

18 July 2024

Australian Government
Department of Infrastructure, Transport, Regional Development, Communications and the Arts
Department of Climate Change, Energy, the Environment and Water

**RESPONSE TO CONSULTATION PAPER LOW CARBON LIQUID FUELS
A FUTURE MADE IN AUSTRALIA:
UNLOCKING AUSTRALIA'S LOW CARBON LIQUID FUEL OPPORTUNITY**

1 Introduction

Xatech International Pty Ltd in association with our partner J.E.Access Ltd are currently investigating opportunities for establishing production facilities for advanced biofuels in Australia. Our process (Cambio Fuels) is based on a one step, non pressurised direct catalytic conversion of lignocellulosic biomass to a Carbin Neutral Fuel and Bio Bitumen product.

This submission has been prepared by David Knight in accordance with the request for an industry response as detailed in the Consultation Paper for Low Carbon Liquid Fuel.

[REDACTED]

[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

3 Cambio Fuels Process

A brief description of the Cambio Fuels Process is as follows:



[REDACTED]

Our Mission

Use the Gifts Provided by Nature to Change the Dynamics of Transportation Fuels From Fossil to Renewable Fuels Protecting the Environment and Achieve Net Zero Emissions by 2050



Transformation of Waste Biomass Into Carbon Neutral Fuels and Bio Bitumen Achieving a Balanced Natural Carbon Cycle and Locking Away Excess Atmospheric Carbon Dioxide as Solid Carbon.

Empowering Farmers and Smallholders To Be Part of the Climate Solution by Providing a Value for Agricultural Waste that Previously was Burned Releasing Smoke and Pollution into The Atmosphere Whilst Improving Their Livelihood

Providing The Solution for Maritime Industry to Achieve Emission Reductions Without Compromising the Efficiency and Economic Cost of Shipping

7/18/2024

CAMBIO CARBON NEUTRAL FUELS

2

Cambio Carbon Neutral Fuel

PROVEN PROCESS	One Step – Non-Pressurised – Direct Catalytic Conversion – Lignocellulosic biomass to Carbon Neutral Fuel and Bio Bitumen
BIOMASS FEEDSTOCK	Wide variety of feedstock – Waste from Agricultural and Forestry Operations – Purpose Grown Biomass on Fallow and Marginal Land
SCALABILITY AND COST EFFECTIVE	Modular Plant Design – Scalable to Match Feedstock Supply and Market Requirements Minimising Infrastructure Investment.
ENVIRONMENT POSITIVE	Natural Carbon Cycle – Carbon Neutral Fuel With No Additional Carbon Emissions – Carbon Removal Via Bio Bitumen/Asphalt – Use of Waste Products Eliminating Crop Burning.
REVOLUTION IN SHIPPING AND TRANSPORT FUELS	True Drop In Fuel Using Existing Infrastructure Avoiding Investments in Upgrades – Meeting Carbon Emission Reduction Goals for International Shipping – Power Generation and Transport

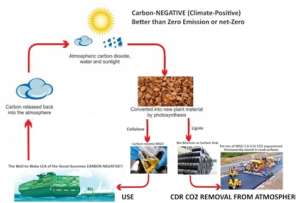
18/07/2024

CAMBIO CARBON NEUTRAL FUELS

4

Background Cambio Biomass to Fuel Process

The Cambio Fuel Process is a one-step, non-pressurized direct catalytic conversion of lignocellulosic biomass such as bagasse, sugar cane trash and alternatives such as Bana Grass into a renewable diesel and bio bitumen. The bio bitumen, when used in asphalt, locks away carbon from the natural CO₂ cycle and as carbon sequestration attracts the issue of verifiable carbon credit certificates which have a value when traded on International and Australian Registries.



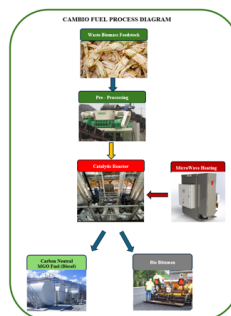
- Direct Catalytic Conversion is a proven process that was developed in the 1980's by famous German Chemistry Professor the late Ernst Bayer.
- The process was further developed by the European Partners of Hans-Henning Judek who built and operated a pilot plant from 2005 to 2010. The pilot plant produced a diesel fuel equivalent to EN590/ASTM1975 using, among other materials, biomass as a feedstock.
- Due to limitations in available technologies in 2010 the opportunity to upscale to an efficient commercial plant was not available. However further R&D was undertaken with an alternative heating process based on microwave technology proven on a test scale.
- With the advent of industrial microwave generators since 2020 for the chemical and food processing industries JE Access and their international partners have reactivated the Cambio Fuel Process incorporating all of the developments proven during the R&D and are now actively pursuing the establishment of a full commercial installation.

18/07/2024

CAMBIO CARBON NEUTRAL FUELS

7

Cambio Biomass to Fuel Process



The main process components are;

- Reception of waste biomass from a variety of sources,
- Pre-Treatment to remove excess moisture to under 10% and reduce the biomass to a required particle size,
- Induction of the biomass into the carrier medium mixed with catalyst
- Chemical reaction under a controlled temperature within a reactor with heating provided by a microwave generator
- Product collection, optional post processing and storage.

The chemical reaction of the biomass/catalyst mixture within the reactor occurs at low and energy efficient temperature between 280°C – 300°C which avoids combustion of the biomass thus enabling the splitting of the hydrocarbons from the biomass cellulose with the hydrocarbons condensed into the fuel product. The remaining lignin is carbonised and then discharged from the reactor as a bio-bitumen that when used as asphalt for road construction "locks away" and removes carbon permanently from the natural carbon cycle and is thus substantially more efficient than just "avoidance" of CO₂ emissions.

The process is energy efficient with the total energy supply requirement of 2MW, covering biomass collection, transport to the plant, pre-treatment, CAMBIO Process, microwave generation and product storage. This is significantly less than the green electric energy consumption per tonne of oil equivalent for alternatives of liquid hydrogen, ammonia and methanol.

18/07/2024

CAMBIO CARBON NEUTRAL FUELS

8

Cambio Biomass to Fuel Process

The key concept of the CAMBIO Plant design is to decentralise the production of fuel/ bio bitumen with the plants located close to sources of biomass to avoid long transportation distances of high volume, low energy biomass and to serve the localised region.



The key module of the plant design is the reactor/ microwave generator component with each reactor sized to produce 8,000 tonne per annum of MGO, or further refined road diesel (EN590/ASTM D975), requiring a minimum of 32,000 – 40,000 tonnes per annum of dry biomass dependent on the type of biomass available. Once the volume of biomass available has been ascertained then the plant can be sized appropriately with the plant size increased by combining multiple modules in a daisy chain configuration. This is different from the economy of scale of other approaches as the plant size can be adapted to the availability of feedstock and can be easily increased should the supply of feedstock increase. The final products are “compressed energy” which can easily be transported and stored.



18/07/2024

CAMBIO CARBON NEUTRAL FUELS

9

Cambio Biomass to Fuel Process

The key concept of the CAMBIO Plant design is to decentralise the production of fuel/ bio bitumen with the plants located close to sources of biomass to avoid long transportation distances of high volume, low energy biomass and to serve the localised region.



The key module of the plant design is the reactor/ microwave generator component with each reactor sized to produce 8,000 tonne per annum of MGO, or further refined road diesel (EN590/ASTM D975), requiring a minimum of 32,000 – 40,000 tonnes per annum of dry biomass dependent on the type of biomass available. Once the volume of biomass available has been ascertained then the plant can be sized appropriately with the plant size increased by combining multiple modules in a daisy chain configuration. This is different from the economy of scale of other approaches as the plant size can be adapted to the availability of feedstock and can be easily increased should the supply of feedstock increase. The final products are “compressed energy” which can easily be transported and stored.



18/07/2024

CAMBIO CARBON NEUTRAL FUELS

9

4 Response

4.1 The Low Carbon Liquid Fuels Opportunity

Xatech International focus is on the production of carbon neutral fuels for the maritime industry and renewable diesel for transport and power generation. The provision of these types of advance fuels will assist in achieving emission reductions in these industries without the requirement for large investments in storage, transport and use as the fuel produced via the Cambio Process is a true drop-in replacement for fossil sourced diesel and maritime bunker fuels.

As Australia is a significant importer of diesel fuels (87% of current diesel requirements – page 15 of the consultation report), the development of onshore production of renewable diesel will reduce the costs of imports and provide security in supply against disruption to imports through external circumstances. An added advantage of process such as Cambio Fuels is that the production facilities can be sized and located where sufficient biomass sources are available. This diversification of the industry from a small number of large industrial sized production facilities to a larger number of smaller production units located throughout the regions provides further advantages in resilience of production, reduced distribution costs and regional employment opportunities.

To achieve Net Zero targets the use of Low Carbon Liquid Fuels will be inevitable as a low-cost alternative to fossil fuels. If Australia does not support and develop onshore production,

then Australia will again make the same mistake and become beholden to imports from major corporations and will be vulnerable to disruptions to supply by world events which could have serious consequences for our economy and the ability to defend our country. Australia has significant advantages in knowledge, land use, climate and entrepreneurship that would allow the development of an onshore LCLF Production Industry providing government policies support its development.

It is recommended that policies be provided that support the development of an Australian Low Carbon Liquid Fuels industry and that these policies encourage diversification of ownership and plant location.

4.2 Options to Support an Australian Domestic Low Carbon Liquid Fuel Production

4.2.1 What mechanism do you think would best support a production credit scheme – through the tax system, contract for difference or grant based funding?

The mechanism of support would depend on the type of project and the size of the proponent of the project. For large corporations who generate income from a range of activities incentive through the tax system such as immediate offset of capital expenditure or accelerated depreciation would be a cost effective approach in delivering government support. For small companies such as SME's that do not generate income from a range of activities the appropriate government support would be grant based funding to assist with cash flow and obtaining construction/ operation finance from local financial institutions.

With regards to contract for difference whilst this has merit and would be welcome the downside of such a scheme is that there is no or little incentive to reduce the cost of production as margin to the producer is locked in. For the LCLF industry to be successful the fuel produced must be competitive and any scheme developed to support the industry in its infancy must not disincentivise the need to reduce production costs over the longer term.

4.2.2 Are there other mechanisms Government could consider to deliver production support, other than a production tax incentive or competitive grant based payment? What do you think is the highest priority form of support.

Again the level of appropriate support will depend on the size of the project and the financial capability of the proponent. History indicates that a significant proportion of government support by way of grants/ low interest loans is provided to large corporations, many of which are foreign owned. Whilst this does achieve the construction of flagship projects it does not assist in the development of an Australian domestic capability much of which would be initiated by SME companies.

The development of a diversified LCLF Industry with production facilities located outside of main population centres will require support to be directed to Australian SME rather than major corporations. Our experience in endeavouring to raise finance for a project is that this is very difficult for a small company with local financial institutions reluctant to accept the project risk associated with the development of new technologies. Apart from a grant-

based system the highest priority for support would be a funding facility specifically for SME's either government owned or operated by the commercial banks with the government providing either a tax incentive or risk guarantee for funds loaned by the banks for specific projects. This would assist LCLF projects to be funded and would keep profits from successful projects within Australia.

4.2.3 What are the expected production costs of LCLF in Australia? How would you design production incentives to make production competitive in Australia.

It is accepted that the cost of production of LCLF will be higher than the cost of fossil fuels. This will be due to several factors based on availability of biomass, production costs and cost of finance. It is noted that the cost of facilities for the production of fossil based fuels will have already been recovered over several years whereas the facilities for the production of LCLF will be new.

As above the key to establishing a diversified LCLF Industry will be the availability and finance for the construction of facilities by Australian SME companies and a reduction in input costs. How to tackle high production costs within Australia which are driven by the high cost of energy, be it electricity or gas, is a problem faced by all Australian manufacturing enterprises. Input costs need to be reduced. To provide relief without distorting the energy sector could be achieved by providing additional tax relief for energy input costs such as 150% of actual costs incurred and also the elimination of excise on fuel produced by the facility used by the company for production of the fuel.

4.2.4 What would an expected rate of support be under a competitive grant-based production scheme (contract for difference or fixed grant amount per production unit)?

No Comment provided

4.2.5 How many producers would you expect a production incentive scheme to support in Australia?

This would depend on the intend of the scheme. If the intend is to build a diversified network of production owned and operated by Australian SME's then this could be many. If the scheme is hijacked by large corporations to concentrate ownership of production facilities and fuel supply then this would be few.

4.2.6 How could the introduction of a production incentive scheme affect competition in fuel production and supply markets and also amongst fuel users?

For LCLP production and use to be success for the longterm will require the fuel to be competitive in price and performance. A potential issue with a production incentive scheme that is provided to some and not others is the reduction in competition and potential restriction in development of alternative

production technology that may provide a competitive solution in the future. What incentive scheme is devised and implemented should be targeted to enable the development of new technologies and the construction of production facilities and not for the subsidising of the sell price of the fuel. For industrial and transport users the need to reduce emissions in accordance with stated targets should be the incentive for a switch to LCLF supply with any additional costs for the fuel offset through a reduction to purchase abatement certificates.

4.2.7 What are the expected timeframes for when an industry would be sustainable without support from Government?

The assessment of when government support would be expected to cease would depend on the advancement of sustainable technologies, reductions in production costs and market penetration. For pioneers in the development of production facilities there may be a requirement for ongoing support until their plants could be upgraded to more efficient technologies. For others a sunset clause determined by the extend of market penetration (eg LCLF represent 20% of market) should apply with a pre-determined phase out of support.

4.2.8 How should production support be funded, and how could this best be aligned with the beneficiaries of the production support?

For tax incentives this would be covered by a reduction in tax revenue which however could be offset by increased employment and company taxes. For grants and low interest loans it is difficult to add levies with out increasing the cost of operating businesses in Australia which would then flow through to cost of living increases which is undesirable. A source that maybe considered is a redirection of a portion of the fuel excise currently collected and the implementation of a levy on those industries that do not pay any excise on the fuel they consume. Some consideration could be given to a levy on imported LCLF fuels to support the development of Australian production facilities.

The opportunity exists to develop an LCLF Industry that is not dominated by large, mainly foreign owned corporations that exists with the current fossil fuel supply production and distribution system. To achieve a diversified industry, that will foster the development of innovative methods of production of advanced fuels, the government is encouraged to provide an industry support program that provides opportunities for Australian SME's to obtain finance to build and operate facilities thus keeping the benefits of the Australian Government incentives within Australia.

4.3 The Government is seeking your views on the design of production incentives to appropriately incentivise the production of SAF and renewable diesel and different pathways to produce LCLF

4.3.1 Would production support need to offer a different rate of incentive for SAF and renewable diesel?

As the complexity of production of SAF is greater than the production of renewable diesel then different rates of incentives would be applicable.

- 4.3.2 Would a potential production support program need to prescribe certain proportions of production towards SAF and renewable diesel?

The production of SAF requires more complex production and therefore would typically be undertaken in larger scale plants requiring significant investment. As indicated above renewable diesel can be produced in single purpose plants located at/near sources of biomass. A production support scheme would need to take into account the purpose of the proposed facility and the available market. As an example the proposed SAF plant to be located in Townsville will have the capacity to meet the demands of Cairns and Townsville Airports and therefore there would be no incentive for other plants in the Northern Queensland Region to supply SAF. When entering into a production support program the contract should clearly state what the fuel outputs are covered by the agreement.

- 4.3.3 Would production support need to provide different levels of support for emerging and established production pathways. What are some of the design considerations Government should consider

The outcomes of any policy should be a reliable supply of LCLF at an economic cost. The level of support should be equal across the various technologies. Supplementary support may be necessary to existing production facilities to upgrade to new technologies as they are developed where the new technology lowers production costs to enable the reduction/ phasing out of government support.

- 4.3.4 What policy approaches are technology agnostic, applying to new technologies as they emerge?

As indicated above one of the major impediments for the establishment of a diversified LCLF industry is the difficulties for SME's to access finance for the construction of plants. A scheme to support the availability of finance for SME's at a reasonable cost would be agnostic across different technologies providing the output from the technology meets established criteria for the LCLF Fuel.

4.4 The Government is seeking your views on the following considerations regarding emissions and sustainability criteria.

- 4.4.1 Do you support an emissions reduction threshold being included as part of the eligibility criteria for fuels to receive support under a production incentive program? What threshold would you seek be included in eligibility criteria (for example 50 per cent emissions reduction relative to conventional fuels, or another emissions reduction ration)?

In reality this is two subjects. The production of an advance fuel from biomass such as produced from the Cambio process should be carbon neutral ie the

amount of carbon released into the atmosphere upon use in an engine should equal the amount of carbon sequestered during the biomass growing process. This means that the carbon cycle is in equilibrium. All LCLF should achieve this should the fuel be able to be used in its production form. It should be noted that for the Cambio process the production of bio bitumen as part of the process locks away carbon and therefore the fuel component is actually carbon negative.

Where fuels need to be blended for use then an emissions threshold should be implemented. The level of this threshold will need to be determined by the government in line with Carbon emission reduction policies. As engines are developed to operate on the new fuels then the level of blending would reduce and the threshold could be increased.

4.4.2 Do you think any threshold should increase over time

As new engine technologies are developed and introduced and the standard of LCLF improves then the threshold should increase over time.

4.4.3 Do you think incentives should be included to encourage emissions reductions in addition to a minimum eligibility threshold.

Incentives to encourage emissions reductions using LCLF fuels should be targeted to end users. This type of incentive will increase the market size for the fuels.

4.4.4 If you don't support a threshold, what emissions requirements do you think are better.

A combination of threshold and user incentive for LCLF users should deliver the required outcome for reduced emissions and development of the LCLF industry.

4.4.5 Do you have views on the sustainability criteria under consideration as part of the criteria? What additional or alternative criteria would you want to see form part of the criteria.

Sustainability in the supply of biomass feedstock is important and required to avoid exploitation of natural biomass resources and to minimise the diversion of land use from food production to fuel production. The Cambio process uses both waste biomass feedstock from agricultural and forestry/sawmill processes as well as specially grown crops. The opportunity for farmers is to use marginal land for the growing of energy crops that provides additional income for the farmer and can also be beneficial for the land.

4.4.6 Do you have any other views on emissions and sustainability criteria

No except that all these considerations should be included in the contract for production support.

4.4.7 What are the community benefits associated with LCLF production in Australia?

By diversifying supply of fuel production employment opportunities in regional areas will be enhanced. In addition by having production near demand will result in less movement of transport fuels across large distances which reduces heavy vehicle traffic on the roads improving road safety.

4.5 The government is seeking your views in the design of demand side mechanisms.

4.5.1 What options should the Government consider in its regulatory impact analysis, such as a mandate introduced over time, low carbon fuel standard connected with a trading scheme, a non-binding target or other demand options.

Most companies today have statements that they are reducing emissions and have targets to Net Zero. The use of LCLF is an important part to meet those targets therefore companies should be held accountable to their statements. By ensuring targets are progressively met or progress is monitored and reported then the market for the LCLF fuels will grow. To achieve this the government should consider design rules for vehicles to include the use of LCLF fuels either as a minimum blend or compatible with the fuel standards.

4.5.2 What demand-signals would best drive confidence and certainty for a domestic LCLF Production industry?

The three most important signals would be continuation of government policy, reliability of supply and compliance to quality standards for the fuels. Achieving confidence on the demand side will provide confidence to the producers of the biomass and other feedstocks for the production facilities.

4.5.3 How might demand measures interact with the Safeguard Mechanism for covered facilities?

No comment

4.5.4 How would the application of a mandate affect your business/operations

If the mandate supported the demand for fuel then this would be positive for production facilities.

4.5.5 Should demand-side interventions be designed to only apply to some areas of the market and not others? Which sectors or subsectors should demand side interventions apply? How would the introduction of a mandate or other demand measures affect competition in your industry.

An issue with mandates is that they can interfere with competitiveness in the production of the LCLF fuels thus driving up prices as there is no incentive to reduce prices. Enforcement of a mandate on emissions reductions by

companies would be the best solution for all industries and does not corrupt the market for the production of the fuels.

- 4.5.6 Should design of a mandate, low carbon fuel standard, target or other demand option create requirements for a certain proportion of fuel use be drawn from Australian produced LCLF.

Experience shows that if the government wants an Australian LCLF Production Industry then a requirement to incorporate all or a portion of fuel from Australian sources is **a must** to avoid dumping of imported fuels destroying local production.

- 4.5.7 How would the introduction of demand side measures impact the feasibility of domestic production of LCLF's and what impact would this have on appropriate design of any production support?

Demand side measures would create a market for LCLF fuels in Australia however as indicated previously a robust competitive industry for the production of the advance fuels is the only solution for long term uptake of LCLF regardless of demand measures. The fuels need to be competitive in price against fossil fuels and they must be available through the current distribution network which should also be mandated.

The greatest issue remains the availability of finance for production facilities to be constructed and government support to provide availability of this finance to the SME sector will be a big contributor to the growth of the industry. The government has the opportunity to ensure diversity of supply and avoid the concentration of supply in the hands of multi national companies that dominate the fossil fuel supply and distribution today.