SNAPSHOT

Aggregated Waste to Energy (W2E)

Project Report Reference: 2020-1006 **Date: 5 August 2020**

Project Description

The objectives of the project were:

- Creation of tools to assess the economic viability of W2E that aggregate wastes from processors, feedlots and other streams.
- Creation of tools to assess the thermal energy and power generation potential from processing plant wastes and other waste streams.
- Provide clarity on the key parameters impacting the economic and technical viability of waste to energy (W2E) facilities for processors e.g. types of waste, scale, etc.
- Explore current interest and activity in W2E throughout Australian RMI processors.
- Map out options and collaborations for aggregated W2E facilities.
- Feasibility studies for two specific case studies considering how waste type, tonnages, composition and technology selection impacts CAPEX and economic viability of aggregated W2E projects.

Project Content

Based upon industry surveys and preliminary economic modelling, two specific waste to energy technologies were considered in detail:

(1) Anaerobic digestion (AD) of red meat process (RMP), pig processing wastes, food organics and green organics from municipal wastes in continuous stirred tank reactors (CSTRs) to generate biogas used to fuel reciprocating cogeneration engine, and

(2) Aggregation of different biomass fuels from within RMP operations and adjacent to operations for combustion in boilers for creating steam.

The other technologies considered were pyrolysis and gasification.

Project Outcome

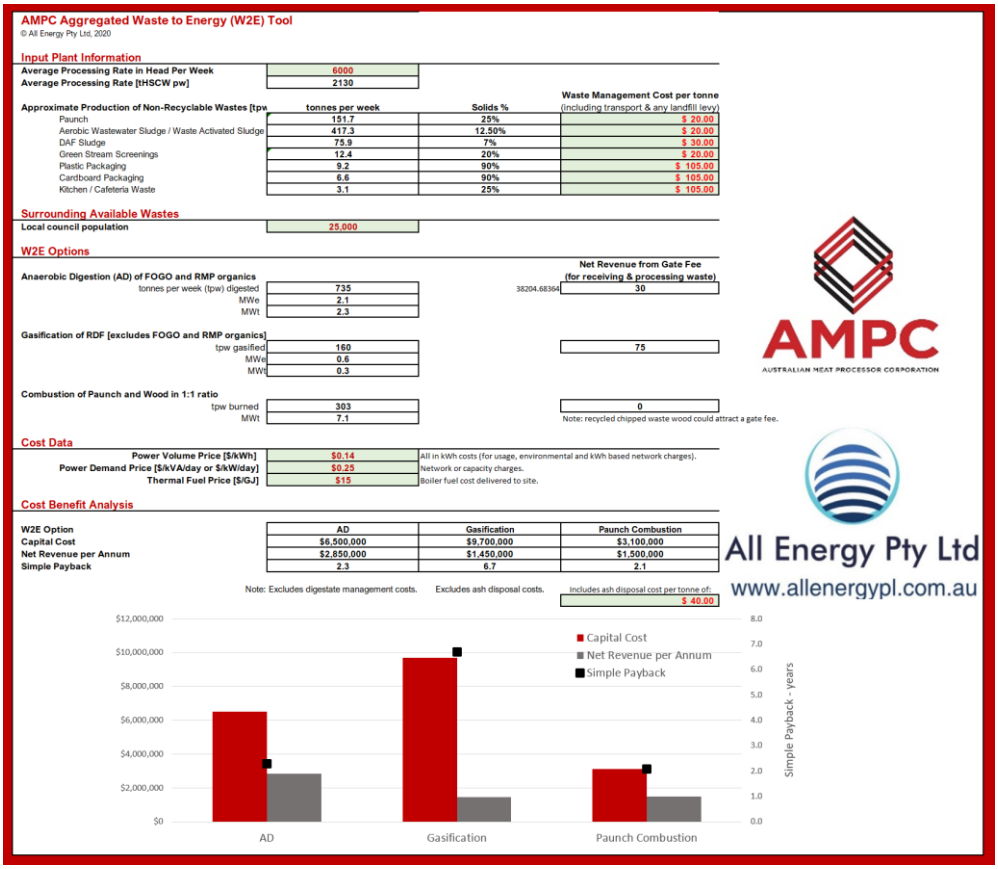
AD: CSTRs provide the advantages of being able to handle higher fats, oils and greases (FOGs) and solids concentrations compared to covered anaerobic systems as well as having smaller foot prints and a high efficiency for conversion of substrates into biogas.

All organic streams from a red meat processor (RMP) were sent to the University of Queensland for composition and Bio Methane Potential (BMP) testing. One under utilised resource is the “paunch press water” (liquid generated when paunch is mechanically pressed) which had a solids concentration of 0.715% and comparatively high volatile solids compared to other pumpable streams, hence is ideally suited if dilution of solids (paunch, rendering wastes, etc) is required to achieve a target AD solids concentration (e.g. 10% total solids). For submissions from the market, the payback period was found to be 5 to 9 years with shorter periods achieved for those systems able to receive all organic wastes whilst minimising OPEX and CAPEX (which ranged from $5.9 to $8.6 mil for processing 40,000 tonnes per annum at a solids concentration of 9.5%).

Multi-fuel biomass boilers: can provide a 2 to 3 year payback compared to LPG fired boilers where low cost biomass fuel (e.g. cotton gin trash or air dried hardwood chip at <~$3 / GJ) is co-fired with other available fuels and 6 to 7 year paybacks compared to coal fired boilers where wastes that attract a disposal fee (e.g. paunch) is co-fired with low cost biomass fuel.

A simple to use calculator was created based on tonnes per week HSCW (or head per week cattle equivalent) to rapidly determine the tonnes per week of different materials that could be utilised in W2E systems: paunch, aerobic pond sludge (WAS), DAF sludge, screenings, plastics, cardboard/paper and cafeteria wastes.

These materials then feed automatically into AD, gasification or combustion. Users can also nominate the municipal waste available from a specific population size which also feeds into W2E technologies thereby achieving an economy of scale. By nominating power costs in $/kWh and $/kVA/day, current fuel costs and waste management costs, CAPEX, revenues and simple paybacks can be estimated.



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