LEAF RESOURCES LIMITED

Sustainable products from plant biomass

Glycell™– Leaf Resources' pretreatment process for the conversion of lignocellulosic biomass to fuels and chemicals

Les A. Edye, Alex Baker and Marc Sabourin

37th Symposium on Biotechnology for Fuels and Chemicals, April, 2015

Forward Looking Statements

This presentation does not constitute, or form part of, an offer to sell or the solicitation of an offer to subscribe for or buy any securities, nor the solicitation of any vote or approval in any jurisdiction, nor shall there be any sale, issue or transfer of the securities referred to in this presentation in any jurisdiction in contravention of applicable law. Persons needing advice should consult their stockbroker, bank manager, solicitor, accountant or other independent financial advisor.

Certain statements made in this presentation are forward-looking statements. These forward looking statements are not historical facts but rather are based on Leaf Resources current expectations, estimates and projections about the industry in which Leaf Resources operates, and its beliefs and assumptions. Words such as "anticipates," "expects," "intends," "plans," "believes," "seeks," "estimates," "guidance" and similar expressions are intended to identify forward-looking statements. and should be considered an at-risk statement. Such statements are subject to certain risks and uncertainties, particularly those risks or uncertainties inherent in the process of developing technology and in the endeavour of building a business around such products and services. These statements are not guarantees of future performance and are subject to known and unknown risks, uncertainties and other factors, some of which are beyond the control of Leaf Resources, are difficult to predict and could cause actual results to differ materially from those expressed or forecasted in the forward-looking statements. Leaf Resources cautions shareholders and prospective shareholders not to place undue reliance on these forward-looking statements, which reflect the view of Leaf Resources only as of the date of this presentation. The forward-looking statements made in this presentation relate only to events as of the date on which the statements are made. Leaf Resources will not undertake any obligation to release publicly any revisions or updates to these forward-looking statements to reflect events, circumstances or unanticipated events occurring after the date of this presentation except as required by law or by any appropriate regulatory authority.

Outline

- Glycell^{TM} Cellulosic Sugars (CS) Process
  - Glycell at pilot scale
- Saccharification kinetics
- Cellulosic sugars production and fermentation tests
- Glycerol recovery by SMB chromatography
- Approaches to market
  - Pulp mill expansion, Retrofit, bolt-on, Greenfield
- Key technological advantages

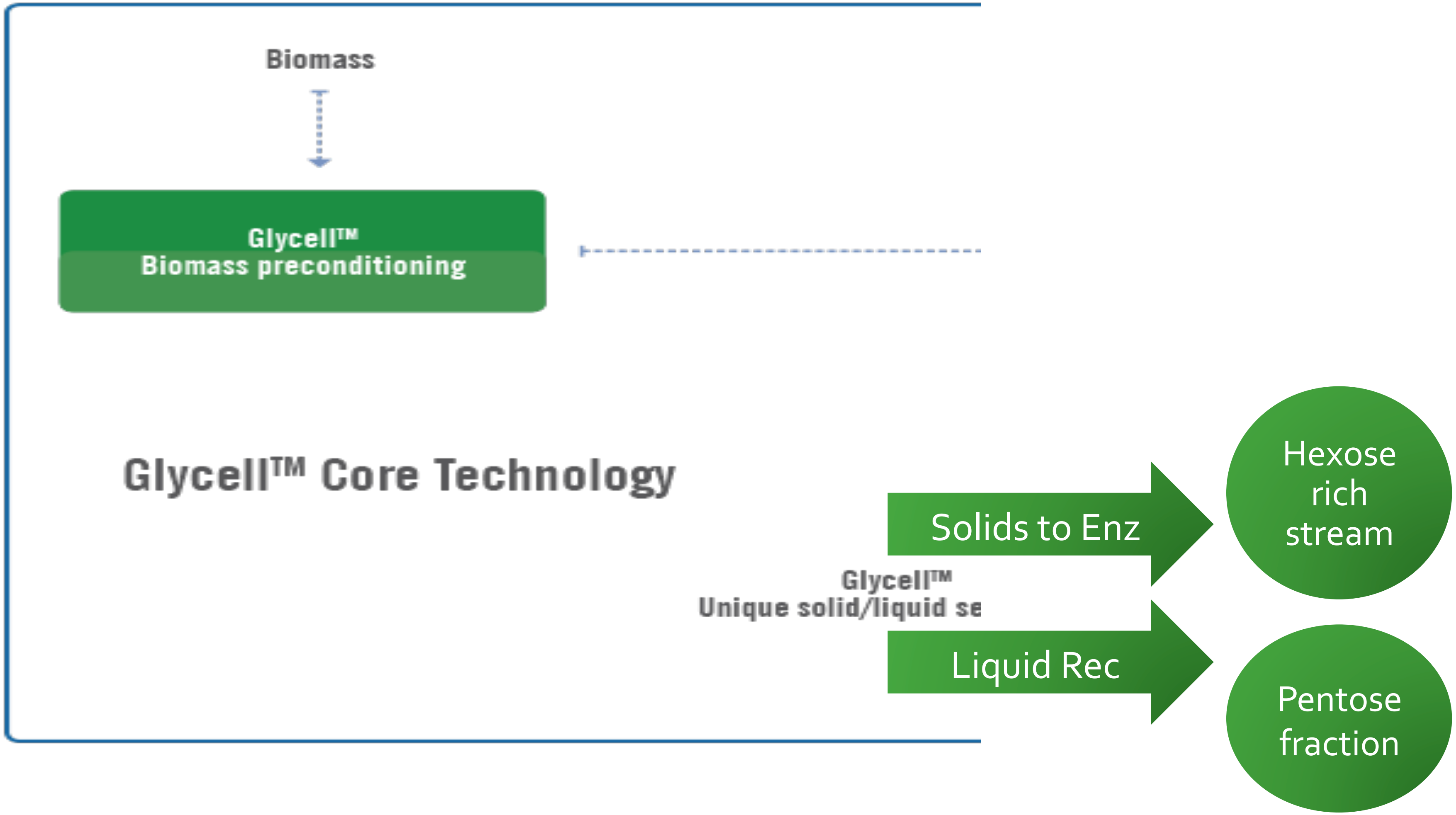
Leaf Resources

Active participants in the advanced bio-economy

- Leaf Resources Limited (ASX:LER) is focused on making sustainable products from plant biomass.
- We offer an advanced technology package for breaking down plant derived biomass to useful, sustainable, renewable and biodegradable products.
- Leaf Resources' innovative Glycell™ is a disruptive process technology that can reshape the economics of using large scale biomass resources as a replacement for petroleum derived products.

Leaf Resources Glycell™ CS Process

LEAF RESOURCES LIMITED
Sustainable products from plant biomass



Glycell at pilot scale

- Several trials at the Andritz pilot plant facility in Springfield since November 2013
- Continuous production rates of 3-5 BDT per day
- > 40 independent pilot scale tests totalling over > 20 tonnes (dry basis) biomass
- Data presented here do not represent proprietary optimised conditions, but are chosen from pilot plant data to demonstrate the technical advantages of the Glycell process.

Biomass flexibility

Poplar

Oil Palm fibre (EFB)

Bagasse

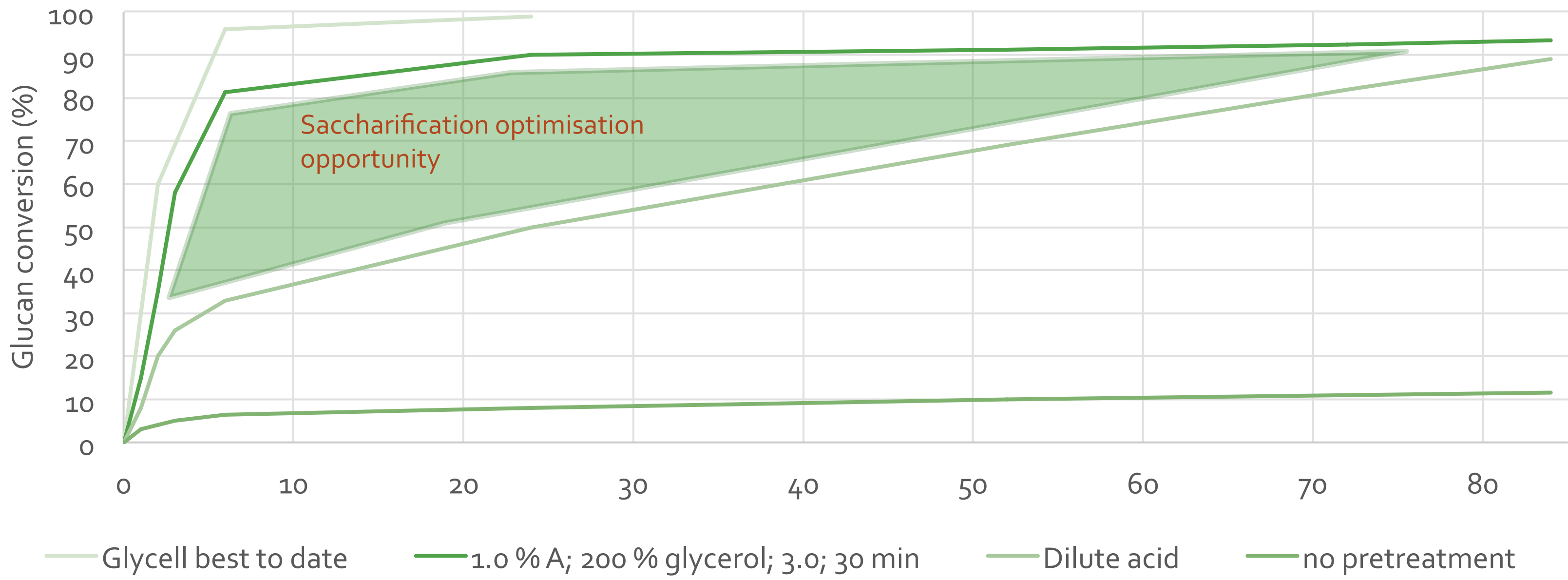
Eucalyptus

Andritz Pilot Plant, Springfield OH

Improved saccharification kinetics

Significant opportunity to reduce enzyme load and size of reactors

LEAF RESOURCES LIMITED
Sustainable products from plant biomass



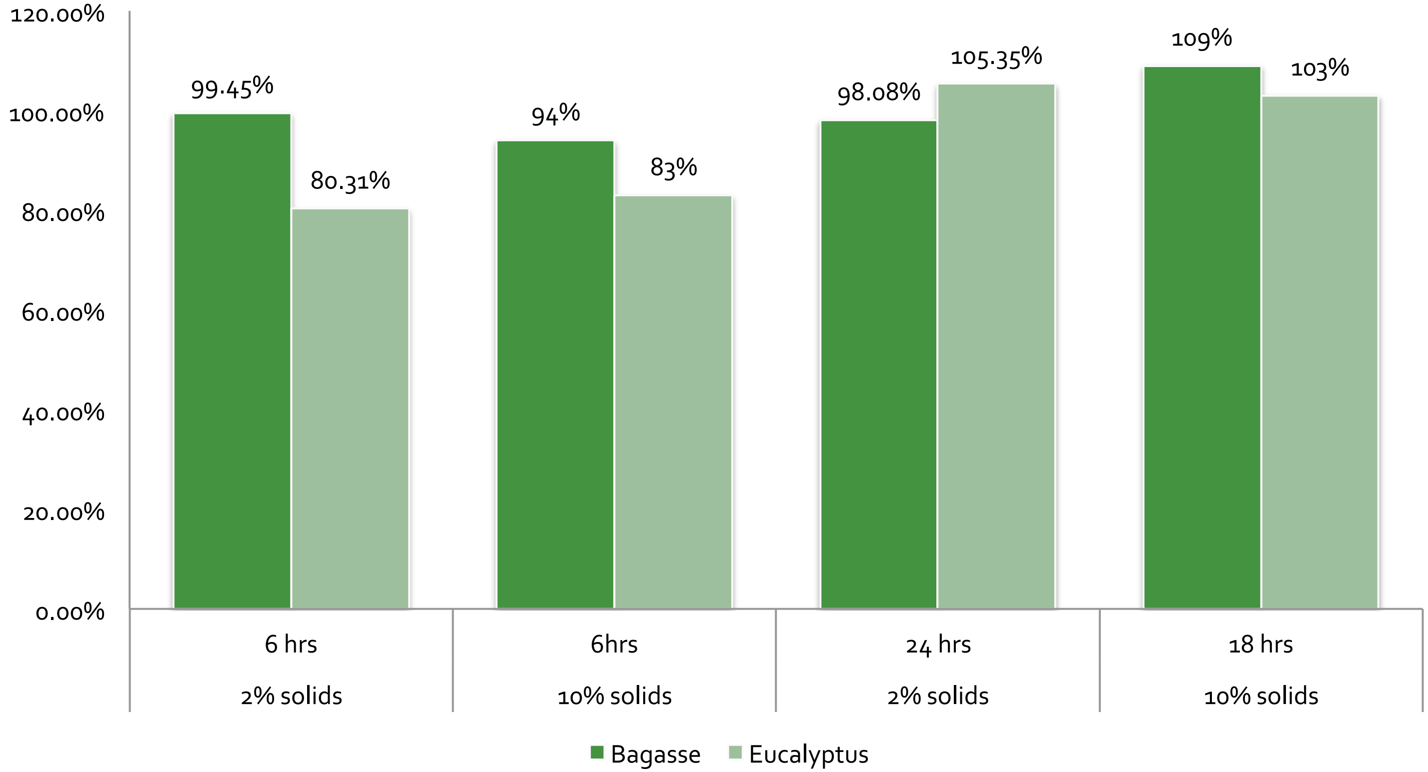
- Dilute acid – NREL design target (2013) – 0.9 % acid; 2.3 liquid:solid; 5 min – 90 % hydrolysis of cellulose after 84 hours with enzyme load of10 mg/g cellulose
  - ca. 5 % conversion of xylan to furfural
- Glycell best to date – Hardwood – 0.8 % acid; 160 % glycerol; 2.4 liquid:solid; 30 min
  - No measurable furfural formation

Effects on solids loading on Glycell pretreated biomass

LEAF RESOURCES LIMITED
Sustainable products from plant biomass

- pH 5.0 - 50°C optimal reaction temperature
- 2 & 10% solids
- 20 mg/g glucan enzyme dose tested
- Testing on Glycell bagasse and Eucalytus pretreated samples
- Confirmed washing effect

Enzymatic efficacy sustained at higher solids



- pH 5.0; 50 ⁰C; 20 mg/g enzyme
- bagasse and eucalyptus at 2 and 10% solids

High solids saccharification

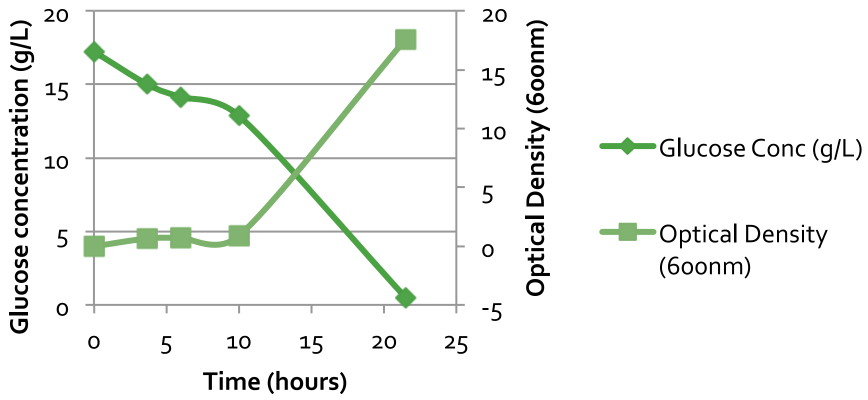
- High solids saccharification studies at Andritz (Glens Falls, NY)
- Glycell Pretreated poplar chips
  - Glycell - 1.15% acid on biomass db, 55% glycerol
  - Dilute acid - 1.07% acid on biomass db, no glycerol
- 15 % solids, pH 5.5, CTEC 3 at 12 mg/g of cellulose
- Initial cellulose saccharification rate of the Glycell pretreated biomass was 3.0 times that of dilute acid pretreatment.
- Final yield of monosaccharides from the Glycell pretreated biomass was 166.6% that of dilute acid pretreatment.

Fermentation testing - 2l biostats

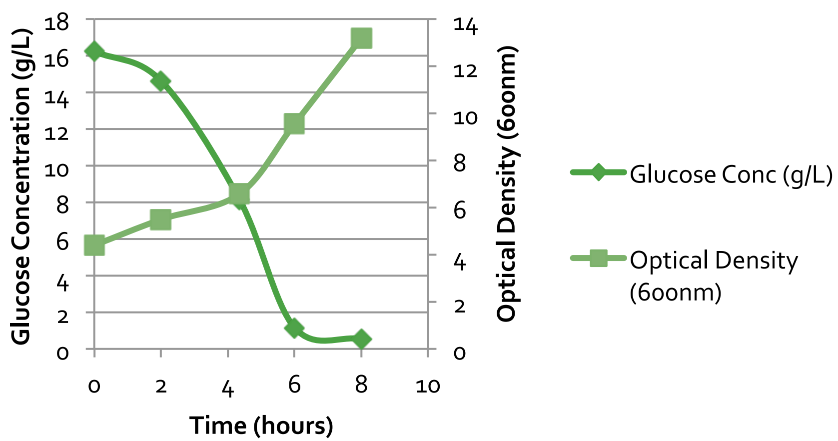
Sugars support microbial growth with no inhibition

	Ferment 1	Ferment 2	Ferment 3
Organism	P. holstii	S. cerevisiae	E. coli
Media (2L)	Tryptone 5g/L Yeast Extract 6g/L $MgSO_4.7H_2O$ 1g/L KH_2PO_4 5g/L Leaf Glucose Solution 44ml/L Antifoam C 1ml/L	Tryptone 5g/L Yeast Extract 6g/L $MgSO_4.7H_2O$ 1g/L KH_2PO_4 5g/L Leaf Glucose Solution 44ml/L Antifoam C 1ml/L	Tryptone 10g/L Yeast Extract 5g/L NaCl 10g/L Leaf Glucose Solution 44ml/L Antifoam C 1ml/L
pH	5.5	5.5	7.0
Temperature	30°C	30°C	37°C
Agitation	300rpm	300rpm	300rpm
Air flow	4L/min	4L/min	4L/min

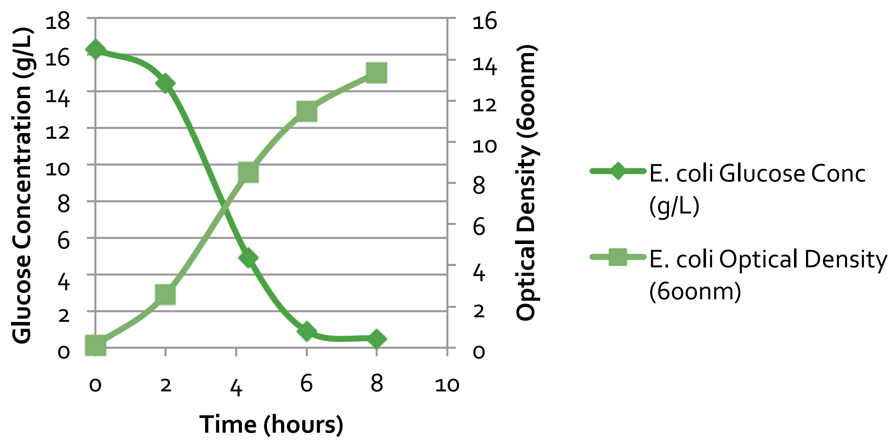
P. holstii



S. cerevisiae



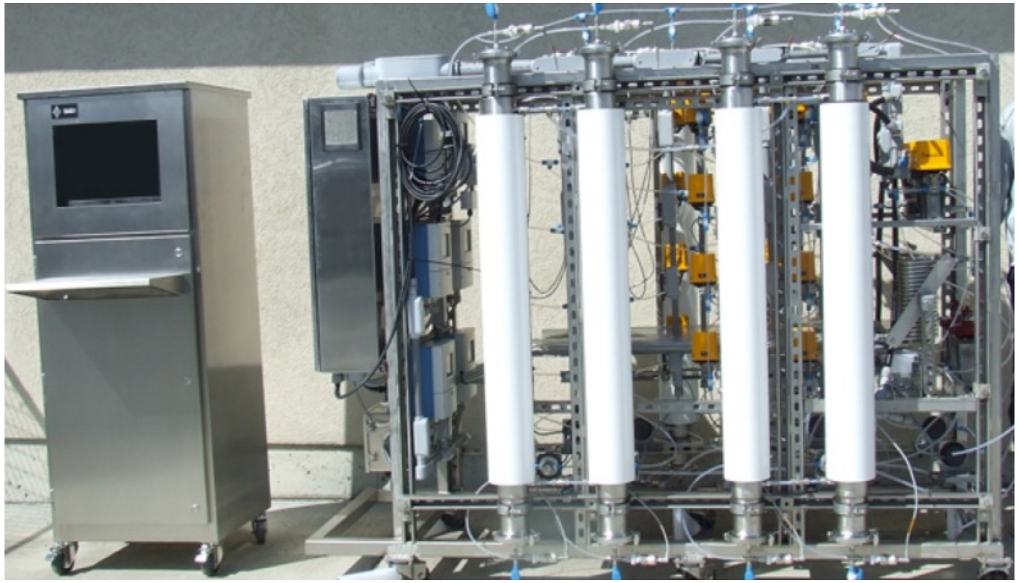
E. coli



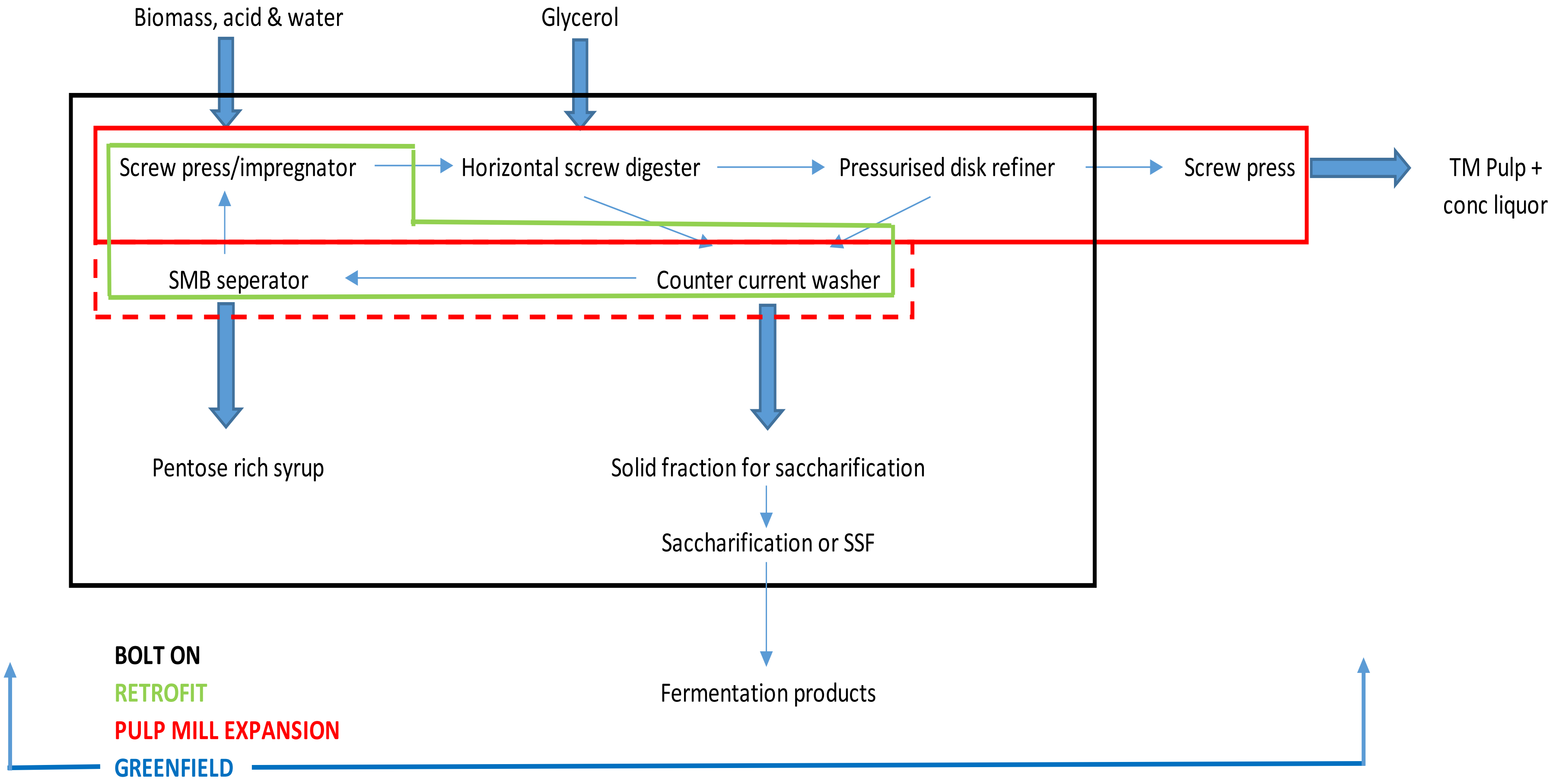
Glycerol recovery at Amalgamated Research LLC (ARi)

LEAF RESOURCES LIMITED
Sustainable products from plant biomass

- ARi simulated moving bed chromatography services include:
  - Testing at the ARi pilot facility.
  - Lease of pilot skids for on-site testing.
  - Sale of custom design pilot plants for customer testing or demonstration purposes.
  - Project R&D, supervision and engineering from lab to industrial scale implementation.
- ARi testing on *ca.* 1 tonne of filtrate over 4 weeks confirms that >95% of the glycerol in the filtrate is recoverable by SMB chromatography at *ca.* 95% purity



Process modes for industry settings



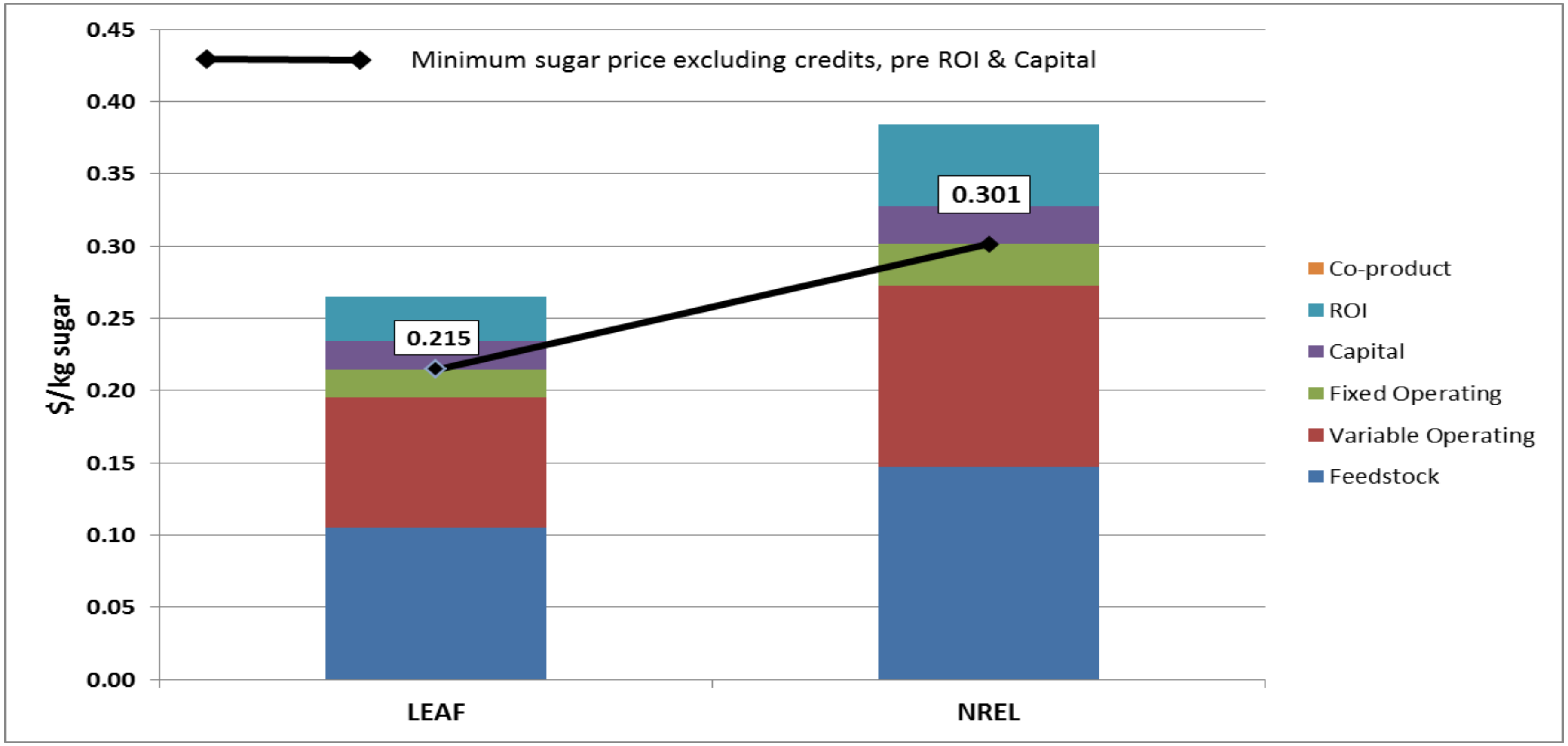
Greenfield design case
Glycell model vs Dilute acid model

LEAF RESOURCES LIMITED
Sustainable products from plant biomass

- Common Class 5 estimate
  - 367,200 tonnes (d.b.) p.a. at $66.10/dry tonne
  - 60% debt funding at 8% over 10 years
  - CapEx spend over 3 years and revenue commencing mid-year 3
- Dilute acid model (NREL design report)
  - Normalised to 80% cellulose to glucose efficiency
  - Capital required for enzyme production removed and purchase of enzymes included in OpEx

resourceinvest

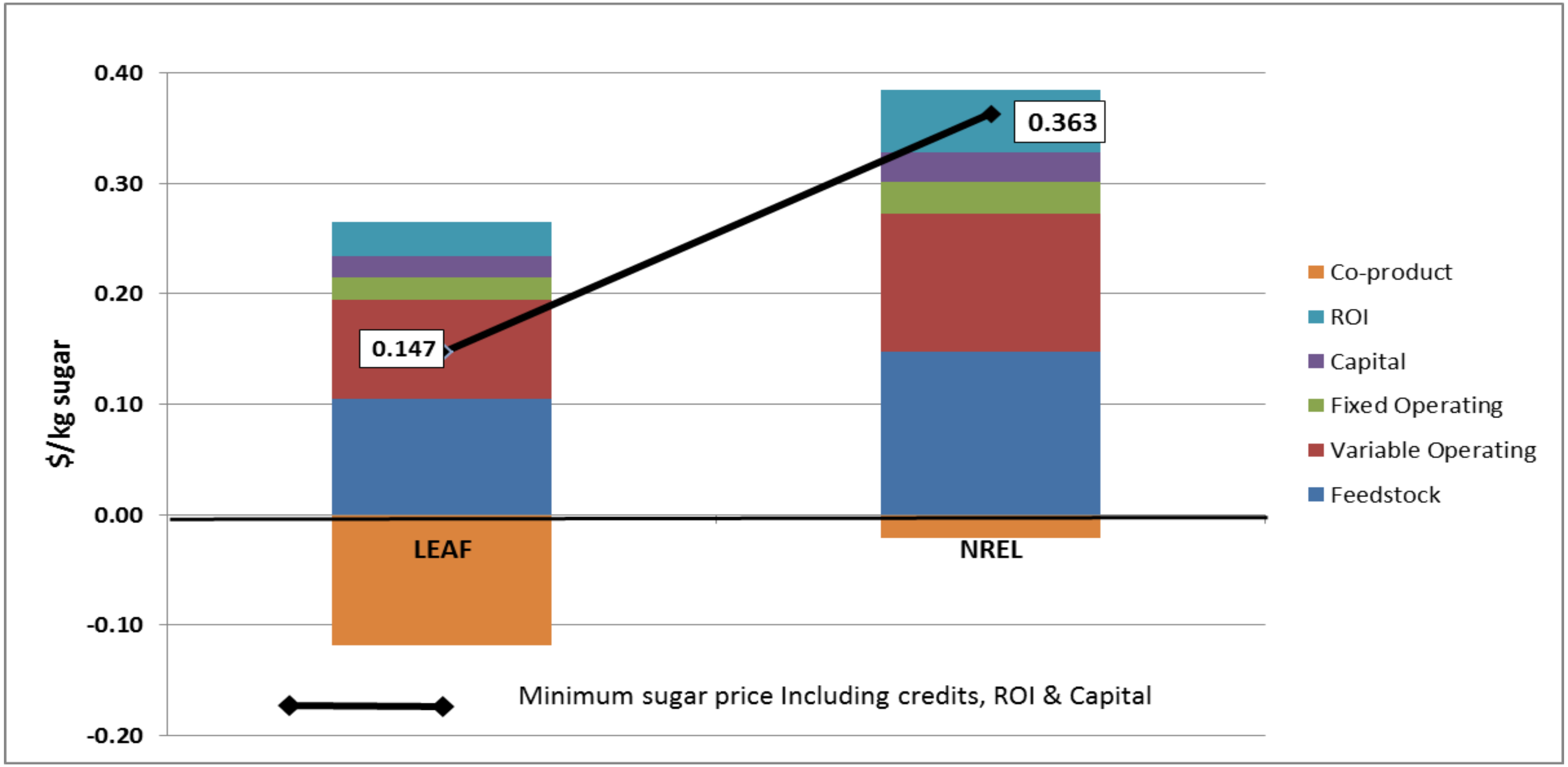
Greenfield design case – excluding coproduct benefit



- 28.7% advantage of Glycell over normalised NREL model (net of ROI and CapEx)
- Represents a $0.09/kg saving

Greenfield design case – including coproduct benefit

LEAF RESOURCES LIMITED
Sustainable products from plant biomass



- Includes CapEx and OpEx required to realise coproduct revenue (Glycell lignin at $450/tonne)
- Represents a $0.21/kg saving

resourceinvest

Key competitive advantages

Based on current data, Leaf Energy's Glycell^{TM} process when compared to other pretreatment processes, such as acid hydrolysis and/or steam explosion:

- Produces high yield cellulose with less degradation products.
- Improved enzymatic conversion of cellulose to sugars.
- Produces a high purity glucose liquor due to milder conditions and separation of pretreatment solids and liquids.
- Other possible benefits – glycerol pacifying metal surfaces impacts on cost and life of plant.

Thank You

Les Edye, VP R&D
l.edye@leafresources.com.au
Alex Baker, COO
a.baker@leafresources.com.au
Marc Sabourin, VP Business Development for North America
m.sabourin@leafresources.com.au

David Humbird of DWH Process Consulting

www.leafresources.com.au