SUEZ Isle of Man annual public report 2018

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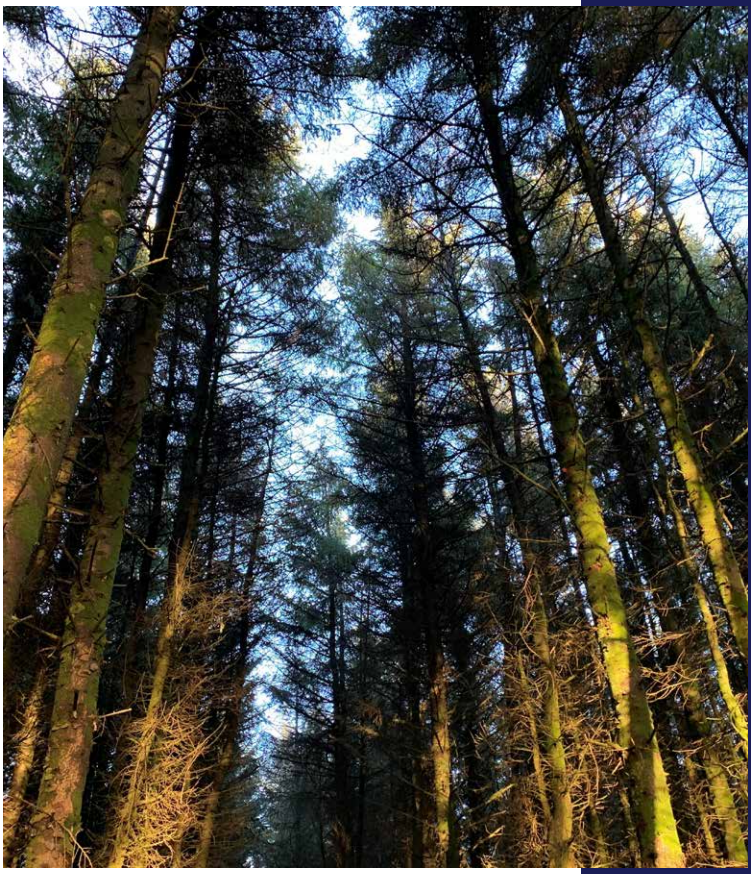


foreword

It is with great pleasure that we are able to report on another highly-successful year for the island's energy-from-waste facility.

Continuing to serve as the Isle of Man's secondary power plant, the facility converted more than 50,000 tonnes of waste into just under 25,000 megawatt hours of electric power in 2018. The year also saw the Richmond Hill facility's pivotal role reaffirmed within the island's recently adopted 2018 Waste Strategy.

The SUEZ Isle of Man team also maintained its exemplary record in terms of both environmental protection and health and safety.

An important theme running through this annual public report is the ongoing emphasis on maximising operational efficiency. Goals set for further improvements to preventative maintenance, equipment availability, continuous improvement projects and oil usage were all met or surpassed. Design improvements were also incorporated, where possible, when overhauling or replacing plant and equipment.

Perhaps the most notable example of this drive to optimise the facility's operations was a highly ambitious bid to pre-empt unplanned shutdowns caused by non-conforming waste.

Oversized waste items, non-combustible materials and other types of unsuitable and prohibited waste cause blockages in the process. These, in turn, increase the risk for personnel faced with the task of clearing each blockage – they can cause a spike in emissions, and then necessitate oil burning during the shutdown and start-up.

This mission to ensure 'no more blockages' for a full calendar year could not have been achieved without the support of our client – the Isle of Man Government and Department of Infrastructure – and the commitment of our team. Their vigilance and ingenuity clinched this success. Thanks are due also to our customers and hauliers who have observed the clear waste acceptance criteria stating which wastes can and cannot be processed efficiently and safely at the Isle of Man energy-from-waste facility.

We will continue to challenge and educate those who fail to comply, and assure you of our team's dedication to sustaining the energy-from-waste facility's high standards of environmental performance and efficiency in the years to come.

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

Gerrit du Toit
Plant Manager
SUEZ Isle of Man

introduction

This annual report covers the 2018 calendar year, providing a comprehensive overview of the operations of the island's energy-from-waste facility over that period.

Its publication fulfils our obligation to the Isle of Man Government Department of Infrastructure to report publicly on our performance, and also reflects the SUEZ policy of being open and accountable to the communities served by our major facilities.

As in previous years, the content of the report has been independently assessed and verified by the international inspection and certification company SGS.

We hope that you find the report's commentary and data of interest, and welcome any feedback or queries you may have.

SUEZ recycling and recovery UK

SUEZ Isle of Man is part of SUEZ recycling and recovery UK, and ultimately, the global SUEZ group.

Now in its fourth decade, our UK parent provides environmentally-responsible solutions for the waste generated by households and businesses across the UK.

The SUEZ name is synonymous with innovation in this industry, which has undergone profound change in recent times. Our group has championed the circular economy, treating waste as a resource and seeking to recover maximum value by putting waste materials to good use.

Achieving this requires various solutions, so the group's services are diverse, and range from recycling and composting to manufacturing alternative fuels from waste.

Richmond Hill is one of nine energy-from-waste facilities within SUEZ recycling and recovery UK. This means we can share specialist expertise across the division, and across Europe – where SUEZ manages 55 energy-from-waste facilities.

We also share a common vision of a society where there is no more waste.

UK operations

Our parent company celebrated 30 years in the UK in November 2018, marking the milestone with a celebratory film, 'We are ready', providing an overview of the diverse activities of SUEZ recycling and recovery UK. The company also released an animated history, charting the development of the business over those three decades, which can be viewed at www.suez.co.uk.

Across the UK, our group employs more than 5,000 people and handles more than 10 million tonnes of waste each year. Our colleagues collect recycling and general waste from over 30,000 industrial and commercial customers. They operate 11 contracts for municipal waste, plus 12 public private partnerships, as well as managing a national network of facilities.

The value these services recover from waste is substantial, as these audited figures for resource recovery in 2016 show:

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

The SUEZ vision

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

We believe waste is a resource and our goal is to help create a circular economy in which waste materials are given a second life – by being reused, recycled or recovered for their energy value.

A resource revolution is required as the world faces up to the depletion of its natural resources and the need to switch to renewable sources of energy. The SUEZ group is a global leader of this revolution.

We view 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, the pressure on natural resources and reliance on fossil fuels.

SUEZ – UK infrastructure

SUEZ recycling and recovery UK invests heavily in the technologies needed to put waste to good use. During 2018, it added to that capacity and will continue to grow in future with the announcement that a sixth line has been given the go-ahead at our Haverton Hill site in Teesside.

Planning permission for the facility was granted in 2014 on industrial land adjacent to SUEZ's existing buildings, which is also equipped with a rail-siding to allow delivery of waste by rail. Enabling works in anticipation of construction of the facility have since been undertaken.

SUEZ is currently in the process of procuring an EPC contractor to build the new facility and it is anticipated that it will become operational in 2022.

The UK infrastructure network includes:

105 household waste recycling centres

68 transfer stations

7 operating landfills

8 materials recycling facilities

9 energy-from-waste facilities

6 wood processing facilities

6 composting sites

2 refuse derived fuel facilities

2 solid recovered fuel facilities

2 street sweepings recycling facilities

1 mechanical biological treatment facility

The global SUEZ group

SUEZ has been a world leader in the fields of waste and water for 150 years. We are part of a global group with more than 80,000 employees working across five continents.

Working with municipalities and industry, SUEZ is an innovator in recycling, recovery and the production of secondary raw materials and alternative resources.

The group's core activities support the resource revolution:

- increasing access to resources – such as clean drinking water and materials recovered from waste
- protecting resources and ecosystems – by treating wastewater, turning sludge and other wastes into energy, and reducing carbon emissions
- optimising use of resources – through smart collection systems, real-time management of water and sanitation, and other digital solutions
- producing new resources – recovering waste, producing secondary raw materials, desalination of seawater for drinking

A sustainable development roadmap is guiding the group in its mission to lead the resource revolution.

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

- a 10% increase in the generation of renewable energy
- doubling biogas production
- helping customers avoid more than 60 million tonnes of greenhouse gas emissions

Isle of Man 2018 Waste Strategy

In July 2018, Tynwald approved a new waste strategy for the island, replacing the Isle of Man 2012-2020 Waste Policy and Strategy.

The new 2018 Waste Strategy can be seen in full at www.gov.im.

This strategy focuses on sustainability, the self-sufficiency of the island and the need to ensure that the essential waste infrastructure is in place to support the economy and manage waste sustainably. It commits the Department of Infrastructure to publishing an annual statement of need for waste facilities and a series of technical reports about waste management.

The Isle of Man's energy-from-waste capacity to treat residual wastes that cannot or have not been recovered or recycled remains a strategic priority in the island's hierarchy of waste infrastructure.

Solutions for hazardous, problematic and inert wastes are also seen as a top priority, requiring access to off-island disposal facilities where this is the best environmental option.

Other elements of the new strategy include:

- the introduction of handling fees for non-conforming waste delivered to the energy-from-waste facility
- the Department of Infrastructure will seek to use the energy-from-waste facility to dispose of wastes that can be managed safely through this treatment process
- the cost and capacity for dealing with waste will be considered in decisions to support the development of businesses on the island
- a target to eliminate all unnecessary single-use plastic across Government by January 2021

Building up self-sufficiency

The 2018 Waste Strategy acknowledges that the Isle of Man cannot avail itself of the UK's producer responsibility schemes for end-of-life consumer white goods or packaging waste, despite their origins.

Neither can the island achieve the economies of scale necessary to develop specialist treatment facilities for all types of waste.

The Isle of Man energy-from-waste facility was commissioned to replace the island's reliance on landfill for the disposal of putrescible wastes.

The facility continues to ensure that the island can process all combustible residual waste from households and businesses. It is also equipped to dispose safely of clinical wastes from our hospitals and clinics. Animal carcasses from farms and meat processors were processed alongside clinical waste until 2008, but now go to the government's purpose-built animal waste processing plant adjacent to the energy-from-waste facility.

Other waste streams that are difficult to treat – such as waste tyres and biowaste from sewage treatment – can also be processed on-island, avoiding the need for exporting or landfilling.

Meanwhile, the island's energy security is enhanced as processing these wastes at the energy-from-waste facility reduces dependence on imported fossil fuels by treating these various waste streams as a renewable feedstock for electricity generation.

The Department of Infrastructure has indicated in the 2018 Waste Strategy that incineration with energy recovery will remain the primary method for disposing of residual incinerable waste on-island beyond the current facility contract period of August 2029, subject to the facility meeting the required emission and operational standards.

Stack is ship-shape

Over the years, the facility's chimney stack has weathered and become dull. Occupying a prominent position close to the island's capital, the facility with its sail-shaped stack is a landmark. During the year, we commissioned the cleaning of the cladding to restore its appearance.

managing waste

The Richmond Hill facility turned more than 50,000 tonnes of waste into energy during 2018, exporting just under 25,000 megawatt hours of electricity to the island's grid.

This section of the report explains the energy-from-waste process, describes the different wastes treated, and reports on the raw materials used and by-products of our operations over the year.

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 Isle of Man energy-from-waste facility has two lines for treating waste. 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 incinerator, while on the secondary line, the minimum operating temperature rises to 1,000°C in its secondary chamber, where volatile gases are incinerated. These thresholds are set out in the EU Industrial Emissions Directive, which is designed to ensure the safe operation of processing facilities and destruction of waste.

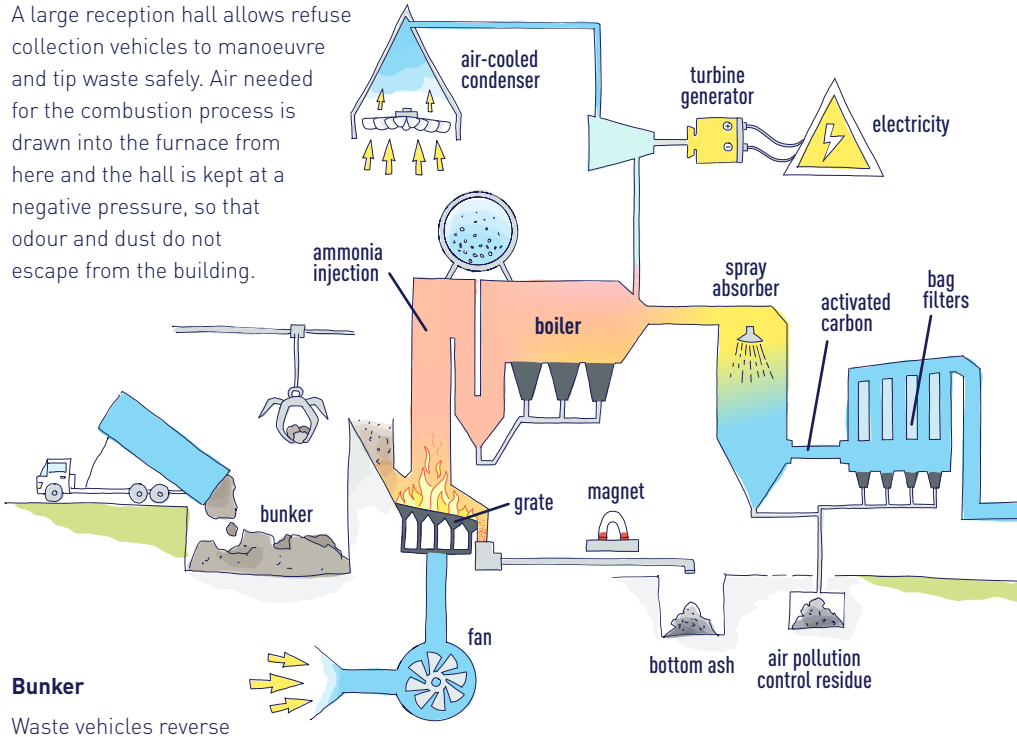
On arrival at Richmond Hill, waste vehicles use an automatic weighbridge set back from the site entrance, so that vehicles do not have to queue on the public highway. Waste type and amount, as well as customer details, are recorded and the driver is directed to the appropriate delivery bay.

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

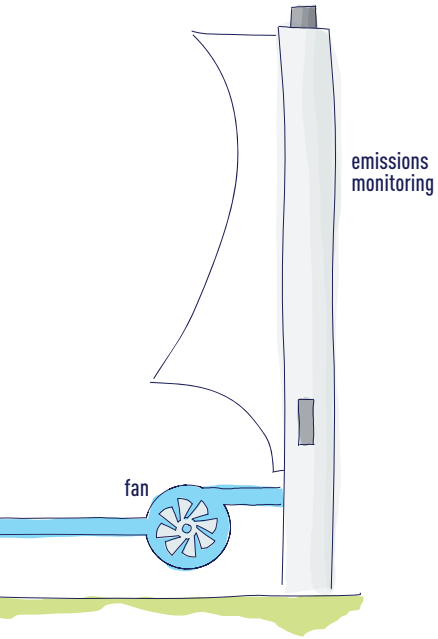
Waste vehicles reverse to a wheel-stop and tip their loads into a large concrete bunker. At 60,000 tonnes of waste delivered per year, this is big enough to hold 16 days' waste, so that tipping can continue when the facility is shut down for maintenance. A shredder, for bulky items such as mattresses,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

Our operations

It was another year of high standards of operational performance by the facility and our team. They completed a heavy programme of maintenance and a series of improvement projects.

Both are essential to the efficiency and smooth running of the facility. The single, most notable achievement in 2018 was the completion of a full year's operation with no unplanned shutdowns due to blockages.

Blockages can occur in any industrial process, but they are an ever-present risk in an energy-from-waste facility, mainly due to non-conforming items of waste. A concerted effort that required the support of our client, a new inspection regime and an ingenious piece of engineering led to the success of our 'no more blockages' initiative.

Scheduled maintenance

The primary incinerator operates around the clock seven days a week, with two shutdowns for maintenance scheduled each year. On the secondary line, clinical waste and waste oils are processed in batches over several days.

A shutdown may also be initiated if the facility's control systems detect that performance is not within set parameters. This could be due to an exceedance of an emission limit, equipment failure or non-conforming waste.

As well as major maintenance, the shutdowns allow for regulatory inspections of the boiler and ancillary equipment.

We plan maintenance based on the results of our ongoing monitoring of the condition of plant and equipment. Where possible, our team incorporates design improvements when replacing worn-out components.

The first shutdown was scheduled for 17 days in May, while the second outage was for a fortnight in October-November. This programme saw major works involving the boiler, waste feed chute, furnace, emissions monitoring system, turbine and generator.


Hardox wear strips

Some examples of the work are set out below:

- Following replacement of the boiler tubes that form the roof of the first and second passes last year, it was time to do the same for the top sections of the walls of the boiler's second pass in May. Nineteen tubes totalling 3.5 metres in length were replaced. Their thickness had been measured at 3.7mm, triggering the programme of proactive replacement. As with the work of a year earlier, the new sections were improved with an overlay of Inconel, a superalloy offering higher resistance to corrosion in extreme temperatures.
- The continuous flow of waste to the furnace subjects the feed chute to heavy wear. Its bottom section also experiences extreme heat, so it has an integrated cooling water jacket. The entire front wall of the chute was replaced, again on the basis of last year's thickness surveys. Our contractors also installed sheet-steel Hardox wear strips. Not only will they last longer, but the strips can also be replaced, making future maintenance easier.
- Previous reports have described the progressive repair of the furnace refractory, which is designed to withstand extreme operating temperatures. We trialled a new application method for refractory tiles in 2015 and reported its success in 2016. The re-lining process was completed in 2018. It involves grit-blasting the boiler wall back to bare metal and stud-welding a large number of anchors between the boiler tubes to secure the panels. This is more stable than the original method, which was susceptible to large areas of premature failure, and better able to accommodate thermal expansion of the boiler walls.
- New equipment for the continuous monitoring of air emissions was also installed in May. This was a complex process involving the installation of a series of major components that analyse raw and cleaned gas streams. Our maintenance staff worked closely alongside specialist contractors to complete the work. We also took the opportunity to replace and reposition control panels to simplify future maintenance. Our operations team were trained in the software package that reports all results of monitoring. All work, bar minor snagging issues, was completed and the monitoring system was extensively tested before the facility was allowed to restart, on schedule.
- The most significant task in the second shutdown centred on the steam turbine and generator. Technically known as a 'minor revision', this is actually an in-depth service and inspection, and is more involved than the annual service. A team of specialists performed the inspection and found that both turbine and generator were in excellent condition. A 'major revision' requiring full dismantling of the turbine is carried out every seven to eight years.

No more blockages

Blockages caused by items of waste that are not suitable for incineration are one of the most persistent causes of unplanned shutdowns in energy-from-waste facilities. They typically occur in the deslagger, which clears ash from beneath the grate. Oversized items may also block the waste feed chute or the furnace grate itself, compromising the combustion process.

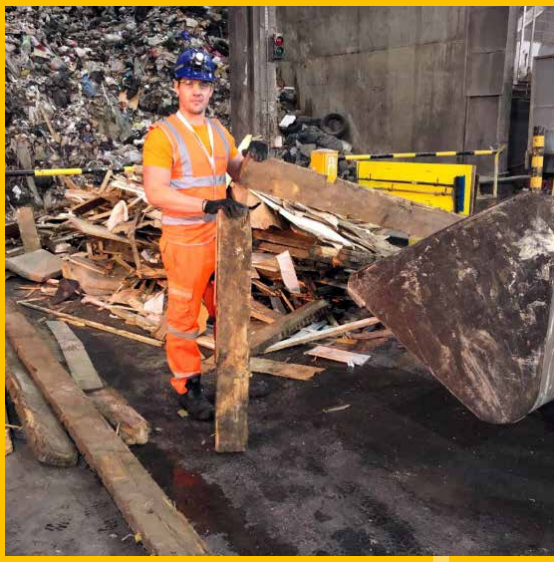
In 2017, deslagger blockages alone were responsible for 486.5 hours of lost production. The task of clearing a blockage exposes our personnel to risk. Our operators are required to take the facility off-line and wait for the grate temperature to fall below 50°C before attempting to clear a blockage, under new procedures adopted in 2016.

During this shutdown phase, and the restart, oil is burned to control operating temperatures, adding to the economic and environmental cost.

A new target for 2018

At the beginning of the year, we set a new target of at least halving the number of hours lost due to deslagger blockages.

As our plans for achieving this took shape, we went further and took on the mission of completing a full calendar year with 'no more blockages'. What may initially have seemed more like an aspiration than a target became more realistic as the year and various initiatives progressed.



This work involved a concerted effort from our team, client and customers:

- A new system of reloading charges for non-conforming waste introduced by the government took effect on 01 January 2018. This followed unsuccessful attempts to combat the problem by educating hauliers and stepping up spot checks on incoming loads. The initial charge is £70, or £105 if the prohibited waste is discovered after it has been tipped. Charges rise for repeat offences.
- Working closely with government officials, we also drew up a new waste acceptance criteria to clarify which types of waste can be accepted for treatment and which are non-conforming. Hauliers are required to confirm they have read and understood the criteria as part of our customer induction process.

- A member of staff was recruited for a new role dedicated to spot-checking loads in the facility's reception hall. Matty Holmes, our new Assistant Day Operator, also explains to hauliers what waste items can and cannot be accepted.
- Our operations team has also been vigilant in identifying abnormal waste items that have been tipped in the bunker, so they can be removed before they enter the furnace.
- A large number of offending items were discovered in these ways. They included: tree stumps, scaffolding planks and other oversized items of timber, fire-retardant anti-vandal boards, and the purlin from a hotel demolition. Over the course of the year, a total of £2,205 in reloading fees were levied by the government.
- A solution to the problem of floating blockages in the deslagger also made a significant contribution. Trainee Senior Operator, Stuart Storie, designed a device for draining water from the deslagger while it is still online. Stuart engineered and fabricated the ram device in his home workshop before testing and installing the device. The ingenious solution is non-invasive and completely safe for operators, and saves the typical £25,000 cost of importing electricity and burning oil during an unplanned shutdown. The ram had to be used four times, saving an estimated £100,000 and the associated carbon emissions.

As a result of these efforts, 2018 passed off with no shutdowns due to blockages – an unprecedented feat and a great testimony to the commitment of everyone involved.

Operational efficiency

Over recent years, we have developed our maintenance regime so as to sustain and enhance the operational efficiency of the facility. The importance of high-quality proactive maintenance is an important factor in securing robust long-term processing capacity.

These measures included a new operations management system for plant and equipment assessments, computerised tracking of all maintenance works on our Mainsaver system, and reviewing maintenance schedules so as to pre-empt equipment failures.

During 2018, the maintenance team introduced a new condition-based monitoring technology.
Using portable equipment, we can now measure and analyse vibration in plant with components that rotate – such as pumps, motors and fans.
Our engineers are trained to interpret these vibration readings, so we can monitor and assess the health of these assets and track the deterioration of key components.

We set annual targets for the performance of the maintenance team. The first is for preventative maintenance – anticipating and pre-empting problems, as opposed to reactive maintenance. The challenging target for 2018 was 80%, which was achieved.

We also monitor the availability and downtime of critical items of plant and equipment. Each year, we set a target for overall equipment effectiveness as a benchmark for the performance of our maintenance team.

The overall equipment effectiveness target for the year was 63%. This value is a product of three quantities (availability, performance and quality) related to the energy-from-waste-process. Our 2018 overall equipment effectiveness target was achieved with a final outcome of 64.1%.

Continuous improvement

Our ongoing efforts to improve extend to every aspect of the facility, from safety to housekeeping, as well as maintenance and operational efficiency.

Staff have been trained how to analyse our ways of working to identify any non-critical element in the process and everyone is encouraged to share their ideas.

The following improvement projects were completed in 2018, and more are ongoing.

Raising safety levels

The carbon used in the gas scrubbing system is received in bulk bags, which are emptied into an elevated hopper every six days. A forklift truck had been used to lift the 500 kilogramme bags onto the top of the hopper.

Shift Manager Ross Cormode suggested installing a lift beam and ATEX-rated hoist instead. These were installed in December, and are a valuable step forward for health and safety.

Atomiser achieves reliability record

Using a lean methodology for improving how workplaces are organised, a project team focused on the atomiser that sprays lime milk to neutralise acidic gases in the flue. This system is prone to blockages and trips.

The project team recommended changes to our procedures for visual management, cleaning of the atomiser at a new cleaning station and the appropriate training. Reliability has improved, setting new records with the atomiser running for over 9,000 hours on two occasions before requiring a specialist overhaul.

Making lighter work

In certain circumstances, our engineers have to set up temporary lighting before they can effect a repair or respond to an emergency. We have begun installing new power outlets at the access points to confined spaces that have to be accessed frequently by maintenance staff. These 110V outlets are dedicated to power lights during outages and minimise the run of trailing cables. We have also installed uninterruptible power supplies at the entrances to the furnace and its second and third pass tubes, so the lights stay on in the event of a power failure. These improvements will save time, reducing our response time and maintenance work.

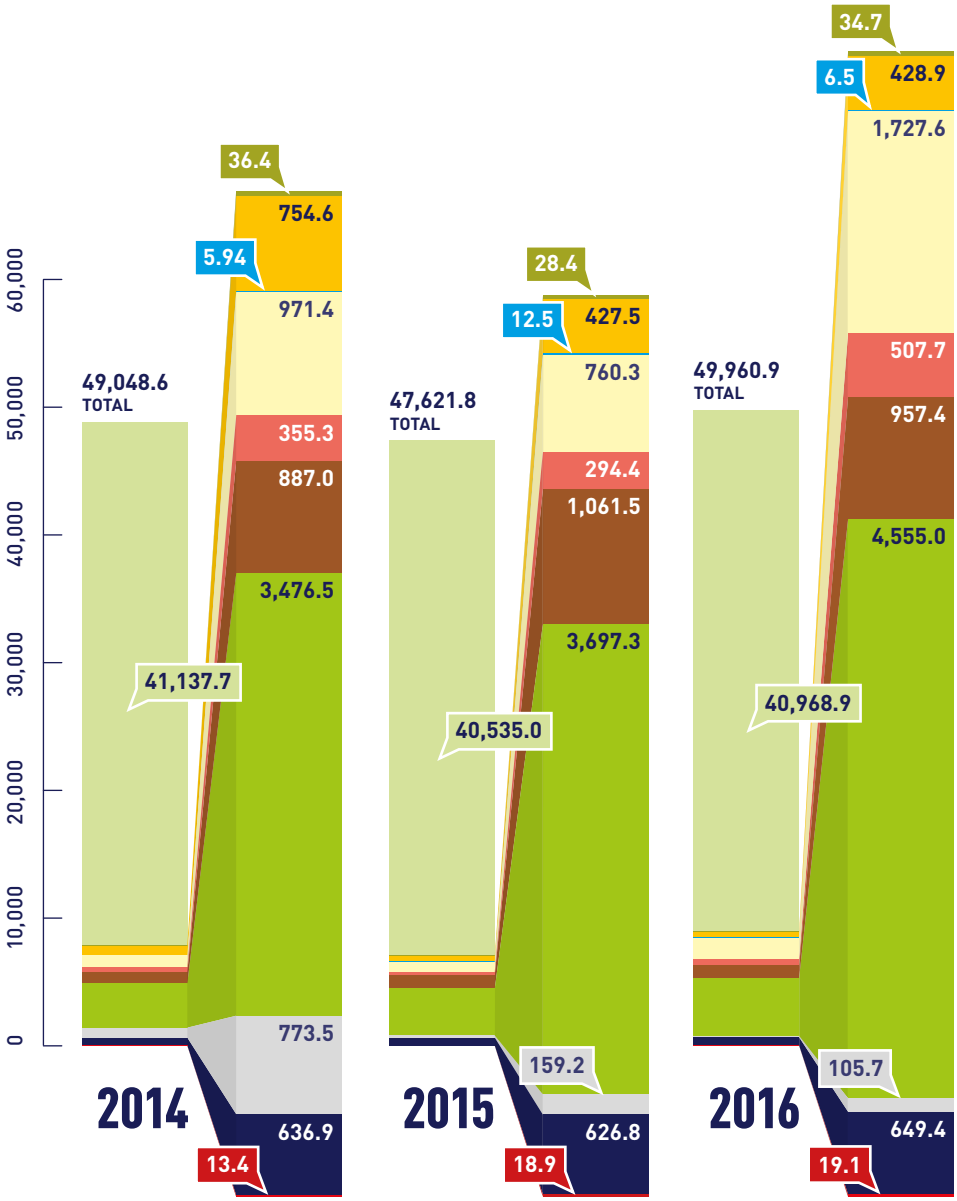
What we processed

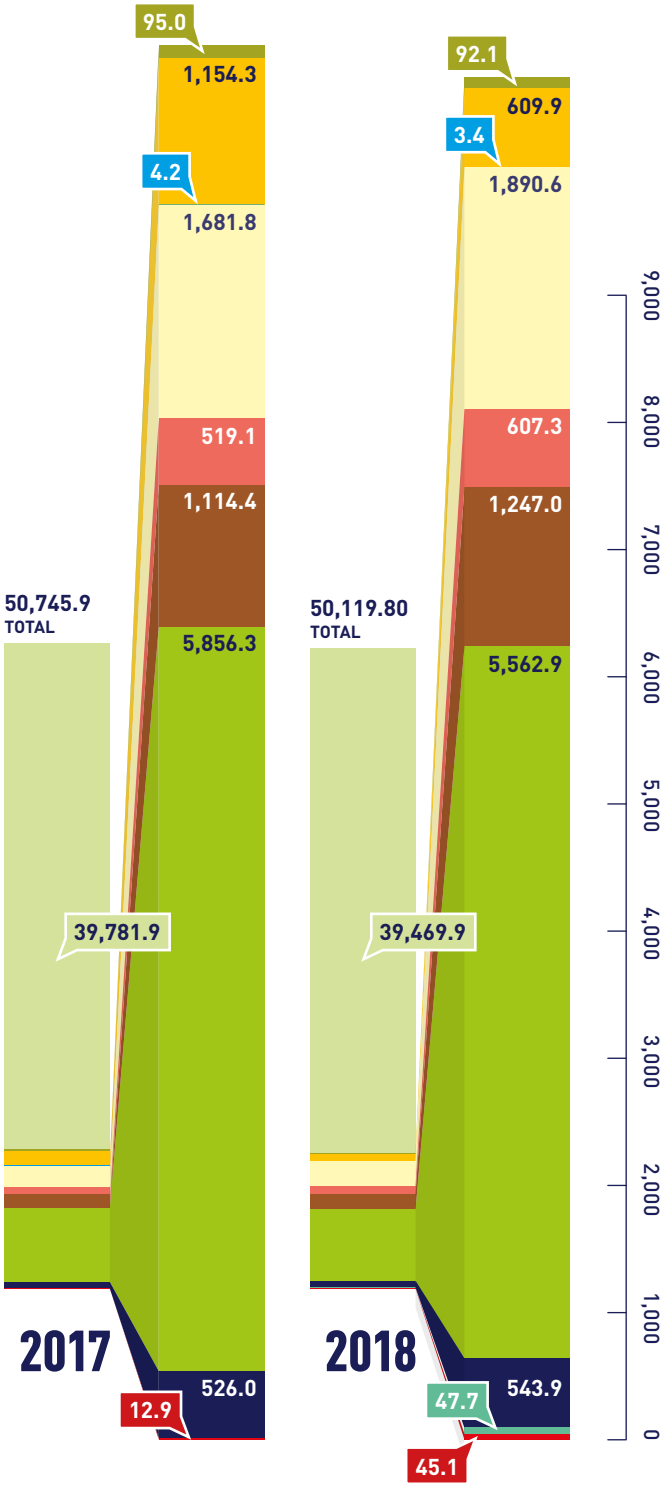
In all, more than 50,000 tonnes of waste were processed at the facility. Both lines saw a small decrease in throughput compared with the year before – to 50,119 tonnes on the primary line and 643 tonnes on the secondary.

A fall in construction waste accounted for most of the decrease. This category saw almost half the 2017 level, at 609 tonnes. The municipal and wood waste streams also decreased by around 300 tonnes each. These falls were partly offset by more packaging (up 200 tonnes) and biowaste (130 tonnes).

On the secondary line, 390 tonnes of waste oil were burned – 85 tonnes less than in 2017.

Waste incinerated in the primary incinerator (tonnes)

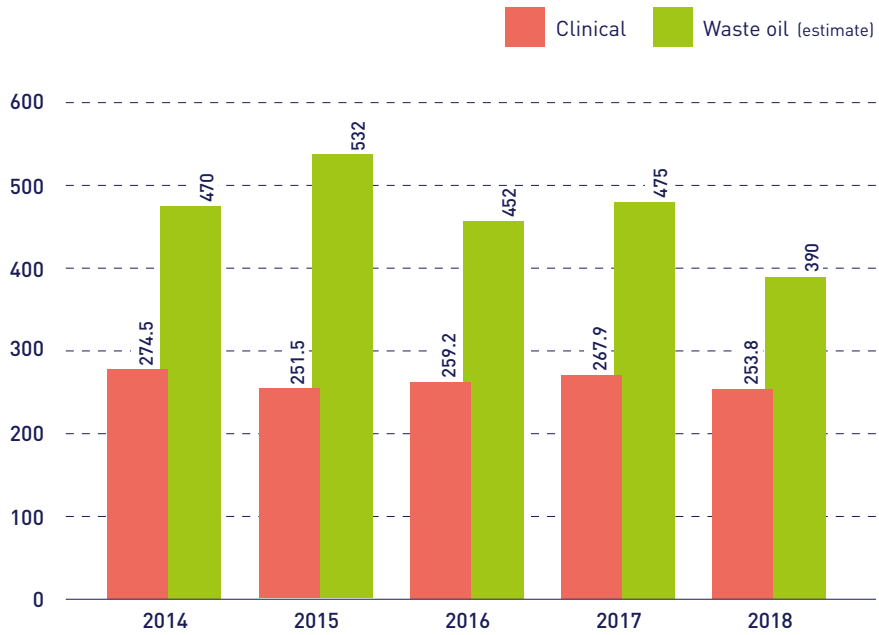




types of waste

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

Waste incinerated in the secondary incinerator (tonnes)



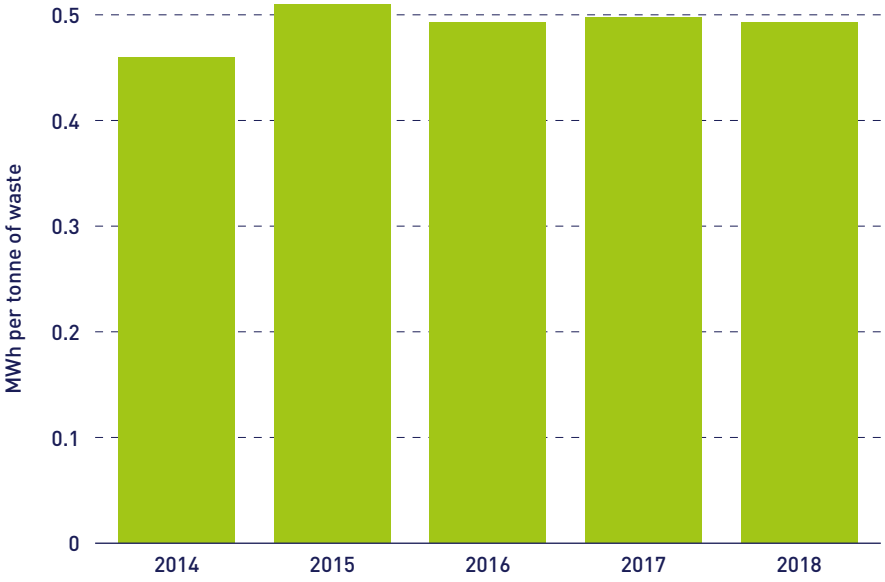
Energy generation

The Isle of Man energy-from-waste facility exported just under 25,000 megawatt hours of electricity in 2018.

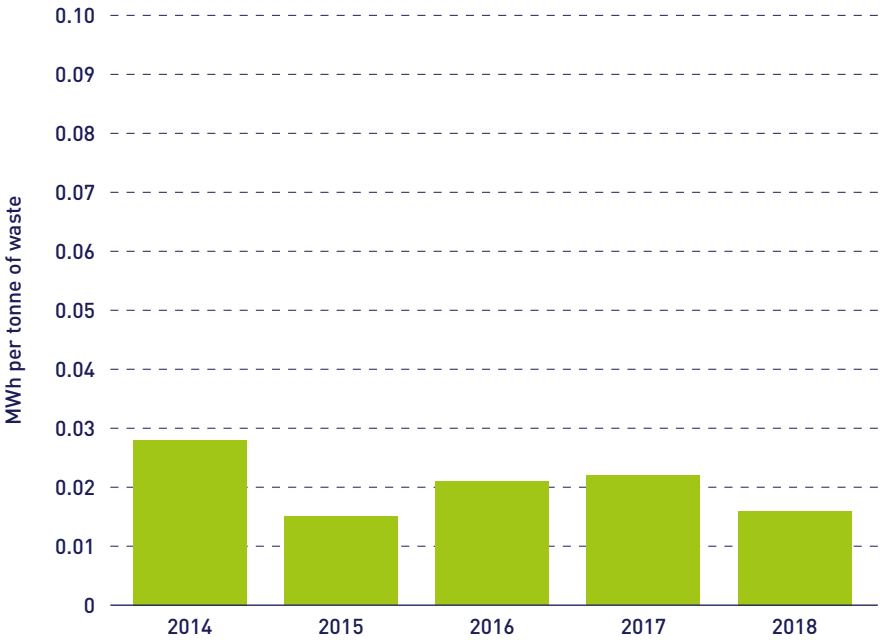
This was a reduction of 2.7%, reflecting both the volume of waste and the calorific value of the materials in the ever-changing waste stream. It was also necessary to run the facility without exporting power following a fire in the turbine hall. This accounted for about 300 megawatt hours of lost power.

Over the same period, the consumption of electricity by the facility reduced, as less energy had to be imported due to fewer unplanned stoppages.

Electricity exported



Electricity consumed



Turbine cladding fire

The fire alarm sounded on the morning of Saturday 06 November when lagging on external pipework to the turbine ignited. Our operations team quickly put out the small fire with powder fire extinguishers. As small flames flared back up several times, the fire brigade were called as a precaution.

Wearing breathing apparatus, the crew and our maintenance technician removed the smoking lagging. Our investigation established that hydraulic oil from a leaking union repaired earlier that week had penetrated behind the lagging. Its ignition was triggered by the high temperature of the pipes.

After consulting our contracted turbine specialists, more lagging was removed and visual inspections made before re-lagging and finally restarting the turbine. Maintenance and inspection procedures have been revised, including a requirement that all lagging in the area of any future oil leak must be removed and replaced.

Other outputs and inputs

Bottom ash is the main by-product of the energy-from-waste process, while gas oil, various chemicals and water are the main resources used, apart from electricity, to operate the facility safely.

Bottom ash

When waste is incinerated, ash is formed. This is sampled for contaminants before it is taken from the facility to Turkeylands Old Quarry for maturation and secondary sorting. The material is then stored / disposed of in the Turkeyland New Quarry landfill facility.

This bottom ash is mainly formed of silica, essentially sandy soil. Other naturally occurring compounds make up the remaining 4-5%.

In 2018, there was a slight reduction in bottom ash to some 10,460 tonnes. The rate at which ash is produced was steady, at around 206 kilogrammes per tonne of waste.

Air pollution control residue

There was also a slight fall in the tonnage of fly-ash captured in the facility's flue. This air pollution control residue is composed of particles that rise with the hot gases from the furnace.

These particles are encapsulated by chemicals and removed in the gas scrubbing process. Due to its lime content, the residue must be treated as a hazardous waste. Air pollution control residue also contains salts and carbon dust, as activated carbon is sprayed into the flue to capture lead, chromium, arsenic and other heavy metals.

The types of waste incinerated, including items such as batteries in household waste, determine the concentrations of these substances. We analyse samples quarterly.

Air pollution control residue is sealed in containers before shipping to specialist facilities in the UK, where it can be disposed of safely.

Just under 1,600 tonnes of the residue were generated in 2018.

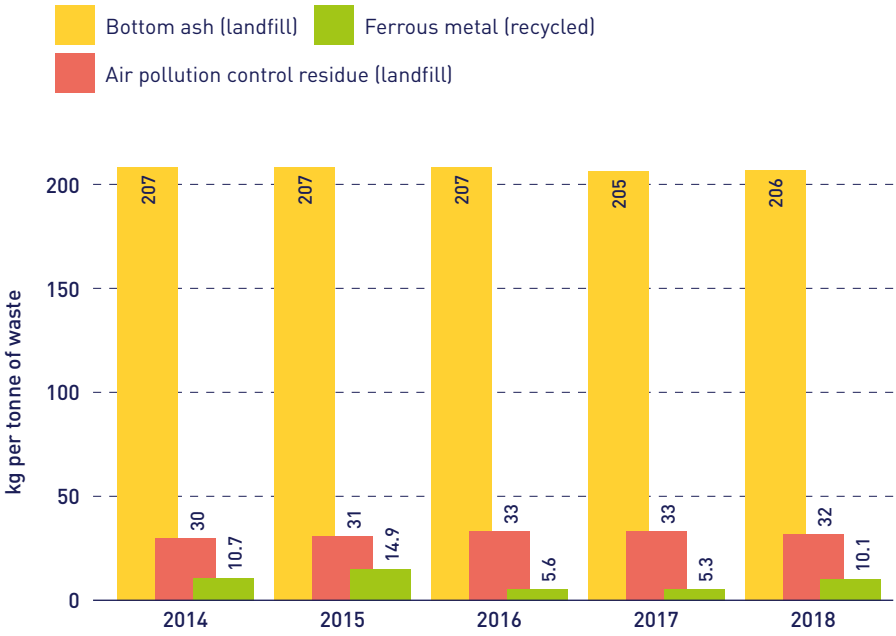
Ferrous metals

Mixed wastes delivered to the facility contain various types of ferrous metal, such as pieces of steel and iron. After incineration, the bottom ash is passed under an overhead magnet to recover these metal pieces from the ash.

Ferrous metals are of less value to reprocessors when they have been through an incinerator, and other items, such as aluminium cans, melt during the process so they cannot be recovered. These waste types should be diverted from the residual waste stream for recycling.

More than 510 tonnes of ferrous metals were recovered in 2018. This is in line with the annual pattern of previous years following the fault that put the magnet out of action for an extended period in 2017.

Waste recovery and disposal



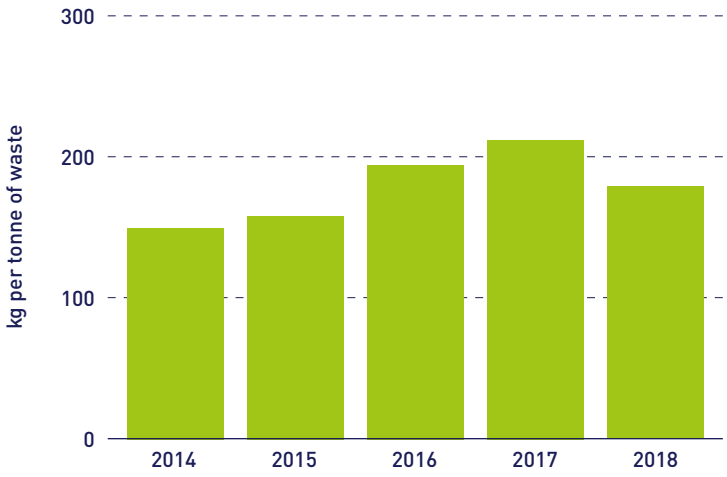
Water

Water is used to cool the furnace grate and to produce super-heated steam in the boiler, driving the turbine. It is also key to our flue gas treatment and ash quenching. Around the facility, water is also consumed in general cleaning and in office and toilet areas, as well as our visitor centre.

The facility was designed to conserve water and protect this resource from contamination. Within the energy-from-waste process, water is recycled. On the site, we store and reuse rainfall.

We used less water in 2018. Consumption was down by about 34 tonnes. Unlike 2017, our maintenance programme did not require the replacement of boiler superheaters, which involved flushing the boiler with large volumes of water.

Consumption of raw materials – Water



Gas oil

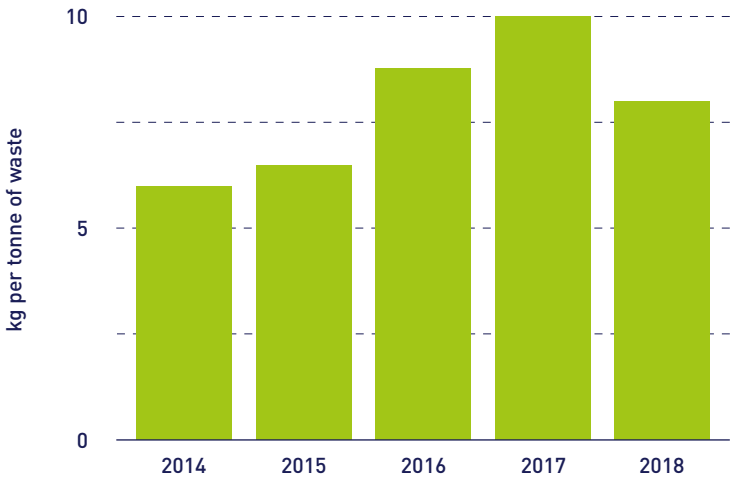
During the start-up and shutdown phases of operation, it is essential to burn gas oil to maintain the minimum incineration temperatures required for the safe destruction of waste.

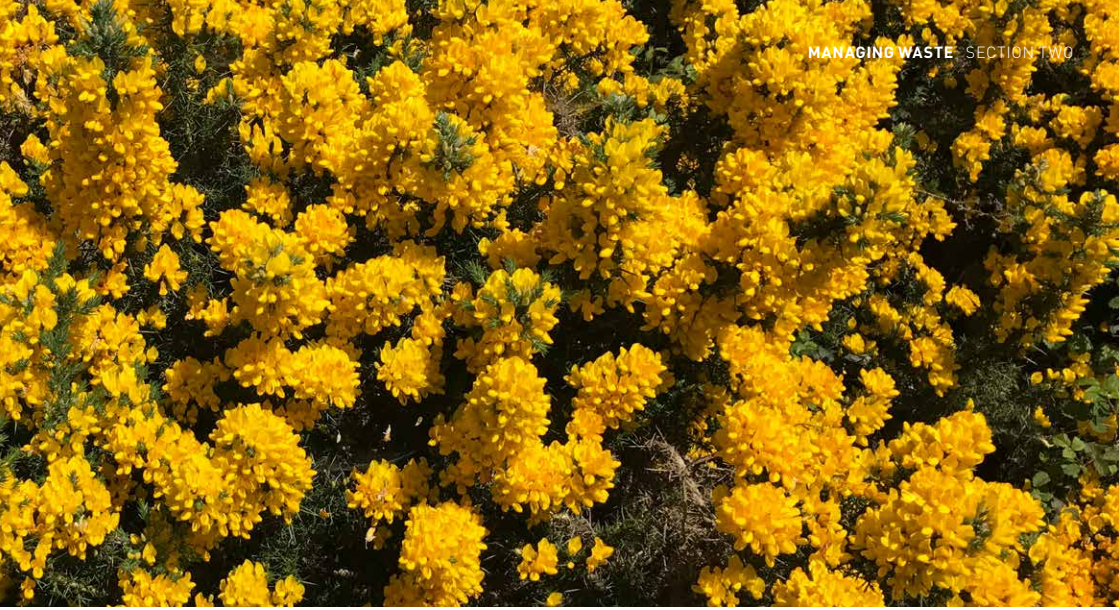
Gas oil burners on each of the incineration lines are also triggered when temperatures drop due to any interruption to loading of the grate or non-compliant waste.

While burning the oil helps avoid potentially harmful emissions, it also creates carbon emissions, so we strive to limit its use.

For 2018, we set ourselves the objective of reducing our oil usage. We managed to cut the consumption rate by 20%, largely due to the success of our efforts to prevent blockages resulting in unplanned shutdowns.

Consumption of raw materials – Gas oil





Chemicals

Lime, ammonia and carbon are used in the gas scrubbing process to ensure emissions remain within the strict limits set in our site licence, issued by the Isle of Man Government Environmental Protection Unit.

While compliance is our overriding priority, we manage our consumption of these chemicals in the interests of resource efficiency and economy.

- **Ammonia**: Oxides of nitrogen form when nitrogen in waste is released into the air. They are controlled by injecting ammonia into the boiler. A reduction in consumption to 25 tonnes was largely due to correcting the balancing of the nozzles that deliver the ammonia solution. The procedure was revised and staff retrained.
- **Lime**: An alkaline lime solution is sprayed to neutralise acidic gases such as sulphur dioxide and hydrogen chloride in the flue. The year saw a slight reduction to 444 tonnes.
- **Carbon**: Dioxins and trace metals are absorbed by activated carbon. An increase in recorded usage to 19.5 tonnes is in line with normal operating parameters.

We review chemical usage monthly while ensuring that the facility's exemplary track record in controlling emissions is sustained.

Our other activities

SUEZ recycling and recovery UK provides a suite of integrated services for managing a wide variety of types of waste. On the island, we operate a confidential waste service, as well as handling hazardous wastes.

Confidential waste

More than 90 tonnes of confidential waste were securely destroyed within the facility in 2018, a similar level to the year before.

Hazardous waste

All wastes deemed hazardous are subject to strict international regulations on shipment and disposal.

We manage hazardous waste on the island and operate a purpose-built facility for securely storing the wastes, pending their onward shipment.

Our staff collect hazardous wastes from industrial and other premises, analyse and classify them, before identifying the appropriate treatment or disposal facility. Wastes from different sources are consolidated into efficient loads and transfrontier shipment notices are issued in accordance with international regulations.

Members of the public can also request the removal of any potentially dangerous chemicals or other substances from their property, under an equivalent service provided for households and funded by the government.

In 2018, we shipped six loads. These comprised acid wastes, DMF solvent (dimethylformamide), alkali cyanide and bitumen.

managing environmental performance

The energy-from-waste facility and its management systems and procedures are designed to minimise impacts on the environment. In 2018, we sustained our track record of delivering high standards of environmental protection.

In this section of the report, we set out our environmental policy, describe the systems used to manage those impacts and explain how our performance is monitored and checked.

All of the underlying data is presented together in the tables in the final section of the report.

Environmental policy

SUEZ recycling and recovery UK sets the policy framework that governs the operation of its energy-from-waste facilities, and our management systems and procedures.

It requires full compliance with the specifications of the site licence and all relevant legislation and regulations, and challenges us to exceed those standards wherever practicable. Our parent company sets objectives and targets to drive continuous improvement and monitors our performance.

Our management system also integrates occupational health and safety and quality of service, alongside environmental protection, 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

All aspects of operating the energy-from-waste facility, and our related activities, are unified within our integrated quality and environmental system.

The system sets out the procedures to be followed at every stage – from accepting delivery of wastes to disposal of bottom ash and the air pollution control residue. In any given situation, it makes the compliant course of action clear to our staff. It also specifies the procedures for reporting our performance to the island's regulator.

Our management system is registered to the relevant international standards. Maintaining certification requires regular and independent re-assessment of our procedures and operations.

In terms of environmental management, our system meets the requirements of ISO 14001, to which it was initially certified in the first year of operations. For quality management, our system is certified to ISO 9001.

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 certification to these environmental standards reflects our commitment to comply with all applicable Manx legal requirements as well as applicable UK and EU legislation adopted by the Isle of Man Government.

The Manx legislation that applies includes:

- 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)

The government's Environmental Protection Unit – which reports to the Department of Environment, Food and Agriculture – regulates the Richmond Hill facility.

Compliance audits

Each year, a series of audits are undertaken to ensure that our operations comply with the terms of our site licence as well as our management systems and procedures.

In 2018, we maintained certification to the international standard for environmental management (ISO 14001) and the international standard for quality (ISO 9001).

Other audits during the year included:

- **OMS compliance**: Internal audits in February and November by SUEZ recycling and recovery UK to check compliance with our Operational Management System.
- **Helistrat audit**: The independent waste management consultancy conducted an audit in June on behalf of its client Marks and Spencer to inspect how its waste is handled.
- **SHEQ**: Another internal audit in November by SUEZ recycling and recovery UK, this time focusing on our systems and procedures for managing health and safety, environmental protection and quality.
- **Lean maturity**: An internal audit by the global SUEZ group of our compliance with the lean business system in December.

All SUEZ facilities are set environmental compliance targets by our parent company.

The target is based on the UK Environment Agency's Compliance Classification Scheme, which awards a site score 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's target for all its sites is for a score of less than 10. The two lines at Richmond Hill have always been rated significantly below that threshold. In 2018, each of our treatment lines retained their score of zero.

Environmental impacts

As with every industrial process, energy-from-waste has an environmental footprint. Our systems are designed and our staff trained to manage and minimise all impacts of treating our customers' waste.

All potentially significant impacts, both negative and positive, are assessed, recorded and reviewed. A Significant Environmental Impacts Register helps us ensure that we manage our activities in ways that mitigate these risks. Maintaining the register also helps identify possible improvements.

Biodiversity

Many procedures in our integrated management system – and the design of the facility itself – afford protection to local wildlife habitats and biodiversity.

This includes the control of all discharges to watercourses, as well as emissions to air, and shipments of ash and hazardous wastes.

Their storage, and also our stocks of chemicals and oil, require special measures to contain any spillages, and we review and test our planning with emergency drills.

Emergency planning

Five emergency drills were carried out during the year.

These tested our staff's preparedness in the following scenarios:

- Rescuing an operative who has fallen into the waste pit – this was repeated later in the year, applying lessons learnt in the first drill.
- A spillage of hydrochloride (HCl).
- A lime tanker spill.
- A rescue from the boiler's fourth pass area, involving the Isle of Man Fire Brigade and our supplier, Absolute Scaffolding.
- A turbine fire, again the with the Fire Brigade's support.

Our environmental performance

We monitor all emissions to air, water and land from the Richmond Hill facility under the terms of our site licence.

The EU Industrial Emissions Directive lays down the regulatory framework for this monitoring. Its stringent standards make energy-from-waste one of the most tightly regulated industrial processes in Europe.

We report the results of all monitoring – including airborne emissions, but also solid residues and discharges to water – to the Environmental Protection Unit.

Emissions

Air emission limits are set in the site's operating licence for a range of parameters.

As gases pass through the flue – after the scrubbing process – they are analysed by the facility's continuous emissions monitoring system. It measures the following:

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

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.

Certain compounds are subject to half-hourly limits under our site licence, while a 10-minute limit applies to carbon monoxide. When such a limit is exceeded, the facility may still operate in full compliance with its licence conditions, but the emission must be brought back under control within a specified time or the facility has to be shut down.

All exceedances must 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.

In addition to this annual public report, we publish updates on the facility's emissions, including 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.

Licence emissions 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			*

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

Our site licence has evolved over the years, mainly to cover additional waste streams. In 2018, the Department of Environment, Food and Agriculture approved an amendment allowing hygiene waste to be processed in the primary line.

Hygiene waste is non-hazardous, and includes healthcare accessories such as gloves, gowns, empty saline containers, nappies and other items. In contrast with clinical waste, hygiene waste is non-infectious as it has not been contaminated with bodily fluids, nor does it contain pharmaceuticals or chemical substances.

As with all licence variations, we have to establish that any additional waste stream can be safely and efficiently processed without compromising the facility's performance, before approval.

Measuring our performance

Since we began operations, the energy-from-waste facility's record on emissions has been exemplary. Each year since 2004, cumulative emissions have fallen well below annual limits.

Our operations team sustained that record in 2018. Airborne emission limits were exceeded on just three occasions. Sampling of bottom ash indicating higher than normal levels of total organic compound are still being investigated. There were no breaches of water-related limits.

The incidents involved:

- **Hydrogen chloride**: In June, there was one exceedance of the half-hourly limit for hydrogen chloride. The primary atomiser that injects lime slurry into the flue failed and, after multiple failed attempts to restart, it was removed. On inspection, oil and coolant were found on the atomiser's connections, which caused it to trip. Waste was removed from the grate and burners were used to maintain temperature. During this time, no lime slurry could be atomised, prompting the brief spike in hydrogen chloride levels.

- **Sulphur dioxide and hydrogen chloride**: On 06 October, spikes in sulphur dioxide and hydrogen chloride exceeded their half-hourly average limits. Maximum lime input was delivered to the spray absorber automatically, but this failed to reduce the emissions to acceptable levels. The decision was made to stop loading waste and suspend operations. Daily limits for the two emissions were not breached. An investigation concluded that large quantities of plasterboard mixed in with demolition waste had caused the elevated sulphur dioxide and hydrogen chloride readings. Our efforts to prevent non-conforming waste will continue. Planning authorities auditing sites before approving demolition could help identify wastes that require special treatment.
- **Volatile organic compounds**: On 26 November, volatile organic compound emissions increased sharply, exceeding the half-hourly limit (measured as total organic carbon). An explosion recorded on the primary furnace's camera pointed to a suspected gas bottle. This event lowered the oxygen levels, leading to incomplete combustion and the excess formation of total organic carbon. Levels returned to normal within five minutes. The incident reinforced the need for continued spot checks of waste deliveries, vigilance when operating the waste crane, and further education of customers about acceptable and non-acceptable types of waste.

All cumulative emissions to air over the year remained significantly below their licensed thresholds.

The data table showing the year's airborne emissions is presented along with the other performance tables towards the end of this report. These figures complement the daily emissions data published on our website. Together they provide a comprehensive picture of the facility's emissions.

Climate change

The SUEZ group is committed to reducing the carbon footprint of all its operations. Our parent company, SUEZ recycling and recovery UK, is accredited to the Carbon Trust Standard. This requires annual monitoring and reporting of carbon emissions, and independent verification by the Carbon Trust.

corporate social responsibility

We owe a duty of care to our employees and the wider community, as well as to the environment.

SUEZ values its people, their safety, skills and development. We are also open in our dealings with the local community and aware of our wider social responsibilities.

This section of the report outlines those commitments, including health and safety, training and development, and community engagement.

Our values

The SUEZ corporate values sum up how we approach our work, collaborate with colleagues and others, and serve our customers. These values are clear and simply put:

ENTHUSIASM
We have a 'can do' attitude

RESPONSIBILITY
We do what we say we will do

EXCELLENCE
We strive to be right first time, every time

COMMUNICATION
We take the time to talk and listen

CREATIVITY
We think and act smarter

COLLABORATION
We help each other to create value

Our people

No matter how advanced our technology, or how well-designed our procedures, ultimately the safe and efficient running of the facility depends on our people. Our track record bears witness to their expertise and commitment.

For its part, the company strives to provide a safe and healthy working environment, and invests in training and development, so that employees are competent and enjoy worthwhile careers.

SUEZ was ranked as among The Sunday Times 25 Best Big Companies to Work For 2018. We are an Investors in People organisation and review how we perform as an employer. Employees are involved in decision-making and consulted regularly on their views. People are also given the opportunity to contribute in routine team meetings and toolbox talks.

Health and safety

Our integrated management system is designed to embed safe ways of working in all procedures and activities.

We also foster a culture of safety awareness and safe behaviour. The Safety in Mind behavioural programme and charter were developed by employees across SUEZ recycling and recovery UK, and has proved a catalyst for positive change. Managers, supervisors and safety representatives benefit from Safety in Mind training, and raise safety awareness among the workforce.

This initiative has won national awards for best practice in health and safety. The latest came in May 2018 with the Barry Holt Award for outstanding risk management practice from the International Institute of Risk and Safety Management. SUEZ was judged against entries from a diverse range of sectors across the globe.

Our safety representatives consult their colleagues on their concerns, and feedback their views and suggestions for improvements to working methods and equipment.

This approach is underpinned by the use of risk assessments, safety training and auditing, and investigation of all incidents – as well as all reported 'near misses'.

Training and development

We invest in training that promotes safety, enhances competence and also advances the professional development of our people.

This investment also supports our policy of promoting, where possible, from within, and providing access to career opportunities across the SUEZ group.

Our policy dictates that we assess each employee's competence, identify their training needs and track their progress. All operations and maintenance staff benefit from in-house competence training and are formally assessed.

We manage this process using a competence and training matrix. The matrix specifies all essential training, as well as the toolbox talks delivered throughout the working year and non-essential training.

In 2018, we delivered more than 1,315 person-hours of training. This included safety training on working in confined spaces, fire warden training, first aid, and the safe use of mobile plant and of breathing apparatus.

Over the years, our company has invested in apprenticeship training. Since joining in 2014, Apprentice Technician Michael Valerga has gained several engineering qualifications, culminating in July 2018 with the completion of his SUEZ NVQ in mechanical maintenance. Michael was also named Mechanical Apprentice of the Year 2018 by the TTE Technical Training Group, the UK's leading provider of technical training to the oil and gas, manufacturing and engineering sectors.

Our team

Our Plant Manager Gerrit du Toit leads a committed team of 34 people, which saw three new recruits in 2018.

Matthew Holmes joined the company in June 2018. After leaving Castle Rushen High School, Matty worked for Lloyds Bank for seven years, starting as an account opener and finishing as the Head Dormancy Specialist. He then spent 18 months as a full-time writer, and produced his first book, The Glowing Stones. Matty then worked for a tiling company before becoming our Assistant Day Operator.

Jordan Callister studied GCSEs at Ramsey Grammar and A-levels at St Ninian's. After working in various roles, Jordan went back to University College Isle of Man to become an apprentice technician and gained a Level 3 BTEC in engineering. Having completed his apprenticeship at Ronaldsway and worked for a time at the airport, Jordan joined SUEZ in September 2018 as Shift Operations Technician.

Steve Christian joined the company in September 2018 as a Shift Operations Technician. Having gained a HND in Mechanical and Electrical Engineering and a Degree in Mineral Extractive Technology, Steve has worked in various industries, ranging from production engineering to the minerals and aggregates sector.

Our community

Our duty of care to society, and our values as a company, demand integrity and transparency in all our dealings with the public, their representatives and local organisations.

We respect the interests of our neighbours, promote open communications with all stakeholders and try to contribute to the wellbeing of the island community.

The company and its people also support good causes.

Fundraising feet

Macmillan Cancer Support is the national charity partner of SUEZ in the UK. Each year, employees take part in a series of fundraising events for Macmillan. In 2018, the centrepiece was 'The Big Walk' in the summer.

A series of sponsored walks were arranged nationwide. In May 2018, eight members of our operations team climbed Helvellyn, the third-highest mountain in the Lake District as part of The Big Walk.

On the Isle of Man, four SUEZ staff set off at 6am on 29 June 2018 to walk to work from Peel and home again (a round trip of 38.6km). This inspired more colleagues to take part. On 27 July 2018, 10 employees were joined by representatives from the Department of Infrastructure for a 14.9km walk along a coastal loop from the facility.

Their efforts and sponsorship contributed to another highly successful fundraising campaign for Macmillan, which reached the year's £250,000 target in November 2018.

Our neighbours

Procedures are also in place to handle all complaints received either directly from the public or local authorities. Each complaint is logged, investigated and the outcome reported back to the complainant.

We received one complaint during the year, which was in relation to noise caused by boiler cleaning activities. The complainant was invited to visit the site and discuss the issue, and we agreed times at which these essential activities would take place.

SUEZ companies also host site liaison committees at major sites as a way to consult and listen to local concerns.

On the Isle of Man, the Richmond Consultative Committee fills that role. Working with the Department of Environment, Food and Agriculture, members of the committee have access to all relevant information on the operations of the energy-from-waste facility, and can raise issues with the Department of Environment, Food and Agriculture and directly with SUEZ.

Volunteering landmark

SUEZ Isle of Man has worked closely with Beach Buddies since the charity's foundation in 2006, so we were delighted to join in their celebration day at Niarbyl.

Beach Buddies held its first team event in 2013. Since that time, 10,000 different volunteers have taken part in beach clean-ups and related activities. Crowds gathered at Niarbyl Bay on 19 October 2018 to mark this volunteering milestone.

> This was a fantastic opportunity for us to interact with the public and talk about our facility.
>
> Amanda Garfield,
> Office Manager (Projects)

Our communications

In addition to reporting publicly on our annual performance, we keep the community informed by updating the information available on our website.

We publish daily emissions data on the site (www.suez.co.im), along with three-month trends on emissions and the figures for electricity generation.

Further information about our group's activities, energy-from-waste and the circular economy is available on the SUEZ recycling and recovery UK website (www.suez.co.uk).

Our visitors

Richmond Hill's visitor and education centre is a resource for education and for the community.

Hundreds of visitors, mostly students from the island's schools, take part in tours and presentations at the facility. During 2018, there were 29 tours as well as one-off visits by the campaigning body Zero Waste Scotland, members of island's local authorities and Isle of Man Government political members.

our objectives

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

Here we report on those outcomes and outline the benchmarks that have been set for 2019.

How we did in 2018

Our strategic objectives	Targets set for end of 2018
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	No daily emission breaches during normal operating conditions.
Oil usage	Reduce oil usage from 2017 level.
Staff competency	Maintain competency matrix.
Management systems	Maintain certification 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.

Achieved?	How we performed
✔	Each line achieved a CCS score of 0.
✔	Five drills completed: Pit rescue, rescue from fourth pas, lime spill, turbine fire and hydrogen chloride spill.
✔	Biodiversity action plan in place.
✔	Six shipments completed.
✔	11 meetings held throughout the year.
✔	Zero breaches.
✔	Reductions were achieved in both the consumption rate (by 20%) and total usage (105.8 tonnes).
✔	Matrix maintained.
✔	ISO certifications maintained.
✔	All reports completed and requirements met.
✔	All targets met. Operational equipment efficiency target of 63% met with 64.1% outcome. Preventative maintenance target of 80% achieved with 80.03% outcome.
✔	Lean management tools rollout completed. Three continuous improvement projects completed.

Objectives and targets for 2019

Our strategic objectives	Targets set for end of 2019
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 2018 level.
Staff competency	Maintain competency matrix.
Management systems	Maintain certification 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	Conduct five continuous improvement projects.

performance data

Waste processed

Wastes incinerated in the primary incinerator (tonnes)	2014	2015
Confidential	36.4	28.4
Construction	754.6	427.5
Food industry (previously dairy)	5.94	12.5
Municipal	41,137.7	40,535.0
Packaging	971.4	760.3
Tyres	355.3	294.4
Waste screenings and biopellets	887.0	1,061.5
Wood	3,476.5	3,697.3
Forestry	773.5	159.2
Meat and bone meal	636.9	626.8
Hygiene waste	-	-
Other	13.4	18.9

* previously included in food industry category.

Wastes incinerated in the secondary incinerator (tonnes)	2014	2015
Clinical	274.5	251.5
Waste oil*	470	532

* estimated.

Exceedances	2014	2015
Number of exceedances of licence emission limits	2	5

2016	2017	2018
34.7	95.0	92.1
428.9	1,154.3	609.9
6.5	4.2	3.4
40,968.9	39,781.9	39,469.9
1,727.6	1,681.8	1,890.6
507.7	519.1	607.3
957.3	1,114.4	1,247.0
4,555.0	5,856.3	5,562.9
105.7	0	0
649.4	526.0	543.9
-	-	47.7
19.1	12.9	45.1

2016	2017	2018
259.2	267.9	253.8
452	475	390

2016	2017	2018
2	0	3

Consumption of raw materials

	2014		2015	
	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
Gas oil	6.0	296.6	6.5	313.8
Water	150	7,472	159	7,687
Lime	8.5	421.6	8.7	422.7
Activated carbon	0.4	19.5	0.5	22.3
Ammonia	0.7	33.0	0.6	28.2

Note: 2014-2016 gas oil and ammonia usage is recorded in litres and converted to tonnes using the conversion factor at: www.thecalculatorsite.com/conversions/weighttovolume.php. 2017 onwards gas oil conversion factor is taken from the Digest of United Kingdom Energy Statistics (DUKES).

Energy consumption and generation

	2014		2015	
	MWh per tonne of waste	Total MWh	MWh per tonne of waste	Total MWh
Electricity consumed	0.028	1,391.5	0.015	717.5
Electricity exported	0.460	22,928.1	0.510	24,675.8

Waste recovery and disposal

	2014		2015	
	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
Bottom ash (landfill)	207	10,330.3	207	10,030.0
Air pollution control residue (landfill)	30	1,501.9	31	1,498.3
Ferrous metal (recycled)	10.7	533.0	14.9	723.2

2016		2017		2018	
Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
8.8	446.2	10	512.5	8	406.7
195	9,888	213	10,977	179	9,063
8.5	430.2	8.7	445.2	8.8	444.1
0.4	18.4	0.4	18.1	0.4	19.5
0.5	24.0	0.7	37.3	0.5	25.1

2016		2017		2018	
MWh per tonne of waste	Total MWh	MWh per tonne of waste	Total MWh	MWh per tonne of waste	Total MWh
0.021	1,044.2	0.022	1,132.0	0.016	816.7
0.493	24,958.5	0.498	25,663.0	0.492	24,966.3

2016		2017		2018	
Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
207	10,457.0	205	10,535.5	206	10,462.0
33	1,650.8	33	1,690.5	32	1,599.1
5.6	283.5	5.3	274.0	10.1	514.6

Air emissions

	2014		2015	
	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
Particulate matter	0.0006819	0.034	0.0006865	0.0332
Volatile organic compounds	0.0049	0.25	0.0043	0.21
Hydrogen chloride	0.07	3.48	0.068	3.31
Hydrogen fluoride	0.00014	0.007	0.00015	0.007
Carbon monoxide	0.045	2.26	0.042	2.01
Sulphur dioxide	0.13	6.59	0.11	5.49
Oxides of nitrogen	1.33	66.37	1.26	60.76
Ammonia	0.015	0.74	0.026	1.28
Cadmium and thallium	0.0000044	0.0002	0.0000046	0.0002
Mercury	0.0000034	0.0002	0.0000018	0.0001
Sb, As, Cr, Co, Cu, Pb, Mn, Ni and V	0.00074	0.037	0.00017	0.008
PAH	2.8×10^{-06}	0.0001	3.0×10^{-05}	0.0015
Dioxins and furans	8.8×10^{-11}	4.4×10^{-09}	1.0×10^{-10}	4.9×10^{-09}
Dioxin-like PCBs	3.0×10^{-12}	1.5×10^{-10}	1.9×10^{-11}	9.0×10^{-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

	2014		2015	
	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.

2016		2017		2018		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	
0.0146147	0.7406	0.0135868	0.6996	0.003943	0.2002	4.6
0.0072	0.36	0.0039	0.2	0.0050	0.2533	4.6
0.079	3.99	0.042	2.16	0.048	2.41	5.3
0.00012	0.006	0.00004	0.002	0.00001	0.001	0.02
0.062	3.15	0.051	2.62	0.052	2.66	17.3
0.14	7.16	0.14	7.41	0.12	5.99	19.5
1.3	65.88	1.1	56.5	1.0	53.3	77.2
0.041	2.08	0.027	1.38	0.007	0.35	-
0.0000038	0.0002	0.0000039	0.0002	0.0000038	0.0002	0.015
0.0000021	0.0001	0.0000022	0.0001	0.0000925	0.0047	0.015
0.00019	0.01	0.00064	0.033	0.00014	0.007	0.15
2.8×10^{-05}	0.0014	1.10×10^{-05}	0.0006	2.28×10^{-05}	0.0012	-
1.7×10^{-10}	8.4×10^{-09}	7.30×10^{-11}	3.70×10^{-09}	7.77×10^{-11}	3.95×10^{-09}	-
2.2×10^{-11}	1.1×10^{-09}	8.70×10^{-12}	4.50×10^{-10}	2.44×10^{-12}	1.24×10^{-10}	-

2016		2017		2018	
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.

EU Industrial Emissions Directive
Issued by the European Union, the directive commits European Union member states to control and reduce the impact of industrial emissions on the environment. It takes an integrated approach to controlling pollution to air, water and land, and sets challenging industry standards for the most polluting industries. The directive aims to prevent and reduce harmful industrial emissions, while promoting the use of techniques that reduce pollutant emissions and that are energy and resource efficient.

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.

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: CEKooser.

Date: 20 April 2019

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