
NEWCO2FUELS SIGNS AGREEMENTS WITH TWO GLOBAL CONGLOMERATES

- **NewCO2Fuels reports two key paths to commercialisation:**
 - **MOU signed with one of the world's largest steel manufacturers to explore the opportunity to utilise excess heat from the steel industry to produce fuel**
 - **Establishes collaboration agreement with Europe-based global conglomerate to partner on product development**

Greenearth Energy Ltd ("Greenearth") (ASX:GER) is pleased to announce that its investee company, **NewCO2Fuels Ltd (Israel) ("NCF")** continues its path to commercialisation with the formalisation of two key relationships for a pilot plant and a collaborative R&D effort to be funded by the United States Department of Energy (DOE).

A non-binding Memorandum of Understanding has been signed to assist NCF and the partner company, one of the world's largest steel manufacturers, to establish a path to develop a pilot plant in partnership with one of Europe's largest industrial scale engineering and equipment suppliers. The Memorandum of Understanding outlines the path for NCF and the global conglomerate to build a demonstration and pilot plant in Belgium, with a more comprehensive agreement and formal details to be finalised within a year. Management of NCF believe that this European pilot project would likely be initiated with the next 18 months.

NCF has also commenced a collaboration with a separate Europe-based international conglomerate that is an industrial scale and energy-intensive equipment manufacturer and distributor, in order to apply for a joint project grant from the United States Department of Energy. Following detailed technical due diligence, this collaboration establishes an opportunity for both companies to plan and test their products together in a formal setting. Upon successful testing, the objective is for both NCF and that company to integrate the two products.

These two opportunities, which will be further developed, are a strong indication of the level of interest NewCO2Fuels is now obtaining from global players in the energy production and waste heat markets.

Attached to this release is a recent article published in the Jerusalem Post containing further details. Alternatively, the article can be viewed online at:

<http://www.jpost.com/Enviro-Tech/Israeli-startup-aims-to-harness-excess-industrial-heat-to-transform-CO2-water-into-fuel-350788>

Greenearth Energy Managing Director, Samuel Marks said:

"These strong collaborations with two globally recognised brands, to partner with NCF and the team, are key steps towards commercialisation of the technology. NCF is also in preliminary discussions with additional industry participants, all of significant scale and opportunity, though offering different routes to market. We are extremely pleased with these developments and look forward to sharing more about these and further opportunities as they develop.

These partnerships come at a time when the Northern Hemisphere is looking for paths to address CO₂ emissions and in doing so, requires long term solutions that are financially viable. The attractiveness of NCF's solution is that it aims to generate an additional revenue stream for the businesses, and reduce their CO₂ emissions."

NewCO2Fuels Ltd CEO, David Banitt said:

"After the successful completion of the first stages of proving its technology, NCF is focusing on the next development stages. The efforts are directed to establishing the technology at manufacturing standards and developing the commercial product. Partnering with global industrial players furnishes NCF with complementary engineering know-how and detailed industrial insights. The intimate familiarity with the manufacturing processes, the various considerations of industrial systems' integration and the correct engineering approaches are all vital ingredients for a healthy and efficient product development process. The introduction of these factors into the product design consideration at this stage is crucial for bringing a successful product to the market. We are very pleased with these two collaboration agreements and looking forward to healthy and fruitful relationships."

Samuel Marks

Managing Director

Greenearth Energy Limited

Please direct all enquiries to Samuel Marks, Managing Director, telephone 03 9620 7299.



From challenge to opportunity

About NewCO2Fuels

NewCO2Fuels(NCF) is an Israeli start-up company, which was formed in 2011 by a group of scientists and entrepreneurs with the support of Greenearth Energy Ltd and the Erdi Group. NCF was formed to develop and commercialize an innovative system to profitably produce fuels from CO₂ and water, using renewable high temperature heat from solar or excess heat from industry. The system is based on a technology developed at the Weizmann Institute of Science and exclusively licensed to NCF.

Review video at the attached link for further information -
http://www.youtube.com/watch?v=vH-YZdqB_SE

NewCO2 Fuels Website - <http://newco2fuels.co.il/>

About Greenearth Energy Ltd

Greenearth Energy Limited is a diversified Australian-based renewable energy company with interests in technology-focussed solutions in the energy efficiency and CO₂-to-fuel conversion markets as well as conventional geothermal resources in Australia and the wider Pacific Rim.

Greenearth Energy Ltd - <http://www.greenearthenergy.com.au>

From challenge to opportunity

Rehovot start-up aims to use excess industrial heat to transform water, CO₂ into fuel

• By SHARON UDASIN

Excess heat squandered in industrial production processes, as well as the carbon dioxide and water vapors emanating from their chimneys, will soon be put to positive use by an Israeli start-up.

The Rehovot-based NewCO₂Fuels (NCF) plans to use the extreme heat released by factories such as steel, ceramics, glass and gasification plants – where residual heat temperatures rise to 1,450°C – to drive an innovative fuel production process, the company's CEO, David Banitt, told *The Jerusalem Post* this week.

Through a process of electrolysis, catalyst- and membrane-laden cells capture the CO₂ and water these factories emit, generating the highly potent syngas (a mixture of hydrogen and carbon monoxide) and a separate stream of oxygen.

While the heat used to drive this process originally came from solar sources – and still does in the company's proof-of-concept laboratory at the Weizmann Institute of Science – the scientists feel that recycling the energy from the process itself would make this configuration a more marketable mechanism.

"What we found out is, there's a lot of heat in the industry not used, and we could use that heat as well to drive our process," Banitt said. "We are moving more to exploit the high temperature excess from those industries."

NCF acquired the original technology in 2011 from Yeda, Weizmann's commercial branch. The technology was developed by Prof. Jacob Karni's laboratory in the department of environmental sciences and energy research, where Karni heads the institute's Energy Center and supervises solar programs. His research, which he conducted in partnership with Dr. Avner Rothschild from the Technion-Israel Institute of Technology, received a \$200,000 grant from the Silicon Valley-based Israel Strategic Alternative Energy Foundation in 2010. Karni serves as a consultant to NCF, while the company continues to fund research at laboratories in the Weizmann Institute that are further developing this technology.

NCF receives financial backing from the Australian firms GreenEarth Energy Ltd. and Erdi-Fuels, and is seeking additional investors.

Logistically the process involves a reactor made up of a single apparatus of cells, each with a membrane sandwiched between two catalyst layers, Banitt explained. The carbon dioxide enters and splits due to the extreme heat, with carbon monoxide exiting through one pipe and oxygen through a second. The same process is applied to water, yielding hydrogen and oxygen. The hydrogen and carbon monoxide can then come together to form syngas, which in turn can be converted into fuels like methanol or plastics.

"You can look at it as a reverse combustion," Banitt said.

Although it has already been proven that the process can be powered by the excess industrial heat, NCF's proof-of-concept laboratory in the Weizmann Solar Tower runs primarily on solar heat, Banitt told the *Post* during a tour of the tower laboratory. The solar heat generation occurs via parabolic dishes, which reflect the light they capture to a reactor high up in the tower. This allows for extremely high temperature generation.

An advantage of using released industrial heat



THIS PROTOTYPE produces syngas, which can be converted into fuels such as methanol. (NewCO₂Fuels)

rather than solar energy is that the former is released 24 hours a day, while solar energy heat can only be generated between eight and 10 hours daily, Banitt noted. In addition, he said, most of the production cost in the former case is associated with the capital cost of the plant.

Looking at the steel, glass and ceramics industries, scientists at NCF realized that companies were wasting a lot of money: In order to produce their chimneys out of cheap materials rather than out of ceramics capable of withstanding extreme heat, the factories would pump in cold air to cool down the hot air released, according to Banitt.

"We tell them, give us this heat, and we will produce fuel from it," he said. "They have heat – they do nothing with it right now."

Insisting that the process was profitable, he stressed how huge the market was for syngas derivatives such as methanol, olefines, gasoline, diesel, ammonia, urea and many other chemicals. As an example, his company calculated that by generating methanol from the process, a plant could have a four-year payback on its investment, he said. In addition, he noted, the process operates with very high energy efficiency: The efficiency rate from heat energy to chemical energy in generating syngas is 40%.

"This is the key to being profitable," he asserted.

During the conducted test runs, NCF found that out of 15 kg. of CO₂, the company's small-scale prototype could produce 10 kg. of carbon monoxide, he explained.

In terms of NCF's path to commercial operation, Banitt said the company had signed a memorandum of understanding last week with two companies in Europe – the largest steel manufacturer in the world, and an engineering and equipment supplier. Together, the team plans to build a demonstration and pilot plant in Belgium, and an official agreement will be solidified within a year, he said. He added that if all went as planned, the European project would kick off in about 18 months.

In addition to taking part in this understanding, NCF has agreed to collaborate with an international company that focuses on energy-intensive equipment, in order to apply for a project grant from the United States Department of Energy. The two firms plan to test their products together, and upon success, to integrate the two, Banitt said.

"Now that we are getting more and more reassurance from the market that what we are proposing to them has real economic potential, we are more confident that we are doing the right thing," he added.