation not so much mitigation.

The debate on environmental effects of mining activities has focused on their impact on water resources, biodiversity and land erosion mainly. Climate change is an issue that is relatively recent in the environmental debate and policy formulation in the country.

Colombia, as a signatory partner of the Kyoto Protocol and as a developing country, has no specific targets for the reduction of GHG, has however, the obligation of conducting and periodically update the inventory of GHG emissions. Up to date, it has complied with producing and updating such inventory at the national level.

Climate change issues have been mentioned in policy documents since the mid 1990's but yet specific policy strategies on it have not been formulated apart from those under the Clean Development Mechanism (CDM) of the Kyoto Protocol.

This implies that emitter sectors in Colombia have no specific obligations in terms of reduction of GHG emissions whether fugitive or not. Economic projects that achieve environmental benefits, specifically the reduction of GHG can apply for Certificates of Emissions Reduction (CER) and can sell them to the public and/or private companies/operations in developed countries that do have specific GHG reduction commitments. Colombia is the fourth country in Latin America with the largest number of projects under the CDM[11].

There is a historical failure in tackling environmental issues in Colombia; it takes a rather passive approach. The environmental authorities for example were established to seek compensation for environmental damage associated with the use of natural resources than for changing polluting behaviour.

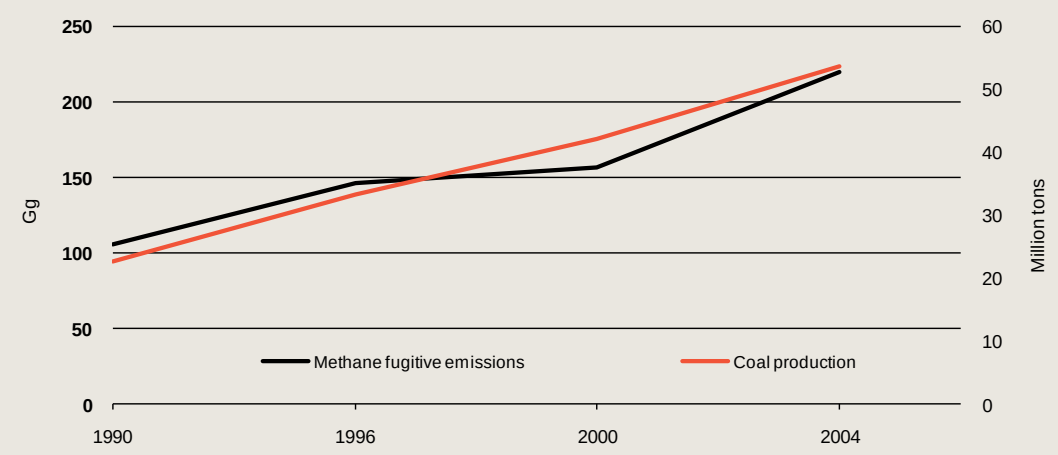
Coal mining and methane emissions in Colombia

Coal mining activities in Colombia are not subject to carbon taxes.

Of total methane emissions by the energy sector, where coal mining is included, between 75 and 80 per cent are fugitive methane emissions. Fugitive methane emissions have rapidly increased in the past two decades. The fast expansion of the coal mining industry is one of the contributing factors to such increase in fugitive emissions.

11 There are 511 projects registered in CDM for Latin America and the Caribbean of which Colombia has 146.

5 **Methane fugitive emissions by the energy sector and coal production in Colombia** [a]



[a] Energy sector includes coal mining, oil exploitation and natural gas management.

Data source: Greenhouse gas emissions in Colombia 1998-2010.

The debate about methane presence and release in coal mining activities in Colombia is mainly focused on the associated occupation health and safety issues (OHS). The risk of explosion and loss of lives have been the main concern. The tragic events in a coal mine early this year have increased the attention towards the regulation of the activity in regards to OHS. President Santos has called for a holistic revision of the mining regulation to avoid future tragic outcomes. Therefore methane emissions are further down in the list of urgent action in the mining sector.

Another element placing methane emissions far from the priority list in Colombia is the fact that most of the coal exploitation in the country is open pit based rather than underground. Underground coal mining releases more methane than surface or open-pit mining because of the higher gas content of deeper seams[12].

Voluntary actions to reduce methane emissions by coal companies in the country relate to cooperation activities with international partners and the accounting of emissions as a control measure and supporting evidence for emissions reduction (potential income through the CDM). This is the case of Cerrejon the biggest coal mining company operating in the country. It accounts for all GHG emissions including methane fugitive emissions. Yet initiatives like this one relate more to Cerrejon being visible to the community and environmental organizations both in Colombia and internationally. Companies of the size and visibility of Cerrejon are faced with the challenge of operating in an environmentally sustainable manner. Cerrejon complies with ISO 14001 operation system certification which warrants that it complies with all environmental regulation in Colombia, including the

12 CH4 emissions: coal mining and handling. Background paper by William Irving (USEPA) and Oleg Tailakov (Russia Coalbed Methane Center). It was reviewed by Dina Kruger (USEPA) and David Williams (CSIRO).

requirements for obtaining the mandatory environmental licence. A fugitive emissions permit specifically for open pit coal mining is required under the environmental licence regulation in Colombia[13]. This permit does not seem to entail emission prices/taxes though.

Other initiatives in place in Colombia for the reduction of methane emissions are the Methane to Markets initiative (M2M), of which Australia is also a partner. This internal initiative targets methane emissions from landfills, underground coal mining and natural gas and oil systems. None of the projects undergoing in Colombia under this initiative relate to coal mining.

Last year both the Ministry of Mining and energy and the Ministry of Environment, Housing and territorial development agreed on a joint agenda to tackle environmental issues. However, the agenda is very broad and does not incorporate quantitative targets and deadlines. With respect to climate change strategies, the agreed agenda includes the formulation and implementation of a national strategy for low-carbon development. Part of the strategy is an action plan under the M2M initiative supported by information on the potential methane that could be extracted and used/sold as a source of energy. Another element of the strategy refers to the conducting 2 diagnostic pilot projects on methane emissions in coal mining zones.

USA

Coal producers in the USA do not currently face a carbon price and there are limited prospects for this in the near future.

Reporting requirements

Under an Environmental Protection Agency (EPA) ruling, underground coal mines in the US are required to monitor greenhouse gas emissions from 1 January 2011 and report annually starting March 2012[14]. Surface mines are not required to report fugitive emissions and the rule applies to active mines and mines under development, not abandoned mines. The rule does not apply to coal bed methane recovery that is not associated with active underground coal mines.

Mines are required to report CH_4 emission liberation and destruction, CO_2 emissions from onsite CH_4 destruction, CO_2 and N_2O emissions from stationary fuel combustion, any other greenhouse gas emissions required under other EPA rules.

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13 Decree 948 of 1995 issued by the Ministry of Environment. It regulates on atmospheric contamination and air quality.

14 http://www.epa.gov/climatechange/emissions/remaining-source-categories.html

Coverage under Waxman-Markey

Under the proposed Waxman-Markey Bill[15], combustion of coal was to be covered, requiring producers or importers of coal based fuel to account for emissions associated with the combustion of the fuel. However, fugitive emissions were not covered.

With the failure of the Waxman-Markey legislation, it is unlikely that the US will introduce a comprehensive carbon pricing scheme in the near future.

Regional schemes

California is introducing an emissions trading scheme, however California does not have any coal production.

The Regional Greenhouse Gas Initiative (RGGI) is a cooperative effort among ten US states to reduce emissions from the power sector; it does not apply directly to fugitive emissions from coal mining[16]. The major coal producing states in the USA; Wyoming, West Virginia, Kentucky, Pennsylvania, and Montana do not participate in the RGGI.

The current price of emissions in the RGGI is relatively low at US$1.89 ($1.77) per tonne resulting in a small electricity price uplift[17].

Canada

There is no federal carbon pricing scheme in Canada. The government has indicated that it will pursue an approach aimed at aligning its policies with those of the US.

Within Canada, the provinces of Alberta and British Columbia — Canada's coal producing provinces — have both introduced climate change related legislation.

Alberta

Under the Greenhouse Gas Reduction Program[18] in the province of Alberta, facilities with total annual emissions exceeding 100 000 tonnes of CO_2e are required to reduce their emission intensity by 12% below their 2003-2005 baseline emissions intensity. A

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15 http://www.govtrack.us/congress/bill.xpd?bill=h111-2454

16 See www.rggi.org. The states covered are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.

17 See *Annual Report on the Market for RGGI Allowances* at http://www.rggi.org/docs/MM_2010_Annual_Report.pdf

18 http://environment.alberta.ca/01838.html

facility may meet its obligation through a combination of any of the following options:

- reduce emissions intensity;
- submit emission performance credits generated in a previous compliance period where the facility reduced its emissions intensity beyond its reduction target, or purchased Emission Performance Credits from different a regulated facility;
- submit Offset Credits generated from an Alberta-based offsets project generated according to a government-approved protocol; or
- submit Climate Change and Emission Fund Credits. Fund Credits purchased at a cost of C$15 per tonne of CO_2e to a maximum of the facility's compliance obligations.

A simple assessment of the liability of a coal mine under the Alberta Specified Gas Emitters Program is that 12% of its emissions attract a liability of C$15 ($14.40) per tonne of CO_2e producing an effective carbon price of C$1.80 ($1.73)[19].

British Colombia

The province of British Columbia has introduced a carbon tax at C$20 (19.86) per tonne of CO_2, increasing to C$30 (A$29.79) in 2012, on the retail purchase or use of fossil fuels in British Columbia[20]. Revenue raised by the tax has been partially returned to business through a reduction in the corporate tax rate from 11% to 10%. The tax does not apply to fugitive emissions of methane. The tax would apply to:

- emissions from diesel and other fuels and
- emissions from purchased electricity.

Approximately 85% of British Columbia's electricity comes from hydropower and so does not incur the tax. This means that only 15% of purchased electricity will be subject to price uplift from the tax.

A coal mine in British Columbia which uses the same amount of diesel and electricity and which has the same emissions profile as an Australian mine would face a proportion of the liability under the proposed Australian carbon tax. Further, the carbon tax liability in British Columbia would be offset by a 1% reduction in corporate income tax.

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[19] Assuming constant emissions intensity and no opportunity to reduce its emissions intensity at a cost of less than C$15 per tonne.

[20] http://www.fin.gov.bc.ca/tbs/tp/climate/A4.htm

Vietnam

The core responses of the Vietnamese Government[21] to climate challenges are based around:

- the National Target Program to Respond to Climate Change;
- a National Program on Energy Efficiency and Conservation;
- the development and use of renewable energy;
- a Five Million Hectare Reafforestation Program; and
- a UN-REDD Vietnam program.

These programs together consist of a wide variety of potential measures including those listed below[22]. Currently, there is no comprehensive price based measure for carbon abatement in Vietnam and there does not appear to be any measures directly targeted at fugitive coal emissions.

Forestry Development Strategy for 2001-2020 of Viet Nam

- Promote the implementation of a plan to plant 5 million hectares of forests on marginal or degraded land to increase the forest cover to 43 per cent by 2010
- Conserve and restore current forests
- Rehabilitate combined forest
- Prevent forest fires

Agriculture

- Sustainable agricultural farming techniques to enhance production and reduce emissions
- Improve manure management and irrigation-drainage management in rice fields
- Strengthen capacity of research institutions
- Improving diets to beyond rice
- Explore opportunities for methane capture

Energy Efficiency

- Improve lighting efficiency
- Encourage energy efficiency in businesses

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[21] See http://unfccc.int/files/meetings/cop_16/statements/application/pdf/101209_cop16_hls_vietnam.pdf

[22] http://www.roap.unep.org/pub/VTN_ASS_REP_CC.pdf

- Implement demand side management programs
- Energy efficiency in buildings through construction standards and auditing
- Efficient transport systems including public transport, fuel efficiency vehicles, vehicle emission standards and improved infrastructure.

Promoting research of new and renewable energy sources

- Solar energy
- Wind energy
- Small and micro hydro power plants
- Biogas and biomass

Research on methane recovery in energy and transport sectors

- Planned collaboration with Germany and Japan to implement methane capture projects, particularly through CDM
- Methane recovery from landfill for electricity generation or other fuel use

EU (Poland)

The major climate policy response in the EU is the EU Emissions Trading System (ETS). On its launch in 2005 it initially covered power stations and other combustion plants, oil refineries, coke ovens, iron and steel plants and installations producing cement, glass, lime, bricks, ceramics, pulp, paper and board. The only emissions initially covered were carbon dioxide emissions.

From 2013, the scope of the ETS will be extended to include additional sectors and gases. CO_2 emissions from installations producing bulk organic chemicals, hydrogen, ammonia and aluminium will be included. Nitrous oxide (N_2O) emissions from the production of nitric, adipic and glyocalic acid production will also be covered as will and perfluorocarbons (PFCs) from the aluminium sector[23].

Thus, fugitive emissions from coal mining are not covered under the EU ETS.

Under the EU 'Effort Sharing Decision' of 2009[24], individual countries are expected to define and implement policies to achieve emissions targets for sectors (and gases) not included in the EU ETS. In principle, this includes fugitive emissions from coal mining — although most of the discussion on this policy focuses on transport based on fossil fuels, promotion of public transport, energy performance standards for

[23] http://ec.europa.eu/clima/policies/ets/cap_en.htm

[24] http://ec.europa.eu/clima/policies/effort/index_en.htm

buildings, efficient heating systems, renewable energy for heating, more efficient farming practices, and conversion of animal waste to biogas.

Consistent with this, Poland's mitigation efforts outside the EU ETS focus mostly on energy efficiency and diversification. It is interesting to note that Poland's annual submission to the UNFCCC does not include estimates of fugitive emissions from coal mining[25].

The EU is also currently considering a modification to its energy taxation (excise) arrangements in order to make them consistent with the objectives of the EU ETS and EU climate policy in general[26]. This potentially involves additional emissions content taxes on the use of fuels not covered by the EU ETS. It does not appear that this will apply to fugitive emissions from coal mining.

25 http://unfccc.int/files/kyoto_protocol/compliance/plenary/application/pdf/cc-ert-arr-2011-12_arr_2010_of_poland.pdf

26 http://ec.europa.eu/taxation_customs/taxation/excise_duties/energy_products/legislation/index_en.htm