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ASIA EDITION

Aquaflow on the path to commercialize biofuels

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Aquaflow, a clean energy company, is working towards making refined next generation biofuels a commercial reality within three years. The New Zealand-based company has executed a technology cooperation agreement with CRI Catalyst, a US firm. CRI Catalyst has exclusive global sub-licensing rights to IH^2 technology. The technology, developed by Gas Technology Institute (GTI) in the US, allows catalytic thermochemical conversion of biomass directly into renewable hydrocarbons. It uses customized proprietary catalysts developed by CRI Catalyst. With the technology, different varieties of feedstock, such as wood, algae, straw or other solid wastes, can be used to generate biofuel.

In an email interview with *BioSpectrum*, Mr Nick Gerritsen, director, Aquaflow, talks about how Aquaflow plans to produce commercially viable biofuels in three years.

Tell us about the unique Aquaflow technology that uses algae.

Mr Gerritsen: Aquaflow has developed significant expertise in efficient wild algae biomass growth and harvesting as well as in technology to mix algae with other biomass to create "multi-biomass" feeds. We have successfully tested these systems at the pilot stage. We have found the algae and "multi-biomass" feeds to produce high yields of renewable hydrocarbon fuels and to blend stocks using the catalytic thermochemical IH^2 conversion process developed by the GTI in the US.

These "multi-biomass" feedstock may incorporate wood, algae, agricultural straws and other solid wastes. The IH^2 technology converts biomass directly into renewable hydrocarbons spanning the gasoline, jet and diesel range using customized proprietary catalysts developed by CRI Catalyst. Where algal biomass is a feedstock option, remediated water is a significant additional benefit.

The renewable hydrocarbon products from IH^2 process are ready to use as transportation fuels and blend stocks without

further upgrading. It's a one-stop bio-refinery.

How will the IH2 technology help Aquaflow develop a sustainable biofuel?

CRI supplies both the customized proprietary catalyst systems for IH^2 technology and the license for the process technology. The IH^2 technology converts a broad range of biomass, including algae, wood, agricultural residues, municipal solid wastes directly into renewable hydrocarbons spanning the gasoline, jet and diesel range. The fuels and blend stocks produced using the technology have been calculated to be nearly 'carbon-neutral' with greater than 90 percent reduction in greenhouse gases relative to traditional fossil fuels (according to Professor David Shonnard at Michigan Technological University).

The IH^2 technology and catalyst available from CRI complements Aquaflow's "multi-biomass" technology by ensuring high conversion of algal, wood and cellulosic materials into gasoline, jet and diesel range hydrocarbon fuels and blend stocks.

Additional by-products from the IH^2 process include high pressure steam, fresh water, bio-char, renewable CO_2, an aqueous concentrated ammonia or ammonium sulphate fertilizer and residual inorganic material (ash). Each of these valuable streams are potential sources of revenue from a combined Aquaflow "multi-biomass" front end and CRI catalyst with licensed IH^2 technology back-end system.

How is this technology superior to other technologies currently used by other companies to generate biofuel?

The Aquaflow technology uses waste products as biomass. It uses naturally-occurring algae that does not need them to be genetically-modified or fed with food sources. We will be able to produce a blend stock that doesn't need further refining. This gives our process a huge competitive advantage over other forms of renewable fuel production.

This technology doesn't need carbon taxes or subsidies to be competitive. The IH^2 technology produces its own hydrogen and a surplus of water to be self-sufficient. The plant can also operate in a stand-alone configuration wherever there is sufficient biomass feed for conversion. Consequently, this can run on a small scale in a regional setting. This is a robust and highly integrated technology package that can leapfrog other biomass to biofuel technologies because it goes straight to blended fuel stock and avoids intermediate pathways.

Please share with us the economics of producing fuel using your technology.

We believe that once we get a refinery up and running (two to three years away), we will be able to produce fuel from multi-biomass. This fuel is competitive with the current price of fossil fuels. Plus, we can achieve significant greenhouse gas reductions in comparison to fossil fuels.

In one refinery, we are aiming to process up to 1,000 tonnes of biomass per day to yield between 250,000 to 300,000 liters of diesel, petrol and jet fuel per day. At the appropriate economies of scale, it is estimated that these hydrocarbons will cost less than $2 per gallon. The hydrocarbons would then get blended with traditional fossil-derived fuels. The final sales price will depend on the selling price of conventional gasoline.

Please highlight the important points of the partnership with CRI?

The companies have worked together previously under a joint testing and evaluation agreement to bring together Aquaflow's unique capability with algae and CRI's license to IH^2 technology to prove their commercial effectiveness in producing hydrocarbon fuels. The agreement with CRI is the vector for Aquaflow to commercialize its global project pipeline with the backing of CRI Catalyst, licensed IH^2 technology and global network. Aquaflow and CRI have developed a strong cooperation with a shared vision of the future of renewable fuels.

What is the current status of the project on producing biofuel using Aquaflow and CRI technologies?

Plans to produce 5-200 tonnes of biofuel per day using IH^2 technology are currently underway. Aquaflow is currently engaged with some entities, both New Zealand-based and international, to develop renewable fuel projects in New Zealand and other international locations, to produce commercial-scale renewable fuels using a combination of Aquaflow "multi-biomass" feed and CRI's catalyst with licensed IH^2 technology.

What are the future plans of Aquaflow?

To work with partners to develop refinery infrastructure over next few years and to create a module that can be applied nationally and internationally. Aquaflow started out with a focus on making a contribution to New Zealand's fuel requirements, so now it's fantastic that we also have an opportunity to contribute globally.