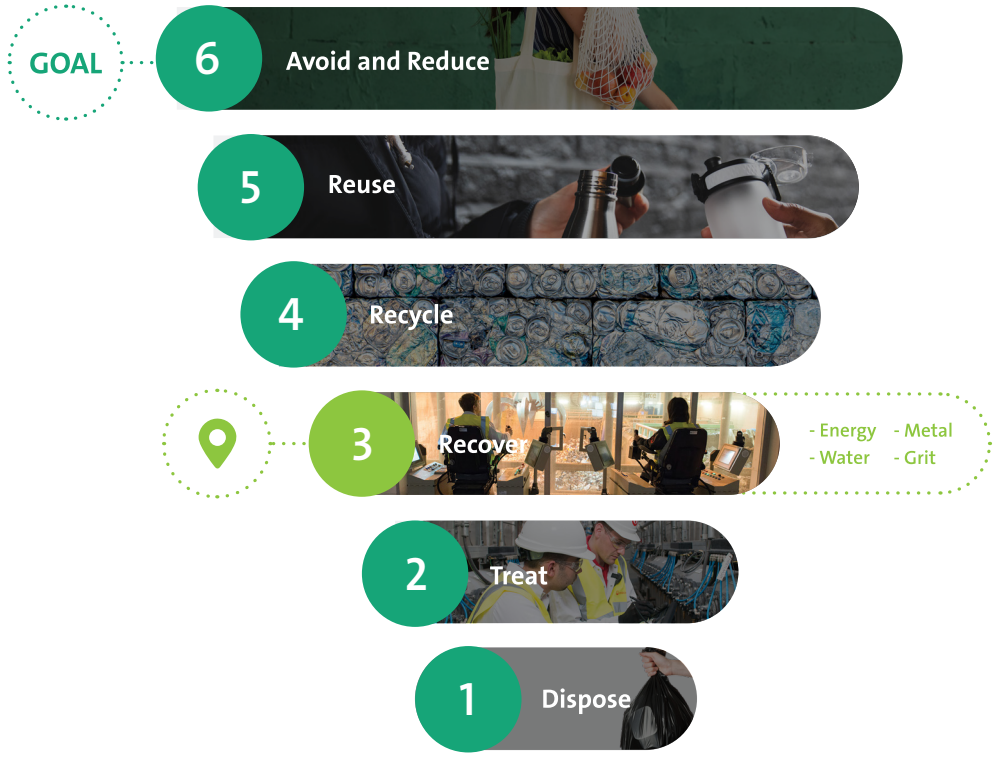
Energy from waste

INTRODUCTION

Where we cannot first avoid, reuse or recycle waste, the next most sustainable way to minimise environmental impact is to recover energy. After every effort is made to extract materials that can be recycled from commercial and residential collections, non-recyclable waste can be sent to Energy Recovery Facilities. Here, waste is safely combusted to recover energy, metals and grit, reducing the need to send waste to landfill and contributing to the circular economy.



Energy from Waste technology is proven and is safely being used in developed countries around the world, with over 450 facilities operating in Europe alone. Veolia operates over 65 Energy Recovery Facilities overseas and will soon manage two more that are currently under construction in Perth, Australia.

HOW ENERGY FROM WASTE WORKS

Energy from Waste works by drying and combusting residual waste with air in a controlled setting. It works in a similar way to conventional coal or gas combustion, where heat is produced to boil water into steam. The steam then drives a turbine, which is coupled with a generator to produce electricity. Instead of using fossil fuels, Energy from Waste technology has been adapted to use non-recyclable waste as the fuel source. For each tonne of coal the same energy output can be sourced from three tonnes of waste. This reduces both our reliance on fossil fuels and the volume of waste sent to landfill.

The ARC will divert up to 380,000 tonnes of waste from landfill per year, where it will be used as feedstock to produce 30MW of energy for the local power grid per year.

You can watch a video about how energy from waste works here.

How the technology works

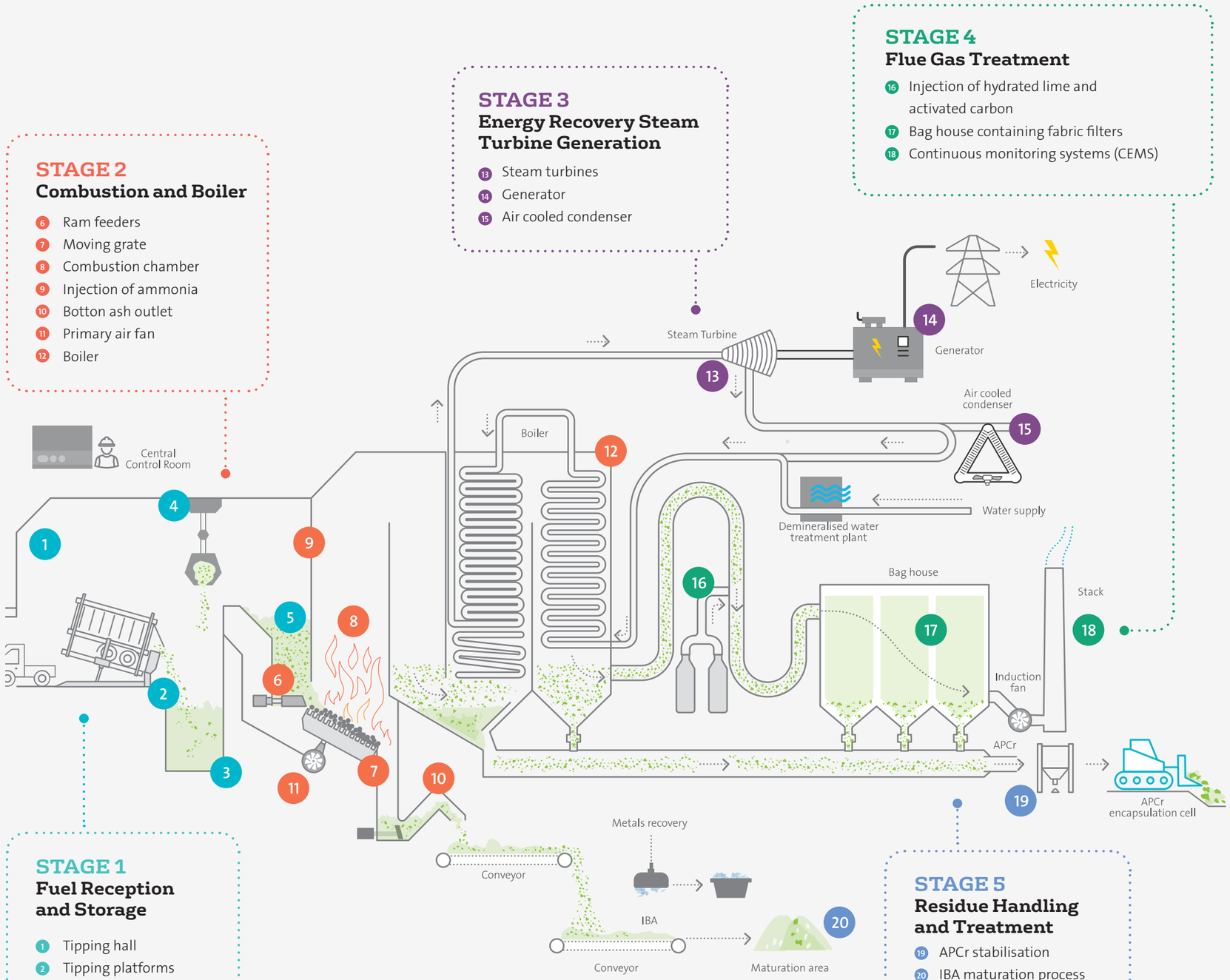
STAGE 1
Waste that can't be recycled is tipped into the waste storage bunker. The waste is lifted by overhead cranes and placed on the feed hopper.

STAGE 2
The waste is fed over a moving grate, where it is thermally treated at temperatures above 850 degrees for two seconds. Ammonia is injected to control oxides of nitrogen.

STAGE 3
Above the furnace is a large boiler, where the resulting superheated steam is used to drive a turbine coupled to a generator to produce energy. After exiting the turbine, the steam passes through an air cooled condenser to return water to the boiler system.

STAGE 4
Hydrated lime and activated carbon are injected to the flue gas to neutralise its acidity and to adsorb pollutants. The flue gas passes through a filter bag house, and particulates within the gases are removed by filter bags. Clean gases are released through the stack. These gases are monitored continuously to ensure environmental limits are met.

STAGE 5
Particulates removed by the filtering process will be stabilised and sent to a purposely built encapsulation cell within the site. An electromagnetic separator removes metal from the ash, which is then recycled. Remaining ash will be either conveyed to a designated area for maturation and eventually turned into alternative aggregate material.



STAGE 1
Fuel Reception and Storage
1. Tipping hall
2. Tipping platforms
3. Waste bunker
4. Overhead grab canes
5. Feed hopper

STAGE 2
Combustion and Boiler
6. Ram feeders
7. Moving grate
8. Combustion chamber
9. Injection of ammonia
10. Botton ash outlet
11. Primary air fan
12. Boiler

STAGE 3
Energy Recovery Steam Turbine Generation
13. Steam turbines
14. Generator
15. Air cooled condenser

STAGE 4
Flue Gas Treatment
16. Injection of hydrated lime and activated carbon
17. Bag house containing fabric filters
18. Continuous monitoring systems (CEMS)

STAGE 5
Residue Handling and Treatment
19. APCr stabilisation
20. IBA maturation process

Scan to watch a video of this process

IN SUMMARY

1 Waste is dried and combusted at high temperatures

2 Heat is generated and steam produced

3 Gases are cleaned to the highest standard worldwide and no liquids or odours are discharged

4 The steam drives a turbine coupled to a generator to produce electricity

In addition to the energy produced, three other materials are recovered during the process:

Bottom ash: stones, grit, glass and rocks are collected for use in the construction industry

Fine dust: captured and managed within the site

Metals: collected for recycling

THE ROLE OF ENERGY FROM WASTE IN THE CIRCULAR ECONOMY

Energy from Waste plays an important role in the development of the circular economy, something that has been recognised as a necessary addition to sustainable waste management by both the NSW and Commonwealth governments. Energy from Waste involves the production of low-carbon electricity and the recovery of recyclable materials as a sustainable alternative to disposing of waste to landfill. The recent NSW Waste Management and Sustainable Materials Strategy 2041 identified the need for at least one energy recovery facility to service Greater Sydney by 2030 and three more by 2040 across the state.

The NSW Government also released the Energy from Waste Infrastructure Plan in September 2021 which identified four locations in NSW as Priority Infrastructure Areas for Energy from Waste infrastructure. One of these is the Southern Goulburn Mulwaree Precinct in which the Woodlawn Eco Precinct is located. Further information about the ARC's technology can be found in Chapter 4 of the EIS.