

# Advanced Waste to Energy Solutions

# Advanced high-capacity incineration and waste-to-energy solutions.

We are one of the UK's longest established manufacturers of bespoke incineration solutions for converting waste-to-energy. Proudly leading the way with our unparalleled design, innovation, service and quality.

Welcome to Addfield Projects, leaders in the design and manufacture of thermal treatment technologies for complex waste disposal and waste-to-energy facilities.

We are proudly built upon a foundation dating back to 1982, growing to the point that we now have a solution to every requirement and installations spanning the globe.

I am happy to invite you to discover more about how we can provide you with the most suitable and sustainable solution, no matter how challenging your requirements.

Our experience and expertise have enabled us to become an international authority, continuously innovating our approach to solving many of the industry's most important disposal needs.

As you will see we approach every installation individually, designing machines to match your needs, ensuring it will continuously deliver

maximum results for you whilst providing a visible return on your investment.

Our waste-to-energy installations are proven to deliver enormous benefits within the communities they are installed. Combining a safe, reliable and environmentally sustainable facility to dispose of large volumes of waste alongside producing green energy, electricity, hot water and steam, reducing operational costs and offsetting the impact of incineration.

Delivering more than just an 'Incinerator' we pride ourselves on the personal touch that Addfield has become known for. Our client list includes many of the world's largest agricultural, municipal and medical organisations, including the NHS in the UK.

Beyond traditional incinerators, we have supplied solutions for the treatment of waste for the mining, gas and oil industries, specialised

scientific operations, and precious metals reclamation. In fact, I am confident that we can find the right solution for all waste types. You only need to ask.

Through employing our own expert design team and highly experienced engineers, we are yet to find a problem that cannot be overcome.

I am sure that you will have many questions about your particular project and hope that we are able to answer many of these in the following pages.

**Derek Carr**  
Managing Director  
Addfield Projects





# Addfield: The Incineration Experts

Addfield Projects are leading the industry in the development of high-capacity waste disposal solutions and waste-to-energy facilities.

We are experienced in complex installations in remote and isolated locations. We support you for the life of your facility allocating a dedicated project manager from the start guiding you smoothly through the entire process.

Following completion we will remain available to keep your facility in full working order able to help with servicing, maintenance, training and operation. All installations are designed and manufactured by us to be fuel-efficient, sustainable and deliver a measurable return on your investment.



## International Supply & Installation Turnkey Operations



Open Pit Mining Incinerator  
**Papua New Guinea**



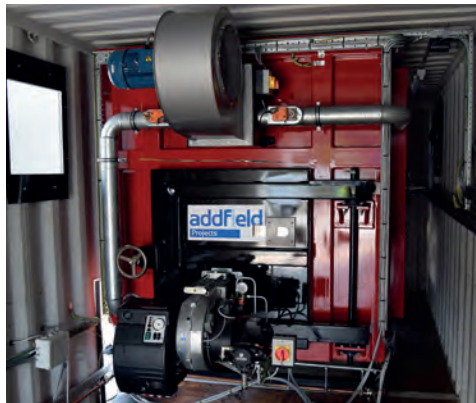
Gold Cyanidation Removal  
**Saudi Arabia**



1000kg/hr Clinical Waste  
**Isle of Man**



Precious Metal Recovery  
**Switzerland**



Waste Oil Disposal  
**Guyana**



Waste Management Remote Islands  
**Ascension Islands**

## Tailored solutions for all waste types



**Chemical**



**Hazardous**



**Animal**



**RDF**



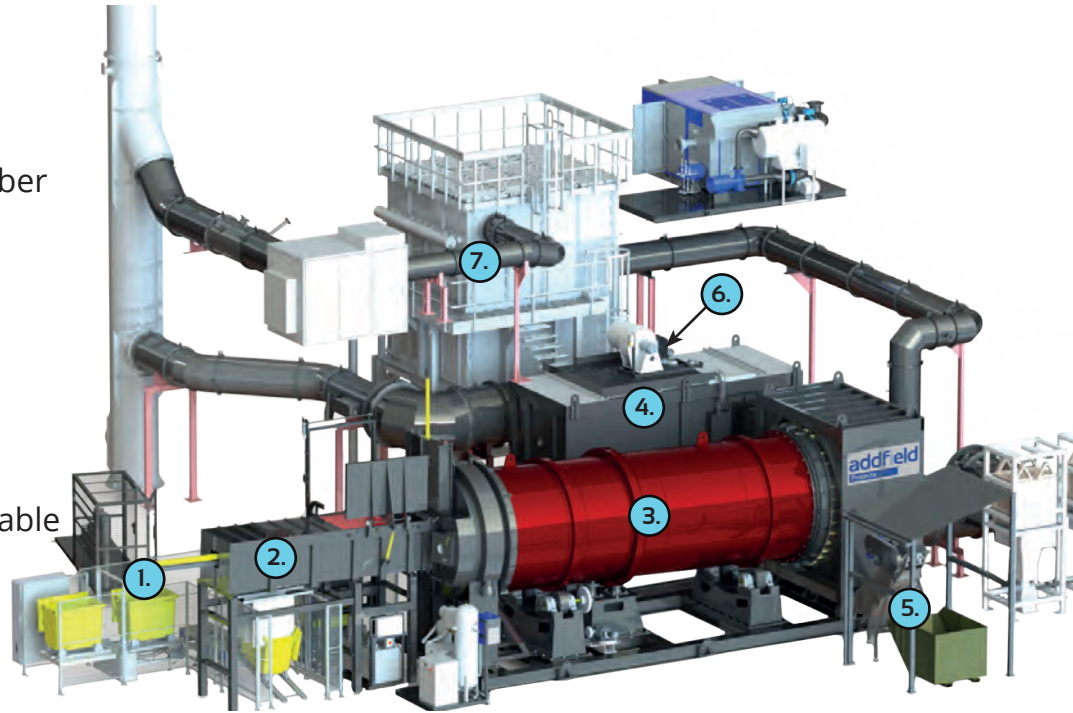
**Precious  
Metal**

# Rotary Hearth Incineration Plant (up to 2000kg/hr)

A rotary incinerator utilises a rotating hearth to effectively destroy waste. This system allows for continuous agitation of waste, from the automated loading sequence, as it traverses the kiln into its final destination the automatic deashing system. This type of system is particularly good for low-calorific waste loads and/or for waste systems with varying inputs.

1. Bin tipper system
2. Automatic loading sytem
3. Rotary hearth primary chamber
4. Secondary after chamber
5. Automatic deashing system
6. Waste heat recovery boiler
7. Filter system

At Addfield we will support you from concept to completion delivering only the most sustainable and efficient solution possible.



High-capacity rotary incinerators are built to securely dispose of a wide range of traditional and complex waste types. Through their revolving chamber, they are adaptable to many waste streams, including large volume items through to liquid and sludge waste equally.

- Loaded via bin tipper/screw feed/conveyor systems.
- Waste is destroyed at temperatures between 800°-1200°C.
- Waste enters at the steepest point of the primary chamber.
- Primary chamber rotates on an incline, tumbling the waste slowly.
- Rotation encourages even and efficient distribution of heat.
- Volume of waste reduces along the chamber before reaching the deashing zone.
- Final stage automatic disposal of ash.
- Non-combustible materials accumulate at the bottom ready for recycling.



Optional agitation blocks can also be installed for specific waste types to optimise the reduction during the process further.

## What is the right solution for you?

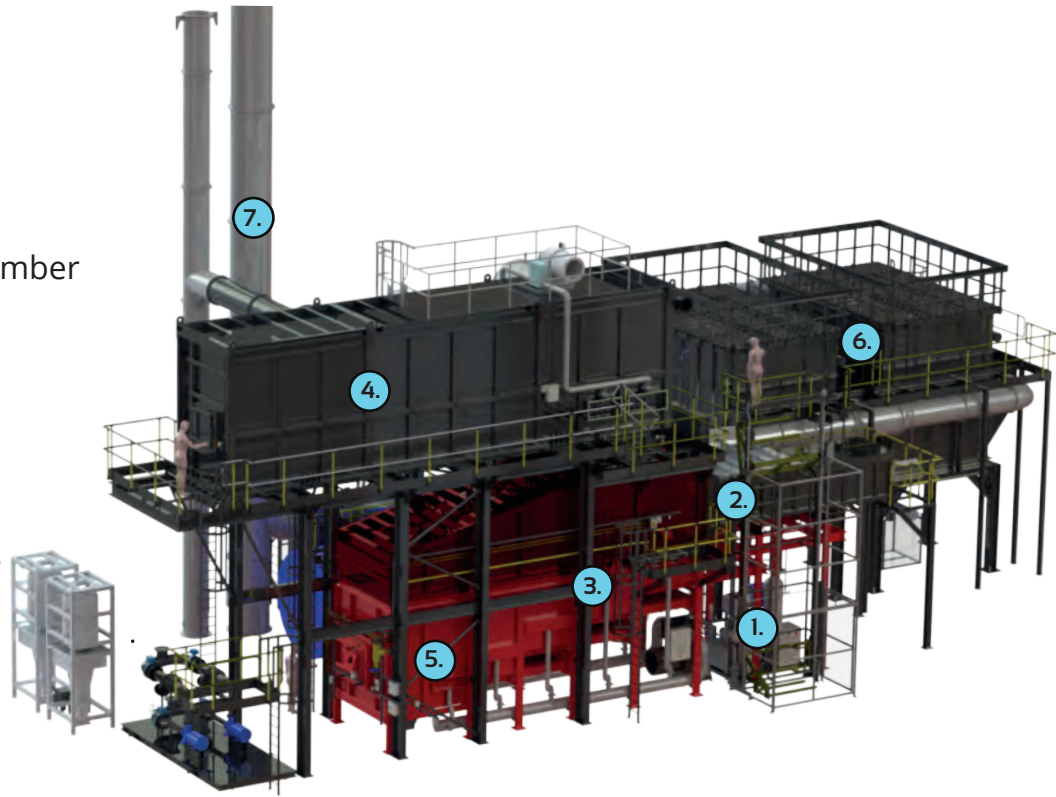


# Stepped Hearth Incineration Plant (up to 2000kg/hr)

A stepped hearth incinerator consists of multiple steps where the waste is progressively pushed and agitated until it reaches the final stage as ash.

1. Waste reception hopper
2. Automatic loading system
3. Stepped hearth primary chamber
4. Secondary after chamber
5. Automatic deashing system
6. Filter tower
7. Chimney stack

Each facility will be custom designed to match your requirements exactly.



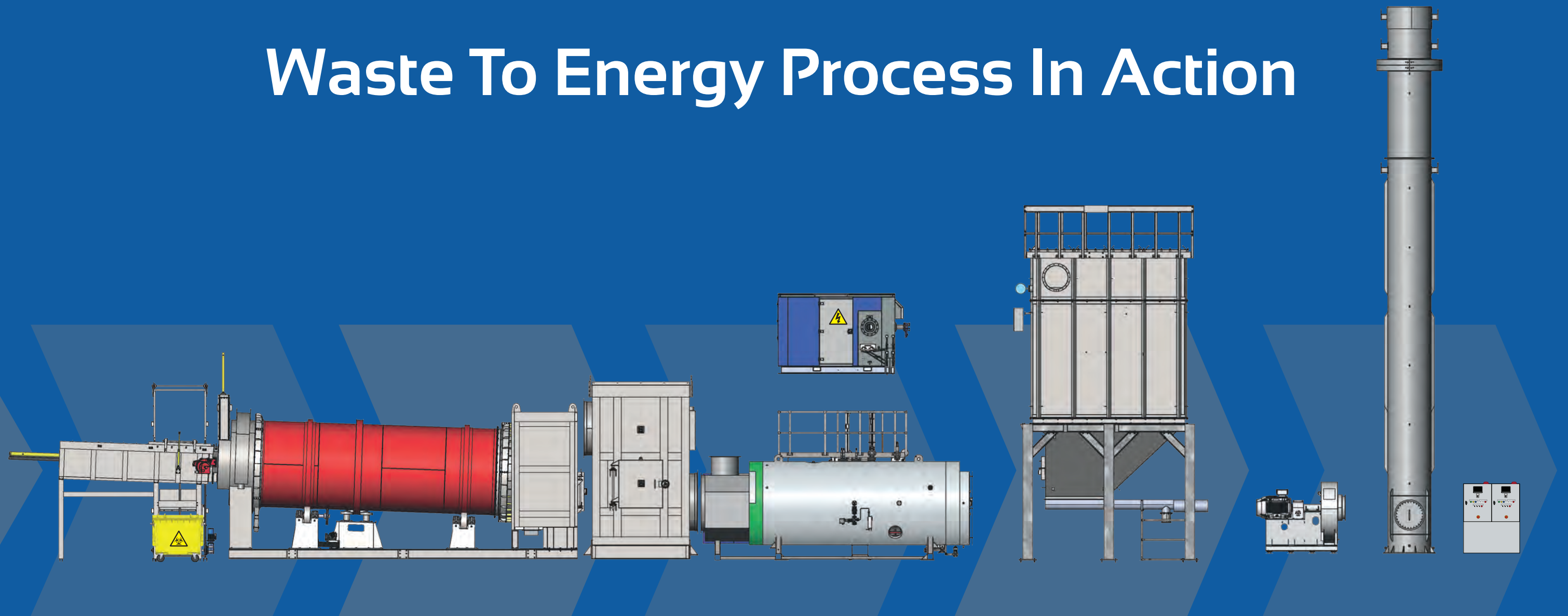
Stepped hearth incinerators are designed to securely process a wide range of traditional and complex solid waste via a multi-stepped primary hearth. Highly adaptable solutions for continuous disposal of large quantities of non-recyclable waste.

- Loaded via bin tipper/screw feed/conveyor systems.
- Waste is destroyed at temperatures between 800°-1200°C.
- Waste enters at the highest stage of the primary chamber.
- Concrete pushers direct waste down multiple steps.
- Pushing and falling encourages breakdown of waste.
- Volume reduces at each chamber before reaching the deashing zone.
- Final stage automatic disposal of ash.
- Non-combustible materials accumulate at the bottom ready for recycling.



**Contact our team of experts to discuss your project.**

# Waste To Energy Process In Action



## 1. Waste Handling

Solid waste is delivered to the facility in proprietary wheeled bins, which is then introduced onto the bin lifting and tipping mechanism by the operators.

The bin lifting and tipping system raises a full bin to the infeed level, invert the bin and deposit its contents into the ram feeder hopper.

The ram feeder, an automatic pusher system then feeds waste into the primary combustion chamber.

## 2. Waste Treatment

The system comprises of two separate sections, the primary chamber where the destruction of the solid waste takes place and the secondary chamber where the combustion products will be thermally treated and oxidised.

The waste undergoes combustion, either self-combusting or with the help of internal burners. The chamber temperature typically ranges from 800° to 1200° Celsius.

Waste traverses the kiln and is reduced to ash. An automatic ash removal and conveyor system discharges residues into a waiting skip or bin.

## 3. Energy Recovery

The hot exhaust gases, upon leaving the secondary chamber, are directed to and through the two-pass waste-heat-recovery boiler.

The primary purpose of this is to reduce the flue gas temperature to a level that is compatible with the downstream abatement and exhaust system.

In doing so it is capable of producing hot water or steam for use within the complex. Alternatively a steam turbine can be installed to generate on site electricity.

## 4. Flue Gas Treatment

An advanced flue gas treatment system is installed to comply with the Industrial Emission Directive.

This system incorporates a number of fully integrated components including;

A chemical reagent dosing system for neutralisation of chemical compounds.

A SNCR De-NO<sub>x</sub> kit to comply with the latest BREF regulations.

A set of state-of-the-art ceramic filters for sorbent and dust removal.

The filter systems also includes an online, automated self cleaning system.

## 5. Monitoring & Exit

Once cleaned, the exhaust gas is pulled through the system by an induced draught system. This manages the flow throughout the plant ensuring adequate retention time during the combustion and cleaning process after which, the exhaust gas is directed towards the chimney to exit.

Whilst doing so, it passes a series of continuous emission monitors. The data from these systems is used to report on the status of the plant. A data acquisition system is used to interpret the readings, allowing the plant to automatically self optimise.

The data can also be used to ensure the compliance with legislation.



# Are you BREF ready?

The globalisation of emissions incoming with the development of BREF (Best available techniques REference documents), establishing a framework for emissions that will need to be achieved for all incinerators.

Addfield has always aimed to achieve and exceed all current and proposed legislation with regards to emissions to support our sustainability targets and support the development of green technology.

Our installations encompass the greatest level of incineration technology combined with advanced flue gas treatment systems including CEMS (Continuous Emission Monitoring Systems) and optional RDF (Refuse Derived Fuels) applications, and the latest WID/IED European Standards.

## Advanced Flue Gas Treatment Systems

Our extensive experience in the industry has given us the ability to provide a full range of environmentally protective flue gas filtration systems to treat even the harshest of waste.

We can provide a range of filtration systems to suit your particular waste and environmental requirements. Helping you to dispose of all waste types safely and sustainably.

### Gas Cleaning Wet Scrubber

A water tower whereby the incinerator gas stream will traverse upward, while liquid is sprayed downward into the incoming gas stream. This counter current flow exposes the outlet gas to the scrubbing liquid. Particulates along with other components are intercepted and removed.

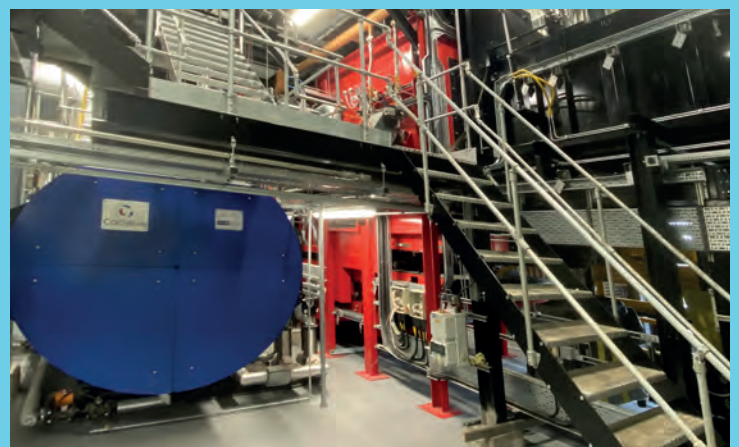


### Sorbent Injection

Sorbent powders come in two forms, lime (or sodium bicarbonate) and activated carbon. Such powders are used to neutralise gases on large installations. Sodium bicarbonate is used to neutralise acid gases whereas activated carbon is used to neutralise heavy metals, dioxins and furans.

### Ceramic Filters

Gas is pulled through vacuum formed ceramic filter tubes. These filters remove the heavy particulates and used sorbent powders in an extremely efficient manner. A dry system that requires minimal long term maintenance and is up to 97% effective in removing particulates.



### SNCR/DeNox Systems

The Addfield DeNOx systems involve the use of Urea, a common, widely available harmless fertiliser to neutralise nitrogen oxides (NOx) formation. Nox is typically kept under control using good combustion however for unusual waste streams a DeNox system may need consideration.

## Achieve Environmental Nox Targets

# Consultative Approach to Waste

We are experienced in working directly with industry leaders as well as environmental consultants to develop suitable incineration facilities. Through FEED (Front End Engineering Design) studies and ultimate lab analysis we are able to calculate your expected waste output, energy generation and possible return on investment.

RDF delivers the opportunity to develop sufficient energy to power your plant alongside selling energy back into your designation grid with SEGS (Smart Export Guarantee Systems). Combine this with the income generated through processing external general and medical waste makes it possible for an active site to achieve a full return on investment in between 2-5 years depending upon waste type processed.

During the past 20 years RDF plants have grown in popularity. Continuing worldwide investment and development has enabled many countries to approach this as a viable source of electricity supporting many communities.

Europe is leading the world in this field, followed closely by America and the UAE. Many countries have become so successful in this approach that they regularly import waste from neighbouring countries including the UK. For example, Sweden processes over 2,200 tons of waste per day directed into the generation of 1200 MWh of electrical energy, which is enough to power over 110,000 average homes. The opportunities for clean energy are enormous, in 2016 America burned 30 million tons of municipal solid waste destined for landfill creating 14 Billion kilowatt-hours of electricity.

## Global Growth in RDF Energy Generation

**There are various forms of energy that can be recovered including:**  
**Hot Water**

A waste-heat-recovery boiler can be utilised to generate hot water for the facility or a localised heating network. Other uses include industrial drying processes or wash-down facilities.

### **Steam**

Generated in the form of saturated steam it can typically be used in a variety of cleaning or humidity-generation applications.

### **Electricity Generation**

By utilising the steam generated. A screw-type turbine is capable of generating on-site electricity. Larger systems have the capability to export electricity to the grid.



**Our EFW plants can be utilised for applications such as:**

- Hazardous waste
- Clinical waste
- SRF/RDF
- Chemical waste
- Petro-chemical waste
- Industrial waste



# Case Studies

## 1. Waste To Energy - United Kingdom

The C350 has been designed to provide a complete solution for managing all medical waste for the New Cross NHS hospital in Wolverhampton. The key component in the custom-designed thermal treatment and waste-to-energy plant. Built to manage the safe destruction of up to 350kg of waste an hour whilst also converting all heat generated through the daily operation into the production of economical, green energy in the form of steam, which is then used to heat the hospital.

Providing a secure and environmentally sustainable approach for reliably disposing of the hazardous waste created by the hospital alongside several surrounding smaller health centres and clinics.

Incineration is recognised as the safest way to fully destroy all bacteria, pathogens and harmful particulates from medical waste. Operating at temperatures in excess of 1100°C for 24 hours a day six days a week. The C350 delivers sustainable waste management and energy generation all year round.

To reinforce the green credentials the installation includes an advanced multi-stage filtration system ensuring that only clean gases are returned back into the environment.

It is able to provide heat for the entire 65-acre site through the waste-to-energy system alongside an additional electrical generator producing two megawatts.

"We save £200,000 in gas a year by using the incinerator,

and we take on about 20 per cent of out-sourced waste, such as the City of Wolverhampton Council. It's certainly a lot cheaper than us exporting our waste. This is where we make big savings because all the site's steam servicing the heating is fed from the energy centre, where the incinerator is the line. We get the energy back in the form of heat – we run the hot gas through the boiler, and we generate steam from that which, in effect, goes to the rest of the site." John Burrows, Energy Centre and Decontamination Manager.

"On top of providing safe disposal of clinical waste, it is also a vital part of the Trust energy security strategy to generate a low-carbon source of energy. Contributing to the reduction of the Trust's carbon emissions and dependence on imported oil and gas." Janet Smith, Head of Sustainability at Royal Wolverhampton NHS Trust.

The installation at the NHS New Cross hospital was made possible thanks to a collaboration of our team of in-house designers, welders, fabricators, refractory masons, electrical engineers, combustion engineers and project management staff. The team worked together to incorporate the latest advances in engineering and design, resulting in a clinical waste disposal system considered the most advanced in the UK.

As with all high-capacity installations, we ensure that each facet is optimised to be compliant with the EU Waste Incineration Directive 2000/76/EU, alongside the most recent legislative requirement, the EU Industrial Emission Directive 2010/75/EU.



## 2. Stepped Hearth Installation - Papua New Guinea

This state-of-the-art G500 general/municipal waste incinerator at the Ok Tedi Mining (OTM), Mount Fubilan mine, has been installed to replace the previous machine, which had reached the end of its functional life.

Selected by OTM, which has operated the Copper, Gold and Silver mine for the past 20 years. It has been installed to dispose of all the waste produced onsite from the workers in the daily operation of the mine as well as the waste generated as a direct by-product.

Benefiting from an automatic loading system, it can dispose of 500kg of mixed non-recyclable and hazardous waste an hour, keeping it from ending up being transported off the island to a landfill or, worse yet, finding its way into the ocean. Essential on an island with limited resources for waste disposal.

Having a stepped hearth primary chamber, it will be able to reduce the volume by as much as 97%, which will be removed automatically through the conveyor deashing system. To further improve the environmental efficiency it is also equipped with waste-oil-fired burners allowing waste oil created on-site to be used as fuel for the burners rather than causing a hazard for the community.

The installation, was delivered pre-in-



stalled and housed within two 40ft containers. The lower housing the incinerator's stepped hearth primary loading and incineration chamber, and the upper container the flue gas cleaning secondary chamber.

The Ok Tedi mine is more than just an open pit mining operation; it is a free-standing closed compound facility that includes accommodation blocks, restaurant and shops, all of which generate waste that can now be safely disposed of.

This installation is already being established within social development programs on the island as a way to

offset and reduce the impact that the mine has on the ecology of Papua New Guinea, and is a fantastic example of a major mining operation taking the environment seriously and investing in a project that will benefit not just those operating it today but also many years into the future.

The installation of this G500 is a great opportunity for the mine to clean up the environment and dispose of all the waste produced onsite. A real investment into the ongoing clean environment of Papua New Guinea and an installation that everyone involved with is equally proud of.

## Why Choose Addfield?

Synonymous with revolutionary thermal technology and innovative ideas. Since our foundation in the early 1980's, Addfield has become the chosen name for state-of-the-art engineering. Today we are respected for quality and reliability. Currently supporting more than 145 countries globally. Addfield are proudly 'Simply Built Better'.

ISO Accredited, with world-class on-site engineering and technical support teams. Your facility will be designed by highly experienced in-house technical engineering teams. Constructed and tested in our dedicated factory by experts before being installed and commissioned on your site. Our global after sales support, large service team, back office services, field engineers, and network of approved distributors all combine to deliver you a solution that cannot be surpassed.



### ECO-FRIENDLY

Fuel efficiency, energy generation and advanced filtration. Delivers the safest approach to disposing of any waste.



### CUSTOMISABLE

Each facility is unique and designed around your waste requirements and energy generation needs.



### QUALITY

All facilities are built to the highest standards. Utilising premium materials and expert engineering.



### INNOVATIVE

Incorporate cutting edge design and the latest technologies to meet all your current and future demands.

**Contact us today to discover how our expert team can help you overcome your waste.**



# Building Sustainable Futures

Design - Manufacture - Install  
Train - Service - Maintain

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