



**SUBMISSION TO SENATE SELECT COMMITTEE ON FUEL AND ENERGY
IN RELATION TO: INQUIRY INTO FUEL AND ENERGY**

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Commercial in confidence

Executive Summary

MBD Energy Limited (“MBD”) was established in 2006 with private funds. MBD is developing sustainable green alternatives to fossil fuels by producing bio fuels for transport and industry use as a partial or full replacement of fossil fuels.

MBD is in the process of building a vertically integrated energy company based on algal oil as feedstock. The by-product algal cake will provide a protein rich meal similar to soy meal to livestock and aquaculture.

MBD has developed an algae feedstock based on the key ingredients of waste CO₂, derived from large greenhouse gas emitters such as coal fired power stations or refineries and, where available, nutrient enriched surplus waste water. MBD is not reliant on traditional feedstocks derived from vegetable oils and grains that require large areas of farmland and significant volumes of water in order to sustain them.

This approach has the potential to provide a commercial approach to coal flue gas sequestration (the removal of carbon from the energy system) by actively providing a cycle for carbon to be reintroduced or re-absorbed) into the energy cycle.

The process has the potential to significantly mitigate the climate change potential presented today by Australia’s power stations. In addition the biodiesel produced will substantially augment Australia’s current diesel consumption of circa 15 billion litres imported into Australia every year.

During 2008, the company with Queensland Government assistance and in collaboration with James Cook University constructed a Test Plant at Townsville in order to prove and optimise its algal synthesiser process. The successful operation of this plant has resulted in MBD’s technology gaining wide scientific business and political support at a national and international level (United Nations). Industry acceptance of its commercial potential has now been demonstrated by the agreement with SEAC for a progressive 3 stage roll out of Display, Pilot and large scale commercial Demonstration Plants at their Loy Yang “A” Plant.

Large scale production of Bio fuels can now become a reality. Overtime the resultant significant reduction of CO₂ emissions will ensure continued and cleaner use of Victoria’s substantial brown coal resources and protect local jobs.

In view of MBD’s planned substantial production of bio fuels it is essential that the Federal Government establishes a regulatory regime which encourages the transition to clean energy sources. The existing piecemeal approach has proved to be a substantial disincentive for the development of a viable bio fuel industry.

Business leaders view emerging green technology as an opportunity with which to drive new economic growth and substantial employment. MBD and similar processes have the potential to provide Australian based sources of low carbon sustainable fuels for transport and industry fuels. The wider community is demanding political action and leadership.

The political system needs to move from its existing deadlock between commitments to:

- An unproven, problematic expensive and wasteful technology – carbon capture and storage, and
- A view that action on climate change will cause energy prices to rise and must await commitment from other countries to support for positive effective action.

The reality is that both delay or a flawed legislative framework will exacerbate the problem and ultimately lead to substantial energy price rises and job losses is graphically illustrated in the once promising bio fuel markets steady decline in the face of Federal Government Rebate and Legislation changes.

MBDs CO₂ to energy is a low carbon process that has the potential to substantially contribute to future proofing Australia’s fuel energy needs. A revised regulatory legislative and innovation incentive system needs to be established at a federal level, specific provision needs to be included in the Carbon Pollution Reduction Scheme to encourage Bio-sequestration.

For this to occur, a revised regulatory legislative and innovation incentive system needs to be established at a federal level. The Committee’s decision to consider these matters in a wider context is therefore supported and timely.

We would welcome the opportunity to provide any further information which the committee requires or to appear before the committee.

The Biodiesel Industry

Renewable alternative to fossil diesel

The ever increasing price and demand for crude oil together with the environmental effects of using of fossil derived fuels has driven the search for renewable and sustainable alternatives. Global warming and agreements such as Kyoto will increasingly drive governments and business to assess their carbon footprint and seek alternate low / neutral carbon solutions.

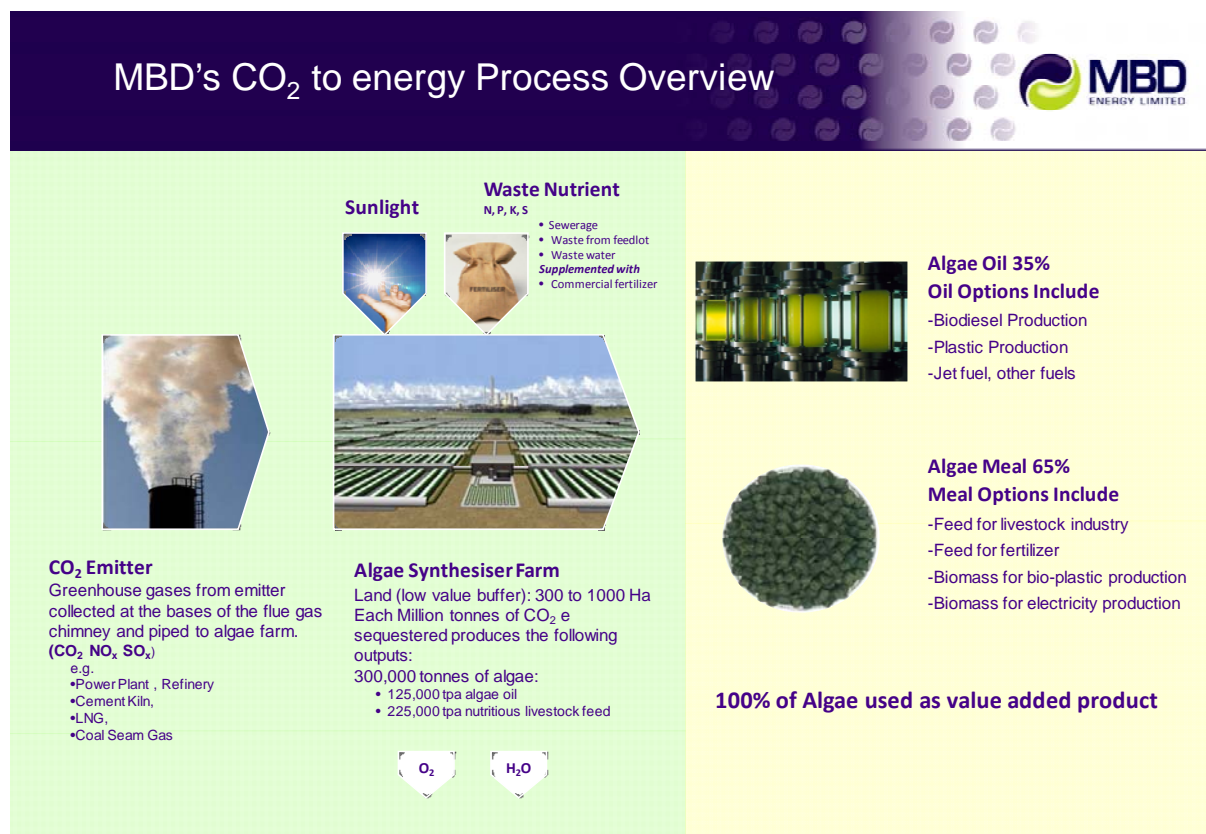
Bio fuels have the potential to provide a significant component of any future solution whereby the fuels produced can meet increasingly higher standards for energy, power and emissions.

We understand the bio fuel association is making a submission on the overall industry, its development and the issues confronting it. The focus in this paper is the potential of MBDs Algal Synthesiser Process to produce bio fuels on a scale which will make a significant contribution to Australia's future energy needs through the production of new fuels and making possible continued use of Australia's extensive gas and coal reserves through substantial reduction in emissions.

Whereas traditional bio fuel production has relied on extensive land areas for crops or pond algae production, MBDs process uses waste buffer land to produce valuable algae oil and meal. Both these factors provide the means to reduce the cost of algae based bio fuels to levels that are more than competitive existing traditional petroleum based products.

A cost effective bio fuel industry is now a reality.

MBD Energy is the Australian Leader in large scale, algae based bio-fuel production and CO₂ bio-sequestration...



Further graphic explanation material is attached to this submission in the form of MBDs POROCES PRESENTATION..

MBD has lodged appropriate patent applications to protect its intellectual property.

Multi Stage Development Plan

MBD's plan is to progressively roll out our technology with each successive plant gaining the benefits in terms of optimisation and inputs / outputs derived from previous smaller scale plants.

A 3 stage roll out as proposed: consists of a comparatively small Display Plant; a Pilot Plant based on the results obtained from the Display Plant; and following the successful operation of the Pilot Plant the construction of a full scale commercial plant.

The scale of each plant can be gauged from the design CO₂ abatement projected for each facility of:

- Display Plant – 800 tons CO₂ **[Proof of Concept]**
- Pilot Plant – 70,000 tons CO₂ **[Commercial Full Scale Module]**
- Demonstration (Commercial) Plant > 1.4 MT **[Large Scale Roll Out]**

Annual production of algal oil will total 11M litres for the Pilot Plant and 300 M litres for the Demonstration Plant with algal meal production totalling 25,000T and 450,000 T respectively. In order to understand income streams generated from these products MBD has worked on the conservative basis of pricing algal oil at \$800/T, Biodiesel at \$1150/T and algal meal at \$400/T.

MBD's agreement with GEAC provides for a progressive roll out on this basis at their Loy Yang "A" Plant in the Latrobe Valley. Loy Yang "A" produces 40% of Victoria's total electricity output and emits in excess of 19M tons of CO₂ annually. Design and survey work for the Display Plant is now proceeding with a view to commencing construction in the December quarter 2009. The agreement provides for the successful operation of the Display Plant to be followed by a Pilot Plant and then full scale commercial Demonstration Plant in 2011-12 and 2014 respectively.

Agreements are now being finalised with Eraring Energy in NSW and a major Queensland greenhouse emitter for the construction of similar algae synthesiser plants. MBD intends to pursue these projects to construction when the appropriate funding is in place.

MBD's approach to other major greenhouse gas emitters including major power stations

Although MBD has concentrated its efforts on the largest emitters of greenhouse gases in Victoria, New South Wales and Queensland, we well recognise the potential to apply our technology elsewhere in Australia and overseas – particularly in countries which import Australian coal and gas. Also the United Nations has taken particular interest in the collaborating with MBD on projects in developing countries. (Our summary notes of discussions etc at the recent 2009 World Business Climate Change Summit in Copenhagen which MBD was invited and attended are available upon request).

MBD has limited resources all of which are concentrated on:

- Successfully constructing the expanded Test Facility at JCU Townsville,
- Display and Pilot Plants and
- Exploring markets for algae oil and meal.

Also we are maintaining a dialogue with other the wide range of large emitters who have greenhouse gas emission issues that need addressing over the coming years.

These proposals raise interesting regional economic and environmental opportunities. MBD has agreed to pursue these opportunities after it has constructed at least one Display Plant – MBD needs to walk before it runs. The long term potential for MBD's process is extremely positive.

Other MBD Algae Synthesiser applications

MBD's CO₂ to energy process will have wide scale potential to be matched to a wide range of large CO₂ emitters including: Power Stations, Refineries, Cement Kilns, LNG and Coal Seam Gas projects.

Principal Australian and New Zealand Coal Fired Power Stations:

Victoria	New South Wales	Queensland	West Australia	South Australia	Northern Territory
Loy Yang A Hazelwood Yallourn W Loy Yang B Valley Power Morwell Somerton Anglesea Bairnsdale	Eraring Bayswater Liddell Vales Point B Mt Piper Wallerawang C Munmorah Shoalhaven Smithfield Redbank Hunter Valley	Gladstone Tarong Stanwell Callide C Millmerran Callide B Swanbank B Tarong North Mt Stuart Oakey Yabulu Collinsville Roma Mackay	Muja Pinjar Cockburn Mungarra Kalgoorlie	Inkerman Sugar Torrens Island Northern Thomas Playford B Hallet Dry Creek Quarantine Mintaro Ladbroke Grove Snuggery Port Lincoln	Channel Island Ron Goodin Pine Creek Berrimah Katherine McArthur River Tennant Creek
					New Zealand
					Huntly

Eligibility of Carbon Abatement of Bio-sequestration under CPRS

A key consideration for each power station/ emitter with which MBD is currently in discussions is the "eligibility" of the MBD and similar process' under the government's proposed CPRS.

Emitters are seeking formal confirmation from MBD / the Federal Government that the physical carbon abatement achieved by undertaking a project with MBD (ie: the reduction of flue gas emissions from their chimney stack/s) will be deemed "eligible" as far as the government's implementation of its proposed CPRS is concerned.

Emitters are keen to ensure that once a quantum of their emissions has been physically bio-sequestered into MBD's algae synthesis process, the emitter is then able to benefit from the resulting emissions abatement by passing on the associated carbon liability to MBD. MBD would in turn utilise the emissions for the production of value added and sustainable products each of which may be treated differently under the proposed CPRS – the responsibility for which is proposed to lie fully with MBD.

Recent discussions with the Climate Change Minister and subsequent follow up with the Department indicate that this arrangement can be achieved outside the proposed legislation through a contracted arrangement. MBD believes the Carbon Pollution Reduction Scheme legislation needs to provide specific provisions which accommodate and encourage bio-sequestration as well as carbon capture and storage. MBD strongly supports the basis of the CPRS Legislation to be one that is "Technology Neutral" and supports any technology that removes or reduces CO₂ emissions in the atmosphere whether permanent or as part of an ongoing process. CO₂ must be seen as a cycle not as separate components that are independent of each other.

Emission Reduction Targets

Relative costs/income potentials of alternative approaches – Potential to use MBD CO₂ to Energy Process

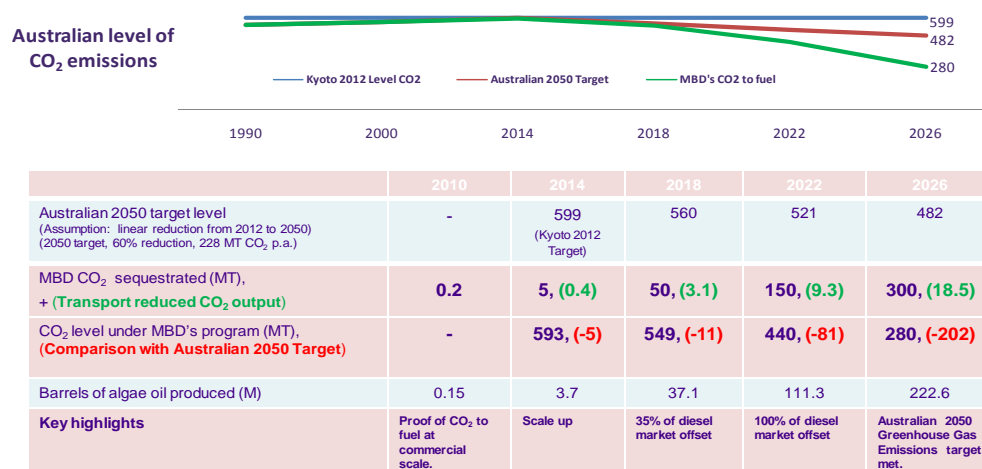
Business leaders and politicians attending the recent Copenhagen World Climate Change Business Summit 2009 were privately sceptical of the technical and financial feasibility of using Carbon Capture and Storage to reduce emissions. This has been strongly reinforced in our negotiations to establish Algal Synthesiser Plants at the major Australian greenhouse gas emitters. Each site has been attracted to the idea of their problem CO₂ gas emissions being used to produce valuable products – algal oil and stockfeed meal.

Former American Vice President leading World Climate Change action advocate Al Gore during his recent visit to Australia, whilst endorsing the urgent need for both the American and Australian Senates to pass carbon reduction as a useful first step, expressed scepticism in relation to carbon capture and storage being viable and the need to explore practical viable solutions in view of the key role played by coal in meeting energy needs in both countries.

MBD's CO₂ to energy process has the potential to offer one of the key solutions to this problem. In order to demonstrate these potentials we have prepared the following chart:



The following table demonstrates a full scale roll out of MBD's CO₂ to fuel system over the next 15 years



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Direct comparison of costs/ revenue for MBD's CO₂ to energy Process and Post Carbon Capture and Storage – Low carbon levels do not mean high cost:

Carbon Capture Comparison

Sequestration of all CO₂ emissions from 1000 MW Brown Coal Power Station

Post Carbon Capture and Storage

Collection, concentration, liquefaction of CO₂ and storage in ground

Emitter to fund large capital and operating costs
 No income from CO₂ based products.
 Feasibility at \$25/T appears questionable.

MBD's CO₂ to fuel Solution

Collection, consumption and use of CO₂ for Algae based value added products.

Emitter not required to fund costs.
 Significant value creation from algae products
 Project feasible independent of carbon price

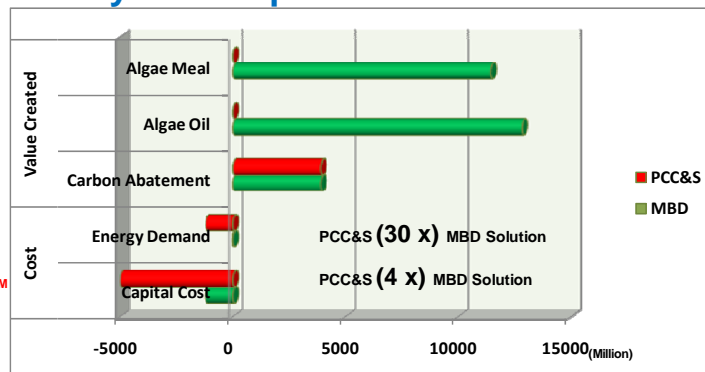
20 year comparison of value created

PCC&S Value Creation -\$2.2B

Annual Value Created
 - Carbon Abatement \$225M
 - Algae Oil income \$0M
 - Algae Meal income \$0M]

Annual Energy Demand
 30%, 300MW
 \$79M p.a. (@ \$30 /MWh)

Capital cost over 20 years \$5000 M



MBD's CO₂ to fuel Value Creation \$26.8B

Annual Value Created
 - Carbon Abatement \$225M
 - Algae Oil income \$740M
 - Algae Meal income \$660M

Annual Energy Demand 1%, 10MW
 \$2.7M p.a. (@ \$30 /MWh)

Capital cost over 20 years \$1225 M

MBD developed comparison – figures are provided for quantum comparison only.
 Detailed comparisons to be developed for each specific site and operation.
 All figures in Million Dollars

Assumptions:
 Carbon Credit Value \$25/T, CO₂ sequestered 9MT, Oil \$800/T, Meal \$400/T,
 Value MW = \$30, 100% Plant operation (8760 hours per year), PCC&S 5 year scale up, MBD 5 year scale up
 All figures per tonne and based on 1 years operation.
 * Estimated plant capital costs for 20 year project.

Potential substitution for fossil oils by algal oil in production of diesel fuel

Algal oil derived from CO₂ is a suitable feedstock for diesel as used in all current Australian industry and transport needs providing it meets rigid design specifications. MBD has held preliminary discussions with existing refiners in the eastern states.

MBD's CO₂ to energy fuel is potentially very commercial project. The company has prepared all its future estimates for algae oil and meal on a very conservative basis. Major oil companies including Caltex and BP have expressed interest in utilising algal oil in view of its potential price advantage and as a means of increasing the proportion of their product range derived from renewal "green" sources. Recently Exxon have followed Shell into a large scale (\$600M) project based on bio fuel from algae. In this regard the proposed MBD plants will be able to supply algal oil at a clear price advantage over other crop derived renewable products. Major mining and transport operators dependent on diesel are keen to pursue long term supply arrangements.

The potential for algal oil to be used as a large scale substitute for petroleum diesel was demonstrated in the emission reduction target diagram which estimated that 100% substitution would be possible by 2022 under a wide scale roll out of the technology.

Specific comments on terms of reference:

1a) The impact of higher fuel and energy prices on:

- *Families*
- *Small business*
- *Rural and regional Australia*
- *Grocery prices key industries, including but not limited to tourism and transport*

Fuel and energy price increases impact virtually every level of activity and sectional group. Clearly measures which reduce these impacts should be encouraged. In addition to immediate sectional impacts it is necessary to consider long term impacts in relation to overall economic activity. Failure to address necessary adjustment to sustainable energy sources will in the longer term result in much greater job losses and price rises than a well targeted systematic transition. Australia's failure to deal satisfactorily with urban and rural water issues during the past decade provides a graphic illustration of the consequences of failing to consider the future in a climate related field. However, whereas one can always hope and pray for rain, the likelihood of cheaper fuel and energy becoming available over time without targeted action is extremely low.

MBD plans to progressively roll out its CO₂ to energy Plants at major greenhouse emitter locations including the Latrobe, Hunter Valley and in Queensland. Most power stations are located in close proximity to coal mines or if gas fired in heavy industrialised areas on the fringe of the major cities. These regions fear local job losses and declining economic activity as a consequence of measures to reduce green house gas emissions. MBD Plants will provide both direct and indirect new jobs, improved local community amenity through substantial reduction in flue gases emissions and in the longer term ensures continued mining and power generation activities. Application of the technology to Australian coal and gas exports could make a substantial contribution to reversing overall world global warming.

MBDs CO₂ to energy process using waste products to produce high value algal oil and meal offers a clear advantage in terms of net energy price/ costs over alternative clean coal technologies including the yet to be proven carbon capture and storage.

1b) The role and activities of the Petrol Commissioner, including whether the Petrol Commissioner reduces the price of petroleum;

No comment

1c) The operation of the domestic energy markets, and petroleum, diesel and gas markets, including the fostering of maximum competition and provision and provision of consumer information;

We will confine our comments to the bio-fuel market. Large scale production of bio-fuel including bio-diesel will progressively occur following the construction of MBD Algal Synthesiser Pilot and Demonstration Plants at major power plants in Victoria, New South Wales and Queensland over the next 5 years. This production will have a significant impact on these markets.

Prior to this, in order that the market can operate efficiently it will be necessary to ensure in relations to bio fuels that clear and appropriate standards, mandated blend ratios and excise rebate provisions are in place. For instance it is totally inappropriate for existing regulatory arrangements place biodiesel at a substantial price disadvantage in relation to petroleum diesel. This disadvantage needs to be reversed to provide positive incentives for the switch to cleaner sustainable energy sources.

MBD' CO₂ to Energy provides the means for this transition.

1d) The impact of an emissions trading scheme on the fuel and energy industry

These issues are covered in the main body of this submission. We stress this issue is of critical importance to MBD and the major power stations and CO₂ gas emitters. We appreciate assurances from the Minister and Department that MBD can enter into appropriate contractual arrangements with major gas emitters in relation to the legislation.

The Carbon Pollution Reduction Scheme legislation needs to be amended to accommodate and encourage bio sequestration.

MBD believes that its CO₂ to Energy process when established in association with major coal and gas emitters can increase local employment and economic activity in these regions.

Bio fuels and meal produced in large volumes through MBDs Algal Synthesiser Plants will not result in product price rises. Indeed, whereas petroleum fuels will steadily rise as world crude declines, bio fuel prices would be comparatively stable.

1e) and f) The existing set of federal and state government regulatory powers as they relate to fuel and energy products AND taxation arrangements on fuel and energy products

Federal legislation and regulations covering use of bio fuels have been a substantial disincentive for the development of a viable bio fuel industry in Australia. MBDs CO₂ to energy technology with progressive roll out committed at Loy Yang "A" in Victoria and planned facilities at Eraring NSW and Queensland nears large scale production of bio fuels will now become a reality in Australia. Therefore urgent action is required to put in place a legislative regime which provides positive encouragement for bio fuel production and use.

MBD believes that this could be achieved through the consolidation of these regulations into indicative provisions for bio fuels.

Clear and certain legislated policy across the whole area including:

- Emission Trading Scheme
- Rebate for bio fuels that as a minimum matches the mineral diesel rebate but more desirably encourages the use of bio fuels over mineral diesel. i.e. the US scheme
- Clear minimum mandates for bio fuels set at a minimum of 5% and rising to 10% over the next 5 years.

The key government policy change that has affected the bio fuel industry over the past 2 years was the former Liberal Government's decision to remove the 38c per litre rebate for bio fuel to primary producers. This change resulted in primary producers receiving the rebate on mineral diesel and no rebate for the use of bio fuel. This has, in many cases, been the difference between bio fuel companies being able to operate profitably and ceasing production. The removal of the rebate has led to the industry restricting the use of bio fuel to low blends (max. 20%) in order to minimise the effects of rebate reduction.

The other key government policy that is causing uncertainty in the bio fuels industry is the lack of legislated blend targets. Many of the developed world economies, particularly those that are net importers of oil, have sought to provide legislated blend levels to ensure that they reduce their reliance on imported oil and realise the environmental benefits of bio fuel.

The USA, Brazil, and many European countries have successfully adopted rebates and legislated target blends of bio fuels to reduce dependence on mineral oil and provide certainty to the bio fuel industry.

The Federal Government must make the necessary legislative changes to support the bio fuel industry or risk the loss of the industry all together.

Standards

The quality standard for B100 should be endorsed by an independent producer organisation (similar to BQ9000 as in North America, www.bq9000.org) to strengthen consumer confidence in biodiesel quality.

European Diesel Standards and blend mandates also provide a satisfactory model for Australia. The problem is highlighted by the fact that a European car which can use either 100% Biodiesel or blends under warranty in Europe would lose its warranty using the same fuel imported from Europe or exact equivalent specification local biodiesel in Australia.

Blends

Proposed B5 (5% blend standard; Federal proposed)

The proposed limit of 5% blend of biodiesel in diesel will increase the working capital costs for producers and distributors to market the biodiesel. No sound practical or scientific basis now for this low scale Australian / European experience provides necessary technical specifications to enable modern transport and industrial engines to operate successfully on 100% biodiesel or lower blends.

A 5% maximum blend means that large scale users (especially the mining industry) face further hurdles to reduce their greenhouse gas footprints and discourages them to increase their biodiesel consumption.

The proposed measures will lead to a reduced total consumption of biodiesel in Australia and increased marketing and working capital expenses for producers and distributors of biodiesel.

State Mandates for minimal biodiesel use

The recent decline in the oil based bio fuel industry in Australia has made it difficult for the states to implement their objective to encourage a switch from petroleum based fuels to bio fuels and other renewables. For instance NSW's 2% mandate has foundered through lack of product and Victoria has placed their proposed mandates on hold.

MBD is progressing roll out of commercial plants which in time will be capable of producing high volumes of bio fuel in Victoria, NSW and Queensland. We have kept these states fully informed as to our plans and anticipate the phased application of progressively higher percentage bio fuel mandates as suitable product becomes available.

1g) The role of alternative sources of energy to coal and alternative fuels to petroleum and diesel

We will confine our remarks to bio fuel substitution potentials. MBDs CO₂ to energy process provides Australia with its best option to substantially replace petroleum derived diesel and other petroleum derivatives including aviation fuel.

We estimate full scale roll out of MBDs Pilot Plant and Demonstration Plants at targeted power stations / major greenhouse gas emitters could produce sufficient biodiesel to totally meet Australia's transport and industrial, agricultural diesel requirements by 2022. It would be possible to source considerably more CO₂ and if applied to further Algal Synthesiser Plants additional substitution of petroleum fuels could occur. This potential is highlighted in the Australian's emissions reduction target diagram.

Barriers to entry that create uncompetitive incumbency advantages in the Australia?

The wide variety of information and varying views distributed in the wider community make new technologies an easy target for incumbent fuel sources to target with misinformation. The current major fuel companies have dominated the market for the last 50 years.

Clearly the major oil companies seek to protect their large scale distribution networks. They seek to maintain the status quo and have established a highly developed level of political support.

Government policy should ensure that all fuel sources are considered equal and that the incumbent fuels and fuel companies do not receive free emissions or quotas in any new carbon emission trading schemes. Emission trading levels must be priced such that the low emission technologies are encouraged over conventional fuel sources. Australia will need to pursue these objectives if it is to meet its global warming targets.

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

In order to encourage private sector investment in low emission technologies government needs to positively support their entry into existing markets. The alternative is to ignore increasing consumption of mineral oil based fuels and reduce carbon elsewhere. It would seem there are clear decisions when assessing options to reduce CO₂ in the environment. The choices are to reduce car dependency, adopt low emission fuels or develop alternate cars and trucks that do not generate CO₂.

In the short to medium term low emission fuels provide the only real solution to significantly (70 – 80%) reduce CO₂ from transportation.

No industry should be exempt from the obligation to participate in the fulfilment of a National Trading Emission Scheme.

1h) Domestic energy supply and domestic oil/gas exploration and refinement

MBD does not intend to directly refine bio fuels using its bio fuel as feedstock. MBD has held discussions with the major east coast refineries in relation to refining bio oils to create biodiesel and so on.

Considerable existing infrastructure such as the BHP/ ESSO Gippsland oil supply pipe lines which run close to Loy Yang provide a means to supply these facilities . In relation to South Australia we are concerned that the moth balled Port Stanvac refinery should not be dismantled prior to the potential for this facility to refine bio-oils be fully explored . This facility is linked by oil product pipeline to Port Adelaide which is within 3kms of the Torres Islands Power Stations.

1i) The impact of higher petroleum, diesel and gas prices on public transport systems

The service capability of major public transport infrastructure in Australia's cities has steadily declined over the past decade. At the same time, partly in response to petrol price rises and costs and a growing community awareness of green sustainability issues and increasing urban densities, patronage of public heavy or light rail and bus transport has increased markedly to record levels. These trends can be expected to increase and demands will steadily rise.

Most heavy and light rail systems in major cities use electricity. The Adelaide heavy rail system is now being electrified and the light rail system extended. Federal funding is supporting major public transport initiative. MBDs CO₂ to energy process will protect continued use of coal and gas fired electricity generation and help to alleviate cost rises. Biodiesel can play an important role in keeping bus and rail car fuel costs rises down. In this way the emerging bio fuel industry can play an important role in continued switch from private car use to more sustainable public transport.

For too long State Governments have prepared Public Transport Strategies rather than designing and building new infrastructure.