Foreword

By Paul Klymenko, CEO of Planet Ark

During a study tour to Europe which informed this feasibility study, I asked an engineer working in the Swiss waste industry where their landfills were located. He replied there weren’t any and that many countries in Europe had achieved this. Countries with a combined population of over 150 million have virtually eliminated their need for landfills including Germany, Sweden and the Netherlands as they are all landfilling 3 percent or less of their waste.* The European experience over more than a decade also shows that reducing waste to landfill increases both recycling rates and residual waste for energy production. Due to stringent environmental standards social acceptance is high with many plants in and around major cities such as London and Paris.

In stark contrast Australia currently puts 40 percent** of its waste into landfill, a total of 21.7 million tonnes. That is the weight of around 410 Sydney Harbour Bridges!

The very concept of landfill is strange when you think about it. As a society we spend so much effort in growing and mining the food and materials that enable us to live our lives. Then when we have no further use of these we send a significant portion to a big hole in the ground to be buried, out of sight and out of mind.

Landfills generate uncontrolled chemical reactions. In addition to emitting methane (a greenhouse gas over 20 times more powerful than CO2) they require long-term management for many decades to ensure that they do not pollute the environment, especially our groundwater. This is why landfills are at the very bottom of the waste hierarchy. Landfills have little role in a sustainable society based on circular economy thinking.

Energy from Waste is a proven alternative to landfill in Europe; and Australian Paper’s proposed Maryvale plant is an exemplar project. This is because both steam and electricity would be supplied to their Maryvale Mill via a Combined Heat & Power mode which delivers superior energy efficiency.

Also, diverting 650,000 tonnes of residual waste from landfill each year creates a net reduction in greenhouse gas emissions of more than 500,000 tonnes annually of CO2 equivalent. This is like taking 100,000 cars off the road.

Australian Paper and the Victorian and Federal Governments are to be congratulated for funding this study which clearly demonstrates the project’s environmental, social and economic benefits.

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* http://www.cewep.eu/2018/07/05/municipal-waste-treatment-2016/
Acknowledgements

Australian Paper would like to acknowledge and thank both the Australian and Victorian Governments for the support they have provided to this major study.

This not only includes their financial contribution, but also the recognition that, if successful, the plant would significantly reduce the company's energy costs, help address south east Melbourne's growing social and environmental landfill issues, secure existing employment opportunities and create valuable new construction and energy generation jobs in the Latrobe Valley.
Background

About Australian Paper

Australian Paper Maryvale is one of the largest employers in the Latrobe Valley with approximately 850 full time employees. When flow on effects are taken into account, we support 2,387 jobs and contribute $451 million to the economy of the Latrobe Valley region.

Our packaging, copy and printing papers are recyclable and made from renewable materials. Products made from paper produced in the Latrobe Valley are used every day in homes and businesses all over Australia, including the nation’s favourite copy paper brand Reflex.

We also sell paper to around 75 countries as a major exporter from the Port of Melbourne.

Australia wide, our operations support 5,786 full time jobs and contribute $911 million to Australia’s Gross Domestic Product with each ream of copy paper produced contributing $1.88 to government revenues.

Through our parent company Nippon Paper, Australian Paper has invested significantly over the past decade in our operations, and further investment is key to our future.
About the Feasibility Study

Like many local manufacturing businesses, Australian Paper is facing challenges. We’re determined to address these efficiently and responsibly by harnessing innovative, proven technologies. One of our immediate priorities is to stabilise our costs and one of the most significant focus areas is energy.

Despite being Victoria’s largest generator of baseload renewable energy, we are also the largest industrial user of natural gas in Victoria and use significant quantities of coal-fired electricity. In line with any other business or household in Australia, we are exposed to surges in energy prices and uncertainty of supply.

We need to address our future energy needs proactively, which is why in July 2017 Australian Paper announced that it would undertake a Feasibility Study into the development of a new baseload Energy from Waste (EfW) facility at our Maryvale Pulp and Paper Mill in the Latrobe Valley.

Funding and support

The Federal and State Governments each contributed $2.5 million towards this $7.5 million Feasibility Study, enabling critical pre-construction planning for the proposed development.

Australian Paper matched the commitment with $2.5 million of its own funding.

Both Federal and State Governments saw this investment as a priority project for the future success of the Latrobe Valley and part of a broader strategy to support economic growth in the region. This was particularly important at a time when the local economy was transitioning.

Australian Paper has been part of the Latrobe Valley for over 80 years. In that time we have employed thousands of people from Morwell, Traralgon, Moe and the surrounding areas. We are deeply connected with the people of the Latrobe Valley.

Community engagement has been at the centre of our $7.5 million Feasibility Study into building an EfW plant at the Maryvale site. The support of the community is crucial in our planning.

2018 Maryvale Mill Energy Mix

- **6%** Electricity
- **36%** Natural Gas
- **58%** Renewable Energy

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Study objectives

Following a competitive tender process Australian Paper engaged Jacobs Group (Australia) Pty Ltd (Jacobs) as Lead Engineering Consultant on the Feasibility Study for the proposed EfW plant at Australian Paper’s Maryvale site in Eastern Victoria. A range of supporting consultants with extensive waste industry experience were also engaged on specific components of this comprehensive study.

During the course of the study, Australian Paper has partnered with Suez Recycling and Recovery Pty Ltd (Suez) to jointly investigate the development of an EfW plant. Australian Paper partnered with Suez because they brought significant global expertise in the development and operation of EfW facilities and would help test the project’s viability.

The partnership was also formed with a view to Suez taking the role of operations and maintenance of the facility when constructed. Suez provided valuable peer review of the Feasibility Study plant design, and their experienced staff provided support during many of the engagement activities.

The overarching objectives of the Feasibility Study were to:

- Deliver a commercially sustainable and environmentally responsible business solution providing energy security for Australian Paper’s Maryvale Mill
- Provide electricity and steam supplies to the mill at improved cost and strategic value
- Engage closely with the local community and other key stakeholders including Federal, State and Local Government, Unions, waste supply groups and our employees
- Ensure compliance with health, safety and environmental standards
- Improve standing in the community, attain and maintain a social licence to operate
- Deliver on time and on budget
- Maximise value from appropriate use of funds.

As part of the Feasibility Study, in October 2017 Australian Paper facilitated a tour to EfW plants in the United Kingdom and Switzerland.

The primary purpose of this was to introduce key stakeholders to the EfW process and provide an opportunity to understand the technical, community and regulatory issues surrounding such a project. The feedback from the tour participants has been used to inform the findings of the EfW Feasibility Study. This investment was considered essential in developing a real world understanding of EfW facilities. In the Victorian context future proponents should leverage industry associations in Europe such as the Environmental Services Association (ESA) and the Confederation of European Waste to Energy Plants (CEWEP) as well as Australian bodies such as the Waste Management Association of Australia (WMMAA) to facilitate physical access to well run and reliable facilities.
Case study: Ferrybridge, United Kingdom

In October 2017, Australian Paper facilitated a visit to the Ferrybridge 1 and 2 EfW plants in Leeds in the north of the UK. The purpose of the visit was to explore the technical, community and regulatory issues that can impact these projects.

The visit gave some of our key stakeholders from Nippon Paper, the CFMEU, Planet Ark, Jacobs and Federation University an opportunity to see the EfW process first hand. Their experience helped inform Australian Paper’s EfW Feasibility Study for Maryvale.

The Ferrybridge 1 and 2 EfW plants provided a valuable opportunity to tour an operational plant and see another under construction. These plants were favourably viewed by the local community for the jobs and economic benefits they brought to the region, especially as the Ferrybridge coal fired power plant closed in 2016.

Ferrybridge 1 has been operational since 2015. It has a waste input capacity of 675,000 tpa and a thermal capacity of 2 x 117 Mw. Most of the plant operates automatically but requires highly skilled operators to monitor plant conditions and respond as needed. Waste deliveries use a mix of road and rail transport.

Start-up of Ferrybridge 2 is planned for this year and it will have a waste input capacity of 556,000 tpa at a higher calorific value and a thermal capacity of 2 x 117 Mw.

It was a well-managed construction site, with large lay-down areas to allow for assembly of the plant in modules on site. The modules were then lifted into place inside the building structure. We understand this approach allowed for a high level of safety and build quality at a lower cost.

Pre-fab crew huts, wet area change rooms, dining rooms and streamlined site entry all contributed to good amenity for the workers and focused on safe movement about the site.
What is the project?

Australian Paper is proposing to develop a thermal combustion EfW plant adjacent to the existing Australian Paper Maryvale Pulp and Paper Mill site on land owned by Australian Paper in the Latrobe Valley, Victoria. The aim of the proposed $600 million EfW plant is to allow Australian Paper to attain a sustainable, long-term and stable alternative baseload energy source to provide steam and electricity for the existing Maryvale Mill, which has been manufacturing paper since 1938.

The 225 Megawatts of thermal energy (MWh) to be generated by the EfW plant would be baseload energy required to run Australian Paper’s Maryvale Mill - the Mill requires thermal energy (steam) and high voltage (HV) electricity. Currently, steam is produced by on-site natural gas fired boilers and used in the manufacturing process (e.g. by the paper machines). Steam is also used by four on-site electrical generators to produce about 45 Megawatts of electricity (MWe) each hour. Additional HV electricity demand is supplied from the electricity grid. Maryvale Mill is already Victoria’s largest generator of baseload renewable energy, producing approximately 600,000 tonnes of biofuel from its pulping process each year.

In addition, the Maryvale Mill purchases approximately 6 million Gigajoules (GJ) of natural gas annually and 30MWe per hour of electricity. Significant effort has been invested to improve the energy efficiency per tonne of pulp and paper manufactured by Australian Paper. However, due to recent substantial cost increases in the market price of natural gas and electricity, an alternate baseload energy source is being sought to enable the Mill to continue to operate in a reliable, sustainable and cost effective manner.

Having regard to total cost (capital and operating), environmental impacts, employment benefits, plant performance and reliability, there is a clear group of technologies that have been identified as appropriate for Australian Paper to consider and are also proven on a global scale – that is the EfW combustion technologies using residual waste as fuel. Most importantly, unlike renewable energy sources such as solar and wind technologies, EfW facilities generate baseload thermal energy in the form of steam which is required by Maryvale to run the majority of its operation on a continuous basis.

For this 225MWh EfW plant the operating waste feed requirement is estimated to be 650,000 tonnes per annum of non-hazardous residual waste which would otherwise be sent to landfill. It is proposed to use Municipal Solid Waste (MSW) for approximately 80 percent of the fuel input to the EfW plant, sourced from long term contracts with councils. MSW is waste from household rubbish collections (not recyclable collections).

Some Commercial and Industrial (C&I) waste (approximately 20 percent of fuel input) would also be used, with the non-hazardous C&I waste being similar to MSW, but sourced mostly from manufacturing facilities, shopping centres and office buildings.

The waste would be sourced from Melbourne (primarily the south east of Melbourne) and Gippsland and transported to the facility via road and rail logistics.
The key steps in the EfW process are as follows:

- Waste is transported to the EfW plant via train and truck
- Waste is combusted in a furnace (or furnaces)
- The furnace(s) produce heat generated as hot gases by the combustion of waste
- The hot gases enter a boiler (or boilers) to convert boiler water into steam
- Some steam is transferred to the Maryvale Mill
- Some steam is used in turbine generators to produce electricity for use in the Maryvale Mill
- Gases from the combustion process are treated to very high cleaning specifications, through combustion control, gas treatment and filter bags
- Cleaned combustion gases are discharged through the stack, while being continuously monitored
- Ash residues from the boiler and filter bags are collected and disposed of.
Waste is transported to the site via train and truck and placed within the waste bunker, which is enclosed in a large building. Air is drawn into the building and put through the boiler to minimise the escape of odour to the outside air.

The combustion process occurs on a moving grate floor allowing for mixing and more complete combustion by providing air directly through the grates. As the combustion occurs, temperatures will reach over 850°C for at least two seconds to destroy dioxins and furans. The combustion gases then cool slightly before entering the boiler tubes section to generate steam. Ammonia or Urea is spray injected to convert nitrogen oxides (NOx is a common unwanted combustion by-product) back to elemental Nitrogen and Oxygen.

Following this section the cooled gases then pass through the flue gas treatment system where lime and activated carbon are mixed to absorb trace heavy metals, acid compounds and trace dioxins and furans. These materials are then removed through a process of filtration as solid residues, before the cleaned air passes inline emissions monitoring equipment and is released out of the stack.

Bottom Ash, a solid post combustion material is collected from the furnace floor. Typically bottom ash is an inert material containing metals suitable for recycling, glass, sand, gravel and un-combusted materials.

The intention is that bottom ash from the combustion process would be collected, the metals recycled, and the remaining ash reused into road base and construction materials such as concrete.

Fly Ash is collected along with Flue Gas treatment residues for disposal to prescribed waste landfill.

In many facilities 100 percent of the steam generated is converted to electricity for supply into the electricity grid network. In the situation where both steam (heat) and electricity (power) are supplied then this is termed combined heat and power (CHP). Both steam and electricity would be supplied to Maryvale Mill in this CHP mode delivering superior energy efficiency of 58 percent versus standalone electricity generation at 27 percent. In the Victorian context, future applications may struggle to demonstrate best practice if they are configured as electricity only generation facilities.
Why Energy from Waste?

EfW is recognised as a proven and reliable technology which has been used in Europe, North America and Japan for decades. There are over 500 operational EfW plants in Europe alone, many of which are in and around major cities such as Paris, Zurich, Vienna and London. Countries such as Germany, Austria and Sweden support EfW as a key component in the waste management hierarchy, reducing their landfill to almost zero.

The technology generates energy from the controlled combustion of non-hazardous waste materials that would otherwise go to landfill. EfW plants can capture and convert the released heat into steam and electricity, with sophisticated filtering technology ensuring compliance with stringent EPA stack emissions standards.

EfW plants can provide energy as steam or electricity and can interchange between the two during the plant’s operation, providing improved flexibility and efficiency. The use of waste as fuel also enables an EfW plant to be a reliable baseload source of energy.

The Maryvale plant would process MSW as well as C&I waste sourced from the Gippsland region and the greater Melbourne metropolitan area. This would greatly reduce pressure on existing landfill sites in Gippsland and Melbourne at a time when existing sites are reaching capacity and closing.

The EfW plant would divert an estimated 650,000 tonnes of waste from landfill each year. Due to the variable nature of residual waste the EfW waste throughput will vary to create a steady energy output. Air quality modelling has been evaluated based on the maximum continuous rated thermal capacity of the plant.

According to the Environment Protection Act (1970) Waste Hierarchy, the recovery of energy from waste is preferred after recycling as a method for managing waste (see below).

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Waste Hierarchy showing the order of preference and where EfW is placed (Environment Protection Act 1970, p.4)
Disposal to landfill is the least preferred method of waste management, yet it is the most widely used in many countries, and many locations around Australia. Leading countries such as the UK have identified EfW technology as a key solution in conjunction with recycling, to significantly reduce waste sent to landfill.

By generating energy from waste in conjunction with recycling, Sweden, Belgium, Denmark and Germany have almost completely eliminated waste being sent to landfill. Additionally these countries have developed significant secondary industries such as bottom ash processing, logistics and maintenance to service their EfW industry.

Victoria’s annual waste generation is projected is expected to approach 20 million tonnes by 2046 - an increase of 60 percent on 2015-16 figures. While landfill is recognised as a critical component of managing residual waste, the EPA’s Waste Management Policy seeks to limit the use and development of landfills and promote higher order waste management alternatives.

Recovery of energy from waste is recognised as an alternative waste management option that could divert 45 to 50 percent of waste currently going to landfill, providing the critical component to achieving the goals and objectives of Sustainability Victoria’s Statewide Waste and Resource Recovery Infrastructure Plan.

The Australian Paper EfW project Works Approval Application has been considered by the Metropolitan Waste and Resource Recovery Group (MWRRG), the Gippsland Waste and Resource Recovery Group (GWRRG) and Sustainability Victoria. The proposal broadly meets the intent of their respective Implementation Plans and the Statewide Waste and Resource Recovery Infrastructure Plan (SWRRIP).
Why Maryvale?

The Maryvale Mill currently purchases approximately 6 million GJ of natural gas per annum (approximately 8 percent of Victoria’s total industrial consumption) and 30 MWe per hour of electricity from the Electricity Network. Despite considerable investment and effort in recent years to improve its energy efficiency, substantial price increases in the market price of both natural gas and NEM supplied electricity have put significant pressure on the Maryvale Mill’s ability to operate competitively.

Australian Paper has deemed EfW to be the most appropriate alternative baseload energy source for its business, after considering:

- Total potential cost (capital and operating)
- Best fit technology for generating significant and variable volumes of steam
- Minimising environmental impacts
- Maximising social benefits
- Employment effects
- Plant performance and reliability, as compared with alternative energy sources
- EfW combustion technologies (using non-hazardous residual waste), which are currently being successfully utilised on a global scale.

By providing energy (electrical and steam) for the Maryvale Mill, the project is expected to enable up to 4 million GJ of natural gas per annum and up to 30 MWe of electricity to be returned for use by the broader market, helping to improve energy security for both the local region and state. Electricity that is produced in excess of Maryvale Mill requirements will be provided back to the NEM, which would increase supply for the broader market.

Siting an EfW plant adjacent to the Maryvale Mill has a range of advantages compared to other potential locations:

- The Maryvale Mill will use the steam and electricity generated by the EfW plant, which would maximise the EfW plant’s efficiency
- The Maryvale Mill has existing rail infrastructure which may enable waste to be transported to the plant by train
- The road infrastructure to the Mill is well established for truck traffic and there are no residential areas from major arterials (Princes Freeway east or west) to the Mill
- Grid electricity connections are available on-site with sufficient spare capacity
- It is located in an existing Industrial 2 Zone (for planning) which is ideal for this type of industrial development
- There is an existing suitable buffer (Amenity Rural Buffer in the Latrobe Planning Scheme) around the Mill of approximately 3km
- Existing good quality water supply capacity available from Gippsland Water
- Existing on-site waste water treatment facility with sufficient capability and capacity
- Access to a skilled local workforce.
The project is situated in Maryvale (north of Morwell), approximately 150 kilometres east-southeast of Melbourne’s central business district. The proposed EfW plant is to be located on the existing Maryvale site as its primary purpose is to provide steam and electricity to the existing Australian Paper manufacturing facility.

Being in the Latrobe Valley, the project is in the vicinity of heavy industrial facilities including coal and gas fired power stations, dairy production, steel fabrication, water processing and heavy and light industrial premises. Gippsland also has surplus electrical grid capacity following the closure of Hazelwood Power Station in 2017.

The Latrobe Valley is largely rural-residential with an approximate population of 72,000. The operational footprint of the EfW plant will be approximately 7-10 hectares. The construction footprint of the EfW plant including laydown,
parking, access / egress, construction and crib areas will be approximately 18.8 hectares, and is within the existing Maryvale Pulp and Paper Mill site, owned by Australian Paper.

The site is adjacent to Australian Paper’s existing paper train rail facility and container handling area and has good access from roads. Extensive geotechnical investigations have been undertaken as part of the Feasibility Study and this has established a baseline for the proposed site. The location of the proposed plant on the site was developed in a siting workshop undertaken with Australian Paper at the Maryvale Mill. The land proposed is owned by Australian Paper and is presently utilised as a eucalypt plantation.
The key technical characteristics proposed for the facility are:

- Two x 112 MWth boiler lines are anticipated. Each line is at the upper end of the main manufacturers’ size range for proven designs creating economies of scale for Australian Paper’s energy needs while processing a high proportion of waste from the eastern Melbourne and Gippsland catchments.

- The annual throughput of waste targeted is 650,000 tonnes processed in a typical equivalent of 8,000 hours per year.

- A condensing / extraction steam turbine generator (70 MWe) converts the steam energy that is not sent to Australian Paper into electricity. The electricity generated is integrated into the Australian Paper Mill’s electricity needs.

- The EFW plant can operate independently of the mill and can process waste when Australian Paper is not able to take electricity and/or steam from the EFW plant or when the EFW steam turbine is unavailable.
Best available technology

The proposed EfW plant will use modern, reliable technology and techniques. Moving grate EfW technology has been selected for the project as it is an environmentally and commercially proven low emissions technology that complies with the most stringent European Union standards. It is also the dominant worldwide thermal combustion technology because of its proven and reliable performance.

The EPA is responsible for regulating industrial and waste management activities. To be granted an EPA Works Approval, the EfW project needed to:

- demonstrate that the siting, design, construction and operation of the facility uses best practice measures for the protection of land, water and air environments
- demonstrate superior energy efficiency and greenhouse gas emissions management, and
- provide evidence of how pollutants, odour, dust, litter, noise and residual waste are to be minimised and managed.

Australian Paper followed the EPA’s best practice methodology to determine the EfW plant’s suitability for the region. This involved conducting a project risk assessment, reviewing available alternative energy solutions and analysing the project’s predicted emissions, economic, social and environmental considerations.

The plant design, after benchmarking of installations in the UK, Europe and Singapore, will include the following features:

- moving grate technology to ensure waste and air mixing to optimise combustion
- flue gases will achieve a minimum temperature of 850°C for at least two seconds to completely combust organic compounds and destroy dioxins and furans
- flue gas cooling via the economiser section is designed to reduce potential for dioxins to re-form
- flue gas recirculation to minimise nitrogen oxide generation in the furnace and assist with complete combustion
Technology evaluation

Australian Paper established that there are two primary thermal technology options for boiler plants that can be used for their Energy from Waste (EfW) Project. They are:

- Moving Grate Boiler Technology
- Fluidised Bed Combustion Technology. Within this technology there are two variations termed ‘Circulating Fluidised Bed’ and ‘Bubbling Fluidised Bed’.

A thorough investigation needed to be carried out that aimed at establishing the most suitable MSW combustion technology to be used for the EfW project. Following a competitive tender process, GHD was engaged to undertake an investigation to determine the best technology options for the project.

Based on the evidence available, the various analyses carried out, and the results of the scoring against a weighted criteria, GHD has concluded that the Moving Grate is the best technology option for the proposed Energy from Waste facility for Australian Paper.

While the scoring showed all positive and negative results for both technology options, on an overall basis, the Moving Grate score was more than 10 percent higher than for either alternative option. This evaluation is indicative of some of the unique factors relevant to the Australian Paper proposal and was not solely a reflection of the technical capability of the respective technologies.

- online flue gas oxygen measurement to ensure sufficient oxygen for complete combustion, including a carbon monoxide analyser for further combustion tuning
- selective Non-Catalytic Reduction methods with Ammonia or Urea injection and air mixing to reduce nitrogen oxide emissions
- burnt or hydrated lime injection systems to neutralise acid gases (HCl, HF and SO2)
- activated carbon injection to absorb trace heavy metals and trace hydrocarbons such as dioxins and furans in the flue gases
- single stage bag filters to collect fly ash particulates, lime and activated carbon solid residues
- recirculation of the air pollution control residues to optimise reagent use and minimise solid waste
- a modern certified continuous emissions monitoring system installed on the stack linked to emission control variables, with an installed live spare
- odour minimisation, including the tipping hall being a fully enclosed building maintained under negative pressure, with odorous air combusted in the boiler to minimise escape from the facility
- recovery of metals from the bottom ash residues to promote recycling
- superior energy recovery efficiency from the residual waste fuel through the generation of combined heat and power (steam and electricity) when compared to standalone electricity generation
- capability to reuse Bottom Ash as a replacement for natural aggregates such as sand and gravel following an appropriate treatment and approval process.

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<tr>
<th>Overall Score</th>
<th>Circulating Fluidised Bed</th>
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<th>Moving Grate</th>
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Against many of the other criteria the Moving Grate was superior, including:

- Health & Safety, particularly as there is no pre-sorting required that would require manual contact in respect of handling the MSW even in an automated plant.
- Life Cycle Cost
- Superior reliability and availability
- Much less complexity
- Reduced generation of Category B ash
- Greater tolerance to fuel variability
- Projected longer asset life.

In the case of environmental performance and Best Available Technology, all options scored similarly, having proven their ability to meet the European Directives and are accepted as suitable technology.

In addition, web research confirmed that Moving Grate dominates the EfW market worldwide, with over 87 percent of European plants and over 80 percent worldwide being based on this technology. In Australia, Moving Grate has also been widely used for industrial power generation in industries such as paper and sugar. This means that there is a body of local experience available to support this technology.

In terms of the size of plant proposed for Australian Paper, Moving Grate has more than double the number of installations than either of the Fluidised Bed options.

With all of these factors taken into account, the Moving Grate was recommended by GHD as the option to take forward. Australian Paper reviewed and accepted this recommendation.
Waste supply and characteristics

The project is targeting 650,000 tonnes per annum of residual waste (as outlined in the table below). This includes 520,000 tonnes of residual MSW collected by councils in eastern Melbourne and Gippsland. MSW (red lidded bin) is source-separated by the house-holder with recyclables diverted into the co-mingled recyclables stream (yellow lidded bin). The project is not targeting recyclables nor green waste.

Up to 130,000 tonnes of C&I would be used to “top-up” the waste volumes to the project on more flexible, short-term agreements.

These are also likely to come from eastern Melbourne and Gippsland. Given the project’s location it would target maximum waste from Gippsland (the six Gippsland councils/shires).

Extensive sampling and testing was undertaken to determine waste characteristics for utilisation as fuel and the level of contaminants and residues. Accurately assessing the waste properties is a key consideration to the project and further testing has been planned for 2019. The extensive data collected to date is considered to be the most comprehensive waste database in Victoria, and potentially Australia. It provides a significant competitive advantage to the project and will therefore remain confidential.

Extensive modelling was also undertaken to determine the impact of existing and potential government waste management initiatives including increased collection of garden and food organics, container deposit schemes, more infrastructure for diverting recyclables from landfill, and a ban on E-waste going to landfill.

The sampling, testing and modelling represents a significant investment in time and effort and provides extremely valuable input into the project design, risk evaluation and commercial viability.

The Feasibility Study concluded that while potential future initiatives would have a positive effect on reducing waste volumes, this would be easily exceeded by the impact of population growth. At best these initiatives would slow the growth of waste volume for a period before the upward trajectory once again continues.

This is reinforced by analysis by the Metropolitan Waste and Resource Recovery Group (MWRG) in its September 2018 report Advanced Waste and Resource Recovery Technologies - Metropolitan Regional Business Case and Procurement Strategy (graph left).
The Study envisaged that at least two Waste Transfer Stations (WTSs) in Melbourne will be required to aggregate the waste into sufficient transport volumes. Council roadside collection vehicles (RCVs) are necessarily small to navigate suburban streets (about 7.5 tonnes each) and this is not a practical logistics option for delivery from Melbourne to Maryvale.

Further, the Melbourne waste volumes should be divided between at least two WTSs to avoid long RCV cycle times and to avoid severe traffic concentrations in the vicinity of the WTS if all Melbourne waste were directed through one WTS. One WTS is envisaged in the South East Melbourne area and another (preferably) in the inner city area.

Long term waste supply contracts with councils will need to be secured before the logistics network analysis and design can be finalised.

**Logistics**

Initial community consultation undertaken by Australian Paper around the EfW project identified early that how the waste would be transported to the plant was a key area of interest and would need to form an important element of the project evaluation.

A logistics study was undertaken to estimate the logistics modes, costs and likely infrastructure required to transport the waste and residues. In summary the base-case comprises:

- Road transport of waste from South East Melbourne to site in sealed 40ft containers or trailers, compacted in an A-double truck format. Additional work investigating site procurement and approvals for another site in South East Melbourne might provide a rail transport option also from that area.

- Rail transport of waste from the Central Melbourne area in sealed, compacted 40ft containers carried on additional wagons added to the Australian Paper paper train, which operates daily from the Maryvale Mill to the North Dynon rail terminal area where Australian Paper handles its paper.

- Road transport of waste from Gippsland delivered directly to the EfW plant with the costs borne by the local councils / waste collectors.

- Air Pollution Control Residue would be transported in sealed, pneumatic discharge vehicles to a suitable prescribed industrial waste landfill site.

- Bottom ash has been modelled to be backhauled to Melbourne to a suitable landfill site until potential reuse options can be developed.

This approach provides flexibility including multiple WTSs, capability to transfer rail freight to road freight options, and ability to source from alternative council areas if necessary.

During this process, Australian Paper engaged closely with various agencies and authorities on key aspects of the proposed project. This has included discussions with VicRoads and Latrobe City Council on the proposed use of roads and the potential impacts. Over a period of several months, meetings were held with VicRoads and Council officers where the requirements for the analysis of potential traffic impacts were discussed.

This led to the scoping of the Traffic Impact Assessment (TIA) which forms part of the Planning Permit application for the project. Prior to conducting the TIA, the scope was agreed with VicRoads and council to ensure that the relevant issues were analysed and assessed.

The findings of the TIA indicate that the modelled traffic volumes and swept paths will have minimal impacts on the road network.

This TIA details the current traffic conditions and the expected traffic generation and distribution during the peak construction phase and the operational phase of the proposed project, as well as the potential traffic impacts when the site is fully operational ten years post construction of the EfW development at the nominated key intersections.
Construction phase

Based on predicted data (which was provided by a construction contractor as typical construction workforce numbers for the construction of a large EfW plant), a total of 446 vehicles are expected to arrive and depart the site each day during the peak construction month (month 25 of 42). Of these 446 vehicles, only 15 of these movements are heavy vehicles, associated with construction material and equipment deliveries.

Peak construction materials and equipment deliveries are expected to occur for 3 months (month 7 to 9 of the 42 months) with 80 vehicles while the workforce associated trips are relatively low at that time.

The total daily trips associated with the construction phase are summarised in the graph left.
Operations phase

During the operational phase, the traffic volumes for the EfW plant will be much less than the construction phase. The traffic volumes will also be more regular. Operational phase traffic includes:

- passenger vehicles for employees and visitors
- Roadside Collection Vehicles (RCVs – standard garbage trucks)
- 30 tonne residual waste trucks
- A-Double trucks with waste containers
- tray trucks; and
- miscellaneous delivery trucks.

It is estimated that a total of 110 vehicles will arrive and depart the site during an average workday which equates to 220 trips per day over a 12-hour period. Therefore, the operation phase is anticipated to generate 22 trips during the am and pm peak respectively. The operational trips associated with the proposed EfW plant will be minimal when compared to the construction traffic.

Based on the analysis undertaken, the traffic generated by the workforce to/from the proposed EfW plant will not have any significant adverse impact on the traffic operations at any of the five key intersections during the construction phase or the ten-year scenario operational phase. On this basis, no intersection capacity upgrades are required.

Approvals

The EfW project requires a number of extensive and formal approvals which, along with relevant supporting information, were submitted during the Feasibility Study. The major approvals consist of the Environmental Effects Statement (EES) Referral, Environment Protection Authority Victoria (EPA) Works Approval, and a Planning Permit.

EES Referral

The *Environmental Effects Act 1978* provides for assessment of proposed projects that may have a significant effect on the environment. It does this by allowing the Minister administering the Act to review and make a decision as to whether an EES should be prepared.

A detailed referral outlining the project and its environmental credentials was submitted to the Minister for Planning for consideration. It was determined by the Minister that no further actions were required under the Environmental Effects Act, and the project could proceed via the existing statutory approvals pathways.

EPA Works Approval

Works Approvals are issued by EPA Victoria under the Environment Protection Act 1970. They are required for industrial and waste management activities that have the potential for significant environmental impact.

Works Approval applications are publicly advertised and may be accessed on the EPA’s website. Members of the public may lodge comments with the EPA within 21 days of advertising and applications are also referred to other relevant agencies for their review and advice.
This process is designed to proactively raise awareness of the project with interested parties and identify any issues the community may have. The EPA will complete its assessment taking into consideration any public comments received and applicant responses during the consultation processes. The EPA will then decide whether to issue a works approval and whether to attach any conditions to the approval.

On 25 May 2018, Australian Paper submitted a Works Approval Application for the EfW project to the EPA, as per section 19B(c) of the Environment Protection Act 1970. This application was over 270 pages (excluding attachments and appendices) and included detailed analysis and modelling of:

- the EfW processes and technology
- environmental best practice
- air quality energy and greenhouse gas emissions
- noise emissions
- water use and surface water management
- waste
- historical aboriginal and cultural heritage
- environmental management.

The application was subject to detailed review by the EPA and other relevant government agencies with a number of clarifications and further analysis including the preparation of a detailed Health Impact Assessment.

In addition, the application was subject to extensive community consultation (see ‘Social Licence’ below) including public comment and submissions as well as a Section 20B community conference. As a result of this process, Australian Paper prepared responses to the submissions received as well as any new questions raised at the Section 20B conference.

This process of engagement with regulators and the community all led to a more rigorous Works Approval Application by Australian Paper and a more thorough assessment of the project’s environmental, social and economic merits. On 28 November 2018, the EPA issued a Works Approval with a range of Conditions. The Works Approval is currently subject to a VCAT appeal.

**Planning Permit**

A detailed Planning Permit application was submitted to Latrobe City Council as part of the approvals process. This included extensive analysis of the Latrobe Planning Scheme including relevant zoning and overlays. The planning assessment component also included analysis and assessment of site access and traffic, truck movement on site, carparking as well as noise, air and light emissions.

The application required the preparation of a detailed Traffic Impact Assessment (see “Environmental and amenity issues” section for further details) which included extensive assessment of road conditions, and modelling of traffic flows in an around the proposed site. The application also required a detailed Bushfire Management plan that was prepared with extensive consultation with the Latrobe City Council and CFA.

Throughout the process, Australian Paper and its consultants met regularly with Council representatives to discuss the permit and additional information was subsequently provided in response to queries to improve the application.

On 7 January 2019, the Latrobe City Council issued a Planning Permit for the proposed project. This Permit allows Australian Paper to begin developing the land for the project. There are a number of conditions that must be met before construction can commence.
These conditions include outlining processes for key aspects of the development phase, like bushfire management, and stormwater, waste and emergency management plans for the site, before any works can begin. There are also conditions regarding protecting, removing and replanting a native vegetation offset.

Project approvals have required a major investment in time and effort to scope, prepare, analyse, evaluate and finalise the project design to meet the unique circumstances of Maryvale Mill and its location within Gippsland. The thorough nature of the application evaluations conducted by all associated authorities provided further opportunities to clarify, address consultative feedback, and improve the proposal.

Economic, Social and Environmental Considerations

The investigations for the design and technology used have considered a range of economic, social and environmental factors in determining a preferred technical solution.

In addition to the best practice analysis described below, examples of broader economic, social and environmental considerations for the project include:

- Improving energy security by returning up to 4PJ of natural gas to the broader market, helping to improve energy security for the state and country
- Helping to secure future investment at the Australian Paper Maryvale site and the jobs of approx. 850 employees who work there
- Supporting an additional 1,046 full-time equivalent jobs per annum across Victoria for each year of the three years of construction and 911 full-time equivalent jobs thereafter
- Diverting 650,000 tonnes of residual waste from landfill each year, to a higher order use as per the Waste Hierarchy
- A net reduction in greenhouse gas emissions of more than 500,000 tonnes per year of CO₂e, the equivalent of taking 100,000 cars off the road

Social licence

Australian Paper and its operations are an integral part of the Latrobe Valley, having existed on the Maryvale site since 1937. Australian Paper understands the importance of its relationship with the local community and this is why an extensive community engagement and consultation process has been at the core of the Feasibility Study. To date the community has shown significant interest in the project and what it means for the region and to the long-term viability of one of the region’s largest employers. A number of independent observers including government agencies have commented positively on the extensive program implemented by Australian Paper and in particular for the early community engagement through focus groups and the establishment of the “Creating Energy from Waste” information centre in Morwell. Australian Paper formed the view early in the project lifecycle that high stakeholder engagement standards would need to be achieved to successfully establish a social licence for this major project.
The potential for an EfW project was first discussed with community members through the ‘Maryvale Community Consultation Committee’ in May 2017, which has been long established by Australian Paper to provide a regular interface between it and representatives of the community.

Since then, Australian Paper has undertaken a series of engagement activities to inform the community of the proposed project, to take stock of the opinions of stakeholders, and address any issues raised. This initially involved a series of community focus groups held in Traralgon, Morwell and Moe to gauge the community views and attitudes on an EfW plant for Maryvale Mill.

Further stakeholder engagement activities undertaken by Australian Paper and Suez to support the Feasibility Study have included:

- The establishment of an Information Centre and Project Office in Morwell for local people to visit, find out about the project, and ask questions of the project team
- The production of regular stakeholder newsletters to provide interested parties with project updates
- Conducting ‘Open House’ sessions as part of the EPA’s public consultation process
- Regular advertisements in the local newspaper with information about the project and Australian Paper
- "Pop up" information centres in Traralgon, Morwell and Moe (at the shopping centres and library)
- Regular updates with the Maryvale Community Consultative Committee
- Maryvale Mill open day.

To date the Information Centre and Project Office has had 242 visitors and over 50 delegations received a tour. The “pop up” information centres undertaken in Moe, Morwell and Traralgon attracted more than 190 visitors.

Australian Paper has also engaged with a wide range of community and business groups, including:

- Latrobe City Council
- Traralgon Chamber of Commerce
- Committee for Gippsland
- Advance Morwell
- Gippsland Local Government Network
- Latrobe Valley Sustainability Network
- Traralgon Central Rotary Club
- Voices of the Valley
- Latrobe Health Assembly
- Latrobe Health Advocate.
Learning from our community

Australian Paper’s community consultation program demonstrated a high level of interest and broad support for the proposed EfW facility. Australian Paper encouraged feedback throughout this process and, as a result, a number of key questions were identified as being particularly important to the local community and needing to be addressed as part of the Feasibility Study.

1. Would an EfW facility increase the number of trucks on our roads?

A full traffic Impact Assessment for the project was undertaken as part of the Feasibility Study. This assessment found that modelled traffic volumes and swept paths will have minimal impacts on the road network.

For more information see the “Logistics” and “Traffic” section of this report at pages 22 and 34 respectively.

2. Could creating energy from waste undermine or reduce recycling efforts?

Ensuring maximum recycling of waste is an important aspect of this technology. The waste from the facility will come only from non-hazardous residual waste streams diverted from landfill such as municipal solid waste (MSW) streams, not recycling bins. Further we expect that in future, more organics and plastics will be diverted from the MSW waste streams and have fully factored this into our future planning.

The evidence from Europe demonstrates that high recycling rates can be achieved alongside high energy recovery rates. For greater detail on waste supply and Australian Paper’s modelling of this, see “The Waste Management Challenge in Victoria” section of this report at page 38.

3. How do EfW facilities manage potential air pollution?

Modern EfW facilities are specifically designed with best practice operating systems to protect health and safety. A detailed Air Quality Impact Assessment was undertaken as part of the EPA’s Works Approval Application.

The assessment demonstrated that emissions from the EfW plant will meet all SEPP (AQM) and IED stack emission limits. You can read about this assessment in the “Environment and amenity issues” section of this report at page 32.

4. How will the issue of noise and odour be addressed?

A key design feature of the facility will be noise control to minimise the impact of the facility. A Noise Assessment was conducted as part of the EPA’s Works Approval Application which found that the noise contribution from the proposed plant would meet EPA limits.

The main source of odour from an EfW plant will be the tipping hall and waste bunker. All waste will be stored, handled and processed in a closed environment which effectively traps odours within the facility.
As part of its consideration of Australian Paper’s Works Approval Application, the EPA conducted a public consultation process between 30 May and 6 July 2018. The EPA received 115 submissions with 84 percent of respondents supportive of the project going ahead, including 7 percent support with conditions.

As noted above, the consultation process also included a series of ‘Open House’ sessions in June 2018, run by Australian Paper and attended by the EPA, held in Traralgon and Morwell. These were designed to give the Latrobe Valley community an opportunity to find out what the project means for the local area, to ask questions, and find out more about the Feasibility Study. The EPA attended these sessions to provide information on the Works Approval process to interested parties.

On 25 July, the EPA conducted a Section 20B Community Conference in Traralgon to discuss Australian Paper’s proposed EfW project.

The session was independently chaired with more than 60 community members, including local residents, representatives from not-for-profit organisations and businesses gathered to discuss the proposed EfW works application.

The independent chair prepared a report detailing key issues and possible solutions raised in written submissions and at the Conference. This was made publicly available on 10 August 2018. The recommendations are listed below.

5. Does EfW reduce CO₂?
A comprehensive assessment of greenhouse gas emissions was undertaken as part of this study. This showed a significant environmental benefit of the project with a net reduction of 543,000 tonnes of CO₂e emissions per year. You can read about this assessment in the “Greenhouse gas emissions” section of this report at page 33.

6. Are there dangers posed by this technology?
The by-product of modern EfW facilities is captured and treated by sophisticated pollution control equipment to ensure the vast majority of particulate matter is captured within the facility. A Health Impact Assessment was prepared as part of this Feasibility Study and found negligible impacts in terms of community health. This is covered in detail in the “Health impacts” of this report at page 31.
The following topic specific recommendations relate to future actions, if a works approval is granted:

Recommendations

**Topic 1 - Air emissions monitoring and control technology to prevent health impacts:**

*EPA to consider:*  
- supporting Australian Paper to undertake specific community consultation in relation to establishing an appropriate monitoring, evaluation and reporting regime as part of considering potential future licence conditions.

**Topic 3 - Waste Hierarchy and waste composition**

*EPA to consider:*  
- outlining in its detailed assessment report for this works approval application (or some other appropriate communication channel) how it expects Australian Paper to manage each of these issues through environmental management plans and the types of licence conditions that it might consider imposing.

**Topic 4 - Management of incoming waste and residual waste generated**

*EPA to consider:*  
- outlining in its detailed assessment report for this works approval application (or some other appropriate communication channel) how it expects Australian Paper to manage each of these issues through environmental management plans and the types of licence conditions that it might consider imposing.

**Topic 5 - Greenhouse Gas Emissions and odour from the site**

*EPA to consider:*  
- the need for expert review of any emissions and odour modelling information relied upon in its detailed assessment.

**Topic 6 - Track record and public consultation**

*EPA to consider:*  
- the benefits and appropriateness of providing access to engagement advice (from EPA's Communications and Engagement Group) to Australian Paper to support their continued engagement approaches.

*EPA to consider:*  
- encouraging Australian Paper to better engage with external stakeholders (agencies and community representatives) specifically around health impacts.

The following general recommendation relates to future action regardless of whether an approval is granted:

Recommendations

*EPA to consider its role in:*  
- improved external communications and access to information.
Health impacts

A Health Impact Assessment (HIA) was prepared as part of the Feasibility Study to identify and evaluate the impacts of the proposed project on the health of the surrounding community.

The HIA considered the operation of the proposed project and potential impacts to the health of the off-site community. The risk assessment process uses conservative (worst-case) scenarios and then compares these results to accepted health standards. These standards aim to protect the most vulnerable members of the relevant community.

It considered a range of issues that have the potential to affect the health of the community (either positive or negative), which relate to changes to air quality, odour, noise, water, traffic, hazardous materials and the economic and social environment.

Based on the assessment undertaken, the project is associated with some benefits to the community, particularly in relation to employment. Where negative impacts have been identified, these are considered to be negligible in terms of community health.

In consultation with the EPA the HIA was publicised and made available for public review and comment. The EPA reviewed these further public comments as part of the Works Approval Application.
Environmental and amenity issues

Air quality

It was identified early that air emission impacts and their management were key focuses and areas of concern for local stakeholders. A detailed air quality impact assessment has been undertaken as part of the EPA's Works Approval Application. This included emissions from the now closed Hazelwood Power Station, Morwell Power Station, Energy Brix and Carter Holt Harvey saw mill in the background assessment, which means the assessment is considered to be conservative in terms of its cumulative effects.

The assessment covers a topographical area over 15km x 12.5km and utilises meteorological data over a five year period taking account of the unique characteristics of the Latrobe Valley including the inversion layer. The assessment also examines specific locations and also a grid matrix of 100 x 100 metres, resulting in 19,040 locations analysed every hour over the five year period.

The air quality impact assessment was conducted in accordance with EPA requirements (State Environmental Protection Policy for Air Quality Management - "SEPP AQM") and European Union Industrial Emissions Directive 2010/75/ EU ("IED"). The IED is one of the world's most stringent assessment benchmarks that leading EfW designers must meet. The Maryvale EfW facility has been designed to meet these rigorous European emissions standards.

The computational model used for the assessment was the EPA's preferred model AERMOD and the methodology was discussed and agreed with the EPA prior to commencement.

A range of substances were analysed and modelled in accordance with EPA Victoria and EU procedures. These included:

- Particulate matter 2.5µm
- Hydrogen fluoride (HF)
- Hydrogen chloride (HCl)
- Ammonia (NH3)
- Polycyclic aromatic hydrocarbons, as benzo(a)pyrene (PAHs as B(a)P)
- Hexavalent Chromium (Cr (VI))
- Cadmium (Cd)
- Mercury (Hg)

The assessment demonstrated that emissions from the EfW Plant will meet all SEPP (AQM) and IED stack emission limits. The assessment also demonstrated that emissions of the above substances from the EfW Plant will not cause exceedances of SEPP (AQM) ground level concentration (GLC) limits (known as 'Design Criteria'), with the exception of PM2.5. For PM2.5, the assessment demonstrated that the infrequent cause of GLC exceedances was due to occasional high background levels of PM2.5 typically due to fires and not due to the EfW plant emissions.

To further demonstrate that the EfW Plant was not the cause of PM2.5 exceedances, modelling was conducted on a range of PM2.5 emission scenarios, including:

- Zero emissions from the EfW plant (i.e. only background air quality)
- PM2.5 emissions at the maximum stack emissions limit allowed by the IED (30 mg/m3)
- PM2.5 emissions at a representative stack emissions value which is an average of UK EfW Plants (0.02 mg/m3)\(^1\)

The HIA specifically assessed PM2.5 and concluded the EfW facility would make a negligible contribution to existing concentrations and would only make up a very small fraction of the NEPM/SEPP guideline.

Greenhouse gas emissions

A comprehensive assessment of greenhouse gas emissions was undertaken as part of the Works Approval Application to the EPA. This showed that a significant environmental benefit of the project is the substantial reduction in overall greenhouse gas emissions, predominately from avoidance from landfill.

The net benefit of CO₂ reduction is calculated to be 543,000 tonnes of CO₂ emissions per year. By comparison, landfill of the waste alone would result in emissions of 500,000 tonnes of CO₂ per year. The following table presents calculated emissions from the construction phase, the operational phase for energy and non-energy related impacts (including transport emissions).

This will be a measurable impact on Victoria’s (and Australia’s) emissions profile and help to achieve targets outlined in the Climate Change Act 2017 (VIC) and Protocol for Environmental Management (PEM) - Greenhouse Gas Emissions and Energy Efficiency.

### Cumulative emission summary

<table>
<thead>
<tr>
<th>Construction emissions (tCO₂e)</th>
<th>Operation Energy related emissions (tCO₂e)</th>
<th>Operation Non-energy related emissions (tCO₂e)</th>
<th>Total emissions (tCO₂e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td>14,606</td>
</tr>
<tr>
<td>Years 1-25</td>
<td>-20,400</td>
<td>-523,531</td>
<td>-543,931</td>
</tr>
<tr>
<td>Total (25 years)</td>
<td>-510,001</td>
<td>-13,088,284</td>
<td>-13,583,678</td>
</tr>
</tbody>
</table>
Traffic

A full Traffic Impact Assessment (TIA) for the project has assessed the existing traffic conditions of the roads that will be used for construction and operation of the EfW facility and assessed the potential impacts of the EfW project development on these roads.

The findings of the TIA indicate that the modelled traffic volumes and swept paths will have minimal impacts on the road network (see ‘Logistics’ section).

Vehicles accessing the Maryvale site throughout the construction and operation phases of the project will use Alexanders Road and Tramway Road to connect to the Princes Freeway (M1), south of the project site, which provides access to the site from Melbourne and elsewhere in Victoria.

East of Princes Drive in Morwell, the M1 carries a two-way total of around 29,000 vehicles on an average day according to the VicRoads Open Data website. Trucks make up around 9 percent of this volume. To the west of Miners Way in Morwell, the traffic volume reduces to around 24,000 vehicles (two-way) per day and trucks make up around 13 percent of this number.
Noise emissions from the project during operations will occur from activities including blowers, fans, cooling towers, turbines and boilers. All of the high noise output equipment will have point source noise limits (dBA) and the majority will be enclosed to minimise noise impacts.

The applicable EPA guideline is Noise for Industry in Regional Victoria (NIRV). A noise assessment was conducted as part of the Works Approval Application in accordance with NIRV, which included the calculation of noise limits and design targets over three time periods.

The assessment found that the noise contribution from the proposed EfW plant would meet EPA limits at receptors, particularly the nearest residential receptors to the north, south, east and west of the site.

During the detailed design phase, there will be further opportunities to consider additional mitigation measures to reduce potential noise impacts. This would include dominant noise sources, including:
- Noise from the boiler house
- Water Cooled Condensers
- Train and truck noise.
Odour

The main sources of odour from the EfW plant will be the tipping hall and waste bunker. To control fugitive odour emissions, the EfW tipping hall, which will receive waste by train and/or truck, will be entirely enclosed and operated under negative pressure - where the outside air is drawn into the tipping hall and air inside the tipping hall is not permitted to escape to the outside atmosphere.

Odorous molecules and hydrocarbons / VOCs are expected to be destroyed in the EfW’s processes; i.e., foul air from the tipping hall will be used as combustion air in the EfW boiler.

The expectation and experience from the European plants visited is that there will be negligible fugitive odour and other air pollutant emissions from the site.
Water use and wastewater discharge

The addition of the EfW Plant will not significantly alter the management of wastewater, trade waste and stormwater at the Maryvale Mill and the EfW Plant water systems will be designed to integrate with the existing Mill systems.

The existing Maryvale Mill sources 70-80 ML/day of water from the Gippsland Water Moondarra Reservoir (via the Pine Gully Reservoir) and discharges approximately 55-65 ML/day of treated wastewater. It also discharges 15-20 ML/day to Gippsland Water as treated trade waste. The design concept assumes that the water supply for the project will be from Moondarra reservoir.

Potable water is sourced from the local water authority (Gippsland Water). Domestic sewage is discharged to the Gippsland Water Factory. The design concept assumes that the potable water supply for the project will be from a connection to the existing water supply line to the Mill and the domestic sewer discharge will be via the existing domestic sewer main from the site.

The estimated demand of the EfW Plant is expected to be 5-6 ML (less than 8 percent of the current Mill demand) of raw water per day, depending on the load and operating mode of the EfW plant, and 30 kL/day of potable water from Gippsland Water.

The design concept assumes the water effluent discharged by the EfW Plant will be to the existing Mill effluent treatment systems.
The Waste Management Challenge
In Victoria

With a number of landfills closing in the next 5 to 10 years, and the fastest rising population in Australia, Victoria needs a solution for the amount of waste being generated. Lowering the levels of waste generated, and increasing the amount of waste that is being recycled is crucial to meeting this challenge.

With the impending closure of the Hampton Park landfill site, there will be no putrescible landfill capacity in south east Melbourne as soon as 2025, creating a shortfall off 550,000 tonnes per annum in Melbourne’s disposal capacity. Continued population growth in Victoria is predicted to exacerbate this situation.

This will have the effect of reducing competition, resulting in a higher cost risk for local councils. It will also put pressure on remaining landfill options and significantly increase cross-city traffic with trucks forced to move 550,000 tonnes of waste each year from the south east to landfill sites in the west.

This will leave councils in the south east of Melbourne with the options of trucking waste across the city, opening a new landfill in the east, or exploring alternative waste treatment options as a solution to landfill.

Evidence from the countries which have decreased the amount of waste being sent to landfill demonstrates that a significant EfW industry is needed in addition to an effective recycling industry. This is the case in leading countries such as Germany, Sweden, and Denmark. Successful waste policy deployment in Europe has resulted in significant reductions in waste going to landfill with corresponding increases in recycling and energy from waste.

By diverting approximately 650,000 tonnes of non-hazardous residual waste each year from Victorian landfills, the EfW plant at Maryvale would effectively be the missing link in Victoria’s waste hierarchy.
For an EfW plant to be successful in Victoria, there are a number of critical factors which are required, all of which Australian Paper’s project has:

- Desire to divert waste from landfill by local and state governments
- Long term energy off-take contracts (25 years)
- Suitable site, appropriate zone and buffers
- Strong community engagement and acceptance
- Credible developers and operators to guarantee performance
- EPA Works Approval and Latrobe City Council Planning Permit.

All that is required now is a long term commitment to MSW supplies (25 years) from:

- MWRGG south east (>400,000tpa);
- Melbourne inner city (>70,000tpa); and
- GWRGG (>50,000tpa).

The benefits of this commitment would be:

- a viable solution to south east Melbourne’s waste crisis
- long term competitive waste disposal pricing at low risk
- improved environmental stewardship supporting Council sustainability strategies
- adding the missing component to Melbourne’s waste management infrastructure
- supporting investment and jobs for Victoria and the Latrobe Valley.

The following chart on Project timing demonstrates that the modelled closure of Hampton Park landfill combined with the Metropolitan Waste and Resource Recovery Group (MWRGG) waste tender timeline results in only a 6month timeline contingency. Any delays in the tender process will mean 550,000tpa of waste in south east Melbourne won’t have a place for disposal.

As noted in the Metropolitan Waste and Resources Recovery Group’s (MWRGG) Advanced Waste and Resource Recovery Technologies – Metropolitan Regional Business Case and Procurement Strategy of September 2018, by 2046, Melbourne’s municipal residual waste (garbage collected from households) will grow by 65 percent and over half a million extra tonnes will go to landfill each year.
The economic, social and environmental cost of landfill means that increasingly it is being seen as an unviable disposal method for the future. Councils are now looking at ways they can recover more resources from waste so they do not have to invest in new landfills and they can better manage existing landfills to dispose of waste that can’t be avoided or recycled.

MWRRG’s report concludes that advanced waste processing (such as EfW) can limit the amount of household waste being sent to landfill and achieve the State’s 25 percent recovery objective. It also finds that advanced waste processing will deliver better environmental and social benefits compared to landfill.

As an advanced waste processing technology, the Australian Paper EfW plant would play an important role in helping Melbourne and Gippsland Councils to meet their recovery objectives and minimise the long term pressure on existing landfill sites.

A key consideration for any alternative treatment of waste is the Landfill Levy set by the State Government. This is currently the main mechanism by which to encourage waste away from landfill.

Presently, only a large scale EfW plant (> 600,000 tonnes per annum) would have the volumes and economies of scale capable of competing with Victoria’s low cost of landfilling.

Councils have a stated objective to deliver better environment and community outcomes compared to landfill, but must also do this against the backdrop of delivering the least-cost outcome for their constituencies. They require low risk and certainty of pricing over the long term, both of which can be delivered through long term waste supply contracts to the EfW plant.
As can be seen from the MWRRG table above, EfW (Scenario 2) is the only alternative waste treatment option that delivers on the key criteria as well as delivering a net long term saving to councils. However, as can be seen from this GWRRG chart below, medium scale (up to 300,000 tonnes per annum) EfW plants are not currently cost competitive.

### Overview of costs (in 2018) associated with processing of general (residual) waste.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Minimum tonnes per annum for viability</th>
<th>Gate rate range ($/t) - low/ high</th>
<th>Bulk Transport ($/t)</th>
<th>Mid-range gate rate plus bulk transport $/t</th>
<th>Total approx. costs ($/ annum, processing)*</th>
<th>Approx Diversion rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill outside Gippsland region</td>
<td>$110 - $130</td>
<td>$35</td>
<td>$155</td>
<td>$8,088,000</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Dirty MRF</td>
<td>50,000</td>
<td>$163 - $221</td>
<td>$20</td>
<td>$212</td>
<td>$11,074,000</td>
<td>45%</td>
</tr>
<tr>
<td>MBT</td>
<td>50,000</td>
<td>$194 - $263</td>
<td>$20</td>
<td>$248</td>
<td>$12,956,000</td>
<td>55%</td>
</tr>
<tr>
<td>WtE</td>
<td>100,000</td>
<td>$230 - $311</td>
<td>$20</td>
<td>$290</td>
<td>$15,132,000</td>
<td>95%</td>
</tr>
<tr>
<td>Landfill Councils Business As Usual</td>
<td>$211m</td>
<td>$134</td>
<td>$0</td>
<td>$163</td>
<td>$8,497,000</td>
<td>0%</td>
</tr>
</tbody>
</table>

Based on mid-range gate rate plus bulk transport $/t and the kerbside collected tonnes per annum (52,000 tonnes in the 2015-16 financial year).
A critical component of assessing the feasibility of an EfW facility in the Latrobe Valley is the financial and commercial considerations.

The Feasibility Study concluded that the project is commercially credible. However, it does require further development to realise a fully viable project. A summary of this work is outlined below. Due to the commercially sensitive nature of this information, the full details of this analysis are not included in this public report.

Financial and commercial considerations

The diagram above outlines the key areas of revenue and expense for an EfW facility. The majority of revenue from such a plant is generated via a gate fee - a charge levied on waste received at a waste processing facility to dispose of it - with the remainder coming from the value of the energy created.
The key costs incurred are the capital expenditure (capex) associated with securing a suitable site and developing and financing the facility, along with ongoing operational expenditure (opex) on logistics, operations and maintenance, treatment inputs and disposing of any residues. Typical debt financing as demonstrated in Europe can extend up to 80 percent of the total capital costs.

In Europe, where EfW facilities are an integral part of the waste management hierarchy, the foundation of the commercial model is generally built on long term waste disposal and energy offtake contracts. These long term contractual arrangements, typically 25 years, are required to provide investment confidence and to secure finance. Short term contracts increase the finance risk premium, and ultimately result in higher gate fee costs.

Additional revenue can be generated from carbon abatement policies including Emissions Reduction Fund and Renewable Energy Targets through Commonwealth and/or State-based incentive schemes.
Carbon reduction and associated revenue is likely to be achieved from upstream sources (diversion from landfill) and downstream sources (substitution of fossil fuels). These revenues are expected to play an important role in the viability of the business case for this project. More detailed analysis will be developed during the preparation of the business case.

Capex and Opex estimates for the plant were necessary for the financial modelling process to determine the likely viability of the project. For the purposes of defining the scope of the proposed Engineer – Procure – Construct (EPC) contract for tendering during the study, the battery limits were taken as the fenceline of the EFW process area at the Maryvale site.

Capex for works required at Maryvale outside of this boundary has been separately estimated (as Mill balance of plant and interconnections).

Opex included the operating and maintenance costs for the EFW plant and interconnections to the fenceline. It may be that the final termination points for operations are adjusted beyond the fence line to capture a logical point
Capex and opex impacts on Australian Paper’s operations at the mill were not included and have been assessed separately.

Contractual arrangements

Given the inherently complex nature of establishing and running an EfW facility, detailed preparation and management are required to ensure robust contractual relationships.

The proposed structure, as outlined in the diagram above, envisages that Australian Paper will manage the relationship with the external electricity market. Residue / ash flows would be handled by Suez, as the operator of the O&M entity, which would be responsible for disposal, beneficial uses and logistics.

Currently the EfW entity would be wholly-owned by Australian Paper. However, this will require further consideration to provide...
a suitable mix of investment returns and risk management. Further development is still required including exploring the interest of potential equity stakeholders and expectations on investment returns.

During the Feasibility Study, full life cycle costing to identify and document all the costs involved over the life of the asset, together with a variations / sensitivities analysis to test assumptions and a range of potential future circumstances was undertaken. This analysis will be subject to ongoing review and updating. At this time the commercial outcome has determined the project is credible and would provide a suitable return on investment consistent with typical infrastructure returns.

NEXT STEPS

With completion of the Feasibility Study, Australian Paper will now move into the Development Stage which will cover those activities which will need to be addressed before construction could proceed. This will include:

- Manage participation in the tender process for waste supply with nominated Melbourne Councils and the Metropolitan Waste and Resources Recovery Group, and Gippsland Councils by the Gippsland Waste and Resource Recovery Group
- Select a preferred Engineer - Procure - Construct (EPC) contractor to work with to optimise the design contract terms and pricing
- Undertake detailed financing analysis to support Financial Close
- Continue community engagement
- Develop relationships with organisations that may be able to take Bottom Ash for a secondary beneficial use
- Develop external contract forms or term sheets
- Complete a final risk review and revise mitigation plans.

Landfill Contracts expire 31 March 2021

AP Feasibility Study
WRRG Tenders
Morwell Community Information Centre
EPA Works Approval
LCC Planning Permit

Commence construction
Construction 42 months
Commence construction
Complete construction
Commission and start up
Hampton Park landfill closes
Conclusion

Australian Paper Maryvale is one of the largest employers in the Latrobe Valley with approximately 850 full time employees. When flow on effects are taken into account, we support 2,387 jobs and contribute $451 million to the economy of the Latrobe Valley region.

We need to address our future energy needs proactively, which is why in July 2017 Australian Paper announced that, with the support of the Federal and Victorian State Governments, we would undertake a Feasibility Study into the development of a new baseload EfW facility at our Maryvale paper mill in the Latrobe Valley.

Both Federal and State Governments saw this investment as a priority project for the future success of the Latrobe Valley and part of a broader strategy to support economic growth in the region. This was particularly important at a time when the local economy was transitioning.

Community engagement has been at the centre of this $7.5 million Feasibility Study into building an EfW plant at the Maryvale site. The process has taken approximately 18 months and represents a thorough investigation into creating a commercially sustainable and environmentally responsible business solution delivering energy security for Australian Paper’s Maryvale Mill.

The Feasibility Study has confirmed that an EfW plant at the Maryvale Mill would be:
- economically positive;
- socially acceptable
- safe for the community
- environmentally sound
- technically proven
- beneficial for Melbourne’s waste management
- commercially viable.