

VEOLIA **PLANET**

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**INNOVATION IS PEOPLE**

**Frontline  
Energy transition**



## PLANET

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# PLANET

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**ESTELLE BRACHLIANOFF**  
Chief Executive Officer of Veolia

**ANTOINE FRÉROT**  
Chairman of the Board of Directors of Veolia

**“Hand in hand, the two of us in our new roles will continue to champion this remarkable company.”**



**July 1, 2022 saw a new governance structure in place at Veolia.** The separation of the roles of Chairman of the Board of Directors and Chief Executive Officer marks a moment when our Group is growing in scale, becoming more international, and strengthening its position across all its business sectors in its determination to become the global champion of ecological transformation.

**Together, over the past four years, we have shaped the Veolia of today.** Thanks to the success of our Impact 2023 strategic program, Veolia is thriving. Our company has undergone a transformation that has resulted in exceptional performance. Veolia has proven itself to be resilient: managing crises, drawing on our collective strength to weather the storm, constantly evolving in order to stay close to our customers, identifying opportunities to ensure it remains at the forefront of developments. Veolia is ambitious, innovative and visionary when it comes to the future of our planet.

**Together, we will continue the fantastic task of building tomorrow’s Group.** We are at the forefront of the fight against climate change, treating all forms of pollution, preserving resources, and improving people’s quality of life everywhere in the world where our customers, territories and industries, turn to us to support them in their transformation.

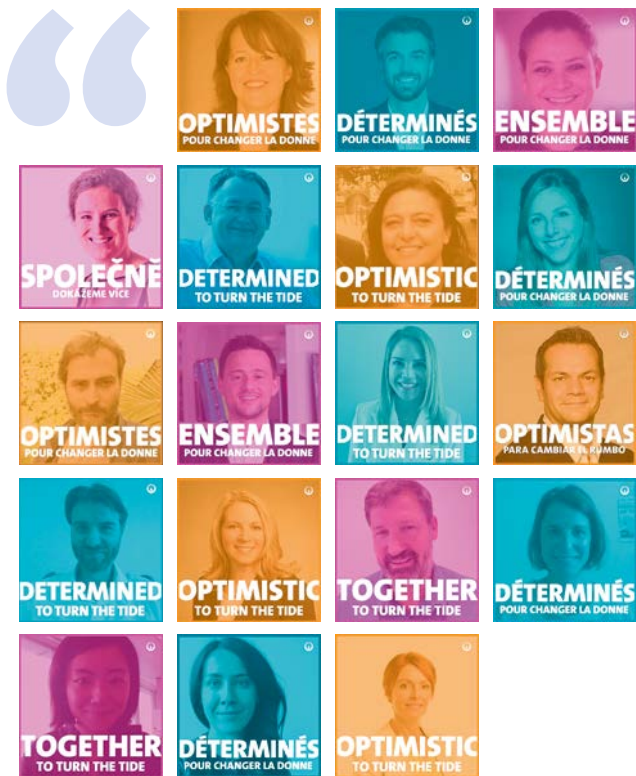
**Hand in hand, the two of us in our new roles will continue to champion this remarkable company. Veolia is proud of what makes it different.** Veolia’s faith in human progress is rooted in its long history. Veolia is resolute in its knowledge that solutions to the major challenges can be found through research, experimentation and innovation. By being unified, Veolia is buoyed by the pride of its tens of thousands of employees, its tight-knit teams of Resourcers who love what they do. This new governance structure reflects who we are. It is that simple.

**At the head of the Board of Directors, the Chairman will lead discussions surrounding Veolia’s strategic direction for the coming years,** examining changes in the world and the industry as well as the needs of our customers and employees so that we are better prepared to address them. He will also ensure that all board members, who each represent the different interests of our stakeholders, can freely express their views and be heard. Now more than ever, the Board will ensure that the plans set out by the senior executive team are well-founded, reflecting its mission to advise and challenge the team about strategic choices they make for the Group.

**At the head of an extensively renewed executive committee, the Chief Executive Officer will lead the way, guiding the team of Resourcers along a path of growth, performance and innovation.** She will make sure that Veolia delivers the full potential of Impact 2023 and, working with you all, the stakeholders in our company, she will set out the new strategic plan, ensuring that it is correctly rolled out over time. Founded on agility, proximity, trust in our teams, and the idea that the most inspired operational decisions are often those taken locally, the new executive team will have a strong focus on making sure our values are upheld: ethics, responsibility, solidarity, respect, innovation, and customer focus.

**Between the two of us, we have spent many decades in the service of Veolia.** Our shared passion for the company will always be our main driving force as we continue this adventure together, and, most importantly, with you all!

## Contributors



## 220,000. We. Employees at Veolia.

Optimistic, determined and always together.  
We are a unique team engaged  
in ecological transformation.  
We are Resources.

And this *Planet* is our magazine.  
But it is also yours...

All of you who work every day for a more sustainable future.  
Read about our stories and projects, as well as your own.  
Let's share our commitment and our solutions for the planet.  
Together we can turn the tide.  
Together for ecological transformation.

### Innovation is People.

**Editors-in-Chief (left to right):** Fanny Demulier, Romain Prudent, Feryel Gadhoun, Eva Kucerova, Martin Curtois, Gabriella Lazzoni, Claire Billon-Galland, Arthur Thoux, Nicolas Levy, Denisse Ike, Jose Guerra, Robert Lozano Vergés, Carrie Griffiths, Stéphane Galfré, Laure Antoni, Justine Shui, Evgeniya Mazalova, Kate Moonen.

## Catherine Ricou

### Director of Innovation at Veolia

Catherine is a graduate of AgroParisTech with over 24 years' experience in the water industry and is joining Veolia as Director of Innovation. Catherine was formerly with SUEZ, where she was responsible for the regulated municipal water investment program in the USA, and headed SUEZ North America's Advanced Solutions division. In this role she oversaw and managed a portfolio of contracts covering municipal water assets with over 4,000 municipal and industrial customers. She was previously VP for Marketing and Business Development at ENGIE, where she implemented the company's strategic growth plan.

## Séverine Dinghem

### Director of Business Support and Performance at Veolia

A Polytechnique and Ponts et Chaussées graduate, Séverine joined Veolia's international finance department in 2000. In 2007, she managed water distribution on Paris' right bank. She was appointed head of the technical department for water activity in Ile de France at Veolia before, in 2011, running the Choisy-le-Roi water treatment plant. In 2018, she was appointed head of the Marne and Oise region for water activity in France at Veolia then Director of Operations in 2020. Her responsibilities included responding to the COVID-19 health crisis. She is now Director of Business Support and Performance at Veolia.



October 22

# WORLD ENERGY DAY

## ACCESS TO SUSTAINABLE ENERGY FOR ALL

For the past ten years, October 22 has had a symbolic significance that is more relevant than ever in today's world: it represents international cooperation that works to provide access to energy for the greatest number of people and highlights the energy challenges of tomorrow. For Veolia, partner to cities and industrial customers around the world, it is also an ideal opportunity for highlighting its unique expertise in energy efficiency, operating heating and cooling networks, and producing renewable energy.

[www.worldenergyday.net](http://www.worldenergyday.net)

# A R T

# F O R T H E

# E N V I R O N M E N T

Art, the universal language, is surely unequalled in its power to highlight the impacts of the major ecological and health crises engulfing us. In its ability to evoke beauty in a way that helps us reinvent our future and together walk the path to a more desirable world. Many thanks to the seven artists carefully selected by Veolia's communications teams in each of the Group's geographical zones. Through their works that shine a light on the world's beauty and fragility, they inspire us and challenge us to focus on the changes that are taking place.



## Faith Bebbington

Sculptor

This 2.5-meter-long Bengal tiger was created using over 300 plastic milk bottles. British sculptor Faith Bebbington washed, cut, colored and attached them to create the tiger's 'fur'. This was the first of a long series of sustainable projects over the past decade commissioned from Faith by Veolia in the UK, with other examples of the partnership including recycled Wembley Stadium lions, an elephant and a great white shark. The Bengal tiger featured in London as part of Tiger Tracks, one of the world's largest events devoted to protecting wild cats in danger of extinction.

To find out more







© IEVA SAUDARGAITE DOUAIHI





## leva Saudargaitė Douaihi

Photographer

What happens to our coastal areas once sea levels rise? This is the question explored by Lithuanian-Lebanese photographer leva Saudargaitė Douaihi during her residency in Normandy as part of the *Les femmes s'exposent* [Women on Show] festival. Sea levels are forecast to rise anywhere from 40 centimeters to almost a meter by 2100, meaning that many French towns will be impacted. Her photos envision two scenarios for towns and the coast at the end of the Anthropocene. One is dystopian while the other is a world of science fiction, where architecture has evolved to take on the appearance of living organisms. Her artistic practice seeks to raise questions about the most suitable mitigation measures.

To find out more



### JR

Street artist

In *Homily to Country*, French artist JR draws attention to farmers confronted by the reality of climate change and water stress. He designed and created a procession of four large-scale portraits printed onto 30-meter canvases. They depict three orchardists forced to abandon their farms by the decline of flows in the Baaka/Darling River, and an Aboriginal elder from the Baakandji tribe. The portraits were carried in procession by groups of about 60 local people. The event highlighted the struggle facing these farmers, who want to protect their environment and make a living wage from their work.

To find out more



© JR / "HOMILY TO COUNTRY, PROCESSION", LAKE CAWNDILLA, AUSTRALIA, 27 FEBRUARY 2022









## Jana Hartmann

Photographer

Why paint landscapes in cities? Is it simply to make concrete more beautiful? Or do these works reveal a deeply held yearning for nature in an ever more artificial environment? German photographer Jana Hartmann's work is a kind of travel diary where the artist has captured locations around the world, with portraits of fictional natural landscapes rubbing shoulders with real settings. At a time when scientific studies indicate that a virtual experience of nature has a soothing and regenerative effect on humans, she invites us to experience nature in a new way.

**To find out more**





## Fernando Maselli

Photographer

This image of a mountain looks like the real thing. Yet, just like all the other images in the book *Infinito Artificial* by Argentine photographic artist Fernando Maselli, it is a landscape recreated from fragments of photographs that have been cut up and reassembled, repeated and superimposed. This technique produces an idealized mountain, enhancing the sense of endlessness, solitude and immensity. The beauty of the natural landscape is amplified, enveloping us in its magnificence and fragility. The work is a stunning tribute to glaciers, the true sentinels of climate change.

***Infinito Artificial***  
**images**







© PAUL NICKLEN / "PIPELINE POETRY", MAKAHA, HAWAII, 2013 & "FACE TO FACE", SVALEBARD, NORWAY, 2008





## Paul Nicklen

Photographer

Canadian marine biologist and photographer Paul Nicklen's mission is to marvel at nature in order to protect it. His photographs tell us about the ocean and the glaciers, weave tales of adventure. Many of them depict encounters between animals, or between animals and humans, as well as the relationship between humans and nature. One example is the surfer riding a tube (a giant breaking wave) in Hawaii. Surfers were among the first to campaign for the protection of natural environments. But

Paul Nicklen hasn't stopped at taking photographs; he also co-founded the ocean conservation non-profit Sea Legacy. Because it's time to begin "putting Earth - our home - first."

**Born Wild**  
newsletter





**“For the very first time, a work of art will be launched into space to call attention to the impact of climate change in Africa.”**

## **N.E.T. collective\***

Visual artists

In December 2022, a geostationary satellite will be launched to monitor climate and weather changes on the African continent. What makes the project particularly special is that the Ariane 5 launcher nose cone will be adorned with a work of art created by three African artists working together as the N.E.T. collective. The piece, entitled *Memory of today, Memory of the future*, represents the shape of a woman walking toward the future. An optimistic message at a time when climate change is already hitting Africa especially hard – despite the fact that the continent emits the least CO<sub>2</sub>. At the heart of the African Space Art Project, the work evokes the union and solidarity symbolized by a satellite tasked with providing information on environmental risks.

**\*Jean-David Nkot from Cameroon and Michel Ekeba and Géraldine Tobé from the Democratic Republic of the Congo**

**Find out more  
about the African  
Space Art Project**





Quand le riz dont on parle  
 atteint enfin l'espace  
 il y a un carton sur terre  
 qui se casse...  
 Geraldine  
 7ème  
 6/06/2022

**TITRE: MEMORY OF TODAY (CUIDAH)**  
**MEMORY OF THE FUTURE**  
 23/01/2022

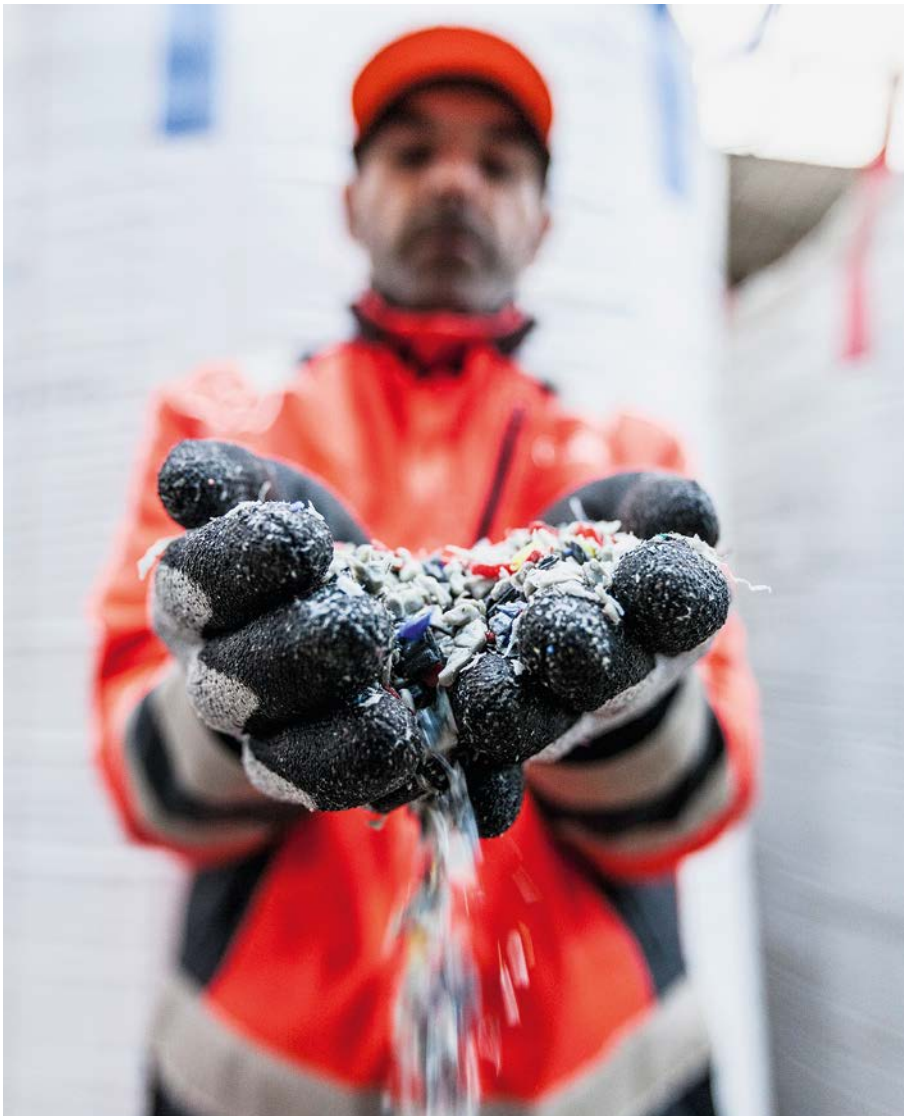
L'Afrique est le miroir du monde  
 L'espace n'appartient à personne  
 Ils doit être ouvert à toutes les cultures  
 Pour cohabiter ensemble pour  
 vivre en synergie, ouverts à toutes  
 les Nations pour un Bien être  
 COMMUN

EN BASSA'Ō  
 - MÈ YÈ MÈ NIN WÈ MÈ GWE BÈT  
 - MÈ GWE BÈT WÈ GWE HOP  
 - MÈ GWE HOP MÈ GWE HOP  
 - MÈ GWE HOP WÈ MÈ GWE BÈT  
 - MÈ GWE BÈT WÈ MÈ GWE HOP  
 - MÈ GWE HOP WÈ MÈ GWE BÈT  
 NI L'ŌŌŌ

- Je suis, je suis c'est que j'ai la parenté  
 - J'ai la parenté c'est j'ai une langue  
 - J'ai la langue c'est que j'ai une origine  
 - J'ai une origine c'est que j'ai une cosmogonie  
 - J'ai une cosmogonie c'est que j'ai une tradition  
 - J'ai une tradition c'est que j'ai la clé de la vie

I HAVE A KINSHIP, SO I HAVE A LANGUAGE  
 I HAVE A LANGUAGE, SO I HAVE AN ORIGIN  
 I HAVE AN ORIGIN, SO I HAVE A TRADITION  
 I HAVE A TRADITION, SO I HAVE A COSMOGONY  
 I HAVE A COSMOGONY, SO I HAVE THE KEY TO  
 LIFE.

2022



**FRANCE**

## With Faurecia, more recycled plastics in cars

Veolia and the automotive supplier Faurecia (Forvia Group) are joining their R&D forces targeting around 30% recycled plastics in car interiors by 2025. The two companies will accelerate the introduction of sustainable materials and their market release, while helping to reduce plastic waste and strengthen the circular economy. This project will also allow Veolia – which has been supplying polypropylene grades to the automotive industry in France for more than five years – to expand its range of components inside vehicles. The Group will start producing secondary raw materials at its recycling sites in France as early as 2023.

**VEOLIA AND SOLVAY ARE BUILDING THE LARGEST SRF (SOLID RECOVERED FUEL) COGENERATION UNIT IN FRANCE, AND ONE OF THE LARGEST IN EUROPE.** Located at Solvay's soda ash production facility in Dombasle-sur-Meurthe, the "Dombasle Énergie" project will halve the plant's CO<sub>2</sub> emissions and ensure the site remains competitive.

**BELGIUM**

### Val'Up: new sorting center for a broader range of PMC waste

Helping to embed the circular economy at the regional level at an acceptable cost for the community: that is the task that has been set for the new Val'Up site in Ghlin, the largest waste sorting center in Wallonia. The added advantage it offers is: the ability to continuously sort some 50,000 metric tons per year of a broader range of PMC (plastic, metal and cardboard) household packaging waste generated by over two million people. This project is a response to the new sorting rules in Belgium, which allow users to put more plastic packaging in their blue PMC bags. The center has made the innovative choice of using, 20 optical sorters to recognize and sort 14 different types of material. The new unit, which employs 90 people, is the result of a public-private partnership between four partners, two Hainaut intermunicipal authorities and two groups (Veolia and Vanheede).

## THE NETHERLANDS

### **Iron Fuel™ technology to decarbonize heavy industry**

Iron powder: that is the solution chosen by the RIFT (Renewable Iron Fuel Technology) spin-off from the University of Eindhoven, which is seeking to decarbonize heavy industry using this combustible powder. Although the idea of burning metal powders is not new – they have been used in fireworks for more than 1,000 years – turning them into a recyclable fuel for everyday use was not an easy task. Hence the decision to build a 1-MW boiler for the Helmond heating network in partnership with Veolia and Dutch heating network operator Ennatuurlijk. It will supply hot water to heat 500 homes from September 2022. This will be followed by a 5-MW commercial installation by 2023.

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**SPANISH AGRI-FOOD COOPERATIVE COVAP IS INVESTING €25 MILLION** to achieve energy autonomy and climate neutrality. Its circular economy model, unique in Europe, has prompted it to acquire three power plants, including a 13.4 MW biomass plant built and operated by Veolia, which will be operational by 2024.

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## FRANCE

### **TotalEnergies and the challenge of biomethane on a large scale**

Veolia and TotalEnergies have signed an agreement covering more than 15 countries to produce up to 1.5 TWh of bio-methane per year by 2025 from Veolia's waste and wastewater treatment facilities. The Group's high-potential areas include India, North and South America, and France. In practice, the two partners will develop and co-invest in a portfolio of international projects, one in biogas from its units, the other in the biomethane value chain. The biomethane produced will be collected, cleaned and marketed by TotalEnergies, either as fuel or to be fed into local gas networks. Eventually, production will be equivalent to the average annual natural gas consumption of 500,000 inhabitants and will avoid the emission of approximately 200,000 metric tons of CO<sub>2</sub> per year.

## FINLAND

### **Biomethanol from paper pulp**

In what is set to be the world's largest biorefinery project, with a start-up date of 2024, Veolia has teamed up with market leader Metsä Fibre. The challenge is to convert the methanol generated during pulp production at Metsä Fibre's Äänekoski bioproducts plant into CO<sub>2</sub>-neutral commercial biomethanol. Veolia will build and operate a crude methanol refinery connected to the plant at a cost of €50 million, of which €9.4 million will be financed by the Finnish Ministry of Economy and Employment. With an annual production capacity of 12,000 metric tons, the plant could reduce CO<sub>2</sub> emissions by up to 30,000 metric tons. Replicable in 80% of the world's pulp mills, this project points to a global biomethanol production potential of about 2 million metric tons per year.



## UNITED STATES

### **Recycle contaminated diesel fuel**

Teams at the Environmental Restoration Disposal Facility in Hanford, a major low-level radioactive and hazardous waste site operated by Veolia, have found a novel way to recycle diesel fuel from contaminated construction equipment. By transferring it to other equipment used in the contaminated areas of the site – without going through the process of treating and then disposing of it or sending it over 2,000 miles to an incinerator in Tennessee – thousands of dollars will be saved in transportation and treatment costs. Not to mention the environmental benefits, since another option would have been to run the equipment until the fuel ran out.

**FRANCE**

## Val’Pôle Veolia, biomethane production in a local loop

In Claye-Souilly (Paris region), the Val’Pôle production unit recovers biogas from a non-hazardous waste landfill. Once recovered and treated, the biogas is transformed into biomethane, a 100% renewable gas that is then fed directly into the GRDF network. The aim is to supply the region’s households and companies with gas for their traditional uses, but also to decarbonize the transport sector with BioNGV. Fully automated and remotely controlled, the unit should produce 120 GWh of gas per year, the equivalent of gas used by 20,000 households or a fleet of 480 buses, and representing around 25,000 metric tons of CO<sub>2</sub> emissions avoided.



**PAPER MANUFACTURER NORSKE SKOG IS INVESTING €200 MILLION IN A BIOMASS COGENERATION UNIT** at its Golbey site (France) to supply a corrugated cardboard production line with carbon-free steam. Veolia, which will operate the plant for 19 years, is providing 10% of the funds.

**UNITED STATES**

## HPD® crystallization for lithium-ion battery recycling

The need for sustainable solutions to recover valuable materials from batteries prompted the Canadian company Li-Cycle to select Veolia’s HPD® crystallization technology for its Rochester recycling hub, which will be operational by 2023. This will give new life to some 225,000 battery components each year. This technology is a key step in one of the final stages of the recycling process, optimizing the creation of nickel sulfate and cobalt sulfate from lithium-ion batteries and transforming them into raw materials ready to be used in new batteries. Li-Cycle will use Veolia’s HPD® crystallizers to produce between 42,000 and 48,000 metric tons of nickel sulphate and between 6,500 and 7,500 metric tons of cobalt sulphate per year, which can then be sold to battery manufacturers.

**RECAPP, THE UAE’S LEADING FREE DOOR-TO-DOOR RECYCLING SERVICE**, has inaugurated a warehouse in Al Quoz, a move that reflects its expansion in Dubai. Since the launch of its app in 2020, Veolia has created a community of 15,000 recyclers in Abu Dhabi and Dubai and collected 180 metric tons of recyclable material.

**VEOLIA FOUNDATION**

## Active support for Ukraine

Since the beginning of the conflict in Eastern Europe, the Veolia Foundation with its partners – including the French Red Cross, Médecins Sans Frontières, Solidarités International, the French Ministry of Europe and Foreign Affairs, and various UN agencies – has been working to support affected communities. It has focused on four projects: the delivery of nearly 200 sanitary facilities to camps in Moldavia and Ukraine; an audit of the situation of water access, sanitation and hygiene (WASH) on the Moldovan-Ukrainian border; production of 1,320 hygiene kits (for 6,600 people) by the Red Cross; and a scheme enabling more than 700 Veolia employees to participate in financing the humanitarian aid provided.

# TRENDS

## The metaverse: a virtual world connected to real-world resources

The metaverse is a headline-grabbing innovation that is sweeping the planet. It is an online virtual territory that offers early adopters a fully immersive parallel world to explore as avatars, courtesy of their virtual reality headsets. This alternative reality is rapidly gaining fans from the private and corporate worlds. It relies on artificial intelligence (AI), virtual reality and blockchain, all highly energy-intensive technologies. According to a scientific study,<sup>1</sup> the training of a single AI model can emit over 284 metric tons of CO<sub>2</sub>e, five times more than the lifetime emissions of an average US car!<sup>2</sup> On this basis, any massive shift to the metaverse would smash all existing records for energy use, regardless

of any anticipated positive rebound effects, such as the reduction of physical travel across the world and its consequent limitation of anthropic carbon emissions. For the time being, the metaverse is in its early stages, but exponential uptake in the near future,<sup>3</sup> driven by a quest for profit, is certain to come into head-on conflict with the vital necessity for greater sobriety in energy use.

1. Training a single AI model can emit as much carbon as five cars in their lifetimes, *Karen Hao, June 2019, © MIT Technology Review.*  
 2. Including manufacture.  
 3. By 2030, Meta's CEO expects to see around "a billion people in the metaverse." A number of other studies agree. A report from US research and consulting firm Gartner says 25% of individuals will spend at least an hour a day in the metaverse by 2026. (Source: O1Net, June 2022).



## Soil, climate and harvests

A study by Chinese scientists<sup>1</sup> of soils in all parts of that country highlights the importance of restoring soil quality. This applies particularly to countries with developing economies that often suffer from very degraded soils combined with

very high food demand. The number one reason for restoring soil quality is that it improves resistance to crop losses caused by the climate emergency. Based on some 12,000 observations of cereal crops across the country, the authors state

that harvest losses attributable to extreme weather events can be reduced by 20% if efforts are made to improve soil quality. ▶

1. Enhancing soil quality makes crop production more resilient to climate change, in *Nature Climate Change*, Vol 12, pp. 516-517, June 2022.

# An unprecedented global movement on Twitter and LinkedIn

#WeFaceTheChallenge provides a forum for Veolia's 220,000 employees. Starting from June 7, each employee has the opportunity to publish posts on LinkedIn and Twitter about their commitment and pride in working in a key profession focused on tackling ecological transformation. Over 4,000 employees have already joined in, part of a worldwide movement that is giving a voice to this determined, optimistic team moving forward together to face the most important challenges of our century. Other events will follow: stay connected.





“This level of participation shows the enormous commitment of our employees to ecological transformation. It reflects the collective to which I belong.”

Estelle Brachlianoff  
Chief Executive Officer, Veolia

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## A VIRAL CAMPAIGN BASED ON PRIDE

› **4,000 posts**

on LinkedIn and Twitter in a week

**17 languages**

used to write the posts

› **100,000 likes**

in response to these posts

**5 continents**

represented, creating global coverage

# NZE 2050

## THE IEA'S PATHWAY TO NET ZERO EMISSIONS

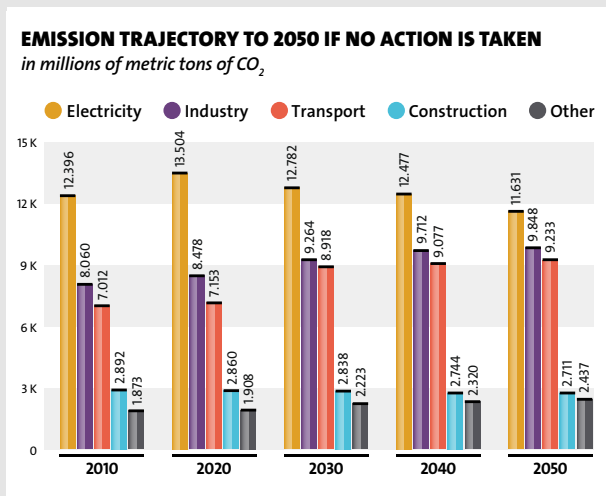
The International Energy Agency (IEA) is clear: we have to do more, faster, and better. Its recent report, *Net Zero Emissions by 2050 (NZE)*,<sup>1</sup> setting out the first global energy pathway for limiting temperature increases to 1.5°C, states that only one scenario will achieve carbon neutrality: NZE 2050.

This scenario combines a fall in global energy demand of around 8%, thanks to less wasteful use of energy and better energy efficiency, with meeting the needs of an economy that will have more than doubled in size and a global population with 2 billion more people than today. It envisages that renewables will provide 90% of electricity, with combined wind and solar accounting for nearly 70% of production. Fossil fuels will supply no more than one-fifth of total energy, down from four-fifths currently.

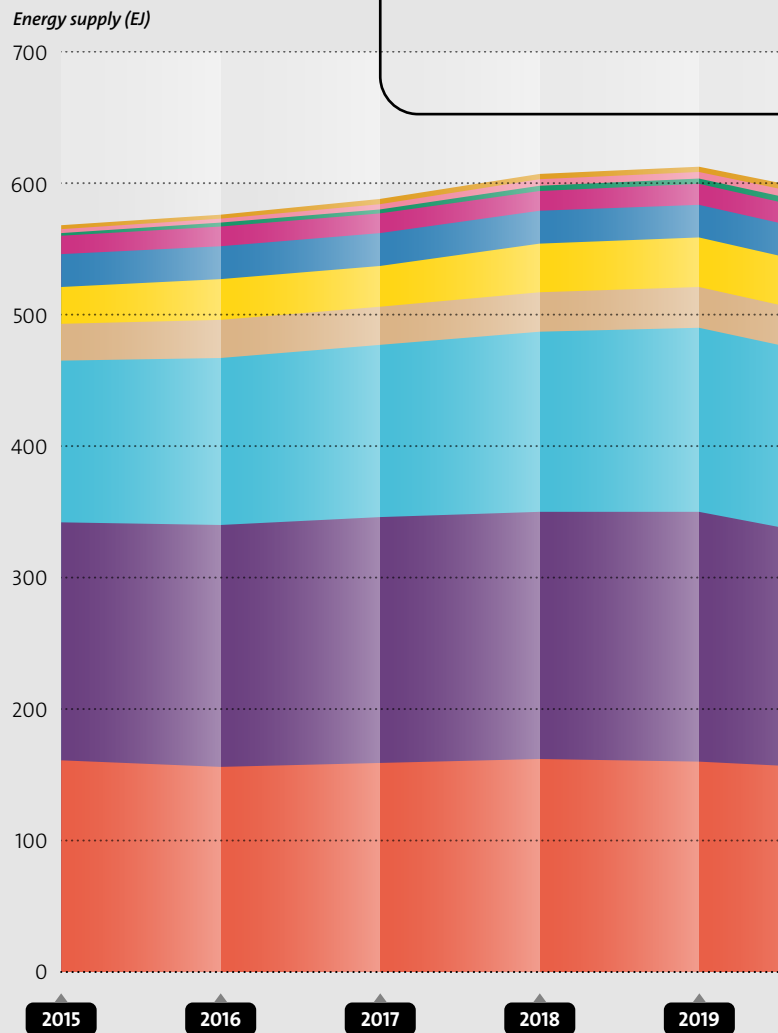
The IEA pathway sets out around 400 separate measures and includes two major milestones: 2030, for a 40% fall in CO<sub>2</sub> emissions, and 2050 for net-zero emissions. Meeting these ambitious targets and deadlines will require, in particular:

- as of now, halting all investment in new fossil fuel supply projects and unabated coal-fired power plants;
- by 2030, a 4% annual increase in global energy efficiency;
- by 2035, halting the sale of new internal combustion engine passenger cars;
- by 2050, generalized roll-out of existing decarbonized technologies, backed by massive investment to develop and kick-start the process of bringing to market new clean energy technologies. ▶

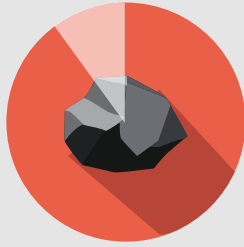
1. [www.iea.org/reports/net-zero-by-2050](http://www.iea.org/reports/net-zero-by-2050), published in May 2021.



**2020:  
milestone  
warning**



**Limit use of fossil fuels**



**90%**  
less coal



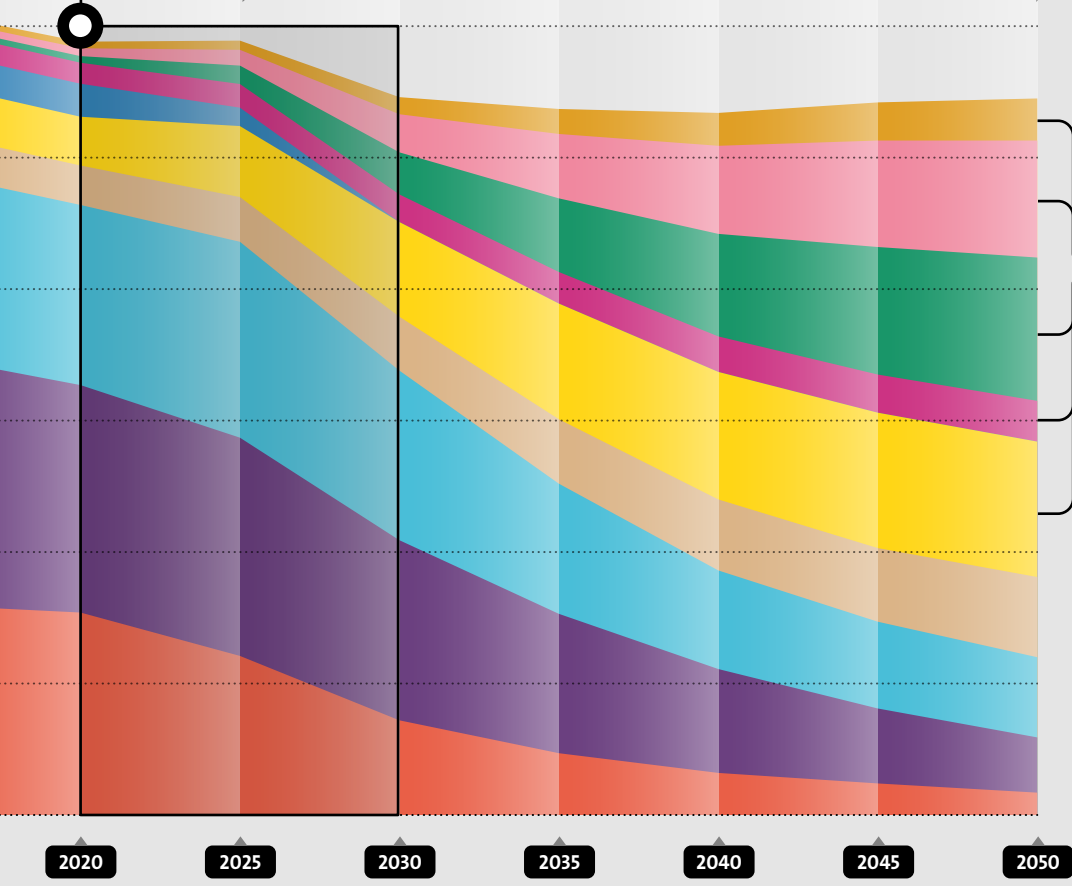
**70%**  
less oil



**55%**  
less natural gas

**Reduce global energy demand by 7% by 2030, and maintain this level.**

**Accelerate rapid growth of advanced bioenergy techniques** (biogas to recover energy recovery from organic waste, etc.) and halt all traditional biomass uses (charcoal, etc.).



Renewables to meet **70%** of energy demand in 2050

- Coal
- Oil
- Natural gas
- Nuclear
- Advanced bioenergy
- Traditional biomass
- Hydroelectric
- Solar
- Wind
- Other renewables

# Simplifying our approach to climate change for faster results

**By Estelle Brachlianoff**

Chief Executive Officer of Veolia

**A** **s another summer of extremes** — multiple heatwaves, dozens of forest fires, depleted waterways, historic water shortages, violent storms and flash floods— draws to a close, people of all political persuasions in France agree that we urgently need to address climate change.

At Veolia, we are ready to support all the actors of society to ramp up their ecological transformation efforts.

However, the implementation of this transformation can only reflect the challenges of climate change and the commitments taken by private and public stakeholders if there is a legal and regulatory framework in place to bring together political will and solutions, those already available as well as those that still need to be invented.

The good news is that many effective solutions already exist, including ones that optimize water management, conserve natural resources by using materials recovered from waste streams, save energy, promote renewables, and reduce pollution and greenhouse gas emissions.

The yet-to-be-invented solutions will present themselves organically if the previous ones have been deployed optimally, setting off a domino effect aided by a constant drive to innovate.

There is a desire among regions and economic actors to embark on a journey of ecological transformation. Affordable, easy-to-implement solutions do exist. However, one point that comes up time and time again is the lack of a framework incentivizing eco-friendly practices.

Quite frankly, nowadays, it's simpler to contribute to pollution than to combat it. It's cheaper to use energy than to save it. It's easier to waste water than to conserve it. It's more convenient to use raw materials than recycled ones. In short, the easy way isn't necessarily the best way. This contradiction needs to end. Solutions need to be implemented across the board so we can start turning the tide today. This process involves helping people, urban areas, industry and agriculture make changes to embrace existing solutions. It also involves deploying simpler, more enticing rules at a faster pace to help drive ecological transformation.

To meet regional energy needs, we can easily use biomass, solid waste and biodegradable waste. We can view stricter energy efficiency requirements as an opportunity to transform our entire approach. ▶



## Opinion

That's why I launched a plan in the spring to help Veolia generate more sustainable energy using local resources and conserve energy at our facilities and those of our clients.

To avoid shortages like the ones we saw this summer, we can stop wasting resources by using more recycled materials and reusing treated wastewater more often.

To reduce our reliance on all strategic materials that are imported and to recycle significant amounts present in our waste streams, we can maximize sorting, recycling and recovery opportunities for electric batteries and electronic components, ensuring there is a secure supply.

To combat air pollution and its adverse health effects, we can step up the development and implementation of purification solutions to help save lives.

Companies are determined to take action to address these challenges, which all directly impact people's lives and well-being. However, they can only work efficiently if governments constantly advance the regulatory frameworks.

In today's global competition, we can set ourselves apart with an environmental strategy that leaves no one behind and favors listening over trading invectives, collaborating over issuing directives. A well-conceived environmental strategy reconciles sustainability with competitiveness and does not treat the "end of the world" and the "end of the month" as opposing challenges.

By providing the necessary impetus, we support a purposeful vision of ecology: an ecology that drives reindustrialization thanks to low-carbon transition, an ecology that creates offshore-proof jobs and increases people's purchasing power by keeping production local and affordable.

This is a mission that many people can support. I firmly believe that, together, we can achieve our ecological transformation goals. ▶



## Key figures

**25%**

of Russian gas  
can be replaced  
with biomethane  
produced in France

**€150**

million invested  
over two years in the  
ReSource plan

**5 years**

before Veolia's  
services in France  
achieve energy  
autonomy

**“We can view stricter energy efficiency requirements as an opportunity to transform our entire approach.”**

**Estelle Brachlianoff**





FATI



# Meet Veolia employees around the world

Fatima, Marta and Viktor are part of a community of 220,000 Resourcers who “want the world as it could be.” Optimistic, determined and always together, they never give up in the pursuit of ecological transformation. Here are the first in a long series of portraits that will be published on [veolia.com](https://veolia.com).

## Fatima

Process Development Engineer, CEDILOR site (a SARP Industries subsidiary)

At 26, Fatima is aware that her generation has been brought up to protect the planet: “We have reached a stage where it is urgent to promote recycling and to reduce the environmental and social impact of the extraction of raw materials, which is very polluting.” The CEDILOR<sup>1</sup> site, her favorite ‘digging ground,’ is where our treasure hunter gives free rein to her commitment. With her colleagues, Fatima has developed several solutions for recycling used electric vehicle batteries. The idea is to extract the strategic metals to be reused to manufacture new batteries. In other words, how to make the electric car truly sustainable, when it is predicted that there will be 100 million EVs on the road worldwide by 2030, compared with 10 million today. “The project arose out of the exponential market for EV batteries over the past 20 years, even though we don’t necessarily know how to recycle them.”

The batteries are first delivered to the neighboring Euro Dieuze Industries site (another SARP Industries subsidiary), where

they are dismantled and then shredded to separate the less valuable elements from the more valuable ones. Three main materials are obtained: paper/plastics, aluminum/copper/steel and, finally, black mass, a kind of powder mixture of carbon, nickel, lithium and cobalt. “Black mass is what we recover at CEDILOR. In our laboratory, it undergoes hydrometallurgical chemical treatment to separate and purify the lithium, nickel and cobalt.”

Work is ongoing to improve this hydrometallurgical process so that recycled cobalt and nickel salts – the by-products from the hydrometallurgical units – can be used to produce new batteries. This is where teamwork and collective intelligence make all the difference, especially when tackling the pitfalls that regularly crop up and where the solution is not immediately apparent. “We’ve got the optimism and perseverance we need to eventually come up with a reliable and robust process.”

1. Industrial depollution center in Lorraine (France)

Listen to Fatima tell her story



# “Reusing wastewater avoids depleting water resources!”

## Marta

Head of a wastewater treatment plant on the banks of the Llobregat

“Water has played a big part in my life since I was very young. In Barcelona, water is everywhere! I see it as the most important element we need to protect for future generations,” are Marta’s first words. “If you take a closer look at it, its composition is spectacular. Taking care of water came naturally to me. After studying environmental sciences, it was only logical to focus my career on wastewater treatment.”

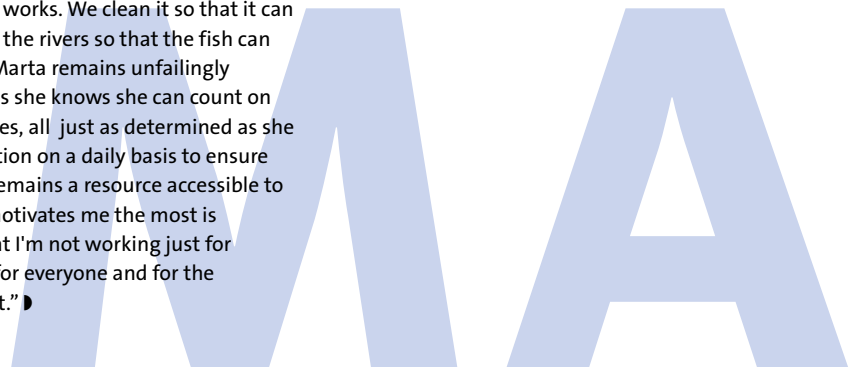
At the helm of a wastewater treatment plant on the banks of the Llobregat River, Marta agrees that there is nothing ordinary about her job: “You give back the best possible water quality to the environment.” For her and her teams, water quality really is a constant challenge. The vast Prat de Llobregat wastewater plant, which treats the wastewater from Barcelona and surrounding areas, houses one of the largest water regeneration systems in the world, using ultrafiltration and osmosis.

“This type of plant doesn’t just treat water. It’s not a conventional wastewater treatment plant but an ecological plant in the real sense of the term. We produce more

than just water. For example, we generate green energy, such as biogas, from the wastewater.” Also, the quality obtained is so high that the water can be reinjected directly into the Llobregat aquifer. This increases water resources and helps maintain the river’s flow. “By reusing wastewater, Barcelona draws less from the aquifer and recycles the high quality water from our plant for agricultural, urban and industrial purposes.”

At home, the mother of two is proud to explain her job to her daughter: “The water that flows from the tap in the bathroom goes to the wastewater treatment plant where mom works. We clean it so that it can go back into the rivers so that the fish can live there.” Marta remains unfailingly optimistic, as she knows she can count on her colleagues, all just as determined as she is to take action on a daily basis to ensure that water remains a resource accessible to all. “What motivates me the most is knowing that I’m not working just for myself, but for everyone and for the environment.” ▶

**Listen to Marta tell her story**





Aigües de  
Barcelona

RTA



**VIKT**

# “Our ambition? To help towns and cities make their energy mix greener.”

## Viktor

Project coordinator at Veolia subsidiary BS|ENERGY's site

“We have to act quickly on ecology if we don't want the future to be bleak,” says Viktor. For him, as for many young people in the generation marked by *Energiewende* – Germany's energy transition in the 2000s – the 2015 Paris Agreement was the turning point. For the first time in history, the world set itself a clear and binding target to limit global warming to 1.5 °C. “In my own small way, I'm helping to improve our carbon footprint here in Braunschweig.”

‘Here’ is the BS|ENERGY plant of the future where they are working on the green and renewable energy of tomorrow. As the concession operator for the city's electricity and gas networks, the company – a Veolia subsidiary – has set itself the target of pioneering a more flexible, ecological and affordable energy supply. “The city of Braunschweig used to mainly use coal for heating. Now we are helping it to make the transition to low-carbon energy.” One of these more sustainable energies is biomass.

Viktor and his team head up the biggest project in the history of BS|ENERGY: to replace the coal-fired heat and power plant with a biomass cogeneration plant that will produce 22 MW of electricity and 60 MW of heat. That is the equivalent to the heating needs of about 50,000 households. The plant will be operational by winter 2022.

While innovations often spring from the minds of young creatives, Viktor too is one of those endlessly inquisitive people, never short of ideas, a Resourcer always ready to experiment and find colleagues with out-of-the-box solutions when it comes to making the energy transition a reality. “This switch to a biomass power plant really makes sense because it reflects the desire to end coal-fired energy production.” Aware that his job makes him a ‘climate protector,’ Viktor definitely feels in tune with the ecological ambitions of his generation. ▶

Listen to Viktor tell his story



Frontline

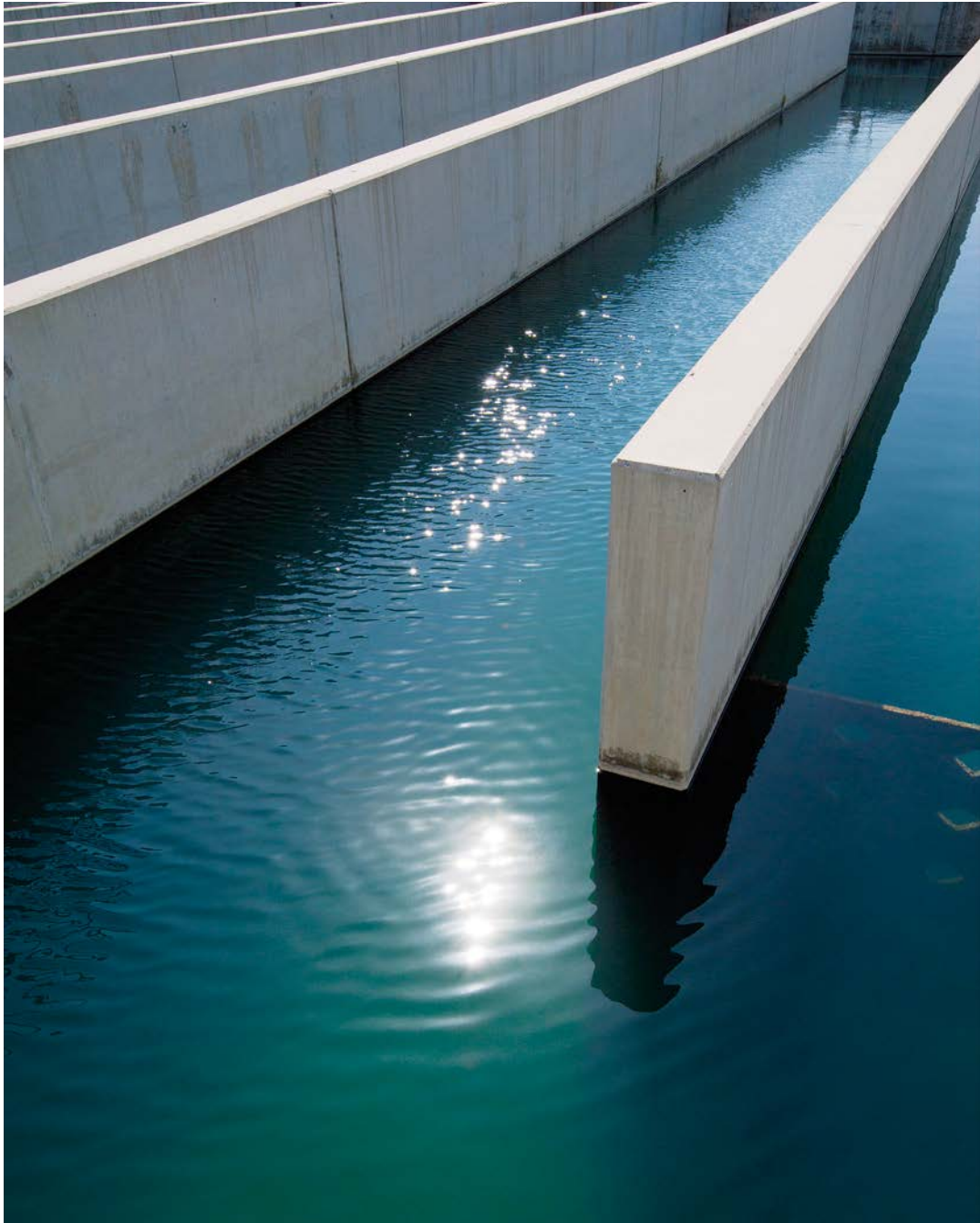


# SOLUTION



energy  
transition

# TIONS





# Energy-positive wastewater

The question of carbon neutrality is central to every industrial challenge, particularly when it comes to wastewater treatment. And this is why Veolia is ramping up efforts to design sustainable solutions for cutting energy use and carbon emissions at its wastewater treatment plants (WWTP).

## Key figures

**1 to 3%**

Share of global energy consumption of wastewater treatment plants (IWA - International Water Association estimate).

**7<sup>TWh</sup>**

Veolia's annual energy consumption, 70% of it for water treatment and wastewater services.

**28 to 34**

Global warming potential (GWP) of methane over 100 years compared to carbon dioxide. This reaches 84 to 86 over 20 years (source: UN).

**25%**

Amount of Russian gas used in France that could be replaced by energy from organic waste (green waste and sewage sludge).

## Issue at stake

High energy costs for wastewater treatment plants.

## Objective

Make plants self-sufficient and reduce climate emissions.

## Veolia solution

Introduce energy efficiency, microgrids and use of self-produced biogas.



## 3 questions to Jean-François Nogrette

Senior Executive Vice President, France and Special Waste Europe at Veolia

**You have announced that Veolia's services in France will be energy-independent within five years. How are you going to meet this target?**

**Jean-François Nogrette:** By leveraging every margin for maneuver our expertise and business lines can generate. First of all, we will increase our own energy production of 100%-local energy, 80% from the circular economy, 20% from solar. We will fit photovoltaic panels at sites where this is possible, increase production of biogas from organic waste and sludge from wastewater treatment plants, and boost energy production from solid-recovered fuels sourced from non-recyclable waste. In this way, we will produce over two terawatt-hours (TWh) of energy, equivalent to the amount of power needed to fully cover the energy use of our services at present. We then intend to pool all our in-country waste and energy streams, meaning we will be the first to use the energy we produce. This means we will

lock in our energy supplies and costs, which will then be very largely immune to price volatility in the energy market. Lastly, we will cut our energy use, by replacing all our most power-hungry equipment, using the digital tools that Hubgrade offers and, of course, placing our faith in the insights and operational experience of our teams in the field. This is the mindset behind our commitment to the EcoWatt energy forecasting program designed by RTE and the ADEME.

**What are the benefits of exploiting biogas from wastewater treatment plants, and to what extent has this been developed in France?**

**J-Fr. N.:** It is estimated that France could reduce its reliance on Russian gas by 25% - the country currently imports around 17% of its gas from Russia - if we produced biomethane from all our organic agricultural waste and local water resources. Veolia is working hard to increase the amount of biogas produced in France, particularly for

injection into the gas grid. We have developed a membrane-based technology to purify the biomethane extracted from biogas.

**What more can be done to develop infrastructure in France?**

**J-Fr. N.:** Much remains to be done. The gas distribution network is slowly becoming a biomethane collection network, a process that still has much untapped potential. In France, no more than 15% of our major wastewater treatment plants are fitted with digesters for producing biogas, compared to 100% in Switzerland. French regulations prevent us from mixing sludge from WWTPs with food and green waste, a practice permitted in other European countries. Lifting this ban would allow us to double the quantity of biogas produced by existing digesters. We need to pick up the pace if we are going to meet the government's target of biogas independence in 2050. ▶

## A scientific and industrial partnership for CO<sub>2</sub> recovery

SIAAP is the Greater Paris Inter-departmental Sanitation Authority and is the largest public sanitation service in Europe. CEA is France's Atomic Energy and Alternative Energy Commission. Collège de France is a scientific institute. Veolia, SIAPP, CEA and Collège de France

are working together on a research project to capture CO<sub>2</sub>, particularly from the biogas from WWTPs, and convert it into formic acid, methanol and methane. Formic acid can be used to treat nitrogen in WWTPs and make energy

generation even more efficient. When biomethane is burned to generate electricity, the nitrogen acts as an inhibitor reducing its combustion properties. By removing this nitrogen, it is therefore possible to extract more energy from pure CO<sub>2</sub>.

It is hoped that within three years a pilot facility will be up and running to test this technology, which can potentially be used in WWTPs, but also in anaerobic digestion and waste incineration facilities. ▶

# W

What if wastewater treatment plants were part of the solution for increasing energy efficiency and limiting impacts on the climate? These energy-intensive plants, which use between 1% and 3% of global energy production according to the International Water Association, are seeing their roles changing, with some now acting as biorefineries.

## **IN RIALTO, A SOLAR MICROGRID ON A WASTEWATER PLANT**

In California, Veolia employees have come up with an innovative microgrid solution that uses a unique combination of biogas cogeneration, solar power and backup battery storage.

The city of Rialto is situated just east of Los Angeles and Rialto Water Services provides water and wastewater treatment to 100,000 people. In 2013, a 30-year concession agreement was signed between the City of Rialto and Veolia. Last year, as part of this contract, the microgrid solution was announced. “Veolia is working with its clients to invest and think boldly and creatively to protect our resources,” says Veolia Senior Executive Vice President in North America, Frédéric Van Heems. “The WWTP in Rialto, California, is a good example of how municipalities can take positive steps toward a greener future by being more energy efficient and by using a microgrid power source.”

This project is expected to cost \$15 million once completed in 2024, with no funding coming from increased taxes in the local community. Instead, the costs are being absorbed into the 30-year agreement. It will include a 360-kw reciprocating engine that will run on the biogas generated from treating the wastewater using anaerobic digestion technology.

Additionally, there will be a 1.6-MW solar photovoltaic system and a 2.5-MWh lithium-ion battery that can run for four hours before needing to be recharged. The plant can therefore run self-sufficiently and can operate during power outages. Any excess energy produced can also be sold on the grid to raise additional revenue. No natural gas will be used and 600 million tonnes of CO<sub>2</sub> emissions will be saved every year. This is equivalent to the CO<sub>2</sub> savings from taking 130 million cars off the road for a year.

There are other environmental benefits, says Frédéric Van Heems: “Besides the positive impact the project will have on energy efficiency and resilience, it will also contribute significantly to protecting crucial

natural resources in the area. The wastewater treatment plant is located near an environmentally sensitive waterway which supports a population of endangered Santa Ana sucker fish.”

## **GREEN ENERGY FROM SLUDGE IN KUBRATOVO**

Near Sofia, Bulgaria’s capital city, Veolia operates one of the largest WWTPs in the Balkan region. Historically, it has consumed between 16,000 and 24,000 MWh of electricity per annum.

In 2009, combined heat and power (CHP) units were installed that used the biogas produced by anaerobic digestors to generate 23,600 MWh in 2021. When combined with measures introduced in 2017 to reduce the facility’s energy consumption, a 16% green energy surplus was produced over and above operational needs.

“In Central Europe, the historic way to get energy resources was using coal and gas,” says Veolia Senior Executive Vice President, in Central & Eastern Europe, Philippe Guitard. “Now with the war in Ukraine, the price of energy soared. By being self-sufficient, we aren’t facing these higher costs but are able to sell excess electricity to the grid and provide biofuel for our vehicle fleets. Methane is around 30 times more climate-damaging than CO<sub>2</sub>, so treating water in this way and turning it into biogas to generate electricity is a very clever solution that helps to mitigate climate change.”

## **WASTEWATER PLANTS GENERATE BIOMETHANE**

Strategically, Veolia recognizes that it needs to reduce both the cost and climate impact of the WWTPs it operates as well as looking at whether it might be more efficient to provide a clean biogas from the methane produced that can be injected into gas grids. According to Geneviève Leboucher, Veolia Senior Vice President in charge of Access to Water and Sanitation, Veolia’s electricity consumption is 7 TWh per year at a cost of €750 million. 70% of it comes from providing water and wastewater treatment.

“All of territories where Veolia works are facing the same economic issues with the cost of energy, and more and more of them are concerned about climate change,” she says.

“The energy crisis pushed us to speed up our energy reduction as we had to manage our costs. But it is also a

**“The energy crisis is also a business opportunity for us as there is potential to develop biomethane capacity.”**

**Geneviève Leboucher**

business opportunity for us as there is potential to develop biomethane capacity and find other sources of feedstock for our existing treatment capacity to enable us to maximize biomethane production. Very often, this is usually used on site to produce energy and heat, but if we look at the bigger picture, it might be more efficient to clean the gas and inject it into gas networks for other local uses, such as residential.”

By taking this approach, more WWTPs operated by Veolia will be able to produce local, affordable and sustainable gas that can be used for home heating and cooking. ▀

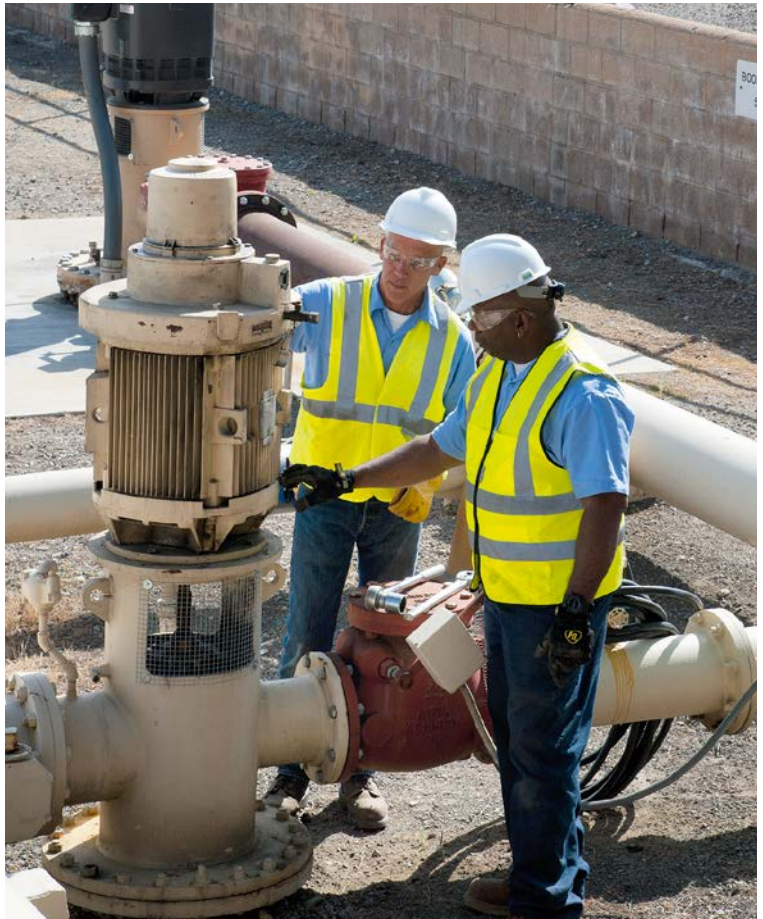
**“The WWTP in Rialto, California, is a good example of how municipalities can take positive steps toward a greener future by being more energy efficient and by using a microgrid power source.”**

Frédéric Van Heems





© VEOUA





# LANDFILL- biogas: pollution becomes a solution

Once a vicious circle, now a virtuous pathway? In every corner of the world, the expertise and commitment of Veolia's teams deliver constant opportunities for discovering and implementing new alternatives that ensure waste streams are at last becoming bywords for resources. From Ivory Coast to Brazil to Australia, we take a look at pioneering actions that have already proved their worth.

## Key figures

**65 to 70%**

Methane content of landfill biogas.

**20,093** metric tons

Volume of methane emissions avoided per year in Brazil (i.e., more than 562,000 metric tons CO<sub>2</sub>e) by capturing biogas at Veolia's waste-to-energy centers.

**18** million metric tons

Volume of waste in the Akouédo landfill before it was closed.

**75%**

Percentage of Australian voters in New South Wales who consider waste management issues to be a concern (Veolia survey in Australia, 2022).

## Issue at stake

Improve waste processing to strip out sources of pollution that may be a hazard to human health and the environment.

## Objective

Act for energy transition around the world.

## Veolia solution

Multiply solutions for transforming waste into clean energy.



## 3 questions to José Manuel Ribeiro

Chairman of the Board of Directors of LIPOR<sup>1</sup>

### What are LIPOR's innovation targets in terms of managing municipal waste in Greater Porto?

**José Manuel Ribeiro:** LIPOR will cease to be a waste manager in the near future, shifting to providing products and services aligned with the circular economy concept. The areas we will focus on? Agriculture, slag recovery from our waste-to-energy center, the recovery and reuse of polymers. This is why we have set up a dedicated department that aims to strengthen our vision of a changing model, and why we make such strenuous efforts to

promote innovations within our organization.

### This is the same expertise that will soon be showcased at your own energy recovery facility.

**J.M.R.:** True. It is the expertise gained over 22 years as manager and operator that today paves the way to installing a third line at our plant. The idea behind this innovative concept is to capture CO<sub>2</sub> and combine it with hydrogen to, ultimately, produce a synthetic green fuel to help the aviation industry become more sustainable.

### And what about the furnace slag you mentioned?

**J.M.R.:** This will be used as a secondary raw material to produce construction materials. Here again, we are counting on Veolia, our partner for nearly 25 years, to continue to give us the confidence we need to carry out our mission successfully. ▶

<sup>1</sup>LIPOR is the organization in charge of managing, recovering and processing around 500,000 metric tons of urban waste every year produced by the 1 million residents of the Greater Porto region in Portugal.



## Become an energy supplier by leveraging sites we already own

Anne Le Guennec, CEO of France Waste Recycling & Recovery Solutions at Veolia

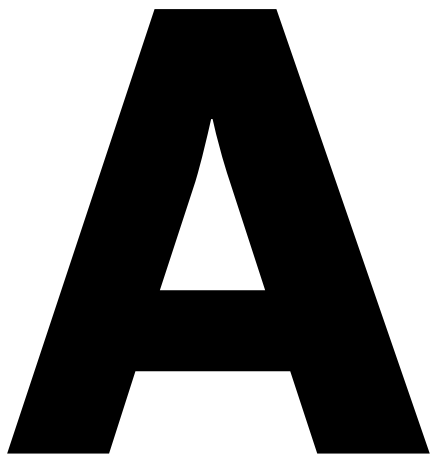
We are determined to leverage land we already own, some 500 hectares, to massively develop production of renewable energy, supported by local authorities. Our goal is clear: ratchet up the number of photovoltaic farms so that by 2025 there are 10 times

more than just the 23,000 modules currently installed at GrandLandes, a former landfill site, that generate 7,000 MW and avoid emission of 3,618 metric tons of CO<sub>2</sub> each year. In future we want to be able to either use what we produce ourselves, or

feed it into the grid for a client. It is precisely this dual role, as producer or supplier, that our teams on the ground are actively developing across France. This involves acquiring new skills but is a challenge we can meet! Inside the business there is a real

desire to decarbonize our activities, and in the years ahead may well see the worldwide rollout of solutions first adopted in France. ▶





kouédo lies a dozen or so kilometers east of Abidjan, the Ivory Coast capital. In 2018, the national government decided to close the 90-hectare landfill site that had been operating here for the past 43 years. The number of people living nearby had quadrupled over the years, meaning the once-isolated site had become part of a peri-urban zone with housing worryingly close to stored industrial, household and medical waste. PFO Africa, the country's leading civil engineering company, was tasked with rehabilitating the site and it turned to Veolia for specialist expertise. "A parallel economy had grown up around the site. Rag-pickers, often just kids, would rummage through the waste with all the risks that brings," recalls Philippe Bourdeaux, Veolia Senior Vice President Africa / Middle East Zone. He goes on to explain how Akouédo, where 1 million metric tons of waste used to be dumped every year, "is a perfect illustration of the lack of infrastructure on the African continent for providing sustainable management of waste streams that are growing in volume very quickly, driven by massive urban growth."

#### **FROM LANDFILL SITE TO A PLACE FULL OF LIFE THAT ALSO PRODUCES BIOGAS**

After several studies raised the alarm about health risks to local people and ecosystems, including pollution of groundwater and the neighboring Ebrié lagoon, the decision was taken 4 years ago to carry out a major rehabilitation of the Akouédo site. Addressing the issue of water infiltration was the first task to tackle, before work started on the future urban park with its modular installations and walking trails. The goal is to prevent groundwater becoming contaminated by leachate when rainwater comes into contact with buried waste. "Back in 2018, as soon as the landfill site closed, our teams moved quickly to begin work on a project that in many ways symbolizes the country's ecological transition," recalls Philippe Bourdeaux. Initially, their role was to support PFO Africa during the installation of a layer of semi-permeable material on top of the waste mountain, followed by a geotextile membrane, topped off with a layer of soil. They then turned their attention to scaling and building installations to recover and treat leachate, and to recover biogas extracted via a waste fermentation process. With 80,000 cubic meters of leachate treated every year, the site will be capable of generating no less than 2 MWh of electricity from biogas. This means that the Akouédo site

will avoid the emission of 76,000 metric tons of CO<sub>2</sub> every year. Interest in the project format, and growing awareness of the importance of these issues, have led to further examples in Africa, with Veolia currently looking into the rehabilitation of landfill sites in Morocco and South Africa.

#### **THE POTENTIAL OFFERED BY ORGANIC WASTE**

The specifics may differ in other continents, but the concerns and risks are the same. Covering 8.5 million square kilometers and with a population of 214 million, Brazil generates 80 million metric tons of waste every year. Half of all this waste ends up in one of the 3,000 uncontrolled illegal landfill sites dotted across the southern hemisphere's largest country. This ecological crisis is something that Veolia's employees are constantly facing and fighting against. Their most recent response, in 2021, involves three new electricity plants in Iperó, Biguaçu and São Paulo. "Together, these plants will generate 12,400 kW of renewable electricity using biogas produced from organic waste in landfill sites, which accounts for a very high percentage of waste in Brazil," says Gustavo Migues, CEO of Latin America Zone at Veolia. This is enough to supply power to a town with a population of around 42,000. Further south, the 2021 partnership with agrifood company Camil Alimentos offers another illustration of this ability to deliver innovative solutions. "Working at their site, we will manage, operate and maintain a cogeneration plant that will use 95,000 metric tons of rice husks per year to fire boilers that generate electricity and steam." Gustavo Migues is certain that Camil Alimentos' model for energy independence could also work in other industries or with other types of waste, such as sugar cane bagasse. Opportunities like this will require considerable research and development efforts.

#### **A TURNING POINT FOR AUSTRALIA**

Australia relies on coal for its energy, for reasons that are as much historical as natural, but the country now stands at a crossroads. "Leaving aside the fact that many coal mines are reaching the end of their life cycles, we are also seeing widespread opposition to any plans for new mining. Recent elections also highlighted the fact that most Australians understand the need to pivot toward renewables and a broader-based energy mix," notes Richard Kirkman, CEO of Australia and New Zealand Zone at Veolia. This new-found realism has been quickly reflected at the

highest levels of government, with a proposal presented to parliament in July 2022 to give legal force to the country's greenhouse gas targets: a 43% fall on 2005 emission levels by 2030, and zero net by 2050. "We are ideally placed to play a central role in the national conversation and to support this shift," says Richard Kirkman, who also points out that

**"The rehabilitation of the Akouédo site is a project that in many ways symbolizes the Ivory Coast's ecological transition."**

**Philippe Bourdeaux**

Veolia is currently developing the country's first energy recovery facilities. Biomethane may well occupy an important place in the Australian energy mix of tomorrow, alongside carbon capture and hydrogen reforming. And although he predicts it will take a dozen years or more before fossil fuels' share of local energy production shrinks to tiny levels, he also believes that considerably ramping up use of renewable energy sources will take just three to five years, with Veolia again at the forefront. ▶

# Frontline



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**“The plants in Iperó, Biguaçu and São Paulo will generate 12,400 kW of renewable electricity using biogas produced from organic waste in landfill sites, which accounts for a very high percentage of waste in Brazil.”**

Gustavo Miguez





# Energy efficiency tested by the crisis

Reduced gas supplies from Russia, the threat of shortages, inflation: Europe is facing a major economic and energy crisis. The response to these challenges is to implement an energy-efficiency strategy. Attractive and competitive, Veolia's energy-efficiency solutions are a tremendous opportunity to establish the European Union's energy independence.

## Key figures

**140** bcm

Volume of Russian gas imported by the EU through pipelines in 2021 (source: IEA).

**60,000**

Number of measurement points centralizing energy, water and waste data in the Hubgrade control center in Dubai (UAE).

**44%**

Share of energy consumed in France by the building sector (source: French Ministry of Ecological Transition).

**26.6%**

Share of electricity used in mainland France generated from renewable energy sources in Q3 2021 (source: RTE).

## Issue at stake

Help buildings and industrial facilities – major consumers of heat, cold, lighting and hot water – make energy efficiency an asset for their attractiveness and competitiveness.

## Objective

Roll out energy services that reconcile energy and environmental performance.

## Veolia solution

Offer smart technologies to optimize energy consumption and renewable solutions to reduce greenhouse gas emissions.



## 4 questions to Adrien Doré

Country Director France, Flexicity, the Veolia subsidiary specializing in the aggregation of electrical flexibility

### What is the principle behind electrical flexibility and how does it work?

**A. D.:** It responds to the need to balance electricity network supply and demand at any given time. With the rise of renewables in the energy mix – and their intermittency problem – electrical flexibility makes perfect sense, since we are able to intelligently control the demand for electricity without being able to influence production.

### How does electrical flexibility meet the expectations or demands of industrial and service sector customers in terms of energy efficiency?

**A. D.:** It is the first pillar of energy efficiency. Electrical flexibility allows

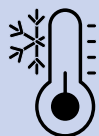
our partners to either consume less or to consume at the best time in order to provide the same service to their users while guaranteeing an appropriate service to the French public transmission system operator (RTE).

### In the current sensitive context, how is industry preparing for the impact of energy tension?

**A. D.:** Today, we are witnessing a very strong paradigm shift among our customers. They are adapting their operational processes to the price of electricity. Our partners are primarily looking for new ways to offset their rising bills and to generate additional revenue to lower them.

### What are the main qualities of a Flexicity Resourcer?

**A. D.:** At Flexicity, our employees are passionate about participating in the electricity system's transition. In addition to the technological and digital solutions that we provide as part of our R&D, we support our partners in their thinking and in changing their production methods. The success of this type of project depends on listening, discussing and understanding our customers' needs and expectations. That is our strength. ▶



## EcoEnergies creates an LNG cold recovery unit in the port of Barcelona

By Xavier Gil Mañero, Director of EcoEnergies, a joint venture between Veolia and Barcelona

“Currently, LNG (Liquefied Natural Gas) transported by ship to the ENAGÁS terminal in Barcelona arrives at a temperature of -160°C before undergoing regasification. The LNG heated with seawater is converted from a liquid to a gas, with a significant loss of residual cold to the sea. Thanks to the project led by Veolia and its partners, this residual cold – up to 18 MW – formerly considered as ‘lost,’ will now be recovered and reused at the ENAGÁS plant as early as 2023. Equipped with specialized exchangers, it will

supply liquid cold at -20°C to our cooling network. Our customers will be able to use it thanks to exchange substations and then it will return to the ENAGÁS plant to be cooled to the same negative temperature. In the midst of the energy crisis, this project has the advantage of reducing dependence on gas imports, thanks to a local, closed-loop energy source that will benefit the main customers at the Mercabana wholesale market, as well as industrial and tertiary sector players. The 150,000 or so people spread

across 1,500 hectares who use the EcoEnergies Barcelona district cooling network, will also benefit from the green-sourced cold for air conditioning. At national and European levels, this scalable project can be replicated at all LNG regasification plants. In addition to its replicability, total CO<sub>2</sub> emission savings are estimated at 32,205 metric tons with cooling consumption expected to reach 131 GWh per year (56% of the Mercabana food city).” ▶

# S

ervice sector buildings and industrial facilities consume a considerable amount of energy, for heating, cooling, lighting and hot water. This is where the Enova's energy efficiency and operational solutions come into their own, as demonstrated by the optimized energy management of Dubai's Mall of the Emirates. "With an exemplary energy performance contract, a high level of expertise and innovation, and proactive facility management, Enova's solutions have cut the Mall of the Emirates' emissions by 34,000 metric tons of CO<sub>2</sub>," says Azad Kibarian, Veolia Senior Executive Vice President, Italy & Africa / Middle East. In Dubai, where temperatures approach 50 °C during the summer, "Enova's teams are demonstrating that it is possible to guarantee the energy performance of one of the world's largest shopping malls while ensuring the comfort and wellbeing of its 45 million annual visitors." The contract has three phases: the audit to identify the building's energy behavior; the implementation of recommended measures, and the operation and maintenance of the site using a Hubgrade<sup>2</sup> control center. It is designed to meet the Emirates' goal to achieve carbon neutrality by 2050. These are considerable advantages, offering energy and economic benefits alike, that the Group has also been able to export to Europe. "On the University of Parma campus, which is home to 32,000 people, our Veolia Siram teams are piloting a sustainable and innovative energy efficiency model that guarantees annual savings of 20% in primary energy consumption. This is the typical level of savings we commit to in Italy," he continues. "This is a big plus in the drive to help free the EU from its dependency on Russian oil and gas, and an additional argument to win over our stakeholders."

## OPPORTUNITY FROM CRISIS

These words echo those of Francisco Silvério Marques, Veolia Senior Vice President of Energy Services for Buildings: "The EU has two major challenges to meet: reduce energy consumption and promote the local production of renewable energy." These challenges are reflected in the targets set out in Veolia's ReSource plan for 2023, namely a 5% increase in the Group's local energy production and a 5% decrease in consumption for its own needs. In addition to the subsidies available to meet these challenges, he reminds us that Veolia is making funds available "so that

our countries and our teams can invest in these various projects." In addition, since energy services for buildings are strongly linked to gas supply, the security aspect is paramount: "Despite the context, we must continue to supply our customers with heat and electricity. We need to secure sufficient flows and limit the impact of market volatility and the return of inflation." Energy efficiency solutions provide an answer to this complex situation, and contribute significantly to the EU's goal of energy sovereignty. "At Veolia, we are actively contributing to the first objective of the REPowerEU<sup>3</sup> plan, which aims for a 30% reduction in gas consumption by 2030, and we are aligned with the International Energy Agency's action plan."<sup>4</sup> Among the IEA's recommendations, he points to the one related to lowering the temperature of heating in buildings, representing a potential saving of 14 billion cubic meters of gas, or 10% of Russian gas imports by pipeline.

## MANAGEMENT AND ENERGY PERFORMANCE: ECONOMIC SAVINGS

Flexcity, a Veolia subsidiary specializing in the aggregation of electrical flexibility (see box), is proving to be a tremendous asset in this period of tension over energy resources. As it is not possible to control solar or wind production – by definition intermittent – the Flexcity solution focuses on managing electricity consumption. This intelligent electricity management system has many advantages for industrial and service sector players who wish to consume less electricity or choose the best time to use it. Hubgrade's energy management centers represent a remarkable lever for reducing energy consumption. Thanks to their exhaustive, remote and real-time vision of equipment behavior and performance, Hubgrade centers identify possible anomalies or savings opportunities, triggering de facto action on the ground. For Francisco Silvério Marques, their importance for building management, and their excellent fit with on-site teams needs no further proof: "When a discrepancy is identified by a Hubgrade center, our on-site operators intervene immediately, for example to replace a filter, lubricate moving parts or check the tightness of a control valve. These are all elements that are not very visible, but have a strong impact on the building's energy consumption. These actions are a concrete addition to the analyses provided by the Hubgrade centers."

**"Veolia is actively contributing to the first objective of the REPowerEU<sup>3</sup> plan."**

**Francisco Silvério Marques**

## PEOPLE-DRIVEN

People are the driving force behind all these smart monitoring solutions. Without operators' know-how, the data collected would be under-exploited. Technology, expertise and investment are the three closely linked aspects. "Together, they have a multiplier effect on economic performance and energy efficiency," concludes Francisco Silvério Marques. A sustainable energy transition implies a paradigm shift, a profound overhaul of the energy system's framework, and unprecedented change in values and growth for all parties involved. But in the end, it is people who make the difference. ▀

1. Created in 2002, Enova is a joint venture between Veolia and Majid Al Futtaim, a pioneer in shopping malls and retail facilities in the Middle East, Africa and Asia.  
 2. A Hubgrade is a platform for monitoring and optimizing the energy performance of buildings.  
 3. REPowerEU is the European Commission's plan to make Europe independent of Russian fossil fuels.  
 4. IEA's 10-point plan to reduce the European Union's dependence on Russian natural gas.

**“The operation and maintenance of the site using a Hubgrade control center meets the Emirates’ goal to achieve carbon neutrality by 2050.”**

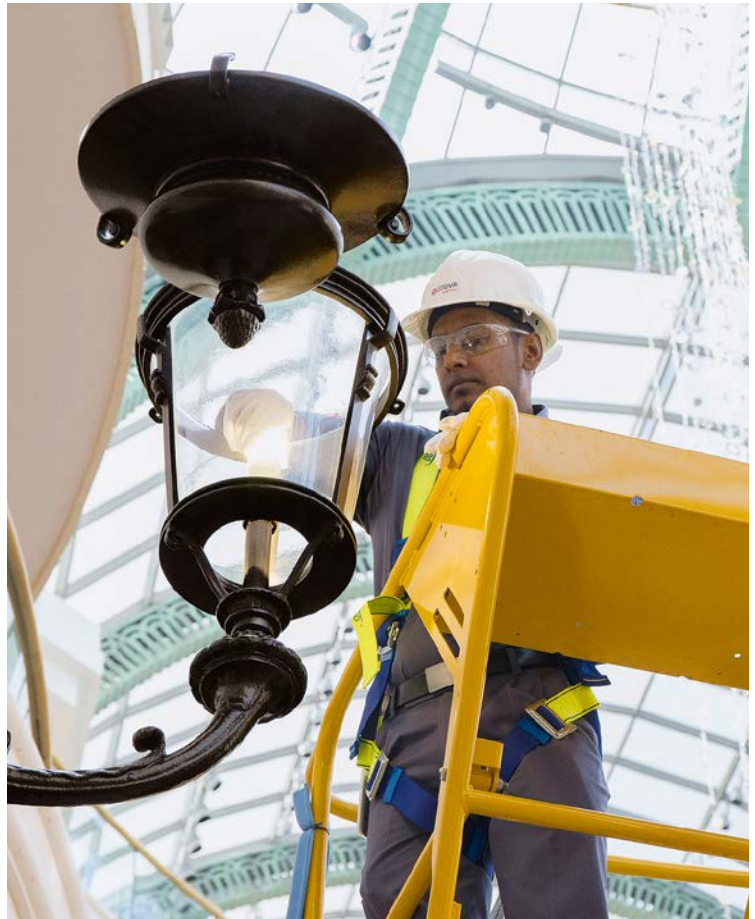
Azad Kibarian







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**And tomorrow?**





# Innovative solutions and collective strength

As we start a new chapter in its history, a Group famed for its expertise in water, waste and energy is giving itself the resources and determination needed to be the benchmark for ecological transformation, driven by a vision of a solutions-based ecology. Climate crisis, environmental emergency, uncertain energy supplies, increasing scarcity of raw materials and food resources, rising inequalities, pollution, etc.: however numerous the multiple obstacles to this challenge, in the years to come they may well turn out to be opportunities for Veolia, and true alternatives for our planet. What will the next decade hold?



## And tomorrow?

P

resent in 44 countries, with 220,000 employees and revenue of 38.4 billion euros, Veolia is writing its own history as the global champion of ecological transformation. With an extended geographical footprint ranging from municipal water services in Spain to waste management in Australia, where it has acquired a leadership position, the Group has the capacity and resources needed to accelerate the speed of technological, financial, commercial and social innovation. The roots of this ability to invent tomorrow's solutions can largely be found in the engagement and close relationships between the Group and its employees and stakeholders. This collective is the mainstay, the people-centered foundation underpinning innovation and transformation. It is also the cornerstone that allows it to weather crises. This was certainly the case in 2020 during the COVID-19 pandemic and it remains true today, in a time of global uncertainty. But this collective power must also be nurtured so it can adapt to the challenges of today's world. "We do this by keeping a close eye on today's trends while also looking ahead to plan for changes down the line. Innovation finds its source in the collective and helps deliver the Group's strategic goals. It's our job to work together to turn the tide and meet the ecological challenges that lie ahead," explains Catherine Ricou, Director of Innovation. This new chapter in Veolia's story will be collective, organizational and historic, written through the innovations that will allow Veolia to continue its long tale of service to human progress.

### FOCUS ON AN ECOLOGY OF SOLUTIONS

Although less commonly associated with the energy industry, looking ahead Veolia is determined to make a difference in a field where the Group already generates revenue of 7 billion euros. How? To start with, by ramping up its products and services for energy efficiency in buildings, and developing heating, cooling and biomethane networks. There are market opportunities in France initially, where connecting all sewage and waste-processing plants to existing networks will deliver major energy savings. Biomethane, with Veolia accounting

“We would rather have 5 innovations we can replicate 20 times than 100 projects that don't align with market realities.”

Catherine Ricou

for 10% of French production, is also in our sights. Veolia is clear in its determination to focus its core business on solutions that turn the tide, no matter whether they are tried and tested, not yet sufficiently deployed, still to be imagined and/or ready for immediate rollout. "Veolia is also driven by a desire to make a difference, with solutions where it clearly has something unique to offer, market opportunities that cut across several business units (BUs) and backed by wide-ranging expertise," adds Catherine Ricou. "This means that deploying these solutions will involve identifying the right partners, improving our grasp of likely changes in regulatory landscapes in France, Europe and around the world, and supporting our customers to roll out these innovations while also working to build greater public awareness. Again, this is the direction of travel for Veolia's strategy, aligned with our commitments to multi-faceted performance that creates impacts in the market that provide benefits to our customers."

**And tomorrow?**



“Adaptation  
and innovation  
in the face of  
the unexpected  
are part of our  
colleagues’  
working  
culture.”

Séverine Dingham



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## And tomorrow?

### COLLECTIVE COMMITMENT AND PILOT PROJECTS

As Director of Business Support and Performance (BS&P), Séverine Dinghem is perfectly placed to gauge the level of support that colleagues, Resourcers, need to help them continue to innovate in traditional business lines. “BS&P and the Innovation department work together in tandem to support BUs with priority issues identified in the Group’s strategy. This can take the form of technical assistance, direct support for pilot projects in strategic business line segments, or as help to scale-up innovations so they take their place among other commercial offers from BUs. We are facilitators, helping to identify priorities and making sure that feedback is shared.” Veolia focuses on three forms of innovation to help it redraw the lines. Incremental innovation is the first of these. This is driven by BUs in the field and helps improve performance in our business lines, it makes a difference when tendering for contracts, and improves working conditions for operators. The second form is scientific and technological innovations. These facilitate enhanced cooperation between research centers. Finally, innovation through diversification lays the groundwork for business seeds and new business activities, working with startups and other emerging new partners. Remember too that the Group defined six strategic priorities in its Impact 2023 program: climate, new energy services, food chain, new loops of materials, health, including air quality and treating new pollutants, and new digital services. Catherine Ricou explains that “we will be setting out innovation roadmaps for each priority, which will help identify markets and projects to roll out, such as battery recycling and bioconversion that have now reached industrial maturity and can be replicated through “Copy & Adapt”. As of 2023, other topics will require pilots to prove our ability to make seeds sprout.” She says these include carbon capture, new uses for biogas, and producing hydrogen. To design these roadmaps, the Strategy and Innovation department, with inputs from zones via the innovation HUBs, coordinates an analysis of customer requirements and market prospects, and reviews business model opportunities and solutions that are suitable for incubation. This collaborative process is critical to ensuring that teams are fully engaged with projects that, in the future, will need support from BS&P so that solutions can be assessed and BUs supported in areas identified for priority action. “The pandemic showed, once again, that we have the ability to adapt and innovate at any time,” says Séverine Dinghem, referring to the handful of weeks it took to develop the Vigie COVID-19 solution in response to a critical public health challenge, “by leaning into our role as an operator of essential services, working under the guidance of Veolia’s Water activities in France. Another good example is the ReSource plan recently launched by Veolia’s executive management team in response to the energy crisis caused by the Russian invasion of Ukraine. The plan includes a focus on accelerating our emerging activities such as electrical flexibility and photovoltaics.” Acting immediately, staying open-minded and tuned in to a world of uncertainty and accelerating change: Veolia will remain future-focused, providing deliverable solutions for tomorrow. The coming decade will be decisive for the Group. The countdown starts now. ▶


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# +1: a tool that supports Veolia's purpose to accelerate the rollout of ecological transformation



### AREAS OF APPLICATION

This prototype consultation process, shared as open source, can be applied to different contexts, geographical zones, and topics. An implementation kit will make it accessible to everybody, inside or outside Veolia, who wants to use the process themselves. +1 is currently being used as part of a contract (Arianeo for Nice Côte d'Azur metropolitan authority), a Business Unit (Prague), by a customer (Bouygues Immobilier) and for an innovation project (indoor air quality). It is now being rolled out as part of the drafting of Veolia's new strategic program for 2024-2027.

Ecological transformation requires businesses to make a profound change so they can implement the changes society demands. They are expected to innovate: to create new interfaces with society, new mechanisms to monitor and listen to their environments, new ways to relate and contribute to their environment. Determined to rise to these challenges, Veolia has designed and developed a prototype consultation process: “+1, the ecology turned into action.”

“A business is successful because it is useful and not the other way around.” says Antoine Frérot, Chairman of the Board of Directors of Veolia. It is this idea of usefulness for the society was behind PACTE, the 2019 French law encouraging companies to adopt a statement of purpose. Veolia has taken the idea a stage further, using multi-faceted performance to embed it directly into its corporate strategy. The Group continues to examine mechanisms to open up its governance in ways that will decompartmentalize interactions with its stakeholders: employees, customers, shareholders, society and the planet. Through its purpose, Veolia seeks to reconcile economic, environmental and social dimensions to create an impact that is both positive and sustainable. This is the motivation behind the “+1, the ecology turned into action” initiative, offering an experience-based pathway embodying the fundamentals of Veolia's purpose to create ties between CSR challenges, and business activities, and suggest a common destination

to reach through collective action. Both a do tank and a think tank, +1 encourages decompartmentalized dialogue between stakeholders from a wide variety of backgrounds, helping to foster new interactions. It triggers a search for more concerted solutions, ideally increasing the willingness to cooperate, a precondition for ecological transformation. Launched by Veolia in 2021, in partnership with the magazine Usbek & Rica, La REcyclerie and with support from Comité 21, this consultation prototype is designed to evolve and adapt to suit a wide variety of operational situations. It leverages collective intelligence to encourage participants to question themselves, look at the bigger picture and cooperate in ways that let them jointly commit to an ecology in action. While the 2024-2027 strategic program is being drawn up, the +1 initiative currently being rolled out to Veolia teams and business units offers an opportunity for broad consultation with the Group's stakeholders in all its geographic areas. ▶

## 3 JOIN 3 WORKSHOP SESSIONS

These help members to compare viewpoints and suggest solution-based actions that reflect every factor: financial, commercial, societal, social and environmental. Each session opens with an inspirational keynote speech designed to set participants thinking.

### Listen

Create a space for constructive, decompartmentalized dialogue where people can learn about each other and how to work together.

### Prioritize

Co-construct and prioritize actions that have the greatest impact on the largest number of people.

### Commit

This is the moment for organizing actions that will need commitment and engagement from various stakeholders to speed up rollout of the solutions.

## 2 SIGN A CHARTER

+1 members sign a charter of commitment describing the project, proposed approach and mutual commitments: a transparent initiative, active participation, cooperation, constructive mindset, etc.



A graphic showing a golden trophy with three stars above it, next to a thumbs-up icon and a bar chart with three bars of increasing height. The entire graphic is enclosed in a light blue rounded rectangle.

### SUCCESS INDICATORS

These indicators make it possible to evaluate the approach: member participation at workshops, level of satisfaction at each phase, etc. During initial trials, 93% of those questioned felt that the goal of getting people from a variety of backgrounds to work better together had been met. Work to develop further indicators is continuing in partnership with Essec.

## 1 CREATE A COLLECTIVE

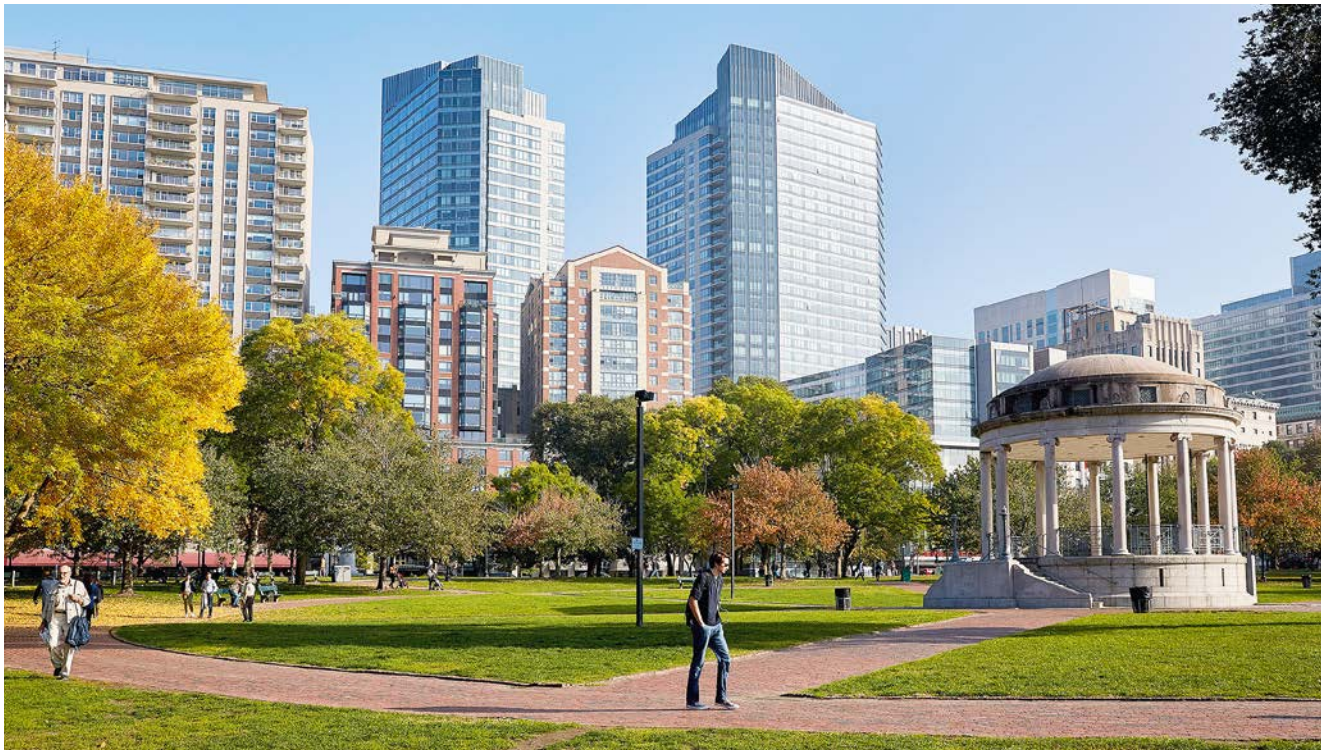
+1 aims to bring together representatives from all five categories of Veolia stakeholders – employees, customers, shareholders, society and the planet – who do not usually work together. The goal is to provide a more ecosystem-based perspective on issues of ecological transformation and the solutions to be provided.

## Successful prototype testing for “+1, the ecology turned into action”

To trial the new mechanism, Veolia created a 50-member group representing each of its stakeholder categories. The collective met for three workshop sessions between September and December 2021. The idea was to exchange

viewpoints and suggest practical actions to make ecological transformation a reality. The sessions featured a keynote speech followed by collective intelligence workshops, with a feedback session in March 2022. Boosted

by this initial success, the initiative is now expanding its scope to take a look at modes of governance for businesses and organizations supporting ecological transformation at the local and regional level.



# INNOVATION: AN EVOLVING MINDSET

Becoming the global champion of ecological transformation requires excellence, performance and constant innovation. For this reason, Veolia is working to instill a mindset at all levels of the company that unleashes the creativity of its employees across all its businesses. The principle is to think beyond the now and come up with fertile ideas for the future.

“To say that the challenge is daunting is an understatement. Veolia now has 220,000 employees. No company in the world in the environmental field has ever had a comparable team,” says Isabelle Calvez, Senior Executive Vice President, Human Resources. It is a uniquely powerful team, but it must remain agile so it can maintain a constant flow of innovation. “For each of us, whatever our level in the

company, our culture or community, to be in a position to innovate, we need ambitious policies focused on inclusion and diversity. In itself that is not enough. We also need to feel free to innovate and accept that mistakes will be made.” Leadership clearly plays a key role in motivating teams. “It is important that managers instill and stimulate a state of mind conducive to boldness, creativity and experimentation, all of which encourage collective innovation.”

## **Taking the path less travelled**

An innovative program called “Explore Tomorrow” has been created for managers. It is a real learning expedition, with full immersion in ultra-stimulating hubs that provide a controlled space for inspiration and experience-sharing. The first two sessions scheduled for fall 2022, one in Boston (USA) and the other in Copenhagen (Denmark), will expose the first groups of employees to disruptive innovations. A small part of the program will take place remotely, the rest in the field for a five-day session. Other sessions and programs will follow, at all levels in the Group. “Innovation is in our DNA. But we have to constantly maintain and stimulate it. It is a state of mind that allows us to see the world as it could be and to invent the solutions to make it happen.” ▶

# Reusing wastewater: a second life for a resource vital to human life

Urbanization and increasingly frequent droughts are just two of the growing threats to freshwater resources. The European Commission warns that half the river basins in the EU will be under threat by 2030. Reusing treated wastewater is therefore emerging as a key challenge for the future.

Reusing wastewater is an alternative to groundwater abstraction and an effective solution for securing access to water. But the technique is very little used in Europe, with less than 1% of wastewater recycled in France, 8% in Italy and 14% in Spain. This is far behind the 80%-90% achieved by the world's leading wastewater recyclers: Japan, Singapore, Kuwait, Qatar and Israel.



Faced with the critical importance of saving drinking water, Veolia is determined to ramp up wastewater recycling, or even make it systematic, at all wastewater treatment plants it operates. This will start in France, where around a hundred sites meet the necessary criteria, primarily centering on the amount of clean water used (over 2,000 cubic meters) and/or abstracted directly from the environment (5,000 m<sup>3</sup>). At these 100 eligible plants alone, this initiative could save around 3 million cubic meters of drinking water annually, equivalent to the average consumption of a city of 180,000 people.

With a small footprint to make it easy to locate and install, the system uses powerful two-stage filtration to produce high quality water from wastewater. This allows Veolia to create tailored wastewater reuse systems that meet each customer's objectives and comply with all regulations applicable to each type of use. "We believe in this solution and

are already actively involved in pioneering initiatives, such as the Jourdain project for Vendée Eau in the Vendée department," says Pierre Ribaute, CEO of France Water Zone at Veolia. "We have now decided to roll out this ground-breaking approach at plants we operate, to encourage greater uptake at scale of this highly promising solution."

The Jourdain project is the first European trial of a system to produce very high-quality water for domestic uses from wastewater. France's Vendée department on the Atlantic coast has no groundwater reserves and relies on surface water for 90% of its supplies. The refining plant under construction will return treated water to nearby waterways, securing water supplies for 200,000 local people.

Perhaps we should look to the stars for inspiration? Astronauts on the international space station, where 100% of wastewater is recycled, have successfully popularized the idea of drinking wastewater. ▶



## #Key figures

× 6

● volume of wastewater recycled

Target set by the European Commission in advance of planned new EU regulations that enter force on June 23, 2023

0.6%

● (only) of wastewater is reused in France

100

● number of wastewater treatment plants

in France operated by Veolia that meet the criteria for installing wastewater reuse technology before the end of 2023

3

● million cubic meters

Estimated volume of drinking water savings once 100 treatment plants are equipped, equivalent to the average annual consumption of a city of 180,000 people



Less  
Russian  
gas



More  
green  
gas

If we unlock the potential of our biomethane resources in France, we can cut demand for Russian gas imports by 25%. Methanation of wastewater and waste helps to address both the challenge of the ecological transformation and achieve energy independence. **Learn more about our solutions at [veolia.com](https://www.veolia.com)**

Resourcing the world

