

VEOLIA **PLANET**

Appointment

Ecological transformation:
a necessary disruption?

Frontline

Water Reuse:
its time has come

And tomorrow?

Ecological transformation:
a question of scale



Ecological transformation:
LET'S THINK BIGGER!



PLANET

RESOURCING THE WORLD

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ANTOINE FRÉROT
Chairman and CEO of Veolia

“

We sounded the alarm in a heartfelt manifesto released in the early days of 2021: “the ecological emergency cannot wait!” Noting that targets for cutting greenhouse gas emissions set five years earlier by the Paris Agreement were becoming ever harder to reach, we made the deliberately provocative suggestion that “we need a depollution giant to face up to the pollution giants.”

A few months later the merger with SUEZ became a reality and, together, we rolled out a campaign that caused our stakeholders to sit up and think, encouraging all of them to carefully consider the underlying reasons behind the work we do with the bold statement that “Ecological transformation is our purpose.” We deliberately chose new words to clearly state our intention to go beyond just transition, preferring to talk in terms of transformation, a process that entails making tough but firm choices that are pivotal for the planet and our societies.

Thierry Libaert, author of *Des Vents Porteurs*, which won our 2021 Environment Book Prize, tells us that in terms of ecology “nothing will truly be possible if we fail to shift our mental imagery, our perceptions, beliefs, ways of being and, ultimately, the ways that we communicate.” We also believe, as he does, in the rallying power of words and ideas.

“Never has there been a greater need for us to continue to seek out fresh thinking, ensuring that new ideas, innovations and collective intelligence remain central to what we do and how we operate.”

We communicate to explain the meaning of what we do as a business, but also because we have to be accountable to the public, whose opinions we welcome and take into account. At a time when we are taking complex decisions for Veolia’s future, the story we have written together over the past years, a process that culminated in our purpose, has instantly positioned us as a credible actor to build, with SUEZ, this depollution giant, the global champion of ecological transformation. And as we look back over an exceptional 2021, Veolia has further strengthened its image among the public, remaining by far and away the company most commonly

cited for its commitment to protecting the planet (source: Image Survey, Elabe, 2021).

As we stand at the threshold of a new page in the history of our Group, never has there been a greater need for us to continue to seek out fresh thinking, ensuring that new ideas, innovations and collective intelligence remain central to what we do and how we operate. Planet, which we are relaunching with a new look, is one of the many tools we can use first and foremost to tell the tale of Veolia to each other at a moment when our community is growing and everybody needs the keys to understanding our business. But also to share our story with all our stakeholders so they can see our usefulness for themselves.

To constantly recount the tale of Veolia is to remember that we have accomplished tremendous things together, ever since our Group was founded in 1853. Perhaps most importantly of all, it also encourages us to do even more in the future!



Laurent Obadia

Laurent Obadia

EDITOR-IN-CHIEF

Veolia Executive Vice President, Director of Stakeholders and Communications, Advisor to the Chairman

As the world faces up to the reality of the ecological emergency, Veolia has to tackle the challenge of its own transformation and meeting the expectations raised by its commitment to creating the global champion of ecological transformation. For Veolia, the year ahead could not be more critical: we have to deliver on the promise of our expanded team, ready to create innovative responses to the growing needs of territories and industries. There's not a minute to lose, and our suddenly enlarged group of people needs to know where we're coming from and where we're going. Giving meaning to our actions is what we've been doing, patiently and tirelessly, over the past 10 years and more, focused always on one united Veolia, with its purpose and values, its roots and its ambitions. We are proud of the Veolia recounted in Planet, the Veolia of resourcers, who represent our Group's public face and collective intelligence, the Veolia of innovations that keep us at the cutting edge, the Veolia of an ecosystem of stakeholders who do us the honor of keeping up a constant dialogue with us. By building bridges, as we do here, we continue to tell the story of a Veolia advancing confidently into the future.



Sophie Gour



Agny Kpata

Sophie Gour

Group Purchasing Director at Veolia

Sophie Gour joined Veolia in 2010 as head of consolidation and IFRS standards, before transferring to London to help strengthen Veolia's UK-based finance team. After a spell as General Secretary at SADE, she took over as head of Veolia's purchasing division in 2021.

Agny Kpata

Member of the Citizens' Convention for the Climate

Selected at random in September 2019, Agny Kpata soon became one of the best-known faces of the French Citizens' Convention for the Climate. She is currently co-chair of *Les 150*, the association for convention members.



Ilham Kadri

Ilham Kadri

CEO of Solvay

Ilham Kadri, who holds a doctorate in macromolecular physical chemistry, is convinced of science's key role in sustainability and is actively encouraging Solvay to embrace the circular economy. Previously CEO of Diversey in the USA, a subsidiary of Sealed Air that specializes in cleaning and hygiene products, her professional experience includes spells with Shell-Basell, UCB-Cytec, Huntsman, and Rohm Haas-Dow Chemical.

Events

10-11 March



WCWM 2022

WASTE CHALLENGES POST-COVID-19

The 2022 World Conference on Waste Management (WCWM) brings together participants including renowned speakers from industry and the academic world along with waste management experts. The conference is an opportunity to improve knowledge and share the latest trends and best practices in interdisciplinary approaches to waste management and recycling.

www.wastemanagementconferences.com

PLANET

In this issue, all mentions of the merger with SUEZ in relation to the acquisition of its activities and new appointments are subject to authorization by competition authorities.

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25-8

April May

COP 15

TRANSFORMING RELATIONSHIPS BETWEEN SOCIETY AND BIODIVERSITY

The second phase of the UN Biodiversity Conference began online in October 2021 and will see an in-person meeting of governments representatives from around the world in Kunming, China. The goal is to establish the post-2020 global biodiversity framework that will act as a launchpad for the 2050 vision: living in harmony with nature.

<https://www.cbd.int/conferences/>

28-2

February March

UNEA-5

STRENGTHENING ACTIONS FOR NATURE

That is the theme of the Fifth Session of the United Nations Environment Assembly (UNEA-5), which calls on Member States and stakeholders to implement stronger measures to protect and restore nature and nature-based solutions, in order to achieve the Sustainable Development Goals (SDGs) in their three interlinked areas: social, economic and environmental.

www.unep.org/events/unea/unea-52

N O M A D

L I F E



Daesung Lee

Photographer

Daesung Lee is a South Korean living in Paris. He has a passion for documentary photography that reflects his social commitment and his particular interests: globalization and ecology. To produce his militant series Futuristic Archaeology, he travelled to Mongolia where he discovered nomadism, undermined by desertification due to global warming, and overgrazing. His approach: invert the concept of the museum by installing gigantic banners in the heart of a landscape, to accentuate the contrast between what remains and what no longer exists. He mixes past and present, fiction and reality to highlight such important notions as heritage, descent and the very survival of humanity.

I C

© DAESUNG LEE



I N

M O N G O L I A



Changing tradition

The traditional Mongolian nomadic family is disappearing, replaced by city dwellers who have often been uprooted. Could the nomadic way of life soon be relegated to history, only to be found in museums? Daesung Lee's response is to create stagings inspired by the naturalist dioramas presented in museums. This compositional device involves characters and objects shown in relief against a painted or sculpted background. Here, Mongolians replicate traditional scenes in front of an artificial background, protected from visitors by a velvet cord. As though they wanted to enter the diorama to survive.



© DAESUNG LEE



The threat of desertification

For thousands of years, the Mongolians have adapted to extremely hostile conditions: a very dry climate with temperatures ranging from 37 °C in summer to minus 40 °C in winter. Cultivating the land is impossible. The only solution is to raise livestock nomadically. However, due to the increasing demand for cashmere, goat farming is being intensified, replacing traditional sheep husbandry. Goats uproot plants and roots in a region where desert encroachment has reached 25% in the last 30 years and where 850 lakes and 2,000 rivers and streams have dried up.



© DAESUNG LEE



Futuristic Archeology

Climate change is exacerbating already difficult living conditions. Over the years, tens of thousands of shepherds have moved their yurts to the gates of Ulaanbaatar, the capital, to find work. They leave behind cultural baggage that has become useless to them, such as Mongolian wrestling, one of the country's three traditional sports along with horseracing and archery. With competitions organized during gatherings such as the Naadam summer festival, this expression of virility dates back to the period of the Xiongnu (ancestors of the Huns), well before Genghis Khan.



© DAESUNG LEE

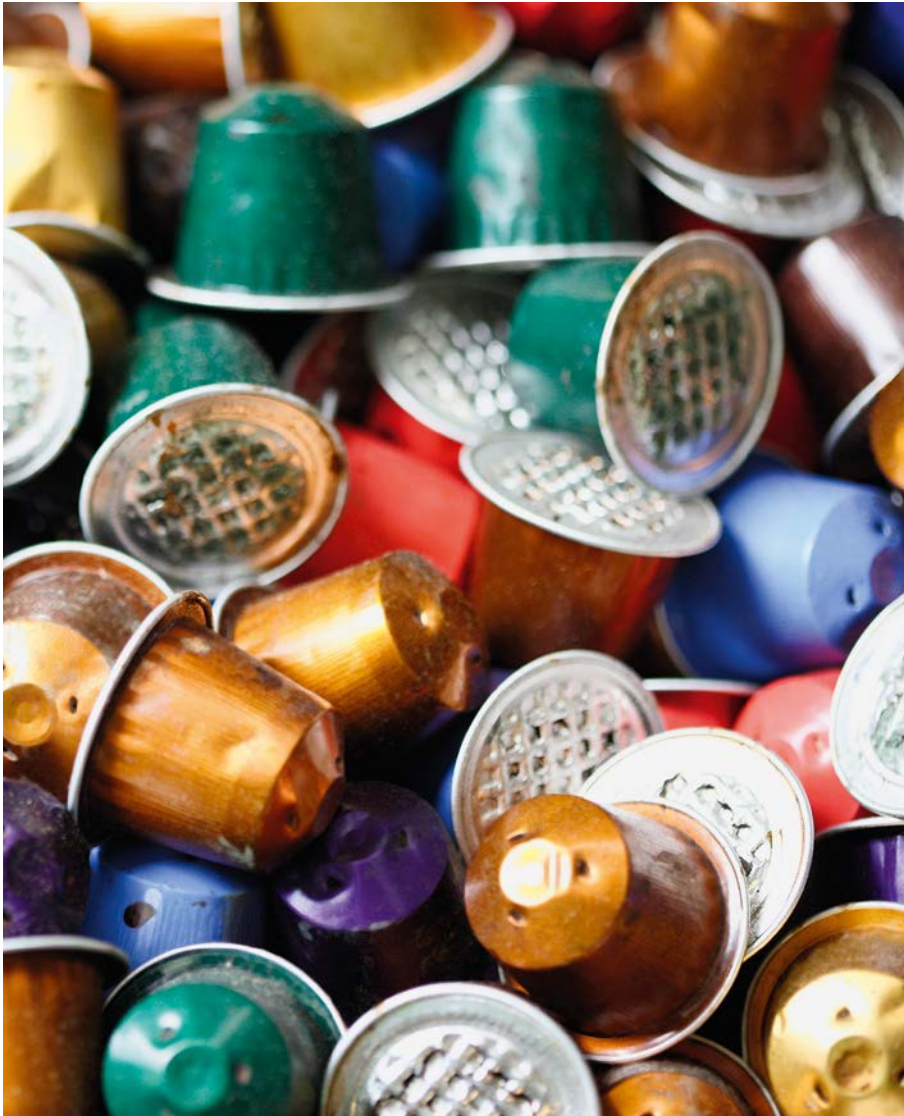


Us, not me

The exodus from the steppes to the cities is likely to continue, as the impacts of climate change intensify. At this stage, herders are sure of only one thing: they and their descendants will have to demonstrate, yet again, the exceptional adaptability that has characterized Mongolian nomads for centuries. And in doing so, they are reminding us that we have already lost our connection with nature.



© DAESUNG LEE



FRANCE

Unlocking value from coffee capsules

The founding members of the Alliance for the Recycling of Aluminum Capsules (ARCA) – Nespresso France, Nestlé France and Jacobs Douwe Egberts France – join forces with Veolia to make sure this activity is located in France. At the start of 2021, Veolia's Valopôle site in Bôve, northern France, began deconstructing and recovering coffee capsules collected from all over France using a specially adapted machine that can separate and sort aluminium from coffee grounds. Once compacted, the metal is sent for refining and the grounds – which account for 90% of a capsule's weight – are added to organic waste streams to create compost. Production is scheduled to hit 5,000 metric tons a year, sourced from 415 million capsules.

A TEXTBOOK PARTNERSHIP BETWEEN VEOLIA AND THE CITY OF RICHMOND, CALIFORNIA, delivers positive results. As part of a 20-year contract to operate and update the city's wastewater treatment plant, Veolia succeeded in resolving 84% of structural bottlenecks. The city has renewed its trust in Veolia to carry out the long-term modernization program.

JAPAN
New milestone in the water sector in Japan

This is a Japanese first, made possible by a 2018 change in legislation. Veolia has won the contract to manage, operate and modernize drinking water installations in Miyagi prefecture. The 20-year concession contract is the first to include the supply of drinking water. Veolia heads a consortium of nine local partners, including leading Japanese specialist Metawater, that will develop a comprehensive digital platform to manage and store all data relating to the concession. This key feature will help Miyagi prefecture tackle challenges centering on a declining population and aging infrastructure, and will also ensure that the services delivered are durable, resilient and high quality. Another important feature is the commitment to constantly sharing information with stakeholders.



WORLD

First SIM card eco-designed with Thales

In partnership with Thales, the world's leading SIM card producer, Veolia has contributed to the eco-design and manufacture of these small, technologically advanced cards that are so critical to cell phone users. Eco-SIM cards are made from plastic recycled from refrigerators. This is a major advance in the light of the 4.5 billion SIM cards manufactured worldwide in 2020, representing 19,000 metric tons of plastic. Using recycled material means Thales avoids consuming 5,000 metric tons of virgin plastic and emitting 15,000 metric tons of CO₂ every year.

UNITED ARAB EMIRATES

Recycle from home with the RECAPP app

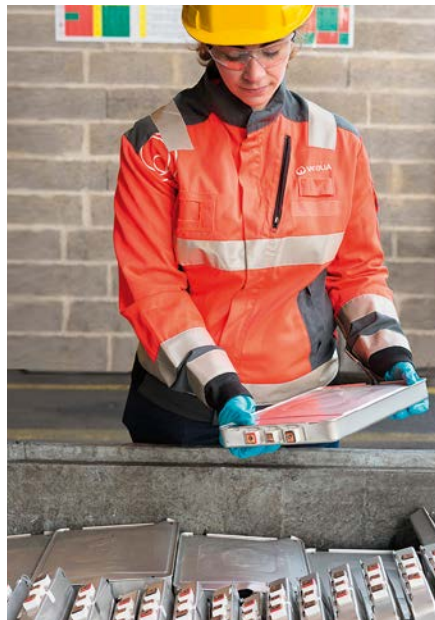
RECAPP is a Veolia-designed app that offers the UAE's first free online service for on-demand doorstep collection of recyclables. The idea is to make recycling plastic bottles and aluminium cans easy and available to as many people as possible. After creating a RECAPP account, every family member can book a doorstep collection to help with the recycling process. And users earn points as a function of the weight of recyclables collected. An online marketplace is available to redeem points for gifts offered by the operation's partners: Coca-Cola, Nestlé, PepsiCo, Majid Al Futtaim and Unilever. Launched in late 2020, RECAPP already numbers 1,500 loyal users and has collected over 3 metric tons of recyclables.



EUROPE

Closed loop for end-of-life electric battery metals

With global demand for electric vehicles rising rapidly, for several years industrial companies have been looking into how to recycle and recover core components from EVs: batteries and the three strategic metals they contain, cobalt, nickel and lithium. The consortium made up of Veolia, automobile manufacturer Renault Group and chemicals specialist Solvay has set itself the goal of reusing at least 95% of metals to manufacture new batteries. This points the way to new forms of collaboration in the EV battery value chain. How? By combining advanced technologies with extraction and purification processes. The pilot plant at Dieuze, France, signals the emergence of this new ecosystem.



THE 2021 STUDENT SOLIDARITY PRIZE

was presented to three winning nonprofits: Cordilleras, for *In the Glaciers' Shadow*; Impulso, for *Impulso agro-engineering program Ecuador*; and Hum'am, for *Djendoub'art*, a cheese-making cooperative in Tunisia.

VEOLIA WILL TREAT WATER AT THE KUSASALETHU GOLD MINE IN SOUTH AFRICA

owned by Harmony Gold. Predicted benefits include sustainable management of water resources, transfer of key skills and a contribution to regional growth and economic development.

WORLD

Biofuel from microalgae

Cultivating microalgae that rely on sunlight and atmospheric CO₂ to grow is key to producing next-generation low-carbon biofuel. Veolia and energy company TotalEnergies are pooling their expertise at Total's La Mède biorefinery where they are running a four-year research project with a testbed that will compare various innovative microalgae culture systems to identify the most efficient. Each partner brings its own expertise: Veolia in water technologies and algae biomass recovery, TotalEnergies in refining and manufacturing advanced biofuels, and in capturing and recovering CO₂.



VEOLIA RECEIVES RECOGNITION AT IE EXPO CHINA 2021 IN SHANGHAI, an event dedicated to environmental technologies, ranking number 1 on the Top 100 Enterprises List. A strategically valuable position as China's 14th five-year plan (2021-2025) sets the country on the path to carbon neutrality by 2060.

BRAZIL

3 Veolia sites produce power from biogas

As of October 2021, three new electricity generating plants running at waste recovery centers in Sao Paulo and Santa Catarina states have been producing renewable electricity from biogas created from the decomposition of organic waste. In the medium term, Veolia hopes to be generating 12.4 MW from these sites, enough to meet the heating and electricity needs of a Brazilian town with 42,000 residents. Veolia is also investigating other ways to recover biogas in Brazil, specifically by producing biomethane for the natural gas network or as a fuel for vehicles. By the end of 2021, biogas captured at Veolia waste recovery centers in Brazil will have prevented the emission of 45,000 metric tons of methane into the atmosphere (1.26 million metric tons of CO₂ equivalent).

WORLD

High quality recycled plastic for L'Oréal

Determined that all its plastic packaging will be 100% biosourced or recycled by 2030, the world's largest cosmetics company chose Veolia to supply it with high quality recycled plastic. Obtained by processing post-consumer packaging waste such as bottles and flasks, the plastic must be food grade. This technological feat is made possible thanks to a process perfected by Veolia to eliminate organic compounds from the treated material, producing a plastic of the same quality as virgin plastic. This plastic meets the strictest international certification standards, including those set by the US Food and Drug Administration.

UZBEKISTAN

Modernizing Tashkent's district heating system

Veolia is to modernize the system that supplies heating to the Uzbek capital, previously managed by public operator Toshhissikkuvati. The 30-year public-private partnership will generate €13.4 billion in revenue. Veolia will fit individual meters in homes and has been given 10 years to separate the domestic hot water and heating circuits, whose Soviet design is a source of considerable energy losses. The contract covers renovations to 181 boiler installations, installation of 28,000 heat outlets, rebuilding 841 kilometers of existing pipes and fitting 576 kilometers of new pipework. The planned works also include the introduction of technical auditing and a billing system to international standards.

IN DOMINICA, A CONSORTIUM MADE UP OF CFG AND SEURECA, A VEOLIA SUBSIDIARY, is involved in the construction of a geothermal power plant that will replace 35% of the country's installed generating base, mostly fossil fired.



Moment of truth for COP26

Three clear themes emerge from listening to the views of the 30,000 participants at the 26th Conference of Parties:¹ time is running out for meeting the target of a 1.5°C rise in global temperatures, countries continue to make announcements about cutting their carbon emissions, and the gap between words and actions remains as wide as ever. Among the 196 countries represented, 100 committed to halting deforestation, another 100 to a 30% cut in methane emissions by 2030, and 40 to halting all domestic coal mining from 2023. But numerous observers remain dubious because the countries that cause the most CO₂ pollution — China, Russia,

India, Australia and the USA — are not on these lists! Perhaps the best hope lies with civil society? Representatives from 450 financial institutions, managing assets worth around \$130 trillion, agreed to put clean technologies at the heart of their investments. But tackling the tricky issue of climate justice was once more left unresolved. We will have to wait until 2022, when COP27 will be held in Egypt, to check whether countries will deliver on their promises.²

1. COP26 in Glasgow, Scotland (October 31 – November 13, 2021).
 2. The United Nations' view is clear: even if countries stick to climate commitments made since the 2015 Paris Climate Agreement, the planet is still heading for a 2.7°C rise in temperature by the end of the century! (Source: Addendum to the Emissions Gap Report 2021, UN Environment Programme).

USA: \$1.2 trillion infrastructure modernization package

President Biden's ambitious infrastructure plan has been approved by the US Congress.¹ In terms of the scale of the proposed upgrades, headline total investment and proposed timescale — a generation —, the plan is comparable to President Roosevelt's New Deal in the 1930s.² The package will fund massive upgrades to national infrastructure, including 32,000 kilometers of roads, 10,000 bridges, and the national power grid. Substantial sums will be spent renovating public schools, improving universal access to digital technologies, and removing lead water pipes. The plan also includes support for the development of renewable energies. Millions of new jobs will be created in the short term. To fund all this, Congress has given the green light to \$550 billion of new federal spending as well as setting new guidelines for public-private partnerships. The federal government will also claw back \$125 billion in previously approved public expenditure that was never used, and is preparing a new tax on cryptocurrency. The assumption in Washington is that the economy will quickly return to growth and rising tax revenue will help balance this colossal budget. ▶


1. Congress is the legislature that votes on federal laws. It consists of two chambers, the Senate and the House of Representatives. The infrastructure package was passed by the Senate in August, but still had to pass the House of Representatives to become law. The House voted in favor on November 5th.
 2. The New Deal was designed in response to the severe economic depression that swept the USA in the wake of the 1929 Wall Street crash.

It's time to act

Ecological transformation campaign

In its role as the benchmark company for ecological transformation, Veolia is committed to accelerating and expanding the rollout of existing solutions while simultaneously creating the solutions of tomorrow. To help drive home the scale of its commitment, Veolia has launched a campaign to highlight impactful, game-changing solutions that tackle four major issues: fighting climate change, treating pollution, optimizing resources and improving quality of life.


DISPOSABLE
DISTAINABLE
SUSTAINABLE



To tackle environmental challenges, adapting is not enough. Climate change, biodiversity collapse, widespread pollution, resource depletion... Our societies need solutions to radically turn the tide, like converting peelings into fertilizer and energy.

Ecological transformation, that is our purpose.

For more information go to veolia.com/eco-transform

Resourcing the world 

DEplete
DEplete
COMPLETE



To tackle environmental challenges, adapting is not enough. Climate change, biodiversity collapse, widespread pollution, resource depletion... Our societies need solutions to radically turn the tide, like converting peelings into fertilizer and energy.

Ecological transformation, that is our purpose.

For more information go to veolia.com/eco-transform

Resourcing the world 

POLLUTION
POLLUTION
SOLUTION



To tackle environmental challenges, adapting is not enough. Climate change, biodiversity collapse, widespread pollution, resource depletion... Our societies need solutions to radically turn the tide, like converting peelings into fertilizer and energy.

Ecological transformation, that is our purpose.

For more information go to veolia.com/eco-transform

Resourcing the world 

REMOVE
REMOVE
RETAIN



To tackle environmental challenges, adapting is not enough. Climate change, biodiversity collapse, widespread pollution, resource depletion... Our societies need solutions to radically turn the tide, like converting peelings into fertilizer and energy.

Ecological transformation, that is our purpose.

For more information go to veolia.com/eco-transform

Resourcing the world 

“The challenges that lie before us are huge. Many of tomorrow’s solutions have yet to be created. The aim of this campaign is to raise public awareness of these critical issues.”

Laurent Obadia,
Veolia Executive Vice President,
Director of Stakeholders and Communications,
Advisor to the Chairman

The campaign consists of 10 visuals for use in mainstream and specialist press, on social media and online, to run in France and the 40 or so countries worldwide where Veolia has a presence.

With each format, readers are encouraged to discover a Veolia initiative relating to one of its business lines, symbolized by word pairs that transform before their eyes. A second campaign will run in 2022, focusing on Veolia’s resourcers, one of

the driving forces behind ecological transformation.

All the campaign content can be viewed online at:
www.veolia.com/en/eco-transform ▶

Green taxonomy's climate scope

70 

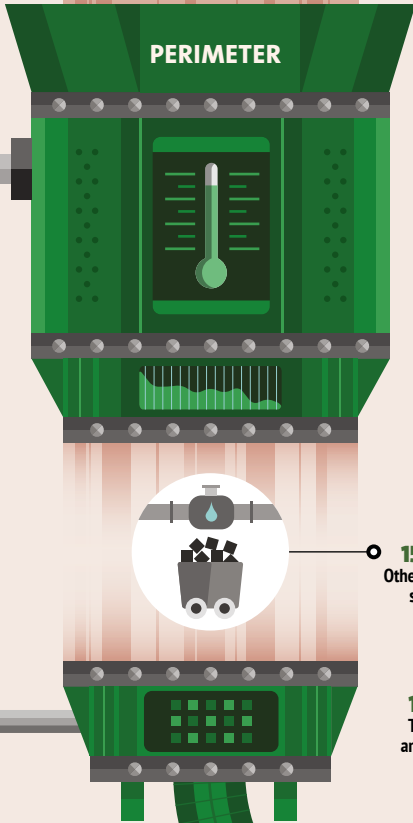
business sectors as defined in the European nomenclature, representing

93% 

of greenhouse gases (GHG) emitted across the Union's territory



14.7 %
Agriculture, forestry and fisheries



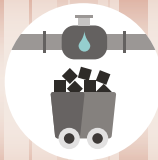
Listed as an eligible activity

Make a substantial contribution to at least one of the six environmental objectives

Do no significant harm to the five other environmental objectives

Comply with minimum social safeguards

Used to establish quantitative and qualitative compliance criteria in the rollout phase for climate objectives 1 and 2 and in the definition phase for objectives 3 to 6, in order to list eligible activities.

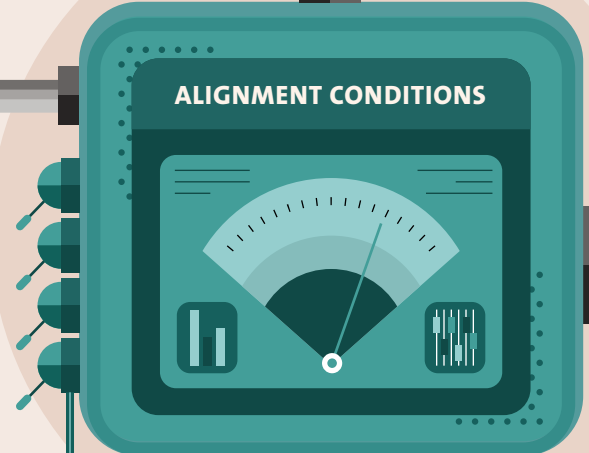


15.9 %
Other business sectors

23.9 %
Manufacturing

15.2 %
Transport and storage

30.3 %
Electricity, gas, district heating and cooling



EUROPEAN GREEN TAXONOMY

The European Union Taxonomy is about creating a system of measures to assess the sustainability of companies' activities.

CLASSIFICATION TO IMPROVE SUSTAINABLE ACTIVITY FUNDING

6 ENVIRONMENTAL OBJECTIVES



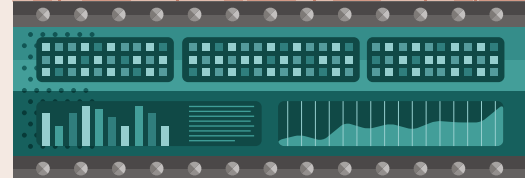
- 3. Water and marine resources
- 4. Circular economy
- 5. Pollution prevention and control
- 6. Biodiversity & ecosystems



- 1. Climate change mitigation
- 2. Climate change adaptation

100g of CO₂ per kWh

The compliance criteria include a highly ambitious CO₂ emission threshold per kWh.



© ILLUSTRATION BY VALERIO PELLEGRINI

Transition activities
for which low-carbon alternatives are not yet available. They form a temporary intermediate stage.

Activities supporting
at least one of the six environmental objectives. They must do no harm to the other five.

Enabling activities
are not necessarily low-carbon, but they provide crucial solutions for the rollout of green activities.

3 CATEGORIES OF ACTIVITIES

INITIAL RESULT
The taxonomy of the 2 climate objectives



Mandatory reporting for the climate criteria will apply starting in 2022 for financial and non-financial businesses.

With its green taxonomy, the European Union aims to steer investors and companies towards financing the most environmentally and climate-friendly solutions.

Conditions and targets for directing investments

For an activity to be green, it must meet the alignment conditions, linked to the 6 environmental objectives. This means a company will be defined according to a percentage of green sales, green expenditure and green investment, providing investors with an idea of the "greenness" of their business portfolio and projects. The delegated acts defining the climate criteria were published in December 2021, with the exception of an expected additional arbitration on nuclear and natural gas. Work is continuing on the other 4 objectives and

will be the subject of delegated acts published by the end of 2022. Starting in 2022, companies subject to a Statement of Extra-Financial Performance (SEFP) will be asked to publish their percentage of green activities for climate change mitigation in 2021. Then the following year in relation to all 4 environmental objectives.

An exportable tool

The green taxonomy will contribute to the development of the International Platform on Sustainable Finance (IPSF), introduced by the EU in October 2019. With 17 member countries, the platform will be able to use the European taxonomy to direct international finance toward the most virtuous industrial activities.¹

1. https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/international-platform-sustainable-finance_en

Ecological transformation: a necessary disruption?





R I N G

**with
Ilham Kadri,
Agy Kpata,
and Antoine
Frérot.**



ILHAM KADRI

CEO and President of the Executive Committee
of Solvay

AGNY KPATA

Member of the Citizens' Convention for the Climate¹
and co-chair of *Les 150*

ANTOINE FRÉROT

Chairman and CEO of Veolia

W W S

1. An unprecedented democratic exercise in France, the Citizens' Convention for the Climate is an initiative set up by the President that was tasked with defining a set of measures to make possible a cut of at least 40% in greenhouse gas emissions by 2030. After 17 months' work, the Convention presented 149 proposals in June 2020.

**“It’s quite simple:
the climate
emergency demands
a paradigm shift,
meaning a radical
transformation is
needed.”**

Ilham Kadri

What the world needs are rapid actions and a collective commitment, solutions that are economically and ecologically efficient, citizen involvement, a way of measuring efforts, and so on. A few weeks after COP26, judged a failure by some, Planet decided to (re)launch the debate into issues that have never been more relevant!

Why does the climate emergency mean our societies need an ecological transformation rather than just a transition?

Ilham Kadri: It's quite simple: the climate emergency demands a paradigm shift, meaning a radical transformation is needed.

Agny Kpata: Transition implies a measure of impetus, of committing to making changes despite a lack of any clear vision of the way ahead. This uncertainty dissuades many actors from making the leap, which is why achievable targets and assistance backed by clear indicators are so important. To be effective, environmental and climate considerations have to be part of a coherent set of overall measures. And because constraints and differences of opinion tend to impact the decision-making process, this means that the behaviors of all stakeholders — citizens, businesses, public bodies and politicians — must be transformed. This is a matter of life and death!

Antoine Frérot: The scale and urgency of the climate challenge — and more generally all the environmental challenges humanity faces — mean half-measures are no longer enough. We need to embark on a far-reaching and vigorous shift of our economic models. This is not the time to suggest transitions; our ambitions have to be greater, more demanding, and more urgent.

What is broken in the current socio-economic model? And what models do we need to adopt to effectively implement this transformation?

A.F.: Our current economic model is doubly profligate, the resources it takes from nature generate scarcity, and discharges into nature are synonymous with pollution. In time we will face seemingly simple binary choices: circular economy or shortage economy; sustainable business models or an exhausted natural world; innovation or pollution.

I.K.: I agree! In a world where resources are finite, our industrial model has to change. We have to shift from linear take-make-dispose habits, pivoting to embrace a mindset guided by the circular economy and regenerating resources.

A.K.: The Citizens' Convention for the Climate takes a similar view. Helping build a society that is low-carbon, sustainable, ethical, just and respectful of lives and the planet means we

have to produce to live, not the reverse. The solutions already exist, but they need monitoring and support. And current frameworks, whether investment guidelines, public procurement regulations or training and the support given to businesses, prevent this issue from being properly addressed.

What must we commit to for this transformation to become a reality?

A.K.: The Paris Agreement, the French national low-carbon strategy for 2050, but also a number of other laws and plans that clearly set out the commitments required. First of all we need to increase training provision by steering investment toward greener skills and green jobs. This will let us create dashboards to list at-risk professions and those where new opportunities are opening up, and to assess pilot projects at scale. This would also have the advantage of providing long-term regional forecasts to help tackle the issues we just touched on. Another commitment we suggest is that reporting is expanded and made annual, rather than every three years, and that it looks at all actors, including the banking sector, offering more transparent and regular accounting for greenhouse gas emissions generated by economic and investment activities.

I.K.: The growing awareness is something you can feel: it's now up to entire chains to create value that is shared by all. This will mean taking account of social and environmental factors, something reflected in our Solvay One Planet program, which incorporates climate, resources and quality of life. In terms of energy, there's no point being carbon neutral if the rest of the chain isn't.

A.F.: Ecological transformation is something that has to happen across multiple territories. States, cities, businesses, civil society, and individuals all have to get involved. Veolia has made five commitments, backed by 18 detailed, measurable targets. They concern our main stakeholders, by which I mean the planet, society in general, our customers, employees and shareholders.

How should the assessments you mentioned be put in place? And, more importantly, who should take the lead on this?

A.F.: We publish annual performance data based on a system of indicators that have gradually become tools used to pilot the entire business. These indicators are audited by a third party — KPMG in 2020 — and guarantee the quality of the information and results published.

I.K.: At Solvay we are working with the Ellen MacArthur Foundation to develop Circulytics, which measures the circularity of industrial activities. In a wider sense, steps to create worldwide standards are underway. Encouraging initiatives include the International Sustainability Standards Board from the IFRS Foundation, as well as future European standards tied to the Corporate Sustainability Reporting Directive.

A.K.: Let's do even more! The aim has to be to get all actors, including the financial sector, to carry out mandatory assessments of the environmental impacts of their projects ▶

Appointment

at every stage of the process. This needs to start with regular monitoring indicators so that production systems can be adapted. We need to encourage businesses to be increasingly transparent about how they embed environmental criteria into their activities, by setting up oversight mechanisms and conditioning access to public funding. Or by setting up a governance mechanism for transitioning jobs and skills across a number of sectors, working at the regional and national levels, establishing an independent observatory to make sure that a portion of regulated saving funds are channeled to green investments, etc. The Citizens' Convention for the Climate also put forward other suggestions, such as the need to promote the development of organizations working in the social and solidarity economy.

Does the planet-wide challenge of ecological transformation call for the emergence of a global environmental services giant?

A.F.: Absolutely! The world's largest companies and cities are industrial and municipal giants that need partners with the scale and skillsets to work across all aspects of their environmental impact. By merging with SUEZ we are creating a depollution giant equipped to deal with pollution on a gigantic scale.

A.K.: This merger needs to be about more than just PR or market share. If Veolia and SUEZ can pool their know-how to deliver planet-friendly innovations for the benefit of us all and the environment, well that's great! But this will all have to be assessed and a close eye needs to be kept on potential monopoly positions in the management of waste and water.

I.K.: A leading player? It all depends on the field. If you look at batteries, for example, Veolia has expertise in collecting and mechanically disassembling materials, but Solvay has the know-how in extracting and purifying metals, which it then transforms into high-quality raw materials to make new batteries. And Renault Group is both the customer and the supplier of end-of-life batteries. This collaboration means that, together, we cover the entire value chain and deliver a powerful and positive impact on the planet.

Is the conviction of the need to act fast on ecological transformation a recognition of the effectiveness of increasingly insistent pressure from civil society to tackle the environmental emergency?

A.K.: Pressure? Citizens are simply reminding our representatives of the commitments they have made! I often hear people say that too much is being demanded when in fact all we are doing is pointing to targets and standards that aren't being met. And you have to remember that it's very important to create jobs that respect environmental standards but also include people who are struggling!

A.F.: This urgency is a reaction to the facts, it predates pressure from civil society. And whether it's mega-fires, floods or record temperatures, the signs of climate change are everywhere.

I.K.: It's true that reality constantly reminds us of the climate emergency. Millennials' commitment to this issue, and the

importance they place on sustainability, prove that this is the shape of things to come. I'm convinced businesses that do not adapt to this change are destined to fail.

Is citizen involvement a non-negotiable if we are to see a genuinely ambitious ecological pivot by the various actors concerned, particularly manufacturers?

I.K.: Of course. And it's the responsibility of each and every one of us, every day, to shape the company we want to work for, and the society we want to live in and bequeath to our children.

A.F.: Citizens do influence politicians and business leaders, particularly at election time, but also because they are themselves actors in the ecological transformation. The decisions they take mean they are voting, dozens of times a day, for or against the climate, for or against waste recycling, for or against depollution.

A.K.: Citizens aren't interested in being killjoys, what they want to see is concrete action to tackle issues that concern us all. You only have to look at the number of deaths caused by air pollution, for example, to understand.

Do you feel that polluter pays rules need to be tightened?

A.F.: Around half all regulated CO₂ emission rights are priced at under \$10 a metric ton, when \$40 should be the minimum. So yes, the rules need to be tightened so that price becomes dissuasive for polluters. I also feel that the system needs to be extended to cover forms of pollution that are excluded or inadequately covered in some countries.

A.K.: The problem is that it's a system that throws the door wide open to pollution caused by businesses that can pay for it. This is why extending and improving enforcement of the Extended Producer Responsibility directive is so important. We think that any mechanism that allows industry to emit more CO₂ than permitted under our proposal for the Carbon Border Adjustment Mechanism should be banned.

I.K.: There's nothing sustainable about creating value at one point in the chain if it entails destroying environmental or social value. Thanks to approaches such as imposing an in-house CO₂ tariff of \$100 per metric ton, this is a trap that Solvay has avoided.

A.K.: Leaving the mechanisms aside, ecological transformation is also going to have a major impact on your business lines.

I.K.: We are very aware of this issue, so we're investing in training and have set up our own academy. We feel that learning, unlearning and relearning to take onboard the importance of sustainability across all our business lines is the only way progress can be reinvented. Our roadmap, Solvay One Planet, by focusing on three topics, climate, resources and quality of life, embraces the same approach.

A.F.: The environmental services champion we are now creating means that we will soon have even more know-how, talented colleagues, investment capacity and locations to help us make a success of the ecological transformation the world so desperately needs. ▶

“Citizens aren’t interested in being killjoys, what they want to see is concrete action to tackle issues that concern us all.”

Agy Kpata

“This urgency is a reaction to the facts, it predates pressure from civil society.”

Antoine Frérot



I S A -

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V E Z

A chance to meet four new members of Veolia's Executive Committee.

Isabelle Calvez, Sébastien Daziano, Azad Kibarian and Ángel Simón will soon be joining Veolia and they talk to Planet about their visions for ecological transformation.

Isabelle Calvez

Director of Human Resources at Veolia

Can you tell us about your background?

IC: After graduating from Sciences Po Paris I began my career in human resources, working at major corporations such as Thomson-CSF, Canal+, Accenture, Groupama and Carrefour before joining SUEZ. These are all leading global companies where the human dimension has always been important. Whatever the industry, specialty or corporate culture, I have nothing but good memories of the people I worked with, the quality of the interpersonal relationships and social dialogue. I am very conscious of the fact that everybody wants the same thing from an employer: a sense of meaning. And I know that's what I'll find when I join Veolia's Executive Committee in the near future.

What is your definition of ecological transformation?

It's something I can feel more easily than I can define! For me, it's central to our decision-making processes, guiding us as we rethink our activities. It's a concept I'm very aware of after my four years with SUEZ. It will help us tackle some of the major challenges facing the planet and to reconcile human and economic development with

progress. Every area of the economy is impacted, and its inclusion by companies in every sector of activity in their business models over recent years is very revealing.

What are the challenges to making our planet more sustainable?

In addition to ecological considerations, obviously I'm more sensitive to social levers. Acting on the ecology and the environment means acting simultaneously on social inclusion and solidarity: reducing poverty, empowering women and girls, and fighting inequality in all its forms. These days, major corporations are acquiring the tools needed to implement sustainable social and solidarity-centered approaches and serving as models for society as a whole.

What can Veolia draw on to successfully manage the ecological transformation?

Getting the mix between colleagues right will be key, so that we form a whole that is even more useful and relevant. We're so lucky to have 230,000 colleagues who, by working together in complementary ways, will make an even bigger daily impact on our planet.

What levers can you call on to make sure that our colleagues really benefit from ecological transformation?

Caring – making sure that others are looked after – will guide my roadmap. Clearly, we'll prioritize bringing our colleagues closer together, using ecology and our purpose as levers. We'll be working in a number of areas: skilling for the future, because digital technologies will profoundly change our traditional business lines; promoting diversity, particularly improving career paths for women, and focusing on young people, because our business lines are inspirational to a generation who want to make a difference and have a highly developed sense of environmental responsibility.

What kind of resourcer are you?

I used to be very wasteful before I became a responsible citizen! This sense of involvement feeds quite naturally into my role as head of human resources, and I realize that looking after colleagues and their sense of self-fulfillment for so many years really does help create a more sustainable planet. It's my social contribution. ▶

“Everybody now recognizes the facts: states, corporations and public opinion all understand that massive investment in ecological transformation is required.”

Sébastien Daziano

Director of Strategy & Innovation at Veolia

Can you tell us about your background?

SD: I started my career as a senior official, successively as a deputy prefect then a diplomat before moving to various ministerial cabinets, first in international trade then at the interior ministry, where I spent nine years from 2010. I was a ministerial adviser, then director of finance for the prefecture of police before moving to the national police headquarters, where I managed a €10-billion budget. My decade at the interior ministry taught me a lot about crisis management. Firstly as a result of the terrorist attacks in the years from 2015 to 2018 then, just as I'd left to join Bertrand Camus' team at SUEZ, when the Covid-19 crisis struck and, finally, with Veolia's takeover bid for SUEZ. I've decided that I want to continue my corporate career and have accepted Antoine Frérot's invitation to join Veolia's Executive Committee in the near future.

What is your definition of ecological transformation?

It's about shifting from words to actions, driven by the stark realities of the climate emergency. Everybody now recognizes the facts: states, corporations and public opinion all understand that massive investment in ecological transformation

is required. This also points to the fact that environmental considerations are going to spread into every facet of society.

What are the challenges to making our planet more sustainable?

I have identified four issues where Veolia can play a key role: decarbonizing the economy and our lifestyles; remediation and prevention of pollution; resource scarcity, and threats to biodiversity and food security.

What can Veolia draw on to successfully manage the ecological transformation?

First of all is its purpose and the ambitious roadmap Antoine Frérot and Estelle Brachlianoff are determined to implement. This is rooted in multi-faceted performance, but also recognizes the special relationships between stakeholders. This is something that gives meaning to our business lines and their roles in greening the economy. Another big plus is the arrival of 45,000 former SUEZ employees, who bring real added value with them. Our portfolio will incrementally increase to embrace new solutions: in carbon capture, agriculture, and so on. And Veolia is well placed to take advantage of favorable circumstances that

will allow it to ramp up its commitments to the climate. Finally, Veolia also benefits from being a well-known brand in many of the sectors that are essential to ecological transformation.

What levers can you call on to help implement the far-reaching innovation programs announced?

This is a good time to grow our business lines. The economic recovery plans announced by the three largest economic blocks — President Biden's infrastructure package in the USA, the European Green Deal and China's goal of carbon neutrality by 2060 — are all good news for Veolia, which now has to decide how to attract investment in our innovations as well as our traditional activities.

What kind of resourcer are you?

I hope to work with my 230,000 colleagues, to build solutions to meet the challenges of the ecological crisis. I'm optimistic by nature. I know that in every crisis, and I've seen a few, lies an opportunity for transformation. The time is right for Veolia to consolidate its global leadership and unleash its formidable capacity for innovation — to help preserve and protect the planet. ▶

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" We need to move the dial, shift the culture, convince civil society and governments alike of the overwhelmingly critical need for an ecological transformation. "

Azad Kibarian

Director of the Italy and Africa Middle East zone

Can you tell us about your background?

AK: My engineering career has always been international, ever since I joined SUEZ as a consultant engineer in water and sanitation and my work took me from Kuwait to China via Indonesia, Croatia, Algeria and Angola, among other places. This nomadic period of my career was also a fabulous learning experience! I was then posted to the SUEZ head office, where I led the energy and climate unit in the strategy division. But I missed field work, so I moved into waste management, heading up a number of business units serving customers in the industrial, aviation and nuclear sectors. SUEZ then tasked me with structuring and leading its hazardous waste activities across Europe. I'm now about to take up a new challenge at Veolia, where I'll shortly be joining the Executive Committee.

What is your definition of ecological transformation?

It's about taking a fresh look at every relationship between our society and the biosphere. It's about acknowledging that without society there is no economy, and without respecting the biosphere there is no society. It means making rapid and

far-reaching changes to our behavior and how we act as citizens, consumers and professionals.

What are the challenges to making our planet more sustainable?

Technology alone cannot solve all the environmental challenges we face. Our powerful tools and flexible habits have, taken together, allowed us to control all ecosystems to a certain degree. But this tools-led approach has reached the end of the road. We need to move the dial, shift the culture, convince civil society and governments alike of the overwhelmingly critical need for an ecological transformation.

What can Veolia draw on to successfully manage the ecological transformation?

The biggest single factor is the women and men who make the Group what it is: they are the driving force behind its successes, yesterday, today and tomorrow. Another plus is its position as leader and benchmark. This gives it the power to influence stakeholders and convince them that certain societal choices about resources are the right thing to do: reusing wastewater, carbon's high price signal,

recycling rare metals, particularly in light of the rapid shift to renewables and all-digital, and so on.

What levers can you call on to make a success of ecological transformation in Italy, Africa and the Middle East?

This is a fascinating part of the world thanks to its diversity and the opportunities it offers for rolling out Veolia's solutions, whether for access to resources, treating hazardous waste, or energy efficiency. We will tailor Veolia's know-how and responses to meet our local stakeholders' expectations. Energy services, for instance, are a great way to win over new customers in new regions.

What sort of resourcer are you?

Enquiring, open to change and doggedly determined! What I love about the term "resourcer" is the idea of regeneration, of being part of a company that is working to preserve our ecosystems and the services they give us. It's about being ready to manage the unplanned and deploy our skills and experience to solve situations that are complex, new, and local. ▶

" Our teams, the ability to create synergies, multidisciplinary skill sets, our shared insights, our forward-looking outlook, and much more, will all help us deliver ecological transformation."

Ángel Simón

Director of the Iberia and Latin America zone at Veolia

Can you tell us about your background?

AS: I am from the province of Barcelona and I graduated as a highway engineer from the Polytechnic University of Catalonia. I joined Agbar in 1995 and was posted to Chile in 1999 as CEO of Aguas Andinas. I've felt a strong attachment to Latin America ever since. On my return to Barcelona, I was appointed CEO of Aguas de Barcelona, later becoming its president. Then, in 2013 I became Senior Executive Vice President at SUEZ — Agbar's majority shareholder — in charge of Southern Europe and Latin America. I'll continue to manage this zone when I take up my position on Veolia's Executive Committee in the near future.

What is your definition of ecological transformation?

Among other aspects, it involves changing how we consume and produce, shifting from a linear to a circular model, and embracing a competitive and decarbonized economy with the support of public-private partnerships. This paradigm shift is critical to the sustainability of the planet and all of us who live on it.

What are the challenges to making our planet more sustainable?

We face multiple challenges if we have to continue protecting ecosystems and looking for ways for people and the environment to cohabit harmoniously. The climate emergency remains the number one priority as it has direct impacts on how water and natural resources are managed. This is why it's so important to focus our efforts on innovating and creating solutions that will build resilience while also delivering the quality of life that people have a right to expect.

What can Veolia draw on to successfully manage the ecological transformation?

The Group's position on this couldn't be clearer. It looks very closely at all aspects of performance, economic, environmental and social. Our teams, the ability to create synergies, multidisciplinary skill sets, our shared insights into the management of water, waste and energy, our forward-looking outlook, and much more, will all help us deliver ecological transformation.

What levers can you call on to make a success of ecological transformation in the Iberia and Latin America zone?

Above all by adopting a more comprehensive approach that aligns more closely with our customers' needs. In Spain, this will involve renovating infrastructure and developing new solutions, reflecting the Next Generation EU recovery and stimulus package. In Latin America, we will encourage investment in infrastructure, incorporating sustainability and climate change resilience from the design phase. There are multiple takeaways and synergies we can transfer and pool between Iberia and Latin America.

What sort of resourcer are you?

I'm a big fan of teamwork and determination. I also have complete faith in the ability and determination of colleagues to put their skills into practice to create solutions and establish partnerships. And although actions matter, it is just as important to explain what we do to our stakeholders, listening actively and attentively to the needs of our customers and the people we serve. ▶

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Frontline

SOLUTION



TIONS

for sustainable
balance



UN- Water Reuse: its time has come

The demand for freshwater has increased sixfold over the past century. At this rate, the world could be faced with a water shortage of around 40% by 2030. Faced with this predicted global shortage, treated wastewater reuse (TWR) is proving to be an effective solution for the future. The world's water actors, led by Veolia, will provide the foundation for this development, which will be decisive for managing the world's water resources.

Key figures

4 billion people

live in countries suffering water stress (i.e., when the demand for water exceeds the available resource).

More than **80%**

of wastewater from human activity is released into the natural environment without any treatment to remove pollution.

130 to 160 liters

/day/person is the average amount of water consumed in France. The WHO considers that 20 liters/day/person is the "vital minimum."

Almost **3,000**

wastewater treatment plants are managed by Veolia worldwide, treating 5.2 billion cubic meters of wastewater.

Issue at stake

Boost the availability of treated wastewater, whether for industrial use, irrigation or human consumption.

Objective

Increase the capacity and improve the quality of wastewater treatment at a lesser cost.

Veolia solution

Capitalize on Veolia's and SUEZ's combined portfolio of complementary patented proprietary technologies to treat the wastewater of public and industry clients and devise new solutions.



Spain, TWR pioneer

With 14% of its treated wastewater reused, Spain is the European leader in this field and ranks fifth worldwide in terms of installed reuse capacity. The acquisition of Agbar (Aguas de Barcelona) following the merger with SUEZ means Veolia will soon have access to a host of opportunities in Spain. "The Catalan subsidiary's expertise in the use of treated wastewater for agricultural purposes combined with its crucial presence in regions suffering water stress, such as Chile (Aguas Andinas) and Spain, are fundamental for the ecological transformation in these parts of the world," emphasizes Gustavo Miguez, zone Managing Director in charge of Latin America. Agbar has been managing water for 150 years in Barcelona, one of the largest cities in Europe. Agbar was created in the late 19th century by the public authorities

in order to find national solutions to capricious rainfall and recurrent droughts. Today, the company covers an extensive supply network, demonstrating its concern for accessibility. "In 20 years' time, France's climate could be similar to Spain's, but we still have a long way to go in terms of TWR. Our Spanish neighbors are showing us that it is possible, that it is proven and that it is accepted. France must overcome the final hurdles, mostly regulatory, but also in terms of accepting the value and therefore the price of recycled water (farmers currently pay almost nothing for water). In a short time, here on the other side of the Pyrenees, we will have access both to qualified data from industrial sites, and to feedback from customers and Agbar's teams," says Pierre Ribaute, Director of the France Water zone. ▶



Loosen the regulatory straitjacket

The reuse of wastewater is strictly regulated at global (WHO), European (EU) and national levels, primarily for health reasons. However, water stakeholders are calling for a relaxation of the regulations to allow more systematic use. In particular, new legislation would facilitate

the recovery of wastewater by-products. According to a UN World Water Development Report, "there is often little or no legislation on quality standards for these products, creating market uncertainties that can discourage investment." Political and public support will be crucial for

reusable water production in the coming decades. For example, some US states are taking the legislative lead. "In California, Direct Potable Reuse will be possible as of 2023; in other words, treated wastewater can be fed directly into the drinking water network or just upstream from

pumping stations. This means that TWR for human consumption will become a reality in North America within the next two years," observes Frédéric Van Heems, Director of the North America zone at Veolia. ▶



As long as there is water, I will water my flowers,” writes Gabriel García Márquez in June 6, 1958, Caracas without water, a fictionalized chronicle of the Venezuelan capital beset by drought. Despite the Colombian writer’s subtle warning, and while the national authorities point out the worrying decrease in water reserves, the residents happily keep watering their gardens. So, rather than saying “As long as there is water,” why not take the opposite approach: “What if one day we run out?”

WASTEWATER’S SECOND LIFE

With the world’s population on the rise, rampant urbanization and global warming, wastewater reuse is an essential solution to secure access to “blue gold.” Although only 2% of the 165 billion cubic meters of wastewater collected and treated in the world is reused, TWR is making progress. And for good reason! It is less energy-intensive and expensive than other alternative solutions (building dams, desalination, etc.), and reduces the extraction of groundwater. A great example of the circular economy, TWR recovers wastewater from municipal and industrial activities and treats it using a range of technologies to remove sediment and eliminate micropollutants and bacteria. The equation is promising: avoid discharge into the natural environment and increase the available resources, at a lower cost, provided that the receiving environment does not depend entirely on discharge from the wastewater treatment plant to function correctly.

HUGE ARRAY OF AVAILABLE TECHNOLOGY

Veolia, with its new business scope, will benefit from a larger global geographic and technological footprint: in addition to the 350 proprietary water treatment technologies it owns, it will also acquire complementary technologies from SUEZ, such as ozonation, UV disinfection processes, the Meteor® technology and ZeeWeed membranes. “These membranes, coupled with Veolia’s biological technologies, represent a tremendous asset for the treatment of highly polluted water,” said Frédéric Van Heems, Director of the North America zone. All these processes will benefit urban, industrial and agricultural uses. In the south of France, Veolia has successfully tested the use of treated wastewater for the micro-irrigation of vines in Gruissan, as part of the Irri-Ait’Eau collaborative project. The results revealed no impact on the physico-chemical composition and taste profile of the wines. Better

still, TWR has a higher fertigation¹ effect than drinking water. Despite the low water flow, the vines received 40% of the required annual supply of nitrogen, 20% of phosphorus and 30% of potassium.

ATTRACTIVE SAVINGS FOR INDUSTRY

In 2010, water consumption by industry accounted for more than 25% (industry + energy production) of total consumption. The microelectronics, paper, food processing, and oil & gas industries use large volumes of water in their manufacturing processes. Veolia installs integrated, customized solutions to meet the requirements of such varied specialty sectors. The multi-technical and multiservice management that the company provides is a response to the search for savings in the most water-intensive sectors. In addition to these savings, CO₂ emissions and annual energy bills are also cut. With Renault in Morocco, Veolia has built the first automobile manufacturing plant with zero carbon emissions and zero liquid waste. For Nestlé in China, Mexico and South Africa, the company has built plants with zero water withdrawal. For Bristol-Myers Squibb, Veolia is optimizing the water cycle at 11 of its laboratory sites in Europe.

“Recycling energy and waste are now almost a given. The same must apply to recycling water for everyone on the road to ecological transformation.”

Geneviève Leboucher

TWR CONCERNS US ALL

It is a sign of the times that public policies are encouraging TWR. In the United States, California is considering legislation to reuse wastewater as drinking water. In Europe, Spain is leading the way, using 14% of its treated wastewater (see box). Israel reuses 90% of its treated wastewater. Better still, Mexico City reuses 100% of its wastewater for crop irrigation.² And we can go even further,

since we can drink treated wastewater. In Windhoek, Namibia, for example, Veolia converts 21,000 cubic meters of wastewater per day into drinking water, which covers 35% of the capital’s needs. “This is an emblematic case – and the only one of its kind on this scale – of the direct reuse of treated wastewater to produce drinking water for human consumption,” says Philippe Bourdeaux, zone Managing Director in charge of Africa Middle East at Veolia. At the bottom of the table, France, with just 0.2%, is showing some resistance. “The aim in France is to triple the installed capacity of non-conventional water sources by 2025, including TWR, gray water recycling from buildings, and recovering storm water,” explains Pierre Ribaute, Director of the France Water zone. He points to the Jourdain project in La Roche-sur-Yon, where Veolia partners Vendée Eau: “As part of the pilot project, 150 cubic meters of wastewater per hour is treated then discharged into a reservoir before being fed back into our drinking water production plant.” ▶

1. Practice involving the delivery of fertilizers and water to crops at the same time. In the case of TWR, the “fertilizer” corresponds to the minerals already present in the treated water at the plant outlet.
2. Réutilisation des eaux usées traitées : un formidable procédé d’économie circulaire [Treated wastewater reuse: a remarkable circular economy process], Le Centre d’information sur l’eau.

“ In France, where nearly 90% of wastewater is treated to very high quality standards, we have only a short way to go before the regions can benefit locally from this recycled water.”

Pierre Ribaute







COM- BATTING POLLU- TION

Exceptional expertise for complex solutions

The new scope of Veolia's expertise provides a historic opportunity to understand and develop new, exceptional and differentiating solutions for treating the most toxic pollutants in our air, water and soil.

Four key figures

90% of wastewater

is discharged untreated in developing countries

400,000

abandoned polluted sites in France alone

33% of land

worldwide degraded by pollution

285 plants

for treating hazardous waste run by Veolia, and SUEZ will bring more

Issue at stake

Treat complex water, air and soil pollution.

Objective

Improve support for industry in preventing pollution emissions and treating its hazardous waste to the highest standards, leveraging our high-level expertise further enhanced by the merger.

Veolia solution

Ensure the broad duplication of solutions that are already operational and invent those that do not yet exist.



3 questions to Frédéric Madelin

Veolia Director Liquid and Hazardous Waste Treatment and Recovery

What are PFAS and what harm do they cause?

Frédéric Madelin: Per- and polyfluoroalkylated substances (PFAS) are a family of more than 4,700 persistent and bio-accumulative chemical molecules. PFAS are manufactured chemicals that do not occur in the natural environment. They are common in consumer products and industrial applications. They are used for their water and oil repellent properties in products such as fire-fighting foams, textiles and carpets, waterproof coatings, non-stick food utensils, food packaging and some cosmetic products such as sunscreens and body moisturizers. In terms of health, PFAS pose human

health risks due to their suspected toxicity.¹ Studies have found effects on reproduction and cardiovascular function, and they can potentially cause cancer.

Why is PFAS management an issue in these regions (USA, Asia, Australia)?

F.M.: Home to various large chemical companies, the US is historically a PFAS-producing country. Two major PFAS have been phased out in the US, but their production has shifted to Asia. Now, PFAS occur mostly in China due to its large manufacturing base, but they are abundant across all of Asia. Australia has a history of PFAS pollution from intensive use of firefighting foams since the 1970s.

What technologies do Veolia and SUEZ have for treating PFAS?

F.M.: Veolia and SUEZ together offer advanced complementary technologies to address PFAS removal in surface, drinking and groundwater using carbon adsorption, ion exchange resins and reverse osmosis (membrane treatment). However, for each site, a combination of proprietary technologies will be needed to meet the expected performances for the removal of PFAS and other pollutants, and to take into account operational constraints, such as inlet water quality and regulatory requirements. ▶

1. Carcinogenicity, endocrine disruptor, immunotoxicity, lipid or thyroid metabolism, etc.



Soil remediation in Europe

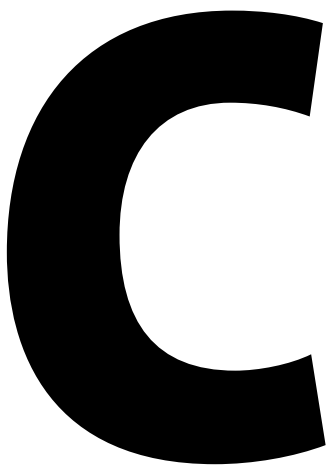
By Cédric L'Elchat, SARP Industries Chief Executive and Director

Forced by increasingly strong pressure on land in urban areas, local authorities, manufacturers and developers are taking a close interest in many polluted sites on the outskirts of cities. In France alone, there are more than 400,000 abandoned polluted sites. That is hundreds of hectares to be treated and restored before being able to build housing and public

facilities, establish light industries, and even develop urban agricultural activity there. The reuse of this land is a response to the problem of urban sprawl. However, soil remediation is an essential prerequisite to guarantee a future healthy environment. Depending on the case, Veolia can treat both the soil and the aquifer at these sites. Each situation requires one or

more specific techniques, since sites polluted by explosives, chemicals, heavy metals or hydrocarbons are treated differently. The solutions selected can be implemented onsite in which case the soil is treated using heating points or intrusive techniques. Depending on the needs, we use thermal desorption, chemical or biological soil treatment. In other cases, the soil is removed

following excavation for treatment offsite at one of the specific centers in Veolia's sectors. The integration of SUEZ's remediation activities should allow us to expand our presence in Europe, broaden our network of treatment tools, and boost our expertise in order to meet the expectations of our various clients as well as possible. ▶



leaning up the pollutants of the past and of today continues to be a huge challenge. Our planet needs help to clean up the mess human activity has created and to prevent even further damage from our current activity.

“We talk a lot about CO₂ and global warming, but this gas is only one of the many pollutants we have to deal with,” explains Veolia Executive Vice President, Chief Operating Officer Estelle Brachlianoff. “These include pollutants such as PFAS [per- and polyfluoroalkyl substances that do not break down in the environment] that are now a hot topic not even considered just a few years ago. New solutions to treat these and other emerging pollutants are to be found, as for all emerging pollutants (such as endocrine disruptors). The Group’s new scope will boost its capacity, technologies, plants and so on. But above all, new knowledgeable and skilled people will make all the difference. That is why the merger is such a wonderful opportunity for our clients and the planet.”

POLLUTANT PICTURE

According to UNESCO, water quality is one of the main challenges that societies must tackle. Poor water quality threatens human health, limits food production, reduces ecosystem functions and hinders economic growth. In developing countries, 90% of wastewater is discharged untreated into bodies of water. But developed countries are largely responsible for water pollution from personal care products, pharmaceuticals, pesticides and industrial and household chemicals that leak into streams, rivers and the oceans. The United Nations Food and Agricultural Organization says that 33% of land is degraded by pollution. These contaminants include heavy metals, such as lead and arsenic, plus organic compounds, such as hydrocarbons and methane. PFAS (see box) and other chemicals also contaminate our soils affecting food production and healthy ecosystems. The excess of CO₂ in the air has a direct impact on climate change, while emissions such as NOx from vehicles cause breathing illnesses.

SOLVING COMPLEX PROBLEMS TOGETHER

For a long time, we focused our efforts on controlling the impact of waste from industry. Going forward, we need to find new ways of tackling the diffuse impact of end-of-life products. These potentially

polluting substances are found in our oceans, along with endocrine disruptors which, in the form of effluents, are harmful to human health, and hazardous waste from our manufacturing processes and resource extraction. According to Jean-François Nogrette, Director of the France and Europe special waste zone, Veolia has been a pioneer since the 1970s in hazardous waste treatment. At that time, Veolia recognized that treating pollution from industrial facilities would protect contaminated rivers. “Thanks to these pioneers, today we operate in 28 countries. Our teams manage 285 specialist plants to treat and recover six million metric tons per year of hazardous waste. We are strong in Europe, China, Australia and North America. But there is still a lot to do. We have huge potential for growth. We are still pioneers and are exploring new territories in Latin America, Africa, Middle East and South-East Asia,” he explains. “Veolia is now focused on treating and recycling new types of waste, including strategic metals contained in electric vehicle batteries and radioactive waste, with the help of specialist teams.”

INCREASED GLOBAL REACH

In Germany, the merger will increase Veolia’s installed capacity from the previous two to three hazardous waste incinerators. Tomorrow’s Veolia also stands to benefit from increased capacity in Italy, Spain, Belgium, Netherlands and the Czech Republic. As Jean-François Nogrette adds, “The SUEZ assets we are acquiring are an excellent fit with Veolia’s. In particular, in the area of soil remediation, there are highly effective tools such as secure landfills and biotreatment plants. This is the benefit offered by the expertise and experience of

a team with a great reputation for providing services at the local level. Concerning technology, the merger provides us with a fantastic portfolio that will complement our own.” Richard Kirkman, zone Managing Director in charge of Australia and New Zealand at Veolia, echoes his words, “This new portfolio of technologies will allow us to tackle emerging pollutants, such as PFAS, which are so complex to treat, as well as water recycling.”

“We talk a lot about CO₂ and global warming, but there are pollutants other than CO₂.”

Estelle Brachlianoff

In Asia, Veolia has 18 facilities currently, plus a further six under construction or ready for commissioning. It has seen growth in hazardous waste treatment of 30% since 2013 in China, South Korea, Hong Kong, Singapore and India. Plus, in Taiwan and mainland China, Veolia has recently entered the soil remediation business. Christophe Maquet, Director of the Asia-Pacific zone adds, “Not every country in Asia has the same requirement or the same maturity in terms of hazardous waste. China, with its increasingly stringent regulations, is ahead of the other countries. We have a very solid presence there.” Additionally, the new Veolia will gain another nine projects in mainland China, one in Taiwan and another in Thailand – two countries where the Group currently has no hazardous waste activity. The synergy with its other assets in Asia means Veolia will expand the knowledge and expertise already provided by its current employees in Asia. ▶



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**“ We have huge potential for growth.
We are still pioneers and are exploring
new regions in Latin America, the
Middle East and South-East Asia.”**

Jean-François Nogrette





Waste to energy: from source to loop

In the future, production capacity and centralized energy distribution networks alone will struggle to keep up with global demand, forecast to rise 30%. This means that decentralized solutions that recover renewable energy, ideal for use in local energy loops, offer reliable and environmentally responsible answers to an increasingly common global problem. Veolia provides integrated solutions, from source to loop.

Key figures

30%

Energy demand will grow 30% by 2040

25 countries

Veolia operates over 580 heating and cooling networks in 25 countries

350,000 metric tons

Energy is recovered from 350,000 metric tons of waste a year by the heat highway project in the northern French city of Lille

450 public buildings

and 31,000 homes heated by the cogeneration power plant at Pécs in Hungary

Issue at stake

Make energy production more sustainable and resilient.

Objective

Deploy alternatives to fossil fuels to reduce CO₂ emissions to zero by 2050.

Veolia solution

Energy efficiency, biomass, refuse derived fuel, energy-positive wastewater plants, cogeneration, electrical flexibility, microgrids: an array of solutions for the energy supplies of tomorrow.



The virtues of biomethane

Thanks to WAGABOX®, a disruptive technology designed by startup Waga Energy, a specialist in gas engineering, Veolia offers a high-efficiency biomethane energy recovery unit. Combining two cutting-edge techniques, membrane filtration and cryogenic distillation, WAGABOX® produces 98% pure methane from landfill gas. The biomethane is then fed into natural gas distribution networks managed by third-party operators.

This new-generation unit, which will enter service in February 2022,

will be installed at a non-hazardous waste landfill site in Claye-Souilly, a town with a population of 12,000 near Paris. It will boost energy performance at a site that has been open since 2006. With a production capacity of 120 GWh of gas a year, enough to meet the needs of 20,000 homes, over the next 15 years it will feed gas into a nearby domestic and industrial distribution network, avoiding the annual emission of 25,000 metric tons of CO₂. In terms of its biomethane production capacity,

this is currently the largest unit in Europe. Further proof of the robustness of the concept and the quality of the partnership, the unit at Claye-Souilly will be Veolia's third of this type in France. And the international prospects are promising too. Recovering biogas from landfill will be one of the keys to meeting the European Union's commitment to carbon neutrality by 2050. ▶

Cogeneration: key technology in the energy mix?

"No matter the sector, public or industrial, or location, in Europe or North America, cogeneration will play a big part in ramping up efficiency in energy mixes and helping the world's economies to reach carbon neutrality," explains Jean-Luc Bohic, Director of Local Loops of Energy at Veolia.

Germany, a country that aims to produce 80% of its electricity from renewable sources by 2050, is relying on Länder and city authorities to

act to ensure its energy transition, setting an example for the rest of Europe. In Brunswick, Veolia subsidiary BS|ENERGY manages a combined heat-and-power plant connected to a 250-kilometer heating network that has recently been boosted by two additional decentralized networks. First is the Hungerkamp cogeneration plant, fired by biogas sourced from organic waste. The second recovers waste heat from local data

centers before feeding it into the network. This second application is part of ReUseHeat, an EU-funded project designed to create the first advanced, modular and replicable system for recovering and using residual heat.

Across the Atlantic, chemicals giant DuPont tasked Veolia with reducing the carbon footprint of its site in Richmond, Virginia, its largest production plant. The cogeneration system, which previously used

coal, was converted to natural gas, a power source that emits half as much CO₂ as coal.¹ The aim is for a 30% cut in greenhouse gas emissions by 2030 and to achieve carbon neutrality by 2050. "With the new installations in service from late 2019, the project saved the emission of some 220,000 metric tons of CO₂e in 2020," says Dan Mattson, Site Services Leader at Richmond. ▶

1. www.eia.gov/tools/faqs/faq.php?id=73&t=11

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ossible sources of decentralized renewable energy include converting waste into green fuel, recovering heat energy from wastewater, and transforming organic matter into fuel, which are all emerging as vital alternative sources of decarbonized energy. Energy recovery from waste is already the third largest source of renewable electricity worldwide.¹ And energy recovery from sludge and organic waste could cut CO₂ emissions by 300 million metric tons by 2050. These are actionable responses to the challenge of carbon neutrality. And these are solutions that Veolia already operates. The Group has also begun the process of eliminating coal from all its installations by 2030. “We will have converted five coal-fired power plants in the Czech Republic to run on a mixture of gas, biomass and RDF by 2023,”² says Philippe Guitard, Director of the Central and Eastern Europe zone. It’s a case of leading by example, something that makes us all the more credible when working with our customers to decarbonize their own utilities. Energy-positive sewage plants, cogeneration, smart grids and energy storage are just some of the tools and technologies that need to be rolled out more widely.

SWITCHING TO GREENER ENERGY SOURCES

Leaving aside the essential nature of sanitation services, sewage sludges are an important source of green energy, as witnessed at the energy-positive wastewater treatment plant in Sofia, Bulgaria. In recent years, recovered biogas produced 23% more energy than the plant needs for its own uses. Biomass is also filling an ever larger share of primary energy production.³ It is a solution that has already delivered “energy self-sufficiency in several regions,” says Philippe Guitard. Among these successes, the Hungarian city of Pécs is a standout example, home to the largest district heating network in Europe to be powered entirely by wood and straw: 100% biomass and 400,000 metric tons of CO₂ emissions avoided every year. The heat highway in the northern French city of Lille uses incinerated waste to supply the equivalent of 35,000 homes with heat, and 20,000 with electricity. “The heat highway is a 20-kilometer network of pipes that carries water heated by incinerating the city’s household waste,” explains Anne Le Guennec, CEO of France Waste Recycling & Recovery Solutions Zone (RVD).

“Veolia is the global leader in local energy solutions.”

Philippe Guitard

This territorialization means issues centering on energy have become socially important, progressively involving the full range of regional actors. The first initiatives to be put in place invite companies to intensify their research efforts, design alternative economic models and experiment with new forms of cooperation in the field. The aim is to deliver greater circularity, along the lines of all the locally produced low-carbon fuels sourced from industrial by-products or wastewater. Thanks to assets acquired from the takeover of SUEZ, Veolia will have an even more extensive footprint and access to new skills and “new sources of green energy,” says Philippe Guitard as he reflects on the emergence of a new global champion of ecological transformation. ▮

1. Global trends in renewable energy investment 2020 - Frankfurt School-UNEP Centre/BNEF, 2020.
2. Refuse derived fuel.
3. Primary energy is all energy not subject to any conversion process.

TECHNOLOGIES SERVING REGIONS

Using alternative energy sources also involves adopting a range of other green techniques and solutions, starting with energy efficiency, recovering waste heat, and using a single primary energy to generate several streams. Cogeneration, for example, combines production of electricity and heat, sometimes with cold or steam. This delivers improved energy yields with lower environmental impact, while also promoting the use of more sustainable inputs. This can produce a 28% fall in CO₂ emissions compared to coal-fired plants, with a 10 to 15% reduction in energy bills.

The need for regional energy independence opens the door to smart grids and microgrids. These can operate with or without being tied into the main power grid. This is made possible by incorporating storage solutions paired with a smart management system. The idea is to develop a new generation of heating and electricity networks with real-time remote management to adapt to variations in production and demand. Philippe Guitard cites the example of Flexcity, a Veolia subsidiary and aggregator of electrical flexibility. “We can monitor and control electricity production and use, stop or start it as easily as starting a car, for our own benefit or on behalf of our customers.” These alternatives to centralized grids actively contribute to increasing the security of electricity supplies, and to overall network resilience, while also cutting CO₂ emissions.

TEXTBOOK EXAMPLES TO ROLL OUT

Veolia manages 10 waste-to-energy plants in the United Kingdom. They generated 1.2 TWh of electricity in 2020, enough to meet the energy needs of 430,000 homes, and 151 GWh of heat that is fed into urban heating networks in Sheffield, Leeds and London. “Low-carbon urban heating, made possible by local loops, is one of the key features of the UK’s plans to achieve carbon neutrality by 2050,” explains Gavin Graveson, Director of the Northern Europe zone.

“ More than just a challenge, above all the waste-to-energy market is an excellent opportunity for relocalizing economic activity and creating jobs.”

Anne Le Guennec





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And tomorrow?





Ecological transformation: a question of scale

The conversation around the urgent need to find an exit strategy for the multiple crises we are experiencing – social, health, environmental and economic – is everywhere. However, the technological, sociological and commercial solutions needed are complex to develop. Ecological transformation requires time- and space-scale approaches that are sometimes difficult to reconcile. Veolia, strengthened by the assets and talents of SUEZ, an operator of essential services, has the historic responsibility of solving the equation. We take a look at some interesting ideas.

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And tomorrow?

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Veolia has always placed foresight and responsibility at the heart of its missions. Thirty years ago, it was still inconceivable to massively desalinate sea water with membranes; today, it is commonplace. It takes a relatively long time for new water technology – and even more so new waste technology – to reach maturity. But being responsible also means foreseeing the consequences and limits of the innovations that have to be developed. This means foreseeing, here and now, the problems that will arise tomorrow around recycling new materials – including those that are currently favored for their positive ecological impact. As Estelle Brachlianoff, Executive Vice President, Veolia Chief Operating Officer, reminds us, “The Group has always taken a very long timescale view.” With current knowledge as the baseline, a rigorous and constant strategic intelligence watch is used to map and identify the missing links in resource recycling and recovery. “Once a future problem has been identified, it is important to be able to commit very quickly to solving it.”

CHOOSE YOUR BATTLES

About fifteen years ago, Veolia became interested in recycling electric vehicle batteries, at an experimental stage and at a time when these cars represented only a small part of the automobile fleet. Today, the Group is ready to ramp up to the industrial stage. And then what will be the next project around mobility? For Claude Laruelle, Executive Vice President, Chief Financial Officer, it's hydrogen, on which some manufacturers are already pinning their hopes.¹ Veolia must devote human and financial resources to it without delay if it is to be tomorrow's leader in the production and recycling of hydrogen. Estelle Brachlianoff mentions the inevitable question of dismantling nuclear power plants. She predicts that it will take 10 to 30 years to respond to this issue, by teaming a technological service with viable business models. This means predicting political and industrial choices and market trends, again and again. “There is no choice other than to be 20 years ahead of the game,” she continues. By focusing its innovation on six major themes – combating and adapting to climate change, new pollutants and health, new material loops, the food chain, new energy services and, finally, the digitization of products and services – where

“The Group has always taken a very long timescale view.”

Estelle Brachlianoff

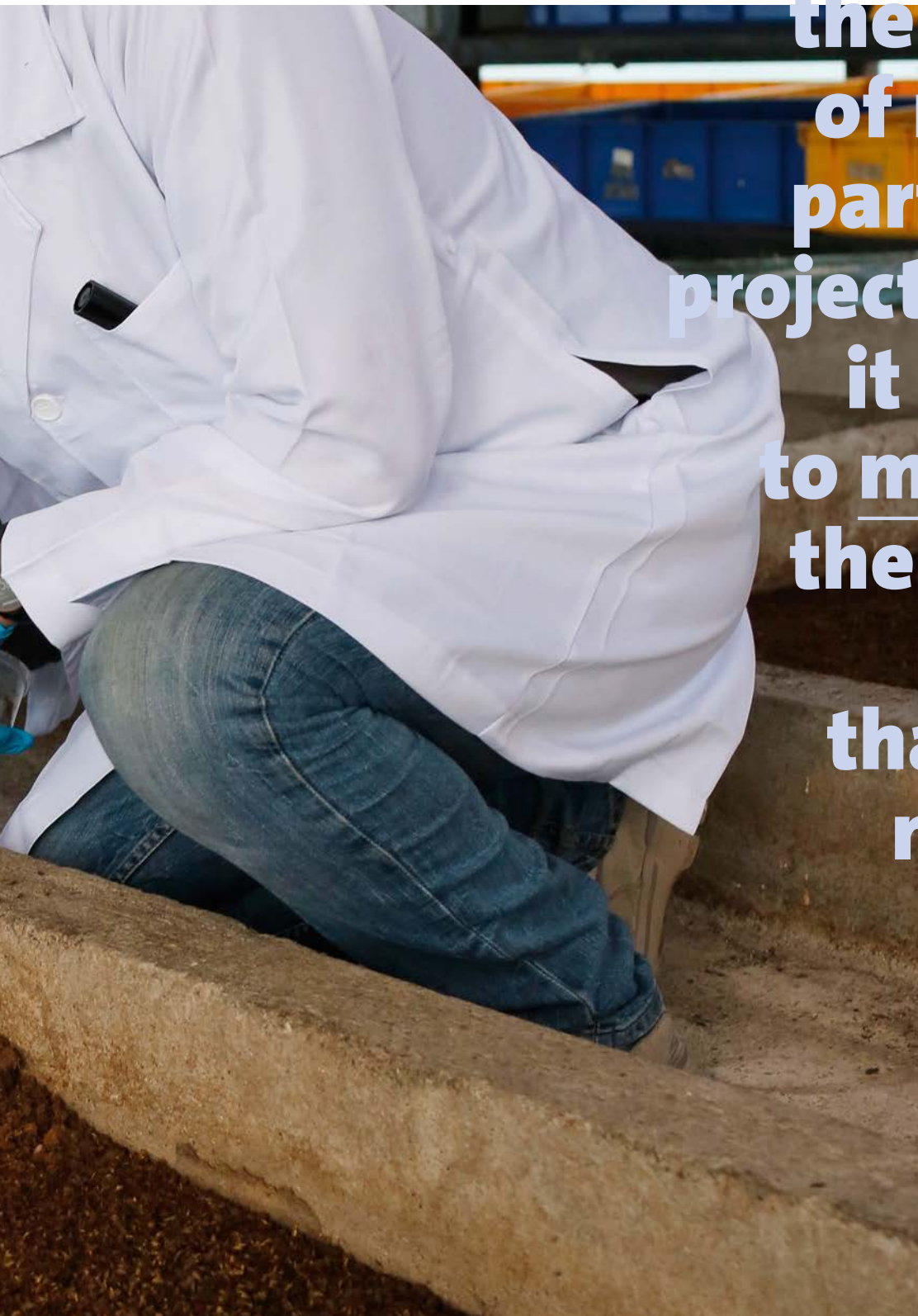
the challenges ahead are concentrated, Veolia is also guaranteeing its position as tomorrow's leader. “When we look to the future, we choose our subjects so as not to be overwhelmed by the needs and at the same time to have maximum impact,” summarizes Estelle Brachlianoff. “We go where there is know-how, obvious expertise, where we can make a difference.” Choosing your battles in relation to future markets is necessary for a successful ecological transformation.

PAIRING CENTRAL VISION AND LOCAL INITIATIVES

Ecological transformation also requires a range of spatial scales. The ecological crisis does not stop at borders. A global problem must be met with a global, or at least replicable, solution. But beware of those who want to standardize and duplicate the same operating methods worldwide. Global warming and the collapse of biodiversity may be of planetary concern, but the way they affect regions depends on ▶

And tomorrow?





**“Multiplied
the number
of research
partnership
projects makes
it possible
to maximize
the number
of those
that get to
market.”**

Jean-François Nogrette

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And tomorrow?

their ecological, economic, social and political specifics. A solution for producing drinking water from treating wastewater developed in Namibia cannot necessarily be replicated in Saudi Arabia, due to specific cultural reasons, different consumption habits, or particular industrial needs. “For strong local initiatives to grow, the solution lies in the balance between global and local vision,” says Estelle Brachlianoff. She sees this as a skillful combination of central management, which allocates financial and human resources (nurturing), and a very strong local breeding ground ready to adopt the resources made available to it. And if it fails? “We try again or we try something else,” she replies.

JOINING FORCES AT DIFFERENT SPATIAL SCALES

Clarifying spatial scales also facilitates the integration of solutions: a coherent cultural and economic unit allows for an effective localized vision. The city of Lille, France, was able to benefit from waste collection performance software, which had previously been tested in London. Even on a regional scale, defining a territorial unit is crucial for implementing innovative solutions. The impact of a water or waste treatment plant is not simply ecological: it saves dozens of jobs, raises public awareness of more virtuous behavior, and reduces the carbon footprint² of client companies. Veolia is thus playing its role in revitalizing the territory. “Environmental challenges go hand-in-hand with economic and social challenges,” says Anne Le Guennec, CEO of Veolia France Waste Recycling and Recovery Solutions Zone. “Each of our proposals takes into account a particular way of life, regulations, and working methods, as well as the specific entrepreneurial, industrial, political and associative fabric,” she explains. “The circular economy is a team sport,” adds Jean-François Nogrette, Director of the France and Europe special waste zone for Veolia. “We are bringing together people who previously did not communicate with each other.” The ecological transformation will not be achieved without the cooperation of players at all scales, guided by central management with a solid knowledge of the field.

SMOOTH TRANSITION TO TOMORROW

To counter the temptation to wipe the slate clean, Jean-François Nogrette insists on consolidating the key processes acquired through experience. “There are many solutions that can be applied to ecological transformation; they simply need to be replicated. Ecological transformation is happening now, and it is sometimes less spectacular than we think,” he says. His priority? Focus on scaling up. Many solutions are just waiting to be applied across the regions already covered by Veolia, along with those taken over from SUEZ. The digitization of wastewater treatment plants, for example, can lead to a 60 to 80% reduction in the reagents used and a 10 to 30% reduction in energy consumption. “The problem is that customers are not always aware that solutions exist,” he notes. “It is important to make them better known.”

DISRUPTION: THE FAST TRACK TO GROWTH

As we have seen, an initial approach to transformation consists in systematizing and optimizing processes that are already known, such

as fully recyclable materials – certain plastics, paper, glass and metals. A second, additional approach is to imagine new ways of recycling and recovery. This is the case when Veolia does not yet have processes capable of closing the material loop by recycling all the material, or when recycling is too energy-intensive to be affordable or environmentally reasonable. Examples include plastic films or composite materials such as carbon fibers. “Finding recycling solutions for new complex materials is going to be very expensive,” warns Estelle Brachlianoff.

COMBINING ECO-DESIGN AND R&D

To invent effective recycling solutions for tomorrow, two avenues are emerging: on the one hand, eco-design, and on the other, material recyclability. According to Estelle Brachlianoff, a new material is released on the market every two weeks. “These patented materials are sometimes reputed to be more ‘ecological’ because they are biodegradable or lightweight. But they are more complicated to recycle than PET plastic.” Ecodesign needs the plastics industry to think through the recyclability of the materials it produces.³ From the R&D perspective, the challenge is to improve the separation of materials and recycle them to the best quality with the least amount of energy possible, in order to then feed them back into a production loop. Certain techniques can be developed internally by Veolia, such as wastewater recycling; or they can be co-constructed with the help of external partners with specific expertise – such as for carbon capture and use (see article on page 71) – or recycling electric vehicle batteries – the focus of the recent partnership between Veolia, Renault Group and Solvay. The aim in this instance is to improve how strategic materials, such as rare metals, are extracted and refined, in order to achieve highly purified metals ready to be reused in batteries. Forming such partnerships allows Veolia to accelerate the design of innovative solutions in response to the ecological emergency, and to continue to occupy a leading position.

RELYING ON COLLECTIVE INTELLIGENCE

Many of the innovations to meet tomorrow’s challenges will in fact be sourced from outside Veolia. “We have to be pragmatic: there are things we don’t know how to invent, or at least not within a reasonable timeframe,” explains Claude Laruelle. For him, it is not a question of a lack of resources, but rather a choice of business positioning. “Of course, we could set up a special research bench for each problem. But imagine the time and effort that would take.” Another virtue of partnerships is that they reduce the investments needed for R&D together with the associated risk, since the technology developed by the partner is already technologically mature and ready to go to market. “In some cases, it is even more advantageous to support the emergence of new technologies by investing in a young company; this is what we have done for waste bioconversion with the startups Mutatec and Entofood,”⁴ says Estelle Brachlianoff, who points out the importance of maintaining an innovation continuum between startups, medium-sized companies and multinationals. The innovation strategy of a large group is based on the complementarity between internal R&D, partnerships and the acquisition of start-ups. This is also what explains Veolia’s historic merger with SUEZ.

“We have to be pragmatic: there are things we don't know how to invent, or at least not within a reasonable timeframe.”

Claude Laruelle

EXPANDING THE PORTFOLIO OF PRODUCTS AND SERVICES

The next innovation accelerator for the Group will undoubtedly be the merger with SUEZ, which will considerably enrich the existing scope of products and services. In the future, SUEZ's know-how and cutting-edge technologies in water treatment and recycling, integrated into Veolia's products and services, will make it possible to 'close the material loop' on certain materials and go further in recycling others. The case of lithium battery recycling, a fast-growing market in which Veolia is one of the pioneers, is a good example. SUEZ has specialized in membrane separation to prepare lithium and treat the saline water discharged by battery plants. This know-how can be integrated into the value chain already established by Veolia. The result is a strong complementarity between the two groups' solutions and specializations, which should encourage their growth at a global scale.

IMPACTING INNOVATION STRATEGY

Another positive consequence of the merger is that innovations can be made available to more customers. “As a result, our innovations will be better amortized and more profitable,” adds Estelle Brachlianoff. The resulting profits will be invested in new research projects. According to Jean-François Nogrette, the merger marks the beginning of a strategy to drive the company's progress through innovation: “In high-risk, cutting-edge research projects, multiplying the number of partnership projects makes it possible to maximize the number of those that reach the stage of technological maturity and so get to market.” The way in which Veolia positioned itself with the public authorities during the Covid-19 crisis is a perfect illustration of this. In conjunction with CNRS, the French National Scientific Research Center, the Group developed a service called Vigie-COVID-19 and its variant Vigie-COVID-19+, capable of predicting epidemic peaks based on wastewater analysis in the cities served. “Even before the contamination peaks were identified by the French Department of Health, we were detecting them in municipal wastewater. Working with another laboratory – IAGE – we now know how to sequence and identify the different variants,” says Estelle Brachlianoff. Trials with this tracing tool have been a success in the 20 cities monitored. Going forward, with the membranes and resins developed by SUEZ that are able to monitor water quality in real time and identify the organic loads present, Veolia will have even more sophisticated means of analysis, will be able to monitor the evolution of other diseases, such as diabetes, and will be in a position to work even more closely with the authorities on public health.

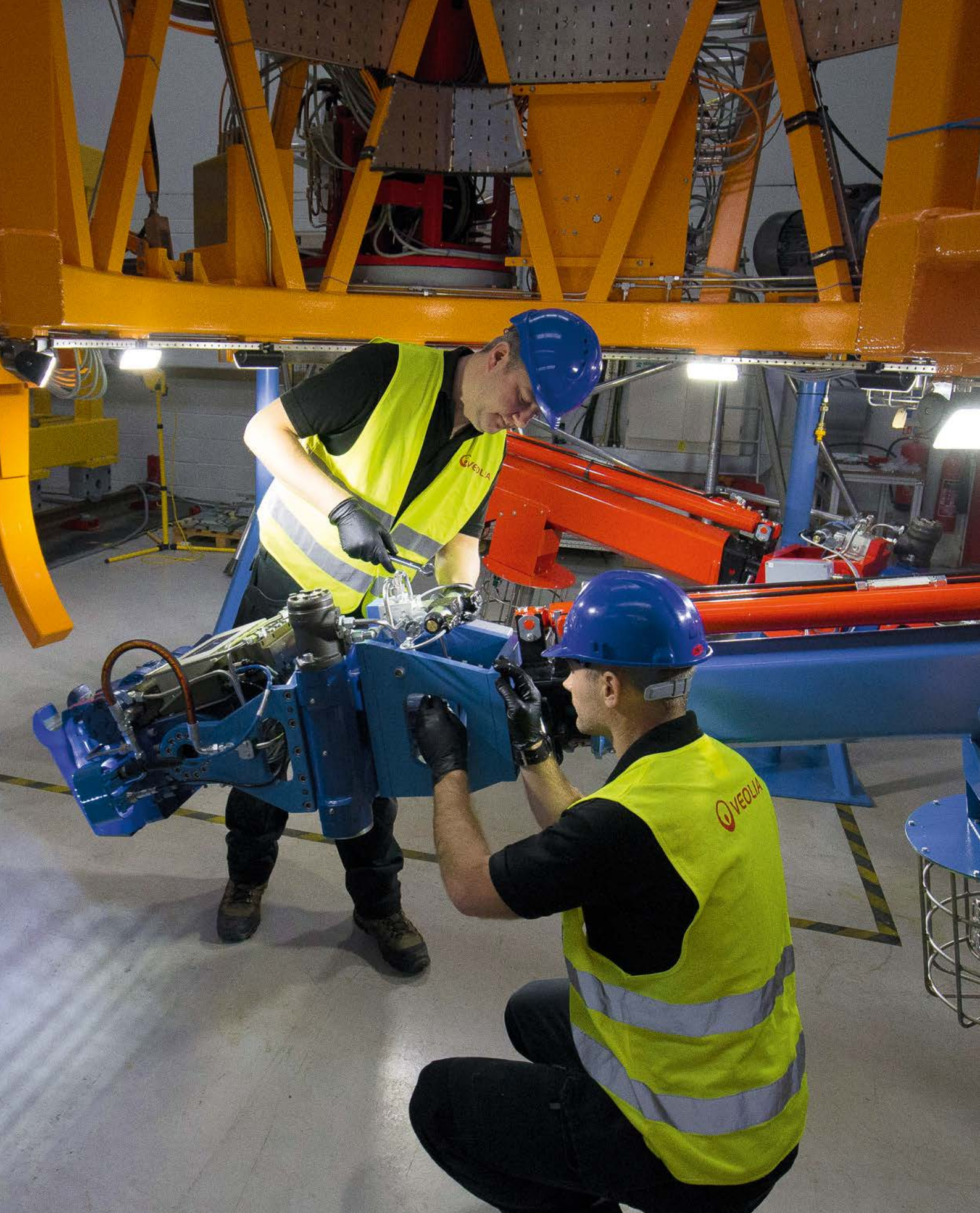
With this merger, the contours of a future Veolia are gradually taking shape: one in which it will be able to treat pollution and, above all, to turn it into a resource, whether from waste, energy or water, and to get the best out of it in terms of preserving biodiversity, reducing footprints and protecting public health. ▶

1. Toyota, for example, is turning to hydrogen for its new vehicle models.

2. In Eastern France, Solvay contracted Veolia to convert its coal-fired power plants to use refuse derived fuel as the energy source.

3. Towards the Circular Economy, Ellen MacArthur Foundation, 2013.

4. This deep tech startup, created almost 10 years ago, uses bioconversion of insects to produce high-value insect protein for animal feed and organic fertilizer for plants.





And tomorrow?



3 questions to Chloé Dupont

Director of Digital Transformation at Veolia

Is there a risk of redundancy between Veolia's and SUEZ's digital products and services?

Chloé Dupont: It would not have been surprising had the two groups offered very similar solutions for water and waste management. But despite the similarities, they actually complement each other really well. First, across the diversity of geographical areas and business lines covered by their digital services, and, second, the solutions they provide. They have not been developed at the same speed, in the same business segments or in the same areas. So, the customer will benefit from products and services with higher added value covering a wider spectrum. There will be no redundancy or overlapping across products and services, just real enhancements.

What are these enhancements?

C.D.: In recent years, we have been working to expand our digital products and services horizontally, by seeking out new customers and markets. SUEZ, on the other hand, has adopted a slightly different, more vertical strategy, focusing on niche opportunities requiring a high level of expertise, such as hazardous waste management using machine learning. By combining successful scaling with very strong maturity in niche areas, we should be able to bring more customers onboard.

Will digitalization lead to increased expertise-sharing internally?

C.D.: For employees, resource digitalization will speed up expertise-sharing between the Group's various businesses and entities. Digital technology can be a lever to facilitate access to knowledge. The Digital Academy, which reaches 40,000 employees, is a training tool that consolidates the digital skills needed for their various tasks. In addition, skills are passed between peers. A self-managed network of Digital Ambassadors currently includes more than 2,500 people from all entities in each country. It is based on a member asking a question, and the community answering it. Sometimes, we get a dozen answers to a single question in a day. That is real knowledge transmission without intermediaries, completely autonomously. But because practice is always the best way of passing on knowledge or skills, Veolia launched the Digital Solutions program three years ago. Each year, it gets digital experts from all over the world to work on priority ecological transformation subjects for the businesses. Today, we have already rolled out these digital solutions in some thirty countries, generated from dialogue between our entities in Mexico, France and Australia. ▶



Mark Radka

Chief, Energy and Climate Branch, United Nations Environment Programme

“What we need now is a global effort by all of society.”

A million species on the brink of extinction, billions of hectares of land degraded, vast areas of forest destroyed every year, and overproduction of polluting waste: the global ecological crisis is accelerating and we have no time to lose. We can choose to continue to watch the situation deteriorate or to take action for change. But to do so, we must accept our responsibility and recognize the levers available to us. Climate change, biodiversity decline, and air and soil pollution are three crises with one cause: our consumption choices and the way we use natural

resources. Ecological transformation requires commitment at all levels: governments, mayors, business leaders, academics and citizens. Governments are spending billions of euros to deal with the economic consequences of Covid-19, and we need to use this opportunity to work together to devise a green recovery plan. Targeted policies must punish the big polluters and promote a clean, circular and sustainable economy. This transformation will not be easy, but if we work together, we can still make it happen for everyone living on this planet. ▶

Purchasers serving the ecological transformation

Becoming the benchmark company for ecological transformation is an opportunity for Veolia's purchasing department to reinvent itself and think outside the box. Purchasers are strengthening their role as creators of value and setting targets that go beyond mere economic performance.

Veolia has made strong commitments to ecological transformation, which it is implementing in all its departments. Benjamin Hulot, Performance and Purchasing Process Director, is pleased with this challenge, "It's a good thing, so that we don't miss out on innovations." These innovations come from everywhere, from suppliers to employees, and are highlighted by the Group's Impact Awards, which singled out Vega Move. This initiative by the Purchasing Department aims to transform employees' professional and personal mobility through digital solutions that are cleaner and more innovative.

While 'multifaceted purchasing performance' comes on the heel of the sustainable purchasing program, it above all enhances how we manage purchases, by systemically including the challenges of ecological transformation. This performance is achieved through a variety of

innovations, but also through support for change (see infographic). This approach is a win-win situation for suppliers, referred to as 'partners,' which can contribute their most innovative ideas.

This transformation and these commitments also have an impact on the people who are primarily concerned: the purchasing officers. "It encourages us to think differently about our contribution to operational staff in order to meet the Group's challenges. For example, we should no longer limit ourselves to the needs expressed by the specifier, but rather challenge them and examine the business models proposed by new players," enthuses Sophie Gour, Group Purchasing Director. The aim is to build a more solid ecosystem of supplier partners enabling us to support Veolia in pursuing its ambition to become the global champion of ecological transformation. A virtuous circle in its own right. ▶

THE 4 PILLARS



DECARBONIZATION

Veolia is limiting its carbon footprint, in particular by ensuring the low-carbon quality of its purchases: low-emission equipment, energy efficiency and suppliers using renewable energy.



CIRCULAR ECONOMY

Integrated into the Group's purchasing plans, it aims to limit resource consumption and waste, and to promote internal reuse solutions.



CREATING VALUE IN THE REGIONS

Veolia's ecological transformation goes hand-in-hand with a focus on its impact on the regions. This can create and secure jobs for suppliers and enhance the value of communities.



HUMAN RIGHTS AND DUTY OF CARE

The selection of suppliers and equipment goes beyond the question of cost to include monitoring of third-party risks – environment, working conditions and human rights, ethics, reputation, etc. – and a 360° evaluation system.

SUPPORTING CHANGE



Change management

Any major transformation requires stakeholder support through training, the creation and management of a network of ambassadors, communication and awareness-raising.

Benchmark sheets for buyers
These sheets are based on the challenges around ecological transformation and provide an evaluation grid for buyers to choose a supplier based on environmental and social impact criteria.

MULTIPLE INNOVATIONS



PHOTOVOLTAIC

Photovoltaic solar energy production is suited to various economic models: self-consumption or resale to the grid, solar panel leasing or purchase, and turnkey contracts.



RE-USE MARKETPLACE

After introducing a marketplace for strategic suppliers, an internal marketplace for the resale of equipment is being studied. The aim is to promote a second life for certain goods at operational sites.

SOCIAL ENTERPRISES FOR INTELLECTUAL SERVICES

Greater use of social enterprises employing differently abled people to provide non-manual services, entrusting them with repository or transactional management missions



PURCHASING RISK MAPPING

Suppliers are assessed according to a purchasing risk map that highlights high-risk categories and makes it possible to trigger a CSR Compliance questionnaire as early as the tender phase.



FLEET ELECTRIFICATION

Veolia is encouraging the use of EV and hybrid vehicles: utility and company vehicles, electric bicycles, etc., and initial trials with construction machinery.



RECYCLABILITY

Buy collection bins made of plastic from Veolia plants and promote suppliers offering a wide range of recycled and recyclable products (office supplies, cups, etc.).



BIOFUEL

Biofuel, produced by Veolia SARL through its subsidiary Dielix from recovered edible oils, is now being used to replace diesel fuel in truck and machinery fleets.

Valuing and mobilizing suppliers
As stakeholders in change, they are made aware of and supported through their active participation in the challenges of ecological transformation, and the promotion of their innovations.

Ecological transformation

Purchasing Awards

In addition to the Group Awards, the Purchasing Department introduced Purchasing Awards in 2021 with all its entities. A total of 49 environmental, social or circular economy projects have already been shared on the purchasing network.

KPIs

By monitoring the multiple aspects of purchasing performance with non-economic indicators, the purchasing function's dashboard highlights environmental, social, employment and ethical impacts.

Start-up Kippit revolutionizes everyday household appliances

Since March 2020, Veolia and Ulule, Europe's leading crowdfunding platform, have been running the #MakeItGreen program. One of the program's winners is the Toulouse-based start-up Kippit. Veolia's support is a real boost for this project aimed at creating a range of household appliances that can be repaired indefinitely.

The idea behind the start-up came from a washing machine that broke down just after the end of its warranty period. The two co-founders, Kareen Maya Levy and Jacques Ravinet, became aware of the environmental cost of household appliances, which are not very durable and difficult to repair. They set themselves the challenge of creating a brand of large and small everyday appliances that are sustainable, made in France, and have spare parts that are available indefinitely.



keep rather than throw the appliance away, the brand has even committed to keeping the cost of parts and labor below that of a new product.

Committed to an approach based on local, sustainable and inclusive recruitment, Kareen and Jacques opened their first workshop near Toulouse, where they employ disabled workers. A second workshop is scheduled to open in 2021 in the Paris region, followed by three more in 2022 in the north, west and southeast, resulting in France-wide coverage.

Repairable rather than disposable

The first trial led to the launch in 2020 of a multi-function kettle that can be used to cook pasta, prepare vegetables, and warm baby's bottles. It is made of stainless steel from Grenoble, in southeast France, and plastic parts from the southern French region of Occitanie. Not only are the materials already recycled or recyclable, but the appliance is assembled locally and repairable for life. To encourage people to

In addition to its financial support, Veolia is helping the young start-up optimize its environmental footprint and social impact. Kippit, which won the 2019 Innovation Award at the Made in France trade show, also benefits from Veolia's expertise in the circular economy. A virtuous collaboration that is in its infancy, since, after the kettle, it will soon be the turn of the washing machine and the toaster. The positive revolution is underway for household appliances! ▶



#MakeItGreen

8

projects supported in 2020

Eight projects were supported in 2020 and promoted to 18.5 million people. Every quarter, a jury made up of Ulule and Veolia experts pre-selects three projects for the campaign from among those labelled #MakeItGreen. The aim is to identify, support and promote environmental protection initiatives.

40

pre-selected projects

For the second round in 2021, 12 of the 40 pre-selected projects will be presented for people in France to vote on.

4

future winners

The four winners will receive financial support of €2,000 and guidance from Veolia experts.



CO₂: CARBON CLEAN CAPTURES COST AND EFFICIENCY

A Veolia partner since 2017, Carbon Clean has all the makings of a forerunner in CO₂ capture. While the market finally seems ready to take off, the start-up founded in India has already made progress with a solution that is currently very competitive.

Johann Clere's memories of his second trip to India in 2016 are not about the exhilarating atmosphere of Mumbai or the Taj Mahal. What impressed the Veolia Carbon Capture Director was the solution devised by two local engineers. "At the time, I was in charge of the Veolia R&D open innovation team whose role was to find start-ups we could work with to develop the environmental solutions of the future." Five years and a joint venture later, Carbon Clean's Carbon Capture for Utilization or Storage (CCUS) solution is one of the most energy-efficient and least expensive alternatives on the market for capturing CO₂ from industrial flue gases. This is a key stage – before underground storage or reuse – that the

London-based company will soon be able to provide for US\$30 per metric ton. A far cry from the average market price of US\$70 for a ton of captured CO₂.

Market maker

Veolia's partner has achieved this unbeatable price thanks to its new ROTA-CAP technology (i.e. large absorption/desorption columns) with a ten times smaller footprint. "The challenge now is to ensure that Carbon Clean secures its position in a market it is opening up," explains Johann Clere. A few years after its successful debut in a coal-fired power plant in Tuticorin (India), where 60,000 metric tons of CO₂ per year were captured and reused by a chemical manufacturer, the start-up is now finalizing the last pilot unit for its new technology. Heading to the north of England, it will be tested starting in 2022 at a Veolia household waste incinerator. The next step will involve an industrialization phase aimed at scaling up for larger plants. While the market is tending to gather pace in the capture-transport-storage value chain, the question of reusing the captured carbon still needs addressing. Beyond some as-yet partial answers (reinjection into certain chemical products or concrete to harden it, etc.), Johann Clere believes the CO₂-hydrogen mix intended to produce low-carbon fuels for aviation and maritime use is of particular interest. And potentially a new opportunity to become a market maker. ▶



How and why, at a glance

Carbon Capture, Utilization and Storage

You Tube

Veolia Group channel

