

# PLANET

#July 2017



Energy transition  
**Producing  
and consuming  
energy differently**

**Forum**  
Efficiency:  
an energy  
transition lever

**Frontline**  
Braunschweig  
on the renewable  
energy battlefield

**Outfront**  
Waste and wastewater:  
tomorrow's green  
energy

**Explainer**  
Hubgrade,  
a performance  
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Cover photo: Veolia Hubgrade Energy Performance Monitoring Center in Bilbao, Spain



**Antoine Frérot**  
Chairman and CEO  
of Veolia

## March 22 **World Water Day: wastewater recognized as an untapped resource**

This year, World Water Day organized by the United Nations was devoted to wastewater. This is a crucial issue when we bear in mind that, in the absence of sanitation, 1.8 billion people drink polluted water, or that 80% of the planet's wastewater is discharged into nature without any treatment whatsoever, insidiously contaminating aquatic environments. It is also a crucial issue when water becomes scarce. In fact, by recycling wastewater, we create an alternative water resource for cities and industries and reduce withdrawals from groundwater tables that are becoming exhausted due to overuse. In Australia, the United Arab Emirates and South Africa, wastewater is reused to irrigate market gardens, green spaces and golf courses; in Singapore, Berlin and Windhoek, it is reprocessed to produce drinking water. Despite appearances, when you think wastewater, you should automatically think resources: it's a completely new way of seeing things! By repurposing something that was worth nothing, recycling's economic model offers municipalities, industrials and farmers the means to meet the demand for low-cost water, while reducing the environmental impact. So it's no accident that there are a growing number of projects giving water a new lease of life. In the future, water will be increasingly produced using unconventional resources such as wastewater, instead of coming from rivers or underground reservoirs. The conventional resource is overexploited, while the alternative resource is untapped: a change in water services is underway to remedy this imbalance and quench the world's thirst!

## May 22 **Veolia will build Latin America's first waste-to-energy plant in Mexico**

Just like wastewater, waste can become a new

resource. This is the subject of the contract that our Group was awarded by the city of Mexico at the end of May. It concerns the construction and operation of a waste-to-energy plant capable of treating 1.6 million metric tons of household waste per year and producing 965 GWh of green electricity, which will power the subway. The exceptional size of this facility – it is one of the largest waste-to-energy plants in the world with a capacity twice that of the largest plant in France – will allow enough electricity to be generated to cover the needs of the Mexican capital's twelve subway lines. At present, two thirds of this agglomeration's waste is sent to landfill. This facility, which is the first of its kind in Latin America, represents an ecological solution for a continent that continues to rely on landfill to a large extent. It is also a forward-looking solution as it brings Latin America one step closer to the circular economy, this innovative economy that systematically turns waste into raw materials or energy.

## June **Record level of engagement by Veolia managers!**

According to an internal study carried out at the beginning of the year, 86% of Veolia's managers feel engaged. This is a record level compared to many similar companies! This excellent score reflects a real sense of achievement at work (88%), a strong desire to excel (93%), high levels of confidence in Veolia's ability to achieve its ambition (84%) and the feeling of genuinely helping to build a new company (79%). This exceptional engagement on the part of our staff is a major asset in accomplishing our mission of protecting the environment, helping humanity make peace with nature, and resourcing the world. It is also reassuring in terms of environmental protection and the future of the planet to know that, through Veolia's example, those who work in this field are so strongly engaged with their job.

# CONTRIBUTORS



## Editor-in-Chief Martina Rauch

Managing Director Marketing & Communications  
Veolia Germany

Energy transition has become one of the major challenges of the 21st century. The reduction of greenhouse gases is not an end in itself. The question is how we will live our future lives on this planet.

State-of-the-art solutions are key to reach the ambitious energy transition goals worldwide. Veolia has all of the necessary skills to meet the huge challenges that energy transition represents to its industrial and municipal customers, from energy efficiency through cogeneration to waste2energy and other innovative processes. In this issue of Planet, which is also published in German for the first time, you will find a rich selection of interesting best practice stories, visionary projects, social and environmental initiatives as well as articles about engaged people combining business orientation with creativity and responsibility for a sustainable future.

I am delighted that I was invited to be Guest Editor-in-Chief of this edition. Thanks to all the contributors, I learned a lot and enjoyed the collaborative spirit of a dedicated team. I am pretty sure that you will enjoy your reading too!

## Also in this issue

### Renaud Mazy

#### Managing Director of Saint-Luc University Hospital

A chemical civil engineer by training, he began his career as a researcher at the Walloon Industrial Biotechnology Center. He then spent some twenty years in industry with the industrial and medical gas leader Air Liquide, the glass fiber manufacturer Owens Corning, and the pharmaceutical company Baxter, developing his R&D, project management and management expertise. Renaud joined Saint-Luc University Hospital in Brussels in 2011. Recognized as a key point of contact by the Belgian public authorities, he sits on the Walloon Union of Companies and helps set up work-study training programs with the national authorities.



### Mechthild Wörsdörfer

#### Director of Energy Policy in DG Energy – European Commission

An economist by training, she has held this post since January 2014 in a DG where she was head of the unit in charge of the energy policy and monitoring of electricity, gas, coal and oil markets, responsible for the follow-up of the 2030 framework for energy and climate policies, the report on energy prices and costs, the energy roadmap 2050, the coordination of infringement procedures, etc. From 1999 to 2004, Mechthild worked in the cabinet of the Finnish commissioner Erkki Liikanen, responsible for enterprise policy and information society.



### Moises Saman

#### Photographer and documentary maker, Magnum agency

After cutting his teeth at the "New York Newsday" (2000-2007), Moises joined the "New York Times" (2007-2012). He was one of the first photojournalists to reach northern Afghanistan after the September 11 attacks and one of the few journalists present in Baghdad during the 2003 bombings. His work in Iraq and Afghanistan has earned him a host of international awards, including World Press Photo (2004, 2007) and International Photo of the Year (2008).

In 2011, Moises lived in Cairo and covered the Arab Spring for the New York Times and The New Yorker. These four years in the Middle East (2011-2015) have given rise to a book and exhibition: "Discordia."



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JUNE 10 - SEPTEMBER 10, 2017, ASTANA (KAZAKHSTAN)

event

2017 WORLD EXPO

# FUTURE ENERGY: WORKING TOWARD A MORE SUSTAINABLE WORLD

THROUGH THE 2017 WORLD EXPO, KAZAKHSTAN IS LOOKING TO PROMOTE  
RENEWABLE ENERGY AND ENERGY EFFICIENT METHODS.



[HTTPS://EXPO2017ASTANA.COM/FR/](https://expo2017astana.com/fr/)

# TRENDS



6/7

**By 2040,**

**60%**

of installed energy capacity will come from zero-emission energy sources.

**64%**

of the 8.6 TW of new power-generating capacity added worldwide over the next 25 years will be sourced from wind and solar.

**60%**

of the \$11.4 trillion invested will be devoted to these forms of energy.

Source: Bloomberg "New Energy Outlook 2016"

**55%**

of all fiber used for paper production comes from recovered paper.

Source: "2015 Global Forest Products Facts and Figures" - Food and Agriculture Organization - December 2016



## The largest carbon market in the world

China is the leading greenhouse gas-emitting country, releasing 10.96 billion metric tons in 2015, i.e. around 30% of global CO<sub>2</sub> emissions. It is going to take a firm stance against global warming with the launch, in late 2017, of a national carbon market twice as powerful as the European Union's market and bigger than all of the existing ones put together. Since 2011, seven Chinese regions have been testing pilot projects for exchanging CO<sub>2</sub> emission quotas. To contain the average global temperature rise, from 2017 onwards the government will ask 10,000 companies from eight sectors to enter this market. After 2020, the authorities will open it up to more companies and extend it to 31 provinces and six other industrial sectors. At the beginning, some four billion metric tons of CO<sub>2</sub> emissions will be concerned, i.e. almost half of the country's total emissions.



## Africa facing the challenges of urbanization

Over the next twenty-five years, the African population will increase from 472 million to one billion inhabitants. For the time being, given the rapid urbanization phenomenon paired with a still insufficient level of wealth, the amount of productive investment in African cities has remained relatively low over the past four decades (around 20% of GDP). This contrasts with East Asian countries (China, Japan and South Korea), which have intensified this kind of investment during their urban boom. Moreover, the population concentration process in cities has not been accompanied by adequate investment in urban infrastructure and other industrial and commercial structures, or by an appropriate affordable housing offering. Because they are poorly served, African cities are today among the most expensive in the world. It is therefore essential to better control urban development on the continent, in order to enhance the economic and social benefits brought by urbanization.

Source: World Bank Report “Africa’s Cities: Opening Doors to the World” - February 2017.

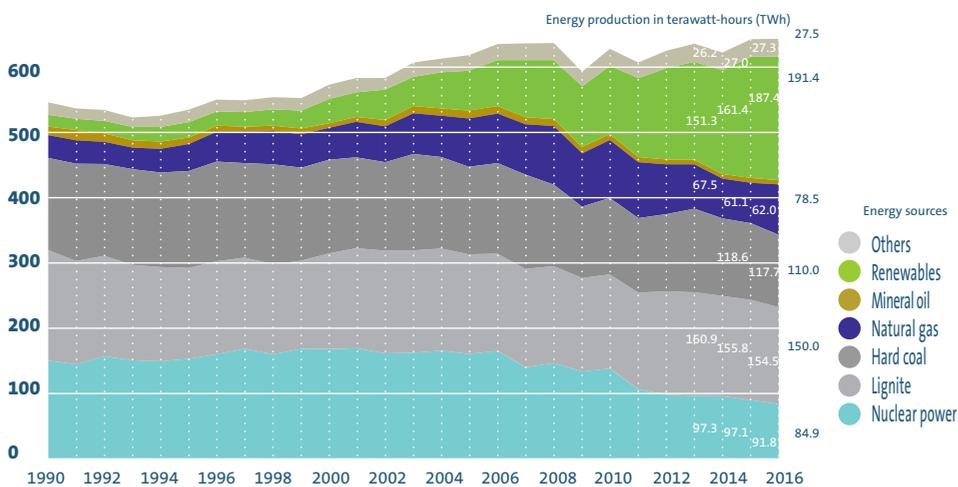


## A fair carbon price

The European Union is the third largest global emitter of CO<sub>2</sub> (3.47 billion metric tons in 2015), behind China and the United States. However, it has set itself the target of reducing its carbon dioxide emissions by 40% by 2030 compared to their 1990 level, and is aiming for an 80% decrease by 2050. The first project: increasing the price of a ton of carbon – which, because there are too many free quotas, has fallen from €35 in 2008 to €5 today – to encourage companies to invest in clean technologies and emit less CO<sub>2</sub>. A group of countries led by France, Sweden and Benelux are asking for it to be increased to €20, the minimum amount they believe will make industrials transform their manufacturing methods. Yet, for many experts, the threshold to kick start the transition to a low-carbon economy is more around the €30 mark. Nonetheless, with the planned opening of a carbon market in China in 2017 and Canada in 2018, 25% of global GHG emissions will be covered by a carbon price.

## Development of energy production in Germany (1990-2016)

Source: Clean Energy Wire - AG Energiebilanzen 2016



“According to a survey conducted among a sample group of German industrials, the majority of them think that the energy transition in Germany is more a source of inspiration than a model to follow.”

Source: “German energy policy - A blueprint for the world?” January 2017 – World Energy Council – German committee

“We actually did the calculations to figure out what it would take to transition the whole world to sustainable energy. You’d need 100 Gigafactories\*.”

Elon Musk,  
about his Gigafactory,  
October 2016  
Canadian-American business  
magnate, investor, engineer and  
inventor. He is the founder, CEO  
and CTO of SpaceX; co-founder,  
CEO and product architect  
of Tesla Inc.

\*Electric battery manufacturing plant.



## CHINESE INDUSTRIALS EAGER FOR ENERGY PERFORMANCE

A renowned expert in energy services for industrials in China, Veolia has signed three contracts for ten, twenty and twenty-five years respectively in the space of a few months, worth a total of €864 million. For the chemical group Hongda Chemical, it will fund and install a best-in-class system for managing and optimizing a steam production plant. On behalf of a publishing house based in Beijing, Veolia will build and operate a chilled water facility designed for its data center, located in one of China's leading IT hubs. Last but not least, three clients from the chemical and construction industries have entrusted it with constructing, operating and maintaining a biomass plant to produce electricity and steam in Hebei province.



## MONTREAL UNIVERSITY HOSPITAL CENTER IN PPP MODE

The Collectif Santé Montréal consortium, of which Veolia is a 20% partner, is the largest public-private partnership in North America in the field of health. It has just completed 85% of the construction of the new Montreal University Hospital Center (CHUM). This vast complex, which as of 2020 will accommodate 400,000 patients and handle 65,000 emergency cases each year, will stretch over more than 330,000 m<sup>2</sup>. As part of the 34-year PPP contract signed in 2011, Veolia is responsible for maintaining the facilities and managing the energy and safety services. In the long term, 150 of the Group's staff members will join the hospital's 10,000 employees and 6,000 students on site. The Centre, which is home to three hospitals, a public research center for Quebec and a teaching and training center, should be entirely operational by 2020.

### Telex

The city of Jackson, Mississippi, has entrusted Veolia with the management of its three wastewater treatment plants (Savanna, Trahon and Presidential Hills) and 98 pumping stations for ten years.



Veolia Nuclear Solutions is assisting the English nuclear operator **Magnox Limited** in equipping four of the twelve British sites that it runs with modules for treating effluent before it is discharged into the sea.

The **Veolia Institute** is joining forces with the **Oxford Martin School** to organize its tenth international conference on November 2 and 3, 2017 in Oxford, on the theme of the availability of resources in a low-carbon world.



# INSIDE



## MEXICO GETS THE FIRST WTEP IN LATIN AMERICA

The city of Mexico has chosen Veolia to construct the first Waste-to-Energy Plant (WTEP) in Latin America – announced as one of the largest in the world – and run it for thirty years. This facility will treat 1.6 million metric tons of household waste per year, i.e. a third of the city's waste. The 965 GWh of green energy produced will directly power Mexico's metro in a circular economy loop.



### London rethinks its waste management

Since April 2017, Veolia has been in charge of recycling and collecting household and commercial waste, street cleaning, selling recycled materials, and the winter maintenance and management of waste collection vehicles in the London boroughs of Kingston, Croydon, Merton and Sutton, which are home to one million residents. The contract signed with the South London Waste Partnership (SLWP) looks to standardize the services provided to these four boroughs, so as to make substantial savings and guarantee the reliability and quality of service there.

# INSIDE



## RESPONDING TO THE EMERGENCY IN IRAQ

Veoliaforce volunteers are continuing to lend a helping hand to the Qatar and Iraq Red Cross and Red Crescent to provide the drinking water supply to several refugee camps in Iraq. These include the new Khazer 2 camp 30 km east of Mosul, which is home to 2,500 families, i.e. around 20,000 people. Thanks to an M40 station, each day the team treats 200 m<sup>3</sup> of water from the neighboring river. Once treated, the water is stored in two 95-m<sup>3</sup> reservoirs and then transported by tank trucks that provide a daily supply to the little reservoirs with rows of taps distributed all around the camp.

## IN LILLE, ENERGY FROM WASTE IN THE NETWORKS

Metropolitan Lille (MEL) has made a major step toward the energy transition by entrusting the operation of Halluin's waste-to-energy plant to Covalys, a joint venture created by Veolia and Idex. In a virtuous local circle, the waste collected across the region will be transformed into energy. 40% of this energy will supply two district heating networks in Roubaix and Lille. The network designed for the occasion will be one of the longest (19 km) dedicated to energy transport operating in France.

### Telex

A center of excellence for decommissioning in the southern North Sea, the port of Great Yarmouth – jointly managed by Veolia and its partner Peterson – welcomed two new end-of-life oil rigs in spring 2017. 96% of the materials will be recycled.



La Société nationale des Eaux du Sénégal (Sones) has entrusted Veolia with building an iron removal station capable of treating 40,000 m<sup>3</sup> of water per day. This facility offers raw water aeration, physicochemical treatment, sand filtration, and then chlorine disinfection.

Veolia has become a partner of Carbon Clean Solutions (CCSL), the world leader in low-cost carbon capture. The challenge is the wide-scale deployment of CCSL's patented carbon dioxide separation technology to reduce greenhouse gas emissions in industry and thus combat climate change.



## IN SRI LANKA, DEVELOPMENT REQUIRES WATER

In the farming region of Greater Matale, some 150 km from the capital Colombo, Veolia is going to build five water treatment facilities, twelve reservoirs, five pumping stations and over 430 km of pipelines. This should ensure the quality and safety of the drinking water supply for over 350,000 people and contribute to this region's development and competitiveness.



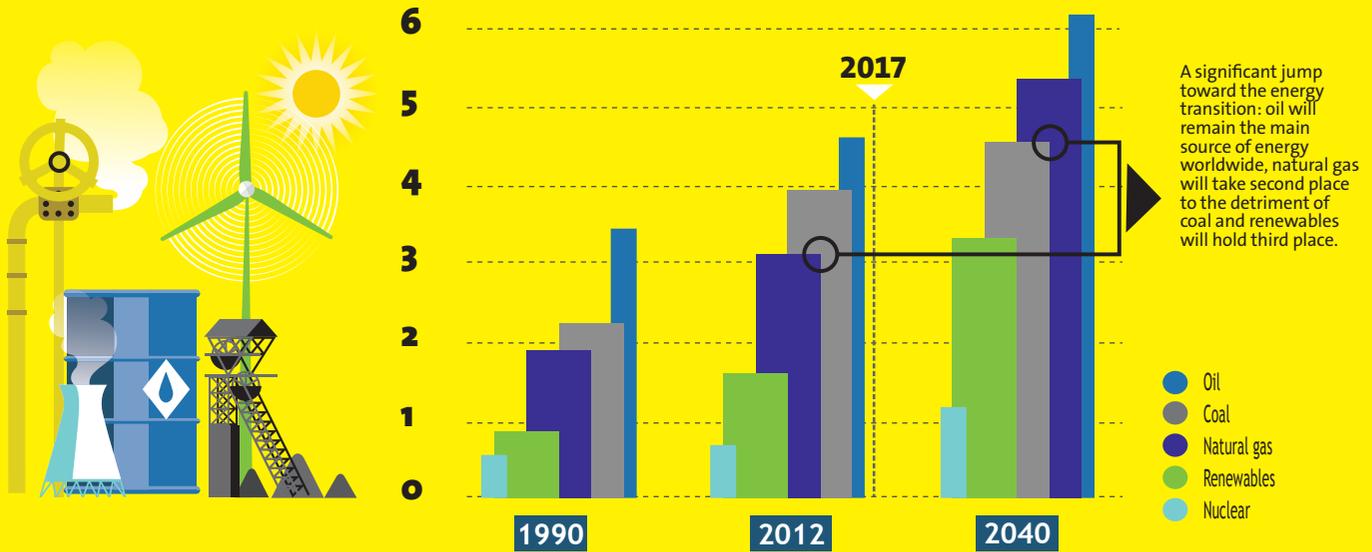
### The first French facility for treating end-of-life solar panels

Located in the Bouches-du-Rhône region and managed by Veolia, the first facility for treating and repurposing used solar panels will recycle over 1,400 metric tons of materials by the end of 2017, and over 4,000 metric tons in 2021. The recycled materials, such as aluminum, glass and copper, will be plowed back into various channels.

# THE ENERGY TRANSITION IS ON THE RIGHT TRACK

While the engine of the world economy still runs to a very large extent on coal or gas, the tipping point was reached in 2015, when renewable energies represented 90% of new capacity installed (50% in 2014). Meanwhile, total CO<sub>2</sub> emissions from the energy sector have continued to plateau despite 3% global economic growth. Are these the first signs of a separation between economic wealth creation and CO<sub>2</sub> emissions?

## ENERGY CONSUMPTION WORLDWIDE, 1990-2040 (IN BILLIONS OF TONS OF OIL EQUIVALENT)

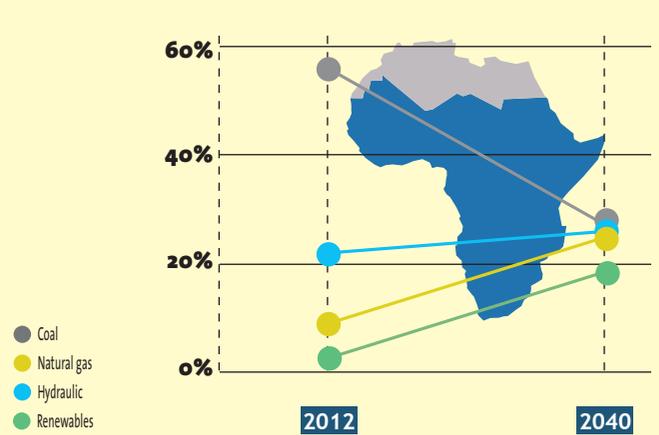


## THREE ENERGY STRATEGIES AROUND THE WORLD

### NORTH AMERICA Toward controlled energy consumption (in billions of tons of oil equivalent)

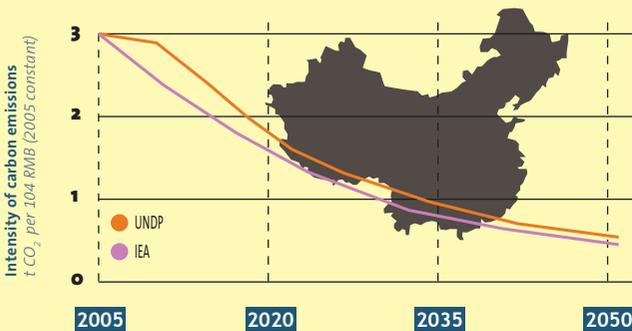


### SUB-SAHARAN AFRICA Toward a heightened use of renewables and natural gas (share of energy sources in the energy mix)



### CHINA Toward a drastic drop in CO<sub>2</sub> emissions

The scenarios agree in predicting a very significant drop in carbon emissions for China by 2050: it comes to around 30% in the United Nations Development Programme's (UNDP) scenario and 40% in the International Energy Agency's (IEA) scenario.



## The outlook for 2040

In its global energy mix forecast for 2040, the IEA makes the following analysis: major winners will stand out, such as natural gas and renewables, which will replace coal. However, fossil fuels will continue to play a key role in primary energy consumption. In fact, their share is set to drop from 81% today to 74% in 2040, but their consumption in volume terms should continue to grow.

Sources: US Energy Information Administration, International Energy Outlook 2016 – International Energy Agency, Africa Energy Outlook 2014 – Climate Change, Comparison of China's Carbon Emission Scenarios in 2050, 2011. Our thanks to IFP Énergies nouvelles for their careful review.

# Efficiency: an energy transition lever

## We meet Mechthild Wörsdörfer, Patrick Labat and Renaud Mazy.

12/13



**Mechthild Wörsdörfer,**  
Director of Energy Policy in DG  
Energy – European Commission



**Patrick Labat,**  
Senior Executive Vice President  
Northern Europe Veolia



**Renaud Mazy,**  
Managing Director of Saint-Luc  
University Hospital - Brussels

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*Everyone is in favor of energy efficiency. On the ground, however, all sorts of obstacles arise, slowing down its indispensable deployment. Three frontline players offer their perspectives on the many stumbling blocks and how to overcome them.*



#### How would you define energy efficiency?

**Patrick Labat:** Increasing energy efficiency means being able to spend less energy and resources for the same service provided – for instance, carrying out the same industrial production or reaching the same level of comfort in a building. If we stay with the example of buildings, these gains can be obtained in three ways: by constructing new housing, but this will take time; by renovating the existing buildings, which is very expensive with extremely long returns on investment; by modernizing the interior of buildings with automatic regulation systems and optimized energy production, especially via cogeneration. The energy mix can also be improved by implementing the best locally available energy sources. The latter kind of investment can be more quickly amortized, particularly when it is combined with raising the occupants' awareness about the impact of their behavior on consumption.

**Mechthild Wörsdörfer:** Indeed the building sector is absolutely key on the issue of energy efficiency, and one of our main focuses, as it represents almost half of the energy consumed in Europe. Other important factors are products (for instance, refrigerators, computers or cars, which can be more or less efficient), industry, transportation, etc. Within the framework of our Energy 2020 strategy, we set a now well-known target for energy efficiency, which is 20% progress by 2020, and we issued a directive in 2012 to help us get there. Though there was some skepticism – including within our member states – when we came up with those objectives, we are now quite confident that we will reach that goal. A revision of this directive is now underway, which would set a further objective of a 30% improvement by 2030.

#### **Renaud Mazy:** Reducing wastage is a real challenge!

Of course, in huge institutions such as hospitals, even small operating optimizations in areas such as ventilation or lighting allow significant savings to be achieved in terms of energy and money. However, in the medium and long term, making real energy savings requires investment whose profitability is far from immediate: these are choices that are complex to make and then implement, especially as they have to be made in a context of major financial restrictions for hospitals. That's why we asked Veolia to assist us in conducting various studies across all of our activities to identify avenues for savings that we could work on together.

#### **Many experts believe that progress is too slow (see boxed text p.15). What is your point of view on the main obstacles at play?**

**M. W.:** There have been a series of market and regulatory failures that have led to insufficient investment, and I think mobilizing investment is the main issue here. We have calculated that we will need more than 150 billion euros per year between 2020 and 2030 in energy efficiency investments if we want to reach our targets. Of course, we have some public money, as member states and regions do, but it is essential that private money get invested here, which is not happening enough, for a variety of reasons. In some cases the banks are not readily providing the money; there are also issues between who is paying and who is benefiting, for example between tenants and landlords. In addition, a lot of this is small scale; there are huge numbers of actors, who probably need to be aggregated in some way, but this raises many problems. In any case, this means that 75% of European buildings are still energetically inefficient.

**“Increasing energy efficiency means being able to spend less energy and resources for the same service provided”**

**Patrick Labat**

...

**P. L.:** The main obstacle is the lack of individual and collective awareness of the need to rapidly invest in energy efficiency: the “greenest” energy is the energy that you don’t consume. The public authorities must create conditions that are both incentivizing and coercive to encourage this investment on a large scale by improving its profitability. In order to be efficient, you must have the clear-sightedness and humility to turn to the experts. Not all of those involved are energy and efficiency specialists. Turning to companies who are experts in the field and offer contracts with a performance commitment, co-construction or co-design is often the best way of making fast and significant gains.

**R. M.:** In Belgium, many large hospitals date from the late seventies, a time when energy savings were not a concern... This liability is a real obstacle! We are also working in a very financially constrained environment: the 2008 crisis hit many sectors and the hospital sector is continuing to experience clear cuts. As a director, I am absolutely convinced that certain environmental choices must be made within the framework of our future construction projects. But, at the same time, I have to explain to my teams that some things are going to be more expensive and that a collective effort will therefore be more important..

**Which levers in your field of activity could be used to speed things up?**

**R. M.:** The public authorities must invest in the long term. I would therefore emphasize the importance of clear and consistent political choices that make it possible to define an energy vision for our society and above all create predictability. For instance, I’m disappointed about the procrastination that we’re seeing in Belgium in terms of incentive measures to develop solar power. Or the fact that the debate between wind power and fossil fuels has not been completely settled, which leaves energy suppliers themselves waiting for more clarity. Luckily, certain players on the market are getting technically and financially involved with companies to accelerate and ensure this transition – that’s what Veolia did with us.

**P. L.:** You have to implement a policy that is both incentivizing and restrictive. In this case, grants or investment aid on the one hand, along with measures penalizing emissions on the other. It is particularly essential that we put a price on carbon, either by taxing it or putting in place a system of payable quotas to promote innovation and the adoption of suitable technologies, especially collective heating systems, which deliver much greater performance and efficiency than individual boilers. It is also important to help people precisely measure their

**“Making real energy savings requires investment whose profitability is far from immediate.”**

**Renaud Mazy**

consumption, which plays a role in raising awareness, as previously mentioned. In the buildings or factories where we are involved, the people who live or work there take the information we provide on the weather, temperature and consumption into account, which helps to make their behavior more energy-efficient.

**M. W.:** The EU’s main contribution is to set strategies and frameworks, which are a powerful lever: it has been proven that our 2020 energy efficiency directive has triggered a lot of activity by providing visibility and predictability. For example, the EU members have committed to rolling out 200 million smart meters for electricity by 2020, and 45 million meters for gas. We have also calculated that our energy efficiency labeling directive has saved Europe 100 billion euros, equivalent to €450 per household! So we are confident that the 2030 targets we are working on will trigger a lot of investment and change.

**What concrete changes or results would lead you to consider that the energy transition has been successful?**

**P. L.:** Achieving the European goals would already be a first success. But for now, the movement is too slow. The energy transition will be successful when individual behaviors – and, through a knock-on effect, collective behaviors – help in and of themselves, i.e. without incentives, to generate savings or encourage people to turn to more high-performance solutions. However, at present, low energy costs are doing nothing to foster this necessary awareness of the need to reduce our consumption. We must therefore put in place mechanisms, especially in the building sector, to direct behavior so that energy efficiency becomes a priority.

**R. M.:** It will be a success when energy consumption has decreased on a like-for-like basis, along with the carbon footprint in turn. At this point, the search for energy efficiency will have become well and truly ingrained in our minds – and it will no longer be a question of adding isolated measures, as is

**“By achieving a 30% energy improvement, we will be in transition to a low-carbon competitive energy system.”**

**Mechthild Wörsdörfer**



sometimes still the case today, but a global approach supported as much by the public authorities as the players on the ground.

**M. W.:** We have set a 30% target by 2030 and, though some may think this is not enough, it seems to us the most cost-effective way to move forward efficiently. At 40% there would be a lot of existing infrastructure too costly to renovate, and it would

also imply an enormous buildings renovation across all of Europe, which we think is unrealistic. If we achieve this 30% target, we will be in transition to a low-carbon competitive energy system, which will be more digitalized, more flexible, with consumers that have a bigger role. This will not only be good for the climate, but it will increase GDP in member states, and strengthen us geopolitically as we will depend less on oil and gas. ■

## A genuine but insufficient energy evolution

The European Union's greenhouse gas emissions fell from 5,735 to 4,419 million tCO<sub>2</sub>e between 1990 and 2014, a significant 23% drop. However, many people doubt that it is possible, at the current pace, to reach the official goal of a 40% reduction by 2030, not to mention an 80% reduction by 2050. The carbon quota system is not working, as one metric ton of CO<sub>2</sub> emitted is currently priced at the derisory sum of €5. Exiting coal therefore seems a far-off prospect, with an annual consumption of 270 million metric tons that is showing little sign of dropping. The transport sector is lagging the furthest behind, reducing its CO<sub>2</sub> emissions at an annual rate of 0.7%, whereas a 2% rate is required.

Source: IDDRI report, November 2016, [http://www.iddri.org/Publications/Collections/Analyses/ST0816\\_TS%20et%20a\\_low%20carbon%20energy%20union.pdf](http://www.iddri.org/Publications/Collections/Analyses/ST0816_TS%20et%20a_low%20carbon%20energy%20union.pdf)

Jessica, “a natural recycler” in Germany, and Rémi, “a globetrotter” and project facilitator in Sri Lanka... Two pioneering spirits seasoned to the challenges of norms and regulations and true “environmental awareness raisers.”

# Above and beyond

Meeting Veolia employees from all over the world.

## Jessica Stolz

Process technology engineer  
Manager of the refrigerator  
recycling plant  
Veolia Recycling and Waste  
Services  
Hanover, Germany

**Jessica Stolz leads** one of the most modern and sophisticated refrigerator recycling plants in Europe. With this system, Veolia is setting new standards in terms of saving resources in an environmentally friendly way. Jessica is extremely familiar with the high-tech processes in the plant and with good reason: she was involved in modernizing the plant and developing the unique recycling processes. “I had the opportunity to work on this project toward the end of my studies in 2011.” After successfully completing her degree, she worked for two years at a world leader in metal recycling before returning to Veolia in Hanover in 2014.

“Today, we recycle 800 refrigerators a day,” says Jessica, who knows exactly what her team and the plant are able to deliver. The closed system offers the possibility of dealing with very different types and sizes of refrigerators. “There are, on the one hand, the older refrigerators, which still contain the ozone-damaging greenhouse gas chlorofluorocarbon (CFC), as well as the newer appliances with unburnt hydrocarbons (HC). With our plant, we are able to ensure the recovery of both gases in asynchronous balanced mode,” explains Jessica. Her team, which works in two shifts, therefore achieves a much higher recycling rate. Secondary raw materials, such as copper, aluminum and iron, are recovered at the end of the separation process. They have a high degree of purity and therefore a good sales value.

Jessica and her team take up the daily challenge of continually improving the system, complying with new laws and meeting existing standards. In recent years, relatively untested optimizations have been rolled out on the site, often serving as an example for other recycling plants. “I love doing test runs and testing new settings. The parameters I obtain are then analyzed and incorporated into comparative statistics. It’s a really exciting approach that enriches our know-how and boosts profitability, with a positive effect on our everyday operations.”

Jessica is convinced that these changes are only possible if employees are brought on board and aware of the importance of their role. Team spirit and motivation can only be created if colleagues feel fully involved in these development processes. If they know why a particular process is important for the plant and what results should be achieved, they will work efficiently and think ahead. “As a private waste disposal company, we are not only responsible for environmentally friendly recycling, but also for the well-being of each of our employees,” says Jessica. ■



## SPOTLIGHT

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## Rémi Horge

Junior Administration and  
Finance Officer  
Sade - Sri Lanka

**You can be barely 25 years old** and already help build a structure from scratch in Sri Lanka alongside a project leader... To say that Rémi Horge relishes a challenge is putting it mildly. For the task that Veolia's subsidiary Sade has entrusted him is far from simple. Hired in October 2016, our young administration and finance officer must support the construction of 430 km of drinking water pipes in the center of the country. "I had to put in place a regular and reliable intermediary for the financial status and project management," he summarizes.

During the first months in the economic capital Colombo, Rémi had to find and furnish offices, recruit the first members of staff, install accounting and project reporting tools, etc. In short, be on the frontline! Fortunately, his university experience – a technological course and then business school, before specializing in management control – gave him a serious advantage when it came to setting up an operational department before the project began in spring 2017. Today, he can concentrate on the more technical aspects of management, whether this involves monitoring the budget, registering staff or configuring the information system.

Rémi forged this ability to work independently – as demonstrated in Sri Lanka – over the course of his work/study contracts, including a year with Veolia Water Technologies. His manager at Sade, Vincent Fousseureau, confirms this: "Rémi has thrown himself into the task with a rigorous, methodical approach, while adapting to how things work in Sri Lanka." In this country where major structural reforms are being carried out, especially in fiscal matters, Rémi has familiarized himself with the specific characteristics of the local administrations. There's no doubt he has been able to satisfy his thirst for international experience "in project mode"... ■



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# Hun gary

## Bonduelle Full steam ahead

*The French group Bonduelle – the world number one in “ready-to-eat” vegetables – washes and cans peas, sweetcorn and beans at its two Hungarian sites in Nagyköros and Békéscsaba. This process generates a huge amount of wastewater, which, since 2010, must be treated under Hungarian legislation. Partnered by Veolia, Bonduelle therefore decided to recover this wastewater to generate steam and provide heat to the factory buildings.*



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### Issue at stake

› Complying with Hungarian regulations making it obligatory to treat wastewater.

### Objectives

› Creating energy from wastewater.

### Veolia solution

› Generating steam from biogas derived from wastewater recovery.

## Bonduelle has been

known across Europe for over a century – and in North America for the past decade – for its fresh, canned, frozen and prepared food. The group, which canned its first peas in 1926, now provides an array of 50 staple vegetables in 500 different varieties. Established in Hungary since the early 1990s, it expanded its operations in the country in 2012 with the acquisition of a local canning factory, Kelet-Food. However, since 2010, Hungarian regulation has introduced stricter criteria for the treatment of wastewater and a whole range of other pollutants before their discharge into the environment. Following this acquisition, Bonduelle was therefore obliged to improve the treatment of its effluents.

## Value-added compliance

To meet these regulations, Bonduelle decided to build a wastewater treatment plant on its Nagyköros site. Once built, the company turned to Veolia to optimize the treatment process and reduce its carbon emissions. Veolia specialists suggested using the sludge from the wastewater at the Nagyköros plant to create biogas, which could subsequently be harnessed to generate the heat and steam required for the plant's activities. Previously, steam had been produced from natural gas. The idea of using biogas had the twofold advantage of cutting both carbon dioxide emissions and Bonduelle's energy bill.

"The biogas is much better for the environment than natural gas," says Veolia Hungary's Head of Industrial Energy Services, Tibor Lukács. "Before its transformation, the facility had major problems linked to water discharge. This difficulty was resolved with the construction of a wastewater treatment plant. There remained the issue of biogas, which was then burnt, which had a negative impact on air quality. We therefore suggested recovering the biogas generated from the anaerobic digestion process used to treat the sludge at the purification plant. Mixed with natural gas, this biogas is transformed into steam in a back-up boiler that had previously been of little use. The steam then serves to heat the factory and power different manufacturing processes."

Bonduelle has therefore been able to

## Hungarian regulations

Hungary joined the European Union in May 2004, and as part of its accession package was required to comply with the 1991 European Union Urban Waste Water Treatment Directive by the end of 2015. The country already had its own General Rules of Environmental Protection Act adopted in 1995. However, along with Romania, Hungary decided to apply more stringent wastewater treatment regulations over its whole territory. In 2011, through the Act on Water Supply, the country therefore introduced stricter legislation to improve wastewater treatment and protect natural resources, along with measures regarding cost recovery and the 'polluter pays' principle. Companies such as Bonduelle, which use water in their manufacturing process, therefore needed to ensure that they were in line with Hungarian standards.

reduce its energy bill by 17%, saving the consumption of 350,000 m<sup>3</sup> of natural gas and avoiding 650 metric tons of CO<sub>2</sub> emissions per year.

## Adapting a successful model

In the light of Nagyköros' success, Bonduelle and Veolia worked on a similar project for the Békéscsaba factory from 2014 onward. However, there was one difference: there was

no back-up boiler that could be converted. Instead, Veolia recommended renovating the two boilers at the factory and dedicating one of them to use a mixture of natural gas and biogas. As the calorific value of biogas is lower than natural gas, this project required the use of a special regulator to mix the natural gas and biogas for consistency of output. The resulting benefit has been 16% savings in energy costs, while 95% of the biogas has been recovered and used to supply the factory with steam. ■

## The technology in detail

The Nagyköros plant uses both anaerobic and aerobic bacteria. The wastewater pollution serves as a food source for the bacteria, which eliminate the pollution by absorbing it. In an aqueous environment without the presence of dissolved oxygen in the water column, the anaerobic bacteria consume the COD (Chemical Oxygen Demand, i.e. the organic pollution content) in the water and convert it into simpler molecules such as sugars, alcohols, acids, different nitrogen forms, carbon dioxide (CO<sub>2</sub>), and methane (CH<sub>4</sub>). In the second stage, in the presence of dissolved oxygen, the aerobic bacteria consume these organic materials and remove the nitrogen forms. This results in fully biologically treated, clean effluent water.

The anaerobic part of the plant is a closed basin, allowing us to collect the methane (biogas), then cool and compress it before introducing it into the boiler to generate steam.



**Ákos Turján,**  
Sustainable  
Development Manager,  
Bonduelle

“Normally, vegetable canning technology needs a lot of fresh water, especially for washing the vegetables, which is why there is a lot of wastewater. At our Nagyköros site, until 2011 we sent all of our wastewater to the neighboring town, paying considerable sums for it to be treated by the communal purification facility. But we quickly realized that the town plant could no longer cope and that the effluent water to the river was dirty. We decided to solve the problem ourselves, rather than entrust it to the town, because the two technologies used to treat the communal and factory wastewater are very different. The new Hungarian regulations also gave us a period to think about the solution. At the beginning of the season in 2011, we started the test run of our new wastewater treatment plant. Since then, it’s been a win-win situation in terms of both the industrial process and national regulations.”

# Germany



24/25

## Braunschweig on the renewable energy battlefield

*If Germany's "Energiewende" transition to low-carbon energy were compared to a military campaign, the frontlines might well run down Hungerkamp street. There, in the suburbs of Braunschweig, a biomass cogeneration plant supplies electricity and heating to a local police station and several hundred district households.*

### Initiated by Braunschweig's

energy provider and Veolia subsidiary, BS Energy, the Hungerkamp project replaces the previous heating facility and its 34 coal, gas and oil burners, contributing to the country's renewable energy and climate change reduction objectives. The project's success reflects

a combination of opportunism, creativity and tenacity says BS Energy Project Engineer, Verena Zitterich. "For the project to be economically feasible, we needed to bring together a number of interconnected components."

### Multi-part solution

Four components, in fact. The complex

consists of a cogeneration plant, a wood boiler, a natural gas boiler and two heat storage units. The cogeneration plant is powered with biogas extracted from organic waste. As the waste decomposes, methane is released and used to fuel a generator that produces green electricity. Waste heat generated by the electricity production is recovered and stored in accumulators before ...



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### Issue at stake

› Help achieve Germany's renewable energy and climate change goals.

### Objective

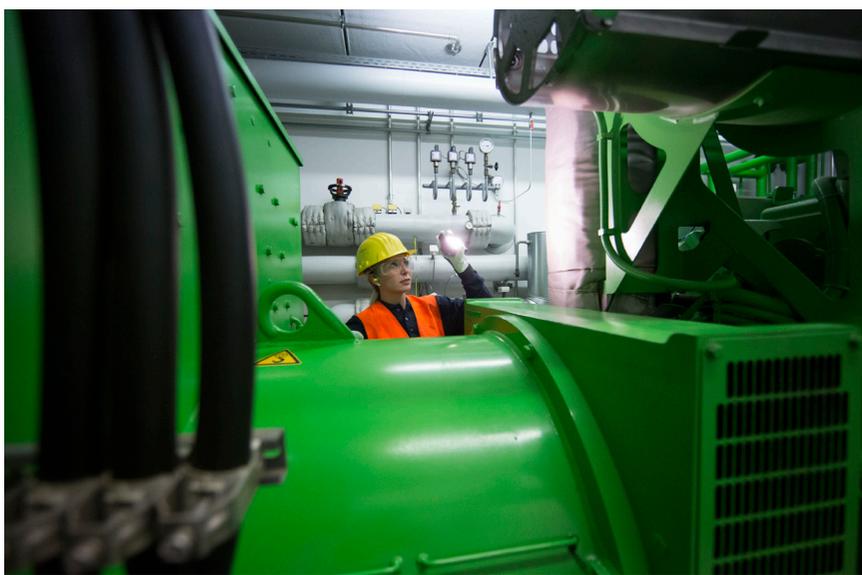
› Convert the district to green electricity and heating.

### Veolia solution

› Install a renewably sourced district heating system.

...

being released to customers through a four-kilometer local heat distribution network. Additional heat is supplied during the coldest days of autumn and winter from the wood boiler, which burns locally supplied wood chip waste. The third component, the natural gas boiler, provides peak-load heating capacity and serves as a reserve source of heat when the other two facilities are under maintenance. Finally, supply and demand balancing is ensured through two thermal storage units, with innovative insulation to minimize heat loss.



26/27

## Connecting with customers

The Hungerkamp project began with the renovation of the local police station and its old coal- and oil-fired boiler plant. But solving the technical challenges of electricity generation was only one piece of the puzzle. “The economic success of the project hinged on ensuring the consumption of the heat that would be produced,” says Verena. A suitable location was identified for the plant near a high-density residential area with sufficient potential heating customers. Proximity, however, would prove to be only part of the equation. “Convincing the customers to sign long-term supply contracts wasn’t easy,” says Verena. “All had existing functional central heating boilers burning fossil fuel. We spent a considerable amount of time on communications to make sure they fully understood the project and its benefits in order to gain their acceptance.”



## Sustainable recognition

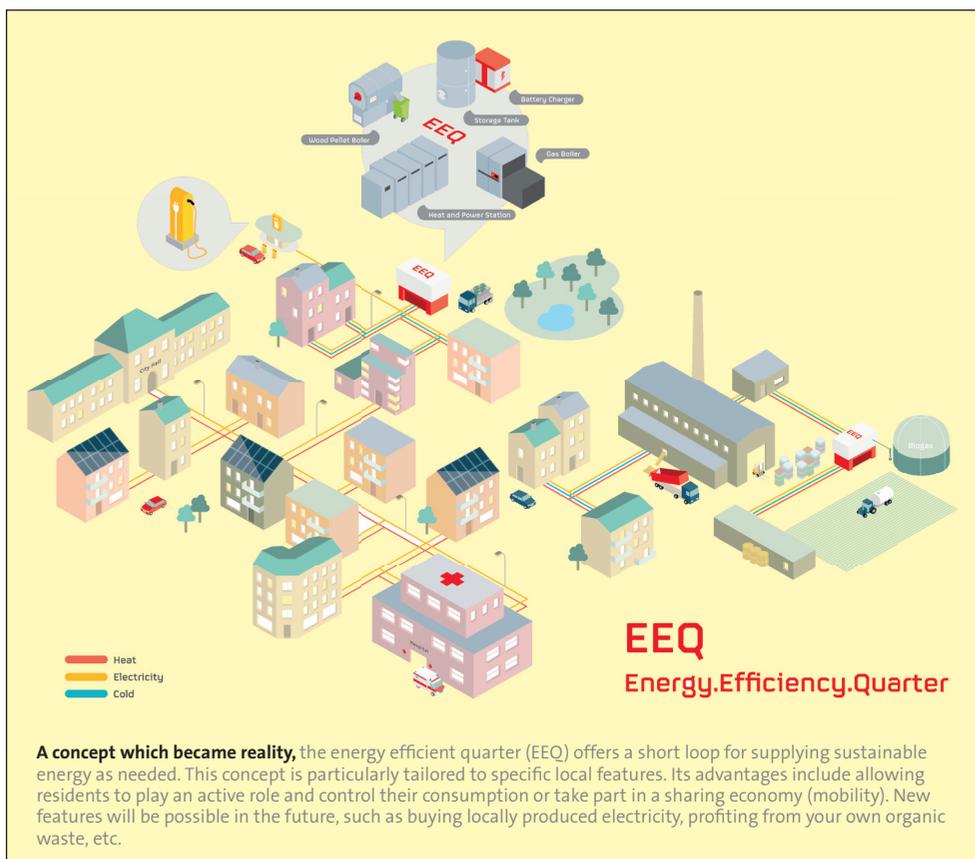
Today, the plant serves as a renewable energy-fueled network for the entire neighborhood, with the capacity to produce 9,200 MWh of green electricity and 15,600 MWh of green heat annually. In replacing fossil fuels with renewable raw materials, the project avoids 8,000 metric tons of CO<sub>2</sub> emissions per year. The use of different types of fuel, biogas, wood and natural gas as well

as its thermal storage allows the system to respond flexibly to fuel price changes and to daily usage fluctuations. The exhaust gases generated during combustion are purified and filtered before being released into the atmosphere and the wood ash is used for fertilizer to create a local circular economy loop.

In 2015, the plant was awarded the international “Global District Energy Climate Award” at the Euroheat & Power Congress

in Tallinn, Estonia, for its demonstrated leadership in providing a clean and sustainable district energy solution on a community scale.

Still operated as a stand-alone system, Hungerkamp may ultimately be extended to connect to Braunschweig’s central distribution network. But, already, it stands as an inspiration of what can be accomplished in the ambitious campaign for a greener tomorrow. One battle at a time. ■



## BS Energy 250,000 inhabitants kept warm!

A subsidiary company of Veolia in Germany, BS Energy is a regional producer of electricity and heat, as well as the district heating network operator for the city of Braunschweig. BS Energy supplies energy and infrastructure solutions to public and private customers throughout the Lower Saxony region, serving more than 250,000 citizens. Its services include low fixed-price basic energy supplies designed to be environmentally friendly. It provides electricity, gas and district heating as well as drinking water and wastewater treatment services. Other elements of its operations include powering city lighting and traffic lights and operating power networks for electricity, gas, water and glass fiber networks in new construction areas. Prior to the Hungerkamp project, the company implemented another biogas pilot project in 2006, building a 20-kilometer raw biogas pipeline from its biogas plant in Hillerse to its heating station in Braunschweig-Ölper.

## The energy transition scaling up in Braunschweig

Produced through an environmentally friendly combination, heat and power are delivered to customers in Braunschweig through its central district heating network. More than 56,000 apartments in Braunschweig and numerous public facilities and companies are connected to the 250-kilometer pipeline network. The network ensures compliance for building owners with legal requirements for structural heat loss, renewable energy and primary energy requirements. Gradually since 2005, Veolia and the city of Braunschweig, which are both BS Energy shareholders, have been gaining small energy transition victories. They are already preparing new plans, such as connecting Hungerkamp to Braunschweig's large district heating system and implementing an identical concept in the town of Springe, some 95 km away.

### Hungerkamp key figures

**Capacity**  
**15,600 MWh**  
 heating per year  
 supplying the  
 equivalent of  
 approximately 1,000  
 households  
**60%** produced out of

biogas in the CHP unit  
**38%** from wood chips  
**2%** from natural gas  
**9,200 MWh**  
 green electricity per  
 year supplying the  
 equivalent of 2,300  
 households produced

100% out of biogas  
**8,000 T** of CO<sub>2</sub> savings  
 per year

**Recognitions**  
 • 2015 Euroheat &  
 Power Global District  
 Energy Climate Award

• 2015 Veolia  
 Sustainability Award

**Community benefits**  
 • Sustainable fuels  
 and modern filtering  
 systems  
 • Lower emissions of

harmful substances  
 • Modular system,  
 flexibly adapted to  
 outdoor temperatures  
 • Use of regional waste  
 wood supplies  
 • Use of wood ash as  
 fertilizer



# United States

## Boston bridging to a carbon-free future

*The port town of Boston, Massachusetts, is one of the world cities most imperiled by the rising sea levels caused by global climate change. Through a combination of resilience planning and carbon reduction actions, civic leaders are fighting to protect both their city and the planet.*



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### Issue at stake

› The increasing threat of sea-level rise for coastal cities like Boston from global climate change.

### Objective

› Design and implement energy solutions to transition toward a carbon-free future.

### Veolia solution

› Investments in the “Green Steam” solution, recycling thermal energy and reducing carbon emissions.

## The people of Boston aren't

waiting around for the waters to rise. Anyone needing a reminder of what the changing global climate means to the world's coastal cities need only glance at the mesmerizing map on the Boston Green Ribbon Commission (GRC) home page. The dynamic graphic shows successive images of the city's low-lying lands disappearing under growing patches of blue by 2100, reflecting the impact of rising sea levels and storm surges. That the map shifts by itself without clicks only underscores the message: without action, we'll all be underwater.

## Local-global focus

The GRC, an NGO composed of business, institutional and civic leaders, is spearheading the fight for dry ground by working to develop strategies for fighting climate change (see inset). As a first step, the volunteer group partnered with the city to organize and finance a resilience project to improve long-term climate preparedness. The GRC's attention is now focused on accelerating progress across all sectors toward the city's Climate Action Plan goal of being 100% carbon-neutral by 2050. Its objective: serve both Boston's



## [...] The battle against climate change [...], in the U.S., is increasingly driven by States, cities and the private sector.

needs and the broader global battle against climate change, increasingly driven in the U.S. by states, cities and the private sector.

Among the most active sectors are the city's energy-intensive healthcare establishments, which are responsible for a significant share of overall greenhouse gas emissions. Major players like Boston Medical Center and Partners HealthCare are on track to reduce emissions by more than 25% by 2020 and are responsible for a 60-MWh renewable energy buy, the largest collaborative purchase made to date in the U.S. The city's 20 largest hospitals have

integrated Boston's goals into their strategic planning and capex budgets and are generating real-time energy use data to help plotting further actions (see inset p.33).

## Green Steam district

Helping to boost the healthcare community's progress is a district energy network operated by Veolia. Up to 75% of the heat supplied to hospitals and other customers is "Green Steam," delivered through a network of steam pipes running beneath the streets and bridges of Boston and

adjacent Cambridge. Veolia's district energy system leverages recovered thermal energy as a byproduct of electricity generation at its Kendall Cogeneration Station to supply the steam network.

The Kendall plant produces the steam from its Combined Heat and Power (CHP) operations, which recycle thermal energy previously lost to the environment. The system integrates highly efficient cogeneration technology with a 26-mile network — making it one of the largest and most extensive district energy systems in the U.S. to generate both electricity and steam. The innovative environmental



## Interview

John Cleveland,  
Executive Director

Boston Green Ribbon Commission

### What is the GRC and its mission?

It is made up of leaders of Boston's largest property-owning businesses, educational institutions and hospitals, as well as top representatives from the three major utilities. Others come from the construction, finance, consulting and hospitality industries, as well as the faith community and non-profit organizations. We support the city's Climate Action Plan, which sets ambitious goals of cutting emissions by 25% by 2020 and achieving carbon neutrality by 2050.

### How do you do this?

Through the Carbon Free Boston initiative, the GRC and other leaders are working to quantify the most effective combination of technologies and policies to reduce greenhouse gas emissions across the electric power, buildings, transportations and waste sectors. The result will be highly specific, sector-based, policy-driven strategies to transition from carbon-based fuels to 100% clean and renewable energy sources in every sector of the economy by 2050.

### Where are you today?

We've started our journey toward transitioning from carbon-based fuels. However, a lot needs to happen before we get to the point of being able to decarbonize our entire electricity grid, for example. In other areas like changing our transportation modes and fuels, we have a long way to go.

### How is Veolia contributing?

Veolia is playing an important role in our bridge strategy as we transition to a carbon-free future. They are also contributing to greater resilience and reliability as we move toward a higher concentration of district energy, which is less vulnerable than centralized generation. We are really glad they are at the table as we design our strategy toward achieving Boston's end goal of zero carbon. Their deep technical expertise will be invaluable as we get into the nitty-gritty of what a redesigned energy system will need to look like.



## Climate-conscious healthcare community

### With their 24-hour

operations and energy-intensive facilities such as laboratories, healthcare establishments are major greenhouse gas emitters. Working through the GRC's Health Care Working Group, Boston hospitals have made significant energy reduction and GHG progress. Between 2011 and 2015, energy greenhouse gas emissions were reduced by 29%, while use of electricity has been cut by 7% and natural gas by 20%. Significant investments in low-impact hydro, wind and solar power by Partners HealthCare and Boston Medical Center (BMC) will produce an additional 20% reduction in healthcare sector greenhouse gas emissions for 2016-2020. Partners is working to make its entire healthcare system net carbon positive for all energy by 2025 and BMC expects all its energy to be carbon neutral by 2018. "When we started working on this with the city, our goal was simply to do the best we could," says BMC Facility Services SVP, Bob Biggio. "As momentum grew, we set our sights on

becoming the greenest hospital in Boston. Beyond reducing costs, contributing to a healthier environment by greening our operations is really imbedded in our DNA of taking a holistic approach to people's health, including the safety net we provide to underserved populations." Taking lessons from recent system failures such as Super Storm Sandy, the healthcare community is also working to increase the reliability of critical public health and safety infrastructure by responding to climate-related vulnerabilities. Bob Biggio says Veolia's district energy contributes to BMC's resiliency by increasing energy supply diversity. "Veolia has also done a good job of aligning their district system with our resilience and carbon reduction goals. In doing so, they've enabled us to avoid costly investments in real estate for new energy facilities, which means we can invest more in patient care and other energy efficiency measures. It's a win-win relationship on which we're continuing to build." ■

...

solution is able to meet the thermal energy needs of over 250 medical research institutions, hospitals, hotels, museums and government buildings throughout Boston and Cambridge. Combined with infrastructure improvements made by Veolia, the system has

improved reliability and reduced the region's overall carbon footprint by 475,000 metric tons annually – the equivalent of removing 80,000 cars from the roads.

In addition to reducing carbon emissions, the system improves air quality, eliminates thermal pollution into Boston's Charles River and helps property owners qualify for LEED (Leadership in Energy and Environmental Design) green building credits. With almost \$170 million invested in the city's energy infrastructure, including a 7,000-foot pipeline and a 256-megawatt gas-powered combined heat and power plant, Veolia is recognized as an active player as the city looks ahead.

"The upgrades at Kendall Cogeneration Station support Veolia's mission to deliver clean energy and reduce the carbon footprint of Boston and Cambridge, while protecting the Charles River – a local treasure and national landmark," says Veolia North America President and CEO, Bill DiCroce. ■

### Key figures

**#8** Boston's World Bank ranking of world cities most vulnerable to rising sea levels

**100%** Boston's 2050 objective for clean and renewable energy sources

**\$168 million** Veolia's investment in the Boston-Cambridge energy infrastructure since 2008

**475,000** metric tons  
The annual reduction of the region's overall carbon footprint thanks to the Green Steam Veolia project

AUGUST 27 - SEPTEMBER 1, 2017, STOCKHOLM (SWEDEN)

event

## WORLD WATER WEEK

# WHAT SHOULD BE DONE WITH WASTEWATER?

FOLLOWING ON FROM THE UN'S WORLD WATER DAY HELD ON MARCH 22, 2017, THE THEME OF WORLD WATER WEEK WILL BE "WATER AND WASTE — REDUCE AND REUSE." WATER IS TOO PRECIOUS A RESOURCE TO BE USED ONLY ONCE!



[HTTP://WWW.WORLDWATERWEEK.ORG/](http://www.worldwaterweek.org/)

# Santiago by light

Lighting singlehandedly represents 15% of global electricity consumption and 5% of CO<sub>2</sub> emissions worldwide. However, if the whole planet were to adopt the strictest standards in this respect, the energy consumption related to this use could be halved. To achieve this, switching to energy-efficient lighting such as light-emitting diodes (LED)

is a priority. UN Environment is committed to supporting — and accelerating — this transition with the implementation of an “integrated policy for efficient lighting” christened “United for Efficiency-en.lighten” in partner countries. Since 2013, Chile has relied on this model to develop the legal framework for using lighting products, as well as raising

public awareness, particularly by distributing two million new-technology bulbs to low-income communities. At the request of the Magnum agency, Moises Saman visited the capital Santiago to witness the launch of this initiative. His images show that a step as commonplace as changing a light bulb already has the power to improve everyday life.



**The efficiency challenge:** by 2025, Chile — one of the countries most vulnerable to the impacts of climate change — plans to reduce its energy needs by 20%. About a quarter of this target can be achieved through national measures to promote efficient lighting. (Source: [united4efficiency](#))





**Working** toward its energy transition since 2005, the country adopted efficient lighting between 2008 and 2009: almost three million energy-saving light bulbs have been distributed. (Source: Center for Clean Air Policy - CCAP)





**National goal:** totally abandoning incandescent lighting should reduce electricity consumption by 2 TWh, i.e. prevent 1 Mt of CO<sub>2</sub> per year from now until 2030. In fact, since late 2015, producing, importing and selling incandescent light bulbs has been prohibited. (Source: UN Environment)





**A partner** in the United for Efficiency-en-lighten program, Chile has committed to putting in place minimum energy performance standards (MEPS) for light bulbs as well as showcase projects for energy-efficient lighting products. (Source: UN Environment)



## Moises Saman, an enlightened wanderer

Like Moises Saman, you sometimes have to wait for darkness in order for things to reveal themselves. At nightfall, the photojournalist slipped into the southern districts of Santiago to meet the residents of Lo Espejo. In this underprivileged neighborhood, where many families live in the single room of their makeshift

house, lighting remains a luxury. Inviting himself into these households recently provided with low-energy lighting, Moises asked them about their everyday life. “When all the light comes from a filament bulb hanging from the ceiling, it may seem ridiculous to us to replace it with a less energy-intensive model. But when you are finding it hard to make ends meet, it’s a major saving,” he notes. There is actually nothing anecdotal about

these illuminated faces: they are a testament to the improvement in living conditions. From intimate portraits to scenes of local life, the photographer has captured the signs of change with the simplicity and intensity of black and white. All the better to “concentrate on the truth of the moment” when all becomes clear, he says. He will long remember “this man in the penumbra of his shop and his joy when he screwed in the light bulb he had just received.”

## Bio

Born in Peru in 1974, Moises Saman grew up in Europe before settling in California to study sociology. In 1998, discovering photojournalists’ work on the Balkans war sparked his vocation. Since then, his multi-award-winning photos of conflicts in the Middle East and the Arab Spring have gone around the world. A member of the Magnum agency, he lives in Tokyo and devotes himself to depicting the problems of post-conflict societies in Asia.

Moises Saman’s images are taken from a collective work produced for UN Environment for several years, various Magnum photographers traveled the globe to discover local solutions to combat climate change.

## T-Park

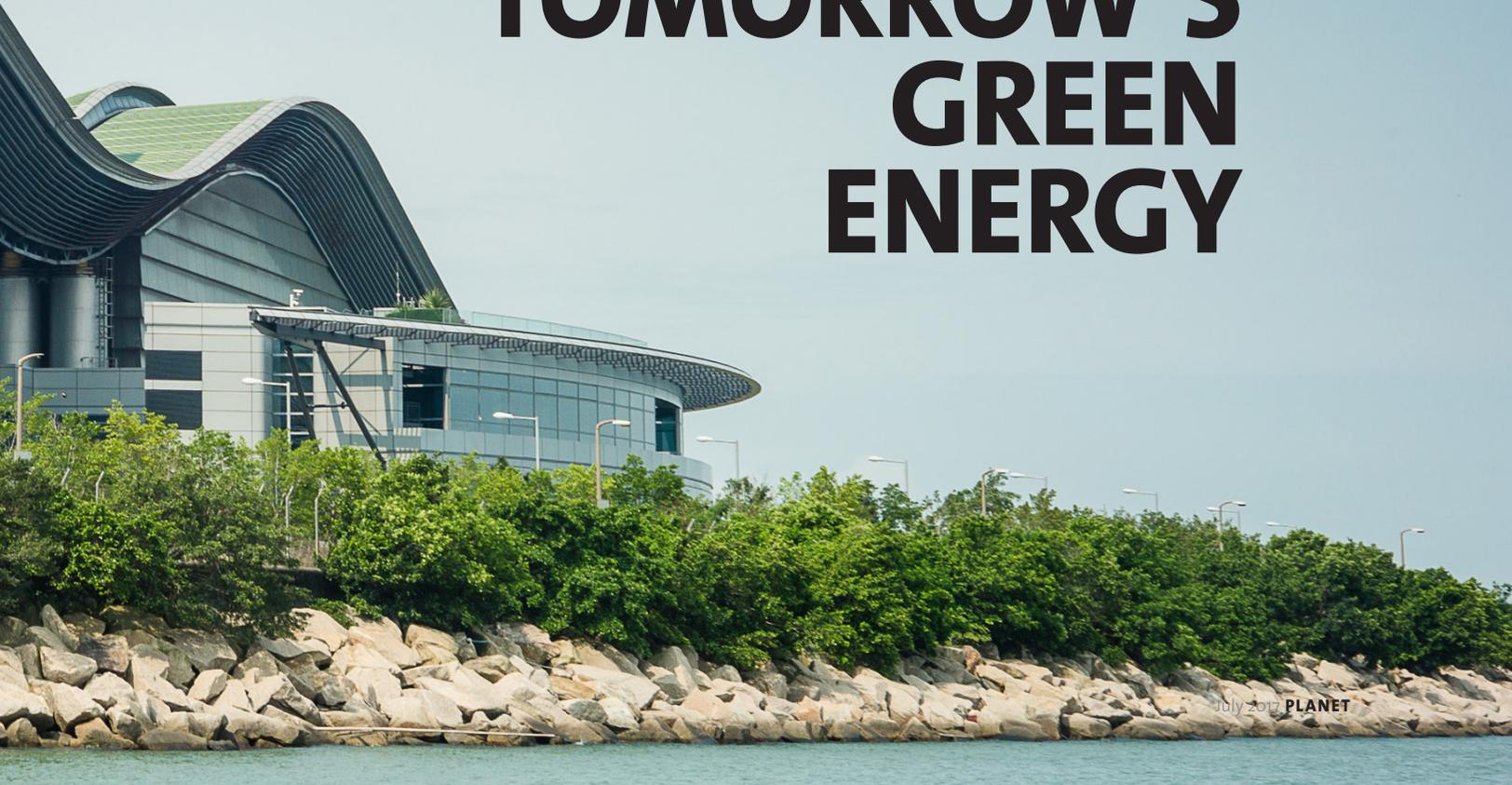
360 meters long and almost 75 meters high, this masterpiece with delicate curves in the form of a double wave blends in seamlessly with the surrounding hills of Hong Kong and overlooks Deep Bay, just opposite Shenzhen. It is the largest sludge treatment facility in the world.



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**Climate change and the increasing scarcity of fossil resources are the major challenges of the 21<sup>st</sup> century. They are making it essential to develop new, more environmentally friendly sources of energy.**

# **Waste and wastewater: TOMORROW'S GREEN ENERGY**



**Waste and wastewater** now represent a resource that can be recovered as energy in the form of heat, electricity or fuel. The market is booming.

## Keeping track of waste

Turning waste into green energy has many advantages. First of all, it makes it possible to side-step the constraints linked to its storage, at a time when regulations in this area are becoming increasingly stringent, especially in Europe and the United States. "The energy transition is a global issue, championed as a priority by countries already highly advanced in the field of resource management optimization," explains Étienne Petit, Veolia's CEO in Germany. "As landfill sites have been prohibited since 2005, Germany began considering the recovery of waste and its use as an energy resource at a very early stage," he states. Most European countries have taken this stance, encouraged by 2008's framework directive. "Waste-to-energy has become an obvious approach. The United Kingdom has put in place financial incentives to encourage local authorities to recover their

waste," adds Pierre Mauguin, Energy Recovery Business Unit Coordinator in Veolia's Technical and Performance division.

## Going with the flow

Sewage sludge from wastewater treatment can also be transformed into energy. "Until now, sewage sludge was used for spreading. This is going to be prohibited," states Étienne Petit. Today, this sludge can be treated to produce RDF (Refuse-Derived Fuel), a high calorific value fuel. "It is an important energy source in Germany for cement works and power plants," highlights Étienne Petit. Some seven million metric tons of RDF are used in the country each year. Another example in Hong Kong, where Veolia runs the largest sludge treatment facility in the world, T-Park: sludge incineration produces up to 14 MWh of electricity per year. This exceeds the plant's energy needs, hence the decision to plow back the surplus into the public electricity network.

Other avenues are emerging, as Étienne Petit describes: "An iron and steel plant emits a lot of heat. The idea is to capture this so-called 'waste' heat, treat it and use the energy potential ..."



### Three questions for Paul Leccia

President of the Cercle des nageurs de Marseille (France)

#### Things are heating up with Energido!

Energido is an innovative solution developed by Veolia for recovering energy from wastewater. The

Cercle des nageurs de Marseille (CNM) has chosen it to heat its prestigious 3,000-m<sup>3</sup> Olympic pool, where champions Camille Lacourt and Florent Manaudou regularly come to train. The patented process recovers heat from domestic wastewater, diverting it to a heat exchanger. This permanently available renewable energy maintains the water temperature at 27°C all year round and preheats the domestic hot water used by swimmers. Paul Leccia explains Energido's economic and environmental benefits for CNM.

#### Why did you choose the Energido solution to heat CNM's Olympic pool?

Our choice was in line with a change that has been discussed by the board of directors for several years, the aim of which is to make significant energy savings. After consulting several studies concerning domestic water recovery, the Energido external heat exchanger solution proved to be much more suitable for our site and above all less expensive, for an equivalent, or even greater, yield.

#### How was this solution implemented?

Once the technology had been defined and the project approved, we chose to delegate power almost entirely to Veolia's subsidiary, the Société des Eaux de Marseille. Our partnership was also concluded with this in mind, based on an ongoing exchange and project management by the Société des Eaux de Marseille's engineers.

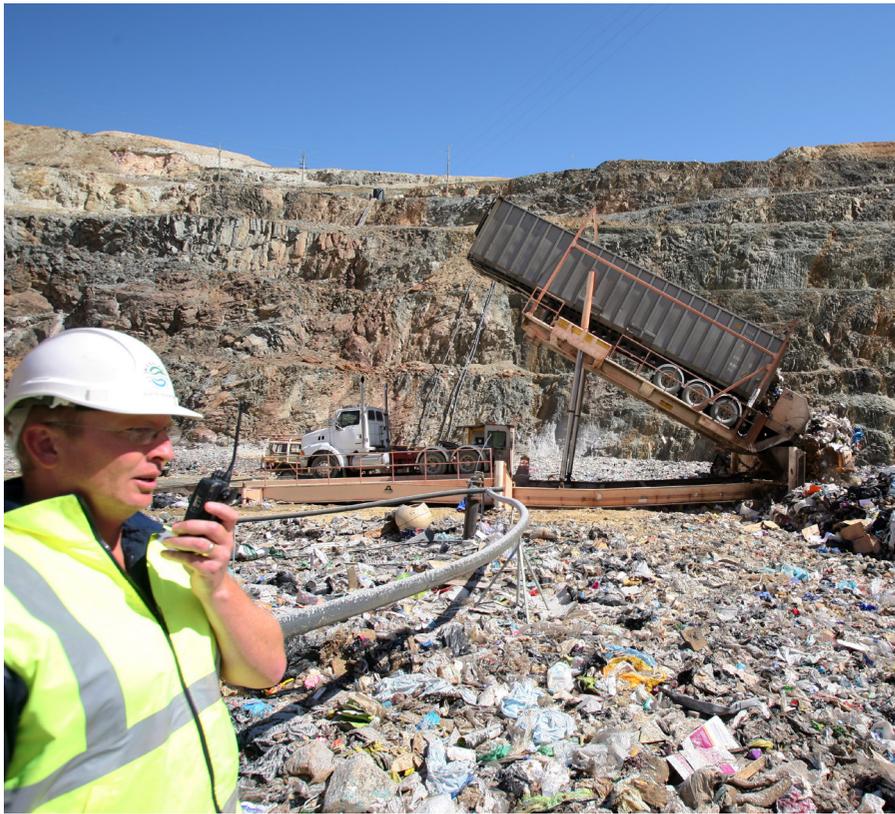
#### After an initial operational review, are you satisfied with choosing Energido?

The results obtained are in line with our expectations, i.e. much lower CO<sub>2</sub> production than usual, due to a 230-metric-ton reduction in emissions, and 30% savings on our gas bill, which is equivalent to entirely covering the costs of heating the Olympic pool year round.



"The energy transition is a global issue, championed as a priority by countries already highly advanced in the field of resource management optimization."

Étienne Petit, Veolia's CEO in Germany



## Energy transition: the legal arsenal to the rescue

Regulations are a significant catalyst in accelerating change worldwide. The energy transition is no exception. In 2016, China launched its 13th five-year plan (2016-2020), ten out of thirteen of whose goals concern the environment. In particular, it is aiming for a 15% drop in energy intensity (relationship between a country's energy consumption and its gross domestic product) and an 18% drop in carbon intensity of GDP. One of the key measures to reduce Chinese CO<sub>2</sub> emissions is the opening of a national carbon market for 2017. In the United States, although the Federal state withdrew from the Paris agreement at the beginning of June, many municipalities, counties and states are continuing their efforts to promote the development of renewable energy and reduce their carbon footprint. Some thirty of them (California, New York City, Ohio, Illinois, Michigan, Texas, Iowa, etc.) have set norms obliging electricity companies to significantly increase their use of renewables over the next decade instead of coal. Meanwhile in Africa, many countries – with Morocco leading the way – have set themselves ambitious energy transition goals. In Europe, the climate and energy package adopted in 2014 looks to reduce greenhouse gas emissions by at least 40% compared to 1990 levels, improve energy efficiency by at least 27%, and have an energy mix including at least 27% renewables by 2030. Continuing this momentum, in November 2016 the European Commission approved new proposals with a view to aligning the policies of the 28 member states with the goals of the Paris agreement. These include reducing energy consumption by at least 30% (rather than 27%) combined with a restrictive energy efficiency goal. These texts still have to be approved by the European Council and Parliament, a process that should be completed by late 2017 or early 2018.

### Key figures

Although waste-to-energy represents less than **6%** of the waste treatment market worldwide, it was valued at **\$25.32 billion** in 2013 and is set to reach **\$40 billion** by 2023, i.e. over **5.5%** annual growth.

Source: World Energy Resources - Waste to Energy 2016

The global waste-to-energy market, via incineration or anaerobic digestion, could reach almost **\$44 billion** by 2024.

Source: market research firm Research & Markets (2016)

Municipal waste-to-energy in the EU represents respectively **1.3% and 8.9%** of the final consumption of the electricity and heat produced by power plants.

Source: [http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/554208/EPRS\\_BRI\(2015\)554208\\_FR.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/554208/EPRS_BRI(2015)554208_FR.pdf)

The waste-to-energy leader, Europe accounted for **47.6%** of global market revenue in 2013. In the Asia-Pacific region, Japan dominates the market with around **60%** of its waste being incinerated. However, the fastest growth on this market is seen in China, which **doubled** its waste-to-energy capacity between 2011 and 2015.

Source: World Energy Council – World Energy Resources 2016

With over **six million** metric tons of waste per day, global waste production will double by 2025. While peak production is forecast for 2050 in OECD countries and 2075 in East Asia and the Pacific, the volume of waste will continue to grow in Sub-Saharan Africa beyond these dates. By 2100, global waste production could reach **11 million** metric tons per day.

Source: World Energy Council – World Energy Resources 2016

In Mexico, Veolia has just signed a contract to build and manage the first waste-to-energy plant in Latin America.



...

released to power a city.” It’s a win-win situation: the local authority reduces its CO<sub>2</sub> emissions and the industry monetizes a resource that would otherwise be wasted.

## Multiple solutions

“Waste-to-energy solutions take many forms, ranging from incineration with energy recovery in the form of steam or electricity, through the recovery of the biogas produced in waste storage facilities, to the anaerobic digestion of organic waste and sewage sludge,” explains Veolia’s CEO in Germany. At Woodlawn in Australia, Veolia transforms organic waste from the metropolis of Sydney into fertilizer and biogas. This green energy supplies electricity to almost 3,600 households.

## Around the world

With a model dominated by nuclear power and inexpensive

energy costs, France is not particularly ahead when it comes to the waste-to-energy sector. However, 2015’s energy transition act should speed things up considerably. Greenhouse gas emissions must see a fourfold reduction by 2050, and nuclear’s share in electricity production must be reduced to 50% by 2025. At the same time, 2015’s act looks to halve the tonnage of household waste buried by 2025, i.e. the equivalent of ten million metric tons must no longer be sent to landfill but used in new waste-to-energy channels. This should encourage France to be creative. Veolia, which already enjoys a prime position on the waste-to-energy market, is continuing to rack up successes. This year, Metropolitan Lille chose the Group and its partner IDEX to recover its household waste in Halluin’s waste-to-energy plant (WTEP). This makes it possible to supply two district heating networks in Roubaix and Lille, creating a real “heat highway” between the three points. Veolia offers a host of innovations

to support the energy transition in France. For instance, the Group has developed Energido, a solution that consists in diverting part of the city’s wastewater to a heat exchanger, which transfers the energy that it contains into a second heat transfer fluid. The calories recovered are transported to a reversible heat pump, which can restore the energy to power a heating or cooling network. Energido is already used to heat the Cercle des nageurs de Marseille pools (see interview p.44) and Aix-les-Bains and Arras aquatic centers. The worldwide potential is vast. The major emerging economies of Asia and Latin America are seeing a sharp increase in their energy needs. “Rather than increasing the number of open landfills on the outskirts of cities, waste recovery offers bright prospects,” summarizes Pierre Mauguin. The proof: Mexico, where ten million inhabitants produce 13,000 metric tons of waste on a daily basis. Today, two thirds of this waste is sent to a storage facility. Veolia has just won a

contract for the construction and thirty-year management of one of the largest waste-to-energy plants in the world and the first in Latin America. The plant will process 1.6 million metric tons of household waste each year, i.e. twice as much as the largest French facility, and will produce 965 GWh electricity that will directly power Mexico’s metro.

## On behalf of industrials

A strong trend is emerging and Veolia is gradually strengthening its offering for industrial clients in order to help them lower their carbon footprint. “Recovering their waste or wastewater represents a promising solution,” says Étienne Petit. In Germany, for instance, the Group is working with the paper industry in particular. In North Rhine-Westphalia, it helped the paper manufacturer Heinrich A. Schoeller Söhne GmbH & Co. KG optimize its water consumption – the sector is extremely water-intensive – and produce energy from its wastewater. In the United Kingdom, it took the same approach with the agri-food giant Heinz to generate the steam required to operate the packaging production lines at Kitt Green, the group’s largest facility in Europe. “We are going to capitalize on the Group’s models to develop an even more structured and powerful industrial offering,” confirms Étienne Petit, adding, “We see the prospect of city-industry partnerships developing within the framework of decentralized local loops. It’s extremely promising from an economic, environmental and social point of view, with the guaranteed creation of strong labor pools. This is an authentic example of a circular economy model in which Veolia comes into its own as a facilitator and integrator thanks to its knowledge of the local markets.” ■

# Community



**New strategy  
for resourcing  
the world**

With the micro-endowment fund Pro Ehrenamt, the Veolia Germany Foundation assists Group employees who wish to devote some of their free time to volunteer work. The Foundation is now opening a new chapter in its history. Since 2016, it has been promoting the Group's expertise and looking to develop cooperation and partnerships to support original actions, directly linked to Veolia's core business areas.

## Veolia in Germany takes a new approach to corporate philanthropy

**T**hey are volunteer firemen, amateurs devoted to their sports club, volunteer first aiders, defenders of nature or youth activity leaders... During their spare time, many of Veolia's employees in Germany dedicate themselves to various causes! To support these civic-minded activities, the Veolia Germany Foundation has created Pro Ehrenamt, a system of endowments capped at €50,000/year. The idea is to allocate €500 to any employee who can demonstrate at least one hundred hours' commitment to an organization. The budget serves to cover expenses such as purchasing

equipment or communication tools. "This microsubsidy principle fosters the values of engagement within the company," explains Fiene Berger, the Foundation's director. "Germany also has a volunteering culture that we wish to maintain. So whenever an employee volunteers for the common good, we support them." Launched in 2014, the program counts a growing number of applicants, as its field of application expands. Last year, for the first time, all of the funds granted were used to subsidize 100 projects.

➤ After sixteen years, the Veolia Germany Foundation is changing in line with developments in its traditional corporate sponsorship role. Its aim is to support innovation in terms of protecting water resources, energy efficiency and the circular economy. The Foundation intends to play a more effective role, with initiatives directly corresponding to the Group's core areas of expertise. "The whole challenge for us is being able to spot large-scale projects that we will open up to external partners, even other foundations," believes Fiene Berger. "This also involves everyone increasing their endowments." These considerations should lead to the implementation of the new strategy in 2018. Find out more: <http://www.veolia-stiftung.de>

➤ **2001:** creation of the Foundation  
**€3.2 M** endowments granted since 2001  
**320** employees engaged in skills sharing  
**430** community projects supported, including 226 through Pro Ehrenamt

## EXPLAINER

# Hubgrade, a performance monitoring center

Veolia's 15 Hubgrade centers are tasked with managing clients' data to optimize their performance and reduce their environmental impacts.

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**T**he scarcity of natural resources means that water, energy and raw materials are becoming increasingly expensive and must therefore be managed wherever they are consumed, i.e. buildings, cities and industries. To optimize facilities and save natural resources, consumption must be efficiently measured. This is the role of Hubgrade, a smart monitoring center created by Veolia where water, energy and waste management experts analyze data from the Group's clients.

"Before Hubgrade, the client only checked their utility and waste management bills once a month. Now, they can find out at any time how much they are spending and saving on energy, water and waste," explains Antonio Neves da Silva, Marketing Manager in Veolia's Development, Innovation and Markets department. "Today, thanks to our investment in the realm of connected objects and smart technologies, we can optimize water, energy and material flows in real time at the sites and infrastructure of our municipal, commercial and

industrial clients." Veolia thus offers its services coupled with a commitment to results. "Hubgrade relies on an integrated digital platform that produces indicators to monitor the facilities' smooth running and makes it possible to trigger alerts and fast and effective interventions," highlights Rachid Hamida, Tools & Methods Manager in Veolia's Technical and Performance department. As soon as a Hubgrade detects a consumption drift or an equipment malfunction, the analysts take real-time action either remotely or by sending a team to the location. "Our command and control systems and modeling tools allow us to reduce the consumption of the facilities we manage," underlines Pierre Fedick, Veolia Energy France's Director of Innovation.

With Hubgrade, Veolia is deploying a new organization, digital systems and innovative business models to implement change. "As we are becoming more efficient, we are also offering new services and an enhanced customer experience to our clients," concludes Antonio Neves da Silva. ■



WASTE TREATMENT PLANT



1

DATA COLLECTION

WATER TREATMENT PLANT



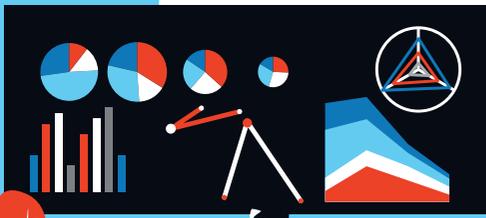
END USER



WASTE COLLECTION



# Hubgrade



241	741	83
74	65	142
123	887	763
784	264	789
62	998	1025



## 2

DATA ANALYSIS

## 3

ACTION PLANNING

## DATA ANALYSIS

Over 300,000 smart sensors already send data in real time from thousands of sites to the fifteen Hubgrade centers, which employ over 50 full-time analysts. Detailed analysis of this data makes it possible to optimize these facilities' consumption. For instance, analyzing a building's indoor air quality in line with the premises' occupation data allows the air conditioning systems to be continually adjusted, guaranteeing comfort conditions, while optimizing their energy efficiency.

## JOB PROFILES

Each Hubgrade brings together 3 to 15 professionals, with three main profiles: data analysts with expertise in energy, water and waste, auditors, and finally systems engineers. Hubgrade is a real change management tool. The in-situ team coordinates with the operational teams on site.

## GUARANTEED SAVINGS

Veolia manages over 160 performance contracts with guaranteed savings. The aim is to help its clients move toward a circular economy by measuring, analyzing and optimizing water, energy and material flows in real time.



PUBLIC, RESIDENTIAL AND COMMERCIAL BUILDINGS

INDUSTRIAL SITE

## FIFTEEN HUBGRADE CENTERS WORLDWIDE



Dublin (Ireland), Birmingham (United Kingdom), Amsterdam (the Netherlands), Stockholm (Sweden), Paris and Marseille (France), Budapest (Hungary), Brussels (Belgium), Shanghai (China), Bilbao, Madrid and Barcelona (Spain), Milan (Italy), Dubai (United Arab Emirates), Sydney (Australia).

# Futurist



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## Borås, sustainable ahead of time

As early as 1959, the city chose to break free from using fossil fuels. Taking its energy destiny in hand, it gradually moved toward alternative heating solutions. Today, it can count on renewable solid recovered fuel (SRF), biomass or cogeneration resources to ensure the thermal comfort of its 110,000 inhabitants.

## The life-sized “Thermos”

On the outskirts of the Swedish city of Borås, a strange metal tower reaching 80 meters high dominates the landscape. Although it is not open to visitors, it is very much appreciated by the inhabitants, who have affectionately nicknamed it “the Thermos.” The purpose of this reservoir – because that is what it is – is to store some

of the thermal energy produced by the urban heating facilities in its 37,000 m<sup>3</sup>. Borås’ municipal department\* saw it as a solution of the future to limit recourse to fossil fuels during peak consumption periods. But how does it work? “Like a gigantic accumulator capable of constantly storing and distributing hot water, all year round,” states

Tobias Klahr, Veolia Sweden’s Business Area Manager for Industry. “At night, when the urban heating demand is low, it keeps the unused hot water at a constant temperature. In the case of a rise during the day, it works like a buffer tank, distributing the amount of heat required for the boilers to operate at a constant rate.” Incorporated

with the city’s thermal power plant since 2010, the Thermos improves the performance of the district heating, which is powered by a mix of renewable energy and supplementary fuel. By smoothing production fluctuations, it optimizes combustion, which ultimately leads to savings in terms of maintenance and fossil fuels. By preventing the emission of 7,700

metric tons of CO<sub>2</sub> each year, the Thermos fulfills the civic-minded role of helping achieve the carbon neutral goal that the city has set itself by 2025.

\* Borås Energi och Miljö AB, which entrusted Veolia in Sweden with running and maintaining its thermal facilities from 2006 to 2016.

NOVEMBER 6-17, 2017, BONN (GERMANY)

event

COP23 ON CLIMATE CHANGE  
SHOWING THE WORLD  
THE FRAGILITY OF ISLANDS

FOR THE FIRST TIME, A COP HAS BEEN ORGANIZED BY AN ISLAND STATE:  
FIJI. HOWEVER, DUE TO A LACK OF SUITABLE INFRASTRUCTURE, THE  
ARCHIPELAGO HAS ACCEPTED THE INVITATION OF THE UNITED NATIONS  
FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNFCCC),  
WHOSE HEADQUARTERS ARE IN BONN.



[HTTP://WWW.COP23FIDJI.COM/](http://www.cop23fidji.com/)  
[HTTP://NEWSROOM.UNFCCC.INT/FR/COP23-BONN/](http://newsroom.unfccc.int/fr/cop23-bonn/)



Drinking water production



District heating



Waste sorting and recycling



Energy efficiency in buildings



Services for the oil and gas industry



Landfilling waste and biogas recovery



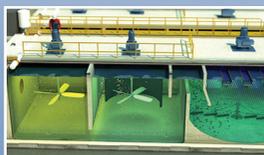
3D videos  
designed to explain simply  
ours activities



Seawater desalination



Cogeneration biomass



Wastewater collection and treatment



The circular economy for the food and beverage industry



Veolia group channel



Environmental services for the mining industry



Drinking-water distribution systems