



MOUNT ALEXANDER SUSTAINABILITY GROUP- BIOENERGY FROM WASTE FEASIBILITY STUDY

STAGE 4 REPORT: FINAL

BUSINESS CASE FOR ESTABLISHMENT OF A BIOENERGY FROM WASTE FACILITY CO-LOCATED WITH DON KR IN CASTLEMAINE, VICTORIA

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Date	Revision	Revision Comment	Prepared	Reviewed	Approved
20/09/17	A	Preliminary Outline Document	HJ		
21/12/17	B	Revised Outline Document	HJ		
16/01/18	C	Draft Business Case Report for MASG Review	HJ/JO	HJ	HJ
23/02/18	D	Final Business Case Report	HJ/JO	HJ	HJ
06/04/18	E	Final Business Case Report with MASG Edits	HJ/JO	HJ	HJ
15/05/18	F	Final Business Case Report	MA/JO	JO	JO
19/05/18	G	With final MASG edits	DB/GE/JO	DB/GE	DB/GE



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Some details of this business case such as energy technology have changed. Shown below are estimates only (circa 2017).

1 EXECUTIVE SUMMARY

This report presents a Business Case focussed on the development of an independently-owned commercial-scale bioenergy from waste facility co-located on Don KR's site. The proposed facility will have a total capacity of up to 30,000 tonnes per annum of organic streams for Anaerobic Digestion and circa 14,000 tonnes per annum of biomass waste streams for a Biomass Energy Plant. The consolidated facility is expected to generate circa 0.97MW(e) of baseload (ie. 24/7) electricity (8500MWh(e) per annum) and 4.8MW(th) of baseload heat (42,000MWh(th) per annum) for export 'behind the meter' to offset fossil-fuel based energy in Don KR's operations.

The location, scale and technology selection for the business case follows a detailed waste review to validate feedstock types and availability, a technical and economic comparison of multiples candidate sites, and an independent technology sounding process.

The proposed site comprises a Bioenergy from Waste Facility precinct located on leasehold land on property owned by Don KR contiguous with the eastern boundary of its Richards Road, Castlemaine operations and adjacent to the rear of its operations including its onsite waste treatment plant.

The proposed facility comprises anaerobic digestion and biomass combustion technologies. Specifically, these include a wet system anaerobic digestion (AD) plant accepting circa 3,700 tonnes per annum of Don KR's organic waste streams (DAF sludge and meat waste) and circa 18,200 tonnes per annum of organic feedstocks to be sourced regionally from the open market for waste, with a mercantile gate fee applicable (or in some cases a payment for feedstock). The total equates to circa 22,000 TPA, leaving 8,000 TPA of spare feedstock capacity for the AD plant.

The AD plant is connected to a 1.2MW(e) capacity biogas-fuelled cogeneration unit. From the nominated quantity of feedstocks, we envisage circa 4,800 MWh(e) per annum of electricity (after parasitic draw of the AD plant) and circa 6,000 MWh(th) per annum of heat or steam, both delivered 'behind the meter' directly to Don KR's operations to offset Don KR's circa 4MW(e) peak load net grid power draw and circa peak 20MW(th) heat requirement. Power and heat off-take to be under a commercially-negotiated energy purchase agreement with Don KR. Note that the cogeneration unit is actually capable of delivering almost twice the energy output with optimal feedstock inputs.

The facility is to also include a biomass bioenergy plant that will accept circa 14,000 tonnes per annum of Don KR sourced cardboard and plastics, and third party organic waste streams. The plant comprises of a biomass boiler (connected to an ORC turbine) for the production of circa 3,700 MWh(e) per annum and up to 36,000 MWh(th) per annum of heat/steam delivered behind the meter directly to Don KR's operations to contribute to its circa 20MW(th) peak heat demand. Optionally, an alternative pyrolysis technology could be deployed using vertical multiple rotary hearth technology and updraft gasification to deliver a biochar product.

The proposed investment and commercial structure is by way of a Special Purpose Investment Vehicle (SPV), whereby the Bioenergy from Waste Facility assets are independently and privately owned via a special purpose investment company, with project finance supplied via a combination of grant funding, equity and debt finance delivered through the SPV.

The project is expected to deliver approximately \$[] per annum in savings for Don KR's operation through avoided costs of waste management and disposal, electricity and heat.

Based on the proof of concept Life Cycle Analysis results, the combined bioenergy facility has the potential to significantly reduce the greenhouse gas emissions (overall net reduction of 88,513 t CO₂e/year via 50,013 from biogas and 38,500 from biomass thermal) associated with disposal of organic waste in the region.

The project investment analysis includes the generation and sale of Large Scale Generation Certificates and Victorian Energy Efficiency Certificates.

An economic and investment analysis suggests an estimated gross project pre-tax IRR of between [] and [] based on SPV cashflow projections before finance.