SUEZ Isle of Man annual public report 2017

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foreword

It is a great pleasure to introduce SUEZ Isle of Man's annual public report for 2017.

In each previous report, we have been able to praise the team operating and maintaining the energy-from-waste facility for the consistently high standards of environmental management they have maintained.

In 2017, that performance reached a new high, as the half-hourly / 10-minute limits for emissions – set in the site's operating licence – were not exceeded on a single occasion during the entire 12 months.

This is an exceptional achievement, but just one of the highlights of the year. Others, of which the company and its employees can be rightly proud of, concern:

- **Safety**: No serious injury incidents for the third year running.
- **Operations**: More than 50,000 tonnes of materials from a wide and fluctuating waste stream were processed.
- **Electricity generation**: An extra 700 megawatt hours of power exported to the grid – increasing the total for the year to more than 25,600 megawatt hours.
- **Efficiency**: Targets were achieved both for ensuring that maintenance is proactive, by pre-empting equipment failures, and that plant continues to provide high levels of effectiveness as the facility ages.

This is not to say that the year was without its challenges.

A major maintenance programme required meticulous planning and the extension of the year's two scheduled shutdowns to accomplish these extensive works. They were delivered successfully.

Unplanned shutdowns due to non-conforming waste increased. These not only disrupt operations, but also increase the gas oil burnt to shut the plant down, start the plant up and maintain safe operating temperatures. Having tried all other practicable means to curb deliveries of unsuitable waste items, a new system of charges for the time taken to reload prohibited waste items was introduced by the Isle of Man Government Department of Infrastructure in January 2018.

We believe that, with the vigilance and co-operation of the island's waste hauliers and their clients, the Richmond Hill facility can continue to put our community's waste to good use safely and efficiently through the coming years.

David Palmer-Jones
Chief Executive Officer
SUEZ recycling and recovery UK

Gerrit du Toit
Plant Manager
SUEZ Isle of Man

introduction

Welcome to the latest annual report on the island's energy-from-waste facility.

Our 2017 annual report is published to ensure that we communicate openly with the community we serve and to honour our commitment to the Manx Government to report publicly on our operations.

We are proud that our 2017 annual report has been assessed and independently verified by SGS.

SUEZ recycling and recovery UK

SUEZ Isle of Man is part of the energy division of SUEZ recycling and recovery UK (formerly SITA UK).

We have three decades' of experience behind us. Over that time, the company has been providing innovative, environmentally-responsible solutions for the waste generated by households and businesses across the UK.

The pace of innovation has increased in recent years, as SUEZ pursues its vision of a society with no more waste. Our group recovers value from waste resources through a diverse range of activities – from recycling and composting to alternative fuel manufacture and mechanical biological treatment, as well as energy-from-waste.

Richmond Hill is one of nine energy-from-waste facilities in the UK that SUEZ manages. SUEZ manages 55 energy-from-waste facilities across Europe. This allows us to pool expertise with our counterparts in the UK and Europe, as well as in-house experts in other energy recovery technologies.

SUEZ recycling and recovery UK employs over 5,000 people, managing recycling and waste for over 30,000 industrial and commercial customers. The company also operates 11 contracts for municipal waste, as well as 12 public private partnerships, serving residents throughout the UK.

We handle more than 10 million tonnes of waste annually and recover significant value from these resources, as these audited figures for 2016 show:

- 655,000 megawatt hours of electricity generated from energy-from-waste
- a further 450,000 megawatt hours of electricity generated from landfill gas
- 8.5 million tonnes of materials recycled and recovered
- 133,000 tonnes of compost produced from green and food waste
- more than 450,000 tonnes of fossil-replacing, alternative fuels produced from other wastes

Our vision

We want to live in a society where there is no more waste

SUEZ is striving to lead the resource revolution required to bring this vision about.

The company has pioneered the concept of the circular economy in the waste management sector. This means that we view our customers' waste as a resource to be recycled or turned into energy rather than thrown away.

By recovering value from waste, we also reduce its environmental impact and the pressure on natural resources.

In the circular economy, nearly all waste materials will be given a second life and reused, recycled or recovered for their energy content.

The global SUEZ group

The Isle of Man and UK company are part of a global group with more than 80,000 employees working across five continents.

Working with municipalities and industry, the group provides world-leading expertise in four areas:

- recycling and recovery of waste
- managing the extended water cycle
- water treatment solutions
- consultancy services for sustainable urban and regional development

SUEZ has published a sustainable development road map setting out challenging targets for its mission to lead the resource revolution.

Covering the five-year period 2017-2021, these targets include:

- a 10% increase in production of renewable energy
- doubling biogas production

A circular approach to plastics

At the January 2017 Davos summit in Switzerland, more than 40 industry leaders endorsed a global action plan on plastics production, use and after-use. SUEZ is supporting this New Plastics Economy Initiative by working with major plastic users – such as Proctor and Gamble – and their supply chains to identify opportunities to integrate plastic packaging into the circular economy. SUEZ is collaborating with our partner Terracycle on the production of a recycled shampoo bottle that will use around 2,300 tonnes a year of HDPE material recovered from beaches.

With nine dedicated plastics facilities across Europe, the SUEZ group is already producing 170,000 tonnes of high-quality recycled polymers.

Manx waste management

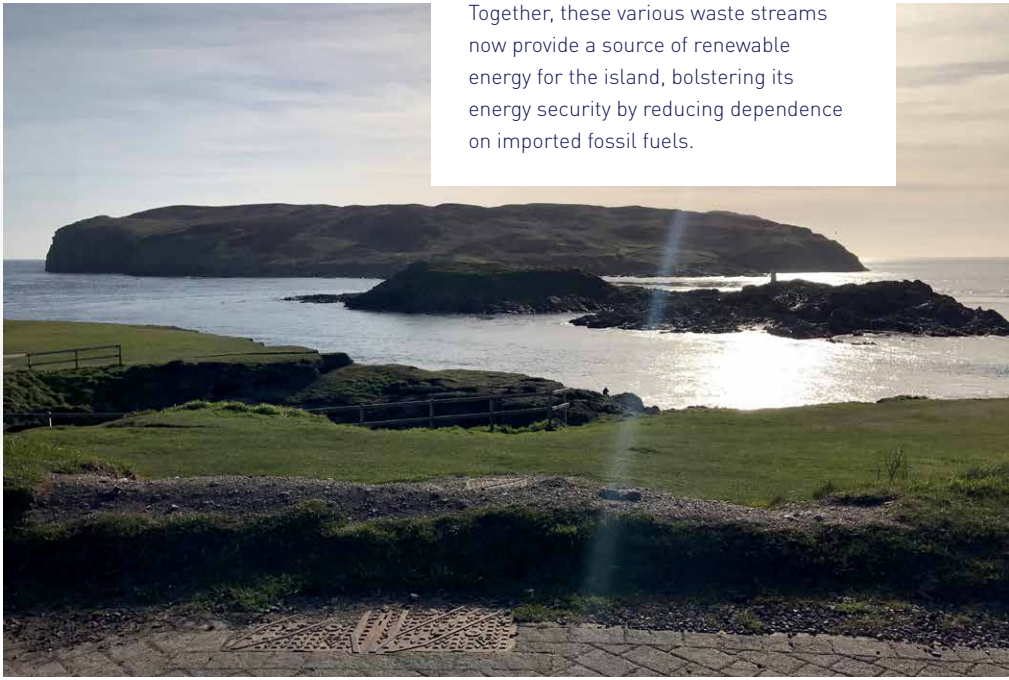
Tynwald has agreed that the current Waste Policy and Strategy 2012-2022 needs to be revised. The revised strategy will focus on interpreting the waste hierarchy and self-sufficiency in an island context. Critical for the island's economy is the need to ensure we have the infrastructure needed to dispose of residual wastes that cannot, or have not, been recovered for recycling. The Richmond Hill energy-from-waste facility is a key part of that infrastructure.

Reliance on landfill for municipal and general wastes was not sustainable in environmental terms or feasible for an island state.

The Richmond Hill facility has the capacity to process all residual waste from the Isle of Man's households and businesses. It is also equipped to dispose safely of clinical wastes from our hospitals and clinics. Up until 2008, animal carcasses from farms and meat processors were processed alongside clinical waste. These now go to the Government's purpose-built facility nearby.

Energy-from-waste also avoids the need to landfill or export difficult-to-treat waste streams, such as waste tyres and biowaste from sewage treatment.

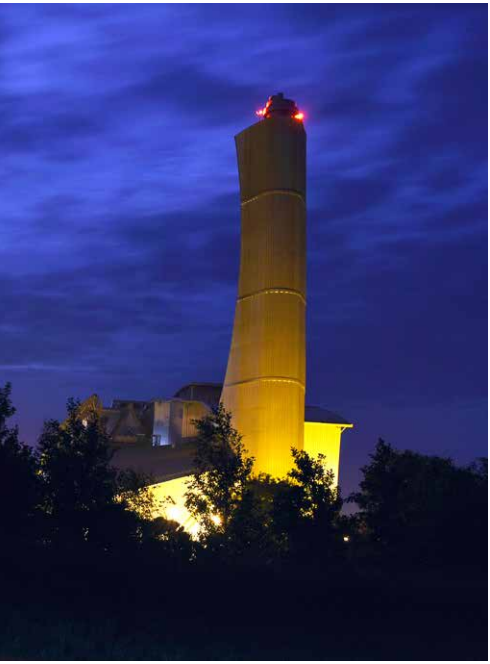
Together, these various waste streams now provide a source of renewable energy for the island, bolstering its energy security by reducing dependence on imported fossil fuels.



Fact or fiction?

Energy-from-waste is a concept that not everyone is familiar with. It is important for SUEZ as operator of the Richmond Hill facility that the energy-from-waste processes and environmental impacts are explained clearly, and the correct information about its operation made available to the island community. Having reviewed reports and comments in the local news and social media about the facility, we are aware that there are a number of myths and misconceptions about its operation.

We've taken these questions and comments, providing answers and clarification throughout this report. If you have any further queries that we haven't answered, please get in touch with us using the details at the end of this report.



The design of the facility

It is an ostentatious facility that doesn't work effectively."

The facility's award-winning design has inspired similar energy-from-waste facilities elsewhere in the UK, including Cornwall's, short-listed for a 2018 Civic Trust Award. Since opening in 2004, the facility has proven its effectiveness in dealing with the island's waste. No wastes we are permitted to accept have ever been diverted to landfill. New categories have been added – even non-combustible wastes, such as unusable milk and contaminated soil and stones. The Richmond Hill facility also processes tyres efficiently, whereas most similar facilities do not accept them.

It is a gold-plated facility."

The facility is equipped to the high standards required of a modern energy-from-waste facility in terms of flue gas treatment, boiler, grate and turbine design – but it is not over-engineered. Our facility, for example, uses just one crane for loading waste and a solely wet lime system for treating acidic flue gas.

The plant is unsuitable for the needs of a small island."

Energy-from-waste is the most sustainable and self-sufficient solution chosen by many island communities – from Jersey to Koh Samui, Shetlands to Sardinia, Isle of Wight to Guadeloupe and Majorca. We could list many more – Grand Cayman and Cocos Islands are also following suit. The facility treats waste streams that could otherwise not be dealt with on the island and would need to be shipped out at substantial environmental and financial cost. Treating our waste at the facility allows us to benefit from its outputs, such as the sustainable electricity that is generated to power our homes. This means the island is more self-sufficient and less reliant on importing power.

It was built for a bigger population than we have."

The facility's design capacity was based on the island's waste forecasts. The primary line allows for seasonal and yearly fluctuations in waste arisings. The secondary line manages all hospital, surgery and other clinical wastes. If it had been under-sized, then it would not have been sufficient for dealing with the island's waste. There would be no option but to build another line to process the additional waste at a cost of tens of millions of pounds, as waste cannot be diverted elsewhere on the island. At the current throughput of 50,000 tonnes per annum, the facility is operating efficiently within the capacity range for which it was designed. The island's population may have decreased slightly, but this infrastructure allows for future growth.

managing waste

In 2017, the Richmond Hill facility again processed more than 50,000 tonnes of waste while electricity exports rose above 25,000 megawatt hours.

This chapter examines the make-up of the waste stream processed during 2017 and the process itself – from delivery to the disposal of residual by-products. We explain the technology we use to recover energy from waste, and quantify both the resources used and the outputs produced.

The energy-from-waste process

The technology used in the facility, and our management regime, are designed to ensure it operates efficiently and, above all, safely.

The Richmond Hill facility has two treatment lines. The primary line can process up to 60,000 tonnes per year of municipal and commercial waste. Our second line – designed for clinical and animal waste, and waste oils – has an annual capacity of 5,000 tonnes.

Waste is burned at temperatures of over 850°C in the furnace of the primary line, while on the secondary line, the minimum operating temperature rises to 1,000°C in its secondary chamber where volatile gases are eliminated. These thresholds are set out in the EU Industrial Emissions Directive, which is designed to ensure the destruction of waste and safe operation of facilities.

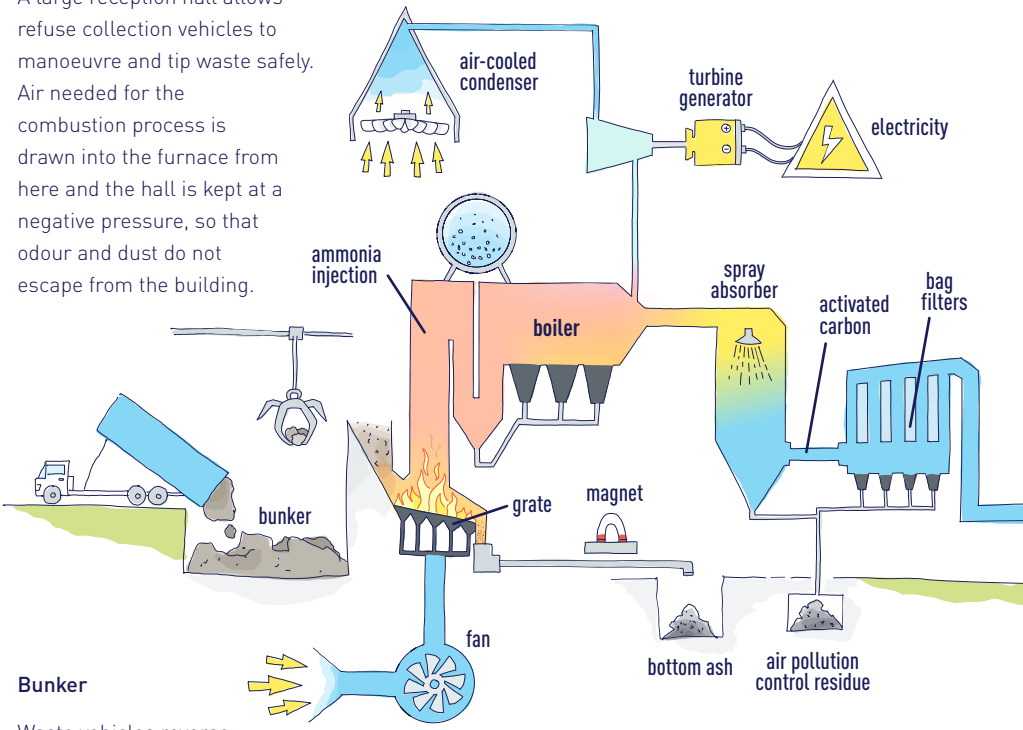
On arrival at Richmond Hill, waste vehicles use an automatic weighbridge set back from the site entrance, so that vehicles do not have to queue on the public highway. Waste type and amount, as well as customer details, are recorded and the driver is directed to the appropriate delivery bay.

Reception hall

A large reception hall allows refuse collection vehicles to manoeuvre and tip waste safely. Air needed for the combustion process is drawn into the furnace from here and the hall is kept at a negative pressure, so that odour and dust do not escape from the building.

Control room

The facility's control room centralises the operation of all equipment, including the grab crane used to mix and load waste into a hopper that feeds the furnace. All on-site functions are monitored both automatically and manually. Control systems verify in real time that equipment is functioning properly, continuously monitor the combustion gas and maximise the efficiency of the entire energy-from-waste process.



Bunker

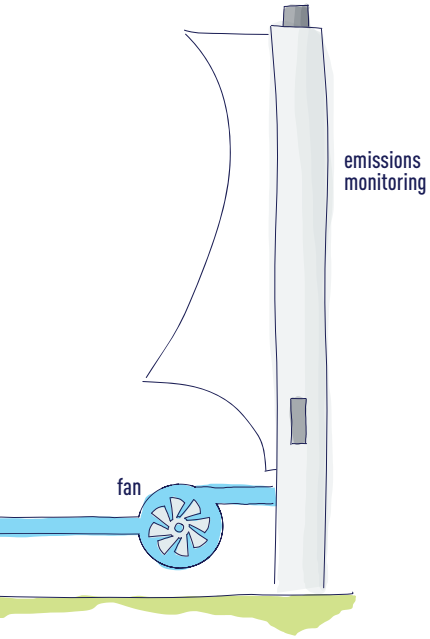
Waste vehicles reverse to a wheel-stop and tip their loads into a large concrete bunker. At 60,000 tonnes of waste delivered per year, this is big enough to hold 16 days' waste, so that tipping can continue when the facility is shut down for maintenance. A shredder, for bulky items such as mattresses, also discharges material directly into the bunker.

Grate and boiler

Combustion air is blown up into the bottom of the water-cooled grate through five computer-controlled zones. The thermal energy released from the burning is used to convert water into super-heated steam. At high pressure, this steam drives a turbine-alternator to generate electricity.

Electricity generation

Electricity is generated at 11kV. At full capacity, around 1.5 megawatts is used to power the facility, leaving up to 5.5 megawatts for export to the Manx Utilities Authority, which distributes it around the island. The facility's switchgear is designed to protect the island's supplies from interruption.



Bottom ash

Ash left on the grate after incineration is carried by conveyor, after quenching, to a storage bunker. A magnet above the conveyor extracts ferrous material for recycling. The remaining bottom ash is sampled for contaminants before being removed for disposal to landfill.

Air-cooled condensers

After exiting the turbine, the steam is cooled and condensed back into water through air condensers. This recovered water is treated and reused in the boilers to produce more steam.

Emission control

The gases from the furnace are subject to a rigorous cleaning process involving selective non-catalytic reduction, spray absorbers and active carbon injection. This removes oxides of nitrogen, acidic gases, dioxins and heavy metals from the gas stream.

Air pollution control residue

The cleaned gas is passed through fine-fabric bag filters to remove solid particles before it is emitted through the stack. The resultant air pollution control residue, or fly-ash, contains particles from the incineration process, lime used in the spray absorbers, salts and carbon dust. It is analysed for contaminants and stored in a sealed silo or bags (approved under international rules for the carriage of dangerous goods) until it is collected for disposal in specialist, authorised facilities.

Emissions monitoring

As they pass through the stack, the residual flue gases from the process are continuously monitored before release. This data is relayed automatically to the control room and to a secure recorder.

Non-conforming waste

To rely on self-regulation and not check incoming waste is just stupid and was never going to work. Two blokes with sticks could do inspections."

Spot checks have been carried out daily since the facility opened. Our Day Operations staff do detect non-conforming waste through tipping observations and perform spot checks for a more thorough inspection. We don't have a materials sorting facility on site to sift through every load. Due to the amount of waste received each day, it would be impractical to thoroughly inspect every load in the reception hall. The load would need to be tipped onto the floor and sorted before being transferred into the pit. The additional costs and delays that this would cause to vehicles tipping would be prohibitive for our customers and would impact upon waste collections.

Everything will burn if it's hot enough. They just need to turn up the dials"

Materials such as bricks, glass, soil and metal do not combust at temperatures below 1,600°C, making them unsuitable for processing in a conventional energy-from-waste facility. They may change state, however, consuming rather than releasing energy. Large items, such as tree stumps, will burn on the outside but are too large to completely burn out in the 40 minutes it takes to move down the grate.

Why not use a metal detector or powerful electromagnet to remove metals from incoming waste"

Combustible waste sitting on top of or attached to metal items would also be picked up along with materials with metal parts, such as wood with nails and metal brackets attached. This would then have to be separated by hand at significant cost and the combustible material reprocessed. An overband magnet is in position at the end of the process to remove any ferrous metal from the bottom ash. The metal recovered at this point is then sent for recycling.

It [a deslagger blockage] happened with a burnable tree trunk. Couldn't they have a maximum size grate to stop over-size objects?"

The feed hopper and feed chute do this, but items may be narrow enough to pass through and still cause a blockage as they fall lengthways across the grate.

The fines for non-conforming waste won't cover the cost of the damage and are no deterrent."

The intention is not to recoup the £25,000 cost of each unplanned shutdown. The charges are meant to give hauliers an incentive to be more vigilant about their deliveries as education and other measures haven't worked in the past. The charge for failing a single spot check is £70, or £105 if detected after tipping in the bunker. The charges double for a second offence, and triple for third and subsequent offences in a six-month period. As there is no cap within a six-month period, the cost could amount to thousands for a persistent offender. The Department of Infrastructure may increase the charges if blockages due to non-conforming waste continue.

Our operations

Our operations team sustained the high efficiency of previous years, while also completing major maintenance and improvement works during 2017.

These works were accomplished during the two shutdowns planned annually.

Outside these times, the primary line operates continuously, seven days a week. The secondary line is operational for short periods, processing batches of clinical waste and waste oils as required.

Shutdowns can also be triggered by the facility's control systems when performance parameters move outside a set operating range. This may happen due to an emission limit being exceeded, a failure in critical equipment or non-conforming waste.

Scheduled maintenance

The year's two planned shutdowns were extended to allow for an extensive programme of major maintenance and improvement works. They took place in May and September 2017.

Maintenance work is carefully planned – on the basis of past defects and repairs, inspections and the service life of components – to pre-empt equipment failures and thus improve the reliability of the facility's systems.

Much of this work involved the furnace, boiler, conveyors and hydraulic systems, along with general servicing of the turbine and generator. These shutdowns also allow for calibration of the facility's many instruments and meters, as well as various regulatory inspections required by insurers.

The major projects undertaken in 2017 involved an upgrade of the facility's fire suppression systems and the replacement of one of the boiler's superheaters.

Our teams and contractors completed all the works as specified. Waste processing and electricity generation resumed on schedule after each shutdown.

Monitoring the boiler

All boilers require maintenance. When waste is used as a fuel, the nature of the combustion gases makes boiler maintenance even more critical.

We conduct regular condition monitoring (including wall and tube thickness checks) each year during maintenance outages to quantify the level of corrosion and erosion. These inspections are essential for planning future boiler maintenance requirements.

In May 2017, the boiler tubes that form the roof of the boiler's first and second passes were replaced. The new tubes were overlaid with a superalloy, called Inconel. Its resistance to corrosion in extreme temperatures will increase their life.

Then, in September 2017, the evaporator pendants of the boiler's second pass and the boiler's second superheater bundle were replaced. There are three superheater bundles. They increase the temperature of the steam before it goes to the turbine.

The roof of the boiler was also modified to ease future replacements.

Superheater three had been identified for replacement in 2018. However, the ongoing condition monitoring has shown this can be postponed until 2019.

Upgrading fire protection

New fire suppression systems were installed in several areas of the facility and a mobile fire tender was acquired during the year.

The upgrade was recommended following an inspection by the facility's insurers, Allianz, and funded by the Isle of Man Government.

Specialist contractor Nobel Fire Systems Ltd carried out the works during the two planned shutdowns.

Improved fire suppression has been provided in the main reception hall and waste pit, secondary line and turbine hall.

Two additional systems that use gas to suppress fire were installed – in the main motor control centre, which houses all the facility's electrical control equipment, and in the turbine control panel.

Thermal imaging cameras were also fitted above the waste pit to detect hot spots in the waste that could lead to a fire.

On completing the installation in September 2017, Nobel provided a full training programme for the operations team on the new systems.

Operational efficiency

Maintenance becomes even more critical to the efficiency of an energy-from-waste facility as it matures and more technical failures can be expected.

Since 2014, we have been pursuing two initiatives designed to sustain and, where possible, improve operational efficiency at Richmond Hill, which is now more than half-way through its 25-year operating contract. These focus on smarter maintenance and facility-wide continuous improvement.

Our team tracks all maintenance works on our Mainsaver software system. It carefully manages plant and equipment assessments, and keeps works schedules under review so as to pre-empt equipment faults.

We also set targets for preventive versus reactive maintenance and for the overall effectiveness of the facility's equipment.

The target set for 2017 was that preventive maintenance should account for at least 80% of the total. This was exceeded, as 84.03% of all maintenance that was completed was designed to pre-empt rather than fix problems.

Our target for overall equipment effectiveness was 60.5%. This is a combination of three measures – availability, performance and quality – of the energy-from-waste process. Again, our operations team exceeded the target, achieving an effectiveness score of 63.3%.

Continuous improvement

Since the facility began operations, we have made incremental improvements in systems and processes, resulting in various benefits – such as safer working in confined spaces and better visibility of critical control indicators for our operators.

For the last few years, these efforts have been channelled through a continuous improvement programme guided by lean methodology. Staff have been trained to identify any wasteful elements in our ways of working.

We set ourselves the target of completing five continuous improvement projects each year, and also keep colleagues informed about the programme and its progress.

The most important projects undertaken in 2017 were:

- **Secondary waste line**: The main aim of this initiative is to reduce the cost to the Isle of Man Government of using gas oil in operations. This is unavoidable during start-up and shutdown phases. The use of waste oils helps limit the need for virgin fuel, and adjustments made to make the secondary line run more efficiently can contribute further. The effects of these technical measures are being monitored and will inform any further work.
- **Turbine hall**: Using a lean methodology template for organising workplaces, the project team identified a series of improvements including standardised routes for maintenance and operational tasks, better visual management and stock control, and ensuring the correct tooling is available to carry out tasks in the area.
- **Reception hall**: A similar exercise here led us to reorganise the area, by marking out new bays for the storage of various items and also improving visual management in other ways.
- **Isolation boards**: New control boards have been installed providing staff with the equipment needed to isolate major items of plant – that tend to require frequent intervention – at the point of use. The isolation boards also provide a clear visual indication of whether the equipment has been fully isolated and re-activated. They now control the deslagger, grate cooling system, grate hydraulics and primary furnace.
- **Ash pit**: During the unloading of bottom ash, there have been numerous incidents of damage caused by ash wagons reversing into the gates. New reflective signs and a stop sign have been installed to remind drivers of this hazard.

Reloading charges for non-conforming waste

Items of waste that are not suitable for incineration, because of their size or what they are made of, cause blockages and/or compromise combustion control. This results in unplanned shutdowns and, in turn, the burning of gas oil, with its associated environmental and financial costs to taxpayers. The need to suspend production so staff can clear blockages in the deslagger more safely, and extended warm-up and cool-down periods to prolong the service life of furnace linings, only increase the impact.

The underlying cause, however, is that our policy of self-policing by waste hauliers, backed up by spot checks, has not been sufficient in deterring deliveries of non-conforming waste. Stepping up checks on incoming waste, letters to hauliers highlighting the problem and a display area in the reception hall showing examples of offending items have not had the desired effect.

Effective from 01 January 2018, the system of reloading charges introduced by the Government sets the initial charge for a non-conforming load at £70, or £105 if discovered after it has been tipped into the waste pit. Increasing the penalty for repeat offences in a six-month period provides a greater deterrent, with charges doubling for a second offence, and tripling for third and subsequent offences. The total charge for 10 non-conforming loads within a six-month period would be £2,835 if all were recovered from the pit.

We believe both the problem, and significant reloading charges, can be avoided if hauliers are vigilant and ensure the waste they are delivering is acceptable.

What we processed

The overall volume of waste processed was in line with previous years, but there were some notable changes in the mix compared with 2016.

Within the total throughput of just under 51,000 tonnes, wood waste increased by more than a quarter, adding an extra 1,300 tonnes.

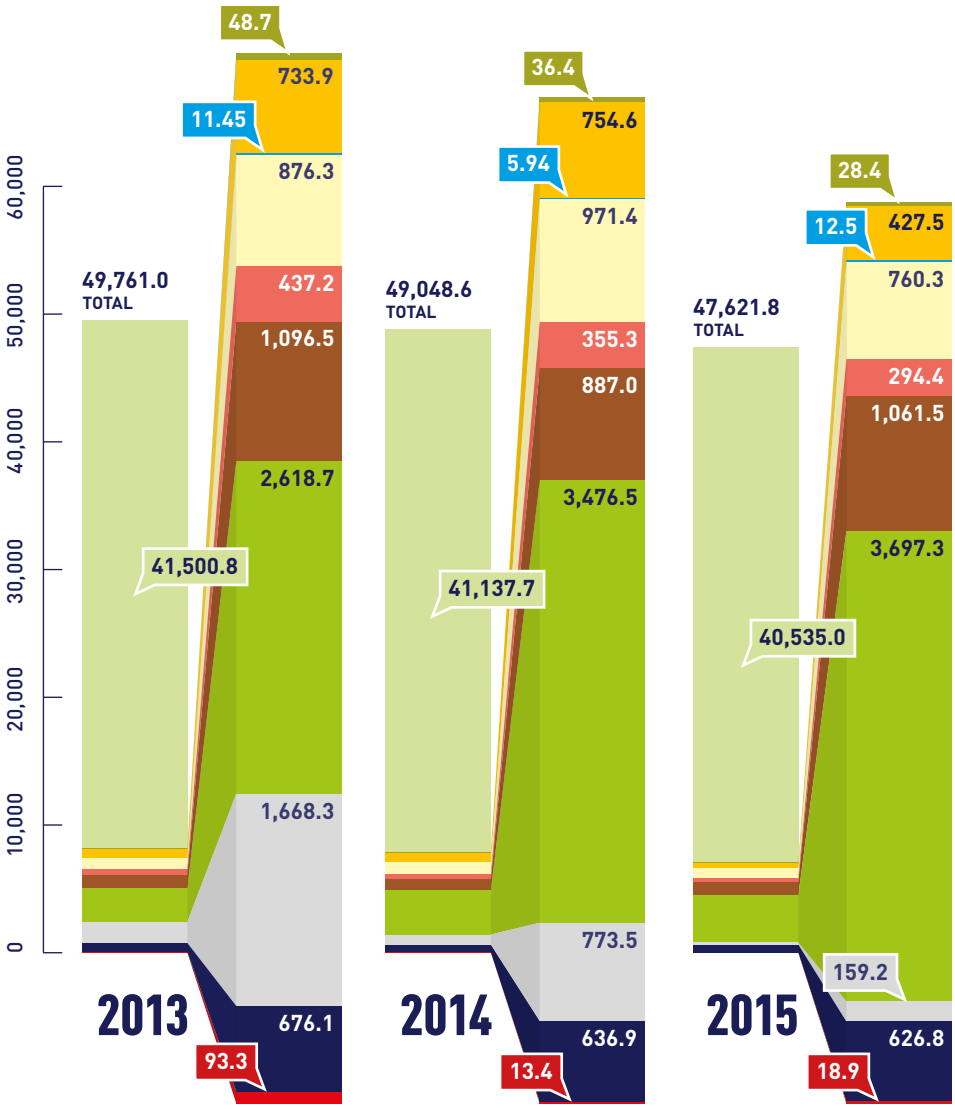
Construction waste also underwent a sharp increase, boosted by materials from the demolition of the Royal Hotel. The annual total rose by two thirds (some 725 tonnes) to more than 1,150 tonnes.

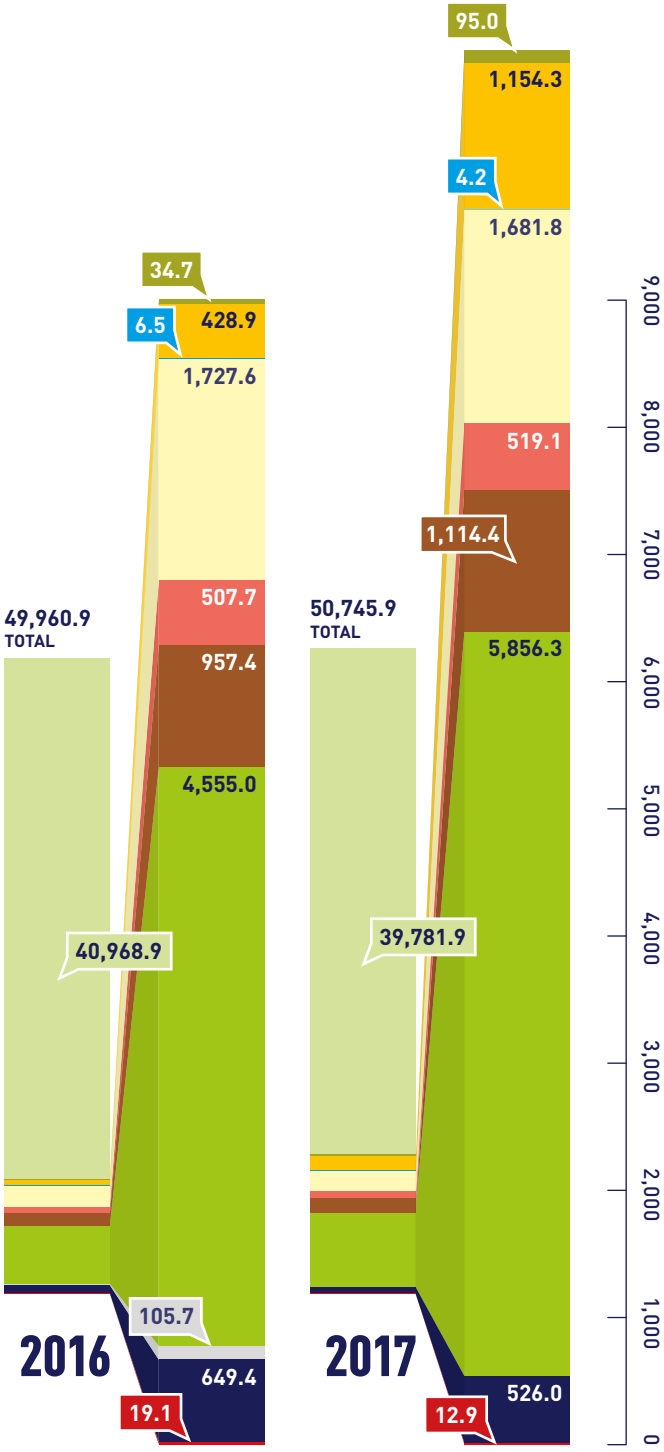
These and other increases were offset by reductions in other waste streams. Both municipal and packaging waste experienced a small decline.

An increase in live animal exports also had the effect of reducing the volume of waste meat and bone meal as meat processing on the island reduced.

Meanwhile, the secondary line saw a slight increase in throughput of both clinical waste and waste oils to exceed 740 tonnes in total.

Waste incinerated in the primary incinerator (tonnes)

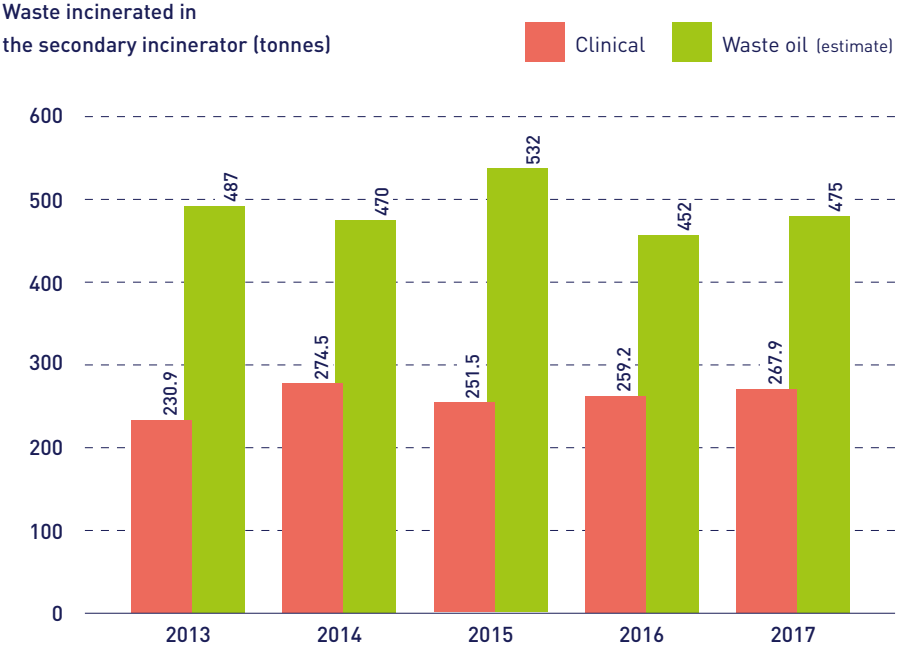




types of waste

- Municipal
- Confidential
- Construction
- Food industry (previously dairy)
- Packaging
- Tyres
- Screenings and biopellets
- Wood
- Forestry waste
- Meat and bone meal
- Other

Waste incinerated in the secondary incinerator (tonnes)



Energy generation

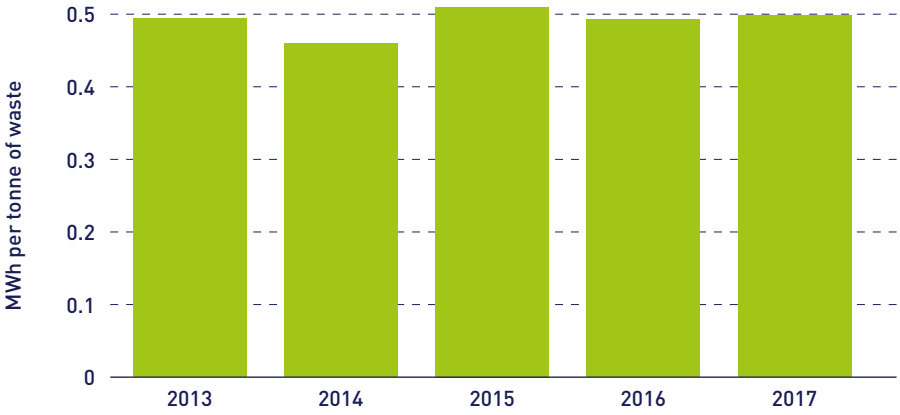
The facility continued to operate as the island's second power plant, exporting more than 25,660 megawatt hours of electricity.

This represented an extra 700 megawatt hours of power for local homes and businesses compared with 2016.

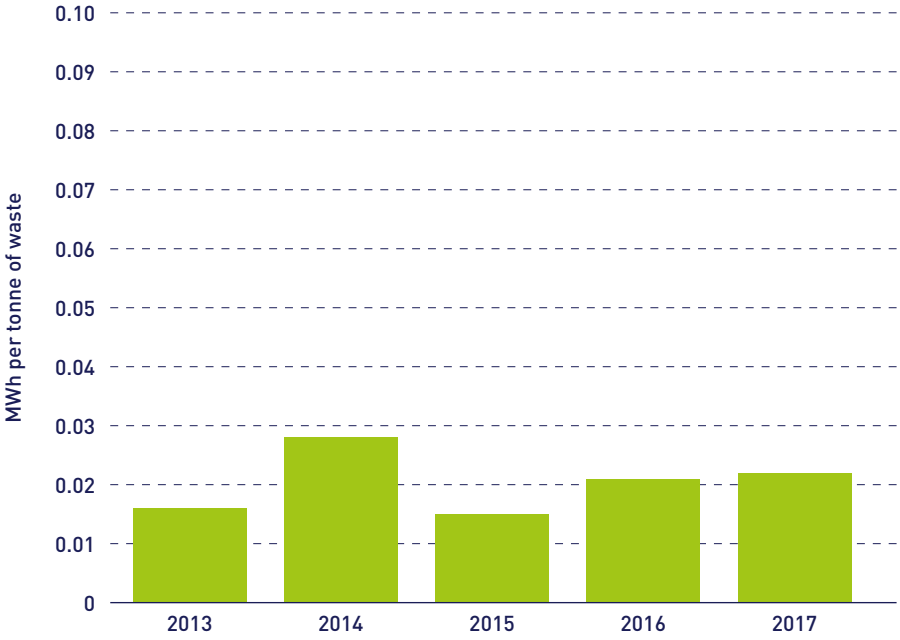
The higher output was achieved despite the two extended shutdowns and an 8% increase in the consumption of electricity when the facility was off-line.

Over the year as a whole, half a megawatt hour of power was still exported for every tonne of waste processed.

Electricity exported



Electricity consumed



Other outputs and inputs

The other main by-product of the energy-from-waste process is ash. As for inputs, the resources consumed during operation are gas oil, water and certain chemicals needed to control emissions.

Bottom ash

The ash left behind on the furnace grate is the largest physical by-product of waste incineration.

In 2017, this amounted to just over 10,500 tonnes. The volume and make-up of bottom ash varies only slightly from year to year, depending on the throughput and mix of wastes.

Silica, which is essentially sandy soil, typically makes up around 95%. The remainder is comprised of other naturally occurring compounds. The ash is taken to Turkeylands landfill site for disposal and, throughout the year, samples are sent to an independent laboratory for testing to ensure the levels of contaminants are not hazardous.

Bottom ash from other SUEZ energy-from-waste facilities is diverted for use as an aggregate substitute in highways and construction. The Department of Infrastructure carried out preliminary investigations into the re-use options early in 2017. While it found limited opportunities for use in groundworks – due to the chemistry of local soils – other applications are being explored.

Air pollution control residue

Ash particles mixed with gases also leave the furnace and are captured by chemicals as part of the gas scrubbing process.

This mix of fly-ash and chemicals – called air pollution control residue – is treated as hazardous waste, due to its high lime content.

As well as lime, activated carbon is sprayed into the flue to capture heavy metals. The concentrations of carbon dust, salts and lime in the residue vary depending on the presence of items such as batteries in municipal and other wastes. Samples of the residue are tested quarterly.

Air pollution control residue is sealed in specialist road tankers for shipping to the UK, where specialist facilities are equipped to dispose of it safely.

The total amount of air pollution control residue sent for disposal in 2017, less than 1,700 tonnes, was in line with the previous year.

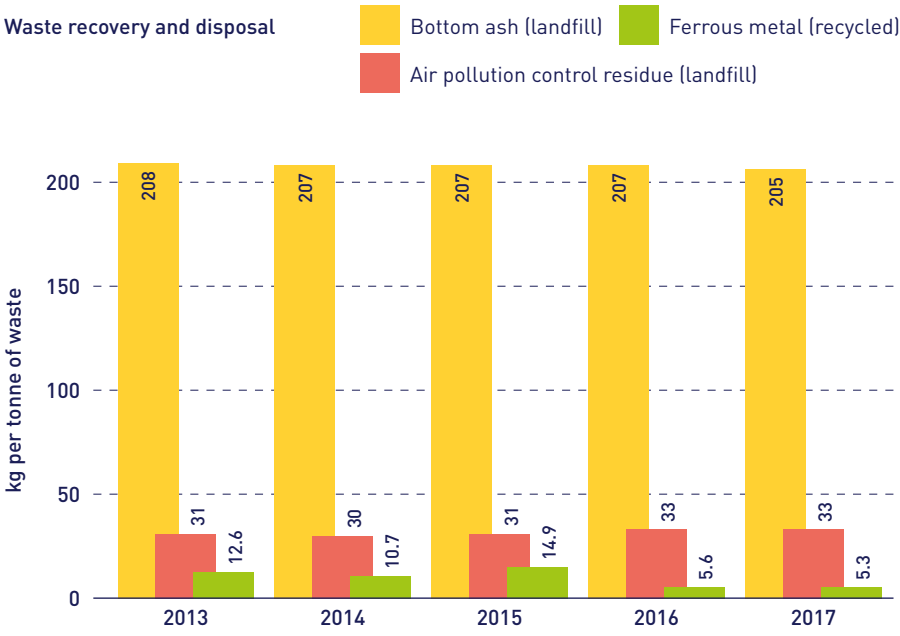
Ferrous metals

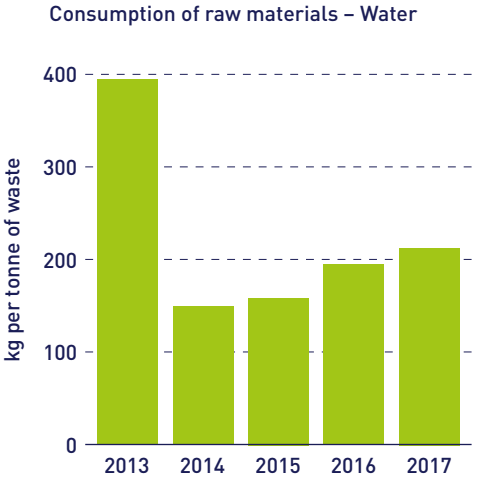
Mixed within incoming waste loads are pieces of steel, iron and other ferrous metals. These are retrieved from the bottom ash as it passes, on a conveyor, under an overhead magnet.

This ferrous scrap material is sent for recycling. Some metals – in particular, cans made from aluminium – should be recycled instead of being sent to the energy-from-waste facility, as they melt during the process and cannot be recovered.

In 2017, more than 270 tonnes of ferrous metal were recovered. This was affected by the non-availability of the magnet, prompting the installation of new equipment that should improve reliability and increase the amounts recovered.

Waste recovery and disposal





Water

Water plays two important roles in the energy-from-waste process. The furnace grate requires a continuous supply for cooling, while water is also essential to create the super-heated steam that drives the turbine.

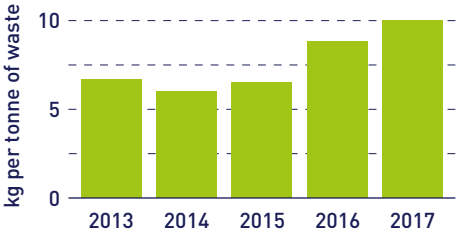
There are also the non-industrial uses of water in offices and the visitor centre, and in general cleaning.

Systems are in place to conserve and protect water from contamination. Within the energy-from-waste process, water is recycled. Vapour exiting the turbine is condensed and the water can be reused in the boilers.

Rainfall is also stored and reused, while any water discharged from the site and its sewage treatment plant is subject to monitoring and quality control.

Total consumption of water over the year rose by around 11% to just over 10,900 tonnes. Large volumes of water were used to flush the boiler following the major works during each shutdown. It was also necessary to drain and refill the system several times, adding to the losses that occur due to leaks in the pipes cooling the furnace grate.

Consumption of raw materials – Gas oil



Gas oil

Minimum combustion temperatures have to be maintained during the start-up and shutdown phases to ensure emissions remain safely within the strict limits of the site licence.

Burning gas oil is essential for this purpose. Oil burners on both lines will also be triggered automatically when operating temperatures drop due to non-compliant waste or any interruption in feeding the furnace.

While we aim to limit consumption, and the consequent carbon footprint, gas oil plays a crucial role in avoiding potentially polluting emissions and breaches of our licence limits.

Just over 512 tonnes of gas oil were used in 2017. This was an increase of 1.3kg per tonne of waste processed, due to a combination of factors. These included the series of unplanned shutdowns caused by non-conforming waste and further changes to our start-up and shutdown procedures. The temperature 'curves' were extended further during the year following work by our technical team. It has set company-wide standards for cooling and heating times so as to prolong the life of boiler tubes and refractory tiling in furnaces.

Chemicals

Three main chemicals – ammonia, carbon and lime – are used to clean the gas stream from the furnace and prevent harmful elements escaping to the air.

As with gas oil, we report on and monitor chemical usage as part of our commitment to resource efficiency, but the overriding priority is always to assure the safety and compliance of our operations.

- **Ammonia**: When injected into the boiler, ammonia removes the oxides of nitrogen that form in waste and the air. Our consumption increased from just under 24 tonnes in 2016 to more than 37 tonnes. This sharp increase is believed to be a problem with the distributed control system, which is being investigated. When operating at high loads – in terms of steam produced per hour – ammonia consumption rises to the top end of the expected range, while still controlling nitrogen oxide. Although the usage increased this year, it remained within the design performance indicator.
- **Carbon**: Activated carbon adsorbs trace metals and dioxins in the gas stream. Recorded usage fell slightly in 2017 to 18.1 tonnes.
- **Lime**: Acidic gases, including hydrogen chloride and sulphur dioxide, are neutralised by spraying an alkaline lime solution in the flue. There was a slight increase in lime consumption to 445.2 tonnes.

Our other activities

SUEZ provides a wide range of recycling and resource management services across the UK. On the Isle of Man, we offer two other services in addition to operating the energy-from-waste facility.

Hazardous waste

Since 2007, we have been responsible for the management of hazardous waste on the island.

Strict international regulations apply to the shipment and disposal of all wastes classed as hazardous to the environment or human health.

Our staff collect, analyse and classify these substances, which are stored in a purpose-designed building on the Richmond Hill site. Transfrontier shipment notices must be issued before these wastes can leave the island.

The wastes from local industries and other sources are consolidated into efficient loads for shipping to appropriate treatment or disposal facilities in the UK.

Potentially dangerous chemicals or similar substances found in the island's homes can also be collected for safe disposal. The Government funds this free public service for households.

During 2017, we made a total of four shipments. Two comprising of acid waste were sent for disposal at a specialist facility in Manchester. The other shipments were of coal tar waste, which was sent for recovery at a site in Heysham.

Confidential waste

For many years, SUEZ Isle of Man has been securely disposing of confidential waste as a commercial service.

The amount processed rose significantly in 2017 to just under 95 tonnes. This was partly due to the closure of a local company, resulting in several loads of material requiring secure disposal.

Cardboard

Cardboard goes to the incinerator from the amenity sites. It's classed as some kind of eco-fuel with a different gate fee."

All cardboard from the civic amenity sites, bring banks and kerbside recycling is sent off the island for recycling. Any cardboard mixed in with incoming loads of trade waste that we process will be processed by the energy-from-waste facility. However, we encourage all residents and businesses to recycle their cardboard.

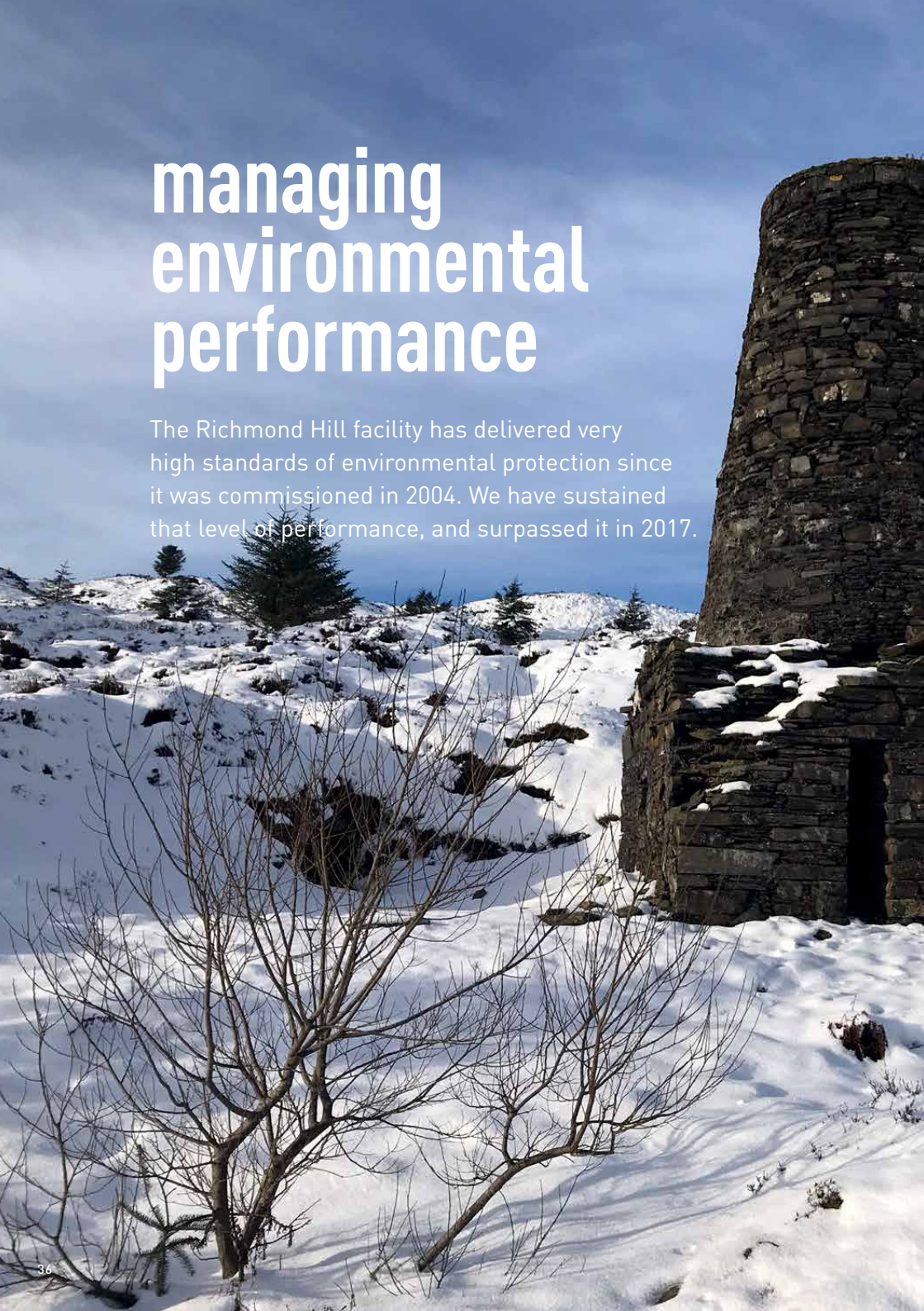
Waste imports

We are importing waste, because we don't generate enough."

We do not import waste and never have. It is currently illegal to do so. An option to import refuse derived fuel has been discussed by the Government. This would use the facility's spare capacity to generate more electricity for the island and give the Manx Government an even better return on investment. An estimated 3.5 million tonnes of refuse derived fuel are exported each year from the UK to northern Europe as a renewable alternative to coal for powering homes and factories. Whilst refuse derived fuel import for the island is not being progressed, there are other wastes produced on the island which are currently exported but which could be disposed of via energy-from-waste. This option is being reviewed as a way of increasing the island's self-sufficiency.

managing environmental performance

The Richmond Hill facility has delivered very high standards of environmental protection since it was commissioned in 2004. We have sustained that level of performance, and surpassed it in 2017.



This chapter of the report constitutes our environmental statement. Here, we set out our environmental policy, describe the systems used to manage those impacts and explain how our performance is monitored and checked.

The supporting information is included with the other data tables towards the end of the report.

Environmental policy

All our management systems and procedures – which stem from the policy framework set out by SUEZ recycling and recovery UK – are designed to minimise environmental impacts.

The policy framework governs how we operate on the island. It requires full compliance with the specifications of the site licence and all relevant legislation and regulations. We are also challenged to exceed those standards wherever practicable.

Our performance is monitored and we are set objectives and targets to drive continuous improvement.

Along with environmental protection, our management system integrates occupational health and safety and quality of service within one unified set of procedures.

Our integrated policy statement for environment, health, safety and quality

SUEZ recycling and recovery UK recognises that how we manage our customers' and our own waste has an impact on the environment, the health and safety of our employees, persons working on our behalf, and the public. From a position of leadership in the UK's recycling and waste management industry, the company is fully committed to the effective management of all issues associated with our activities.

Management responsibility

The company's Management Board will ensure that responsibility for environmental, health and safety, and quality issues is clearly defined and understood throughout the company. All activities will be conducted in a manner designed to: protect the health and safety of our employees and persons working on our behalf; protect the environment from risk of pollution; and ensure a high quality of service for our customers.

Legislation

SUEZ recycling and recovery UK will comply with, and wherever possible exceed, existing environmental, health and safety, fleet and other pertinent legislative requirements at all stages of our business activities and operations.

Stakeholder relations

SUEZ recycling and recovery UK recognises the importance of our relationship with stakeholders: employees, the public, contractors, customers and shareholders. We will communicate this policy to them, report annually on performance, and engage with stakeholders so as to understand and consider their expectations in the way we manage our business.

Continual improvement

SUEZ recycling and recovery UK will monitor and measure progress by setting improvement objectives and targets to ensure continuous improvement in performance. In order to mitigate the impact on the environment, enhance health and safety management and performance, and ensure delivery of service to all our customers, we will:

- Seek to prevent injury and ill health and promote a positive health and safety culture.
- Ensure all our facilities are managed in such a way as to prevent and minimise pollution.
- Seek to minimise the environmental impact of transport use.
- Seek to reduce the amount of energy obtained through non-renewable resources, use energy efficiently and reduce greenhouse gas emissions.
- Seek to minimise the volume of waste generated to maximise reuse, recycling and energy recovery from waste.
- Use suppliers or contractors that have environmental and health and safety standards compatible with our own wherever possible, and maintain good customer and supplier relationships.
- Continually reassess all of the above in light of changing technology, legislation, the precautionary principle, business requirements and best practice.
- Ensure adequate resources are provided to meet specified customer and company requirements.
- Ensure personnel working for the company and on our behalf are aware of their responsibilities and comply with our policies and procedures.
- Regularly evaluate and review company performance and service provision.

The Management Board will periodically review this policy to ensure that it continues to meet the needs and aims of the business.

Management systems

Our integrated quality and environmental system brings together all aspects of operating the energy-from-waste facility and our related activities.

It is designed to make the compliant course of action clear to our staff in any given situation, outlining the procedures to be followed at every stage – from accepting delivery of wastes to disposing of the residue from gas scrubbing. The management system also directs how we report on our performance to the island's regulator.

We have registered our management system to the relevant international standards and are committed to maintaining certification. This requires regular and independent reassessment of our procedures and how we follow them.

Our environmental management system meets the requirements of ISO 14001: 2004, to which it was initially certified in the first year of operation. For quality management, our system is certified to ISO 9001:2008.

We first achieved registration to EMAS, the EU standard for environmental management, in 2006. This has been renewed each year and was confirmed again in 2017, as were our other accreditations.

This external verification is in addition to periodic inspections by the Government's Environmental Protection Unit, audits by our parent company and our own internal auditing.

Environmental compliance

Our registration to EMAS and ISO 14001 environmental standards reflects the commitment of SUEZ Isle of Man to satisfy and surpass the standards set in the relevant UK and European legislation as well as local laws and regulations.

The Manx legislation with which we must comply is as follows:

- Public Health Act 1990
- Collection and Disposal of Waste Regulations 2000
- The Import and Export of Waste Regulations 2001
- Town and Country Planning Act 1934-1991 (as amended 1999)

We are regulated by the Government's Environmental Protection Unit, which reports to the Department of Environment, Food and Agriculture.

Compliance audits

Our operations and compliance with the operating licence are subject to a series of audits.

An annual assessment for our certification under EMAS took place in March 2017. Inspectors from SGS, an international verification and testing organisation, visited the site and verified that our systems and procedures complied with the EU standard for environmental management.

Certification was also renewed to the international standards for quality and environmental management – ISO 9001 and ISO 14001, respectively.

Another audit focused specifically on the facility's equipment and machinery. Conducted under the Provision and Use of Work Equipment Regulations (PUWER), this inspection confirmed that the plant used at Richmond Hill is regularly maintained to ensure safety and only used by employees or contractors with appropriate training and qualifications.

Our parent company sets environmental compliance targets for all its facilities.

Based on the UK Environment Agency's Compliance Classification Scheme, the score awarded to a site is determined by breaches of licence permit conditions and weighted according to the potential environmental impact. A breach due to a lack of appropriate staff training can result in a double score.

SUEZ recycling and recovery UK sets a target score of less than 10 for all its sites. The two lines at Richmond Hill have always been rated significantly below that threshold. Given that both units operated with zero breaches of emission limits in 2017, they qualified for the lowest possible score.

Environmental impacts

Energy-from-waste – like any industrial process – has the capacity to cause environmental harm. Our systems are designed and our staff trained to manage our customers' waste in ways that minimise its impact on the environment.

The facility's Significant Environmental Impacts Register helps manage these activities in ways that control these risks. It records all potentially significant impacts, both negative and positive, which are assessed and reviewed. Maintaining the register also helps identify possible improvements.

In areas where chemicals and liquids are stored, we take special measures to prevent leaks to groundwater. We also monitor all discharges to watercourses and review and test our emergency planning.

Biodiversity

Our facility and integrated management system are designed to enhance the protection afforded to local wildlife habitats and biodiversity as well as the wider environment.

Preparing for emergencies

Four emergency drills with different scenarios were carried out to assess staff's preparedness during the year.

- In February 2017, the ammonia alarm was sounded in the middle of the day. All SUEZ staff moved promptly to the correct muster location, the reception area on the second floor of the building.

  Our Safety, Health, Environment and Quality Advisor monitored the evacuation on CCTV, before the Shift Manager took a gas monitor to the ammonia bund to check the levels. Once it was confirmed that no ammonia was present, the alarm was re-set and work allowed to continue.

  On the resultant near miss report, our advisor noted that contractor personnel had evacuated to the car park. The emergency procedures for an ammonia leak were reiterated and were properly observed when the drill was repeated several days later.

  The exercise highlighted that it can be hard to distinguish between the ammonia and fire alarms. As several alarm sounders are required to provide coverage for all areas of the facility, the sounds can overlap. Options for syncing the sounders or changing the alarm's sound are being explored.

- Following a fire drill in March 2017, staff were reminded that they should go straight to their designated muster point after escorting drivers out of the building.

- The other drills – simulating a spillage of ion exchange resin causing a slip hazard, and a lime spillage caused by a blocked pipe to the silo – confirmed that the staff on duty knew the procedures to be followed.

Our environmental performance

Under the terms of our site licence, all emissions to air, water and land from the Richmond Hill facility are closely monitored.

The results are reported to the Environmental Protection Unit. This data covers airborne emissions, solid residues and discharges to water.

Monitoring follows the regulatory framework set by the EU Industrial Emissions Directive, whose stringent standards make energy-from-waste one of the most tightly regulated industrial processes in Europe.

Emissions to air

After the scrubbing process, gases are analysed as they pass through the flue by a continuous monitoring system.

These readings are automatically recorded and compared against the emission limits set in the facility's operating licence.

The continuous emissions monitoring system measures the following:

- Particles
- Carbon monoxide
- Sulphur dioxide
- Hydrogen chloride
- Oxides of nitrogen
- Volatile organic compounds
- Ammonia

The primary facility also continuously samples for dioxins and furans. Other compounds are subject to emission limits, but cannot be continuously measured. Flue gases are monitored biannually for metals. Quarterly monitoring of particulates is carried out on both lines. Dioxin testing is also performed each quarter on the secondary line.

Our waste disposal licence sets half-hourly limits for certain compounds and 10-minute limits for carbon monoxide. When an emission exceeds such a limit, the facility may still operate in full compliance with its licence conditions, but it must be brought back under control within a specified time or the facility is shut down.

When an emission exceeds the limit, it must also be reported to the Environmental Protection Unit. Our compliance staff investigate the root cause and take corrective action, where appropriate. Before the event is closed, the Environmental Protection Unit is also informed of the outcome of each investigation.

Updated information on the facility's emissions is openly available. As well as publishing this information annually, we post daily emissions data for the continuously monitored parameters on our website (**www.suez.co.im**). This shows the emissions profile for the previous 90 days for both lines, with daily readings displayed graphically for each parameter and emission limit. We also report the quantity of electricity exported.

Plume from the stack

"A diesel burner in the flue was used to ensure PCBs were burnt off. You used to see a plume from the top stack, but not these days."

The facility was designed with low-sulphur oil burners in the stack to prevent a visible plume forming. We commissioned the burners, but they have never been used because it was agreed that they would increase the carbon footprint of the facility with no environmental benefit. A plume caused by steam is sometimes visible, mainly on cold days.

Dioxins and furans are toxic compounds created by industrial processes and natural events, such as forest fires and volcanic eruptions. PCBs (polychlorinated biphenyls), now banned, are dioxin-like chemicals that were manufactured for use as insulator fluids and additives in paints.

Incomplete combustion – for example, through uncontrolled burning of waste and bonfires – is the major source of dioxins and furans. However, in the energy-from-waste facility, they are destroyed when waste is burned on the grate for two seconds at an operating temperature of 850°C.

Licence emission limits

Emissions to air

	Half-hour average	Daily average	Other limit
Particulate matter	30 mg/m^3	10 mg/m^3	
VOCs as Total Organic Carbon	20 mg/m^3	10 mg/m^3	
Hydrogen chloride	60 mg/m^3	10 mg/m^3	
Hydrogen fluoride			2 mg/m^3
Carbon monoxide		50 mg/m^3	150 mg/m^3 95 per cent of all 10-minute averages in any 24-hour period
Sulphur dioxide	200 mg/m^3	50 mg/m^3	
Oxides of nitrogen	400 mg/m^3	200 mg/m^3	
Cadmium and thallium (and their compounds)			0.05 mg/m^3
Mercury (and its compounds)			0.05 mg/m^3
Sb, As, Cr, Co, Cu, Pb, Mn, Ni and V (and their compounds)			0.5 mg/m^3
Dioxins and furans			0.1 ng/m^3
Ammonia			*
Polyaromatic hydrocarbons			*
Dioxin-like PCBs			*

* Parameter does not have a limit stated in the waste disposal licence, but is required to be measured and reported to the Environmental Protection Unit.

Emissions to water

Surface water	Limit
pH minimum	6
pH maximum	10
Conductivity	*
Temperature	30°C
Flow duration	*
Suspended solids	*
Chemical oxygen demand	*
Sulphides	*
Sb, As, Cd, Cr, Co, Cu, Pb, Mn, Hg, Ni, Ti and V	*
Visible oil	Nil
Ammonia (N)	0.6 mg/l

* Parameter does not have a limit stated in the waste disposal licence, but is required to be measured and reported to the Environmental Protection Unit.

Sewage treatment facility	Limit
pH minimum	6
pH maximum	10
Visible oil	Nil
Suspended solids	60 mg/l
Biochemical oxygen demand	50 mg/l

Licence variations

Over the years, the facility licence has been amended, mainly to cover additional waste streams. Before requesting any change, we ensure that the substance in question can be safely and efficiently processed without compromising the facility's performance. All such proposals – whether for a permanent or temporary variation – must then be approved by the Department of Environment, Food and Agriculture.

There were no major changes during the year, apart from some temporary exemptions. Permission to process contaminated soil and stone granted in 2016 was extended for a further 12 months. The other specific wastes arising on the island and newly approved for processing were anti-freeze, fibreglass and e-cigarettes containing lithium ion batteries.

Measuring our performance

From the start of operations in 2004, the energy-from-waste facility's performance in managing emissions has been exemplary. The total output each year has always fallen well below the annual limits set in our licence.

We also report on incidents when the half-hourly or 10-minute limits are exceeded. Here again, our track record has been excellent, with no more than eight incidents in any year since 2010. Our operations team limited the total to just two in 2016.

In 2017, there were zero breaches of the facility's airborne emission limits or the limits for water discharges. This is an exceptional achievement.

A summary of the year's airborne emissions can be found with the other performance tables towards the end of this report. Combined with the daily emissions data published on our website, this provides a comprehensive picture of the facility's performance in managing emissions.

Climate change

Along with our parent company, SUEZ Isle of Man is committed to the global SUEZ group's goal of reducing the carbon footprint of all operations. Carbon emissions are monitored and reported annually. At the UK level, this monitoring is independently verified by the Carbon Trust as part of SUEZ recycling and recovery UK's accreditation to the Carbon Trust Standard.

Combustion temperatures and efficiency

> ***The incinerator uses inefficient low-temperature combustion."***

The minimum operating temperatures are enshrined in our licence: 850°C for the primary line and 1,000°C for the secondary line. These thresholds are in line with the EU Industrial Emissions Directive and our other facilities in Europe. Our track record of compliance is exemplary.

corporate social responsibility

Our duty of care to the environment extends to the people who work for and with us, and we recognise also our wider responsibilities to employees and the society we serve.

SUEZ values its people and their development, and we strive to build open and supportive relations with the local communities where we work.

These commitments, and our activities over the year in discharging those responsibilities, are outlined in this penultimate chapter of the report.

Our values

SUEZ recycling and recovery UK's corporate values are clear and simply stated. They are meant to express how we collectively, and as individual employees, approach our jobs, teamwork and customer service.

Our people

The previous sections examined the advanced technology, operational controls and ongoing maintenance involved in turning waste into energy while managing emissions.

Ultimately, the safe and efficient operation of these systems and procedures relies on individuals and on teamwork.

Our top priority is to provide a safe and healthy place of work for our people. Like all SUEZ companies, we also invest in our employees' training and development. We know this is fundamental to our success and also for the job satisfaction and commitment of team members.

We are an accredited Investors in People organisation. We strive to be a good employer, involving employees in decisions that affect them and consulting them on their views.

enthusiasm
We have a 'can do' attitude

excellence
We strive to be right first time, every time

creativity
We think and act smarter

responsibility
We do what we say we will do

communication
We take the time to talk and listen

collaboration
We help each other to create value

Health and safety

The waste management industry has historically suffered a high toll of accidents among its workforce.

As a group, SUEZ has built its safety policy on two main principles: embedding safe ways of working in all procedures and activities, and fostering a positive safety culture.

Our integrated management system (described in section three) is designed to promote safety alongside environmental protection and quality.

Safety in Mind is the name of the UK-wide SUEZ programme to address the everyday behavioural aspects of safety. It was developed with the input of employees from across SUEZ recycling and recovery UK. In November 2017, colleagues across the company marked the programme's five-year anniversary.

Recognised as best practice in the sector, Safety in Mind focuses on safe behaviour and encouraging everyone to take personal responsibility for safety. The programme also involves tailored training for managers, supervisors and safety representatives, who are coached in techniques to raise and maintain safety awareness among the workforce.

All employees can feed back their views, concerns and ideas for improving the safety of working methods and equipment to our safety representatives who regularly consult their colleagues.

This twin-track approach is supported by various mechanisms, including risk assessments, permits to work, method statements, regular safety training and auditing, and the investigation of all incidents – as well as all reported 'near misses'.

Incidents in 2017

Incidents leading to injuries that are sufficiently serious for a person to be off work for three days or more must be reported to the authorities under Manx health and safety regulations. In 2017, there were no such incidents for the third year running.

There were seven incidents that caused minor injuries. This compares with three the year before and 10 in 2015.

We also record incidents resulting in damage to property or equipment. There were six such events in 2017.

The total number of recorded near misses was 49, including several arising from drills conducted to test emergency preparedness (see section three). We encourage employees and contractors to report all near-miss events. By investigating their causes, we can refine our safety procedures and continue to improve.

Electricity generation

"I would like to see the evidence of any electric generated. I have been informed the plant is incapable of generating power and has been for years."

In 2017, we exported 25,662.97 megawatt hours of electricity to the island's grid. This is enough electricity to power 6,580 residential homes for a whole year – the equivalent of Peel and Onchan. We publish the daily figure for electricity generation on our website (www.suez.co.im).

"The so-called 'energy-from-waste facility' is really just an incinerator."

We recover energy from the waste burnt on both our lines. This has economic value, avoids the use of fossil fuels, and increases the island's energy security. This approach – and the stringent standards of environmental protection met by modern energy-from-waste facilities – is far removed from incinerators of old.

"Are we really selling the power generated at reasonable export prices?"

The fee for exported electricity is set in a contract between the Manx Government and Manx Utility Authority. The Manx Utility Authority is free to trade this electricity at market value.

Training and development

It is our company policy to assess each employee's ability, identify their training needs and opportunities, and track their progress.

The system for managing this process is called a training and development matrix. It specifies all forms of training, whether provided in-house or by external bodies, and also covers the less formal instruction delivered through our programme of toolbox talks.

Over the year, we provided a total of more than 670 hours of training. Much of this training revolved around safety, including first aid at work, awareness of the COSHH regulations on the control of substances hazardous to health, and fire warden practice.

Maintenance staff took part in a course on the use of mobile plant, while shift operators trained for the Boiler Operator Accreditation Scheme (BOAS), an important industry qualification.

Michael Valerga began his Maintenance Apprenticeship with us in 2014. In 2017, he completed his National Certificate in Engineering at double Merit grade, enabling him to start his Higher National Certificate. He is now on track to finish his SUEZ NVQ in mechanical maintenance in April 2018, three months early, and then further qualify in July the same year.

Michael has been nominated by his assessor from the Technical Training Group for Mechanical Apprentice of the Year for his first year of study and Most Improved by SUEZ.

Another significant benefit of our training and development programme is how it enables our employees to advance their careers within SUEZ Isle of Man – as illustrated by our internally promoted Maintenance Manager – and across our group.

Our team

We employ a total of 33 people on the island – two of whom work part-time – led by our Plant Manager Gerrit Du Toit.

There were several changes in the team during the year.

After more than 10 years with the company, Jonson Brennan stepped up to become our new Maintenance Manager in August. Jonson joined in April 2007 as a Technical Officer, was promoted to Technical Plant Engineer two years later and then moved into operations in July 2012 as a Shift Manager.

Jonson's promotion followed the retirement of Steve Hewings as Maintenance Manager. Steve took up the position of Maintenance Manager in 2011 and after seven years working at the Richmond Hill facility, as well as assisting the technical team with projects, left to enjoy retirement. However, his vision of 'no more breakdowns' lives on at the facility.

Our new Operations Technician, Mike Hamlett, joined in July 2017. Mike worked for more than 29 years with the De Beers group, producing industrial diamond products. As a result of the global slowdown in the oil and gas industry, the manufacturer moved production of its Isle of Man product line to a larger plant in Ireland. After working there as part of the relocation team, Mike took the opportunity to return to the island in his new role with SUEZ.

The year began with another retirement, as Jim Jennings left us in January 2017 after more than nine years as Office Cleaner. Jim was a valued member of the team, whose cheerful and kind-hearted demeanour is much missed by everyone on site. We wish him well as he enjoys spending time with family, including his grandchildren who have moved to the island.

Our community

As well as providing what is an essential service for the island, SUEZ Isle of Man is committed to being part of the community.

That collaboration has several aspects, such as being open and accountable, a good neighbour and supportive of the common good, plus education and environmental awareness.

Stuart puts in to the charity box

Operations Technician Stuart Storie swapped his hard hat for a gum shield to raise money for Hospice Isle of Man.

October 2017 saw the third annual round of the Thriller in the Villa, a boxing contest for men and women ready to try their hand at the sport in aid of local charities. The highly popular event pits Manx residents against each other and the residents of Ramsey against Douglas.

The volunteers had to go through a gruelling 12-week training programme with experienced boxers – and raise £500 in donations – before taking part.

Stuart's backers contributed more than £750 towards the event's fundraising total of £14,000.

Our neighbours

SUEZ companies set up local liaison committees as a voluntary forum for people who live in areas surrounding major sites and other local stakeholders.

On the island, complaints about any aspect of our operations can also be made directly to SUEZ Isle of Man. We have procedures in place to ensure that any complaint is logged, investigated and the outcome is reported back to the complainant. During 2017, no such complaints were made.

Our visitors

The visitor and education centre at Richmond Hill serves as a community resource for the island.

In 2017, we hosted just under 800 visitors, 70% of whom were under the age of 18.

Primary and secondary schools availed of the opportunity to enrich their teaching of curriculum subjects with insights into science, technology and environmental issues.

Tours of the facility were also arranged for scout groups, adult social clubs and Councillors from Douglas Corporation.

Gas oil

"The plant uses £4,000 worth of oil per day. It's red diesel… tax dodging."

Burning gas oil is essential when starting up and shutting down the facility to maintain the minimum operating temperatures set in our licence that ensure safe and efficient combustion. The annual cost in 2017 was £286,418. Each unplanned shutdown adds about £12,000 to the bill. To put that consumption in context – over the year we burned less fuel than two return trips from London Heathrow to Auckland, New Zealand, on a Boeing 777. As for the type of diesel, most industries are permitted to use lower-duty 'red diesel', not just agriculture.

Our communications

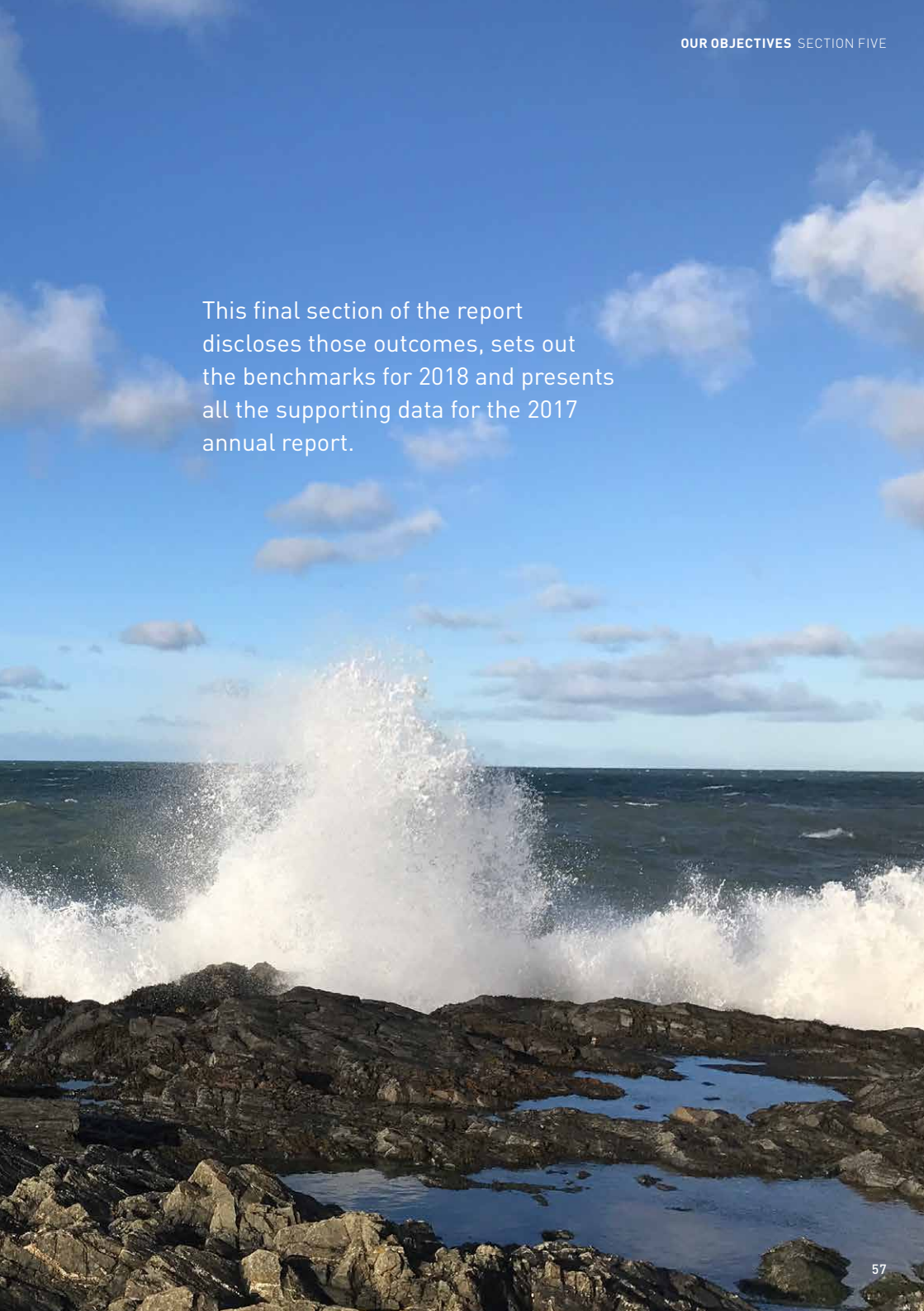
While this report provides an overview of the year's operations and performance, information on daily emissions is readily available through our website (**www.suez.co.im**).

It also shows three-month trends for emissions as well as the level of electricity generation and more general information about the energy-from-waste facility.

Further information about the circular economy and the role of energy-from-waste and other technologies can be found on our parent company's website (**www.suez.co.uk**).

our objectives

Annual objectives and targets are set for our performance each year in a range of areas – from compliance to operational efficiency.



This final section of the report discloses those outcomes, sets out the benchmarks for 2018 and presents all the supporting data for the 2017 annual report.

How we did in 2017

Our strategic objectives	Targets set for end of 2017
Compliance	Each line to achieve a CCS score <10.
Emergency preparedness	Carry out four emergency preparedness procedures.
Biodiversity	Implement biodiversity action plan, as required.
Hazardous waste storage	Complete hazardous waste shipments, as required.
Compliance and communication	Conduct safety, health, environment and quality meetings.
Environmental protection and compliance	Complete site-specific accident management plan. No daily emission breaches during normal operating conditions.
Oil usage	Maintain oil usage in line with 2016 levels.
Staff competency	Maintain competency matrix.
Management systems	Maintain certification to ISO 14001, ISO 9001 and registration to EMAS.
Reporting	Meet SUEZ internal reporting and carbon monitoring requirements.
Operational efficiency	Meet operational equipment efficiency and preventative maintenance targets.
Continuous improvement	Complete five continuous improvement projects.

Achieved?	How we performed
✔	Each line achieved a CCS score of 0.
✔	Four drills carried out – two spill drills, an ammonia alarm drill and a fire drill.
✔	Biodiversity action plan in place.
✔	Four shipments made.
✔	Seven meetings held throughout the year.
✔	Accident management plan in place.
✔	Zero breaches.
✖	The base level of oil needed to operate the facility safely increased due to the new deslagger process and additional shutdowns.
✔	Matrix maintained.
✔	Accreditation maintained.
✔	All reports completed.
✔	All targets met. Operational equipment efficiency target of 60.5% achieved with 63.3% outcome. Maintenance target of 80% achieved with 84.03% outcome.
✔	Five projects completed.

Objectives and targets for 2018

Our strategic objectives	Targets set for end of 2018
Compliance	Each line to achieve a CCS score of <10.
Emergency preparedness	Carry out four emergency preparedness procedures.
Biodiversity	Implement biodiversity action plan, as required.
Hazardous waste storage	Complete hazardous waste shipments, as required.
Compliance and communication	Conduct safety, health, environment and quality meetings.
Environmental protection and compliance	No daily emission breaches during normal operating conditions.
Oil usage	Reduce oil usage from 2017 level.
Staff competency	Maintain competency matrix.
Management systems	Maintain accreditation to ISO 14001 and ISO 9001.
Reporting	Meet SUEZ internal reporting and carbon monitoring requirements.
Operational efficiency	Meet operational equipment efficiency and preventative maintenance targets.
Continuous improvement	Complete rollout of lean management tools and conduct three continuous improvement projects.

performance data

Waste processed

Wastes incinerated in the primary incinerator (tonnes)	2013	2014
Confidential	48.7	36.4
Construction	733.9	754.6
Food industry (previously dairy)	11.45	5.94
Municipal	41,500.8	41,137.7
Packaging	876.3	971.4
Tyres	437.2	355.3
Waste screenings and biopellets	1,096.5	887.0
Wood	2,618.7	3,476.5
Forestry	1,668.3	773.5
Meat and bone meal*	676.1	636.9
Other	93.3	13.4

* previously included in food industry category.

Wastes incinerated in the secondary incinerator (tonnes)	2013	2014
Clinical	230.9	274.5
Waste oil*	487.0	470.0

* estimated.

Exceedances	2013	2014
Number of exceedances of licence emission limits	6	2

2015	2016	2017
28.4	34.7	95.0
427.5	428.9	1,154.3
12.5	6.5	4.2
40,535.0	40,968.9	39,781.9
760.3	1,727.6	1,681.8
294.4	507.7	519.1
1,061.5	957.3	1,114.4
3,697.3	4,555.0	5,856.3
159.2	105.7	0
626.8	649.4	526.0
18.9	19.1	12.9

2015	2016	2017
251.5	259.2	267.9
532.0	452.0	475.0

2015	2016	2017
5	2	0

Consumption of raw materials

	2013		2014	
	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
Gas oil	6.7	350.1	6.0	296.6
Water	395	19,933	150	7,472
Lime	8.9	447.0	8.5	421.6
Activated carbon	0.4	21.2	0.4	19.5
Ammonia	0.6	32.3	0.7	33.0

Note: 2013 - 2016 gas oil and all ammonia usage is recorded in litres and converted to tonnes using the conversion factors at **www.thecalculatorsite.com/conversions/weighttovolume.php**. 2017 gas oil conversion factor is taken from the Digest of United Kingdom Energy Statistics (DUKES) 2017: main chapters and annexes.

Energy consumption and generation

	2013		2014	
	MWh per tonne of waste	Total MWh	MWh per tonne of waste	Total MWh
Electricity consumed	0.016	814.4	0.028	1,391.5
Electricity exported	0.494	24,940.9	0.460	22,928.1

Waste recovery and disposal

	2013		2014	
	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
Bottom ash (landfill)	208	10,493.0	207	10,330.3
Air pollution control residue (landfill)	31	1,551.3	30	1,501.9
Ferrous metal (recycled)	12.6	634.9	10.7	533.0

2015		2016		2017	
Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
6.5	313.8	8.8	446.2	10.0	512.5
159	7,687	195	9,888	213	10,977
8.7	422.7	8.5	430.2	8.7	445.2
0.5	22.3	0.4	18.4	0.4	18.1
0.6	28.2	0.5	24.0	0.7	37.3

2015		2016		2017	
MWh per tonne of waste	Total MWh	MWh per tonne of waste	Total MWh	MWh per tonne of waste	Total MWh
0.015	717.5	0.021	1,044.2	0.022	1,132.0
0.510	24,675.8	0.493	24,958.5	0.498	25,663.0

2015		2016		2017	
Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
207	10,030.0	207	10,457.0	205	10,535.5
31	1,498.3	33	1,650.8	33	1,690.5
14.9	723.2	5.6	283.5	5.3	274.0

Air emissions

	2013		2014	
	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
Particulate matter	0.0015257	0.0770	0.0006819	0.0340
Volatile organic compounds	0.0032	0.16	0.0049	0.25
Hydrogen chloride	0.071	3.57	0.070	3.48
Hydrogen fluoride	0.00018	0.009	0.00014	0.007
Carbon monoxide	0.030	1.51	0.045	2.26
Sulphur dioxide	0.16	7.93	0.13	6.59
Oxides of nitrogen	1.37	68.96	1.33	66.37
Ammonia	0.018	0.90	0.015	0.74
Cadmium and thallium	0.0000080	0.0004	0.0000044	0.0002
Mercury	0.00000	0.0002	0.0000034	0.0002
Sb, As, Cr, Co, Cu, Pb, Mn, Ni and V	0.00015	0.007	0.00074	0.037
PAH	3.8×10^{-03}	0.1897	2.8×10^{-06}	0.0001
Dioxins and furans	4.5×10^{-11}	2.3×10^{-09}	8.8×10^{-11}	4.4×10^{-09}
Dioxin-like PCBs	4.7×10^{-12}	2.4×10^{-10}	3.0×10^{-12}	1.5×10^{-10}

* Tonnages allowed under licence conditions calculated using the waste disposal licence limit, average flow rate and hours the facility operated in the year.

Water emissions

	2013		2014	
	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
Suspended solids*	0.012	0.59	0.008	0.40
Biochemical oxygen demand*	0.0017	0.09	0.0009	0.04
Chemical oxygen demand*	0.006	0.31	0.005	0.03

* Calculated from estimated flow rate.

2015		2016		2017		Tonnes allowed under waste licence*
Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage	
0.0006865	0.0332	0.0146147	0.7406	0.0135868	0.6996	4.6
0.0043	0.21	0.0072	0.36	0.0039	0.20	4.6
0.068	3.31	0.079	3.99	0.042	2.16	5.3
0.00015	0.007	0.00012	0.006	0.00004	0.002	0.02
0.042	2.01	0.062	3.15	0.051	2.62	17.3
0.11	5.49	0.14	7.16	0.14	7.41	19.5
1.26	60.76	1.30	65.88	1.10	56.50	77.2
0.026	1.28	0.041	2.08	0.027	1.38	-
0.0000046	0.0002	0.0000038	0.0002	0.0000039	0.0002	0.015
0.0000018	0.0001	0.0000021	0.0001	0.0000022	0.0001	0.015
0.00017	0.008	0.00019	0.010	0.00064	0.033	0.15
3.0×10^{-05}	0.0015	2.8×10^{-05}	0.0014	1.10×10^{-05}	0.0006	-
1.0×10^{-10}	4.9×10^{-09}	1.7×10^{-10}	8.4×10^{-09}	7.30×10^{-11}	3.70×10^{-09}	-
1.9×10^{-11}	9.0×10^{-10}	2.2×10^{-11}	1.1×10^{-09}	8.70×10^{-12}	4.50×10^{-10}	-

2015		2016		2017	
Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
0.008	0.38	0.010	0.49	0.009	0.48
0.0008	0.04	0.0008	0.04	0.0008	0.04
0.006	0.28	0.015	0.75	0.035	1.78

glossary

Anaerobic digestion
The process by which organic matter is broken down by bacteria in the absence of oxygen.

Air Pollution Control Residue (APCR)
Particles from combustion gases, heavy metals and dioxins, carbon dust, salt and lime used in the gas-cleaning process, also known as fly-ash.

Biodegradable
Capable of being decomposed by bacteria or other biological means.

Bottom ash
The residue formed on the furnace grate when waste materials are incinerated.

Climate change
The process in which man-made gases are building up in the atmosphere, trapping the sun's heat, causing changes in weather patterns on a global scale.

Deslagger
The system that removes the bottom ash from the incinerator. It comprises a drop-off chute from the final grate, a water filled chamber, a hydraulic pusher and an inclined discharge chute. Also called an ash-extractor.

Dioxins and furans
A large family of compounds – including some of high toxicity – that are by-products of uncontrolled burning, incineration and certain industrial processes, as well as volcanoes and forest fires.

Energy-from-waste (EfW)
The incineration (burning) of waste at high temperatures to reduce its weight, volume and toxicity. The energy from the incineration process is used to generate electricity.

Environment Agency
The UK's waste industry regulator.
A non-departmental government public body, set up under the Environment Act 1995 to take an integrated approach to environmental protection and enhancement in England and Wales.

EMAS
The Eco-Management and Audit Scheme.
An EU-backed scheme designed to recognise and reward organisations that go beyond minimum legal compliance and continuously improve their environmental performance.

EU Waste Incineration Directive
Issued by the European Union, the directive relates to standards and methodologies required for incineration. The aim of the directive is to minimise the impact of negative environmental effects on the environment and human health resulting from the emissions to air, soil, surface and ground water from incineration.

Fly-ash
See Air Pollution Control Residue.

Furans
See dioxins.

Gasification
Gasification is a method for extracting energy from different types of organic material through thermal treatment.

Greenhouse gas
Natural and man-made gases that contribute to the 'greenhouse effect' and climate change, including carbon dioxide, methane, ozone and chlorofluorocarbons (CFCs).

Hazardous waste
Defined by EU legislation as the wastes most harmful to people and the environment.

ISO 14001
The international standard for environmental management.

ISO 9001
The international standard for quality management.

Landfill
The deposit of waste into or onto land in such a way that pollution or harm to the environment is minimised or prevented and, through restoration, reclaims land which may then be used for another purpose.

Landfill Directive
The Landfill Directive (Council Directive 1999/31/EC) aims to prevent, or to reduce as far as possible, the negative environmental effects of landfilling.

Leachate
Water that has come into contact with waste within a landfill site.

Mainsaver
A Computerised Operation and Maintenance Management System (COMMS). Used for the management of maintenance and operational tasks, including scheduling of preventative and planned maintenance activities, asset health recording, electronic shift log, raising and recording work requests and detailed maintenance costs.

Methane
An odourless gas and principal component of natural gas and landfill gas, produced as biodegradable waste breaks down in a landfill site. Over 20 times more potent as a greenhouse gas than carbon dioxide.

Municipal waste
Household waste, as well as other industrial and commercial waste similar in nature or composition, such as wastes collected by a waste collection authority or its agents (i.e. wastes from municipal parks and gardens, beach cleansing, and fly-tipped materials).

MWh
Megawatt hour, equivalent to one million Watt hours, and a unit of energy (one Watt is equivalent to one Joule of energy per second).

OHSAS 18001
The international standard for health and safety management.

Recycling
The direct reintroduction of a waste type into the production cycle from which it originates as a total or partial replacement for new material.

RIDDOR
The UK's Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995, which require the reporting of work-related accidents, diseases and dangerous occurrences.

VOCs
Volatile organic compounds: carbon-based compounds that easily evaporate into the atmosphere, commonly used in industry for de-greasing, thinning and dissolving, and found in paint, inks and adhesives.

WEEE
Waste electrical and electronic equipment. The WEEE Directive was introduced in the UK in January 2007 and aims to reduce the amount of electrical and electronic equipment being produced, and to encourage re-use, recycling and recovery.

the external verifiers' verdict

"Further to consideration of the documentation, data and information resulting from the organisation's internal procedures examined on a sampling basis during the verification process, it is evident that the environmental policy, program, management system, review (or audit procedure) and environmental statement meet the requirements of the Isle of Man Government in providing an annual report and reflects the commitment of SUEZ Isle of Man to satisfy and surpass the standards set in the relevant UK and European legislation as well as local laws and regulations."

Signed: 

Date: 10 May 2018

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