

## Regulatory Story

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### Altona Energy Plc Enters into

#### Coal and Biomass Gasification Cooperation Agreement with Rentech, Inc

Altona Energy Plc, ("Altona" or the "Company") the AIM-listed Australia-based energy company, is pleased to announce that it has entered into a cooperation agreement (the "Agreement") with U.S. based clean energy company Rentech, Inc ('Rentech'), owner of proprietary technologies for the Fischer-Tropsch Process ('FT Process') and the **gasification of biomass to produce Synthesis Gas ("Syngas")**. **The conditioned Syngas, when used with the FT Process and upgrading technology, produces drop-in transportation fuels such as low sulphur diesel and aviation fuels. Rentech's gasification technology can process biomass such as waste renewable organic materials, such as wood or wood bi-products, agricultural crops or wastes, and municipal green wastes.**

The Agreement with Rentech includes working together to evaluate coal and biomass gasification projects for the application of Rentech's technologies in South Australia, where the Arckaringa Project is located. The Arckaringa Project is the **Joint Venture between Altona and CNOOC-NEIA** (a subsidiary of Chinese oil major CNOOC) to evaluate the development of the estimated 7.8 billion tonne Arckaringa coal resource (of which 1.287 billion tonnes is JORC compliant). The current base case for the Arckaringa bankable feasibility study ('BFS') is a 10 million barrel per year coal-to-liquids ('CTL') plant (applying the FT Process) and 560MW co-generation export power facility.

The Company believes that there are significant potential synergies in the evaluation of the gasification of biomass in conjunction with the gasification of coal at the Arckaringa Project, for the production of energy products, including diesel, jet fuel, naphtha and electricity.

Rentech owns proprietary iron catalyzed, slurry bed FT Process, which may be used to produce various FT intermediate hydrocarbon products from Syngas. Rentech also owns the Rentech-SilvaGas process technology for the gasification of biomass to produce Syngas. In addition, Rentech has a strategic

partnership agreement with UOP, LLC, a division of Honeywell International ("UOP"), which provides for UOP to offer access for the use of UOP's technologies for Syngas conditioning and for upgrading FT intermediate hydrocarbon products into commercial grade products such as transportation fuels and chemical grade naphtha.

Peter Fagiano, Executive Director of the Company responsible for Project Technology said: "This is an exciting opportunity to further work with Rentech in evaluating the application of their technology. Rentech's technology is not only suitable for the Arckaringa CTL project but also for biomass derived Syngas for the production of renewable diesel where Rentech also has its own proprietary biomass gasifier. I have been associated with Rentech in the application of their FT Process technology since 2001 and I welcome the opportunity to augment this relationship in evaluating the gasification of biomass in addition to the gasification of coal at Arckaringa and South Australia."

Chris Lambert, Chairman of Altona, commented: "Our agreement with Rentech reflects the increasing demand for the production of transportation fuels through the FT Process, utilising coal and biomass feedstocks. Aviation fuels produced using Rentech's technology and carbon capture and sequestration, has a lower carbon footprint as well as lower regulated emissions compared to traditional aviation fuel. The gasification of biomass presents an alternative method of disposing of waste and reducing the need for landfill solutions. The production of clean energy products from biomass, alongside those produced from the Arckaringa CTL plant would further contribute to South Australia's energy security."

The potential of Rentech's biomass gasification technology was highlighted in November 2010, with the agreement between Rentech and Solena Group, Inc. ('Solena'), a zero emission bioenergy company, regarding the potential establishment of Europe's First Commercial Scale Sustainable Jet Fuel Facility in the UK utilising Rentech's FT Process synthetic fuel technology. Solena's sustainable BioJetFuel project, GreenSky, plans to convert more than 500,000 metric tonnes of waste biomass feedstock *per annum* into a synthesis gas every year, using Solena's proprietary plasma gasification technology. The BioSynGas could then be processed by Rentech's FT Process and UOP technologies into 16 million gallons of sustainable synthetic aviation fuel and nine million gallons of BioNaphtha. It is envisaged that the facility will also export more than 20 megawatts of baseload renewable power to the grid after powering the entire facility with clean electricity.

**\*\*ENDS\*\***

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### **Notes**

Altona Energy Plc is an AIM listed Australian based energy company. Its asset is an estimated 7.8 billion tonne coal resource (non-JORC) in the Arckaringa Basin of South Australia (JORC-compliant: 1.287 billion tonnes). This is considered by the Board to be one of the world's largest untapped energy banks. Per Jacobs Engineering's study for the Company, assuming a 50% conversion of CTL fuels and 50% to synthetic gas ('Syngas'), Arckaringa total coal resources (both JORC and non-JORC) would represent respectively 28% and 29% of current North Sea remaining proven reserves of 10,900mb of oil and 114,800 bcf of natural gas.

Altona has already accomplished a number of key phases in its development:

- The Company has agreed the terms of a joint venture agreement with CNOOC-NEI, a subsidiary of Chinese oil major China National Offshore Oil Corporation, to accelerate the Arckaringa Project towards commercialisation.
- Under the terms of the agreement, CNOOC-NEI will fund the bankable feasibility study ('BFS') for a coal mine and an integrated value-added project.
- The current base case is a 10mb per year CTL plant and 560MW co-generation power facility.
- CNOOC-NEI will also act as the operator and take responsibility for assessing the full potential of the coal resource, in return for a 51% interest in the exploration licences.
- It is envisaged that numerous new additional projects may also be opened up to create a multi-project, multi-national business.

### **Rentech**

Rentech, Inc. ([www.rentechinc.com](http://www.rentechinc.com)), incorporated in 1981, provides clean energy solutions. The Company's Rentech-SilvaGas and Rentech-ClearFuels biomass gasification processes can convert multiple biomass feedstocks into synthesis gas (syngas) for production of renewable fuels and power. Combining the gasification process with Rentech's unique application of syngas conditioning and clean-up technology and the patented Rentech Process based on Fischer-Tropsch chemistry, Rentech offers an integrated solution for production of synthetic fuels from biomass. The Rentech Process can also convert syngas from fossil resources into ultra-clean synthetic jet and diesel fuels, specialty waxes and chemicals. Final product upgrading and acid gas removal technologies are provided under an alliance with UOP, a Honeywell company. Rentech develops projects and licenses these technologies for application in synthetic fuels and power facilities worldwide. Rentech Energy Midwest Corporation, the Company's wholly-owned subsidiary, manufactures and sells nitrogen fertilizer products including ammonia, urea

ammonia nitrate, urea granule, and urea solution in the corn-belt region of the central United States. Rentech has been recognized by Biofuels Digest as one of the "50 Hottest Companies in Bio-energy" and has been named as one of the "Biofuels Digest Companies of the Year" for its innovations and achievements, particularly in aviation biofuels.

## CTL

The quality of the Company's coal is suitable for conversion to synthetic gas ('Syngas'), using existing commercial CTL technologies. The process involves two major stages;

- 1. gasification to produce Syngas rich in hydrogen and carbon,*
- 2. a liquefaction stage where the Syngas is reacted over a catalyst to produce high quality, ultraclean synthetic fuels and chemical feedstocks.*

CTL is a prime example of clean coal technology - the associated combined cycle units produce negligible sulphur oxides, significantly less nitrogen oxides and 10-20% less CO<sub>2</sub> per unit of power generated than a conventional coal fired plant, whilst carbon capture and storage offers the potential to reduce the overall greenhouse gas emissions from CTL to below the 'well to wheel' level of fuels derived from crude oil. The technology is best demonstrated in South Africa, where currently 30% of the country's gasoline and diesel fuel needs are met through CTL plants.

This information is provided by RNS  
The company news service from the London Stock Exchange

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Biofuels produced from organic waste materials are generally considered to be sustainable, even if they use first generation conversion technologies, as they do not impact significantly on land-use, indirect effects, food prices, etc.. <http://www.biofuelstp.eu/waste.html>

### Examples of biofuels from waste streams

**British Airways** has announced (February 2010 and May 2011) it will develop a facility in East London to convert 500000 tonnes of waste per annum to 16 million gallons of jet fuel. **The plant will use Solena's Plasma Gasification (SPG) technology**, which involves a combination of plasma arc gasification and the Fischer-Tropsch process to convert waste into biofuel.

**California Energy Commission** has recently allocated \$26m for [biomethane production projects](#), including a \$4.5m project to demonstrate [production of biomethane from MSW](#).

In December 2011, CHO Power SAS (a subsidiary of [Europlasma](#)) and Sunrise Renewables announced plans to build [4 high temperature plasma gasification facilities at UK docks to convert waste wood into clean syngas](#). The Syngas will be cleaned further and the tar removed, prior to power production via gas engine generators. The company is also developing a demonstration facility in Morcenx, France that will gasify

37,000 tonnes of ordinary industrial waste and 15,000 tonnes wood chips per annum, generating power for EDF.

**The city of Edmonton, Alberta**, has signed a 25-year agreement with GreenField Ethanol Inc and [Enerkem](#) to develop a \$70 million facility for producing 9.5m gallons of ethanol per annum from municipal solid waste (MSW). Sorted MSW is shredded and then fed into a gasifier, where heat and pressure create syngas, which is then cleaned and conditioned (via cyclonic removal of inert matter, tar conversion and heat recovery) prior to catalytic conversion to methanol and ethanol.

In February 2011, [INEOS Bio](#) broke ground at the Indian River BioEnergy Center, US, the first commercial-scale project using INEOS Bio's patented technology, which features a four-step process: gasification, fermentation, distillation and power generation [Source INEOS Bio].

In November 2009, INEOS Bio, UK announced a £3.5m feasibility study for a commercial plant to convert locally generated biodegradable household and commercial wastes into bioethanol and electrical power using a combined thermochemical and biochemical technology. The study, including detailed engineering design, is being supported by a £2.2m grant from the Regional Development Agency One North East and the Department for Energy and Climate Change.

At the heart of the INEOS Bio technology is an anaerobic fermentation step, through which naturally occurring bacteria convert gases derived directly from biomass into bio-ethanol. The process supports high recycling and high landfill diversion rates.



[IMECAL](#) is working with [CIEMAT](#) and [FORD Spain](#) on the PERSEO pilot plant to demonstrate production of bioethanol from MSW. These partners, as well as [AVEN](#), are also operating the ATENEA pilot plant, to demonstrate the conversion of citrus wastes into cellulosic ethanol.

## **Solena and Rentech to partner on synthetic fuel technology for Europe's proposed first sustainable jet fuel facility**

18.11.2010 (GreenAir online) <http://www.airportwatch.org.uk/?p=3184>

Solena Group, which is seeking to build a facility in London to convert waste biomass feedstock into sustainable jet fuel, has signed a letter of intent with fellow US company Rentech to negotiate a licensing deal to the use the latter's proprietary Fischer-Tropsch (F-T) synthetic fuel technology.

The GreenSky facility is due to open in 2014 and will produce around 16 million gallons of jet fuel and 9 million gallons of bio-naphtha a year when fully operational. Solena has identified potential sites and is currently in discussions with various funding sources to secure the finance for the project. British Airways has committed to a minimum 10-year offtake agreement to purchase all the jet fuel produced. Meanwhile, the airline said it has attracted interest from 18 potential suppliers of alternative jet fuel for an engine test programme it is planning with Rolls-Royce.

GreenSky will convert more than 500,000 tonnes of waste biomass material that would have been destined for landfill sites into synthesis gas (BioSynGas) every year, using Solena's proprietary plasma gasification technology. The BioSynGas will then be processed by Rentech's F-T technology into jet fuel. The plant will also export more than 20 megawatts of baseload renewable power to the grid after supplying the entire facility with clean electricity.

"Solena is delighted to have Rentech as a technology provider to what will be Europe's first commercial scale sustainable biojet fuel facility," said CEO Dr Robert Do. "We welcome them to the GreenSky consortium. Rentech's iron-based catalyst F-T process is an ideal fit for Solena's proprietary gasification solution.

"Bringing the two technologies together will allow us to create a truly sustainable drop-in jet fuel with the potential to transform the aviation industry."

Solena says the facility will deliver a total reduction of over 2 million tonnes of CO<sub>2</sub>, including 145,000 tonnes from the replacement of conventional kerosene with its sustainable jet fuel, and claims a saving of 95% in lifecycle emissions.

Rentech is believed to have already completed a preliminary engineering study to help facilitate the integration of its process into the project.

"Airlines will soon be included in the EU Emissions Trading Scheme and Rentech is one of the few companies whose synthetic fuel technology can provide solutions to help reduce the financial and environmental impact of this legislation on the airline industry," commented D. Hunt Ramsbottom, President and CEO of Rentech. "Renewable jet fuel is one of the only options airlines have to reduce the carbon footprint of their fleets."

Solena says it is in the advanced stages of securing equity and investment, and has begun preparing debt financing for the \$280 million facility. The company is looking to close all financing by the end of 2011 and start construction in 2012. It is aiming to complete construction by the end of 2013 and start delivering jet fuel to British Airways in 2014.

Solena is looking to announce its selection of an engineering, procurement and construction (EPC) contractor for the project and provide an update on site selection in early 2011.

**The British Airways agreement is a model that Solena says it plans to replicate with other airlines.**

"We can only say that we have a pipeline of biojet fuel projects with other European and US airlines that are currently under discussion," said Dr Do recently. "These facilities will be identical in design and capacity to the British Airways project."

Meanwhile, the stalled British Airways programme with aero engine manufacturer Rolls-Royce to test alternative jet fuels appears to be back on track. When the two companies sent out Request for Proposals (RFPs) for adequate supplies of potential fuels two years ago there was little response. However, another attempt has yielded over 18 fuel companies interested in supplying the required 60,000 litres of fuel for testing.

<http://www.greenaironline.com/news.php?viewStory=979>

Links:

[Solena Group](#)

[Rentech](#)

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## Technology

**Plasma Gasification and Vitrification Technology** <http://www.solenaq.com/technology>

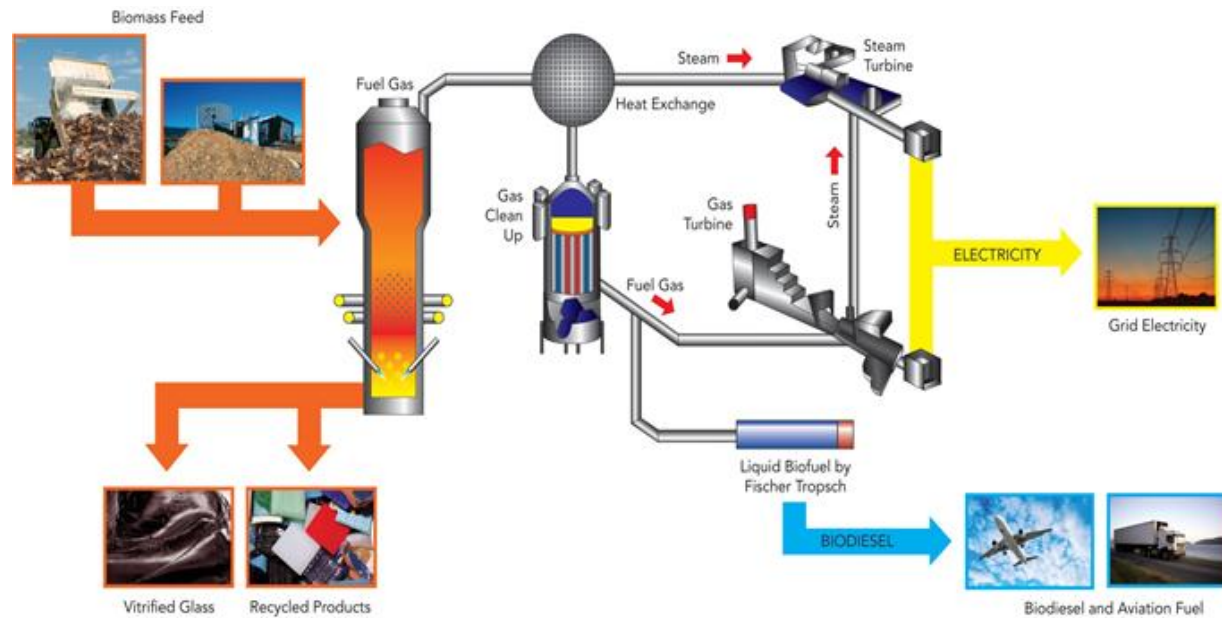
Solena Q NRG uses the proprietary Solena Plasma Gasification and Vitrification (SPGV) technology, which is superior in performance to any other biomass conversion technology in commercial use today. The patented SPGV system and the Integrated Plasma Gasification and Combined Cycle (IPGCC) produce power by the gasification of waste streams into a synthetic fuel gas (biosyngas). The key to the process is the use of plasma that is produced in a controlled environment (using plasma torches developed by NASA in the US) and generates temperatures up to 5,000 degrees Celsius. At these extreme temperatures, in a partially deprived oxygen reactor, there is no combustion but complete molecular disassociation of all organic compounds, converting them into bio-syngas. **This biosyngas is used to produce electric power or second-generation liquid bio-fuels using the well-established Fischer-Tropsch method to produce biodiesel and aviation fuel.**

As the conversion of any carbon-based material is in excess of 99%, the efficiency of these systems is very high. This is a particular benefit of the SPGV process: a highly cost-effective and technically efficient thermal de-polymerization and gasification process. The high temperature heat also melts the inorganic compounds into an inert non-toxic vitrified “slag”, which is five times less leachable than bottle glass. **This slag, comprising less than 7 percent of output, can be safely used as construction material with numerous commercial applications (e.g., road fill, concrete mix, bricks, tiles, etc.).**

Regardless of the type of biomass sources used, there is very minimal negative impact on the environment. Under a US Environmental Protection Agency (EPA) definition, Solena Q’s process is distinct from incineration and thermal waste disposal facilities. Compared to conventional coal-fired and other fossil fuel power plants, Solena Q NRG’s plasma gasification solution produces no air pollutants such as Semi-Volatile Organic Compounds, including dioxins or furans, or any toxic fumes, heavy metals, hazardous ashes, bottom ash, fly ash, or flue gas, as do incinerators or boilers. Solena Q’s technology is a viable, cost-effective way to meet today’s



rigorous permitting regulations and to reap the environmental, societal and economic benefits of combating global climate change.



### Benefits of Solena Q's Technology

- Plasma gasification is not dependent on one source of feedstock, but instead is fuel flexible, offering high availability of base load power
  - Scalable renewable power plants to serve as captive power, or in rural or major metropolitan areas
  - Highly efficient and self-sufficient plants that consume less than ¼ of the energy they produce
  - Reduces dependency on fossil fuels, enhancing energy security and energy independence
  - Creates green jobs in construction and operations of the energy plants
  - Energy positive, producing four times more energy than combustion technology
  - Low greenhouse gas and carbon-neutral emissions
  - No toxic fumes, no heavy metals, dioxins, furans, or hazardous ashes
  - Complete recycling and reuse of waste
  - Utilizing waste for feedstock eliminates the need for landfills and reduces harmful emissions and toxins. Methane from landfills is 23 times more potent as a greenhouse gas than CO<sub>2</sub>
  - No health or public safety problems
  - Lower Operation and Management costs than other “clean” renewable energy processes
- [Projects](#)
  - [Contact Us](#) Copyright © Solena Q NRG 2011

## Qantas, Solena Group to partner in aviation biofuels effort

January 3, 2011



In Australia, Qantas and Solena Group have announced that they expect to finalize a partnership in the next two weeks to determine the feasibility of a Fischer-Tropsch based biofuels plant in Australia that will produce aviation biofuels from waste.

Early last year, Solena inked a \$309 million partnership with **British Airways** to construct a 16 million gallon aviation biofuels demonstration plant in East London. The London project would utilize up to 500,000 tonnes of waste as feedstock for the project.

According to Qantas and Solena, the partners expect to complete a business case by year-end – as airlines struggle to determine the most cost-effective means of coping with new EU regulations on aviation carbon emissions that will take effect in 2012 under the Emissions Trading Scheme.

According to a report in the Guardian, Solena is also negotiating at an early stage with **Lufthansa**, and for a Dublin-based project with a coalition of airlines including **easyJet, Ryanair and Aer Lingus** – with a prospective price tag of \$309 million per project.

[More on the story.](#)

The Digest's Take: A breathtaking expansion of the potential investment and user base for aviation biofuels. It also confirms that carbon regulations drive investment interest from obligated parties, and provides a boost for the supporters of Fischer-Tropsch technologies, which have struggled for years with a reputation of being too capital-intensive in order to manufacture biofuels at commercially feasible per-gallon costs – with costs of \$600-\$1 billion per commercial-scale project previously touted as target construction costs.

The move by Solena and Qantas has also broadened the geography of aviation biofuels, which had primarily been confined to interest in Europe and the US, although Air China, PetroChina and Boeing had made strong preliminary moves towards opening up East Asia for aviation

biofuels, and Air New Zealand had successfully tested aviation biofuels though announcing no commercial-scale biofuels purchases.

<http://www.biofuelsdigest.com/bdigest/2011/01/03/qantas-solena-group-to-partner-in-aviation-biofuels-effort/>

**Partnership between SAS** and Solena to build a Waste-to-fuel plant to be built at Arlanda Airport (Stockholm), modeled on those already budgeted for London-Heathrow (BA) and Sydney (with Qantas). The unit gasifies biomass waste, including municipal waste, and converts to syngas in jet-kerosene synthesis (SPK) and other bio-based energy.

Virgin Atlantic also announced a P / S focused on bio-kerosene: will team with LanzaTech, high bio-tech. U.S. specialist in microbial fermentation for the production in India and China of synthetic jet fuel from industrial waste gases with which supply the operational bases of Delhi and Shanghai. The project involves Boeing, the first demo flight is planned in 18 months

<http://biojetfuels.blogspot.com/2011/10/sas-firma-con-solena-virgin-con.html>

**Nine airlines have signed letters of intent with Solena Fuels to procure up to 16 million gallons of jet fuel** from biomass in California by 2015. The US Department of Agriculture and Energy and U.S. Navy hope to begin award matching grants for commercial biofuel production later this year. John Heimlich, chief economist with Airlines4America, hopes for “meaningful production of bio-jet fuel by the early 2020s.” Heimlich emphasizes that securing fuel availability is as important as price protection.

<http://atwonline.com/article/biofuel-price-relief-still-distant-0417>