



# MOUNT ALEXANDER BIOENERGY FACILITY

Mount Alexander Sustainability Group (MASG) is engaged in a project to build a **Bioenergy from Waste** facility in the Mount Alexander Shire to process local and regional organic waste and provide clean, green energy in return.

The project has many benefits for the community including an expected reduction of greenhouse gas emissions by more than **88,500 tonnes of CO2** per year - the equivalent of the shire's total household emissions!

## WHAT IS BIOENERGY?

Simply put, bioenergy is a form of renewable energy generated from the conversion of recently living organic matter (biomass) into electricity, heat, gas or liquid fuels.

Bioenergy feedstock can be derived from:

- **agricultural green waste**
- **garden/green bin waste**
- **food waste**
- **crop stubble**
- **agricultural/horticultural woody waste**
- **urban and manufacturing wood waste**

Bioenergy is one of the oldest forms of energy generation available to humans. In the context of this proposed bioenergy from waste facility there are two complementary forms of extracting energy from waste organic material under consideration: a) **biodigester** (anaerobic digestion) which consumes wet material, and b) **biomass** combined heat and power (CHP) plant which consumes dry organic material.



## Bioenergy has a vital role to play as part of Australia's clean energy future.

CIRCULAR ECONOMY

# RENEWABLE ENERGY

DIVERT ORGANIC MATERIAL

# FROM LANDFILL

GREENHOUSE GAS

# EMISSIONS REDUCTION

# WHAT IS A BIOENERGY FACILITY?

One form of bioenergy is an **Anaerobic Biodigester** which is an engineered, fully enclosed and contained process for the controlled digestion of organic wastes into methane and digestate. The process occurs in an oxygen-free environment, where naturally occurring bacteria present in organic materials digest and break down the organic component. The biogas produced from this process is methane (CH<sub>4</sub>), a gas which can be further concentrated and used as a green fuel or combusted to produce green electricity.

Another form of bioenergy uses dry organic material such as woody waste. This is a thermal decomposition process, using pyrolysis-gasification at high temperature, to crack the timber molecules and produce syngas (hydrogen and CO) with biochar and wood vinegar as co-products. This process when coupled with a reciprocating gas engine creates electricity and heat (steam) and is referred to as a **Biomass CHP** (combined heat and power).

# HOW DOES IT WORK?

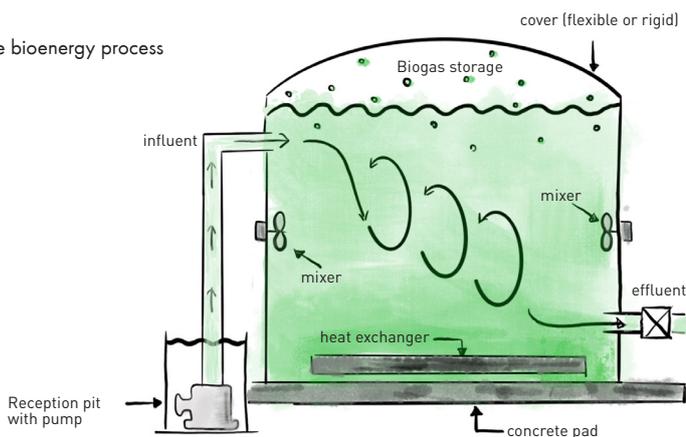
The planned facility will draw on two complementary technologies:

**ANAEROBIC DIGESTER** technology, which consists of a bio-digestion plant to reduce organic waste into water, sludge (digestate) and biogas. This complete-mix process uses bacteria to break down organic material down in the absence of oxygen. The biogas is mostly methane (like liquefied natural gas/LNG).

**BIOMASS COMBINED HEAT AND POWER** technology is a two stage pyrolysis-gasification process, which enables dry waste materials (e.g. wood) to be converted in an oxygen starved chamber into energy rich gas ('syngas') comprising mostly carbon-monoxide and hydrogen, with lesser amounts of carbon-dioxide, methane, hydrocarbons and nitrogen.

Don Smallgoods will use this syngas and biogas energy as a clean fuel, displacing LNG and electricity, to produce either steam, hot water or electricity.

The bioenergy process



## STEPS TO ANAEROBIC DIGESTION

- 1 Organic waste is collected and decomposed in oxygen-free conditions inside a contained facility.
- 2 Micro-organisms (from biosolids) digest the decomposing waste, which releases a biogas.
- 3 The biogas is captured and heated via a combined heat and power unit, which converts it to energy.
- 4 The energy is sent back into the unit to power the facility and the Don Smallgood plant.

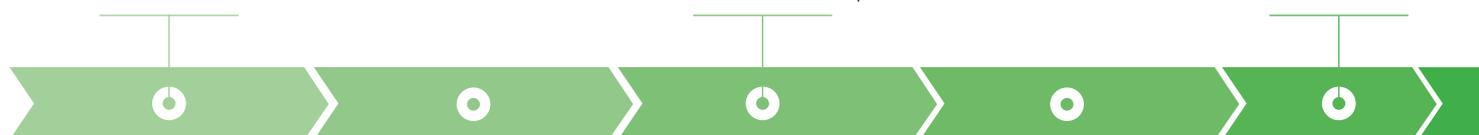
# PROJECT TIMELINE TO DATE

AT AUGUST 2021

**2015 CONCEPT** MASG first explored the practicality of a **Bioenergy from Waste** facility in the shire in 2015.

**2017-2018 FEASIBILITY STUDY – BUSINESS CASE**  
With the support of the Shire Council, Coliban Water, DON Smallgoods, and funding from State and Federal government along with the McKinnon Family Foundation, a feasibility study was conducted and business case presented.

**2021 PRE-CONSTRUCTION**  
Pre-application community consultation and planning.



**2016 PRE-FEASIBILITY** Embarked on a pre-feasibility study, funded with philanthropic support.

**2019-2020 (COVID) NEGOTIATION WITH DON/GWF**  
The concept of the project was shared with Council, presented at a town hall community event and discussed in the media.

CURRENT STATUS AUG 2021 → COMMUNITY CONSULTATION

# HOW COULD A BIOENERGY FACILITY BENEFIT US?

Our waste and recycling systems are under extreme pressure, and landfills across the region are near capacity. Government and councils realise that landfill of organic matter is not the answer. It creates more greenhouse gas emissions and wastes a valuable energy source. The recent IPCC report (August 2021) is alarming and scientists tell us that if we are to avoid catastrophic climate change we need to act quickly. Local community action is essential.

The proposed bioenergy plant provides a safe, environmentally responsible, cost effective and efficient way of turning multiple issues into an elegant solution that has great local benefits (less waste, reduced emissions, clean renewable energy, multiple co-products). Furthermore it will help drive progress towards Mount Alexander Sustainability Group's target of **zero net emissions by 2030** whilst helping meet the Victorian Government's target of **zero net emissions by 2050**.

## REDUCE

- A saving of 88,500 tonne/CO<sub>2</sub>e per year
- Divert ~36,000 tonnes of organic waste from landfill annually
- Divert all of Don Smallgoods organic, non-toxic waste away from landfill
- Net emissions across the precinct
- Existing emissions, noise and odour levels currently experienced across the precinct
- Synthetic fertilizer used by local agriculture and hence emissions
- Australia's reliance on fossil fuels

## WHEN WILL IT BE OPERATIONAL?

The proposed plant would become operational in 2023.

## WHERE WILL IT BE BUILT?

The proposed location for the facility is on a section of unused Don Smallgoods industrial zoned land on Richards Rd, Castlemaine.



↗ Aerial view of the proposed site

## PRODUCE

- 24/7 dispatchable and controllable renewable energy 365 days a year
- 270,000 GJ of renewable energy
- A bio-fertiliser (using biochar blend) that contributes to regeneration of local farmland, and drought resilience
- Local processing facility for agricultural and commercial organic waste.
- A case study for future community-led bioenergy initiatives
- Secure local and sustainable employment opportunities in the shire
- Hedges against loss of regional revenue due to purchase of grid energy
- Inspires the younger generation with positive climate-friendly solutions
- Contribution from profits to help fund future community projects

## WHERE DOES OUR ORGANIC WASTE CURRENTLY GO?

Short answer: mostly to landfill.

Around 42% of household and commercial waste going to landfill is food and garden waste which could be recycled. Left to rot it undergoes anaerobic decomposition and generates significant quantities of methane which is released into the atmosphere.

## WHAT ORGANIC WASTE WILL BE USED AT THE FACILITY?

The bioenergy plant uses organic waste streams that would otherwise be destined for landfill where they generate large amounts of methane, a greenhouse gas 27 times more potent than carbon dioxide.

## WHY IS THE DON SMALLGOOD'S PLANT THE PREFERRED SITE?

- They are sited on Industrial Zoned land (I1Z)
- They can directly use all of the energy generated without it having to use the mains gas or electricity grid
- They can take the energy in raw form (gas or steam) and do not require it to be converted to electricity
- They are a source of significant amounts of organic waste which otherwise is sent to landfill where methane is created and escapes into the atmosphere
- The siting is largely hidden from neighbours and out of the way
- The combination of the above results in a commercially viable facility

## WILL THERE BE AN INCREASE IN NOISE OR ODOUR?

Waste is delivered to and processed inside a contained facility. We expect overall a net reduction of existing noise levels and odours. All aspects of the anaerobic digestion process will be fully enclosed, minimising impacts on air quality, noise and vibration.

## WILL TRAFFIC INCREASE THROUGH THE AREA?

It is anticipated that between 3 and 5 employees will be employed on the site during a working day between 8am and 6pm. This is insignificant given the 600 odd vehicles involved at a Don Smallgoods shift change.

We also expect 4 to 5 trucks to access the site daily. These would displace an average of 2 per day trucks going to landfill so an overall increase of 2-3 trucks per day on the current 30+.

## WOULD THERE BE ANY VISUAL IMPACTS FOR NEARBY RESIDENTS OR BUSINESSES?

The building will be low profile with minimal visibility from the road or residents. Tree planting will be undertaken as necessary to provide appropriate screening. We will also consider all community suggestions for minimising potential visual impact to neighbours.

## IS BIOGAS HARMFUL TO THE ENVIRONMENT?

Biogas is mostly methane and carbon dioxide produced through the anaerobic digestion process and is contained inside a controlled low pressure facility. The biogas is captured and hence not released into the atmosphere, so the environment is unharmed. Instead, it is contained, collected, purified and converted to renewable energy for using, storing or converting into electricity and exported to the electricity grid.

## IS THERE A RISK OF EXPLOSION?

Biogas is inherently safe because it is not explosive. The waste is broken down inside a contained facility under controlled temperature and pressure settings. The risk of explosion is extremely low and far less than other waste facilities operating in Australia. **Energy Safe Victoria** ensures that all safety requirements are met.

## WILL RECYCLABLE MATERIALS BE ACCEPTED?

There will be no recyclable materials processed. Out of date foodstuffs that may be accepted will be stripped of their packaging and this will be sent for recycling.

## ANY BIODIVERSITY IMPACTS?

The biodiversity impacts arise as a consequence of the co-products created from the bioenergy plant. The potential for biofertiliser (biochar, digestate, rock dust and compost) is significant. It can contribute greatly to local agriculture through improved soil health, increased water holding capacity, more diverse soil micro-organisms and vegetation.

## WHO WILL OPERATE AND OWN IT?

MAB is a company established by Mount Alexander Sustainability Group to conduct this project. We expect investors to take a majority shareholding of MAB and to either operate it themselves or appoint an operator, whilst preserving the inherent values that gave rise to this project. MASG will seek to retain a seat on the board to oversee this.

## WHERE CAN I FIND OUT MORE OR HAVE MY SAY?

We encourage all members of the community to be fully informed about the project and the benefits it brings to the local community, whilst remaining discerning about what the bioenergy plant is and is not. MASG welcomes hearing your thoughts and concerns whilst inviting the community to support this project.

You can provide feedback to the project team by emailing [info@masg.org.au](mailto:info@masg.org.au) or via the MAB website [www.bioenergy.net.au](http://www.bioenergy.net.au). More detailed information on the proposed development is also available on the MAB website including detailed Q+A documents. As the project progresses, detailed fact sheets will become available.

More detailed information about bioenergy can be found at the following websites:

[www.energy.vic.gov.au/renewable-energy/](http://www.energy.vic.gov.au/renewable-energy/)

[www.sustainability.vic.gov.au](http://www.sustainability.vic.gov.au)

[www.arena.gov.au/renewable-energy/bioenergy/](http://www.arena.gov.au/renewable-energy/bioenergy/)