

Promoting Bioenergy in Gippsland

Conor Blomquist, Avery Ingegneri, Sydney Seo, Ari Trey-Masters
Friday, April 26th, 2019

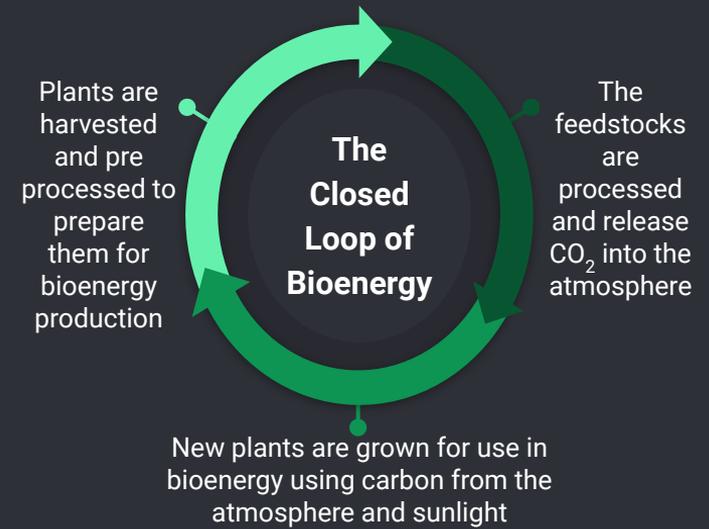


We would like to show our respect to the traditional custodians of the land on which this presentation takes place and pay respect to their Elders, past, present and emerging.

Climate Change



Background on Bioenergy



Feedstock

- Agricultural and timber waste
- Organic municipal and industrial waste
- Waste water
- Animal residues
- Oil-producing plants

Processing

- Direct Combustion
 - Cofiring
- Thermochemical
 - Gasification
 - Pyrolysis
- Biochemical
 - Anaerobic Digestion

Outputs

- Electricity
- Biofuel
- Biogas
- Heat
- Secondary byproducts:
 - Compost
 - Activated carbon

Project mission:

To assist the development of a bioenergy framework in Gippsland through an initial survey of New England (USA) bioenergy, a food-waste survey of Warragul and a viability and feasibility template of using bioenergy at the Grantville Landfill facility

Our Project Objectives

Objective 1

Undertake an analytical overview of bioenergy projects in the New England region, USA, as well as several relevant Victorian case studies

Objective 2

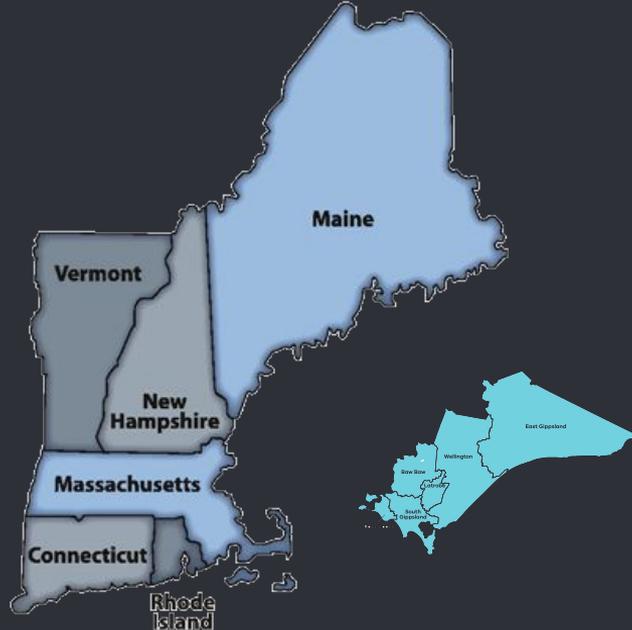
Conduct a representative survey of 30+ organizations' food waste usage in Warragul, Gippsland

Objective 3

Create initial template to determine the viability and feasibility of using bioenergy in Gippsland utilizing the Warragul and Grantville assessments

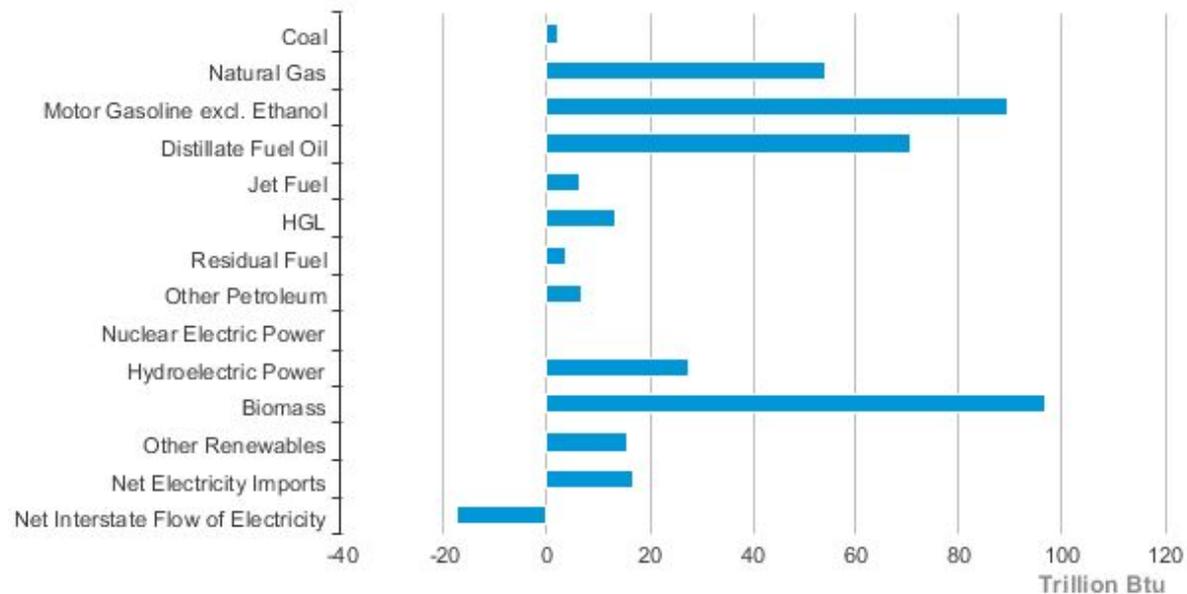
Objective 1

- Undertake a technology trend assessment, market analysis and supply chain analysis of bioenergy projects in the New England USA region, providing examples and case studies, as well as case studies focused on Victoria, Australia to allow for initial comparative analysis.



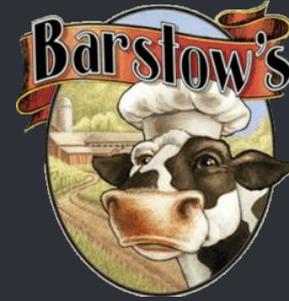
Overview of NE bioenergy usage

Maine Energy Consumption Estimates, 2016



Source: Energy Information Administration; State Energy Data System

New England Case Studies: Barstow Farm



- Located in Hadley, Massachusetts
- Partnership with Vanguard Renewables, Cabot Creamery, local food waste sources
- Produces electrical energy, heat, and organic fertilizer for itself and Cabot Creamery



New England Case Studies: Quantum Biopower



- First anaerobic digester in Connecticut
- Mission is to educate about renewable alternatives
- Located in Southington, Connecticut
- Marketing Demonstration Tool



New England Case Studies: UMass Extensions



The Center for
Agriculture,
Food and the
Environment

University of Massachusetts CAFE Program

- Research based operation facilitating the spread of information
- Has a number of research farms and online solutions
- Funds and spreads research to local businesses and organizations



UMass
Clean Energy
Extension

Research & Outreach



UMass
Extension

Crops, Dairy,
Livestock &
Equine
Program



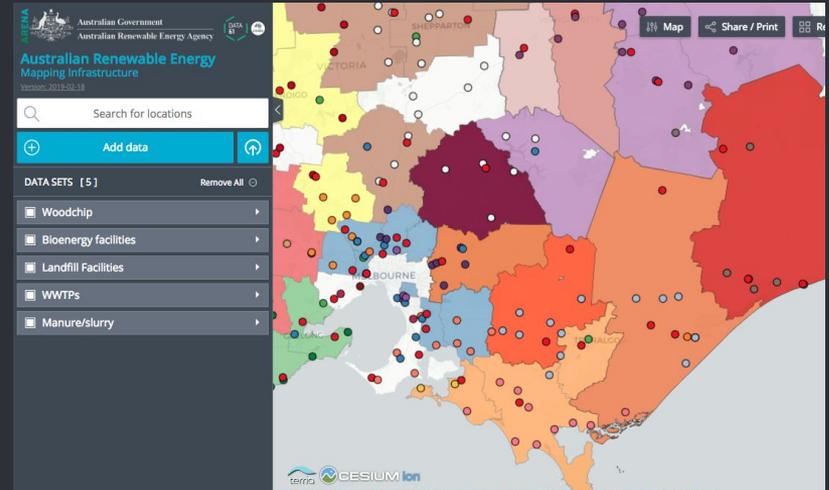
Victorian Case Studies

- **Berrybank Farm**
 - Piggery waste to energy and compost
- **Smorgon Fuels**
 - Biodiesel from waste/waste oil
- **BE Bioenergy**
 - Farming oil crops for biodiesel
- **Reid Brothers Sawmill**
 - Timber waste to heat and energy
- **South Eastern Organics Processing Facility**
 - High-grade compost from green waste
- **Murray Goulburn Co-Operative**
 - Biogas from dairy waste
- **Beaufort Hospital**
 - Wood chips for heat
- **Australian Tartaric Products**
 - Grape waste into electricity



Objective 2

- Develop a food waste data generating methodology and test it during a Food Waste Assessment of Warragul. Conduct food waste assessments and surveys of as many of 150 food and hospitality SMEs in the Warragul area as possible. Generate a qualitative and quantitative report and integrate the data into the ABBA database.



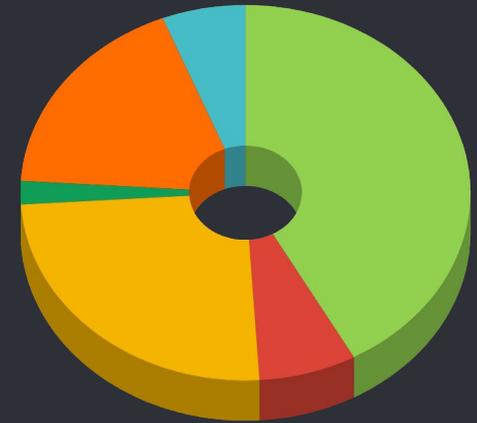
Objective 2- Warragul Methodology



Objective 2 - Example of Warragul Survey Data

Earth Market Cafe

- Type: Café
- Size: N/a
- Types of Waste: General Waste, recycling, and paper/cardboard (6x general waste, 6x recycling, 1x 660L cardboard)
- Number of bins: 6
- Size of bins: 240 L
- Pick up: 1x per week
- Full at end of week: 100%
- Notes: Food waste in pig bins, not much food waste. Separate for recycling and cardboard. 12 bins shared by multiple businesses (hairdresser, cafe, etc.)
- Waste Breakdown
 - 42% Avoidable Food
 - 7% Unavoidable Food
 - 25% Paper
 - 2% Plastic Containers
 - 18% Residual Waste
 - 6% Coffee Grounds



- Avoidable Food
- Unavoidable Food
- Paper
- Plastic Containers
- Residual Waste
- Coffee Grounds

Real Time Analysis Example

Abbey Gardens

Bin:

70 litres

Waste Breakdown:

85% residual waste

5% avoidable food

10% unavoidable food



Objective 2 - Final Warragul Results

ANZSIC Code	No. of establishments surveyed	Kg / Week	Kg / Week per establishment
Accommodation (ANZSIC 4400)	1	33	33
Bakery (ANZSIC 1174)	3	528	176
Cafés or Restaurants (ANZSIC 4511)	25	6354	254
Child Care Centre (ANZSIC 8710)	3	133	44
Church (ANZSIC 9540)	1	21	21
Community Group - Club (ANZSIC 8790)	3	593	198
Nursing Home/Aged Care Facility (ANZSIC 8601)	3	236	79
School Canteens or Take Aways (ANZSIC 4512)	8	1024	128
Supermarket (ANZSIC 4110)	4	3085	771
Total	Businesses Surveyed	Kg / Week	Kg / Year
	51	12007	624364

Qualitative Data Excerpts

Quote	Source (General)
“We are doing a lot. We have degradable bins and a large container to collect food waste next to our rubbish. However, we definitely have a long way to go.”	Local Grocer
“The only food that goes into the rubbish are orange peels. All other lunch waste is composted in the worm bins or fed to the chickens out back.”	Childcare operator
“We try to reuse as much of our prep waste as we can, but there are limits on what we can do with table scraps once people eat it.”	Cafe Owner
“I do not have any food waste. I have 6 large compost bins outside, as well as dogs and chickens. All of the leftover food from any of the events I cater ends up being either eaten or utilized to grow more food”	Local Caterer

Objective 2 - Qualitative Discoveries

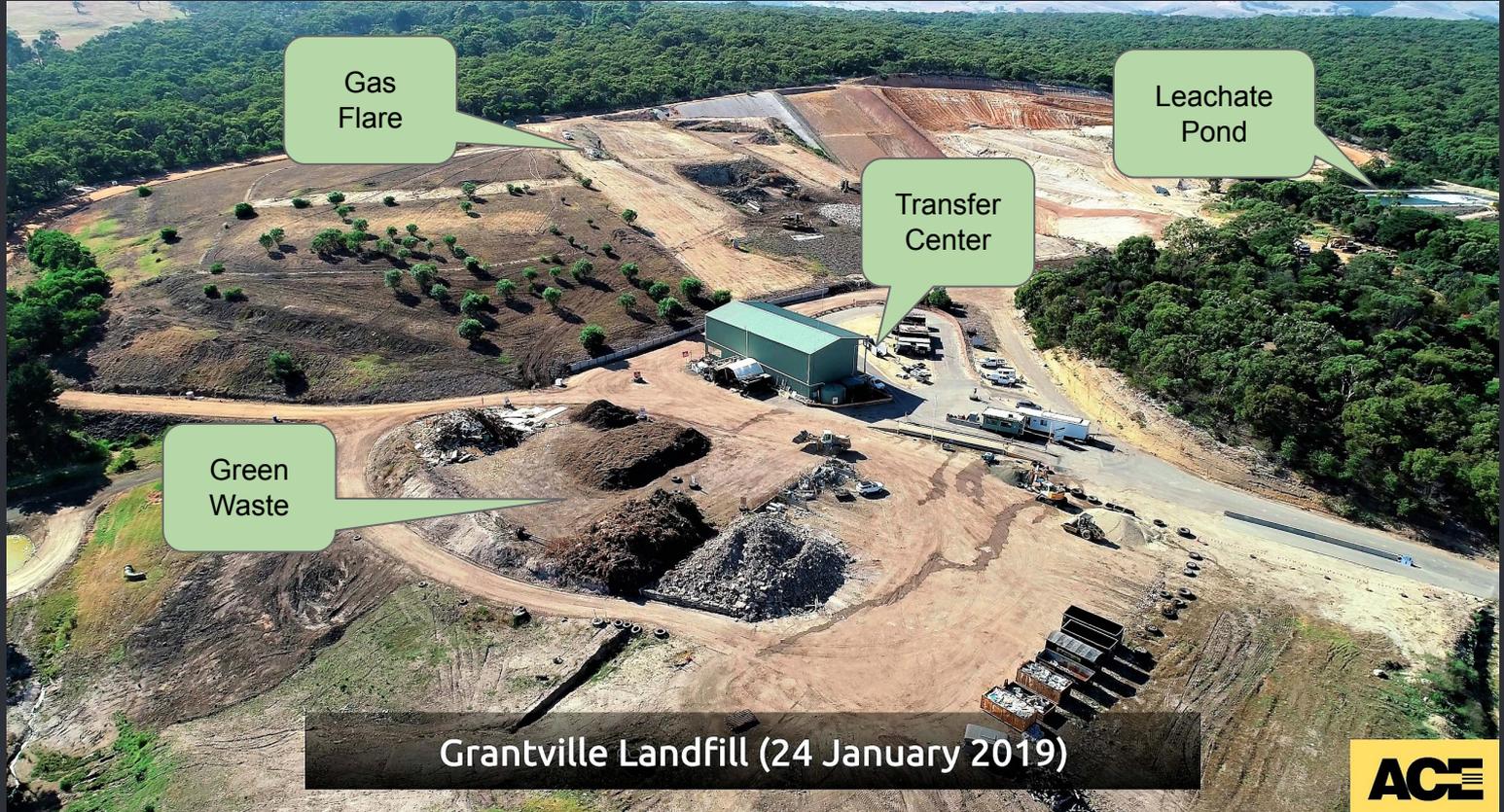
- Sustainable food waste practices
 - Perishables donated to charities, given to farmers/chickens/pigs, composted
 - Generally, smaller places were more sustainable and larger places were less sustainable
 - Stronger connections to farmers and focus on food service
- Lots of enthusiasm towards the project from most of the surveyed businesses
- Most businesses would like different bins for recycling
 - Majority of the businesses had paper/cardboard, but nothing for food waste
- Could benefit from educational campaign to disseminate information

Objective 3

- Assist SRI and its stakeholders to develop an initial framework (viability and feasibility) to assess the bio-hub development opportunity at Grantville, Bass Coast Shire, and a potential micro bio-hub for Warragul (applying the SV Warragul ABBA Data survey findings).



Objective 3 - Grantville Landfill



Grantville Landfill (24 January 2019)



Objective 3 - Grantville Landfill



Gas Flare

Objective 3 - Grantville Landfill



Wood Waste Pile

Objective 3 - Waste to Energy Technologies

Technologies	Viable	Companies	Value Added Products
Incineration	X	Currently used on site at Grantville Landfill	<ul style="list-style-type: none">• Heat & Power
Pyrolysis	✓	Pyrotech Earth Systems Pyrocal	<ul style="list-style-type: none">• Biochar• Heat & Power• Syn-gas
Gasification	✓	MAGS Pyrotech	<ul style="list-style-type: none">• Biogas• Heat & Power
Plasma Arc Gasification	X	Zenergy Australia	<ul style="list-style-type: none">• Biogas• Heat & Power
Anaerobic Digestion	X	Case studies CERES	<ul style="list-style-type: none">• Biogas• Heat & Power• Compost

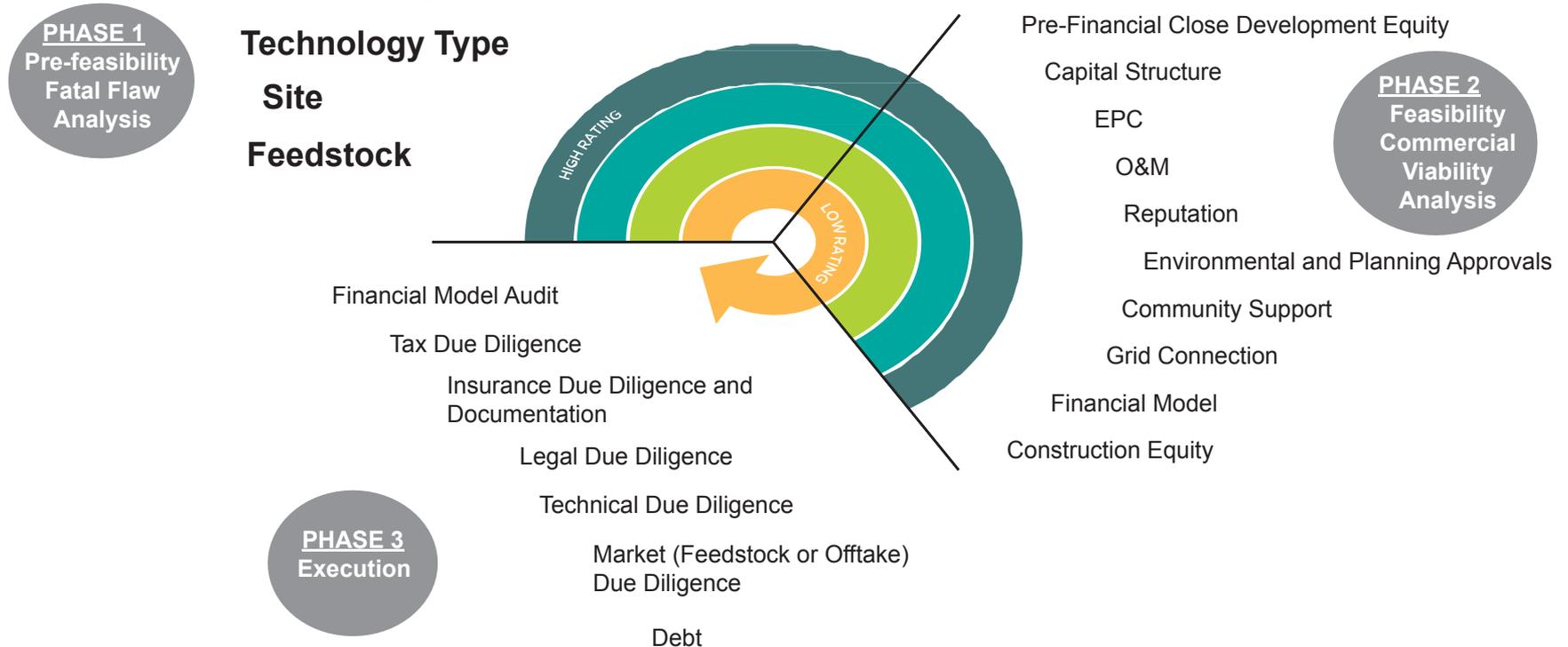
Objective 3 - Data Summary

Redacted Proprietary Data

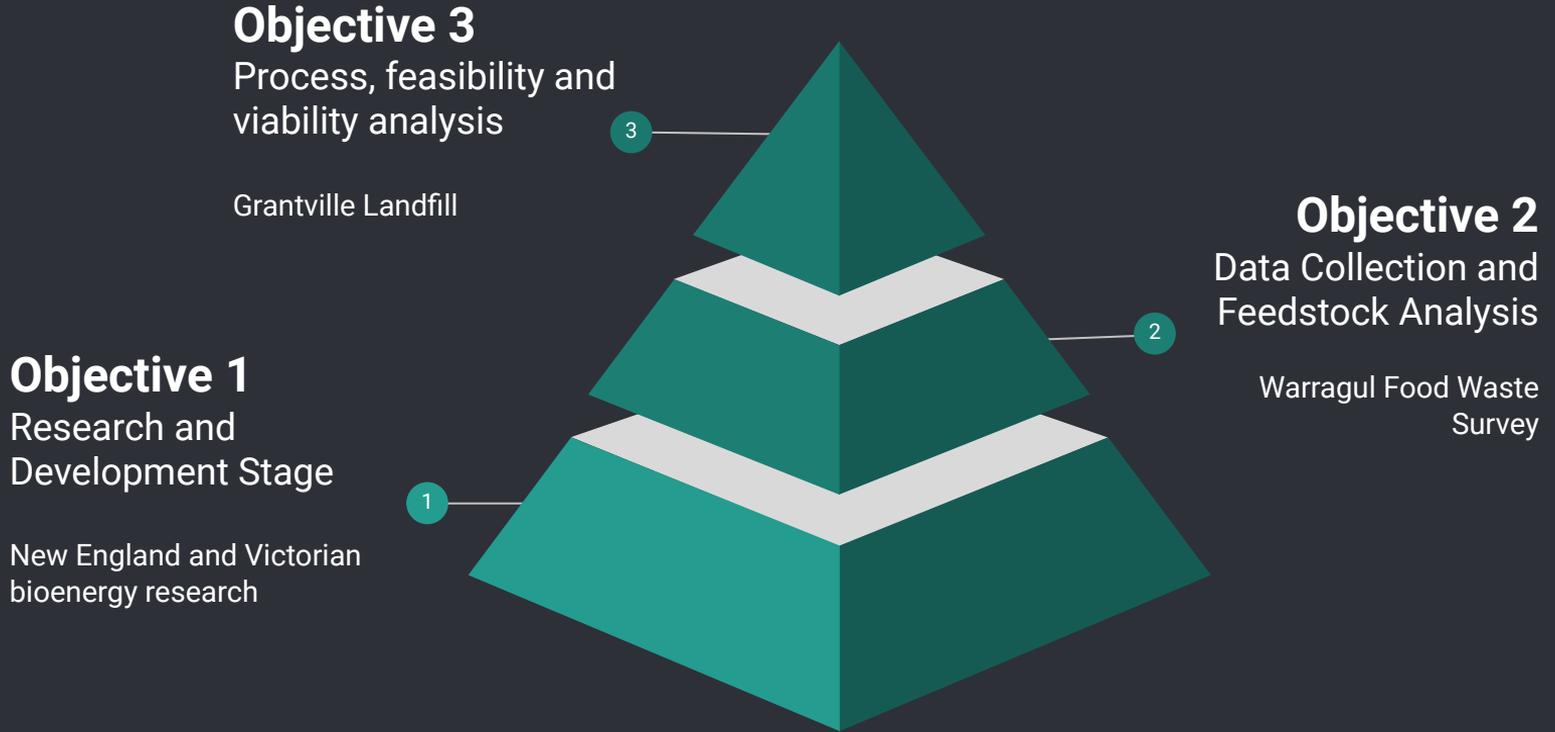
Redacted Proprietary Data

Preliminary Financial Model / Project Return (IRR)

Offtake Arrangements (power, heat, fuel)



Conclusion



These project components showcase the initial stages of a bioenergy framework

Recommendations

1. Utilize the survey methodology developed by the WPI team to collect data for the ABBA database in other townships.
2. Pursue a bioenergy micro-hub in an area other than Warragul due to the area's current sustainable practices and lack of feedstock.
3. Continue exploring the two technologies as viable options for generating energy from green waste at Grantville, depending on ACE's desired primary and secondary outputs.

Acknowledgements

Our team would like to acknowledge all of the individuals and organizations that helped in the completion of this project.

Sponsors:

Sustainability Victoria

Gippsland Climate Change
Network

Snowy River Innovation and
Supporting Project Partners
- Capricorn Power, ACE
Contractors, Genesis Now,
and Going Solar

Warragul Project Partners:

Warragul Business Group

Baw Baw Sustainability Network

Baw Baw Shire Council Officers

Federation Training

Federation University

SME Survey Participants

Thank You

Questions?