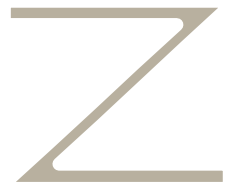


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Coverage of coal mining fugitive emissions in climate policies of major coal exporting countries

Prepared for Australian Coal Association

*Centre for International Economics
Canberra & Sydney*

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Contents

Summary	5
Summary of country policies	8
Indonesia	8
Russian Federation	10
South Africa	10
Colombia	12
USA	15
Canada	16
Vietnam	18
EU	19

Boxes, charts and tables

1	Coal production and consumption Top 10 countries 2009	5
2	Proved recoverable coal reserves 2008	6
2	Coal exports by major country 2009	6
4	Coal fugitive emission mitigation policies in place or proposed	7
6	Methane fugitive emissions by the energy sector and coal production in Colombia	14

Summary

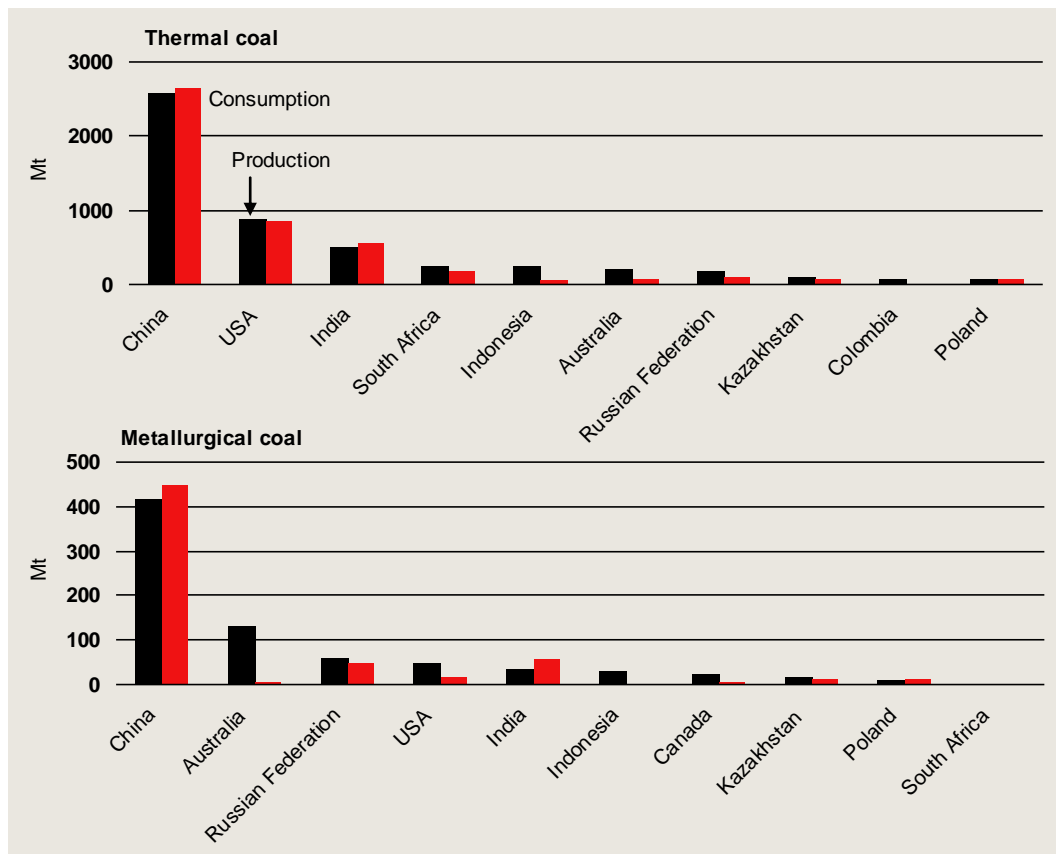
This report

- 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

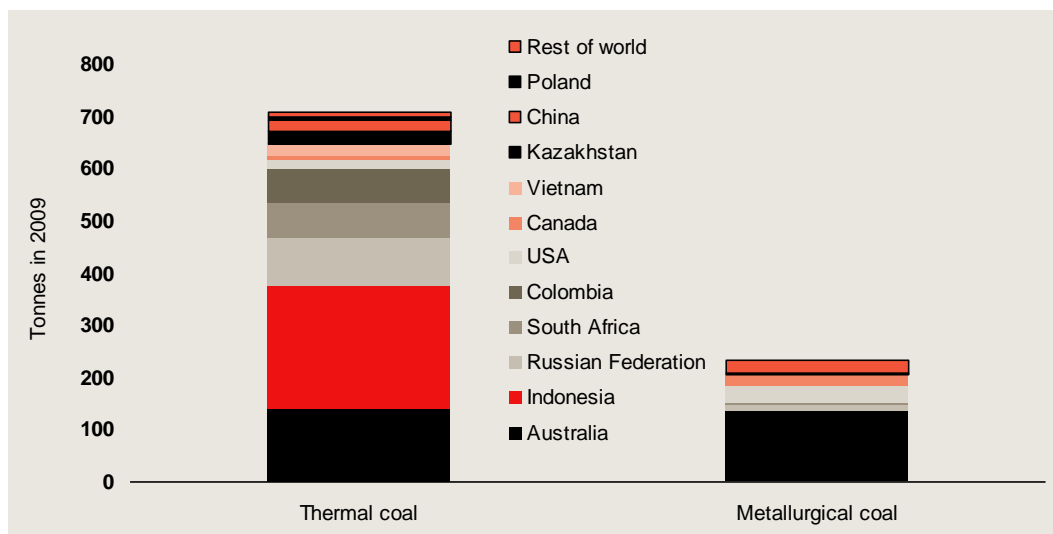
Country/Region	Mt	Share of world (%)
Europe	18 447	2.5
North America	237 607	32.4
Pacific (mostly Australia)	41 111	5.6
Russian Federation	69 496	9.5
Other transition economies	54 195	7.4
China	180 600	24.6
Other Asia	90 076	12.3
Colombia	5 298	0.7
Other Latin America	3 734	0.5
Africa and Middle East	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 peatlands¹.

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 Accord² 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*

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 quality⁴. 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.

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 Russia⁶).

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 efficiency⁷.

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 cent⁸.

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.

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 CO₂
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

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 an 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 CO₂
- 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 CDM¹¹.

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.

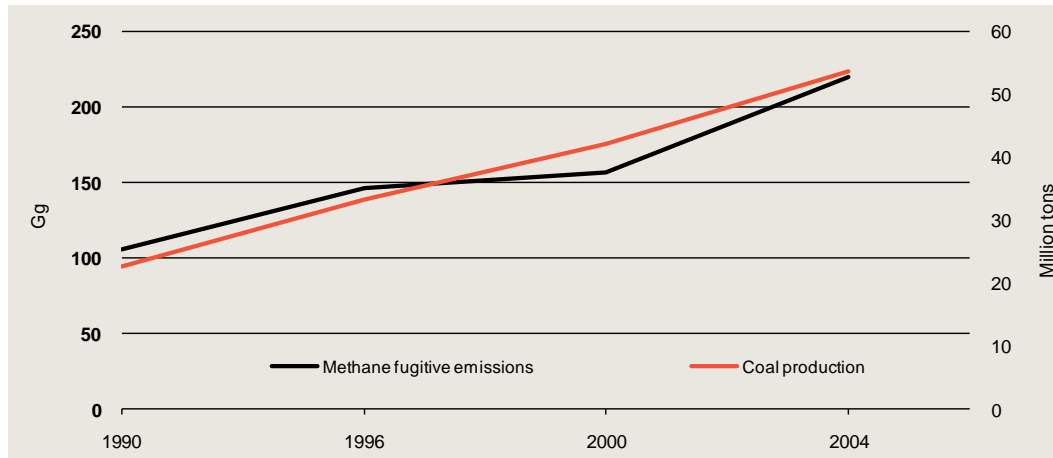
Coal mining and methane emissions in Colombia

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 seams¹².

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 Colombia¹³. 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 2012¹⁴. 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 CH₄ emission liberation and destruction, CO₂ emissions from onsite CH₄ destruction, CO₂ and N₂O emissions from stationary fuel combustion, any other greenhouse gas emissions required under other EPA rules.

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 Bill¹⁵, 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 mining¹⁶. 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 uplift¹⁷.

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 Program¹⁸ in the province of Alberta, facilities with total annual emissions exceeding 100 000 tonnes of CO₂e are required to reduce their emission intensity by 12% below their 2003-2005 baseline emissions intensity. A

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 CO₂e 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 CO₂e producing an effective carbon price of C\$1.80 (\$1.73)¹⁹.

British Columbia

The province of British Columbia has introduced a carbon tax at C\$20 (19.86) per tonne of CO₂, increasing to C\$30 (A\$29.79) in 2012, on the retail purchase or use of fossil fuels in British Columbia²⁰. 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.

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 Government²¹ 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 below²². 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

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. CO₂ emissions from installations producing bulk organic chemicals, hydrogen, ammonia and aluminium will be included. Nitrous oxide (N₂O) emissions from the production of nitric, adipic and glycolic acid production will also be covered as will and perfluorocarbons (PFCs) from the aluminium sector²³.

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

Under the EU 'Effort Sharing Decision' of 2009²⁴, 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 mining²⁵.

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 general²⁶. 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