



## LEAF RESOURCES LIMITED

Sustainable products from plant biomass

28<sup>th</sup> September 2015

Australian Securities Exchange Announcement

### Monaghan Biosciences and Leaf Resources sign Memorandum of Understanding (MOU)

#### Highlights

- The MOU objective is a bankable feasibility study for a renewable chemical project.
- Project will be based on spent mushroom substrate and will showcase Leaf Resources' Glycell™ process and Monaghan Biosciences' enzyme technology.
- Initially a 50/50 joint venture between the parties.
- The aim is to have cellulosic sugars produced and converted to a renewable chemical.
- The project is potentially an important advance in the cellulosic space.

The Directors of Leaf Resources would like to advise that a Memorandum of Understanding has been signed with Monaghan Biosciences and their parent company Monaghan Mushrooms to establish a viable renewable chemical project utilising Monaghan Mushroom's spent mushroom substrate as feedstock and Monaghan Biosciences' enzyme technology integrated to the Leaf Resources Glycell™ cellulosic sugar platform.

Leaf Resources' Glycell™ process uses glycerol as a catalyst to make cellulosic sugars from biomass such as waste from agriculture. These sugars are a key intermediate used in the production of (renewable) bio-chemicals. This project could enable significant cost advantage sugars as alternatives to fossil fuel-based industry processes.

Monaghan Biosciences is part of the Monaghan Mushrooms Group. Monaghan Biosciences have a skilled team of highly qualified research and development scientists with commercial and industrial experience, working in state-of-the-art facilities, located in Tyholland, County Monaghan in Ireland developing enzyme technology for several industry segments.

#### Background to the MOU

In January 2015 Monaghan Biosciences and Leaf Resources signed a Material Transfer Agreement under which Leaf Resources provided cellulose produced by the Glycell™ process for testing with Monaghan Biosciences' enzyme technology.

The results of the testing showed that Monaghan Biosciences' enzyme technology in combination with Leaf Resources' Glycell™ pretreatment produce superior performance versus other commercial enzymes and pretreatments. These results were encouraging and initiated further discussions between the parties as to how they could be commercially exploited.

Monaghan Mushrooms produces a significant amount of spent mushroom substrate from their operations each year and both Monaghan Biosciences and Leaf Resources believe that this material could be an integral part of a viable biobased project. Most of Monaghan Mushroom production sites are in Europe so the likelihood of a renewable chemical project being located in Europe is high.

For personal use only



## LEAF RESOURCES LIMITED

Sustainable products from plant biomass

Leaf Resources and Monaghan Biosciences have now progressed discussion to the point where an MOU has been signed. Under this MOU both parties will initially own 50% of the project but as the project develops this level of ownership may be reduced to allow other parties to assist in the financing of the project.

The companies will explore options on processing of the cellulosic sugars produced into renewable chemicals. Both companies will look at the many possibilities that exist and open discussion with third parties about licensing/Joint Venture for their conversion technologies into the project. Leaf Resources in particular is in discussion with several companies but will look at all suitable partners. An off-take contract for the renewable chemical produced will be sought to deliver a complete project that is financeable.

### Project work

The MOU details the preliminary work leading to a bankable feasibility study. Preliminary work will include testing the spent mushroom substrate biomass, moving to pilot scale process development and enzyme optimization. Data generated will be applied to engineering design and modeling.

Detailed work on the potential end products for C5/C6 sugars, lignin and the potential for valorizing the spent glycerol will be undertaken as well as investigating potential contracts for the sale of these end products. Work will also be done on potential locations and supply of glycerol.

### Budget

The budget for the initial phase of the project, getting the data ready for the bankable feasibility study is AUS\$300,000, which will be shared equally. The budget and funding of the bankable feasibility study will be decided later and may involve government funding or the addition of other investors.

### Other details

Both Monaghan Biosciences and Leaf Resources have provided a free option to license their respective technologies on terms to be agreed but based on the economic benefit against the NREL dilute Acid Benchmark. Monaghan Mushrooms have agreed to provide a long term supply contract for spent mushroom substrate for the project.

Michael Crossin, Chief Operating Officer of Monaghan Biosciences said:

**“We are excited to be working with Leaf Resources. Their technology has been shown to be a step above alternative technology”.**

Leaf Resources Managing Director Ken Richards commented:

**“This is potentially a great partnership with Monaghan Biosciences. Not only does our process and their enzyme technologies work well together, but the two companies provide complementary skills to the Joint Venture. The ability to progress a project from biomass through to renewable chemical is exciting and will be an important project in the cellulosic space.**

**Leaf Resources is benefiting from the hard work of the last eight months having recently announced MOUs with two other parties. All three projects utilise different biomasses and therefore showcase the versatility of the Glycell™ process.”**



## LEAF RESOURCES LIMITED

Sustainable products from plant biomass

### ENDS

#### **About Leaf Resources Ltd (ASX: LER)**

Leaf Resources is commercialising the Glycell™ process.

The Glycell™ Process is an innovative technology that uses a low cost, recyclable, biodegradable reagent glycerol, in a simple process that breaks down plant biomass into lignin, cellulose and hemicellulose at low temperature and pressure. The cellulose is then converted to cellulosic sugars through enzymatic hydrolysis and the lignin, hemicellulose and glycerol become valuable co-products.

Cellulosic sugars are a major feedstock for green, renewable biobased chemicals, bioplastics and biofuels, products whose markets are multi \$billions and fast growing. Many biobased products can now economically replace petroleum based products.

The Glycell™ process can produce cellulosic sugars at under \$50 per tonne when co-products are included. This compares with \$220 per tonne for sugars produced from the conversion of corn starch, the cheapest alternative and \$280 per tonne for raw sugar.

By dramatically reducing the cost of the main feedstock for bio based chemicals, plastics and biofuels, the Glycell™ process has the potential to change the face of global renewable production.

#### **Contacts:**

Ken Richards (Managing Director)  
Jay Hetzel (Chairman)

M: +61 403 385 051  
M: +61 413 045 478

For personal use only