VEOLIA

LIQUID AND HAZARDOUS WASTE TREATMENT AND RECOVERY

CONTENTS

01

INTRODUCTION

HUMANITY HAS NEVER FACED AS **MANY CHALLENGES** AS IT DOES IN THE **21ST CENTURY**

We live on a planet we have not cared for properly.

And now we are paying the price. If the extreme weather events battering every continent are the most visible scars, other equally fearsome challenges need tackling during the coming two decades. With the clock now running on the climate emergency, treating and recovering liquid and hazardous wastes plays an essential role in terms of public health, the fight against pollution, regional resilience and the preservation of resources.

01 — Introduction

In strictly practical terms, in 20 years' time there will be nine billion people on earth, all of them needing homes and food; the rise of the global middle-class and digital technologies will increase energy demand by 30%; rampant urban spread continues to swallow farmlands that are already heavily degraded; proximity between untamed natural environments and urban spaces will increase the risk of new viruses being transmitted to humans; rising temperatures will make life ever harder in megacities, where population densities will continue to increase; the emergence of new pollutants in water, soil and air will continue to cause more sickness and death; resource scarcity will cause major conflicts between users, destabilizing entire regions across the planet, and so on.

In 20 years' time
there will be nine billion people on earth.

These are just a few of the planetary challenges that Veolia seeks to help resolve.

Tackling these challenges is critical: they have shown us that our lifestyles are untenable and that we need to change them right now, humanity cannot go on living in the same way. Our world is different now, and we must adapt. Unless we act immediately, circumstances that seem exceptional today will become the norm tomorrow. We have to take stock and act collectively.

The rise of the global middle-class and digital technologies
will increase energy demand by 30%.

01 — Introduction

BECAUSE **ALTERNATIVE SOLUTIONS** EXIST

Veolia's resolute commitment to ecological transformation means it is able to respond to the highly complex challenges shaping the world of tomorrow.

As part of its activities in water, energy and waste management, the Group has developed solutions that help support its stakeholders in their own transformations. So that everybody can join forces. Because nobody, in isolation, can tackle all these challenges while also preserving natural resources and combating the climate emergency.

Against this challenging background, liquid and hazardous waste are major risks. Treating them is a powerful lever for limiting the environmental impact of industrial activities, avoiding the dispersion of pollution and boosting the circular economy. This is why the liquid and hazardous waste treatment and recovery activities are central to the ecological transformation that is vital if we are to move to lower carbon lifestyles and enjoy a better quality of life.

The following pages show how these activities actively contribute to building a more sustainable world, and how they leverage innovation to roll out new solutions for tomorrow.

By controlling the complete hazardous waste treatment cycle, Veolia's solutions limit the environmental impacts of industrial activities, avoid the dispersion of pollution into the environment and promote the circular economy.

As a pioneer in the treatment of hazardous waste for over 40 years, everything the Group does is rooted in strongly held, non-negotiable, values: traceability, non-dilution, effective treatment of pollution, protecting the environment as well as the health and safety of employees and local people.

BENJAMIN CHAN

Director, Liquid and Hazardous Waste Treatment and Recovery

VEOLIA SERVING THE PLANET

Global economic and social development inevitably creates large quantities of hazardous waste. There are as many sources as there are varieties of residues requiring treatment. Refineries, petrochemical complexes, the automotive industry, nuclear power plants, the chemical industry, pharmaceutical companies, etc. All these heavy industries generate hazardous waste that can take a variety of forms: solid, liquid and/or gas, which can be toxic, infectious, radioactive or carcinogenic (waste oil, sludges, solvents, ash, pharmaceutical residues, etc.). And this waste is stored in an extremely wide range of containers: cans, tubs, barrels, aerosols, batteries, tanks, etc.

02

PROTECTING HUMAN HEALTH AND REDUCING ENVIRONMENTAL IMPACTS

Hazardous waste is a risk to human health. It is also an industrial risk to sites where it is processed and, of course, a risk to the environment.

Improper handling or inappropriate treatment can lead to serious accidents (fires, explosions, toxic clouds, etc.) that can cause lasting pollution to water, soil or the atmosphere. The risks are greater still because of the fast pace of industrialization in low- to medium-income countries and the growing use of new materials and technologies (nanomaterials, new pharmaceutical molecules, etc.), that require costly treatment and installations capable of being upgraded at a later date.

02 — Veolia serving the planet

It is often precisely in these emerging economies that the regulations governing hazardous waste are less evolved and more haphazardly applied, which in turn increases risks from hazardous industrial waste. In reality, “hazardous waste” only exists if there are regulations that classify it as such, and if these regulations are correctly applied.

So, to make sure that the world’s population can live in a healthy environment at a time when new pollutants are appearing all the time, Veolia is trialing alternative solutions and rolling out innovative treatment and recovery mechanisms for liquid and hazardous waste. These aim to protect human health and reduce environmental impacts by offering protection from new exposure or remediating pre-existing contamination (soil remediation), preserving resources via regeneration (water recycling), combating harmful pollution (hazardous waste, plastics, micropollutants), reducing industrial risks and workplace health and safety risks, minimizing energy use and limiting greenhouse gas emissions.

Veolia focuses on using its expertise to concentrate pollution caused by hazardous waste so that it can be processed effectively in a manner that eliminates it completely, or renders the waste inert. Veolia will never mix highly hazardous waste with other less-hazardous or non-hazardous waste to reduce its relative toxicity so that it can be processed via alternative, less appropriate, treatment methods. This practice, designed to bypass regulations, is something that Veolia opposes in every part of the world.

A RELIABLE SOLUTION
FOR THE TREATMENT OF ORPHAN NUCLEAR WASTE

All over the world, an important quantity of waste (such as sodium reactive metals) has been stored for decades, due to the lack of a reliable treatment solution allowing significant chemical & radiological risk reduction in a safe and economical manner.

Veolia Nuclear Solutions has developed GeoMelt®, a vitrification process for the treatment of this kind of waste, until then neglected. Vitrification is a process for immobilizing radionuclides and heavy metals in an ultra-stable glass. The very high temperature emitted during the vitrification process freezes the waste into a volume of inert glass for safe storage and transportation.

GeoMelt® creates ultra-stable glass that is typically 10 times stronger than concrete, and more durable than granite or marble. Its leach-resistance is among the highest of all materials in the world. Thus, a radionuclide trapped in the glass matrix will no longer be released into the environment, even after years of runoff.

Vitrification is considered by international nuclear authorities as a relevant choice for nuclear waste treatment because of its durability, which is counted in hundreds of thousands of years. GeoMelt® is a proven treatment method for the nuclear industry with a low life cycle cost compared to other treatment methods for hard to dispose of waste.

In Andrews, USA
(State of Texas)

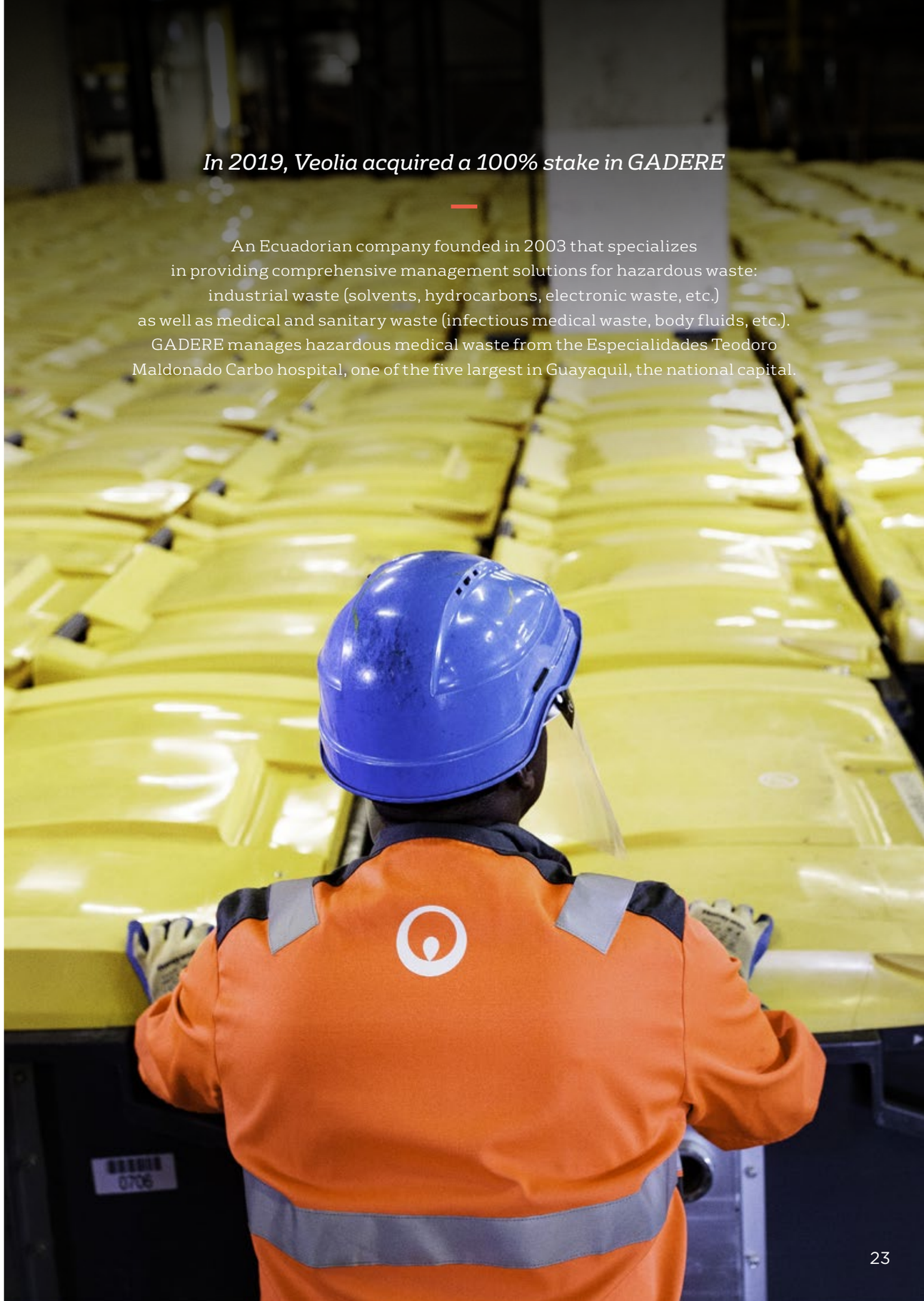
In 2022, Veolia opened a commercial GeoMelt® vitrification facility in Andrews, Texas, which treats low-level nuclear wastes. Due to the proven leach resistance of the vitrified product, it is disposed directly into the landfill on the same site. In its first year, the facility treated two complete waste streams of reactive metal waste for the U.S. Department of Energy.

In Sellafield, United Kingdom

In partnership with the NDA's National Nuclear Laboratory (NNL), Veolia installed a GeoMelt® vitrification system at Sellafield in 2016 for nuclear waste stabilization. Sellafield is the former plutonium production facility for the UK's first nuclear power plant. It is currently a nuclear fuel reprocessing facility and nuclear decommissioning site.

TREATING INFECTIOUS MEDICAL WASTE

Masks, syringes, medical sharps, dressings, bandages, medicines and soiled items: every year the amount of infectious medical waste produced by healthcare establishments creates very large quantities of hazardous waste that requires treatment. Some of the waste carries viable micro-organisms or their toxins and can be a danger to human health (burns, puncture wounds, poisoning, etc.) and the environment (pollution). This means the waste must be collected, treated and managed in a specific manner.



In 2019, Veolia acquired a 100% stake in GADERE

An Ecuadorian company founded in 2003 that specializes in providing comprehensive management solutions for hazardous waste: industrial waste (solvents, hydrocarbons, electronic waste, etc.) as well as medical and sanitary waste (infectious medical waste, body fluids, etc.). GADERE manages hazardous medical waste from the Especialidades Teodoro Maldonado Carbo hospital, one of the five largest in Guayaquil, the national capital.

02 — Veolia serving the planet

Over the past 50 years and more, Veolia has developed extensive expertise in management of this type of waste, providing bespoke support to medical professionals for the comprehensive treatment of their hazardous medical waste. The Group works alongside its clients, and everything it does complies with applicable regulations in every respect, working in complete safety at every stage of the process. This includes training for healthcare staff, distributing of plastic waste bags, sharps containers, cardboard boxes, etc., so that different types of hazardous medical waste are kept apart: collecting and transferring to a treatment center, with traceability guaranteed; cleaning and disinfecting containers; treating infectious medical waste via incineration, or with a disinfectant preliminary treatment (autoclave or microwave).

Veolia continued to expand its geographical footprint in 2020, through the acquisition of medical waste management activities in Chile, Peru and Spain.

This is dangerous waste, and it is critical that the safety of the operators who handle it is ensured at every stage: during collection from sites where it is produced, when transported by vehicle, when at grouping and repacking centers, when emptying treatment installations, etc. This rule also applies to protecting assets (vehicles and treatment sites) against the risk of fire or explosion, which may lead to the destruction of facilities and have serious consequences for local people and the environment.

VEOLIA SERVING INDUSTRIAL CLIENTS

To accompany them in their ecological transformation, Veolia helps its industrial clients to process the hazardous waste they produce, combining safety with cost-effectiveness and continuity of service. The Group always offers flexibility in the ways that it handles this type of waste, whether it is larger volumes to process or a change in waste characteristics. It also ensures total traceability all the way from production site to final elimination, so that regulators can track the entire process.

03 — Veolia serving industrial clients

Veolia's hazardous waste treatment facilities are generally located near its industrial clients, to ensure that their production is unaffected. This applies to many chemical and pharmaceutical industry clients, as they constantly need to remove waste from their sites. Veolia guarantees the availability and long-term operation of its installations handling this type of waste, as was shown from the start of the Covid-19 pandemic.

The high added-value solutions developed by Veolia deliver many benefits: for example the reuse of oils or regeneration of sulfuric acids, waste recovery with exploitation of energy potential (heat treatment by incineration for solid and liquid hazardous waste) to provide energy savings, business continuity in compliance with all applicable regulations, securing supplies of recycled materials, lower carbon footprint, etc.

These innovative processes are capable of producing high-quality raw materials such as plastics, regenerated oils, etc. Veolia makes no compromises when obtaining these materials, looking at the bigger picture to manage every aspect of hazardous waste treatment, where every phase plays an essential component in dealing effectively with pollution and, therefore, protecting the environment. The Group is convinced that it is vital to concentrate and extract pollutants. They must then be processed appropriately, such as in high-temperature incineration furnaces dedicated to hazardous waste and fitted with advanced flue gas treatments. Residues from combustion and flue gas treatment are hazardous waste too, and they must be buried in secure waste storage facilities (class 1).

Veolia helps its industrial clients to process the hazardous waste they produce, combining safety with cost-effectiveness and continuity of service.

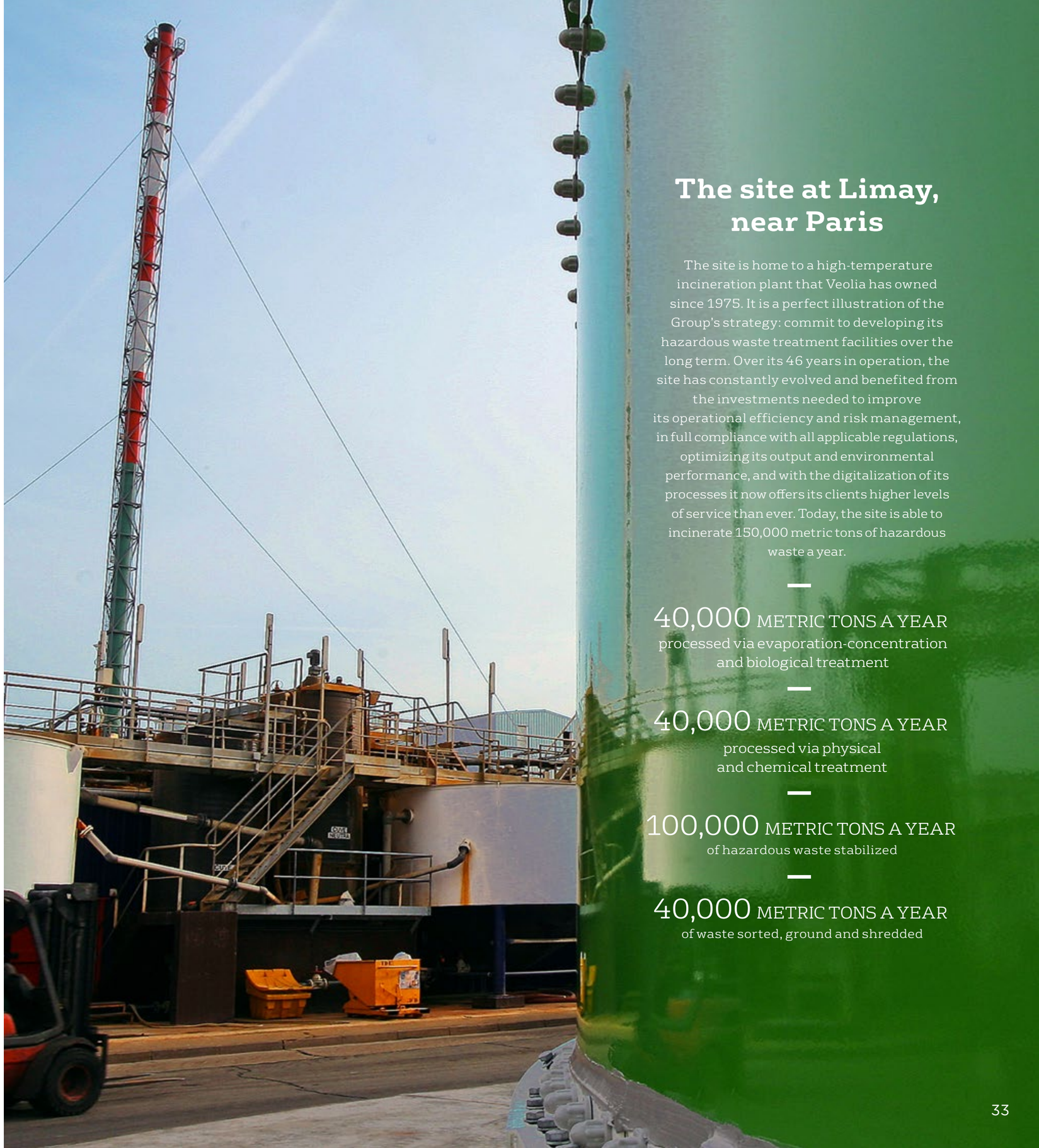
RECOVERING HAZARDOUS WASTE WITH HIGH-TEMPERATURE INCINERATION

Over 11 million metric tons of hazardous waste were produced in France in 2020.

Their management, recovery and traceability are all covered by specific, extremely strict, regulations. Against this background, they are incinerated in high-temperature incineration plants to produce energy, heat, electricity or steam, which are used in heat or power networks.

03 — Veolia serving industrial clients

The process involves heating hazardous waste in furnaces at temperatures between 850 and 1100°C, which reduces the volume and captures the pollutants. Waste collected from Veolia's clients is transferred to repackaging sites before being trucked to treatment facilities where they undergo an initial laboratory inspection. Once the inspection is complete, they are prepared or stored prior to incineration. By-products generated by the process (fly ash, bottom ash) are then processed and stabilized to recover various secondary raw materials such as metals, before being buried at class 1 waste storage centers. There is total traceability for the hazardous waste at every stage. Veolia can then offer its users renewable energy, a lower carbon footprint and a reliable constant supply of electricity, steam or heat.



The site at Limay, near Paris

The site is home to a high-temperature incineration plant that Veolia has owned since 1975. It is a perfect illustration of the Group's strategy: commit to developing its hazardous waste treatment facilities over the long term. Over its 46 years in operation, the site has constantly evolved and benefited from the investments needed to improve its operational efficiency and risk management, in full compliance with all applicable regulations, optimizing its output and environmental performance, and with the digitalization of its processes it now offers its clients higher levels of service than ever. Today, the site is able to incinerate 150,000 metric tons of hazardous waste a year.

40,000 METRIC TONS A YEAR
processed via evaporation-concentration and biological treatment

40,000 METRIC TONS A YEAR
processed via physical and chemical treatment

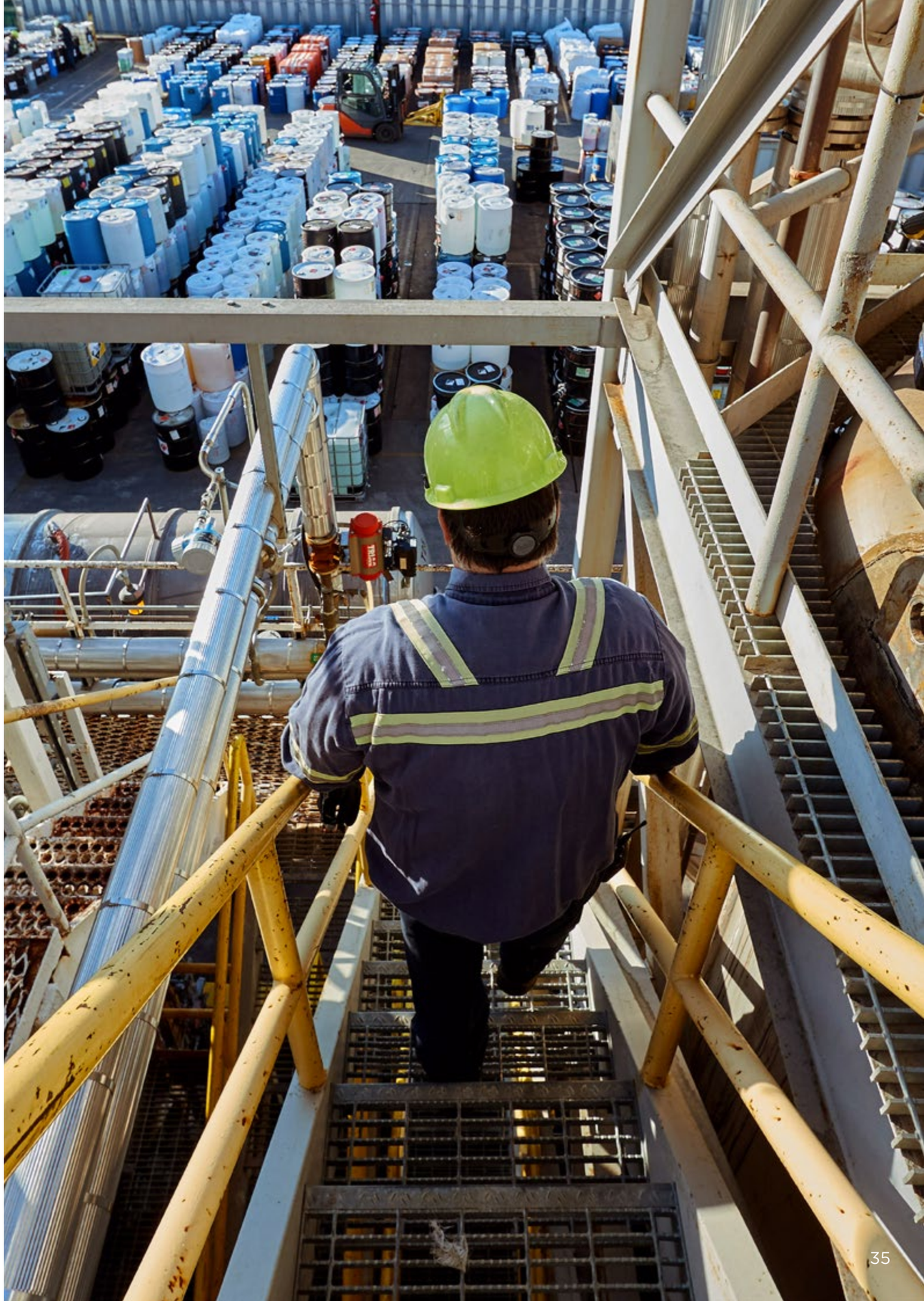
100,000 METRIC TONS A YEAR
of hazardous waste stabilized

40,000 METRIC TONS A YEAR
of waste sorted, ground and shredded

RECOVERING SOLVENTS VIA REGENERATION

Widely found in products produced in the pharmaceutical, automotive, cosmetics and cleaning industries, solvents are a form of hazardous waste that presents major risks to people and the environment.

There are several thousand different solvents used to degrease, dissolve, strip, clean, and so on. All these uses can lead to handling errors, harmful contacts with people (inhalation, swallowing, etc.), pollution to natural ecosystems, and potentially an explosion.



In Taixing, China

Veolia has built and now operates a hazardous waste incineration and disposal center. Its activities include collection, transportation, storage and incineration. With a capacity to process 30,000 tons of waste per year from the Taixing Industrial Park, the facility produces high-pressure steam as a form of clean energy to power the park's businesses. This helps reduce the consumption of standard coal by 8,042 tons per year. Taixing plant is committed to providing all employees with all-round growth and development opportunities to ensure a safe, reliable and efficient waste disposal service to customers. Due to the safe and green operation process, Taixing plant was awarded the title of Environmental company open to the public by the State EPB (Environmental Protection Bureau).

03 — Veolia serving industrial clients

In response, Veolia has created and designed custom solutions to support its industrial clients by recovering and regenerating contaminated solvents to produce secondary raw materials of a quality identical to virgin materials, at a low price and in full compliance with all applicable legislation.

The Group guarantees the safety and quality of its techniques and the traceability of all flows of materials at every stage. Clients are provided with suitable containers, contaminated solvents are pumped out or collected in special tanks, samples are then analyzed, etc. Substances are processed mostly using thin-layer evaporators that separate and recover solids, and equipment that distills and separates the solvent from its impurities. Once recycled or regenerated, secondary raw materials are returned to the client for reuse or resale to a third party.

Clients are provided with suitable containers.

At Chauny, in France

SPR, a company owned by SARPI, a Veolia subsidiary, processes 18,000 metric tons of solvents a year. Its main client is Renault, the vehicle manufacturer. Regenerating clients' solvents avoids the emission of 22,000 metric tons of CO_2 every year.

In Almelo, Netherlands

Veolia operates one of the largest solvent regeneration sites. This site handles a wide range of solvents from all over Europe. After purification, this classified hazardous waste is regenerated into solvents that can be commercialized and meet industrial demands. Each year 5 million tons of non-regenerated solvents are produced in Europe (20 million worldwide). By 2023, the Almelo site will be able to process 30,000 tons of solvents per year. With this facility, Veolia enables its industrial customers to reduce their carbon footprint.

In the USA

Veolia operates four sites around the country dedicated to solvent recycling: Azusa in California, Henderson in Colorado, Middlesex in New Jersey, and West Carrollton in Ohio. The Group's advanced technologies mean it is able to meet the needs of a very large number of industrial clients (refineries, chemical industries, etc.).

04

INVENTING TOMORROW: CENTRAL TO EVERY VEOLIA INNOVATION

As a pioneer in the treatment and recovery of liquid and hazardous waste for almost 50 years, Veolia has always innovated so that it can better anticipate the emerging needs of its clients and adapt to changing industrial landscapes in Europe and around the world.

ANTICIPATING THE EMERGING NEEDS OF ITS CLIENTS AND ADAPTING TO CHANGING INDUSTRIAL LANDSCAPES IN EUROPE AND AROUND THE WORLD

As early as 1975, in response to pollution in the River Seine, Veolia founded SARPI, a subsidiary specializing in treating the liquid waste that industrial companies of the day would discharge directly into the river. Protecting the environment, natural resources and human health was already deeply embedded into Veolia's purpose.

Today, whether in emerging, recent or mature markets, the challenges are changing and the responses require ever greater levels of technology and innovation. The power of digitalization makes it possible to go further, and faster, in the ways that facilities are managed and run. Veolia has created a smart monitoring solution, known as Hermod, which makes it possible to manage and continuously improve performance at its facilities.

04 — Inventing tomorrow: central to every Veolia innovation

Another challenge we are able to meet is our clients' increasing demands for reductions to their carbon footprint: choosing the right treatment sector for each waste flow; taking account emissions made or avoided once the pollution has been properly treated; trials at our hazardous waste incineration sites looking into solutions for capturing and recovering CO_2 emitted during high-temperature waste combustion. A trial into mineralizing incineration by-products is currently underway, converting CO_2 captured in flue gases into carbon trioxide (CO_3).

USING DIGITAL TECHNOLOGIES TO RUN THE GROUP'S FACILITIES

Faced with the complexity of processes used to manage environmental and health risks, and for recovering waste from the pharmaceutical, petrochemical or nuclear industries, Veolia has rolled out digital technologies across its business lines, primarily to improve how its treatment facilities are managed and run.

In terms of technology innovations, Veolia leverages synergies created across its Water-Water-Energy activities. Our Hermod technology is a good example of this. Initially developed by Veolia's water business, this monitoring tool was then adapted to meet the requirements of liquid and hazardous waste treatment and recovery sites. It makes it simpler to conduct analyses of incineration lines and to detect, for example, the presence of any unwanted air intakes. This can potentially increase waste loads by 15 to 20%, which represents a significant improvement in these plants' treatment capacity. Hermod then collects data from sensors located in every part of an installation, paving the way for automated analyses. Automated mode makes it simpler to fine-tune how a unit operates, the amounts of reagents used, ash content, etc. It is currently being trialed in France and North America.

Hermod can potentially increase waste loads by 15 to 20%.

INVENTING
TOMORROW'S LIQUID AND HAZARDOUS WASTE TREATMENT AND RECOVERY

To make it certain that it is able today to tackle the challenges facing its clients and the planet tomorrow, whether technological, economic, sanitary or environmental, Veolia designs innovative solutions for treating waste that contains sulfur, for capturing fluorinated gases to reduce greenhouse gas emissions, and for extracting perfluorinated alkylated substances (PFAS).

Cutting greenhouse gas emissions

How to limit emissions of fluorinated gases?

Cutting greenhouse gas emissions is fundamental to combating the climate emergency. To help industrial companies reduce their carbon footprint, Veolia has perfected a technology for capturing and treating fluorinated gases. This is a high-impact solution for the future, since the global warming potential of hydrofluorocarbons (HFC), for example, is approximately 15,000 times greater than CO_2.

Environmentally friendly shipping

How to process waste that contains sulfur?

A cruise liner emits around 300 metric tons of sulfur dioxide each year. This pollutes water and air, and has widespread negative health impacts for people who live near ports. To combat this form of pollution and assist shipping companies to comply with new regulations, Veolia designed and rolled out a solution for capturing sulfur emissions from ships' engines.

Treating perfluorinated alkylated substances (PFAS)

How to avoid concentrations of PFAS?

Manufactured since the 1940s, these chemical substances are used in many industries (textile, household appliances, automotive, construction, electronics, etc.). The problem is that these chemicals are extremely persistent and highly damaging to the environment, contaminating water, soil and foods. They also accumulate in the body and lead to serious health consequences. To avoid endlessly concentrating PFAS, Veolia is working on decontamination and extraction solutions for these dangerous compounds that are contained, for example, in fire-fighting foams.

IMPACTFUL SOLUTION

SOIL DECONTAMINATION

05

6,400

polluted or potentially polluted sites
in France

3 MILLION SITES

in Europe have been potentially impacted
by activities liable to cause soil pollution

33%

of land has been degraded
as a result of human activities

BACKGROUND

Their very nature means that pollutants—organic (hydrocarbons) or non-organic (made from heavy metals such as lead, mercury, copper and zinc), toxic chemical or biological products—pose risks to ecosystems. They cause dangerous soil contamination when present in high concentrations. In France, the Ministry for Ecological Transition estimates that there are 6,400 polluted or potentially polluted sites. In China, 16% of the land is affected. In Europe, 3 million sites have been potentially impacted by activities liable to cause soil pollution. There are 530,000 sites in the USA, covering over 90,000 square kilometers. Worldwide, 33% of land has been degraded as a result of human activities (intensive agriculture, industrialization and urban sprawl).

These pollutants affect groundwater, surface water and humans, via skin contact, ingestion, from eating plants grown in contaminated soil, and via the inhalation of particles. The consequences are startling: around the world, pollution causes 500,000 premature deaths every year.

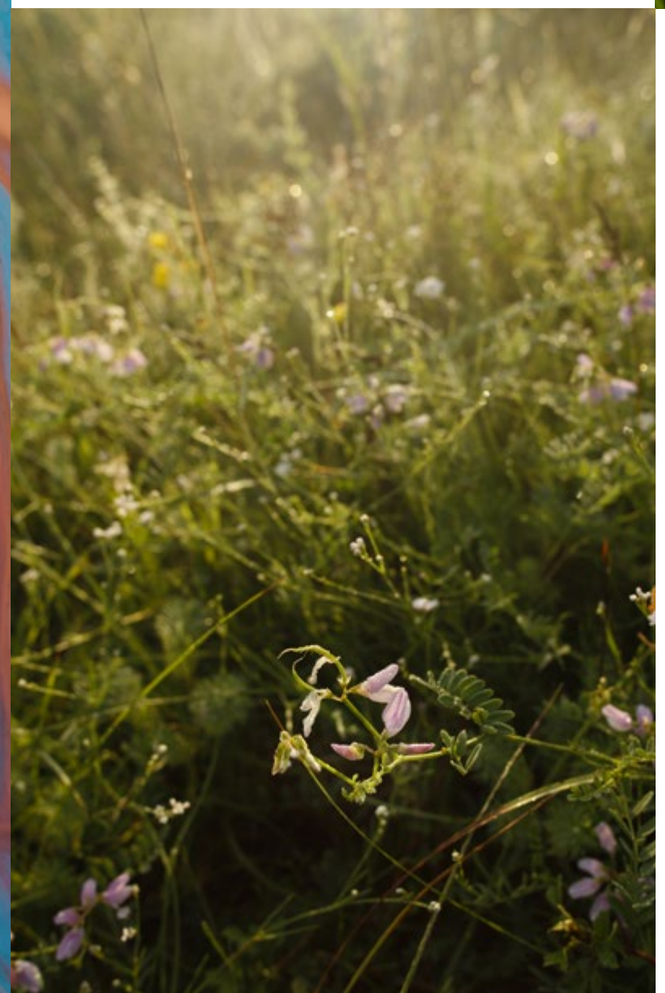
SOLUTION

These phenomena are accentuated by global population growth. This leads to rampant urban growth, meaning that former industrial sites need to be converted to other uses, but without posing threats to human health and the environment. This requires soil decontamination, either directly on-site or at an off-site location. This stage is vital in terms of health and safety. Soil is dug up and then transferred to a Veolia treatment center for biological, chemico-physical or heat treatment, or heat-treated on-site. After treatment as a function of the specific soil characteristics, it is either recycled as in-fill or reburied. There is total material traceability at every stage. This offers multiple benefits: lower environmental footprint, ability to reuse treated soil, on-site recovery of excavated soil, etc.

The fight against soil pollution uses processes that rely on chemico-physical treatments that are often environmentally aggressive as well as being expensive. To side-step these drawbacks, Veolia is testing various treatments that are less harmful to ecosystems and cheaper to deploy.

Phytoremediation

This technique uses types of plants that naturally absorb pollutants such as nickel, arsenic and lead, that are present in the soil. The process is more environmentally friendly than chemico-physical treatments that involve excavating the soil. Although the process is already in use experimentally, improvements are needed to adjust the plants' properties, accelerate natural pollutant assimilation cycles and improve their post-remediation treatment. Once they have absorbed metals, the plants have to be incinerated to avoid recontaminating a new environment.



Biological soil treatments using micro-organisms

This is another minimally invasive technique that is more respectful of the environment. It uses the proliferation of micro-organisms to degrade certain pollutants such as polychlorinated biphenyls (PCBs). These micro-organisms need nutrients to grow and accelerate breakdown of pollutants. Further work is needed to identify the most suitable micro-organisms and the most efficient nutrient mix as a function of the type of pollution, oxygen level, ambient humidity and temperature.

In Milan, Italy

Veolia is in charge of the remediation of the Santa Giulia district, a partially built-up former industrial area.
This project is one of the largest urban redevelopment projects in Europe.
Thanks to their experience in the treatment of hazardous waste and the remediation of polluted sites and soils, Veolia's teams are working on 64 hectares to clean up 1.2 million m^3 of soil on site (excavation, sorting, washing, stabilization and backfilling), while treating 300,000 tons of soil and materials off site for disposal or recovery, depending on their characteristics.

At the end, the area will include a residential area of 3,000 accommodations, a business center, a large park and green spaces, as well as shops and leisure facilities. It will also be home to the "Pala Italia" Arena, a future emblematic entertainment and sports venue where some of the 2026 Winter Olympics events will take place.

IMPACTFUL EXAMPLE

Since 2016, working in partnership with Société du Grand Paris, Veolia has been carrying out major soil clean-ups in urban areas as part of the Grand Paris Express project (4 new metro lines, 68 new stations, 200 kilometers of new track). The Group is in charge of cleaning up a portion of the spoil generated by construction work, estimated at 45 million metric tons. Polluted soil will be treated off-site then mixed with organic matter to transform it into fertile soil, or be reused at other Grand Paris construction sites.

The Group is in charge of cleaning up a portion of the spoil generated by construction work, estimated at 45 million metric tons.

IMPACTFUL SOLUTION

BATTERY RECYCLING

06

BACKGROUND

In Europe, sales of electric vehicles (100% electric or battery hybrid) rose from 3% of the market in 2019 to 10.5% in 2020 (source: ACEA). In Norway, they account for 54.9% of the market. According to Global EV Outlook 2021, by 2030 there will be between 145 and 230 million electric vehicles on the road. Although it does lower tail-pipe emissions of CO_2, the growing popularity of electric vehicles also raises the problem of large-scale recycling for vehicle batteries, which contain polluting materials.

An average electric vehicle battery weighs 300kg, some weigh twice this amount. Batteries contain plastics, solvents and electronics and, primarily, metals, some of them increasingly scarce, such as copper, cobalt, nickel, manganese, aluminum and lithium. In addition to increasing resource scarcity there is also the fact that these elements are harmful to human health and the environment.

In the face of this major ecological and industrial challenge, the European Union now requires 50% of total battery weight to be recycled.

BETWEEN 145 AND 230 MILLION

electric vehicles on the road by 2030

An average electric vehicle battery weighs

300KG

The European Union now requires

50% OF TOTAL BATTERY WEIGHT TO BE RECYCLED

SOLUTION

Veolia has designed and perfected electric vehicle battery treatment solutions that protect the environment and recover the rare metals they contain, transforming them into secondary raw materials.

Working via its Euro Dieuze Industrie subsidiary, Veolia offers a five-stage solution for recycling electric vehicle batteries, helping to limit the extraction of natural resources by recovering copper, plastic and electronics and in particular rare earth metals:

1. Diagnosis, making safe and complete discharging the battery
2. Dismantling each element for transfer to the appropriate recycling stream
3. Cutting up to extract the active cells
4. Grinding to render metals accessible
5. Hydrometallurgy, for chemical extraction and subsequent recovery of metals

IMPACTFUL EXAMPLE

To meet the strategic challenges surrounding access to cobalt, nickel and lithium, the raw materials needed to produce vehicle batteries, Veolia has created a local circular economy consortium, working with Solvay, and Renault, the vehicle manufacturer. This partnership gives a new life to used lithium-ion batteries and optimizes their recycling, from collection to dismantling, extraction and purification of the metals they contain. These metals are then transformed into new materials ready to be returned to the battery manufacturing process.

KEY ACTIVITY DATA

GLOBAL **GEOGRAPHICAL AND INDUSTRIAL** FOOTPRINT

Present in over **28 countries** worldwide

285 treatment and recovery plants

APPROXIMATELY 6 MILLION

metric tons of waste processed

+10%

Organic growth up between per year, since 2014

3.06 BILLION OF REVENUE

euros (2021)

ACTIVITY **BREAKDOWN** TODAY

27%	23%	10%	24%	16%
incineration	chemico-physical treatments	transfers	landfill	materials recovery

SAFETY AT WORK

Frequency rate	Severity rate
6.84	0.33

(2021)

A BUOYANT MARKET

THIS ACTIVITY
represents a strong source of growth for Veolia:
revenue is forecast to reach

4 billion euros

in 2023.

The amount of liquid and hazardous waste produced worldwide is increasing constantly:

THIS MEANS THERE IS **VERY HIGH POTENTIAL** FOR FURTHER GROWTH

Veolia Communications Department
July 2023

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