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Waste Management Plan

Gladstone Green Energy Manufacturing Centre

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1. PURPOSE

This Waste Management Plan (WMP) has been developed in order to document the way in which Fortescue Future Industries (FFI) manages waste generated at the Green Energy Manufacturing Centre (GEM) facility and how it proposes to implement practices and processes to avoid, reduce, reuse and recycle materials before disposing to landfill.

It has been developed in accordance with the Gladstone Regional Council Planning Scheme framework.

2. SCOPE

This plan is applicable to all designated work areas and work processes within and surrounding the GEM facility.

3. OBJECTIVES

The objectives of this plan are to prevent pollution and reduce the impact of FFI business activities on the environment by:

- Avoiding waste where practical
- Reduce the amount of energy FFI uses to perform its business activities
- Reuse materials where practicable in the production of products and provision of services
- Recycle materials and scrap where possible
- Dispose of waste only through licensed operators and facilities

4. DEFINITIONS (TERMS/ACRONYMS)

Word/Term	Definition
FFI	Fortescue Future Industries
GEM Facility	FFI's Green Energy Manufacturing Centre in Gladstone
GRC	Gladstone Regional Council
Inert Waste	Waste also known as solid general waste is waste that is incapable of being broken down by microorganisms. Waste streams associated with inert waste include but are not limited to; construction and destruction rubble, bricks, roof tiles, road base, soils and concrete
Putrescible Waste	Waste also known as general waste that contains organic matter capable of being decomposed by microorganisms. Waste streams associated with putrescible waste include but are not limited to; waste from household bins, manure, food and animal waste and treated timber.
Recoverable/Recyclable Waste	Waste that can be recovered or reused. Waste streams associated with recoverable waste include but are not limited to;

Word/Term	Definition
	glass, cardboard, paper, plastics, organics, metals, plaster board and untreated timber
WMP	Waste Management Plan

5. ROLES AND RESPONSIBILITIES

Role	Responsibility
Facility Manager	<ul style="list-style-type: none"> providing adequate resources for waste management aspects. ensuring integration of waste management requirements throughout business processes, e.g., risk assessment, procurement, and acquisition. communication of waste management performance ensuring that waste management is reflected across business and departmental objectives
HSE Specialist	<ul style="list-style-type: none"> Ensure the adequacy of this plan to meet relevant approval and licence conditions, legislative requirements, and other compliance obligations Ensure that this plan is developed to address potentially significant waste impacts resulting from FFI's operational activities Monitor the effective implementation of this plan Ensure adequate levels of waste management training for all levels of personnel Any non-conformance of the plan is appropriately addressed through corrective actions, e.g., incident or hazard reporting, review of action
All Workers (including contractors)	<ul style="list-style-type: none"> Actively apply and participate in the application of this plan

6. LEGISLATIVE CONTEXT

The following Legislation provides the broad framework for which this plan must operate and with which it needs to comply.

Applicable Legislation

Act / Regulation / Standards
Environmental Protection Act 1994
Environmental Protection Regulation 2008
Gladstone Regional Council Planning Scheme SC6.11 Waste Management policy



7. PROJECT LOCATION AND DESCRIPTION

The GEM Facility is situated on Lot 4 SP245936 Euroa Circuit, Aldoga in Queensland, approximately 20km west of the centre of Gladstone. The Facility is located within:

- The Gladstone Regional Council local government area, administered by the Gladstone Regional Council
- The Gladstone State Development Area (SDA), administered by Queensland's Office of the Coordinator-General (Department of State Development, Infrastructure, Local Government and Planning).

The GEM Facility will be the first step in a series of projects that will transform regional Australia through green industry manufacturing and energy production centres. The operational activities shall include:

- Manual assembly of hydrogen electrolyzers
- Development of a 2GW Automated Assembly Facility, which will receive components, assemble and dispatch hydrogen electrolyzers for various hydrogen projects.



8. IDENTIFIED WASTE TYPES

FFI has identified the following types of waste aspects and their potential impact on the environment. These shall be managed through this plan.

WASTE ASPECT	POTENTIAL IMPACT
Solid Waste	Has the potential to negatively impact the facility/site and surrounding areas. Potential examples include plastic waste, paper/card waste, metal scrap.
Liquid Waste	Possibility of negatively impacting on soil and water through contamination includes dirty water, waste detergents or organic liquids.
Chemical Waste	Possibility of negatively impacting on soil and storm water/drainage systems if uncontrolled and released to the surrounding environment or not disposed of correctly. Uncontrolled release of emissions to atmosphere.
Recyclable Waste	Possibility of positively impacting the environment as it reduces the amount of solid waste that needs to be disposed of and reduces the amount of water and raw energy used in new manufacturing.

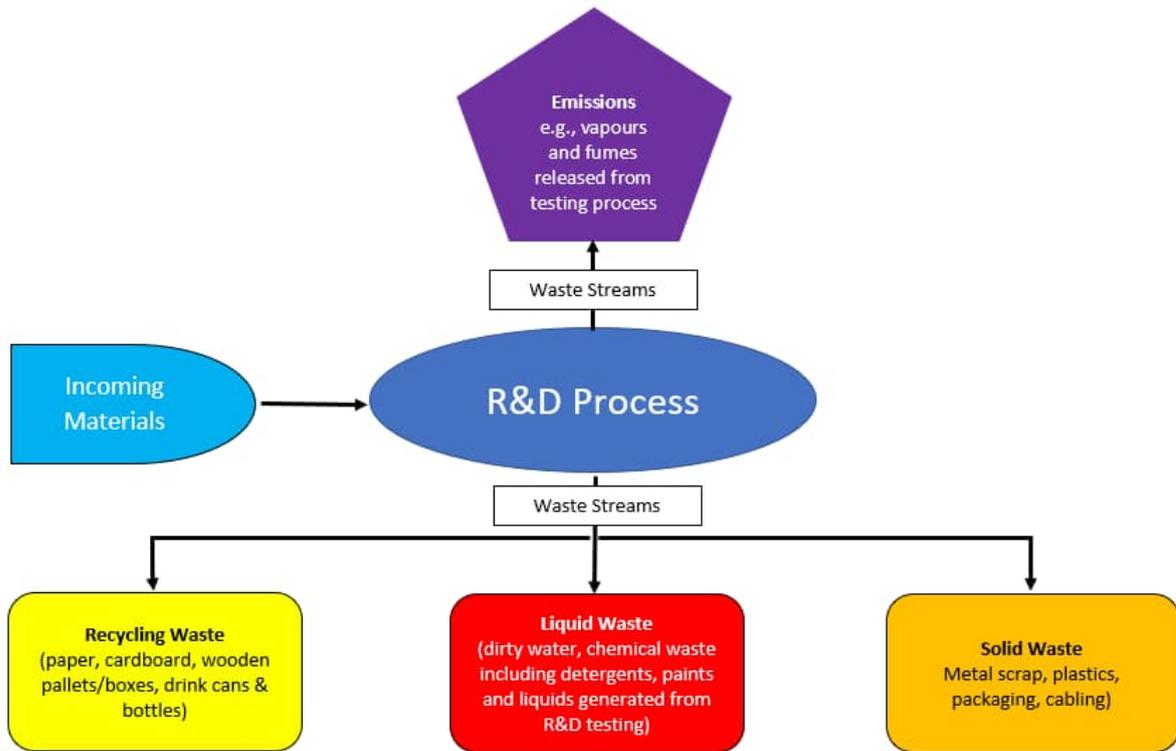


Figure 1: Example of Waste Generation Process Flow for GEM Facility

9. WASTE MANAGEMENT STRATEGY

The waste management strategy for the GEM Facility is modelled on the waste hierarchy, which is based on maximum conservation of resources. All identified waste streams shall be assessed with the aim of determining the most appropriate way to deal with the waste.



The waste hierarchy includes:

- **Prevention and Avoidance** - This concept focuses on the measures to be taken so as not to create any type of wastes in the first place. This step shall be given the top priority for the GEM waste management program; if this option is not practicable, then
- **Minimisation** (or reduction of the waste) - The minimisation of wastes is the second preferred option. At this stage FFI will look to take action to make changes in the type of materials that are being used for Research and Development (R&D) and Manufacturing of specific products, so as to ensure that any by-products are of the least toxicity; if this option is not practicable, then
- **Re-use** - This option will help us in minimizing the amount of waste produced and ensure we look to reuse and repurpose as much material and product as possible e.g. waste paper to become scrap paper. The intent of re-use is to reduce the use of natural resources and reduce the costs associated with R&D and Manufacturing. If this option is not practicable, then
- **Recycling** - Materials that cannot be reused in their present form but could be used in a different form will be sent to a third-party contractor for recycling. Common materials on site that shall be considered for recycling include wastepaper, cardboard, plastics, batteries, cans, and drink bottles. If this option is not practicable, then
- **Treatment** – FFI Manufacturing recognises that some types of waste, such as hazardous chemicals, cannot be safely recycled and direct treatment or disposal is the most appropriate management option. We will work with our Waste Contractor to ensure waste is treated to minimise any impact on the environment to as low as practicable. If this option is not practicable, then
- **Energy Recovery** – FFI shall work with our preferred waste contractor to ensure the wastes that cannot be recycled are being converted into useable forms of energy such as heat, light and electricity etc. It is hoped that by implementing this process it will help save various natural resources. If this option is not practicable, then
- **Disposal** of the waste in an environmentally sound manner

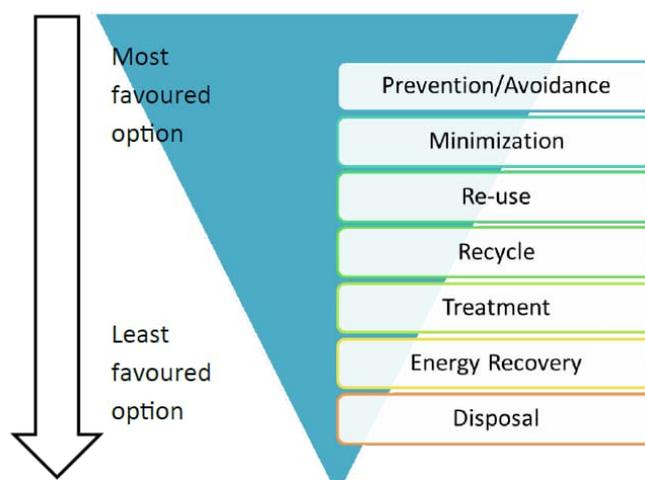


Figure 2: Example of Waste Management Hierarchy

9.1 Waste Minimisation

FFI manufacturing personnel shall be encouraged to minimise waste production and exposure to the surrounding environment whenever possible.

Personnel (including contractors) shall be encouraged to:

- Purchase materials and supplies in bulk where possible to reduce packaging and transport.
- Re-use and recycle materials as much as possible.
- Segregate waste material (including recyclables) at the source as far as practicable, to reduce commingled waste.
- Ensure all waste bins are closed or covered to prevent wind-blown litter and fauna access to receptacles.
- Use of computers and portable electronic devices to read and review documents in an effort to reduce printed material
 - Print smarter – ensure default printing selection is set to double sided print to save up to 50% on paper, ink and electricity costs
- Utilise personal water bottles to remove the need for plastic water bottles on site – filtered water is available
- Reuse stationary e.g., reuse files or binders

Examples of proposed waste mitigation methods include:

TYPE	SOURCE	MANAGEMENT METHOD
Material Waste	Manufacturing	<ul style="list-style-type: none"> • Recycle all available material or • Reuse suitable off cuts • Reuse packaging/cardboard • Recycle through designated recycle bins
Recycled Waste	Paper, cardboard, packaging, glass, soft plastic,	<ul style="list-style-type: none"> • Reuse cardboard and packaging where appropriate • Recycle through designated recycle bins • Secure destruction
	Printer / Toner Cartridges	Recycle through equipment provider – <ul style="list-style-type: none"> • designated recycle bin available
	Batteries	Designated recycle box available to capture waste batteries
	E Waste	E-waste Recycling & Reuse across other FFI locations
Vegetation Waste	Garden waste, site infrastructure	External contractor to reuse vegetation for: <ul style="list-style-type: none"> • Compost • Rehabilitation or Landscaping

9.2 Energy Consumption

Energy reduction is a major focus area for our business and one where we shall continue to look at alternatives to reduce our energy consumption. To reduce energy usage the following strategies shall be implemented:

ENERGY USE	MANAGEMENT METHOD
Lights	<ul style="list-style-type: none"> • Circuit switches • Low volt globes • “Turn Off” stickers
Natural Light	<ul style="list-style-type: none"> • Open plan design allows for use of natural light and reduced need for power generated lighting
Air-conditioning	<ul style="list-style-type: none"> • Air-conditioners to be set on timers • Temperature controlled
Computers	Use of Laptops wherever possible
Printers	Automatic power off

10. WASTE COLLECTION AND DISPOSAL

All wastes to be disposed of for the GEM facility shall be managed by an external contractor who is trained, qualified and licensed to remove, transport and dispose of waste material.

Collection of waste is generally on an as needs basis with collection services booked based on the results of weekly waste inspections of site

Currently FFI have entered into an agreement with Veolia Waste Management Services to provide waste management solutions including recycling and reducing our waste volumes going into landfill.

10.1 Weekly Waste Inspections

Waste inspections are conducted on a weekly basis of all skips and bins onsite, with the exceptions of kitchen and office bins. Inspections are conducted in order to:

- Identify which bins require servicing
- Identify any non-conformances in regard to segregation of wastes and illegal disposal of material
- Identify the need for additional bins and/or waste streams

These inspections are typically undertaken by the FFI Facilities Supervisor.

10.2 General Waste Storage



Waste materials produced from site activities shall be separated at the source and stored separately on-site. It is anticipated that there is sufficient space on-site for separate storage, for example, separate skip bins or appropriately managed stockpiles, of the following waste types:

- Paper and cardboard
- General commingled recycling waste
- Non-recyclable general waste, and
- Hazardous waste (if present)

All waste placed in skips or bins for disposal or recycling will be adequately contained to ensure that the waste does not fall, blow, wash or otherwise escape from the site. Waste containers and storage areas are to be kept clean and in a good state of repair.

Areas designated for waste storage shall also consider environmental factors which may cause an impact to the waste storage, such as slope, drainage, proximity relative to waterways, stormwater outlets and native vegetation.

10.3 Chemical Storage & Disposal

Storage of waste chemicals such as chemicals in liquid form, solvent and oils will be held to an absolute minimum and shall be stored in Australian Standards approved chemical cabinets with impervious bunds.

All chemical wastes will be disposed of through FFI's approved waste contractor.

10.4 Spill Management

Spill kits are placed at or in proximity to locations where potential for a spill has been identified.

Spill kit equipment and materials shall allow an immediate response to intercept and clean-up a spill and reduce the potential impact on the environment. FFI personnel shall adopt the 3 "C" process for spill response: 'Control', 'Contain', and 'Clean up'.

1. Controlling the situation is to stop the cause or source of the spill or slowing down the rate of release of material.
2. Containing the spill is minimising the damage caused by preventing the spill from spreading to other areas.
3. Clean up is the removal of the contaminants itself from the affected area. The proper disposal of the materials used in the removal of the contamination is the final step in any clean up.

Removal of any contaminated material from a spill response shall be by a licensed contractor who is qualified to respond and capable of transporting and disposing of any contaminated material as required.

11. MONITORING AND INSPECTIONS

FFI are committed to minimising the risks associated with the generation of wastes associated with operational activities at the GEM facility.

FFI's existing workplace inspection process shall be used to provide a formal documented review process of how waste management is performing as well as opportunities for improvement.

In addition to a formal process of inspection, daily walk arounds and prestart inspections of work areas shall also provide an opportunity to monitor the need for any waste management mitigations.

12. DOCUMENTATION AND RECORDS MANAGEMENT

This plan supports the Environmental Management Plan that has been submitted to the Gladstone Regional Council (GRC).

The following documents should be read in conjunction with this plan:

Table 1: Policy, Standard, Work Instructions, Forms (Templates)

Document ID	Title of Document
XXX-0000-EN-PLN-0001	Environmental Management Plan – Gladstone Green Energy Manufacturing Facility



13. APPENDICES

APPENDIX 1: WASTE RECEPTACLES

Waste collection bins and the products they can accept are provided in the Table below. Wastes have been categorised into four (4) main waste types:

- General waste (non-recyclables) – green bin and green lid.
- Recyclables (paper and cardboard) – yellow bin and yellow lid.
- Recyclables (plastic) – blue bin and blue lid
- Hazardous waste (solid only – no liquids) – green bin and red lid

Green Bin & Lid – Non-Recyclable (General Waste)	Yellow Bin & Lid – Recyclable Waste (Paper & Cardboard)	Blue Bin & Lid – Recyclable Waste (Plastic)	Green Bin & Red Lid (Solid Hazardous Waste)
			

In addition to the four categories above there is also access to bulk waste containers:

Large General Waste Bins (Red Lid)	Large Yellow Recycling Bin (comingle paper, cardboard, plastic)	Open Skip Bins (As required)	Intermediate Bulk Containers (IBC) for chemical liquid waste
			

For recycling, there are the following options

Boxes for fluorescent tubes	Battery Recycling	Containers for Change- (Bottle and Can Recycling) Bin	
			

APPENDIX 2: Waste Management Options

Examples of how solid and liquid wastes may be managed on site

Description	Origin	Waste Type	Waste Management Options				
			Prevention/Avoidance	Reduce	Re-use	Recycle	Disposal
Solid Waste	Incoming Waste Streams (e.g., Raw materials)	e.g., Plastic Packaging	Limiting packaging from raw material suppliers including supplier waste management practices through alternative product supply.	Identify products in supply chain with reduced plastic packaging	Limited options exist for reuse of packaging plastics.	Plastic packaging should be collected for recycling unless contaminated with other waste materials.	Plastic packaging should not be sent for disposal unless contaminated with other waste materials that cannot be readily separated from the plastic waste stream.
	Other: Offices	e.g., Fluorescent Tubes	N/A Use of natural light already a control measure	Procurement and use of High-quality tubes to ensure extended product life and reduce volume of hazardous waste generation.	N/A – no option to re-use a broken tube	All fluorescent tubes shall be captured in a cardboard box to be sent back to local agent for recycling	Fluorescent tubes may only be disposed of at a hazardous waste landfill facility after treatment.
Liquid Waste	Incoming Waste Streams (e.g., Raw materials)	e.g., Potassium Hydroxide (KOH) 30% Concentration	No alternatives due to testing requirements	Pressure tests conducted prior to reduce the need for retesting Reduce volume of KOH onsite to minimise spills	N/A – no option to re-use KOH used during testing	Mix of KOH and demineralised water captured in IBC for treatment by external contractor	All KOH waste material that cannot be recycled must be disposed of at a hazardous waste facility
	Maintenance Activities	Solvents and Paints	Identification of opportunities for non-toxic alternatives.	Reduce the volume required during maintenance		Certain solvents and paints can be recycled through a purifying process	Solvents and paints that cannot be recycled must be disposed of at a hazardous waste facility