Australian Securities Exchange Announcement
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Scoping study confirms robust commercial path for Glycell™process

Leaf Energy Ltd **(ASX: LER) ("Leaf" or "the Company")** is pleased to announce the results of its class 5 scoping study for the Company's Glycell™ process.

Managing Director Ken Richards said, *"The release of the scoping study results is another major milestone for Leaf Energy, underpinning our future in converting plant biomass into valuable, sustainable products and giving Leaf a clear commercial path forward.*

"The process's attractive operating costs and relatively low capital requirements confirm a robust commercial return for the Glycell™ process and projects a healthy estimated after tax Internal Rate of Return (IRR) for the base case of the process," he said.

Leaf's Glycell™ process is a simple, innovative and effective process that operates at low temperature and pressure using a waste biodegradable reagent, glycerol, to break down plant biomass into its constituent parts: cellulose, hemicellulose and lignin.

The competitive advantage of Leaf's Glycell™ process is that it is expected to have significantly lower capital and lower operating costs than more commonly used processes, such as steam explosion and therefore can operate at virtually any scale. This will open up areas with suitable biomass that was previously deemed to be too small to undertake the commercial production of cellulose and related products.

Commercialisation Path

Leaf 's initial pathway to commercialisation for the Glycell™ process is based on a hardwood feedstock with a cellulose output. Cellulose is a natural fibre that is a major part of plant biomass and is a building block for many bio-based products used in industrial, food, cosmetics and pharmaceutical applications.

International demand for cellulose is rapidly outstripping supply as more companies seek alternative options to replace oil derived products with products made from plant biomass. Leaf's low cost, low capital Glycell™ process positions it well to seek to take advantage of the global demand for cellulose, which has been projected to increase by 84% by 2030.

The Class 5 concept scoping study has confirmed the economic viability of the Glycell™ process for an application based on hardwood input and a downstream cellulose output. It is important to note that Leaf has not built a plant nor operated a plant of this scale and the scoping study is an estimation of potential outcomes, which can be used to assess collaborative and stand alone opportunities for production.

Scoping Study

The model for the scoping study was prepared by Dr. Les Edye a principal of BioIndustry Partners. Dr Edye is an Adjunct Associate Professor of Biofuels and Biorefineries at Queensland University of Technology, has a background in carbohydrate chemistry and consults on the conversion of lignocellulosics to fuels and chemicals, biorefining for total biomass utilisation biomass production and logistics, and other related areas. He currently holds the position of National Task Leader, International Energy Agency, Bioenergy Task 39 – Commercialising Conventional and Advanced Liquid Biofuels from Biomass.

The capital cost was based on a quotation for supply of equipment from Andritz Inc. (a globally leading supplier of equipment, plant and services for the paper and pulp and other industry).

The model was independently reviewed by a US based process engineering consulting group DWH Process Consulting, led by Dr. David Humbird PhD P.E. Dr Humbird has previously worked for the US National Renewable Energy Laboratory (NREL) and has considerable experience in this particular field.

The scoping study model was based on the underlying chemistry of the process and looks at the mass balance of inputs and outputs in detail, as well as the estimated capital and estimated operational costs of the Glycell™ process.

Capital costs

The base plant and infrastructure capital cost was estimated at A$18.4m when co-located at a site that can provide the ability to draw on utilities, including steam.

Given the nature of a Class 5 cost estimation the total capital has a number of engineering factors applied to the base plant costs to allow estimation of unknown costs such as site works, project management and design (engineering, procurement and construction (EPC)), contingency, profit and commissioning. These were estimated at 78% of the base costs and when added to the base plant cost the total capital expenditure was estimated at A$32.8m. This total capital cost was the figure used to calculate the after tax IRR for the project.

Leaf Energy will look to finance a plant of this size through partnerships with biomass owners, end users or other interested parties.

Model Inputs and Outcomes

The scoping study was based on a hardwood feedstock and a cellulose output at an input rate of 40 tonnes per hour (20 tonnes dry weight). The following are the key input assumptions for the base case and outcomes estimated from the Scoping Study:

- Base case input costs of $100 per dry tonne of hardwood and $230 per tonne of glycerol
- Production cost of $400 per tonne of raw dried cellulose pulp
- Cellulose price $550 per tonne (hardwood pulp price)
- Estimated capital cost of $32.8m
- AUD – USD exchange rate of $0.94
- Estimated after tax internal rate of return for this base case of 42%

Sensitivity Analysis

A sensitivity analysis of the after tax IRR was conducted using changes in the two key variables; biomass input price and cellulose sale price. The IRR sensitivity was positive for all but one of the scenarios ranging from -5% with Biomass cost per BDT (Bone Dry Tonne) at $120 and Cellulose price (per tonne) at $450 to 61% with Biomass cost per BDT at $90 and Cellulose price (per tonne) at $600.

Glycerol usage

A key feature of the modeling has been the assumption that the glycerol is consumed as part of the process. At the input price used and based on the studies assumptions, glycerol makes up approximately 33% of the operating cost.

Leaf is progressing methodologies to recycle the glycerol and whilst this would add to the capital cost of the process it would reduce the operating costs significantly.

Leaf is also looking at alternative ways to add value to the liquid output of the process, which includes the glycerol, a significant part of the hemicelluloses and a smaller fraction of lignin. It is too early to include this work in an economic analysis but the aim of the work is not just to neutralise the cost of glycerol by recycling it, rather to turn it into another revenue stream.

Class 5 Estimate

Estimates are prepared during the development of a project in parallel with the various project development stages. A class 5 estimate scoping study is the first level estimate under AACE (Association for Advancement of Cost Engineering www.aacei.org) guidelines and is undertaken to provide preliminary economic evaluation or comparison of alternatives. It is used to indicate whether additional study or engineering is warranted. Typically, it has a stated accuracy of -30% to +50%.

Quality assurance

The model was quality assured by QMI Solutions, who analysed the construction of the formulas and that the model functions as intended. QMI Solutions is a Queensland based organisation dedicated to improving the growth, skills, performance, innovation and capability of businesses Australia wide.

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About Leaf Energy Ltd
In virtually every industry consumer demand for greener more natural products is fuelling a surge of interest in bio-based alternatives to replace oil based products. Leaf Energy's Glycell™ process is a simple, innovative and effective process that operates at low temperature and pressure using a waste, biodegradable reagent, glycerol, to break down plant biomass into its constituent parts: cellulose, hemicellulose and lignin. Cellulose is a critical building block for many bio-based products.

The operating conditions of the Glycell™ process means it has significantly lower capital costs and significantly lower operating costs than rival, currently used, processes such as steam explosion and can produce low cost cellulose at virtually any scale. Leaf Energy's pathway to commercialisation is tangible and realisable and initially targets the production of cellulose derivatives that have applications in industrial (drilling mud), food, nutraceutical and pharmaceutical markets. We are currently planning the scale and location of our first demonstration plant. www.leafenergy.com.au