SUEZ Isle of Man annual public report 2019

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foreword

Our team on the island put in a highly successful performance once again in 2019. It is a pleasure to introduce another annual public report detailing SUEZ Isle of Man's exemplary standards of environmental protection, health and safety, and operational efficiency.

More than 50,000 tonnes of waste were delivered to be processed at Richmond Hill over the 12 months and in excess of 25,000 megawatt hours of electricity were exported, bolstering the island's energy security.

The facility again managed emissions, so as to minimise the environmental impacts of the energy-from-waste process. Without exception, cumulative emissions have been well below annual limits every year since operations began.

Fifteen years on, it is satisfying to see the team setting new records for safety and efficiency. Operating for 714 days without an enforced shutdown due to a blockage, and 222 days without a workplace injury resulting in time off work – these are notable achievements in our industry. Further proof of the Isle of Man team's commitment to continuous improvement and efficiency came with their 'gold standard' rating for implementing lean principles – confirming the facility's world-class status in energy-from-waste operations.

As the facility ages, the importance of preventative maintenance and the need to replace plant and systems increase. Great strides have been made recently in monitoring components to pre-empt mechanical failures. We are also seeing the benefits of major upgrades completed during the year – for example, in improved combustion control – and further investments are scheduled for 2020.

We are confident that our highly able team, supported by ongoing training and development of current and new staff, can sustain the high standards that the Isle of Man Government and island community expect and deserve.

John Scanlon
Chief Executive Officer
SUEZ recycling and recovery UK

Jon Garrad
Plant Manager
SUEZ Isle of Man

introduction

This is our annual account of operations at the Isle of Man's energy-from-waste facility for the calendar year 2019.

The report aims to provide a comprehensive overview including all key data to support our commentary on SUEZ Isle of Man's activities.

Our purpose is to keep the community informed about a key element of the island's infrastructure, as agreed with the Manx Government. The publication also reflects the commitment of the SUEZ group to be open and accountable to the residents and businesses served by our major facilities.

The contents of the report have been verified by the independent inspection and certification company SGS.

We hope that this report is clear and useful, and welcome any feedback or queries.

SUEZ recycling and recovery UK

SUEZ Isle of Man is a subsidiary of SUEZ recycling and recovery UK, and in turn, part of the global SUEZ group.

Since 1998, SUEZ has been providing environmentally-responsible solutions for the waste generated by households and businesses across the UK.

In the last decade in particular, the waste management industry has been transformed – and SUEZ has led the transformation. Our group has re-engineered itself from a waste disposer, with a core business of collecting waste and managing landfill sites, into a manager of resources, fuel manufacturer, energy producer and materials trader. We are leading the shift away from the linear 'extract, manufacture, consume, dispose' economic model, towards the 'circular economy'. This means treating waste as a resource and seeking to recover maximum value by putting waste materials to good use.

SUEZ has developed diverse solutions to achieve this, ranging from recycling and composting to anaerobic digestion and gasification, as well as turning residual waste into alternative fuels for industry.

Richmond Hill is one of more than 50 energy-from-waste facilities operated by SUEZ across Europe, nine of which come under the group's UK energy division. Given this pool of specialist expertise, our staff on the island have access to and share world-leading technical know-how and support.

With our SUEZ colleagues we also share a common vision of a society where there is no more waste.

UK operations

SUEZ recycling and recovery UK employs more than 5,000 people and handles 10 million tonnes of waste each year, serving millions of residents and over 25,000 business customers.[1]

The national network of SUEZ waste management facilities in the UK is comprehensive and the value they recover is significant, as the latest figures show:

- 1.2 million megawatt-hours of electricity from energy-from-waste
- a further 387,000 megawatt-hours of electricity from landfill gas
- 111,000 tonnes of compost from green and food waste
- more than 450,000 tonnes of alternative fuels

[1] SUEZ recycling and recovery UK statistics for 2018

The SUEZ vision

our vision is of a society where there is no more waste.

We see waste as a resource. Harnessing its value is essential to the circular economy. This will give almost all waste materials a second life – through re-use, recycling or energy recovery.

The SUEZ group is a global leader determined to limit the depletion of natural resources and support the switch to renewable sources of energy.

We reduce the environmental impact of our customers' waste by investing in new technologies and innovations, while reducing the pressure on natural resources and reliance on fossil fuels.

SUEZ – UK infrastructure

SUEZ recycling and recovery UK invests heavily in a range of technologies that enable us to put waste to good use, some of them pioneering.

For example, 2019 saw several significant developments at the Eco Park in Surrey that puts our group at the forefront of waste management in the UK.

In May 2019, feeding of pasteurised food waste began to an anaerobic digestion facility producing biogas. Phased commissioning of the site's gasification facility also got underway. Black bag waste is being mechanically pre-treated to produce refuse derived fuel for the gasification unit, which – like Richmond Hill's facility – drives a turbine with super-heated steam. Both the digestor and gasifier will export electricity to the grid. The Eco Park also houses a community recycling centre and recyclables bulking facility for Surrey County Council.

The UK infrastructure network includes:

- **90** household waste recycling centres
- **69** 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.

The group has more than 80,000 employees across five continents working with municipalities and industry in recycling, recovery and the production of secondary raw materials and alternative resources – as well as in water purification and wastewater treatment.

SUEZ is synonymous with innovation: more than €120 million was invested in research and development in 2018 alone.

The group also ranks highly in independent indices that gauge the sustainability credentials of corporations worldwide.

This effort is guided by a Sustainable Development Road Map with challenging targets. For the period 2017-2021, these include:

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

In September 2019 – in light of the climate emergency and the recommendations of the IPCC (Inter-government Panel on Climate Change) for action to limit the global temperature rise to 1.5°C – SUEZ strengthened its commitments[2]. The group undertook to:

- reduce CO_2 emissions by 45% by 2030
- save industrial and city authority customers 20 million tonnes of CO_2 per year by 2030
- devise 100% sustainable solutions – with a positive environmental footprint in terms of CO_2, water and biodiversity – for customers by 2030

[2] https://www.suez.com/en/who-we-are/a-committed-group/fight-climate-change

Manx waste management

The Isle of Man Waste Strategy was approved by Tynwald in July 2018.

This strategy focuses on sustainability and the particular challenges facing a small island economy. These include the inability to access take-back schemes and packaging obligations for imported goods, or to achieve the economies of scale needed to fund specialist treatment facilities for all types of waste.

The strategy, which will be updated annually, also recognises the uncertainty, post Brexit, surrounding access to off-island markets and the costs of processing recyclables, waste electrical and electronic equipment (WEEE), hazardous and other problematic wastes.

The Department of Infrastructure is working with local authorities to extract more packaging materials from household waste and maximise recycling.

For residual incinerable wastes, Richmond Hill's capacity remains a strategic priority in the island's hierarchy of waste infrastructure. This will continue to be the case after August 2029 when the current contract for the facility ends, subject to its continued compliance with emission and operational standards.

This energy-from-waste facility supports self-sufficiency by ensuring that the island can continue to process all residual waste from households and businesses, as well as safely disposing of clinical wastes from hospitals and clinics. The need to export or landfill other challenging waste streams – such as waste tyres and biowaste from sewage treatment – is also avoided.

Treating the diverse waste stream as a renewable feedstock for generating electricity, meanwhile, enhances the island's energy security.

The Waste Strategy also supported the efficiency of the facility's operations with the introduction of handling fees to deter deliveries of non-conforming waste that disrupt the energy-from-waste process.

managing waste

Both the amount of waste handled and energy generated by the Richmond facility increased slightly in 2019. More than 50,800 tonnes of wastes were delivered to be processed, generating more than 25,000 megawatt hours of electricity for export to the island's grid.

In this chapter, we describe the energy-from-waste process and the breakdown of the waste stream, along with the raw materials required for our operations and the by-products.

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 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 line. 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.

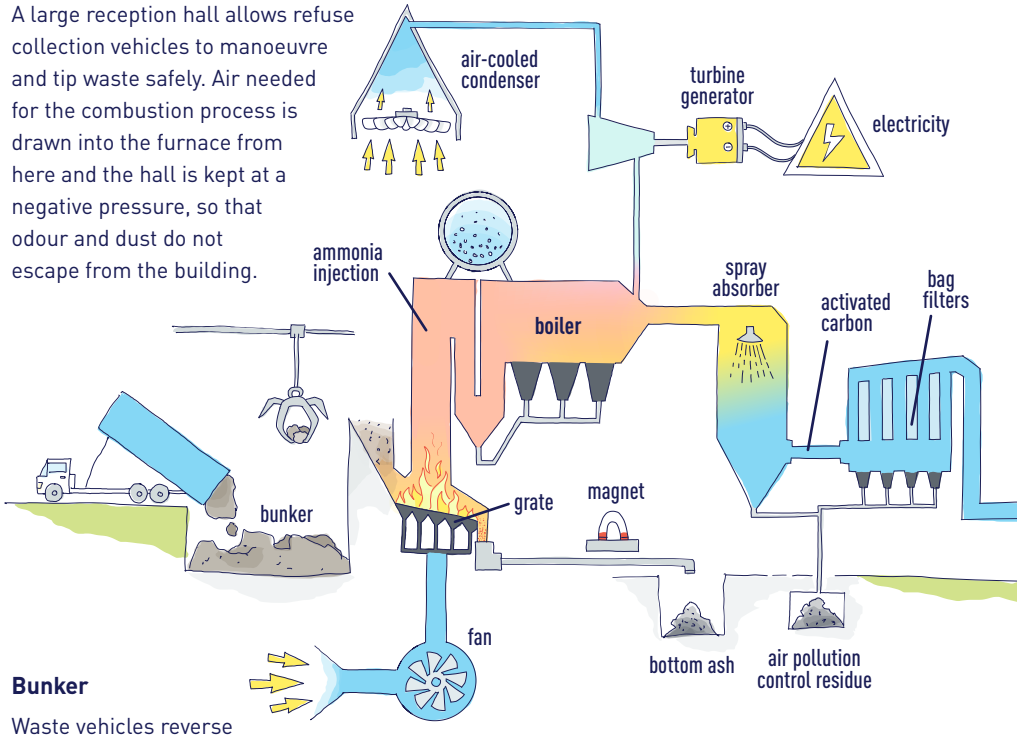
On arrival at Richmond Hill, waste vehicles use an automatic weighbridge set back from the site entrance, so that vehicles do not have to queue on the public highway. Waste type and amount, as well as customer details, are recorded and the driver is directed to the appropriate delivery bay.

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

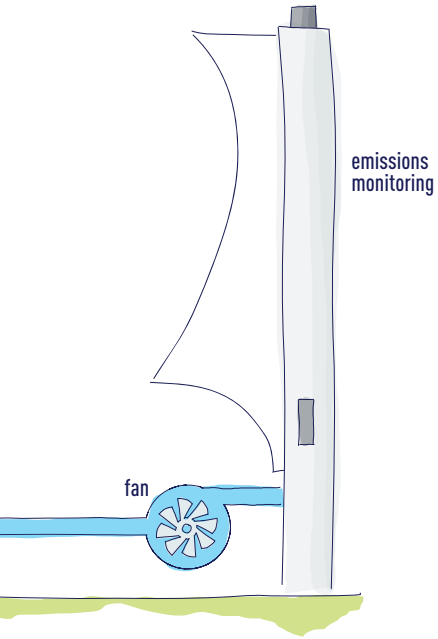
Waste vehicles reverse to a wheel-stop and tip their loads into a large concrete bunker. At 60,000 tonnes of waste delivered per year, this is big enough to hold 16 days' waste, so that tipping can continue when the facility is shut down for maintenance. A shredder, for bulky items such as mattresses,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

Emissions data for 2019 can be found in the tables at the end of this report, while the systems for controlling emissions are described in the next chapter (section three).

Our operations

Our team sustained the facility's high standards of operational performance through 2019.

Our last report described in detail the joint initiative to avoid blockages – mainly caused by unsuitable items of waste. Having completed a full year's operation with no unplanned shutdowns due to blockages in 2018, the facility set a new record for uninterrupted operation in 2019.

Richmond Hill operated for a total of 714 days without a shutdown caused by a deslagger blockage (until 06 December 2019). Unplanned shutdowns increase the oil usage of the facility, as well as increasing wear. CO_2 output also increases as a result of having to burn oil to start up and shut down the facility, and so we strive to minimise unplanned outages.

The operations team may shut down either or both lines when the facility's control systems detect that performance is outside of set parameters. Apart from major blockages, this might be due an emission limit exceeded for some other reason or a failure of critical equipment.

Alongside day-to-day management and maintenance of all plant and equipment, we planned and delivered a series of major repairs and upgrades during our scheduled shutdowns.

Scheduled maintenance

Two scheduled shutdowns are required each year for essential maintenance of the primary line. For the rest of the year, this line operates around the clock every day while there is sufficient waste to process. The secondary line processes clinical waste and waste oils in batches over several days.

As well as preventative maintenance, the scheduled shutdowns allow for regulatory inspections of the boiler, cranes and certain other plant, as well as checks on the level of wear of components such as the furnace grate, refractory walls and conveyors.

Major maintenance works are planned months in advance based on servicing schedules and our ongoing monitoring of the condition of plant and equipment. They must also be planned to avoid clashes with outages elsewhere in the group, so that resources such as planning engineers and technical specialists are available. Upgraded components and design modifications are incorporated where feasible when replacing worn or broken parts.

The first shutdown for the Isle of Man facility took place over two and a half weeks in June/July 2019, with the second outage occupying three weeks in November 2019. Major works delivered during this programme involved the furnace, boiler, bag filter house, magnetic separator for ferrous metals, combustion control system and the reception hall doors.

- The magnetic separator that removes ferrous metals from bottom ash failed early in the year and was beyond economic repair. Given its position above the ash conveyor, its replacement had to wait until the first shutdown. As the area is not accessible by mobile plant or crane, the contractor installed a temporary rail track on the inclined ferrous metal conveyor to transfer the old and new units to/from a telehandler. Installation of the new magnet was completed without incident. This unit is slightly larger than its predecessor and should enable the recovery of more ferrous metal.
- Boiler works included abseil cleaning to remove slag build-up, modifications to prepare for a new combustion control system and a boiler tube thickness survey. This identified the need to replace the wall between the first and second passes. The opportunity was also taken – as on earlier replacements – to install Inconel overlaid tube, which increases resistance to corrosion in extreme temperatures.
- A new combustion control system was installed during the second shutdown. The original system was no longer supported, and its limitations made it difficult for operators to manage combustion air and anticipate or solve problems that could result in deslagger blockages. A specialist contractor installed the new computerised package. The more advanced control it provides is enhanced by complementary equipment, including pyrometers – installed in the first pass during the previous shutdown – along with a high-resolution furnace camera and a pressure transmitter under the grate.
- The bag filter house – where particles are removed from the furnace gas stream before it enters the stack – was due for its first major refurbishment. This included total replacement of the hoppers, which collect the air pollution control residue, along with design modifications to allow easier access for future maintenance and inspection.
- The doors to the reception hall were replaced with fast-acting fabric doors. These are now linked to induction loops that detect vehicles and open and close automatically. An anemometer has also been installed to allow the doors to open in high winds to prevent storm damage.

After each shutdown, the facility was brought back online and feeding of waste began after completing the extended furnace warm-up procedure. From 2020, an additional step is being introduced to mitigate the risk of technical problems occurring at this stage. Inspection and Test Plans will help us manage checks on all operational parameters of the facility prior to commencing start-up. This includes signing off all work by contractors that might, in the event of work being completed incorrectly or left unfinished, necessitate aborting the warm-up procedure.

Operational efficiency

Previous reports have described the maintenance regime we have developed to sustain and enhance operational efficiency.

After 15 years' operations since the facility was commissioned, the importance of proactive maintenance has never been greater.

Since 2018, our engineers have been using portable equipment to measure vibration in components that rotate, such as pumps, motors and fans. By analysing these readings, we can monitor and assess the health of these assets and track the deterioration of key components. Maintenance schedules are also reviewed to help pre-empt equipment failures, and all maintenance works and repairs are tracked on our Mainsaver computer system.

Targets are set each year to spur maintenance performance.

One indicator is the balance between reactive maintenance and preventative work that pre-empts faults and equipment failures. In 2019, a new measure was introduced for preventative maintenance adherence – to promote preventative maintenance by completing a set percentage of all the preventative maintenance tasks due in the year. The stretch target for the year was set at a completion rate of 95%, which was made all the more challenging with the loss of our long-serving Electrical Technician (see section four). The outcome was 85.8%.

The other key maintenance target measures overall equipment effectiveness. This was set at 61% for 2019. The maintenance team achieved 64%.

The asset test

Our targets for preventative maintenance and equipment effectiveness test the calibre of our maintenance regime. Another checkpoint is provided by the SUEZ asset management team. This team audits the operation and maintenance of the steam turbine and generator. Their assessment is comprehensive, ranging from shift-based checks and major six-yearly overhauls, and weekly preventative maintenance inspections to periodic sampling of oil. The monitoring of plant vibration and thermal patterns, and preventative maintenance performed during shutdowns, are also audited against group-wide standards.

In the latest audit, the Isle of Man facility was awarded an overall 99.2% compliance score in the asset management audit.

A separate audit of the bag filter system again showed 99% compliance.

These results are indicative of the high standards being achieved by our maintenance personnel.

Continuous improvement

Since taking over the new facility in 2004, SUEZ Isle of Man has strived to meet the highest standards for energy-from-waste operations achieved anywhere.

In recent years, much of this effort has been channelled through the group's strategy for continuous improvement following lean manufacturing principles. Staff are trained to identify any wasteful element in our ways of working and everyone is encouraged to share their ideas.

Early in 2019, an independent assessment of lean maturity confirmed that we had, indeed, achieved our goal of being a truly world-class operator.

Meanwhile, the team has been identifying opportunities to improve. Their target was to deliver five continuous improvement projects during the year:

1 Boiler blockages

Three blockages occurred in the boiler over the last two years due to an under-performing rapping system. This is a cleaning device for removing dust deposits using vibration. A root cause analysis of all the variables identified that the length of the rapper anvils was critical. We commissioned a specialist contractor to replace the short worn anvils and reset the system. This is now working well.

2 Combustion control

Managing the quality of combustion was becoming increasingly difficult with the original control system, which used a computer program that made problem-solving difficult. As part of the upgrade to a state-of-the-art system, additional hardware – pyrometers in the first pass, a high-definition furnace camera and under-grate pressure transmitter – was installed to optimise control. These additions allow the new control system to react faster to process changes, resulting in more stable combustion, less steam flow fluctuations and improved flue-gas scrubbing. Operators also have more options to manage combustion control and the risk of unburnt waste blocking the deslagger has been reduced.

3 Reception hall doors

The new high-speed fabric doors in the waste reception hall replace two sets of doors that proved problematic over the years. Drawing on the experience of our sister facilities, the specification for the doors has been tried and tested in areas that suffer extreme weather events. They are programmed to open automatically to avoid damage from severely gusting winds.

4 Wireless networking

Increasingly, operations and maintenance staff use tablets to record data on the performance and condition of plant and equipment. The Wi-Fi network was extended to cover the entire site, so that this information can be captured and shared more quickly and easily.

5 Bag filter house

Replacing the hoppers in the bag filter house where air pollution control residue is captured was a major project that involved cutting off the old hoppers, which were affected by corrosion, and bolting on new hoppers and trace heating. The upgrade has allowed the facility to run at full operating load without the leaks that have caused problems from high-differential pressure in the past.

First to gain gold

The results of the Isle of Man facility's first maturity assessment under the group's lean strategy were announced in March 2019.

A special group transformation team carries out these rigorous evaluations to gauge lean progress against a global portfolio of more than 50 energy-from-waste facilities, nine of which are in the UK. Areas assessed ranged from lean maintenance and problem-solving to skills management and process improvement.

Our facility scored highly across the board, not least for customers' satisfaction with service delivery and performance. The assessors adjudged our operations to be 'gold standard', making the Isle of Man team the first SUEZ facility worldwide to achieve this top rating – a great tribute to the commitment and skills of the entire workforce on the island.

Plant Manager, Gerrit du Toit, said: "It has been a real team effort and considering we are a small facility, this is a massive achievement. Everyone is working with their heads held high."

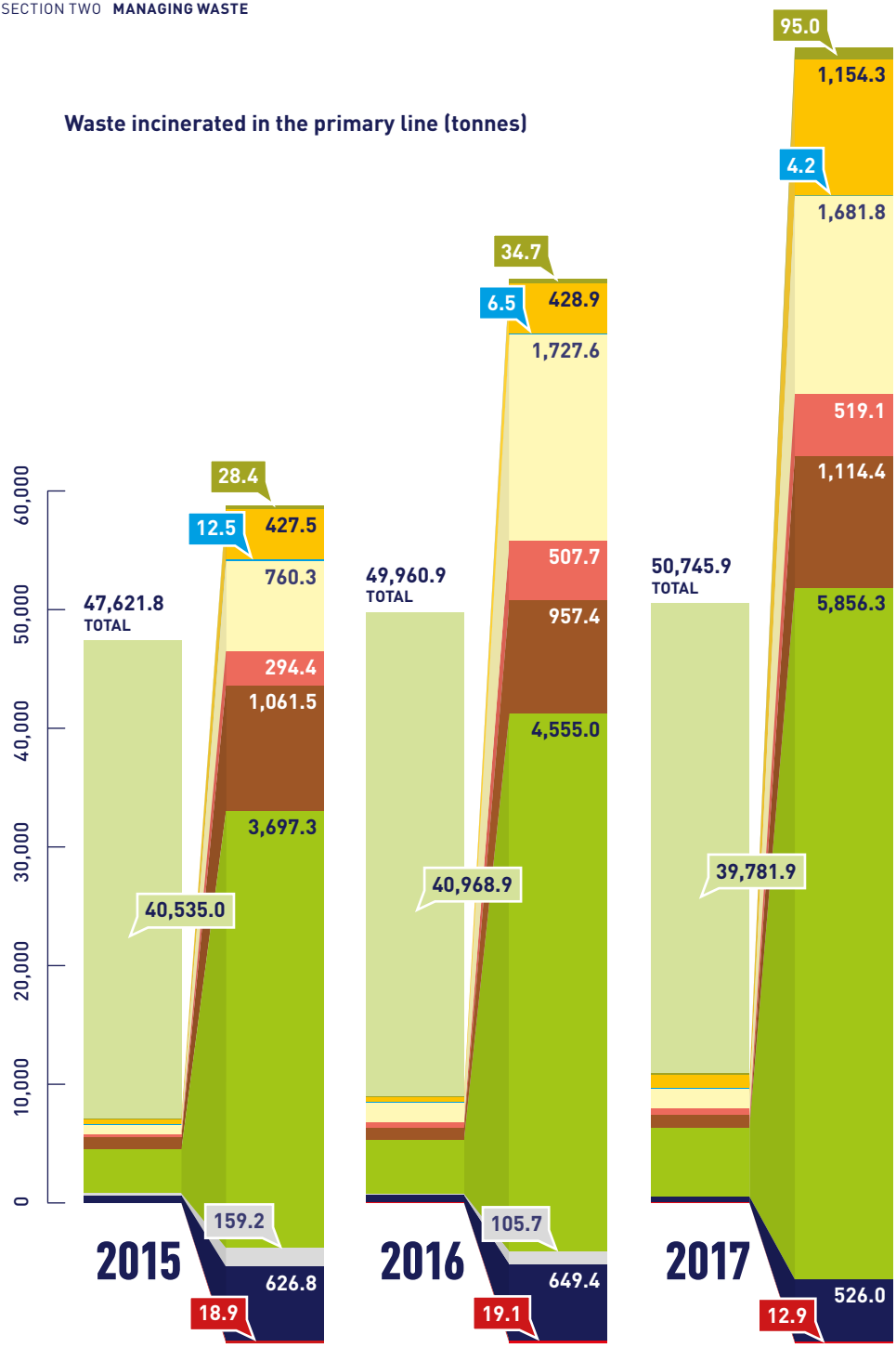
Jon Garrad, Site Operations Manager, said: "We know following lean ways of working means there is always room for improvement, so we're not going to stop here."

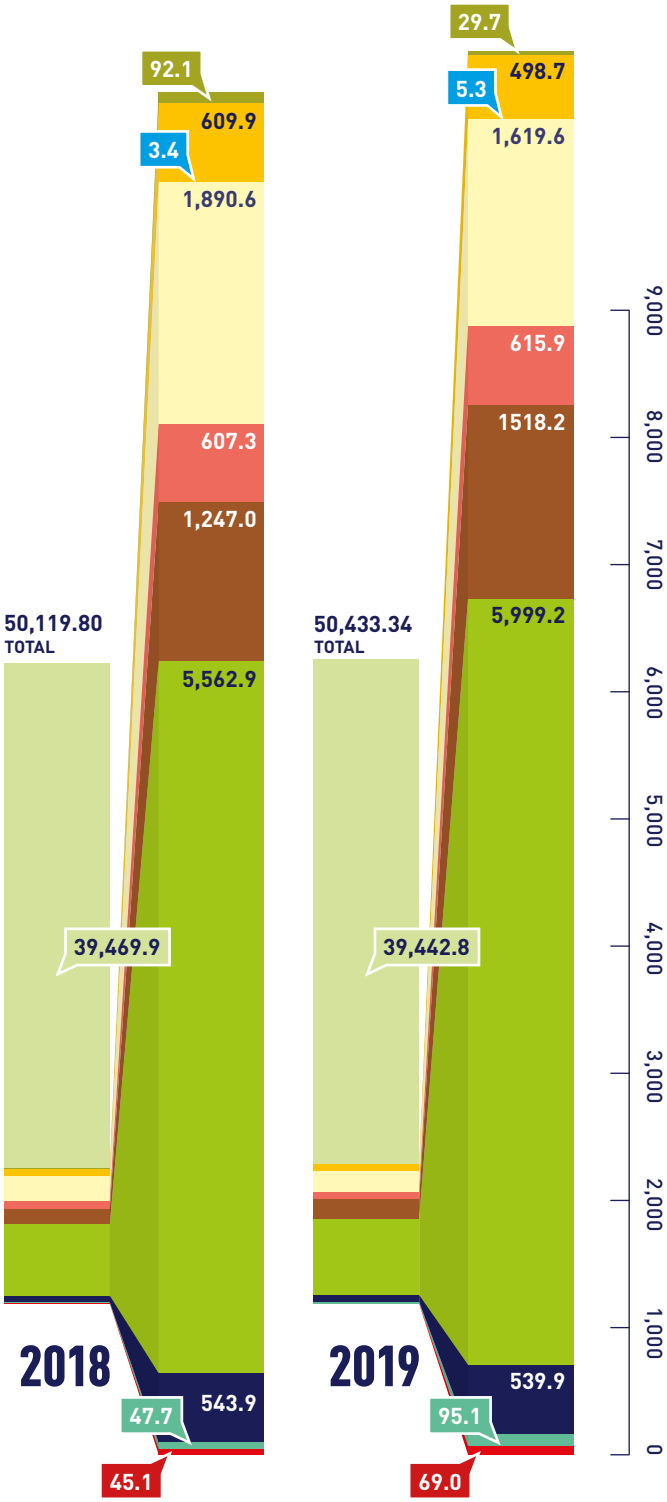
What we processed

With more than 50,800 tonnes delivered to site in 2019, there was a small increase of just over 310 tonnes in the waste processed on the primary line. Inflows of wood waste and biopellets increased, outweighing falls in packaging materials and construction waste.

This net rise was offset, on the secondary line, by a reduction in waste oils – due to a change in how this waste stream is measured. Now metered rather than estimated, tonnages have been recalculated for the period 2015 to 2019.

Waste incinerated in the primary line (tonnes)

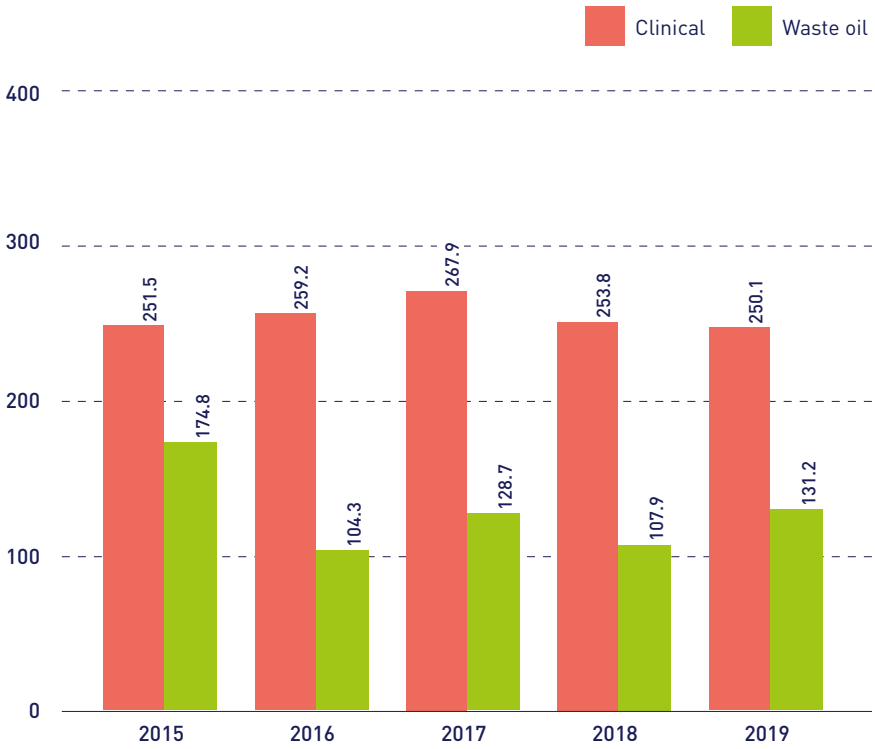




types of waste

- 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 line (tonnes)

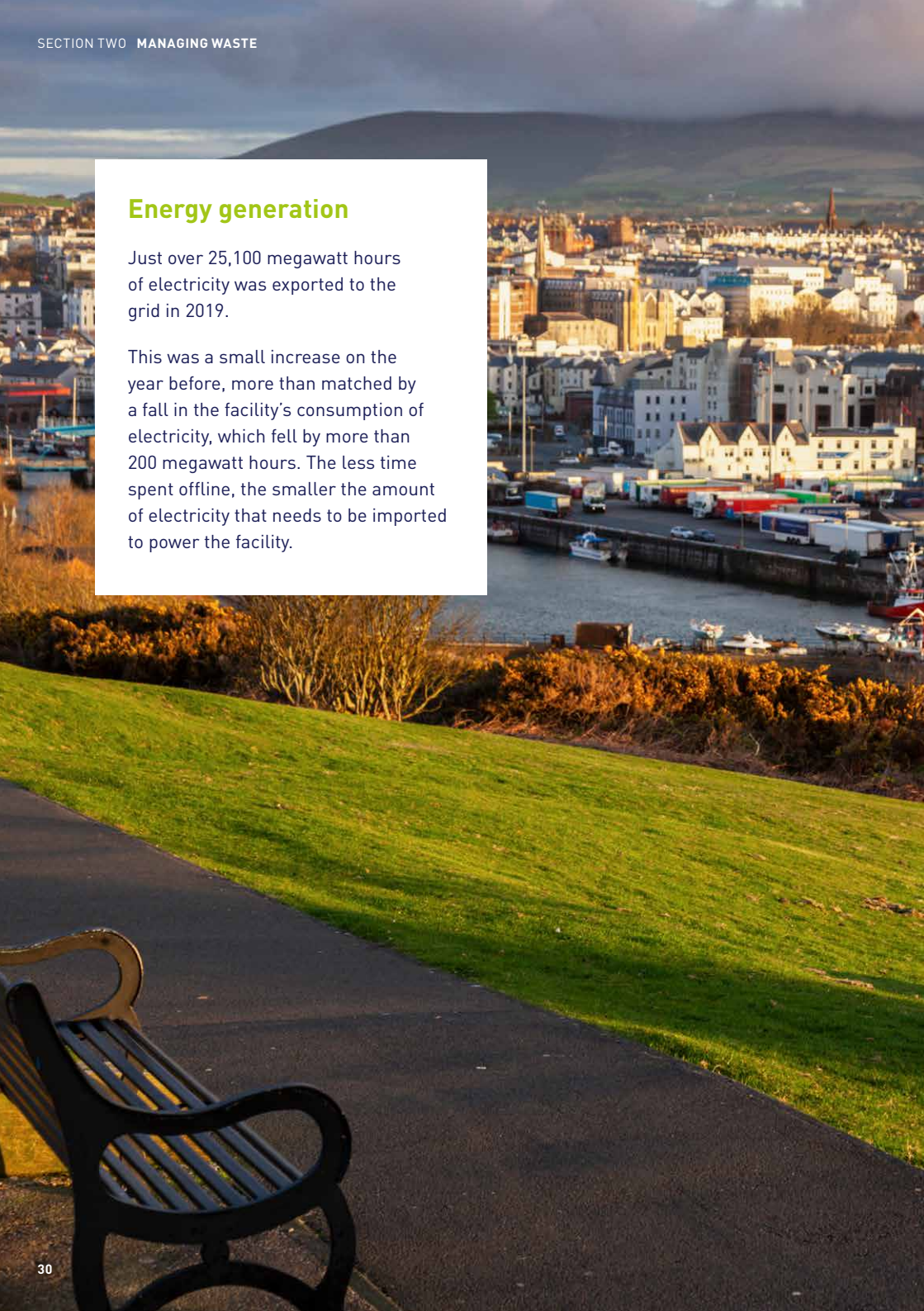


Note: Waste oil figures for 2015 onwards amended in March 2020

Energy generation

Just over 25,100 megawatt hours of electricity was exported to the grid in 2019.

This was a small increase on the year before, more than matched by a fall in the facility's consumption of electricity, which fell by more than 200 megawatt hours. The less time spent offline, the smaller the amount of electricity that needs to be imported to power the facility.



Other outputs and inputs

The biggest by-product of the energy-from-waste process is bottom ash. This outweighed air pollution control residue and ferrous metals combined by a factor of five in 2019.

The main inputs are gas oil, water and three chemicals (lime, ammonia and carbon), which are essential to safe and efficient operations.

Bottom ash

As waste is incinerated, ash is deposited on the furnace grate.

This bottom ash is mainly formed of silica, essentially sandy soil. Other naturally occurring compounds make up the remaining 4-5%. The ash is sampled for contaminants before removal for disposal in the Turkeylands New Quarry landfill.

Despite the increased throughput of waste in 2019, the total amount of bottom ash decreased to less than 10,250 tonnes. The rate at which ash was produced declined to just over 201 kilogrammes per tonne of waste. This reflects changes in the mixture of materials in the waste stream, as well as efficiency of combustion.

Air pollution control residue

Air pollution control residue is generated as polluting gases from the furnace are cleaned and particles in the stream are encapsulated. The volume of this residue increased in 2019, due to air ingress through the severely corroded baghouse hoppers which caused the air pollution control residue to become damp and so increase in weight. Additional material recovered as a by-product of replacing the baghouse hoppers also contributed to the increase. More than 1,700 tonnes were generated, equivalent to less than two kilogrammes extra per tonne of waste.

The residue is a hazardous waste that is sealed in containers before shipping to specialist facilities in the UK for safe disposal.

Air pollution control residue contains lime, salts and carbon dust from the activated carbon sprayed into the flue to capture lead, chromium, arsenic and other heavy metals. Their concentrations depend on the types of waste incinerated, such as batteries in household waste. Samples are analysed quarterly.

Ferrous metals

Mixed wastes delivered to the facility contain various types of ferrous metal, including pieces of steel and iron. As the bottom ash passes along a conveyor, an overhead magnet recovers these metal pieces.

All metals are best diverted from waste collections for recycling. Aluminium cans melt during the process, so they cannot be recovered, while ferrous metals are of less value to reprocessors after they have been through the incineration process.

The amount of ferrous metal recovered in 2019 was half the average of previous years, due to the failure of the magnetic separator early in the year. Just 160 tonnes were sent for reprocessing. As the magnet is located directly above the ash conveyor, it could not be replaced safely until the first scheduled shutdown, further modification was required in the second outage. The new unit is more powerful and is designed to increase the amount of metals recovered in the future.

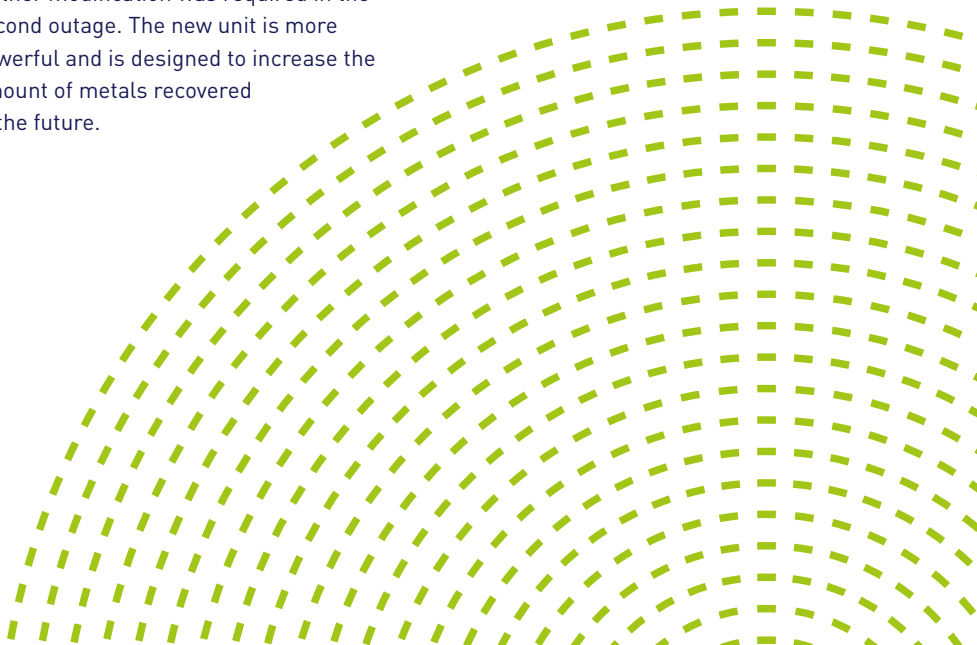
Gas oil

Burning oil has environmental as well as financial implications and we strive to reduce its usage year on year.

Controlling the temperature at which wastes are destroyed is critical. It is essential to burn gas oil during the start-up and shutdown phases of operation.

Oil burners are also triggered when non-compliant waste or any other interruption to loading of the grate causes temperatures to drop on either line.

In 2019, we managed to cut oil usage by 17% – more than 330 tonnes. This follows a 20% reduction the year before. In both years, the success of our efforts to pre-empt unplanned shutdowns due to blockages was a major factor.



Water

Water is used for cooling the furnace grate and for producing super-heated steam in the boiler to drive the turbine. General cleaning, offices and toilets, and the visitor centre also consume water.

The facility is designed to conserve water and protect watercourses from contamination. Rainfall is stored on site and reused. Water is also recycled as part of the energy-from-waste process.

Consumption increased by 19% to more than 10,700 tonnes over the year. This is mainly due to drain valve wear, leaks in the grate cooling system, and the new standard procedure for pressure-testing the boiler at the start and end of every outage.

Chemicals

Consumption of all three chemicals used in the gas scrubbing process was lower in 2019 compared with the previous year.

Our priority is always to ensure emissions remain within the strict limits set in our site licence, while managing these resources efficiently.

- **Lime**: The amount of lime required to neutralise acidic gases, such as sulphur dioxide and hydrogen chloride, averages 420-450 tonnes a year. In 2019, there was a 5% reduction – equivalent to around 20 tonnes – to the lower end of that range. This reduction was a result of the installation of new raw gas analysers better controlling the abatement system. The chemical is delivered in a lime slurry by sprayers in the flue.
- **Ammonia**: The biggest reduction in usage of chemicals was for ammonia, which is injected into the boiler to control oxides of nitrogen. Consumption was down 8% to around 23 tonnes for the year – a decrease of two tonnes. This reflects an improved procedure for balancing the flow meters supplying ammonia to the spray lances, along with more frequent checks.
- **Carbon**: Consumption of activated carbon – which adsorbs dioxins and trace metals – fell by 6% to less than 18.5 tonnes.

While continuously monitoring emissions, we continue to review chemical usage monthly.

Our other activities

SUEZ Isle of Man provides ancillary waste management services on the island, reflecting the wider expertise of our parent company. We manage hazardous wastes and also offer a secure service for disposal of confidential waste.

Hazardous waste

Hazardous wastes are held within a purpose-built store on our Richmond Hill site, pending their onward shipment in batches. All substances are disposed of or treated at appropriately licensed facilities in the UK.

Strict international regulations must be observed when shipping and disposing of any wastes deemed hazardous. We manage this process.

SUEZ Isle of Man staff collect hazardous wastes from producers, analyse and classify the substances, and specify the appropriate treatment or disposal facility. Transfrontier shipment notices are raised for each load, in which the various wastes are consolidated for efficiency.

The Government also funds a service for households. Members of the public can request the removal of any potentially dangerous chemicals or other substances from their property.

In 2019, we shipped just one load, which comprised bitumen waste. Other substances remained in safe storage, due to the complexities of the regulations surrounding transfrontier shipment and the need to consolidate compatible wastes in single loads to minimise shipping costs. This also avoids the environmental impact of having multiple shipments.

Confidential waste

In 2019, around 30 tonnes of confidential waste were securely destroyed in the primary line, a third of the amount processed in each of the last two years, but more reflective of the long-term average.

managing environmental performance

Environmental protection and safety are the overriding priorities on Richmond Hill. Our facility and its management systems and procedures are designed to minimise impacts on the environment. We have sustained our high standards of environmental performance in 2019.

Over the following pages, we outline our environmental policy, systems for managing environmental impacts and the performance monitoring regime that governs our operations.

All the supporting data for this chapter is included within the tables at the end of this report.

Environmental policy

Our facility is governed by the policy framework of SUEZ recycling and recovery UK. This applies to operations at all its energy-from-waste facilities, including their management systems and procedures.

As well as requiring total compliance with the terms of our site licence and all relevant legislation and regulations, the policy challenges us to exceed those standards wherever practicable. We are also set objectives and targets to drive continuous improvement, and our performance is monitored.

Our integrated management system has one unified set of procedures that govern occupational health and safety, and quality of service, as well as environmental protection.

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 addresses all aspects of operating the energy-from-waste facility.

Its procedures guide every stage of our activities – from accepting incoming wastes to how we handle and dispose of process by-products, such as bottom ash and air pollution control residue.

In any given situation, this system makes the compliant course of action clear to our staff. It also defines the procedures for reporting our performance to the island's regulator.

Our management system is registered to the relevant international standards. Renewal of this certification is subject to an independent assessment of our procedures and operations each year.

Our system has met the environmental requirements of ISO 14001 since we began operations. For quality management, the equivalent certification is to ISO 9001:2008.

In addition to this external verification, the government's Environmental Protection Unit conducts periodic audits, as does our parent company. We also perform our own internal auditing.

Environmental compliance

As well as complying with these standards, SUEZ Isle of Man abides by Manx laws and regulations, as well as all relevant UK and European legislation.

This local legislation 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)

Our local regulator is the Environmental Protection Unit, which reports to the Department of Environment, Food and Agriculture.

Compliance audits

Our integrated management system is certified to international standards. Annual renewal is subject to external audits.

International testing organisation SGS conducted its three-day audit on site in July 2019. It confirmed that our systems and procedures complied with the standard for environmental management (ISO 14001).

Our certification to the international standard for quality, ISO 9001, was also renewed.

As well as our own internal audits, our parent company also carries out regular and rigorous checks of our operational management system, adherence to procedures for managing health, safety, environmental protection and quality, and other aspects of our operations, such as preventative maintenance and lean practice.

Environmental impacts

Like every industrial process, energy-from-waste has an environmental footprint. Our management system and staff training are designed to minimise all impacts of treating customers' waste.

We assess and review all potentially significant impacts, both negative and positive, and record them in the site's Significant Environmental Impacts Register. This is designed to help us mitigate these risks and identify possible improvements.

Biodiversity

The Richmond Hill facility was designed with local wildlife habitats and biodiversity in mind, as were many of our environmental protection procedures.

These control all discharges to watercourses, as well as emissions to air and the handling and transportation of ash and hazardous wastes.

Measures are in place to manage the risks associated with on-site storage of these wastes, chemicals and oil. We review and regularly test our preparedness to control spillages through emergency drills.

Emergency planning

We completed five emergency drills during the year, having been set a target of four.

Staff on duty had to respond to scenarios simulating fire, rescuing of casualties, and a chemical alarm:

1. In a joint exercise with the Fire and Rescue Service, a casualty had to be removed from a work area confined by scaffolding. The rescue team successfully used a rescue belt and safety line with an improvised high lifting point.
2. Operation of the new fire suppression system's mobile fire cannon was tested in a drill planned with the system's installers. The two responders set up the cannon within eight minutes. Refresher training will ensure new joiners, and other staff, can at least match this response time.
3. The shift team promptly followed procedures after an unannounced sounding of the ammonia alarm. A subcontractor's team who were slow to evacuate their workplace had to be reminded of the importance of promptly attending the muster point.
4. Confined space procedures were again tested with Fire and Rescue's Line Rescue Team – using a dummy as a heart attack casualty on a platform within the stack. Good communication helped ensure that gas checks, climbing harnesses and winching were expertly deployed.
5. Another joint exercise involved recovering a dummy casualty from a particularly awkward space by the stack burner control panel. The team showed good manual handling and winching techniques, but the drill showed how additional guideline ropes and protection mats could help control the lowering of a stretcher in such confined spaces.

Our environmental performance

Energy-from-waste is one of Europe's most tightly regulated industrial processes. The strict regulatory framework set by the EU Industrial Emissions Directive governs how emissions are to be monitored.

Under the terms of our site licence, we monitor all emissions to air, land and water – including solid residues – and report the results to the Environmental Protection Unit.

Emissions

Our operating licence sets air emission limits for a range of parameters.

After the scrubbing process, gases in the flue are analysed by the facility's continuous emissions monitoring system. It measures:

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

Dioxins and furans are sampled continuously on the primary line. Other compounds that cannot be continuously measured are subject to emission limits.

Monitoring for metals in flue gases takes place biannually. Particulates from both lines are subject to monitoring each quarter, as is dioxin testing on the secondary line.

Half-hourly limits apply under our site licence to certain compounds, while the limit for carbon monoxide has a 10-minute interval. The facility may continue to operate in full compliance with its licence conditions when these limits are exceeded, but a shutdown is required if the emission is not brought back under control within a specified time.

We are required to report all exceedances to the Environmental Protection Unit and investigate the causes. Our compliance staff inform the Environmental Protection Unit of the outcome of each investigation and the corrective action, where appropriate, before closing the event.

Daily emissions data for the continuously-monitored parameters are published on our website (www.suez.co.im) along with other updates. Daily readings are displayed using graphs for each parameter and emission limit, showing the emissions profile for the previous 90 days for both incinerators. 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

Over the years, our facility has shown its capability to safely dispose of a wide range of wastes, some of which are difficult to manage – from vehicle tyres to biowaste, for example.

New wastes may require licence variations, which are only granted by the Department of Environment, Food and Agriculture when it can be demonstrated that the process is safe, cost-effective and will not compromise the compliance or efficiency of the facility.

During 2019, there were two amendments to allow additional waste streams to be brought to the facility.

Measuring our performance

The energy-from-waste facility has maintained its exemplary record on emissions. Without exception, cumulative emissions have been well below annual limits every year since operations began on Richmond Hill.

During 2019, airborne emission limits were exceeded on six occasions and there was one exceedance by the sewage facility.

Hydrogen chloride and sulphur dioxide

Two of the incidents involved spikes in the levels of hydrogen chloride and sulphur dioxide.

- On 14 January 2019, there were three breaches of half-hourly limits for hydrogen chloride and two for sulphur dioxide within a four-hour period. The decision was taken to stop loading waste onto the grate and run on oil burners for three hours, as a breach of the daily emissions limit was otherwise unavoidable. Checks showed the facility was operating as it should, the operations team reacted in the correct manner to this event, and normal operation continued with the reintroduction of waste.
- On 04 April 2019, half-hourly limits were exceeded twice for sulphur dioxide and once for hydrogen chloride, prompting the decision to stop loading waste. Emissions stabilised, but spiked again when loading resumed, causing two further exceedances for sulphur dioxide until the waste with high sulphur content was fully incinerated.

In each case, checks by our operations team showed that the facility was operating as it should.

When normal operations resumed, the waste mix was changed – by loading from a different section of the pit. Initial investigations centred on the possible presence of pockets of gypsum dust deep in the pit, as this non-compliant waste could have been concealed within the large volumes of demolition waste received in 2018.

Following the event, in April 2019, two one-tonne bags containing jet-black material were identified from CCTV footage of the grab crane and feed hopper before the exceedance. These were subsequently traced to deliveries of activated carbon used to filter hydrogen sulphide in sewage treatment. The size of the bags prevented mixing with other waste and their high sulphate content exceeded the capacity of the gas scrubbing system. Investigations determined this to be the cause of all three exceedances.

Two further bags were found and removed from the pit. To pre-empt similar exceedances, it was decided not to accept this material for the foreseeable future.

Sulphur dioxide

In between these two events, an exceedance of the sulphur dioxide limit occurred. There was a spike in sulphur dioxide emissions on 28 March 2019 resulting in a half-hourly exceedance. The operations team quickly intervened, increasing lime flow to maximum and changing the waste mix by loading waste from different parts of the pit. Gas readings soon returned to normal. Initial investigations attributed this to demolition waste. However, further investigation following the April 2019 sulphur dioxide and hydrogen chloride breach, and the discovery of the activated carbon used to filter hydrogen sulphide, lead us to believe this material was also the cause of this exceedance.

Hydrogen chloride

Two hydrogen chloride exceedances occurred later in the year in the secondary furnace.

- Two readings late on 26 September 2019 – between 10pm and midnight – showed a spike in hydrogen chloride levels. As they were late in the reporting period, it was not possible to reduce the average below the daily 10 mg/m^3 limit before midnight. A daily average of 10.4 mg/m^3 was recorded. Investigations have revealed that the absorber temperature control loop was not functioning as expected due to an issue with the cooling water flow meter. This issue was rectified and an alarm added to inform operators of a high temperature in the absorber. This alarm did not exist previously.
- On 06 December 2019, a further hydrogen chloride exceedance occurred. The problem occurred as the primary line was being shut down due to a deslagger blockage. Water was sent to the slaking tanks in accordance with the primary shutdown procedure. However, this does not take into account the rare occasion the secondary line is operated in isolation. The water diluted the lime slurry that feeds the spray absorbers and the over-diluted spray was not of sufficient strength to combat the acidity of the gases from the secondary furnace. We reviewed the standard procedure for primary shutdowns and added guidance on the steps required while operation of the secondary line is continuing.

We strive to not only comply with the emission limit values, but remain significantly below them. We are pleased that, despite suffering these two exceedances, our overall hydrogen chloride emissions for the year were just 72% of the value which would be permitted.

Volatile organic compounds

The loss of a fan due to a faulty sensor led to an exceedance for a volatile organic compound.

In the early hours of 18 May 2019, the 30-minute limit for total organic carbon was exceeded following a trip of the induced draft fan, which controls the dust and fly-ash. After the fan and related systems were reset, the facility had resumed normal operation within an hour. Our investigation established that the trip was triggered by a false signal in a bag filter compartment indicating that the gas path was blocked. The fault was traced to a sensor on a slide valve and rectified, the system was also reprogramed to prevent the same issue occurring.

Biochemical oxygen demand

The sewage works exceeded the limit for biochemical oxygen demand following the year's first planned shutdown for maintenance.

Sampling of the water discharged from the site's sewage system in July 2019 showed a reading above the biochemical oxygen demand limit. This followed a scheduled maintenance period and a peak in contractor personnel on site. It is thought the increased usage of chemicals in toilets affected the levels of bacteria active in treating sewage. Cleaning staff have reviewed consumption levels and will aim to curb usage during future shutdowns.

Over the year, the cumulative emissions to land, water and air remained considerably below their licensed thresholds.

All the relevant data are shown in the tables at the end of this report. Together with the daily emissions data published on our website, they provide a comprehensive picture of the facility's emissions.

Climate change

SUEZ is a leader in the global response by corporations to the climate emergency. The group is now listed among the 30 most advanced 'LEAD' companies of the United National Global Compact in terms of commitment to sustainable development.

SUEZ Isle of Man monitors and reports carbon emissions and related data to SUEZ recycling and recovery UK, which are consolidated in group-level reporting.

Our global group's latest 2019 Integrated Report[3] shows that in 2018 emissions avoided on behalf of SUEZ customers exceeded 10 million tonnes CO_2e, partly due to a 15% increase in production of renewable energy.

The group's science-based target is for a 30% reduction in direct and indirect emissions by 2030.

Recalculating carbon emissions

Following the Isle of Man Government's announcement on the climate change emergency, a carbon balance analysis was carried out for the facility. This analysis covered the period from 2010 to 2018.

A carbon balance is a set of calculations that weighs the total emissions of the facility against its total emissions savings.

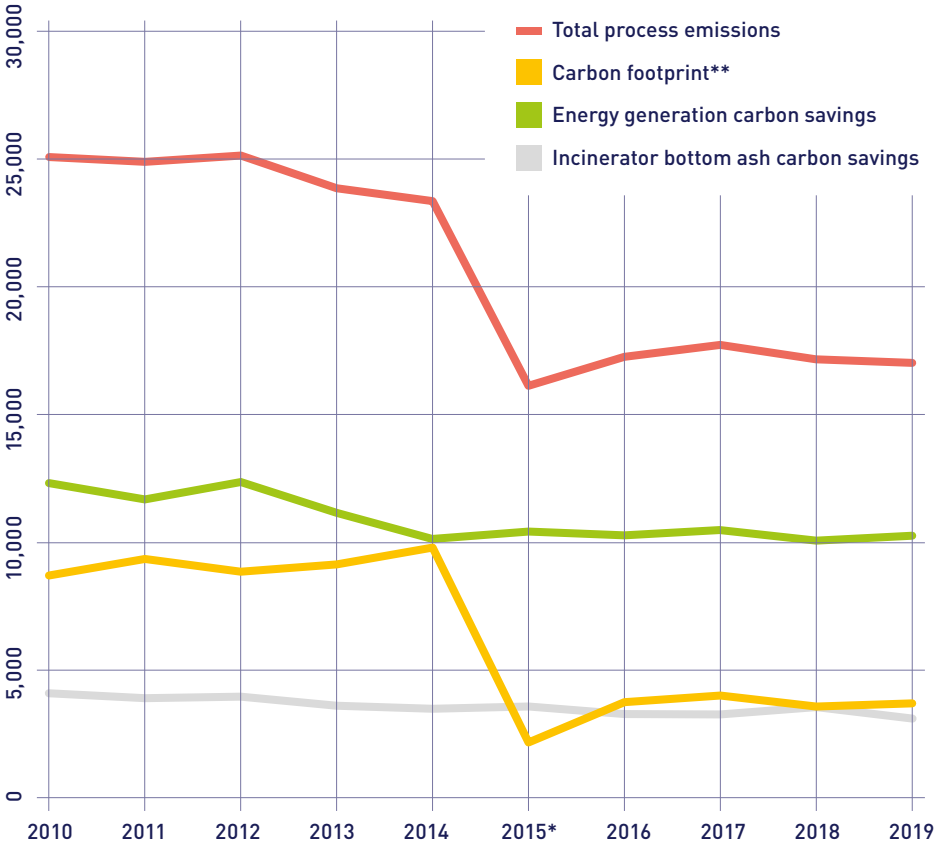
The calculation used takes the total carbon emissions from processing waste and adds onto this any emissions of gases that are known to cause the greenhouse effect.

The calculation then subtracts from the facilities total emissions, the carbon savings that arise due to electricity generation and metal recycling. These processes represent carbon savings, as the electricity generation and metal recycling offset the production requirements from primary sources – e.g. natural gas power station or aluminium ore refining.

All the data used is based on operational figures – such as waste throughput, energy export and chemical analyses of the waste, which this year showed the waste stream to comprise 47% renewable materials.

[3] https://hosting.fluidbook.com/suez/rapport-integre-2019/EN/#/page/1

Isle of Man energy-from-waste facility carbon footprint (tonnes CO_2e)



	2010	2011	2012	2013	2014	2015*	2016	2017	2018	2019
Total process emissions	24,939	24,754	25,004	23,727	23,228	16,078	17,203	17,667	17,106	20,327
Energy generation carbon savings	12,184	11,582	12,248	11,042	10,023	10,364	10,204	10,438	10,014	10,258
Incinerator bottom ash carbon savings	4,042	3,871	3,930	3,575	3,450	3,523	3,252	3,202	3,498	3,102
Carbon footprint**	**8,713**	**9,301**	**8,826**	**9,110**	**9,755**	**2,191**	**3,747**	**4,027**	**3,594**	**6,967**

* Step change as a result of an updated waste composition analysis carried out in June 2015. A further analysis has been carried out in February 2019.

** Net carbon equivalent emissions = [Net CO_2e emissions from the process] - [CO_2e savings from electricity generation] - [CO_2e savings from bottom ash recycling]

corporate social responsibility

SUEZ Isle of Man is a responsible company, not just in our stewardship of the environment but also as an employer, neighbour and part of society.

Employee safety is our overriding priority, and we value our people's skills, development and wellbeing.

The company also recognises the need to be open and accountable to the government and public, and to contribute to the benefit of the community.

We report on relevant activities in this chapter of the report, including health and safety, training and development, and community engagement.

Our people

The capabilities and commitment of our people are critical to the safe and efficient running of the facility. SUEZ Isle of Man's track record is a testament to their qualities as well as our corporate policies, systems and procedures.

Our first responsibility is to provide a safe and healthy working environment, not least by ensuring staff receive all necessary training. Our comprehensive training and development programme is also designed to promote learning and careers as well as consolidating competence in day-to-day roles.

SUEZ reviews its performance as an employer and consults employees regularly on their views. People are encouraged to contribute and inform decision-making, for instance in routine team meetings and toolbox talks, by raising problems and opportunities to improve our ways of working.

U Say, the bi-annual employee engagement survey of SUEZ employees in the UK and Isle of Man, was held in September 2019.

Positively speaking

The U Say survey tracks opinion across a range of subjects – from the quality of leadership to remuneration and community involvement.

Results from the 2019 survey showed the level of engagement of SUEZ Isle of Man employees was above the average for big companies, which acts as a benchmark.

SUEZ Isle of Man scored as a 'two star company' (the highest rating being a 'three star company'). This is above the UK average and a significant achievement.

Compared with the previous survey in 2017, all indicators showed positive increases. That improvement exceeded 10% for the following measurement factors: my company, my manager, personal growth, my team and wellbeing.

Health and safety

SUEZ policies and practice on health and safety are well developed and comprehensive.

Procedures governing all activities – set out in our integrated management system – guide employees on how to carry them out safely, while also protecting the environment and safeguarding quality of service and workmanship.

Safety management is supported by risk assessment, safety training and auditing. All incidents are investigated and any necessary action is taken before reports are closed. Employees and contractors are encouraged to report 'near misses', which are tracked and reviewed.

Day-to-day safety is a matter of culture, as well as procedures and checks. Our award-winning behavioural programme – Safety in Mind – was developed by employees across SUEZ recycling and recovery UK. All employees – managers, supervisors and safety representatives – benefit from Safety in Mind training, which raises and refreshes safety awareness among the workforce. In 2019, a total of 6,658 Safety in Mind conversations were carried out by our staff at the Isle of Man facility.

Within our teams, safety representatives play a valuable role by discussing any concerns colleagues may have and feeding back views and suggestions for changing work methods or equipment to enhance safety.

Incidents in 2019

Our enviable health and safety record continues.

Over the year, there were nine personal injury incidents. One resulted in injury requiring time off work, when an operator tripped while starting a diesel pump in November 2019 – the first time in 222 days that anyone working in the facility was involved in a lost-time accident. This incident was not sufficiently serious to be reported to the authorities. Under Manx health and safety regulations, any incident resulting in an employee's absence for more than three days must be reported.

In 2019, a total of 57 near misses were reported, most during the planned shutdowns when major maintenance works and the number of contractors on site are at their highest.

All near-miss reports are reviewed by our Safety Manager and investigated where appropriate. New procedures are introduced or existing ones revised, as necessary.

Wellness for all

Inspired by the Safety in Mind programme, some 50 employees from across SUEZ have helped to create a new Wellness Charter for the company with a vision of 'wellness for all'.

They identified eight areas that impact on the wellness of everyone who works at SUEZ: diversity and inclusion, emotional, financial, job-related, mental wellbeing, physical health, social and work environment.

Training and development

We assess each employee's competence, identify their training needs and track their progress using our training and competency matrix. All operations and maintenance staff go through our in-house competence training and are formally assessed.

The matrix specifies all essential training, but we also invest in training designed to enhance skills and personal development. Our policy is to promote fulfilling careers within our company and the wider group and, where possible, to promote from within.

In 2019, we delivered more than 820 person-hours of training – internal and external. Much of it was safety-related, covering areas such as the Dangerous Substances and Explosive Atmospheres Regulations, accident investigation and rescue team drills.

Complementing our training on first aid at work, senior staff also received instruction on mental health first aid.

External courses included the industry-standard Boiler Operation Accreditation Scheme, NEBOSH (the National Examination Board in Occupational Safety and Health), and development training in mechanical and electrical installations for our former apprentice, now a Maintenance Technician.

A tribute to Dave Pratt

In May 2019, the team lost a much-admired colleague when Dave Pratt, Senior Maintenance Technician, died suddenly.

Dave was one of our longest-serving employees – having worked for more than 13 years on Richmond Hill – and very popular with everyone.

In his memory, we dedicated the facility's high-voltage switchroom in his name with a plaque and photo. As it records:

"Dave was so much more than our electrical technician who 'saved the day' countless times. Dave had a mastery and passion for his 'Wiggly Amps' and was a high-voltage guy."

He is much missed.

Our team

At the end of the year, SUEZ Isle of Man employed 34 people, under the leadership of Plant Manager Gerrit du Toit.

Having been part of the company since its creation, Gerrit will retire in 2020, after eight years in the top job and a similar period as Operations Manager. The succession, by Operations Manager Jon Garrad, will see a series of internal promotions and further recruitment.

In 2019, Jonathan Smith was our only new joiner, arriving in the autumn as Senior Electrical and Instrumentation Engineer.

Raised on the island, Jonathan studied engineering at University College Isle of Man. On completing his Ordinary National Certificate, he joined the Royal Navy and continued his mechanical and electrical engineering studies (to HNC level), becoming a marine engineer. After service, he returned to the island and University College Isle of Man, and qualified as an electrician (with NVQ3 and City and Guilds qualifications).

Jonathan worked as an industrial and commercial electrician, and then as a Mechatronics Technician at Ronaldsway Aircraft Company, before joining us in September 2019.

Customer care

Each year, our group's Customer Insights team survey all customers and use the responses to score the different parts of the business. Not for the first time, SUEZ Isle of Man achieved a 10/10 mark in 2019, based on the questionnaire completed by our client, the Department of Infrastructure. The evaluation covered both waste processing and energy services.

With a view to improving customer service further across the group, SUEZ recycling and recovery UK is piloting a new initiative. Building on investments already made in lean processes and new technology, the initiative aims to optimise the way the company works to improve the customer's experience, ultimately helping create the capacity to grow the business sustainably.

Our community

SUEZ Isle of Man serves the community by putting its waste to good use and providing all aspects of this essential service as safely and efficiently as possible. Our commitment also extends to openness and accountability, being a good neighbour and giving back to society.

Over the years, the company and our people have supported local causes and community groups, and we host a visitors centre that is a resource for education.

Since 2014, we have raised funds for our parent company's partner charity, Macmillan Cancer Support. The total donated exceeded £280,000 by the end of 2019, enough to fund more than 9,700 hours of health and social care by the charity's professionals working alongside nurses and doctors.

Clocking up funds

Our people know all about round-the-clock operations. They decided to put this teamwork to good use for Cancer Research UK on 24 August 2019.

A SUEZ crew took part in the Isle of Man's Relay for Life fundraising challenge, which brings the local community together in the battle to beat cancer.

They walked round an athletics track for 24 hours – from 12pm Saturday to 12pm Sunday – with at least one colleague on the track at all times. They raised more than £1,200 for the charity.

Our neighbours

Other SUEZ companies host voluntary site liaison committees at major sites as a forum for consulting community representatives. In the Isle of Man, a statutory body fills that role. The Richmond Consultative Committee – in collaboration with the Department of Environment, Food and Agriculture – helps ensure we are regulated in a transparent manner.

Committee members can raise issues and make recommendation in meetings or directly with the Department, and they have access to all relevant information on the operations of the energy-from-waste facility.

We also have procedures to record and investigate all complaints received either directly from the public or local authorities. The outcome is reported back to the complainant. No complaints were received during the year.

Our communications

Apart from this annual report, we keep the community informed of our performance through our website.

This presents 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 is available on the SUEZ recycling and recovery UK website (www.suez.co.uk).

Our visitors

Local schools and community groups continue to make good use of Richmond Hill's visitor and education centre.

Each year, hundreds of visitors, mostly students, are taken on guided tours of the facility, and attend presentations on our work and environmental issues.

In 2019, we conducted around 30 tours and hosted more than 420 primary, secondary and college students, along with another 80 adults from social clubs, industry bodies and Tynwald.

our objectives

Each year objectives and targets are set to drive our performance in areas such as compliance, efficiency and continuous improvement generally.

Here we report on how we performed against these objectives in 2019 and the benchmarks we have set for 2020, followed by performance data tables compiled from the year's figures underlying the commentary of the preceding chapters.

How we did in 2019

Our strategic objectives	Targets set for end of 2019
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.

Achieved?	How we performed
✔	Five drills completed: Rescues from stack, secondary platform and scaffolding; mobile fire cannon drill and ammonia drill.
✔	Biodiversity action plan in place.
✔	One shipment completed.
✔	10 meetings held during the year.
✖	One daily emission breach.
✔	17% reduction achieved.
✔	Matrix maintained.
✔	ISO certifications maintained.
✔	All reports completed and requirements met.
✔	Operational equipment efficiency target of 61.3% met with 64.0% outcome.
✖	Preventative maintenance adherence stretch target of 95% recorded 85.8% outcome.
✔	Five projects completed.

Objectives and targets for 2020

Our strategic objectives	Targets set for end of 2020
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	Maintain oil usage at 2019 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)	2015	2016
Confidential	28.4	34.7
Construction	427.5	428.9
Food industry (previously dairy)	12.5	6.5
Municipal	40,535.0	40,968.9
Packaging	760.3	1,727.6
Tyres	294.4	507.7
Waste screenings and biopellets	1,061.5	957.3
Wood	3,697.3	4,555.0
Forestry	159.2	105.7
Meat and bone meal	626.8	649.4
Hygiene waste	-	-
Other	18.9	19.1

* previously included in food industry category.

Wastes incinerated in the secondary incinerator (tonnes)	2015	2016
Clinical	251.5	259.2
Waste oil*	174.8	104.3

* recalculated in 2019 to use metered figures. Delivery estimates previously used where one metano was estimated at one tonne – many of these were not full and so weighed less.

Exceedances	2015	2016
Number of exceedances of licence emission limits	5	2

2017	2018	2019
95.0	92.1	29.7
1,154.3	609.9	498.7
4.2	3.4	5.3
39,781.9	39,469.9	39,442.8
1,681.8	1,890.6	1,619.6
519.1	607.3	615.9
1,114.4	1,247.0	1,518.2
5,856.3	5,562.9	5,999.3
0	0	0
526.0	543.9	539.9
-	47.7	95.1
12.9	45.1	68.9

2017	2018	2019
267.9	253.8	250.1
128.7	107.9	131.2

2017	2018	2019
0	3	7

Consumption of raw materials

	2015		2016	
	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
Gas oil	6.5	313.8	8.8	446.2
Water	159	7,687	195	9,888
Lime	8.7	422.7	8.5	430.2
Activated carbon	0.5	22.3	0.4	18.4
Ammonia	0.6	28.2	0.5	24.0

Energy consumption and generation

	2015		2016	
	MWh per tonne of waste	Total MWh	MWh per tonne of waste	Total MWh
Electricity consumed	0.015	717.5	0.021	1,044.2
Electricity exported	0.510	24,675.8	0.493	24,958.5

Waste recovery and disposal

	2015		2016	
	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
Bottom ash (landfill)	207	10,030.0	207	10,457.0
Air pollution control residue (landfill)	31	1,498.3	33	1,650.8
Ferrous metal (recycled)	14.9	723.2	5.6	283.5

2017		2018		2019	
Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
10.0	512.5	8.0	406.7	6.6	336.5
213	10,977	179	9,063	212	10,775
8.7	445.2	8.8	444.1	8.3	424.0
0.4	18.1	0.4	19.5	0.4	18.4
0.7	37.3	0.5	25.1	0.5	23.1

2017		2018		2019	
MWh per tonne of waste	Total MWh	MWh per tonne of waste	Total MWh	MWh per tonne of waste	Total MWh
0.022	1,132.0	0.016	816.7	0.012	597.4
0.498	25,663.0	0.492	24,966.3	0.494	25,100.5

2017		2018		2019	
Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
205	10,535.5	206	10,462.0	201	10,237.1
33	1,690.5	32	1,599.1	34	1,714.6
5.3	274.0	10.1	514.6	3.2	160.4

Air emissions

	2015		2016	
	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
Particulate matter	0.0006865	0.0332	0.0146147	0.7406
Volatile organic compounds	0.0043	0.21	0.0072	0.36
Hydrogen chloride	0.068	3.31	0.079	3.99
Hydrogen fluoride	0.00015	0.007	0.00012	0.006
Carbon monoxide	0.042	2.01	0.062	3.15
Sulphur dioxide	0.11	5.49	0.14	7.16
Oxides of nitrogen	1.26	60.76	1.3	65.88
Ammonia	0.026	1.28	0.041	2.08
Cadmium and thallium	0.0000046	0.0002	0.0000038	0.0002
Mercury	0.0000018	0.0001	0.0000021	0.0001
Sb, As, Cr, Co, Cu, Pb, Mn, Ni and V	0.00017	0.008	0.00019	0.01
PAH	3.0×10^{-05}	0.0015	2.8×10^{-05}	0.0014
Dioxins and furans	1.0×10^{-10}	4.9×10^{-09}	1.7×10^{-10}	8.4×10^{-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

	2015		2016	
	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
Suspended solids*	0.008	0.40	0.008	0.38
Biochemical oxygen demand*	0.0009	0.04	0.0008	0.04
Chemical oxygen demand*	0.005	0.28	0.006	0.28

* Calculated from estimated flow rate.

2017		2018		2019		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	
0.0135868	0.6996	0.003943	0.2002	0.003389	0.1722	3.0
0.0039	0.2	0.0050	0.2533	0.0049	0.2482	3.0
0.042	2.16	0.048	2.41	0.042	2.14	3.0
0.00004	0.002	0.00001	0.001	0.00000	0.000	0.01
0.051	2.62	0.052	2.66	0.044	2.24	14.8
0.14	7.41	0.12	5.99	0.12	6.06	14.8
1.1	56.5	1.0	53.3	1.0	51.5	59.3
0.027	1.38	0.007	0.35	0.001	0.03	-
0.0000039	0.0002	0.0000038	0.0002	0.0000049	0.0003	0.015
0.0000022	0.0001	0.0000925	0.0047	0.0000016	0.0001	0.015
0.00064	0.033	0.00014	0.007	0.00012	0.006	0.15
1.10×10^{-05}	0.0006	2.28×10^{-05}	0.0012	1.89×10^{-05}	0.0010	-
7.30×10^{-11}	3.70×10^{-09}	7.77×10^{-11}	3.95×10^{-09}	5.61×10^{-11}	2.85×10^{-09}	-
2.2×10^{-11}	1.1×10^{-09}	8.70×10^{-12}	4.50×10^{-10}	5.69×10^{-12}	2.89×10^{-10}	-

2017		2018		2019	
Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage	Kg per tonne of waste	Total tonnage
0.010	0.49	0.009	0.48	0.016	0.80
0.0008	0.04	0.0008	0.04	0.0012	0.06
0.015	0.75	0.035	1.78	0.005	0.24

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: 12 May 2020

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