Pentland Bioenergy Project

Presentation –Developing The Pentland Bioenergy Project
Bioenergy Australia

22 March 2017

Contents & Overview

1 Introduction and Project Overview

1 Introduction

- The Development of the Pentland Bioenergy Project will no doubt form the nucleus for the start of the Bioenergy industry in Australia.

- The Development will be unique as it adopts a fully integrated delivery model benefitting the environment, the local community, the state and the nation.

- The value of the ARENA Grant to the development of this project is immeasurable and an absolute critical step to the success of our project.

- The ARENA $3 million grant was a crucial part of the $13 million measure that was used to deliver world class documentation for the investment community to strongly consider investment in:
  - A fully integrated
  - Greenfield
  - Renewable Energy Project
  - Contributing substantially to the decarbonisation of our environment.

1 Introduction

The Australian sugarcane industry is one of Australia's largest and most important rural industries with sugarcane being Queensland's largest agricultural crop. Up to **35 million tonnes** of sugarcane is grown on about 380,000 hectares annually. This sugarcane crop can produce up to **4.5 million tonnes of raw sugar**, 1 million tonnes of molasses and 10 million tonnes of bagasse annually. Approximately 85% of the raw sugar produced in Queensland is exported, generating up to **$2.0 billion in export earnings** for Queensland.

The Australian sugarcane industry is located mainly along Australia's eastern coastline, from Mossman in far north Queensland to Grafton in northern New South Wales. There are approximately **4400 cane farming entities** growing sugar cane on a total of **380,000 hectares** annually, supplying **24 mills**, owned by 7 separate milling companies. The vast majority of cane farms are owned by sole proprietors or family partnerships. The mill ownership structures are a combination of publicly owned entities, privately held companies limited by guarantee, and co-operatives.

Australian Sugar Milling Council

1 Location & Overview

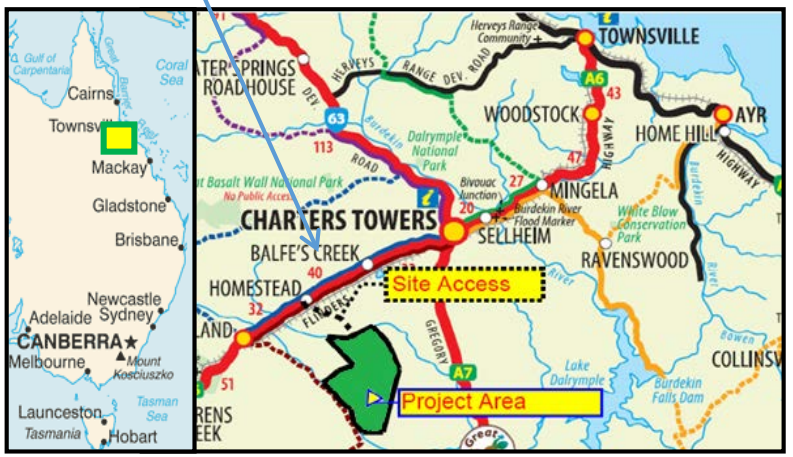
The Project

- The RDA Pentland Bioenergy Project ("Project") is a fully integrated and energy self sufficient, bioethanol production facility located in North Queensland
- Base project capacity is to deliver 190ML per annum (p.a.) of fuel grade ethanol to the domestic and international markets
- Base Project Divided into two Stages:
- Stage 1A deliver 190ML per annum (p.a.) of 1st Generation fuel grade ethanol to the domestic and international markets
- Construction of a 16MW cogeneration plant to be fired using bagasse as a primary feedstock:
  - Entirely energy self sufficient; will not require electricity to be delivered from the NEM
  - Will generate 128,000 Large Scale Renewable Energy Certificates per annum as a by-product of electricity generation
- Ready access to existing infrastructure, water and irrigable land suited for sugar cane production
- 500 Construction Jobs
- 200 Operational Jobs
- 600 Indirect Jobs
- The Project has strong local land owner, local council and State Government support
- Stage 1B deliver 150ML per annum (p.a.) of 2nd Generation fuel grade ethanol to the domestic and international markets
- Stage 1B (2nd Generation) + Extra 16Mw Power Plant to start on Financial Markets support.
- Scalable project with the ability to increase production capacity via staged development to > 1 billion litres of bioethanol

Site Location

- Approximately 100 kilometres ("km") south west of the township of Charters Towers and approximately 240km south west of Townsville
- Strategically located between the Cape and Campaspe Rivers
- Initial Project area will utilise 28.5kha with 19kha under cultivation producing 2.1mtpa of sugarcane

Clear access to the Flinders Highway providing a logistics path to market



Leases signed over additional land for optional expansion

Burdekin water consents currently being finalised with SunWater & Townsville City Council

2 The New Model - Expand & Diversifying the Industry

Creating an inland Cane & Sweet Sorghum Industry.

- Developing a fully integrated project produces the lowest cash cost product
- Huge tracts of land available to be developed
- Through detailed modelling and trial growing we have shown that irrigation can be reduced to 4ML/Ha.
- Using sugar cane & sweet sorghum a variety of products can be produced:
  - Sugar
  - 1st Generation ethanol
  - 2nd Generation ethanol
  - Biomass pellets for renewable energy co-firing of coal fired power plant
  - Bioplastics
  - Renewable jet fuels
- Stage 1A & 1B of the Pentland Bioenergy project can produce 340 million litres of ethanol P/A
- Valuing ethanol at AU$0.88, export earnings for the State would be AU$300 million P/A
- On land acquired to date by RDA this project can be repeated 4 times.

3 Growing Trials

3 Growing Trials

- Objective
  - Soil suitability
  - Variety confirmation
  - Irrigation demand & type
  - Fertiliser demand
  - Yield
  - Fermentable Sugars
  - Out of season effects
- Land Preparation – plough/cutterbar
- Irrigation install
  - Pivot System
  - Trickle system
- Borehole – 30L/sec
- Moisture Sensors (Telemetry)
- Planted Nov 2015
  - Ratoon Cane (Q208)
  - Sweet Sorghum (multi)
- Fertilisation - 250 kg of CK88 /HA

3 Growing Trials

- Pentland Field Trial
  - Planted Nov 2015
  - Feb 2016 to July 2016
  - 3.5 ha Pivot & Drip System, Local Bore
  - QUT Independent Verification
    - Sweet Sorghum – 270 ton/ha (3 x ratoon)
      - 9% Fermentable Sugars
    - Sugar Cane – 138 tc/ha (9 months)
      - 15% Fermentable Sugars

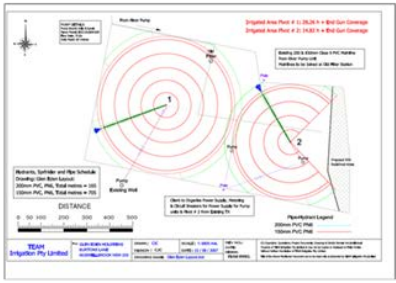
Aerial Imagery – Drones

- NDVI/ High Res
- Fertiliser
- Herbicide
- Insecticide
- Variable Rate Application

Data Loggers

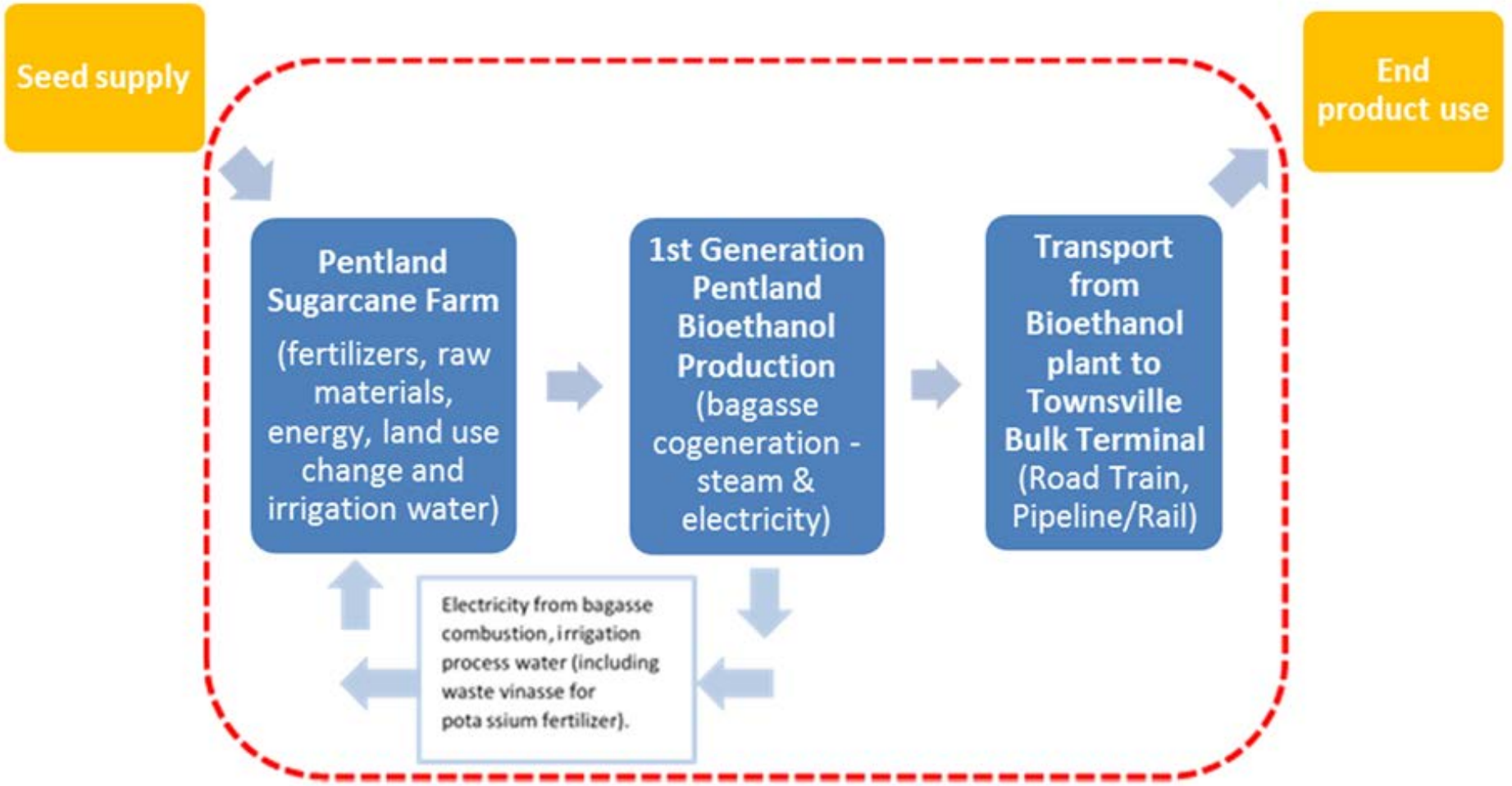
- Bores
- River Gauging Stations
- Load cells
- Emissions
- Water/Air quality

3 Growing Trials - Irrigation Control Systems



4 Life Cycle Analysis

System Boundary
Pentland Bioethanol 1G Production from Sugarcane LCA Analysis



4 Life Cycle Analysis (1st Generation)

Below is the total GHG-100 emissions for the Bioethanol Process (including transportation and crop farming). Also provided are the associated emissions from land use change i.e. change from cattle grazing to sugarcane farming. The black value is the total LCA emissions factor for the system boundary adding the red values together. The associated energy balance value is highlighted green as energy consumed per unit of production.

GHG-100 (Ethanol production and sugarcane farming)	220†	gCO_2e-/litre of bioethanol produced
Land use change emissions	395	gCO_2e-/litre of bioethanol produced
Total emissions	615	gCO_2e-/litre of bioethanol produced
Non-renewable energy balance	1‡	MJ (non-renewable energy consumed)/litre of bioethanol produced

† This value represents a 35% improvement in equivalent CO_2 emissions per unit of production against the comparable farming, production stages in the GREET model 'Brazilian Bioethanol Production from Sugarcane' (GREET.net Tool, 2015).

5 Marketing Report

Process and Market Overview

Market Opportunity & Growth

Argus Ethanol Market Analysis

Figure 7-1 Cash cost comparison of RDA plant vs. plant in US and Brazil

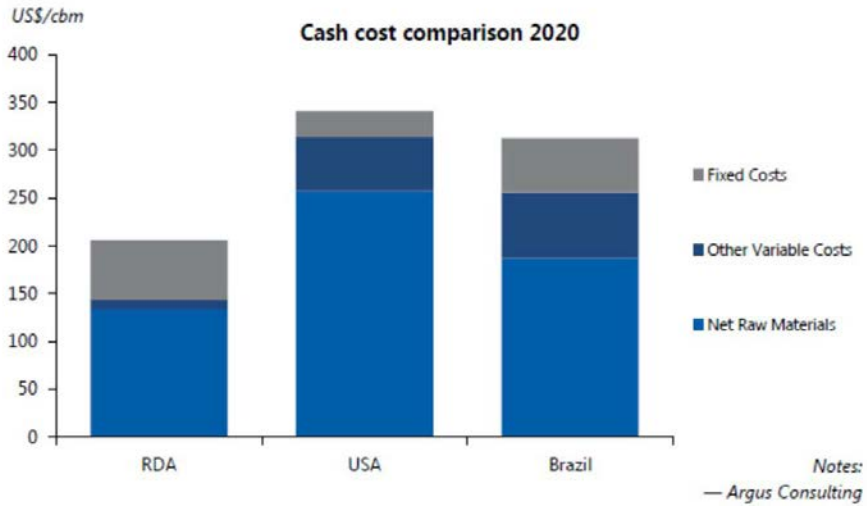
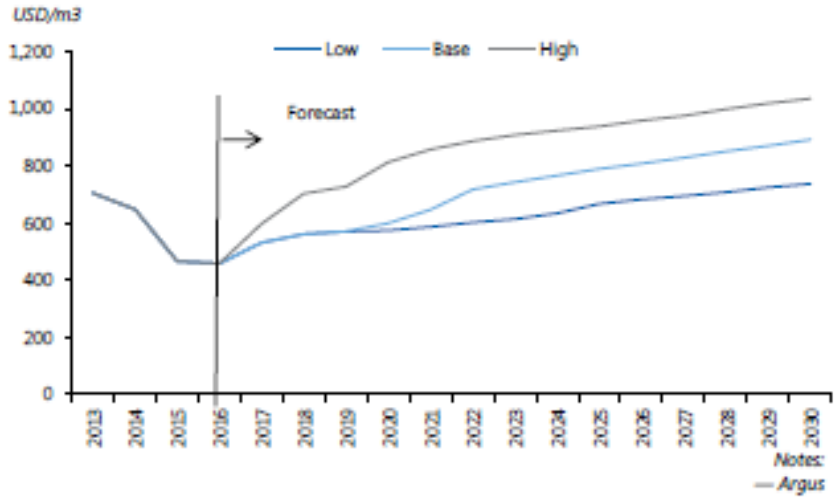


Figure 6-9 Price outlook fob Queensland (2016 to 2030) [competing in the US West Coast market]



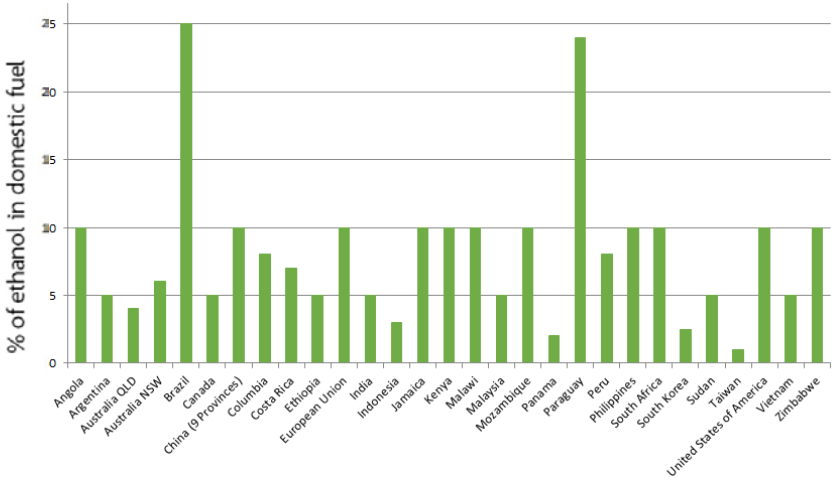
Queensland Bio-fuel Mandate Provides Upside to a Domestic Sale Strategy

- The Amendment Act was passed on the 1st of December 2015
- The Mandate took take effect from 1st of January 2017
- Requires all petrol fuel to have 3% of total sales volume to be ethanol
- Requires it to be 4% from 1st July 2018
- Requires 0.5% of all diesel sold to be biodiesel

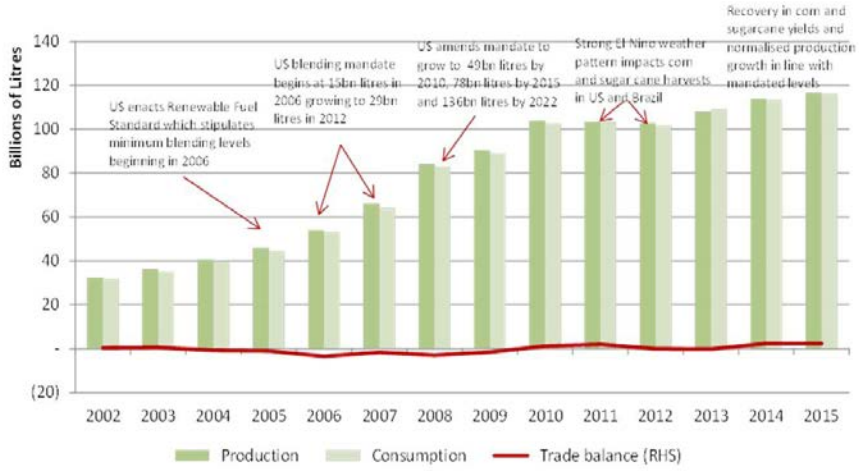
Process and Market Overview

Demand Factors

The increased demand for ethanol has been driven primarily by the introduction of blending mandates globally in an effort by governments to pursue global clean energy targets and technology advances in the field of flexible fuelled vehicles



Global blending mandates driving ethanol demand



Transport Fuel

Global clean energy and ethanol mandates are driving the requirement for advances in vehicle technology to transition from gasoline fuelled vehicles towards vehicles powered by ethanol compatible engines and battery fuel cells

unleaded E10

Most vehicles produced after 1986 can run on E10

E85 85% Ethanol

Many major car manufacturers produce models classified as flexible-fuel vehicles that can run on fuel blends of up to 85% ethanol

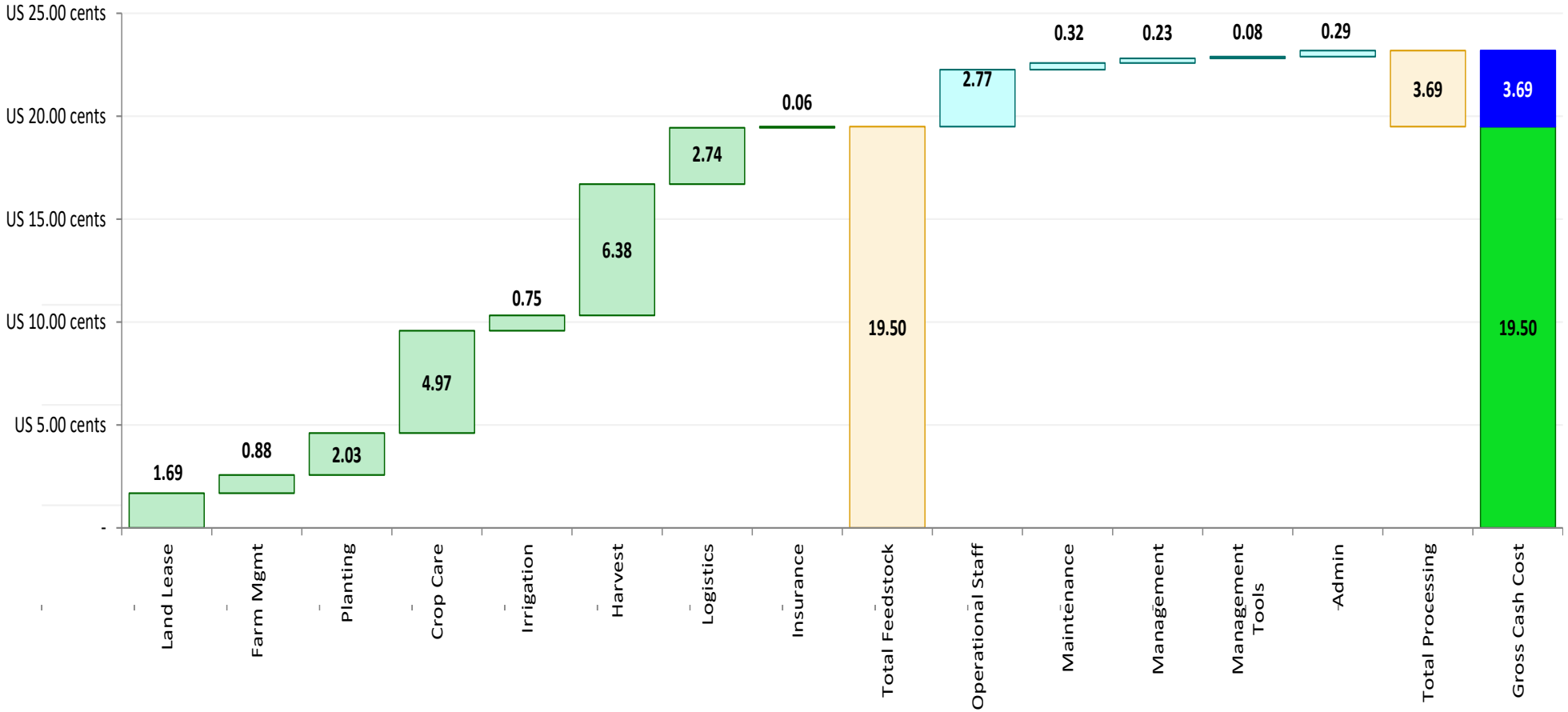
NISSAN

Alternative fuelled vehicles utilising ethanol based technology are being developed with the potential to replace hydrogen fuel cells in electric vehicles (eg Nissan e-bio fuel cell scheduled for commercialisation in 2020)

6 Operating Costs 1st Generation

6 Operating Costs 1st Generation

The Project benefits from vertical integration and controls the cost of feedstock delivered to the processing facility. The vertical integration enables the Project to be globally competitive and in the lowest cost quartile of global production



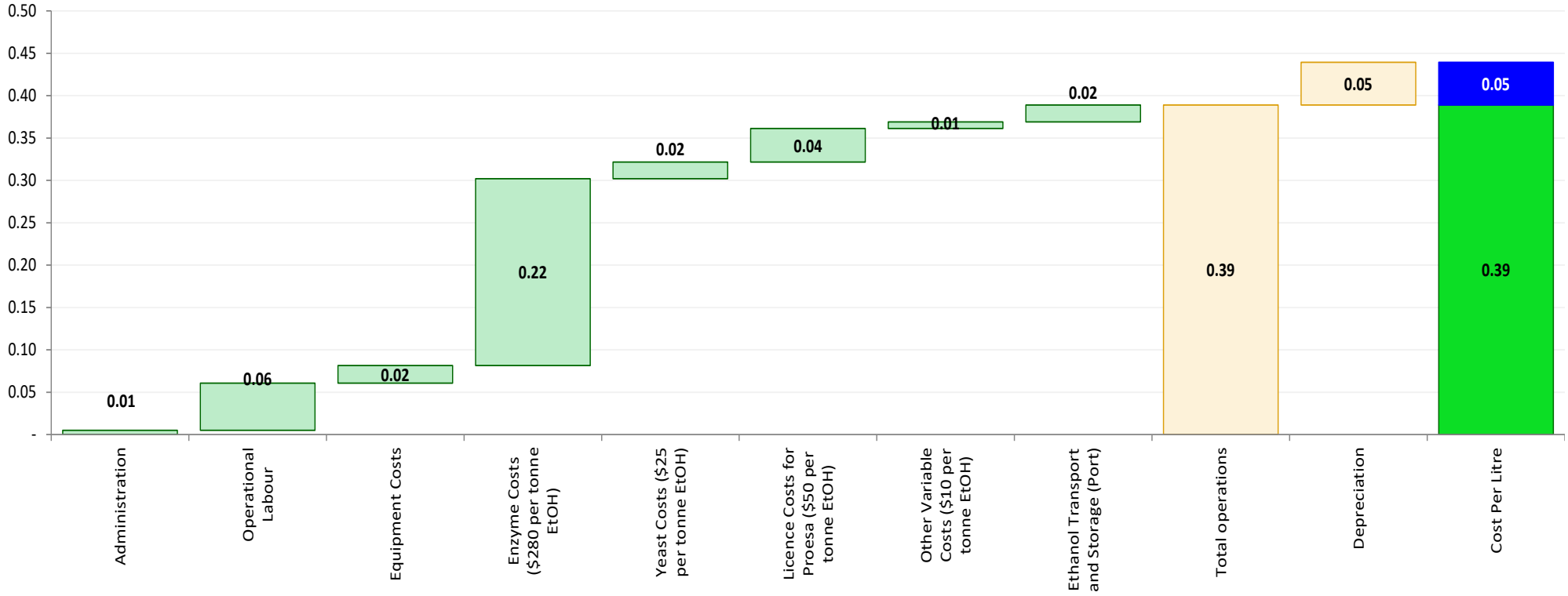
7 Cost Analysis 2nd Generation Production

Beta Renewables 2nd Operational Costs	
Production (litres)	154,000,000
Production (tonnes)	121,260
OPERATING COSTS - SECOND GEN	
Administration	798,720.00
Operational Labour	8,563,770.00
Equipment Costs	3,206,700.00
Enzyme Costs ($280 per tonne EtOH)	33,952,755.91
Yeast Costs ($25 per tonne EtOH)	3,031,496.06
Licence Costs for Proesa ($50 per tonne EtOH)	6,062,992.13
Other Variable Costs ($10 per tonne EtOH)	1,212,598.43
Ethanol Transport and Storage (Port)	3,080,000.00
Total Operations	**59,909,032.52**
CAPITAL EXPENDITURE	
Second Generation Process Facility	128,000,000.00
16 MW Lignin Fired Power Station	70,000,000.00
Lignin Pelletising Plant	15,000,000.00
Modifications to 1A Bagasse Power Station	8,500,000.00
Contingency	11,075,000.00
	232,575,000.00
Straight line plant depreciation (30 years)	**7,752,500.00**
Total Annual Cost	**67,661,532.52**
Cost per Litre (AUD)	**0.44**

7 Cost Analysis 2nd Generation Production

2nd Generation ethanol plants have a very high operational costs due to costs of enzymes compared to 1st Generation Plants even though the vale of the biomass is transferred at zero cost.

The average costs when 1st & 2nd generation plants are integrated is approximately US$33 cents per litre and is still market competitive.



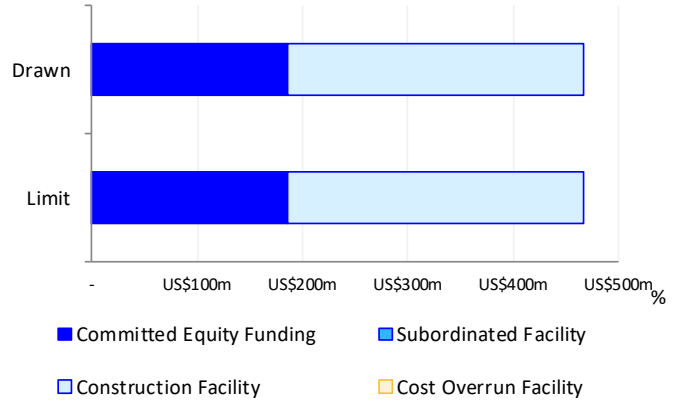
8 Financial Model

8 Financial Model Stage 1A -1st Generation

1.1 Sources & Application of Funds	USD'000	%
Application of Funds		
Seymour White Farm Development		
Farm Civils	26,898	6%
Buildings	9,756	2%
Services	21,965	5%
Farm Infrastructure	7,036	2%
Irrigation	46,734	10%
Risk/ Contingency/ Overheads	49,005	11%
Total Seymour White Farm Development	161,394	
Tomsa Processing Plant		
Sugar Cane Front End	25,268	5%
Ethanol Process	20,927	4%
Utilities, Storage & Services	74,386	16%
Power Plant	54,964	12%
Total Tomsa Processing Plant	175,545	
RDA Pre-Completion Opex and Water Storage		
Pre Opex Purchases and Seed Farm Developmer	5,542	1%
Initial Cane Planting to Entire Farm	27,736	6%
Water Risk Contingency	37,343	8%
Total RDA Pre-Completion Opex and Water Stor	70,621	
Total Capital Expenditure	407,560	
Financing and Transaction Costs		
Financing Costs	26,936	6%
Transaction Costs	20,250	4%
Debt Service Reserve Account Funding	11,173	2%
Total Transaction Costs	58,359	
Total Application of Funds	465,918	100%
Sources of Funds		
Pre-Completion Cash Flow	-	-
Committed Equity Funding	186,367	40%
Subordinated Facility Drawdowns	-	-
Construction Facility Drawdowns	279,551	60%
Cost Overrun Facility Drawdowns	-	-
Working Capital Facility	-	-
Total Sources of Funds	465,918	100%
Senior Debt Gearing at Conversion		*60%*
Total Construction Capital Expenditure	*407,560*	*87%*
Other Financing and Operating Requirements	*58,359*	*13%*

1.2 Capex Native Currency '000	AUD	USD	EUR
Seymour White Farm Development			
Farm Civils	35,864	-	-
Buildings	13,008	-	-
Services	29,287	-	-
Farm Infrastructure	9,381	-	-
Irrigation	62,312	-	-
Risk/ Contingency/ Overheads	65,340	-	-
Total Seymour White Farm Development	215,191	-	-
Tomsa Processing Plant			
Sugar Cane Front End	-	-	22,971
Ethanol Process	-	-	19,025
Utilities, Storage & Services	-	-	67,623
Power Plant	-	-	49,967
Total Tomsa Processing Plant	-	-	159,586
RDA Pre-Completion Opex and Water Storage			
Pre Opex Purchases and Seed Farm Developmer	7,389	-	-
Initial Cane Planting to Entire Farm	36,982	-	-
Water Risk Contingency	49,791	-	-
Total RDA Pre-Completion Opex and Water Stor	94,162	-	-
Total Capital Expenditure	309,353	-	159,586

1.3 Financing Established	USD'000	USD'000
	Limit	*Drawn*
Committed Equity Funding	186,367	186,367
Construction Facility	279,551	279,551
Subordinated Facility	-	-
Cost Overrun Facility	-	-
Total	465,918	465,918



1.4 Returns Summary	Project	30 Years	20 Years	15 Years
Equity IRR Pre-tax	25.4%	25.4%	24.7%	23.4%
Equity IRR Post-tax	21.8%	21.8%	20.9%	19.4%
Project IRR Pre-tax	18.4%	18.3%	17.3%	15.3%
Project IRR Post-tax	15.1%	15.0%	13.6%	11.2%

9 Project Viability & Repeatability

The delivery and operation of a fully integrated project with both 1st & 2nd generation ethanol plants with fully owned farming facilities delivering the biomass feedstock, will be so much easier to deliver once RDA has proven this model.

Viability

- **Detailed Financial Modelling together with strong due diligence documentation prepared by very strong counterparties clearly shows that both 1st and 2nd generation ethanol processes are financially viable especially when delivered through a fully integrated delivery process.**

Repeatability

- **RDA has developed very detailed documentation for the delivery of the whole project, so that the project could use the same design for repeat developments.**

10 Lessons learned in reaching financial close

First Lesson – Always have ARENA as a Development Partner:

- The development delivery timeline needs to be monitored constantly and appropriately reviewed and accordingly.
- Detailed financial modelling should be the first step in your development journey using realistic preliminary budgets and marketing estimates.
- The following steps should be carried in parallel:
  - Technical details and accurate and detailed project capital costs.
  - Secure Long term Product offtake
  - Government planning & approval processes
  - Secure Debt and Equity Partners through experienced financial advisors


Questions