

Future of Waste Management in Australia – Collection and Treatment

Chani Lokuge

AECOM Technical Director – Waste Management

2 November 2018

Agenda

- Current waste collection issues
- Innovative solutions for waste collection
- Energy from waste technologies
- Key factors for successful energy from waste project delivery
- Questions and discussion





Waste Collection

Current Issues and Innovative Solutions

Waste collection: So what's the problem?

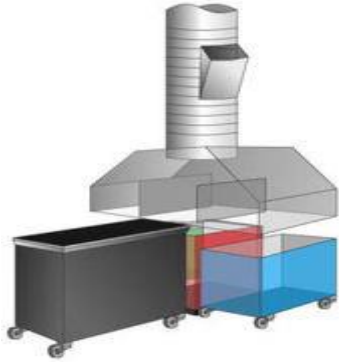


“Can't they just place the bins out like normal dwellings”

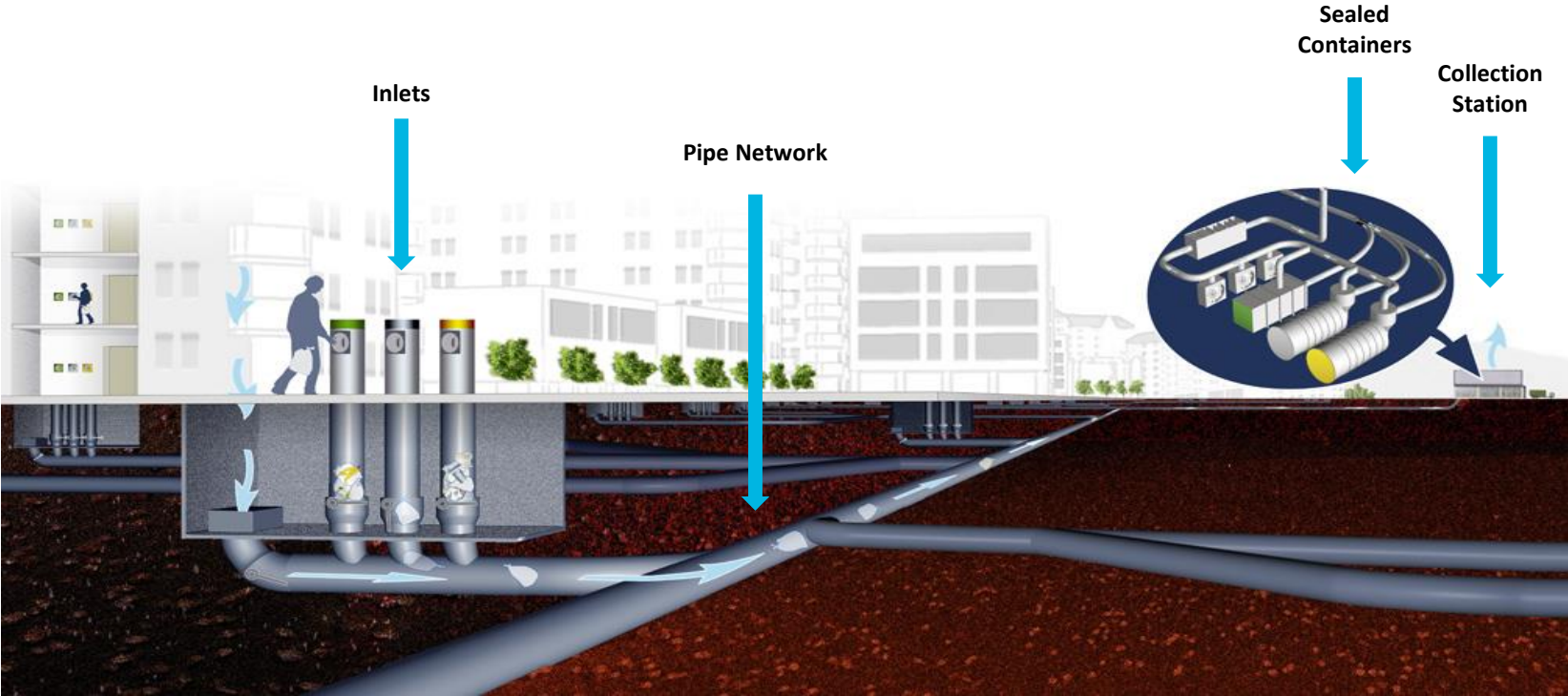


“It's a service lane, cars won't park there as they know it's for waste vehicles”

Are there any solutions?



Automated Waste Collection Systems (aka Vacuum Waste Systems)



Source: <http://www.envacgroup.com/>

Separate collection inlets for multiple streams (garbage, recyclables, organics)



Wembley Envac
Residential Waste Inlets



Stockholm Envac
Residential Waste Inlets



MariMatic (Avac)
Wall Mounted Waste Inlets

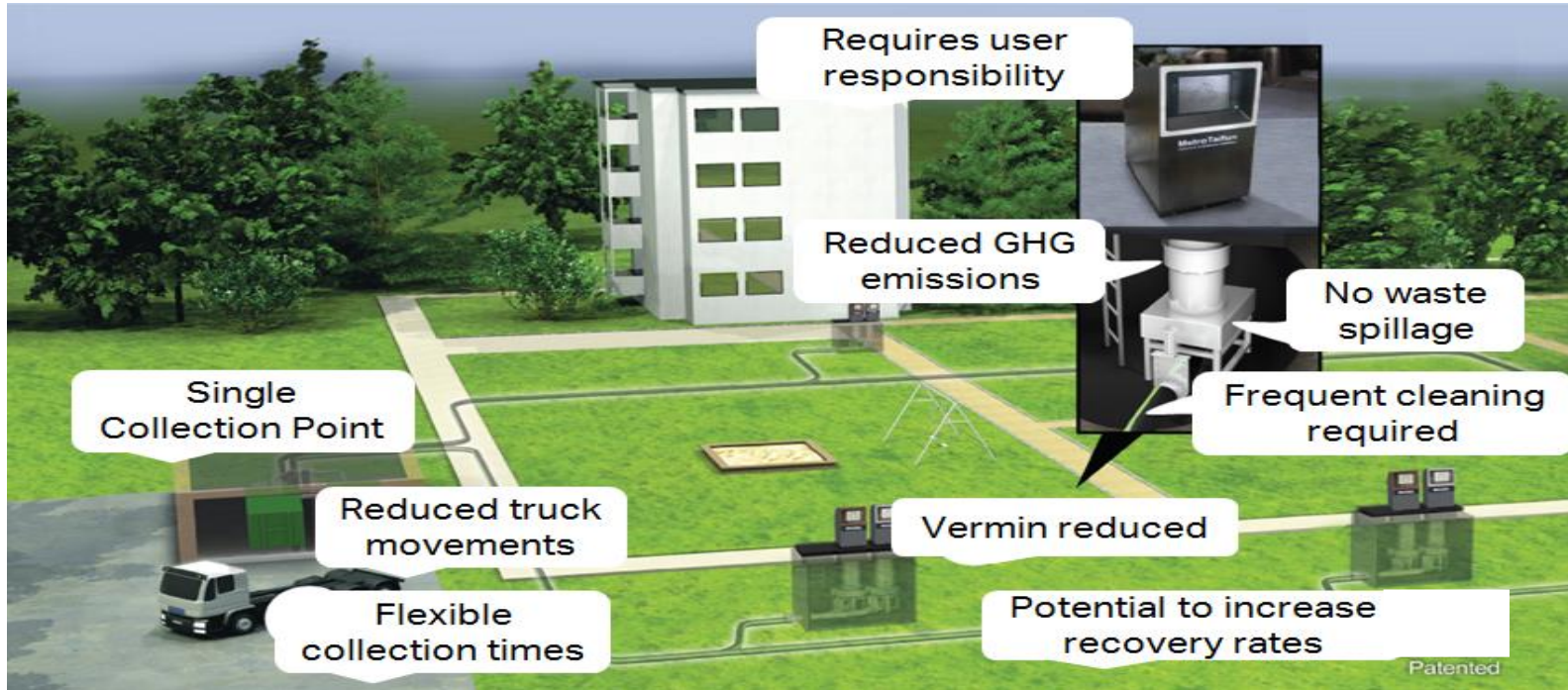


Envac
Wall Mounted Waste Inlets

Multiple vacuum systems operating globally



Vacuum system - social and environmental impacts



Source (Background photo from): MeriMatic

1st in Australia: Maroochydore CBD – Sunshine Coast, QLD – under construction

- 1st AWCS in Australia
- Residential, commercial, hotel, public litter, retail
- Three stages over ten years
- Three inlets: **residual**, **recyclable**, **organics**
- \$21 million capital cost
- Greenfield site
- 53 ha in area
 - 150,000 m² commercial
 - 65,000 m² retail
 - 2,000 dwellings

- Stage 1A to be commissioned in February 2019



A photograph of a cable-stayed bridge at night. The bridge features four tall, cylindrical towers illuminated with blue light. Numerous cables fan out from the towers to support the bridge deck. The sky is a deep blue, and some city lights are visible in the distance. The overall scene is a striking display of modern infrastructure lighting.

Energy from Waste

Waste Hierarchy - Sometimes forgotten

MOST PREFERRED

1

AVOIDANCE

Design out waste
Maximise product lifetime
Hiring over buying new
Using less non-recyclable and hazardous materials

2

PREPARE FOR REUSE

Cleaning
Repairing
Refurbishing

3

RECYCLE

Separating out waste into components
Turning waste into new products
Composting organic materials/food

Energy from Waste

4

OTHER RECOVERY

Full value extracted from waste using biological or thermal processes that produce energy

5

TREAT/CONTAIN

For hazardous waste only:
- Reduce toxicity and release of pollutants
- Control pollution by appropriate storage of remaining toxic waste

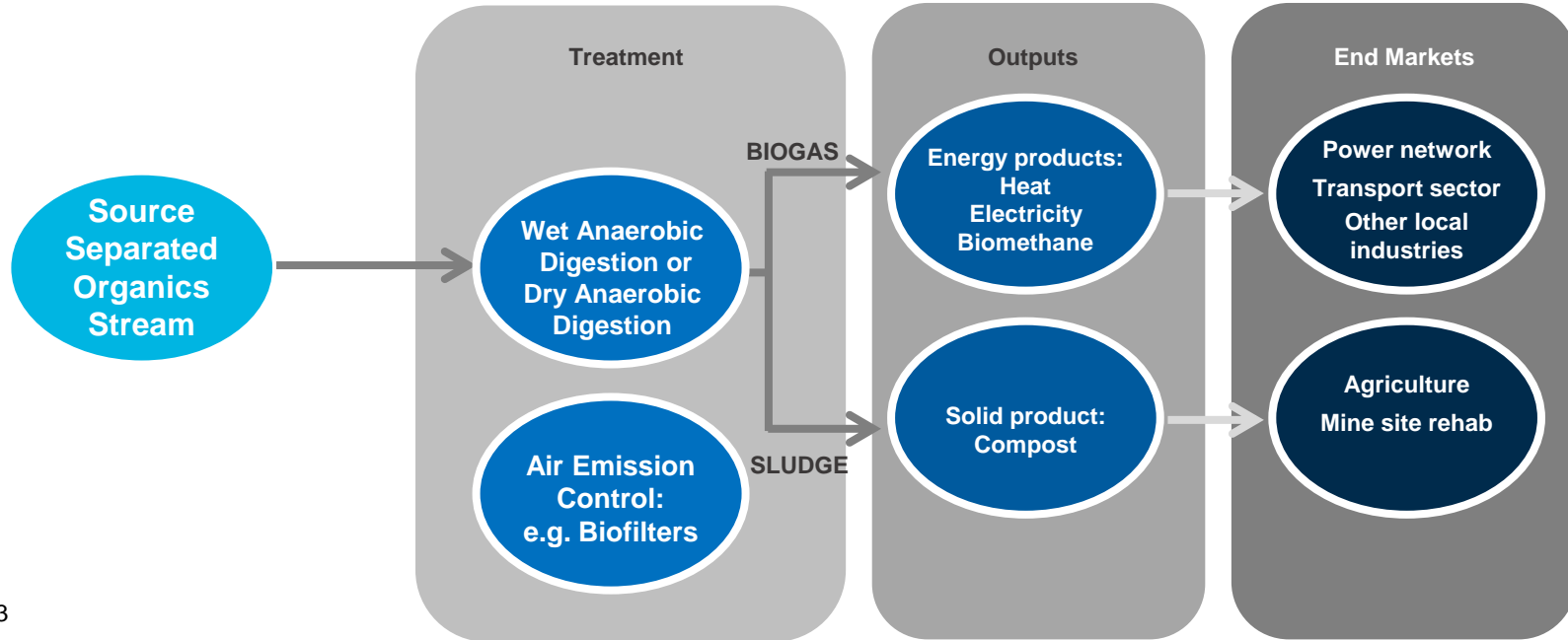
6

LANDFILL DISPOSAL

Residual waste that has had all value extracted

Anaerobic Digestion

- Biological treatment process undertaken in the absence of oxygen
- Produces renewable energy
- Less proven than composting, especially in Australia
- Increase diversion from landfill to around 65%



Anaerobic Digestion

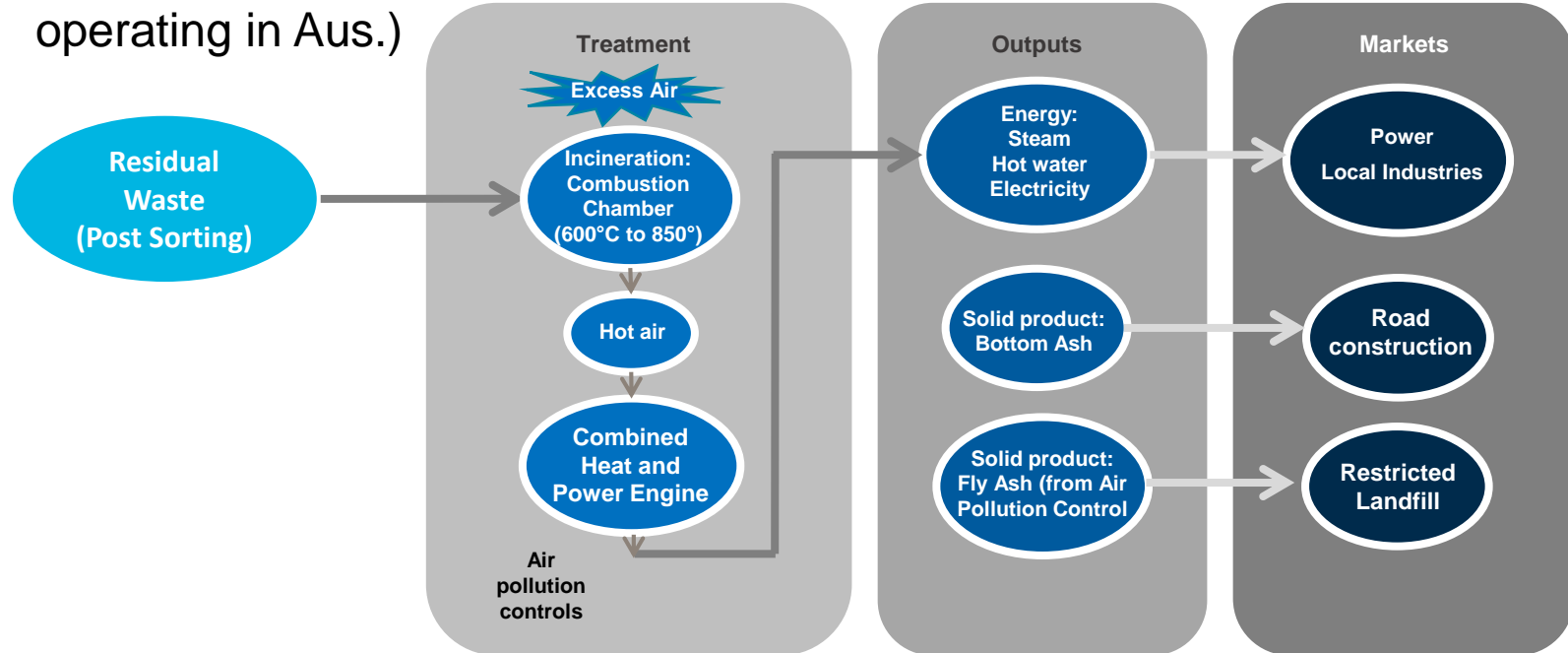
Facility in Yarra Valley Water, Wollert, Victoria

- \$27 million facility operating since May 2017
- Facility receives around 100 tonnes per day of food waste
- Sufficient electricity to power the adjoining wastewater treatment plant with surplus electricity exported to the local grid



Incineration with energy recovery

- High temperature process undertaken in an excess air environment
- Increase diversion from landfill to around 90%
- Air emissions a key issue which must be managed
- Proven technology for mixed waste streams overseas (no commercial plants operating in Aus.)



Incineration with energy recovery

Battlefield Energy from Waste Plant, Shropshire, UK

- 90,000 tonnes of municipal waste per year



Energy from Waste plant process

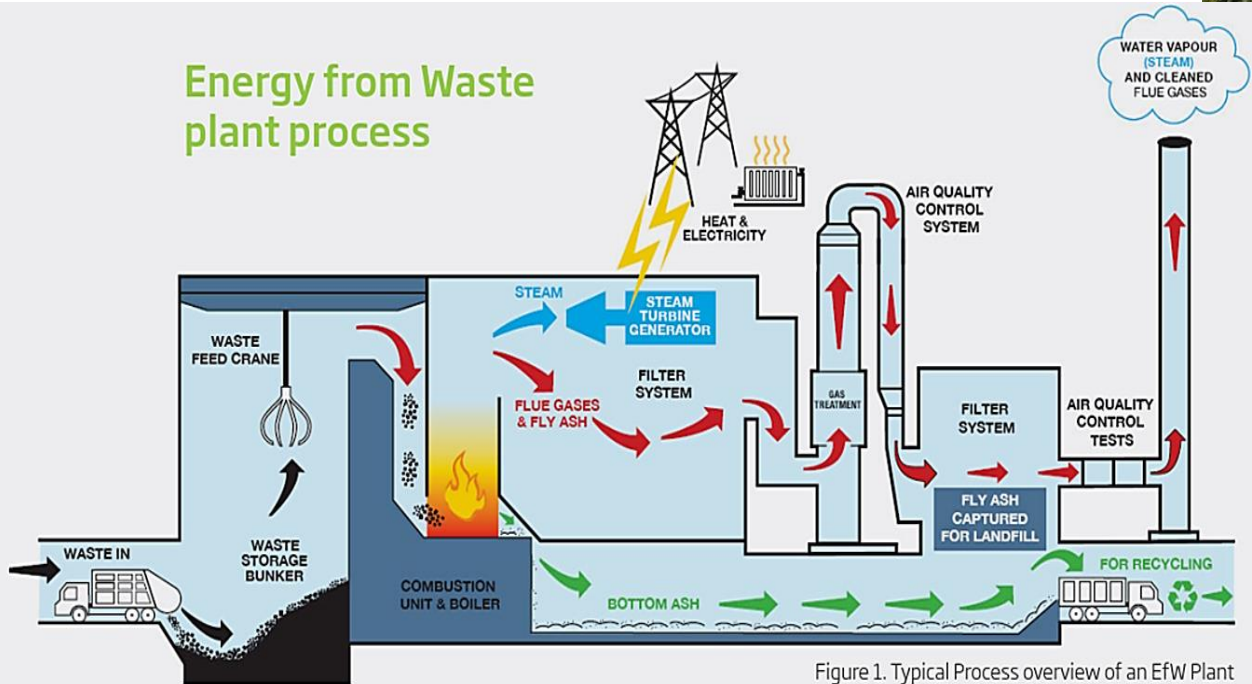


Figure 1. Typical Process overview of an EfW Plant

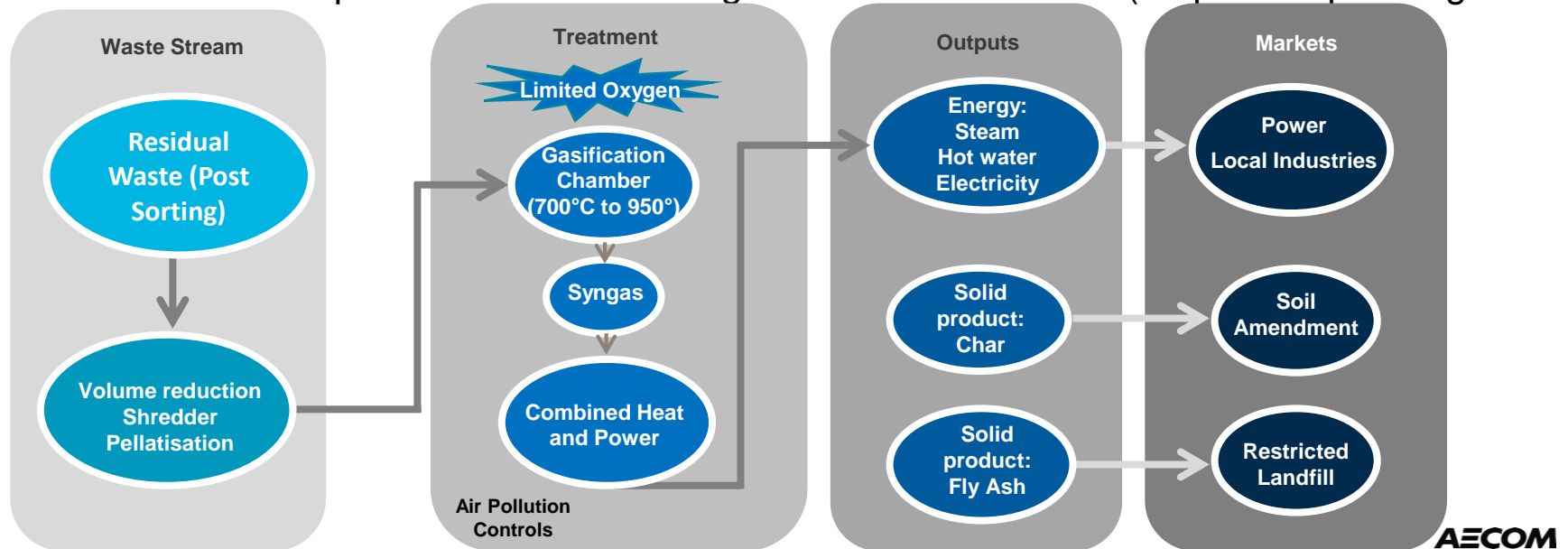
(Ref: <http://www.arc21.org.uk/opencontent/?itemid=27§ion=Residual+Waste+Project>)

Australian Paper Proposed Maryvale, Victoria Energy from Waste Plant

- Process 650,000 tonnes per year of mixed waste from Melbourne and Gippsland region
- Produce electricity and steam

Gasification

- High temperature process undertaken in a limited oxygen environment
- Produces renewable energy typically with better efficiency than incineration
- Increase diversion from landfill to around 85%
- More sophisticated technology so requires uniform feedstock
- Limited reference plants overseas treating mixed waste streams (no plants operating in Aus)



Gasification

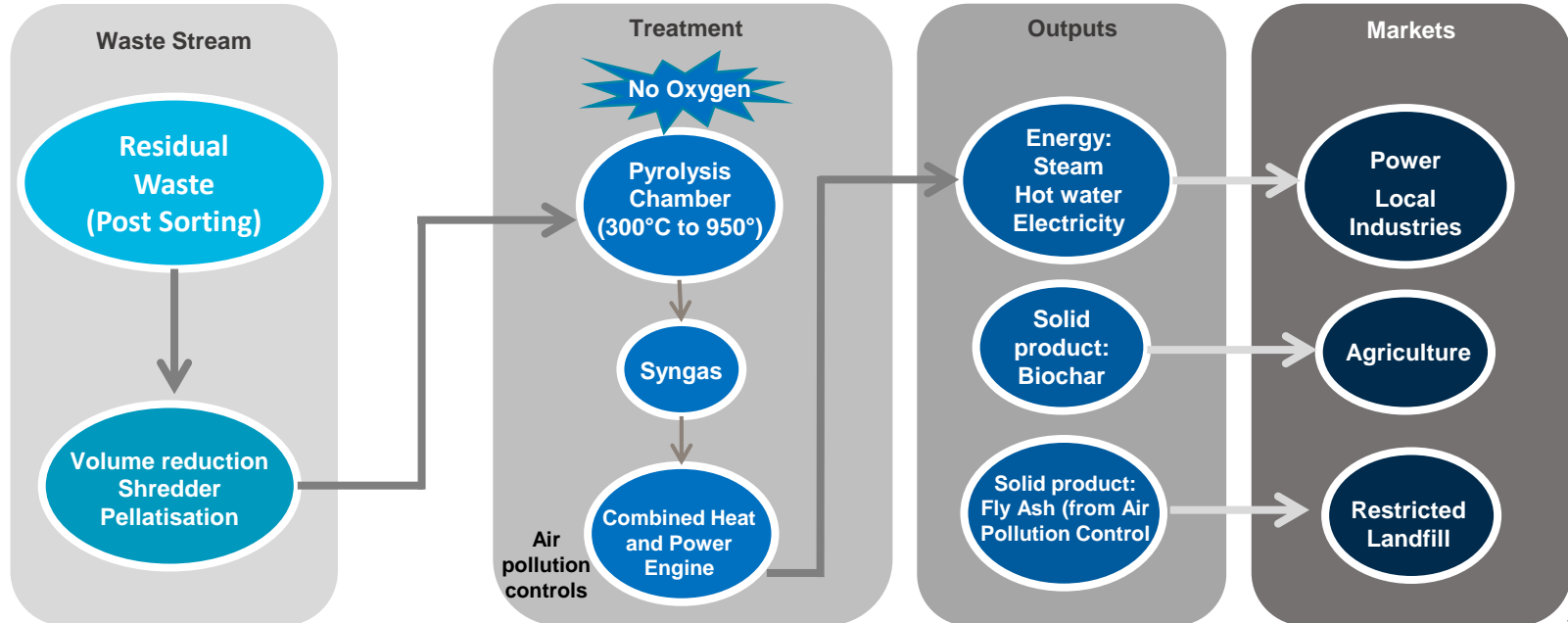
Finland

- 250,000 tonnes per year of Refuse Derived Fuel (RDF) - consists of plastic, wood and paper products unsuitable for recycling
- The plant supplies power to 87,000 customers
- District heating is supplied to 7,600 customers mainly apartment blocks and industry



Pyrolysis (Emerging Technology)

- Thermal process undertaken in an oxygen free environment
- Not proven at commercial scale for mixed waste overseas or in Australia
- Used for source separated waste such as tyres, wood chips



Energy from Waste Technologies - Summary

Criteria	Anaerobic Digestion	Incineration	Gasification	Pyrolysis
Reduces greenhouse gas emissions compared to landfill	✓	✓	✓	✓
Generates Energy	✓	✓	✓	✓
Help Meet Landfill Diversion Target	✓ 65%	✓ 90%	✓ 85%	✗
Proven Technology at Commercial Scale	✓	✓	✓	✗
General Community Perception	Neutral	Negative	Neutral	Neutral

Key Factors for Successful Energy from Waste Delivery

- **Residual Waste Only**
 - types, quality, variability
- **Use Proven Technologies**
 - existing commercial scale facilities treating similar waste streams
- **Meet Air Emission Regulations**
 - no exceptions
- **Early and Ongoing Engagement**
 - community and key stakeholders
- **Secure Supply Chain & Output Markets**
 - lock in long term waste supply feedstock and energy use agreements
- **Early Site Selection and Suitability Assessment**
 - sufficient buffer distances to sensitive receptors, suitable zoning, compatible surrounding industrial land uses

Questions?