



**OMEGA ENERGY**

A New Horizon in Resource Recovery

# Presentation Overview

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5. Technology Overview





## Company History

# Overview

## Company

- Project Concept – began late 2011 by ESS Australia Pty Limited
- Omega Energy formally established – Oct 2013

## Corporate Structure

- Jacob Whiting – General Manager / Executive Director
- Shannon Sullivan – Business Development Manager / Executive Director
- Lauren Davison – Financial Controller
- Represent interests of various investors / shareholders / directors

## Background

- Company principals have a development industry background
- Infrastructure and opportunity focus
- Using technology to disrupt the current waste market



# History

## 2011 - 2012 Milestones

- Due diligence (waste, energy, technology, financial viability, policy, etc)
- Vetted EfW technology types (incineration, gasification, etc)
- Identified preferred site location (infrastructure, regional proximity, etc)

## 2013 - 2014 Milestones

- Secured site
- Secured initial investment funding
- Commenced planning process

## 2015 Milestones

- Completed technology review and commence negotiations with technology partner



# Purpose

Omega Energy (Omega) is an Australian based renewable energy company. Omega's vision is to be a leading advanced resource recovery provider in Australia. Omega will develop, manage and own energy from waste projects, recovering commodities and converting residual waste into clean renewable energy. In short, Omega will:

- Demonstrate the Business Case for the project
- Site selection
- Choose the best technology available for the project
- Sign supply agreements with feedstock suppliers
- Obtain all approvals and licenses to erect the plant and process the waste
- Secure financing, debt and equity
- Setup, own and manage the project, i.e. BOO (Build-Own-Operate)

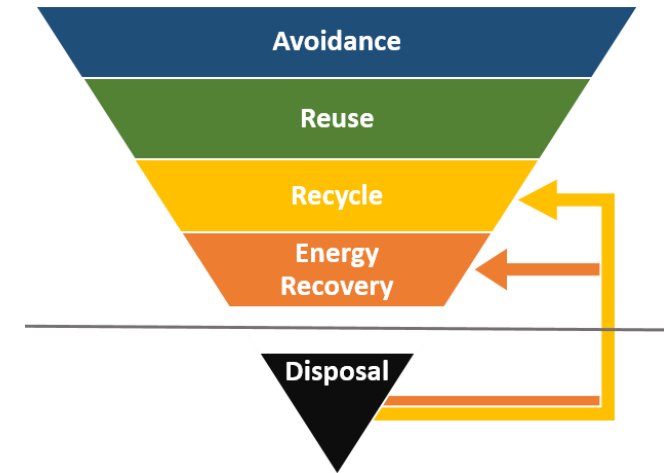




## Project Overview

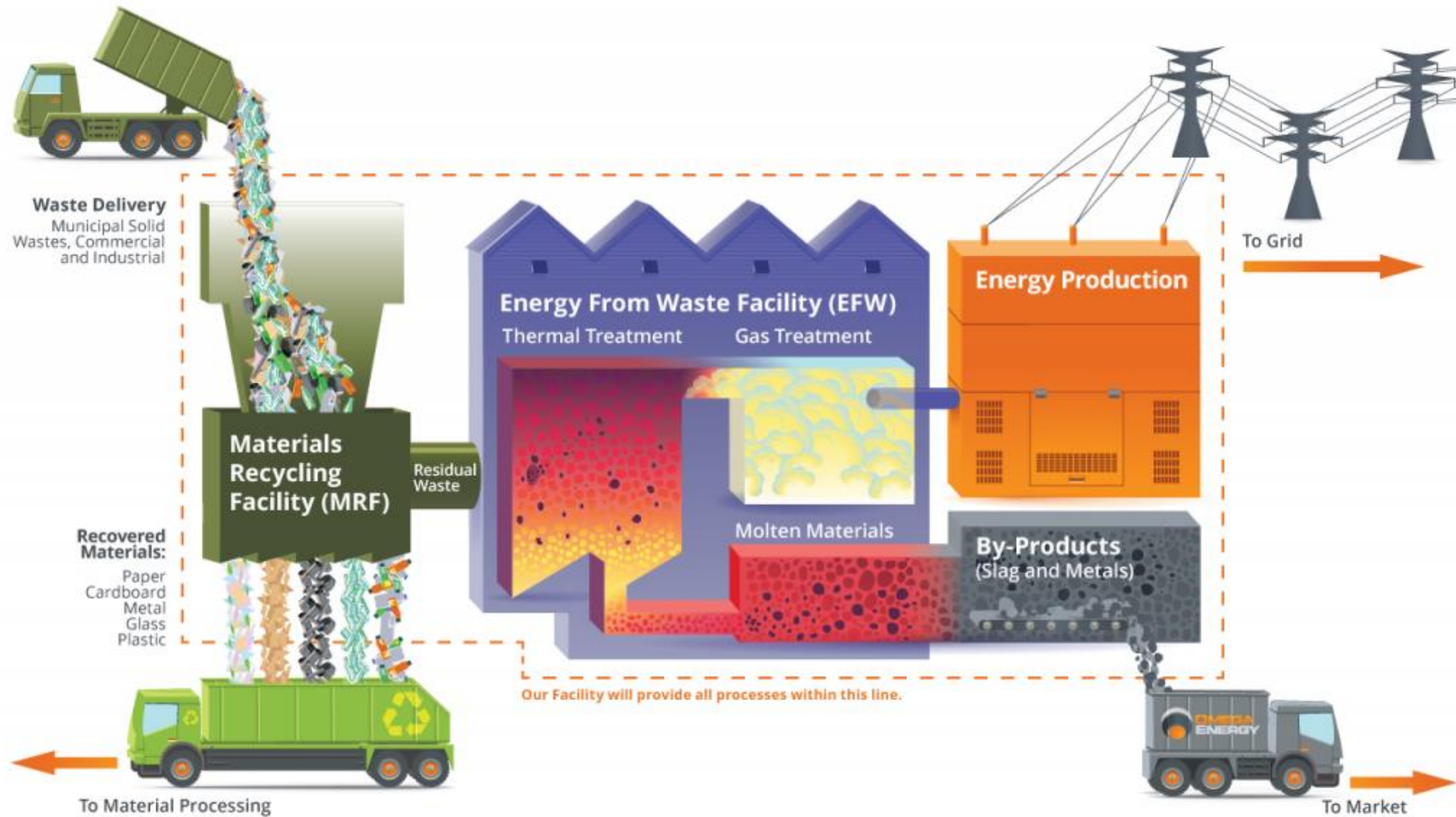
# Attributes

- Facility capacity of up to 200,000 tonnes annually
- Consistent with Energy from Waste policy
- Meets needs of increasing waste pressures
- A viable Red Bin and C&I Resource Recovery option
- Recovery of currently unrecovered commodities
- Renewable energy supply
- A significant direct investment into the region
- Incorporation of a Material Recycling Facility (MRF) within the overall process





# Omega Energy Process Diagram

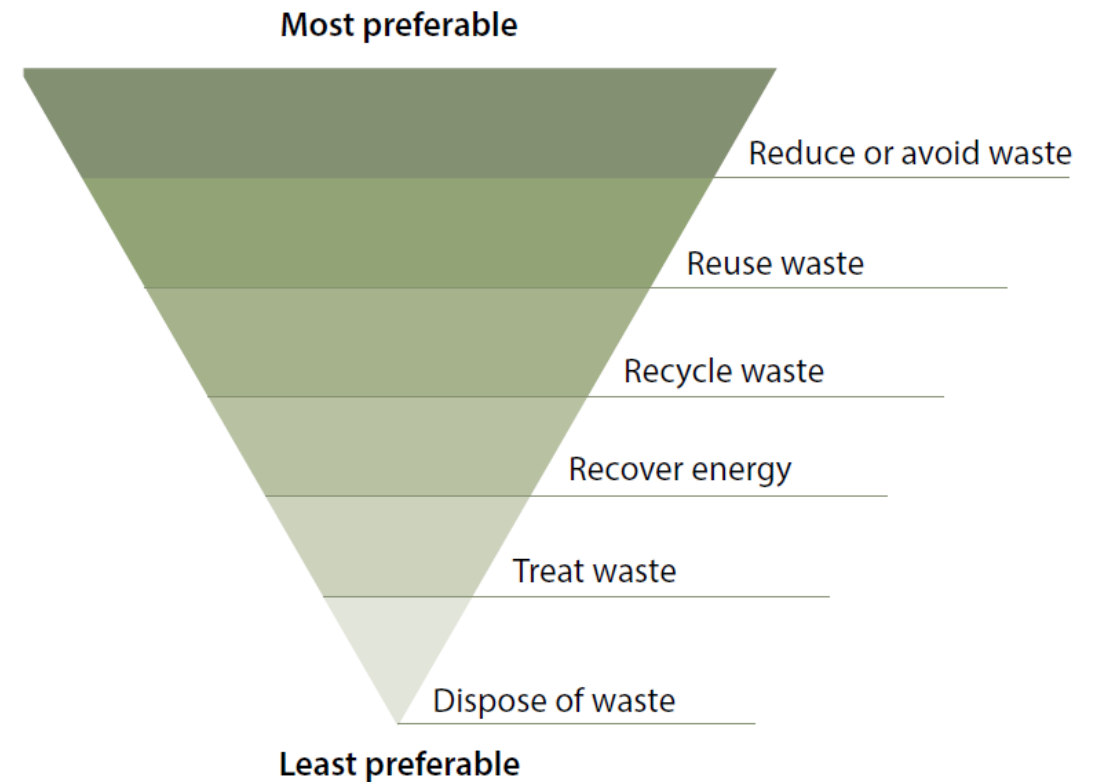




Waste

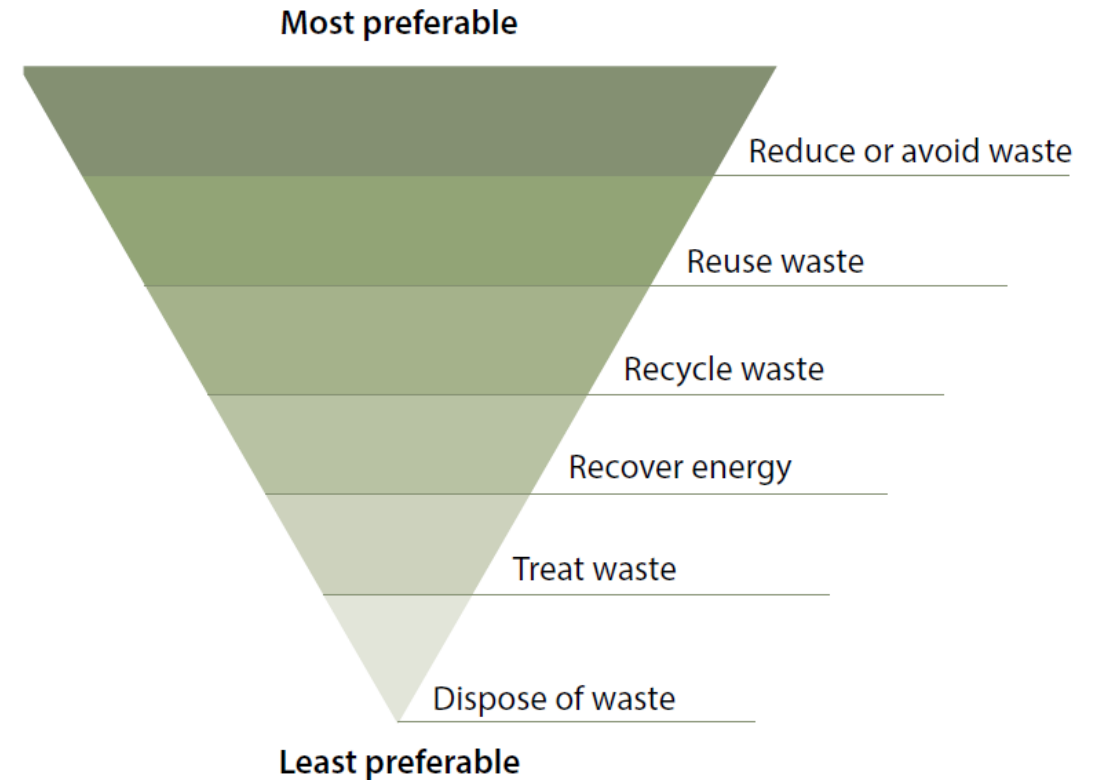
# Waste Policy

- NSW Energy from Waste Policy Statement
- NSW Waste and Environment Levy
- NSW Waste Avoidance and Resource Recovery Hierarchy – draft (image)
- Hunter Region Waste Avoidance and Recovery Strategy
  - Options to be considered includes *Regional waste to energy, based on gasification system with pre-treatment - a single facility for the region*



# Waste Overview

- Hunter waste market
  - Limited commercial operators
  - Opportunities for significant capital investment
- Regional infrastructure
  - Newly adopted regional waste strategy
  - Existing landfills are nearing capacity
  - Limited cooperation between Councils for residual waste
  - Opportunities to compliment existing infrastructure



**Table 1: Resource recovery criteria for energy recovery facilities**

Mixed wastes		
Waste stream	Authorised facility	% of residual waste allowed for energy recovery
Mixed municipal waste (MSW)	Facility processing mixed MSW waste where a council has separate collection systems for dry recyclables and food and garden waste	No limit by weight of the waste stream received at an authorised facility
	Facility processing mixed MSW waste where a council has separate collection systems for dry recyclables and garden waste	Up to 40% by weight of the waste stream received at an authorised facility
	Facility processing mixed MSW waste where a council has a separate collection system for dry recyclables	Up to 25% by weight of the waste stream received at an authorised facility
Mixed commercial and industrial waste (C&I)	Facility processing mixed C&I waste where that waste is sourced solely from an entity that has separate collection systems for all relevant waste streams	No limit by weight of the waste stream received at an authorised facility
	Facility processing mixed C&I waste	Up to 50% by weight of the waste stream received at an authorised facility
Mixed construction and demolition waste (C&D)	Facility processing mixed C&D waste	Up to 25% by weight of the waste stream received at an authorised facility
Source-separated recyclables	Facility processing source-separated recyclables	Up to 10% by weight of the waste stream received at an authorised facility
Source-separated garden waste	Facility processing garden waste	Up to 5% by weight of the waste stream received at an authorised facility
Source-separated food waste (or food and garden waste)	Facility processing source-separated food or source-separated food and garden waste	Up to 10% by weight of the waste stream received at an authorised facility

# EfW Criteria

- **Energy recovery facility** A facility that thermally treats a waste or waste-derived material that does not meet the definition of an eligible waste fuel. These facilities must be able to demonstrate that they satisfy the NSW EPA Policy.
- **Inputs - Residual waste**
  - MSW
  - C&I
  - Tyres
  - Specific Waste



# Waste Landscape

- In both the National Waste Report 2010 (Australian Government) and the Environmental Issues and Trends January 2010 (ABS), it was noted that Australia produced over 43 million tonnes of waste or over 2,000 kilograms of waste per person, with NSW producing the most waste.
- Medium to long-term projections – for example, Hyder Consulting accurately estimated that based, on data from Sydney, Victoria and the Australian Capital Territory, waste generated in Australia would rise from 31.6 million tonnes in 2002/03 to 42.6 million tonnes by 2012/13 and 57.5 million tonnes in 2022/23.
- Of the 57.5 million tonnes in 2022/23, the projected tonnage of material disposed in landfill would amount to over 31.6 million compared to an estimated 25.8 million tonnes recycled.
- There will be a change in infrastructure dynamics.





Site Assessment

# Site Attribute Criteria

## Historical

- Location based on void space – formal quarries, etc.
- Preferably located remote due to odour, traffic impacts, etc.

## Planning

- Appropriate Land Use Zone
  - Permissible in a broad range of zones
  - Where is the best location?
- Approval pathway

## Infrastructure

- Proximity to transport infrastructure
- Proximity to existing waste infrastructure
- Key site infrastructure
  - Electricity
  - Gas
  - Road





# Site Selection – Hunter Attributes

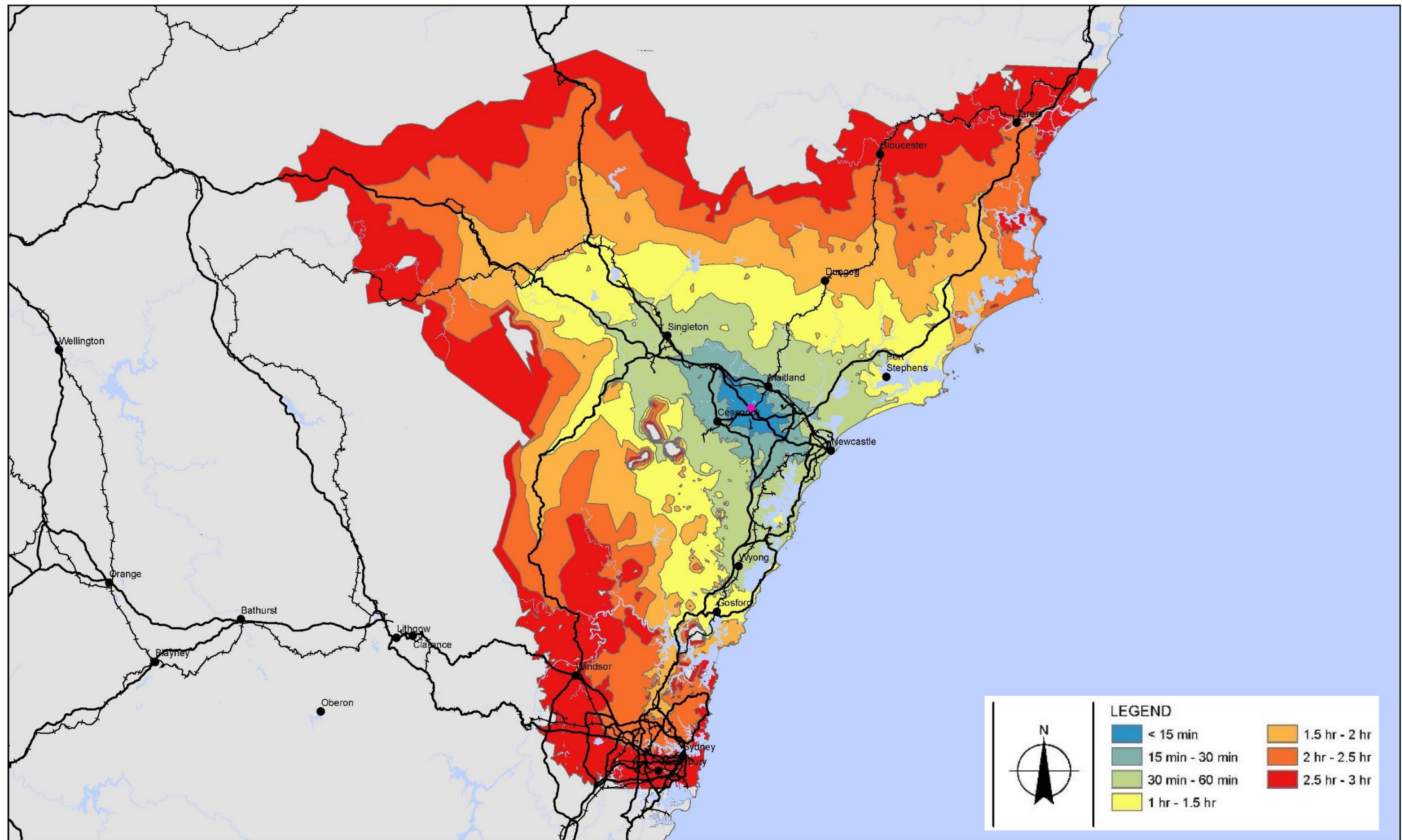
## Planning

- Appropriate Land Use Zone
  - IN3 – Heavy Industrial Zone
  - Within the Hunter Industrial Ecology Park
  - Adjacent to other heavy industries
- State and Regional Development – Project Application

## Infrastructure

- Close proximity to Hunter Expressway
- In close proximity to existing landfill operators
- Key site infrastructure with capacity located on site or in the vicinity
  - Electricity
  - Gas
  - Road









RESOURCE RECOVERY FACILITY





## Technology Overview

# Why Gasification?

There are specific advantages to each technology and a careful consideration of requirements, constraints and outputs is essential in the selection of an appropriate technology for any given project.

A significant degree of overlap between each of the technologies adds further difficulty to individual technology selection.

If gasification is the best solution, the obvious question is WHY there aren't more plants processing MSW using plasma?

There are 100 plants operating numerous different types of waste – why not MSW? The answer is simple.

The capital cost is very high. MSW has very low tipping fees and no one has ever worked out the economics in the past.

(Recovered Energy, Inc., 2010)



# Gasification is not Incineration

Gasification	Incineration
Occurs in the absence or near absence of oxygen, prohibiting combustion.	Excess air is induced to ensure complete combustion.
Gases resulting from degradation of organics are collected and used for production of various forms of energy and/or industrial chemicals.	All potential energy converted to heat.
Products of degradation largely converted to inert (non-hazardous) glass-like slag of a volume 6% to 15% of the original solids volume.	Combustion results in ash (as much as 30% of original solids volume) that must often be treated as hazardous waste.
Emissions substantially lower than those resulting from incineration.	Far greater emissions of GHG and other pollutants than with thermal gasification systems.

*Dovetail Partners, Inc. (7 June 2010)*



# EfW Technologies/Companies

The table below shows the spectrum of technologies reviewed by Omega.

Technology	Providers	
Incineration	Seche Environnement (SEV)	
Combustion	Covanta (CVT) Hitachi Zosen Inova (HZI)	Eurolasma (EPL) Entech (ETC)
Traditional Gasification	Environmental Energy Resources (EER) Peat International (PTI)	Thermoselect (THM)
Gas-Plasma	Advanced Plasma Power (APP) Nippon Steel (NPN) JFE Engineering (JFE)	Inentec (ITC) Plasco (PLS) Alter NRG (NRG)
Plasma Arc Gasification	Arc Sec Technologies (AST) Pyrogenesis (PYR)	





# Outputs

Different technologies will result in minor differences in percentages/volumes of outputs, but generally most gasification technologies will result in:

- Synthesis Gas
  - Steam/electricity
  - chemical feedstock or
  - liquid fuels
- Metals
- Slag
  - rock wool
  - building products or
  - Aggregate
- Residual
  - Gasification - Flue gas treatment, bag filters, etc. will accumulate up to 2% in pollutants/ash that will need to be deposited in landfill.





# Conclusions

There are a number of fundamentals that have prevented the EfW sector from developing in Australia.

- What is the business case?
  - Commercial basis for the project
  - Costs for alternatives
  - Large capital investment, requires long term waste capture
- Long term basis of the decision?
  - Will the policy drivers remain, uncertainty around government decision making
  - What will the waste landscape be like in 10-20 years
  - What will the waste composition be
- Why are you proposing an EfW solution?
  - Environmental/social
  - Financial
  - Providing alternatives in the market, dealing with residual/difficult wastes or would it deal with the 'easy' waste streams
  - Conserving existing void space
- Is recycling the current 'environmental fad', will people move onto the next fad?





# Thank You

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