

March 2018

# From A to W

Water Stewardship



## Foreword from the Chairman

People have long been aware of how precious water is. The availability of water has been one of the primary conditions for human settlements on Earth, and water sharing has often been the origin of laws regulating inter-community relations.

Today, climate change and the growing water needs of our civilisation all too often exacerbate tensions over local water-sharing arrangements, with many countries questioning existing agreement and regulations. Water resources can certainly be increased, but often at the cost of substantial, and not always sustainable, energy consumption. The acknowledgement of the fragility of biodiversity has also led to new expectations of industry and its use of water.

In its production processes and those of its suppliers, industry does indeed consume a lot of water, which is drawn directly from groundwater sources, rivers or the water supply network before being transformed. Water is a component of products and processes; it washes or cools equipment, and it evaporates through chimneys, with a proportion (not always pollution-free) being released into the environment by factories. Consumers, too, are using more and more water due to the products they buy and everyday patterns of consumption.

This situation is leading a number of corporate actors to pay increasing attention to the risks associated with water depletion and pollution. As a complement to their longstanding work in greenhouse gas emissions and biodiversity measurement, the first task of EpE members was that of measuring their own water footprints. This led to the publication of a booklet entitled "Measuring and Managing Water" in 2015. They then set out to reduce these water footprints as well as those of their partners, all while adapting to local situations in the field. Sometimes they went even further by improving control of their indirect footprints, in this case those of their customers.

# GLOSSARY by companies

The aim of this new booklet is to promote the best practices developed by EpE member companies by disseminating them widely among industrial players so that potential tensions may be alleviated without undermining the growth or competitiveness of individual players. On the contrary, most of these measures are profitable, reduce operational risks and improve relations with neighbouring communities with whom businesses often share the same water resources.

The task of translating these practices into better water management is global as much as local.

We hope that our readers will embrace this challenge with the same determination as EpE members.

Jean-Dominique Senard,  
EpE Chairman  
Michelin Chairman

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## 50 corporate best practices in water stewardship

There is a surfeit of knowledge and publications on economic issues related to water, due to the simple fact that the moderate, measured and sustainable use of this resource<sup>(1)</sup> is deemed crucial for governments and businesses alike. A search of the US Library of Congress website, for example, turns up more than 10,000 publications relating to water. Corporate water experts, for their part, are spoilt for choice when it comes to seeking new tools and methodologies<sup>(2)</sup>.

### THE IMPORTANCE OF WATER ISSUES FOR BUSINESSES

In spite of this, forecasts have hardly reversed since EpE first began publishing reports dedicated to water issues<sup>(3)</sup>. Surface water resources are expected to decline as much as 30-40 % by 2050<sup>(4)</sup>. Of the 2.1 billion people who do not have safe access to water, 844 million do not have even a basic drinking water service. Among them, 263 million live more than 30 minutes away from the closest watering point<sup>(5)</sup>. Adequate quantities of good quality water are still lacking in some parts of the world, and are gradually declining in other areas due to the pressure that human activities put on the water cycle. Today we are faced with the overexploitation of 13 of the 37 largest natural water reservoirs and the likelihood of climate disasters in the foreseeable near future. To address this growing problem, many companies of all nationalities have explicitly set out to identify and assess water-related risks. Pursuing Sustainable Development Goals, in particular SDG 6 dealing with access to water and sanitation, is an urgent priority.

- (1) "Stewardship" is the more commonly used term rather than "saving" in water-related literature in the English-speaking world.
- (2) In December 2017, eleven assessment models, along with their advantages and limitations, were identified by the working group focusing on the water footprint of EpE member companies. See entry: Assessment.
- (3) L'eau à l'horizon 2025, août 2008. <http://www.epe-asso.org/leau-a-lhorizon-2025-2008/> and L'entreprise et l'eau : vers une gestion responsable – Étude Deloitte EpE – 2012. <http://www.epe-asso.org/lentreprise-et-leau-vers-une-gestion-responsable-etude-deloitte-epe-2012/>
- (4) Les tensions sur l'eau et les crises associées en Europe et dans le bassin méditerranéen d'ici 2050, SHF, AFEID and Académie de l'eau, March 2017.
- (5) Progress on drinking water, sanitation and hygiene : 2017 Update and SDG baselines. Geneva : World Health Organisation (WHO) and the United Nations Children's Fund (UNICEF), 2017. <http://apps.who.int/iris/bitstream/10665/258617/1/9789241512893-eng.pdf?ua=1>

All businesses are directly affected by issues relating to their water usage, as water is employed in the production of most goods and services. The availability of water and the high economic stakes involved in its use constitute a challenge for the corporate world.

In 2016, water-related production losses amounted to \$14 billion for the 1,432 organisations reporting their data to the Carbon Disclosure Project. 43 % of companies and 63 % of cities are aware that climate change will pose a risk to their water supply and economic activities<sup>(6)</sup>.

Therefore, while water demand and the treatment of polluted water increase, there are still no viable substitutes for water and its distribution remains inconsistently regulated and priced. The price of water and its treatment is often too low to cover the full cost of water purification but measures to increase water prices often come up against cultural barriers. Population growth and economic development, coupled with declining quantities of available water, can only lead to conflicts over usage, in which companies are major stakeholders.

In spite of innovations and rationalisation efforts, the water needs and water footprint of the most water-intensive industries (namely agriculture and energy) are expected to continue to increase until 2030, while population growth and climate change further exacerbate water stress in some regions. In order to best manage these foreseeable tensions, sweeping changes in mindset and outlook will be necessary at the appropriate level. This is true for all parties, but especially so for corporations.

## ACT LOCAL, THINK GLOBAL

The companies most dependent on water resources started to address this matter several years ago. Awareness of the general nature of the issue as well as the importance of work at local level has led to a series of evaluation and management measures<sup>(7)</sup> being put in place. Assessments of both direct and indirect impact have allowed priorities and focal points to be identified prior to the definition of action plans. Manufacturers are becoming increasingly involved, and management focus is primarily at the local level since each area has its own hydrogeological specificities, stakeholders, practices and regulations. Corporate water policy is increasingly coordinated at the highest level.

(6) CDP Water 2017.

(7) Measuring and managing water, April 2015.

<http://www.epe-asso.org/measuring-and-managing-water-april-2015/>

## MULTIPLE WATER-BASED ACTIONS

Because the actions of EpE members are many and varied and because companies have different reasons for supporting initiatives in this field, we have chosen to illustrate in this publication the best practices of EpE member companies in the form of action fact sheets, organised by topic. Each fact sheet reflects the manner in which companies are being questioned and challenged by their stakeholders.

In addition to the publication about the measurement of water footprints, some recent assessment initiatives dealing with footprint measurement and life cycle analysis have been included.

*See entries:* **Water footprint, Assessment.**

This impact measurement, shared by all EpE members, is the first step towards improving internal corporate management practices and addressing the challenge of cutting water consumption and promoting more efficient water use.

*See entries:* **Wastewater, Savings, Leaks, Quality, Recycling, Reuse.**

As businesses evolve, so does the analysis of issues and risks, most notably in terms of new scientific data as well as new economic models and technologies. Adapting to change is the hallmark of a good water management policy.

*See entries:* **Actual cost of water, Data, Phytosanitary products, Risks.**

Various examples show the concrete measures taken by corporations to deal with this issue. *See entries:* **Management, Employees, Strategy.**

In order to take local parameters into account, the analyses incorporate external factors that vary according to the degree of water stress, quality of governance in the field and the needs of the local populations. Regular contact with external stakeholders and a new mode of governance provide new opportunities to improve the management of water as a shared resource.

*See entries:* **Catchment Basin, Biological sewage treatment, Irrigation, Water resource protection, Rainwater recovery.**

Some sector-specific approaches are outlined.

*See entries:* **Insurance, Micropollutants, Phytosanitary products, Plastics.**

Lastly, many collective initiatives to promote the sharing of tools and methods are described.

*See entries:* **Assessment, Governance.**

This brochure brings together 50 concrete, pragmatic actions taken by EpE members for sustainable water management. It reflects not only the involvement and maturity of these companies with regard to sustainable water management, but also how they manage to address the issue. The aim is to inspire and mobilise all corporate actors affected by the conservation of this essential resource – water.

## Development and implementation of a new methodology for assessing water stakes



Company name	MICHELIN
Location	Group
Keywords	Risks, opportunities, impacts, Total Cost of Ownership, ecotoxicity
Company contact	christophe.simoes@michelin.com

### GENERAL BACKGROUND

Michelin sites use water mainly to cool their facilities and to produce steam and hot water. Some industrial operations require water for the surface treatment of wire ropes. A new analysis of water management stakes was launched in 2014 in an effort to better understand and anticipate them.

### SOLUTIONS IMPLEMENTED

In mid-2016, after two years of development and testing in all the geographical zones (14 sites), a new methodology for assessing stakes was made available to all sites. This process, thanks to multidisciplinary teams located at each site, helps identify risks (continuity of activity, reputation amongst locals), impacts caused by the volume and quality of water withdrawn and discharged (Ecotox database), and operating costs.

The aim is to implement appropriate risk reduction measures and identify opportunities by adopting a watershed approach.

This method draws on principles of sustainable development, in particular ISO standards 14046 and 14000 (2015).

In all, this approach requires five to eight days of preparation at the sites, two days of assessment with the support of central teams (country or group), and lastly two days of finalisation to produce a 'water dashboard' for the site. Depending on the decisions reached, subsequent updates require a maximum of two days per year.

### RESULTS ACHIEVED/FIGURES

To date, approximately 30 % of Michelin's industrial sites have implemented the new method or are ready to do so with the support of members of the team of 'water experts'.

Sites that have implemented this approach made, on average, two to three times faster progress in terms of water volumes withdrawn per tonne of finished product. This is mainly the result of making water-related stakes a primary concern and quantifying them.

Other industrial companies and water experts (Veolia, Suez, Quantis, etc.) have also approved this approach, describing it as comprehensive and mature.

### DEPLOYMENT PROSPECTS

This methodology was approved at Group level after being validated by the Executive Committee sponsor in December 2017.

During 2018 its status will change from a recommendation to a prescription.



© Christophe Simoes

## Total decision-making tool for water management projects



Company name	TOTAL
Location	Worldwide
Keywords	Economic and environmental assessment, water risk, water footprint, water reuse, water management.
Company contact	matthieu.jacob@total.com frederic.perie@total.com

### GENERAL BACKGROUND

Current changes in the areas of sustainable development and the circular economy are encouraging Total to reconsider its approach by integrating other factors such as environmental and social impacts. The purpose is to better understand the value of water in various projects.

### SOLUTIONS IMPLEMENTED

Wat-R-Use, Total's proprietary, innovative, multi-criteria decision-making tool, was developed with the help of the group's internal expertise and the skills of a well-known external provider (Quantis). This tool is designed to assess water management projects and reach decisions based on a systematic and scientific method.

The user can benefit from this tool iteratively at any stage of a project by filling in the relevant indicators and consulting an interactive Guide & Manual, which helpfully includes LCA (Life Cycle Analysis) databases and calculation tools. The user is thus encouraged to collect consolidated data that are then processed in a standardised manner to facilitate decision-making.

Wat-R-Use processes this data using four sets of criteria: (i) economic assessment, (ii) environmental assessment (approach based on LCA methods under ISO standard 14046) (iii) water resource-related risks in line with the GEMI Local Water Tool methodology, (iv) social impacts.

### RESULTS ACHIEVED/FIGURES

The Wat-R-Use tool has been tested in cases of (i) improved water management, (ii) solar panel production units, (iii) the Refining & Chemicals branch to reduce consumption at a petrochemical site and (iv) the Exploration & Production branch to inject low salinity water (Smart Water Injection Methods) in chilling production operation.

### DEPLOYMENT PROSPECTS

The latest version of the tool is now available and users can benefit from in-house support. Improvements will be made to the criteria sets over the next few years based on user feedback.



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## Biological wastewater treatment with Jardins Filtrants® by Phytoestore



Company name	CLUB MED
Location	Mauritius, Morocco, China
Keywords	Jardins Filtrants®, biological sewage treatment, purification by plants, water treatment, ecological engineering, local biodiversity, landscape integration, environmental regeneration, wetland, energy saving, phytoremediation, wastewater recycling
Company contact	agnes.weill@clubmed.com

### GENERAL BACKGROUND

Often located in water-stressed areas, the tourism industry is faced with the challenge of increasing scarcity of drinking water. Aware of this operational issue and the importance of improving local acceptability, Club Med has established policies to control consumption (reduction of watering needs, high-performance equipment, leak detection, etc.) and reduce drinking water withdrawal (sea and brackish water desalination, wastewater recycling in 47 % of villages, use of greywater for watering in 57 % of villages), with particular emphasis on water-stressed areas.

### SOLUTIONS IMPLEMENTED

Jardins Filtrants® is an efficient biological water treatment solution adopted by Club Med for its new wastewater treatment plants. Jardins Filtrants® consists of artificial wetlands that combine the different components of an ecosystem: higher plants, microorganisms, soils (alluvial materials, pozzolan, peat, etc.) It is one of the most advanced solutions for the treatment of wastewater, and includes elimination of organic load, nitrogen and phosphorus, germ disinfection, new molecule biodegradation, etc.

#### AREAS OF USE :

Mauritius (Jardins d'Albion, 2006),  
Morocco (Yasmina, 2011),  
China (Guilin, 2013).

### PERFORMANCE, IMPACT AND RESULTS ACHIEVED

- Efficient and 100 % ecological water treatment without unpleasant smells, sights, or sounds.
- Reuse of filtered water for the irrigation of green spaces.
- Excellent landscape integration, positive visual impact and biodiversity conservation. Sanctuary for birds and other species of flora and fauna. Coral reefs are fully protected (Albion).
- Support of the green economy, "green" showcase for some customers (decision makers, influencers, investors).
- Lower investment than for a traditional water treatment plant, as well as lower operational costs with no energy or chemicals required.

### DEPLOYMENT PROSPECTS AND THE CONDITIONS FOR SUCCESS

Club Med wishes to deploy this technology at its new sites, which requires :

- the creation of a nursery providing plants prior to the start of the project ;
- regular surveillance and garden maintenance in the operational phase.



© Club Med

## Natural swimming pools with phytoremediation



Company name	CLUB MED
Location	China, Portugal
Keywords	Biological wastewater treatment, wastewater treatment by plants, water treatment, ecological engineering, local biodiversity, landscaping, energy saving, phytoremediation, wastewater recycling, natural swimming pool.
Company contact	agnes.weill@clubmed.com

### GENERAL BACKGROUND

Club Med resorts are often located in areas that are highly sensitive to pollution. Offering quality swimming water without harming the environment is important to Club Med.

### SOLUTIONS IMPLEMENTED

Phytoremediation is an effective biological solution for the treatment of swimming water. The natural, ecological pool operates without chemicals or toxic risk, using water that has been treated naturally by plants via the rhizosphere.

This is an innovative environmental technological process in which the water is recycled either in a separate pool (Guilin) or inside the swimming pool itself (da Balaia).

#### AREAS OF USE :

- China (Guilin, 2013),
- Portugal (da Balaia, 2016)

### PERFORMANCE, IMPACT, AND RESULTS ACHIEVED

- Protection of local natural wetlands and rice fields (China).
- Better quality and more reliable water treatment than when using a more conventional process.
- Improved comfort for the user (no irritation or stinging of eyes).
- Landscaping and reconstitution of local biodiversity.
- Reduction of negative impacts on the environment thanks to the absence of chemicals and limited energy consumption.
- Simple and rustic maintenance.

### DEPLOYMENT PROSPECTS AND THE CONDITIONS FOR SUCCESS

This technology is used for the new, quiet swimming pools at our resorts.



© Club Med

Reconciliate agricultural production and water quality at catchment basin level, in a sustainable manner and through a multi-partnership approach



Company name	BAYER SAS
Location	Doazit, France
Keywords	Phyto-sanitary products, quality
Company contact	celine.ballesteros@bayer.com

## GENERAL BACKGROUND

Doazit Agri-Eau is a multi-partner program of actions initiated in 2013 to protect the Gouaougue river watershed in Doazit village. A detailed study of the area is relevant in the light of runoff phenomena arising in the local Chalosse agricultural region.

## SOLUTIONS IMPLEMENTED

A detailed study of the watershed (environmental assessment, water quality monitoring) was followed by the implementation of simple technical and agronomic solutions identified both at the watershed and plot levels, with a view to minimizing transfer of phyto-sanitary products. Actions were implemented by farmers at various stages.

The most significant ones helped identify more precisely the needs of farmers, as far as the sustainable use of plant protection products is concerned: simplified cultivation techniques, the use of inter-row cultivators on steeply sloping soils to prevent erosion, sowing winter cover crops, crop rotation diversification, weeding, the use of drift-control nozzles, plot developments (hedges, grassy area), Aquasite® diagnosis performed by Maïsadour engineers.

## PERFORMANCE, IMPACT, AND RESULTS ACHIEVED

The development of a collective and the management of phytosanitary effluents have been initiated in order to face the lack of equipment and amenities in the farms. The overall results and actions implemented are being presented and developed during technical meetings attended by the several dozens of local farmers and partners involved in the project.

## DEPLOYMENT PROSPECTS AND THE CONDITIONS FOR SUCCESS

If relevant, the implementation of actions for water quality will be extended to biodiversity. Such aspects have also been dealt with pedagogy on an "Agrobassin" reconciling the protection of the environment (water and biodiversity) and agricultural production.



© Bayer

## SMART water program



Company name	SANOFI
Location	Worldwide
Keywords	Water management, target
Company contact	jean-christophe.bligny@sanofi.com

### GENERAL BACKGROUND

As a worldwide environmentally responsible company, Sanofi is committed to sustainably manage water as a local resource. Apart from requesting all facilities to have a site's water management plan, Sanofi worked out its approach to identify specific water reduction potential at each site level, in order to determine dedicated reduction targets.

### SOLUTIONS IMPLEMENTED

In 2011, Sanofi decided a global top-down water reduction target. Implementation of this target had to be adapted in a case by case approach for each site, but local ownership was difficult to obtain, even if some good progress were achieved.

Through the group's Planet Mobilisation approach (Sanofi global environmental strategy), it was decided in 2015 to define a new bottom-up process for water : the idea is to work out at each site a Site's Maximum Achievable Reduction Target (SMART) for water usage and define the real objective of each site from this exercise.

The first step is to build a team of site experts coming from all concerned related departments (production, quality, utility, engineering, environment, controlling) – together with corporate experts. The team's aim is to review all possibilities to reduce water consumption to absolute minimal possible level. Some benchmarks within the business and for similar operations can help determine this value.

Then, as a second step, from this list of potential actions, according to local conditions, economical drivers, technical constraints (such as trade-off with energy for cooling), a site's specific reduction target, associated with decided actions, calendar, investments... is defined at site level and agreed upon at corporate level. Action plan follow up is now implemented.

### PERFORMANCE, IMPACT AND RESULTS ACHIEVED

As a program under development, today the main issues perceived are the following :

- Commitment at site level, and understanding of the local importance of water topics
- Availability of good data (monitoring for quantities and qualities) to assess the site's water situation



Polishing treatment with moving-bed active carbon at organic synthesis factory in Vertolaye (France).

© Sanofi

## Smart Water : the intelligent way of preserving the water resource



Company name	SUEZ
Location	Worldwide
Keywords	Smart, water footprint, water scarcity, sensors, data, monitoring.
Company contact	camille.richard@suez.com

### GENERAL BACKGROUND

Currently, 35 % of the drinking water that supplies networks worldwide is lost. This represents 49 billion cubic meters of water per year. When it comes to reducing water footprint, the first measure to implement is the monitoring and control of the water cycle.

### SOLUTIONS IMPLEMENTED

To optimize water assets management, to reduce leaks losses and prevent failures, Suez has developed solutions using digital technologies applied to water management. The whole water circulation systems and the consumption are controlled and optimized in real time through the installation of sensors networks and data analysis.

- **Aquadvanced®:**  
Optimizing the management of water and wastewater treatment networks.

This modular software solution uses the data collected by sensors installed in the entire drinking water distribution network to identify and anticipate anomalies in the network collating large volumes of data from various sources. Suez has already installed more than three million of communicating sensors in Europe, half in France, and plans to multiply this number by four within the next ten years.

- **Smart Wells :**  
Wells advanced monitoring

Industries and municipalities rely partly on wells for their water supply. The WellWatch® offer developed by Suez propose a dashboard continuously monitoring and optimizing wells and their pumps and calculating performance indicators to extend the wells' life time, reduce losses and release the pressure on the resource.

- **Insight Asset Performance :**  
Optimizing water use in industrial processes

This cloud-based knowledge management platform enables to pilot the water usage within the production process. The system reduces risks and operating costs but also the water footprint of the site thanks to a better understanding of water needs and supply.

A Canadian beverage company managed to reduce by 40 % the water consumption of its production line thanks to this monitoring system.

- **Smart irrigation :**  
Optimizing irrigation systems to reduce water consumption

The RegControl® system developed by Suez is able to remotely and automatically deliver to the plant the right quantity of water and fertilizer needed, based on weather predictions and moistures sensors.

The data thus becomes the lever for more efficient water consumption in agriculture, reducing water and energy consumption and associated costs.

### RESULTS ACHIEVED/FIGURES

These technologies enable to secure the water quality, guarantee the production and distribution continuity, improve productivity and reduce costs, while preserving the water resources.

Suez won the Smart Water Company of the Year award at the Global Water Awards 2017 recognizing the companies that have contributed the most to the advancement of digital technologies in the water sector.

### DEPLOYMENT PROSPECTS

Reducing and optimizing water usage becomes essential for municipalities, industries and farms to face and prevent water scarcity. Smart water solutions are not about creating new sources of water but developing a more efficient and sustainable usage of existing water assets, reducing the pressure on the resource.

## Water savings in Durance Valley



Company name	Electricité de France (EDF)
Location	France
Keywords	Multipurpose water uses, Water-Energy-Food nexus, Stakeholder engagement, Water valuation, Water governance
Company contact	laurent.bellet@edf.fr

### GENERAL BACKGROUND

EDF is operating a cascade of 32 hydropower plants (2000MW) along the Durance-Verdon river system (250km) in South-East France where water resources are under a high level of pressure due to significant withdrawals for various water uses (irrigation, hydropower, drinking water, industrial use and recreational activities) and the need to maintain ecological services.

### SOLUTIONS IMPLEMENTED

EDF used water valuation to help the decision-making process for optimal water management with respect to competing multipurpose uses of water. The overall aim was to optimize water allocation between energy generation and irrigation and to develop appropriate incentives for water savings in order to restore financial margins, and answer to future water demand from other users.

The value used for water was the energy cost (€ /KWh) based on current and future prices in France and linked to the energy productivity (m<sup>3</sup>/KWh) and the volume of water used (m<sup>3</sup>) by the hydropower plant.

The approach adopted was to implement a Water Saving Convention, signed by EDF and the two main irrigators, for a six-year period with the possibility to adjust it if it achieved better results than expected. To balance these efforts, EDF has a commitment to financially compensate the partners for their savings.

### RESULTS ACHIEVED/FIGURES

The deal was so effective that several agreements were signed, allowing a decrease in agricultural consumption of about 30 % (from 310 to 200 million cubic meters per year), and this approach was extended to a larger perimeter with the engagement of the local Water Agency.

A new Convention has been signed for 9 years, from 2014 till 2022 including a new concept of solidarity between upstream and downstream stakeholders. Both parties come out ahead, with a third winner being ecosystems as around 84 % of the water savings are used for ecological purposes.

### DEPLOYMENT PROSPECTS

This experience can be easily replicated in any multipurpose hydro scheme where irrigation and energy production are the main users of the water in the reservoir.



© EDF

## Reducing water consumption in ready-mix concrete production units



Company name	LAFARGEHOLCIM
Location	Concrete plants (244 units in France in 2017)
Keywords	Withdrawal, consumption, recycling, water recovery, water separation, waste management
Company contact	didier.collonge@lafargeholcim.com

### GENERAL BACKGROUND

Water is essential in the manufacture of concrete. First, it is the element that triggers the cement hydration reaction in the sand, gravel and cement mixture, giving plasticity to the mixture called "concrete" so that it will pour as desired by the builder. It is also the most practical way to clean tools, machinery, vehicles and circulation areas.

For many years, concrete plants have been reducing their water consumption by retrieving water from the plant, recycling wash water after settling and using that as the water for concrete manufacture, all while adhering to strict product quality standards.

The 2017 assessment confirms the headway made, with average consumption falling below 280 liters/m<sup>3</sup> of concrete produced.

### SOLUTIONS IMPLEMENTED

This progress is the result of the mobilisation of all French teams at all levels (plant managers, operators, mechanics, laboratory technicians, drivers, concrete pump operators, managers, etc.) and across all areas (quality, maintenance, production, sale, subcontracting). After installing meters at every water supply circuit, the teams measured, compared and studied the effects on the products and thus identified areas for improvement on a site-by-site basis.



© LafargeHolcim

### RESULTS ACHIEVED/FIGURES

In 2004, the optimum consumption level had been set at 300 liters/m<sup>3</sup> of concrete produced in order to raise employee awareness of the environmental impacts of their plants. At the time, average annual consumption regularly exceeded 360 l/m<sup>3</sup>.

In 2011 the thresholds were changed under new legislation, to 350 l/m<sup>3</sup> for units equipped with a mixer with a capacity of 3 m<sup>3</sup> or less, and 400 l/m<sup>3</sup> for those with mixers with a capacity of more than 3 m<sup>3</sup>.

### DEPLOYMENT PROSPECTS

This mobilisation has also enabled other technical advances, such as the optimisation of the choice of settling pond sites, mixer truck washing areas and concrete waste storage areas; the calculation of volumes of recycled and stored water; the optimisation of plant topography for enhanced water recovery; and the management of automated water mixing systems in manufacturing programmes.

The following areas have been identified for ongoing improvement:

- Upkeep of our water consumption monitoring devices (regular maintenance, corrections and calibrations) to ensure their long-term reliability).
- Closer monitoring of consumption on a monthly basis and adjustment of consumption targets with regard to new product ranges and production units.
- Tighter concrete waste management.
- Promotion of sustainable water use practices through reduced consumption of drinking water or water drawn from the natural environment in favour of industrial water subject, to adequate quality standards, or more generally rainwater, wherever there is space to build and accommodate storage basins.

#### Reminder of how a concrete plant operates

Water that enters into the concrete manufacturing process comes from different sources:

- natural environment: most often groundwater (boreholes, wells) or surface water (rivers, canals, other bodies of water);
- supply systems (city water, industrial water, rural water);
- recycled water from collection basins at wash areas, after it has been settled;
- recovered rainwater (roofs, parking areas, circulations) that is settled, de-oiled and stored in a storm water basin.

## Water savings and risk mitigation



Company name	VALLOUREC
Location	Brasil
Keywords	Water savings, water re use, risk
Company contacts	jean-louis.merveille@vallourec.com olivier.desurmont@vallourec.com

### GENERAL BACKGROUND

Water is an essential resource in the process for manufacturing seamless steel tubes. It is mainly used to cool down the machines and produced tubes in steel making, rolling mill and heat treatment processes. It is even quantitatively the main production factor as almost 6.2 million m<sup>3</sup> have been required to produce 2.3 million tons of tubes in 2017.

Vallourec has always worked to use this resource in a responsible manner quantitywise and qualitywise. With the assistance of Veolia, the WIIX indicator has been calculated in the main plants for also taking local scarcity risk into account. The result is the water overall footprint is low.

### SOLUTIONS IMPLEMENTED

In all plants, actions have been successfully deployed to increase process water recirculation, to use rain water, to reduce water withdrawal, to improve the quality of waste water to limit the impact on the environment, and to reduce the cost of managing water.

### RESULTS ACHIEVED/FIGURES

As a consequence of its activity our Brazilian ore mine generates an annual volume of 1.000.000 m<sup>3</sup> of tailings which used to be disposed as a liquid stock behind a dedicated dam. Considering the growing structural stability risks involved, a new solution was proposed based on a dewatering plant which would separate the water from the solids in the pulp and making then possible to dispose this material in piles instead behind a dam.

This cost saving decision avoided the extension of the dam and also allowed the possibility to reuse 85 % of the water used in the beneficiation process after being cleared. On top it allows converting tailings into reusable material replacing sand in the manufacture of concrete pavers.

### DEPLOYMENT PROSPECTS

In 2017 the Vallourec Environment Award was granted to this project.



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## Launch of a contest to better manage water at home



Company name	MICHELIN
Location	Chennai, India
Keywords	Awareness, home, contest, practices.
Company contact	christophe.simoes@michelin.com

### GENERAL BACKGROUND

At a zero-liquid waste site operating under very specific environmental constraints, it was essential for all internal stakeholders to play an active role. As part of a scheme promoted by headquarters, the site decided to launch, on World Water Day, an initiative to raise employees' awareness about their own water consumption habits at home.

### SOLUTIONS IMPLEMENTED

On 22 March 2017, the Chennai site launched a contest 'Haven't you ever saved water at home?'

The contest ended on 5 June, World Environment Day.

Employees were asked to share concrete actions taken at home. The primary objective was to get employees to discuss the measures they had taken amongst themselves.

Then, five people were chosen to be rewarded for their actions. These included the recovery of rain water, re-use of cooking water for watering plants and trees, separation of drainage channels, and lowering tap water consumption.

The winners were given a manually rechargeable camping lantern.

### RESULTS ACHIEVED/FIGURES

Good progress was made at the site, enriched by many discussions.

Employees were made even more aware of water conservation issues and Michelin's determination to continually find avenues for improvement. Direct discussions among employees were particularly fruitful.

### DEPLOYMENT PROSPECTS

This initiative was acknowledged at group level through the practice sharing process implemented across all group sites.

The 'Water Expert Team' supports and encourages this initiative to be taken in other sites.



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## AXA Global Parametrics : Using data science to ensure the sustainability of hydropower



Company name	AXA
Location	Worldwide
Keywords	Energy, hydropower, data, insurance
Company contact	esther.delbourg@axa.com

### GENERAL BACKGROUND

Hydroelectric power supplies around 17,5% of the world's electricity. Its growth in the next 15 years will mainly stem from Latin America, China and other developing countries where the potential for hydropower is still largely untapped.

Precipitation drives the production of hydropower. To maintain power supply during a drought, energy companies reliant on hydropower need to purchase electricity from other sources at much higher prices. Extreme droughts are therefore especially devastating for a country that is heavily dependent on hydropower as its population is impacted by low food production while the wider economy suffers from a lack of power supply.

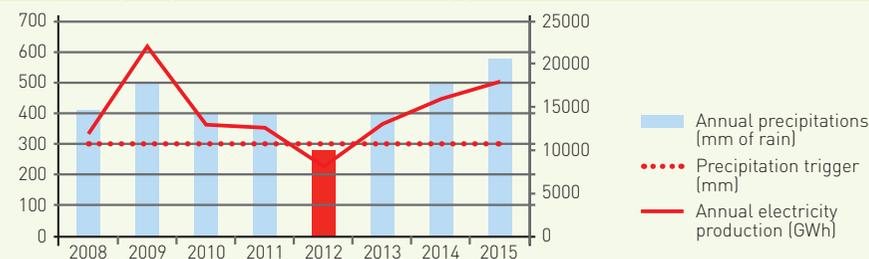
### SOLUTIONS IMPLEMENTED

To solve hydropower plants' sensitivity to precipitation, Axa has created an innovative parametric insurance coverage that provides fast and transparent payouts during droughts. These rapid payouts help the energy company to finance the purchase of electricity externally which smooths energy supply and keeps hydropower plants sustainable.

Parametric insurance is based on the use of a parameter that is correlated to a client's damages or financial losses and pays out automatically should an event occur. The parametric insurance cover for hydropower plants was developed by Axa Global

Parametrics. The insurance is based on rainfall data from satellites or weather stations. The data is used to create a precipitation index that correlates closely with the hydropower plant's energy production levels. If the index shows there has been low levels of rainfall, an insurance payout is triggered to the energy company.

### Impact of precipitation on annual electricity production



**Figure 1**  
Illustration of precipitation index (mm of rain per year) closely correlated with hydropower plant's energy production (GWh per year). The energy company would have received a payout in 2012 as precipitation fell below the selected trigger of 300 mm/year.

The payout is received within weeks and as it is index-triggered, there is no need for the claim to be assessed which saves time and lowers the cost. The company selects at what rainfall level it wishes the insurance to trigger and the amount of the payout. The coverage is therefore tailor-made to suit the company's risk appetite and budget.

### RESULTS ACHIEVED/FIGURES

Axa Global Parametrics is providing parametric insurance across 35 countries and 5 continents with a concentration on renewable energy including hydropower plants. The portfolio is quickly expanding : Axa is being approached by hydropower plants from both developed and emerging markets that are keen to find out about its innovative insurance offering, harnessing data science and satellite technology to support sustainable energy supply.

### DEPLOYMENT PROSPECTS

With climate change exacerbating the risk of drought in many regions, hydroelectric production is becoming increasingly sensitive to weather. This is complexifying the risk as well as fueling more demand for insurance protection. To better understand these sensitivities, Axa Global Parametrics is currently working with hydrology and climatology experts to better assess climate shocks and enhance its parametric offering.



**Figure 2**  
Reservoir behind dam in southern Africa which was severely impacted by drought in recent years

Photo courtesy of Joseph McKenna

© Axa

## Wastewater, a renewable biogas source



Company name	VEOLIA
Location	Urumqi, China
Keywords	Biogas, renewable energy, recovery, circular economy, wastewater
Company contact	amelie.rouvin@veolia.com nina.cambadelis@veolia.com

### GENERAL BACKGROUND

Today, the major challenge for wastewater treatment plants is to use as much as possible of the by-products from the wastewater treatment chain. Turning sludge into biogas allows recovering renewable energy from materials up to now considered as pollution.

### SOLUTIONS IMPLEMENTED

For over 10 years, Veolia has been operating in Urumqi a wastewater treatment plant of an initial capacity of 200 000 m<sup>3</sup>/day. The challenge at hand was to double its production capacity while proposing a sludge treatment system. Veolia then developed a solution to extend the treated volumes to 400,000 m<sup>3</sup>/day for a land area serving 1.5 million inhabitants.

The sludge digestion solution associates thermal hydrolysis and anaerobic digestion, allowing a 30 % reduction of their volume (80,000 m<sup>3</sup> /month). It gives enough thermal energy to maintain the plant at the right temperature and covers 50 % of the site's energy needs, up to 1.8MW /day. The plant's environmental footprint is therefore reduced.

### RESULTS ACHIEVED/FIGURES

The implemented solutions give a better performance than a classic digestion and allow the optimisation of sludge treatment producing 30 to 50 % more biogas, emitting no odour, by generating 25 to 35 % less digestate ( dry matters), giving out a hygienic and stabilized digestate for a better controlled safety and health risk along agricultural recovery.

### DEPLOYMENT PROSPECTS

This kind of biogas production from wastewater has a great deployment potential for municipal or industrial wastewater treatment plants worldwide.

For instance, the Braunschweig plant in Germany is 100 % energy self-sufficient and the Gresham site in the United States is 92 % self-sufficient and has reduced its energy spending by \$45,000 a month.



© Veolia

## Partnership between a quarry and a local community for flood management risk



Company name	HEIDELBERGCEMENT
Location	France
Keywords	Quarry, floods
Company contact	hjanot@ciments-calcia.fr

### GENERAL BACKGROUND

The activity of GSM is to value a local resource, quarry of lime or alluvial stones to answer the development needs of the community in sand and gravels. The company operates about one hundred quarries in France and manages its activity with a constant will of collaborating with the local stakeholders to meet social, economic, geological and environmental local requirements.

Among its numerous sites of extraction, GSM runs a quarry of limestone, on a site close to Nîmes (East-South of France). The region is subject to sudden or unexpected weather conditions, in particular strong seasonal pluviometry, which regularly turns small rivers into torrents and causes strong floods. In this context and to take into account all these data, the dialogue with the local community is essential, when designing and operating a quarry.

### SOLUTIONS IMPLEMENTED

The local involvement of GSM has started upstream by working with the local stakeholders to design the installation and to plan for operations to be compatible with the prevention measures bounded to flood risks. Thus, in case of water flood, a whole diversion system from a small river just by the quarry has been realized by GSM as well as the digging of a channel to stream the exceeding volume of water in the space provided by the extraction of limestone.

In case of floods, the quarry is able to hold 4.000.000 m<sup>3</sup> of water, that is twice more the volume of the total precipitations which caused the tragic floods in Nîmes on October 3rd, 1988.

### RESULTS ACHIEVED/FIGURES

The sustainable management of natural resources is the major stake in our industry; the water, as the limestone, the main material used for the production of cement, is totally integrated into our management system.

In France, in our industry, the water cooling within a closed circuit system has been efficient for quite a number of years. The main focus is on the supervision and the preventive maintenance of the system. Thanks to this closed loop, external make-up water is greatly limited to around 0,3 m<sup>3</sup> per ton of cement.

### DEPLOYMENT PROSPECTS

Considering these very good outcomes, the capacity of the basin is going to be increased to 7.000.000 m<sup>3</sup> to strengthen the prevention of repetitive climatic events.

At the end of the quarry life, the municipality will own the site. The quarry will maintain its role of protection for the local residents facing intense rainy events.



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## Pits converted into flood alleviation basins



Company name	LAFARGEHOLCIM
Location	Oise and Aisne Valley, (60), Rieu Valley (30), France
Keywords	Flood management, quarries, aggregates, flood, natural reservoir, wetland, alleviation, compensation
Company contact	didier.collonge@lafargeholcim.com

### GENERAL BACKGROUND

Water is a natural resource that LafargeHolcim uses and takes into account in all its industrial facilities and for the three types of commercial activity it conducts (quarries, cement, concretes). Effective management of this resource is a powerful source of motivation for the company and its employees, as well as a growing concern for society at large. Many stakeholders today are joining forces to promote the protection of natural environments like wetlands because of the essential role they play in flood prevention and reduction, and as buffer zones through water containment and absorption. Depending on their location and the area's hydrogeological conditions, quarries can help offset or alleviate certain flood events.

Picardy is an example of a region regularly prone to flooding, especially when the Oise and its main tributary, the Aisne, overflow their banks. Alluvial quarries can serve as reservoirs where flood waters can be stored provided the soil is sufficiently impermeable. In other areas (such as the south of France) quarries are converted into storm water basins to reduce the risks for riverside communities: for example, the Broussant and Coste Rouge quarries for the city of Bellegarde, and Antiquailles quarry for the inhabitants of the northern districts of Nîmes in the Gard area.

### SOLUTIONS IMPLEMENTED

A 17-hectare site at Longueil-Sainte-Marie met all the geological criteria required for conversion into a flood retention basin. LafargeHolcim decided to create a 600,000 m<sup>3</sup> basin in partnership with the local authorities and municipalities (Entente Oise Aisne, the local authority responsible for flood control and environmental conservation in the Oise catchment basin). This led to the construction of comprehensive hydraulic infrastructure (dikes, channels and connecting ditches). Riverbanks were consolidated and waterproofed, and some vulnerable areas lined with riprap.

### RESULTS ACHIEVED/FIGURES

Operational since 2001, this site is integrated in vaster area named 'global flood detention of Oise' built up of about fifty independent hydraulic sites which rehabilitated quarries LafargeHolcim with link-up structures (ducts, channels, overflows, valves...) allowing filling phase. This detention ponds are characterized by a winter drawdown level (before a flood) and a maximum detention level (during a flood). The whole of this flood device grows to an area of 1250 ha distributed on eight communes of Oise for a maximum exceptional storage capacity for 15 million cubic meters, upstream from vulnerable cities like Creil and Pont-Sainte- Maxence.

### DEPLOYMENT PROSPECTS

From 2007-13, in the commune of Choisy-au-Bac (north of Compiègne), another network of Aisne flood alleviation basins was built. These basins, which span an area of nearly twenty hectares, have a capacity of 1 million m<sup>3</sup>. This project is part of the SAND (Spatial quality enhancement, Alleviation of flood damage and Nature enlargement by Development and redevelopment of mineral extraction sites along rivers) programme, which brings together different European players to develop quarries for flood abatement purposes. During a new phase that started in early 2018, Choisy's capacity will be doubled, thereby strengthening its compensation function with regard to the urban development in and around the industrial zones of Compiègne.

In the south of France, climatic events can cause water levels to rise very quickly. Over the course of the last century, communities have been subjected to strong flash floods on numerous occasions. Thus, the basins excavated during the exploitation of the Bellegarde quarry on the Costières plateau help to reduce risks for the western riverside communities of this commune. The current 40-hectare extension in the place known as "Coste Rouge" in the northwest will strengthen this "retention" role during flooding from the Amarine, a stream in the Rieu valley and a tributary of the Rhone. As a result, the total storage capacity of water bodies will be increased to over 2 million m<sup>3</sup>, which matches the volume of water generated by a 100-year flood.

In 2017, work began on digging a quarry in the limestone massif to the north of Nimes in the Gard department (more precisely in a place called "Ville Verte"), with the aim of excavating a 3.6 million m<sup>3</sup> pit over the next 15 years. When completed, this basin's retention function during dangerous flood events in the Cévennes region will be ensured by the creation of a riprap-lined hydraulic threshold connected to neighboring valleys.



© LafargeHolcim

## OECD Water governance initiative



Company name	ENGIE
Location	Worldwide
Keywords	Water governance, indicators, good practices
Company contact	elsa.favrot@ENGIE.com

### GENERAL BACKGROUND

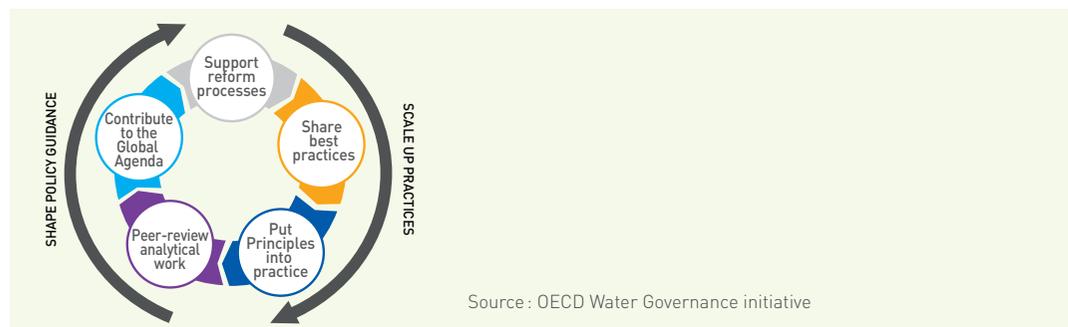
2013 was created the OECD Water Governance Initiative (WGI), a multi-stakeholders network with more than 100 members from the public, private and not-for-profit sectors that meet twice a year to share knowledge, experiences and good practices. The WGI works on ensuring continuity and collective action to build and disseminate governance responses to water challenges.

The Principles of Water Governance were adopted in June 2015 by the 35 OECD member countries to promote the design and implementation of effective, efficient and inclusive water policies.

ENGIE is supporting this initiative and participates to the studies done by the network.

### SOLUTIONS IMPLEMENTED

The first phase of the program, 2013-2015, was focused on contributing to the definition of OECD water principles and guidance, the implementation of the governance targets defined during the 6th World Water Forum and raising up the issue.



Then in 2016-2018, the second phase was dedicated to the implementation of the principles with two aspects :

- best practices to foster peer-to-peer dialogue within and across cities, basins and countries facing similar types of challenges.
- indicators as a voluntary-based self-assessment tool for bench-learning and dialogue within and across countries.

The results will be published during the 8th World Water Forum.

### RESULTS ACHIEVED/FIGURES

Multiple documents have been provided by the OECD such as :

- The OECD Principles on Water Governance
- The Daegu declaration
- Countries reports
- Highlights from the plenary meetings

### DEPLOYMENT PROSPECTS

The Members of the Water Governance initiative are engaged to support it, to disseminate the Principles, and to pledge that all stakeholders use the Principles, share good practices and implement indicators.



© OECD

## Introduction of a sharing initiative between manufacturers



Company name	MICHELIN
Location	Clermont Ferrand, Group
Keywords	Sharing of practices, experiences
Company contact	christophe.simoes@michelin.com

### GENERAL BACKGROUND

It is important that industrial firms share experiences both internally and externally for the sake of efficiency.

The effectiveness of this approach is based on mutual understanding and trust, as well as on simple sharing practices adapted to the firms' immediate or near-future needs.

### SOLUTIONS IMPLEMENTED

On World Water Day 2016, Michelin launched a simple and versatile initiative dedicated to bringing manufacturers from the Water Industry Club together to discuss water issues.

This initiative invites participants to define and share their issues, needs and experiences one or two days per year.

The topics include concrete actions related to improving performance (reuse, recycling, etc.) not only in terms of volume and quality, but also in management, stakeholder interactions, communication initiatives, and monitoring. All such actions follow a simple operational charter.

While it has been hosted twice by the Clermont-Ferrand headquarters, the organisation of this initiative is shared by all members.

### RESULTS ACHIEVED/FIGURES

An average of 20 practices are shared during each of these information sharing days. So far, nine industrial companies have committed to this process (Heidelbergcement, L'Oréal, Nestlé, Safran, Total, Solvay...).

### DEPLOYMENT PROSPECTS

Maintaining this initiative in 2018 and possibly including more industrial firms, while preserving the desired versatility.



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## Business Alliance for Water and Climate



Company name	SUEZ
Location	Worldwide
Keywords	COP21, governance, water, climate, alliance, business, resilience
Company contact	jean-pierre.maugendre@suez.com s.pellion@suez.com

### GENERAL BACKGROUND

The Business Alliance for Water and Climate (BAfWaC) was launched at COP21 in 2015, upon Suez initiative, with the support of the French government by the UN Global Compact's CEO Water Mandate, the CDP, the World Business Council for Sustainable Development (WBCSD) and Suez.

It relies on the capacity of companies to work together to meet the public interest challenge of protecting our water resources. Its goal is therefore to help water management to play a greater role in business strategy and, more specifically, to incite companies to develop collective action to protect the quality and availability of water in the river basins in which they operate.

### SOLUTIONS IMPLEMENTED

Every company in the Alliance commits to signing up to at least one of the following three levels of commitment, and to defining concrete measures to this effect :

- Analysing and sharing the water-related risks of its business to implement collaborative response strategies
- Measuring its water footprint
- Reducing its impacts on the availability and quality of water in its direct operations and its value chain.

The Water Action Hub launched by the Alliance brings together all the initiatives already launched by its founding partners. It aims to :

- Connect companies to identify opportunities of concrete collective action, including their stakeholders. The Hub focuses particularly on applying the principles of the circular economy to water management, enhancing the resilience of the agriculture/food value chain, and promoting "green" infrastructure
- Share best practices
- Formalise communication between companies and policymakers on the importance of taking water into account within climate policies.

### RESULTS ACHIEVED/FIGURES

51 companies have joined the Alliance, of which 7 large French companies, with a total of \$750 billion in annual revenue and operating in over 100 countries on five continents. The target is to reach 100 signatories by 2020.

See : <https://bafwac.org>

### DEPLOYMENT PROSPECTS

Recognised by the UNFCCC as a stakeholder in the Global Climate Agenda, the BAfWaC joined, as part of the Marrakesh Agreement launched at COP22, the Global Alliance for Water and Climate (GAfWaC). It gives an annual report of its actions on Water Action Day, organised by the UNFCCC during its Conferences of Parties.



## The As Samra Project, a water governance success story



Company name	SUEZ
Location	Jordan
Keywords	OECD, governance, wastewater, stakeholders, dialogue, water scarcity, reuse, partnership, agriculture
Company contact	camille.richard@suez.com

### GENERAL BACKGROUND

See p. 41 (Governance, "OECD Water governance initiative").

### SOLUTIONS IMPLEMENTED

As part of the OECD Water Governance Initiative's steering committee, Suez has committed to implement these principles through its activities and projects. On the As Samra project, Suez adopted a bottom-up and multi-stakeholders approach to improve the project's governance.

Population growth, water scarcity and increasing energy costs are a challenge for Jordan; the local authorities needed a new project to produce reused high-quality treated water for irrigation, optimizing energy consumption. The Government of Jordan awarded Suez with the extension and operation of the As Samra wastewater treatment plant, initially designed to treat the wastewater of 2.3 million inhabitants from Amman and its surrounding areas. The plant is the first wastewater treatment facility in the Middle East to use a combination of private, local government and donor financing. One of the specificities of this project was actually the large number of stakeholders involved; this is why Suez engaged in a proactive dialogue with these different stakeholders to improve the understanding and the acceptance of the project by the communities

Today the plant treats more than 70 % of the total wastewater treated in Jordan. The plant produces reusable treated wastewater for agriculture usage which represents approximately 10 % of the water consumption in Jordan, freeing up fresh water. Through hydro energy and biogas production, the wastewater treatment plant has an energy potential recovery of 80 % of its needs.

### RESULTS ACHIEVED/FIGURES

This dialogue approach allowed the project to have access to international financing mechanisms for the plant extension phase.

The participation of international donors together with the innovative financing and the plant's energy recovery features, contribute to make the treatment cost per cubic meter the lowest in Jordan.

It enabled the integration of the project within its territory, guaranteeing the acceptance by local communities and the sustainability of the plant.

### DEPLOYMENT PROSPECTS

One of the key factors for the As Samra project has been the implementation of a wide stakeholders dialogue, following the 12 principles of the WGI.

This is a great illustration of how proper governance can participate to the success of projects that impact territories and a wide range of stakeholders.



© Suez

## Reducing your water and insurance bills



Company name	AXA
Location	France
Keywords	Data, smart meter, water leakage, insurance
Company contact	esther.delbourg@axa.com

### GENERAL BACKGROUND

Leaking faucets represent an annual average of 35,000L while leaking toilet flush amount to a close 100,000L in France. Overall, water leakages impose surprisingly high hidden costs for consumers and is an issue of high concern for water utilities managers and insurers. While connected water meters provide a powerful tool to inform and alert households on irregular water consumption levels, the question of whether their water efficiency potential is truly maximized remains to be solved.

### SOLUTIONS IMPLEMENTED

To that end, Axa has partnered with a French utility company to understand if household equipped with connected water meters have indeed achieved lower frequency of water claims. The insurance group is also investigating how good practices and behaviors could be rewarded through lower premiums or additional water services to reduce water waste and water bills.

### RESULTS ACHIEVED/FIGURES

Axa's partnership entails intensive data crunching and analysis from the Digital Innovation Lab by crossing claims data with water consumption from connected meters. The aim is to determine whether there is a correlation between owning a water meter, achieving lower water consumption rates thus translating into lower amounts of insurance claims.

The features of the study are the following :

- Coverage of 1.5 million households equipped with connected water meters including 200,000 households with a water leakage alert service
- Digital transfer of water consumption four times a day
- Households can stream their water use online and small leaks can be detected after a period of five days to confirm irregular consumption (large leaks directly identified by households)
- A total of 8,000 households are alerted every month

### DEPLOYMENT PROSPECTS

By equipping customers with relevant data and easy instructions on how to mitigate leaks, this partnership can help build stronger relationships with their clients and also reduce costs for individuals and the communities in which they reside. This combination of skills is aimed at unveiling the hidden opportunities beyond the hidden costs of water leakages.

# INSURANCE

## Introduction of environmental risk insurance providing coverage against negative impacts on systems and the quality of treated water



Company name	MARSH
Location	France
Keywords	Environmental risk
Company contact	Christoph.Mocklinghoff@Marsh.com

### GENERAL BACKGROUND

The wastewater treatment operations of local authorities require sewage collection systems to be monitored. The introduction of pollutants in these systems, whether accidental or willful, can cause significant harm, especially if the pollutants are not subject to a monitoring programme.

Marsh, a risk management advisor and insurance broker, has developed with an insurance partner a customized range of coverage. The coverage insures local authorities against the financial consequences of the contamination of wastewater collection systems.

Regulatory analyses upstream of a public water treatment plant customarily help to ensure the compatibility of treatment technology with the quality of incoming water. In the event that the system is contaminated, exceptional pollutants such as dioxins may not be identified by the monitoring network in place. As a result, the pollution can first infiltrate the systems and the plant and then be partially discharged with the treated water and sludge destined for reuse, only being detected at a later stage

### SOLUTIONS IMPLEMENTED

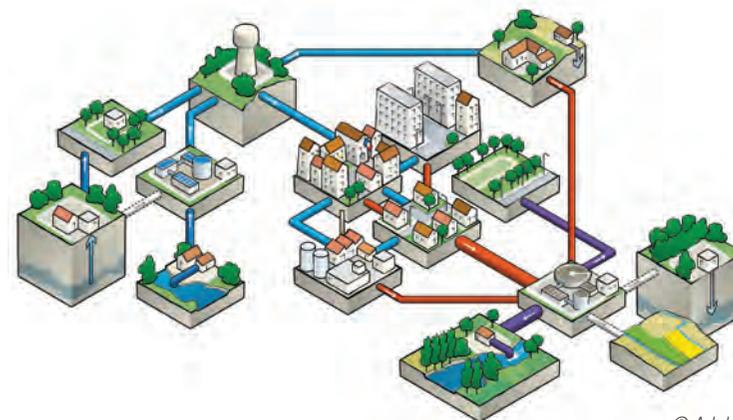
The insurance product is based on a risk analysis carried out across all industrial plants located upstream of collection systems. In this way it is also possible to identify pollutants not intended for discharge but which might be present as a result of an accident. The local authority can thus supplement its risk management with additional insurance coverage. The coverage includes decontamination of systems, the plant and sludge. It also provides protection from liability claims for potential damage caused to water and biodiversity.

### RESULTS ACHIEVED/FIGURES

The prevention system adapted for a broader risk approach ensures better quality treated waste and reusable sludge. The coverage against hazards allows the initial costs related to the system's study and improvement to be reliably factored into the budget for optimum transparency.

### DEPLOYMENT PROSPECTS

This system primarily applies to local authorities responsible for managing massive amounts of wastewater. It can also be adapted for smaller communities.



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# IRRIGATION

## Spatial optimisation of irrigation withdrawals to reduce their impact on the environment



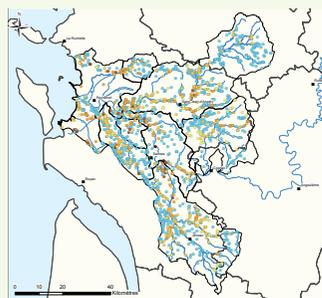
Company name	AGROSOLUTIONS (INVIVO)
Location	Saintonge, (Departments 16, 17, 79), France
Keywords	Irrigation, impact, environment, agriculture.
Company contact	Scharriere@agrosolutions.com www.agrosolutions.com

### GENERAL BACKGROUND

Agrosolutions has assisted the Organisme Unique de Gestion Collective (OUGC) of Saintonge in drawing up an irrigation withdrawals distribution plan for its region. An assessment of this plan's impact on the environment in the short, medium and long term has also been carried out.

Water withdrawals put a lot of pressure on the OUGC region, especially in summer when there are recurrent droughts and the pressure of agricultural withdrawals has to be reduced, while simultaneously doing everything possible to protect the business of local farmers and ranchers.

### General overview of study area



### SOLUTIONS IMPLEMENTED

OUGC Saintonge was created to centralise the irrigation demands of the operators of several watersheds in Saintonge and, because of the volumes involved, is required to conduct an impact study. In this study, OUGC presents its annual distribution plan, how it has evolved and an assessment of related impacts.

To address the issue of reducing the impacts of irrigation-related withdrawals against a background of rising tensions and climate change, Agrosolutions has proposed a two-step approach:

- Assess the environment's vulnerability to withdrawals,
  - intrinsic (or 'primary') sensitivity of the environment to withdrawals,
  - so-called 'secondary' sensitivity associated with sensitive sites such as wetlands or areas of recurring drought,
  - withdrawal pressures for irrigation and all other uses (drinking water, industry, etc.).

The intersection of all these parameters already contains a great deal of information on how to construct a distribution plan and identify the areas to be avoided.

- Prioritize withdrawal points to spatially optimise pumping: to review the inventory of so-called 'secondary' areas and cross-reference them with agricultural withdrawal points according to their historical maximum consumption.

The result of this exercise is a classification of withdrawal points according to their potential impact on sensitive environments.

### RESULTS ACHIEVED/FIGURES

Applying the proposed method has helped to create a hierarchy of withdrawal points and to identify those that should be the first to reduce their withdrawals in order to lessen their impact on water resources. As a result, the most sensitive areas (wetlands, recurring low flows, etc.) are better protected in the middle- and long-term.

### DEPLOYMENT PROSPECTS

As well as meeting the regulatory requirements of the impact study, OUGC aims to capitalise on the results of the study to improve its annual distribution plans, both temporally and spatially.

Accordingly, it also wishes to take into account the actual recharge of the environment from year to year (climatic variations) and better distribute withdrawals based on the situation on the ground and the actual availability of water, which will vary increasingly as a result of climate change.

By adjusting spatially and temporally and improving crop selection (strains consuming less water, different choice of species, etc.), it will be possible to ensure that agricultural production in this region remains sustainable and environmentally-friendly.

## Give Data Back : news tools to prevent water leakages in your home



Company name	AXA
Location	Worldwide
Keywords	Insurance, Prevention
Company contact	esther.delbourg@axa.com

### GENERAL BACKGROUND

Water leakages are responsible for wasting around 20 % of annual household water consumption. Ensuring 107 million customers in over 64 countries, Axa disposes of a large volume of data on water claims and their location which proves an invaluable source of information.

By making this information accessible to its customers through the website [www.givedataback.axa](http://www.givedataback.axa), the group is committed to not only reducing water waste but also helping its customers reduce their exposure by strengthening their ability to prevent them.

### SOLUTIONS IMPLEMENTED

Data collection and analysis are key to enable insurers to prevent risks and protect their consumers. In particular, the Axa group believes that the data it collects will remain an imperfect resource if it does not fully benefit its customers, shareholders and civil society. Axa opted for transparency by publicizing the analysis and consolidation of its claims and policy data for six European countries (Germany, Belgium, Spain, France, Italy and Switzerland) to enable users, both customers and non-customers, to better protect their homes by better understanding and preventing water damage.

The website, available in six languages (English, German, Spanish, French, Italian and Dutch), includes :

- An interactive map on which users can enter an address to locate their home.
- Data relating to the risks of water damage and theft displayed according to the "zone" (most granular level) corresponding to the geographical location entered by the user.
- A section containing practical information and expert advice from the Axa network and users to reduce the exposure of users to risks. These contents can be sorted by criterion as for example by type of housing and the users have the possibility to share directly on the site their experience and tips to reduce the risks.
- Social sharing capabilities are also available.

### RESULTS ACHIEVED/FIGURES

The quantitative data currently displayed on the website are only Axa policy and claims data for household risks. This covers water damage for private individuals with data from 2014 to 2016.



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## Implementation of an accurate follow-up in cement plant



Company name	CIMENTS CALCIA - HEIDELBERGCEMENT
Location	France
Keywords	Industry
Company contact	hjanot@ciments-calcia.fr

### GENERAL BACKGROUND

Ciments Calcia is a leading cement producer in France, with 10 plants, and has implemented for some decades the principles of industrial ecology. It was the first cement manufacturer in France to implement a quality (ISO 9001) and environment (ISO 14001) management system. The company has thus played a role of pioneer in setting the guidelines of sustainable development on the construction materials market and has been working on environmental-friendly building solutions.

The very high-temperature and continuous fire cement manufacturing process requires water cooling systems with closed-loop circulation.

### SOLUTIONS IMPLEMENTED

As large quantities of water are needed, it is essential to have a quantitative and qualitative management of this resource. Water used in the cooling equipment process is entirely recovered and recycled into the circuit. To minimize losses and thus the volume of additional water needed, a monitoring system tracks the volume of water in the circuits, and analyzes its quality. A continuous supervision covers the whole loop to warn of any dysfunction. In the cement plants, water ponds are in place to collect, particularly rainwater, to be used as make-up water.

### RESULTS ACHIEVED/FIGURES

The sustainable management of natural resources is the major stake in our industry; as limestone (the main material used for the production of cement) is totally integrated into our management system.

In France, in our industry, water cooling within a closed circuit system has been efficient for quite a number of years. The main focus is now on supervision and preventive maintenance of the system. Thanks to this closed loop, external make-up water is greatly limited to around 0,3 m<sup>3</sup> per ton of cement.

### DEPLOYMENT PROSPECTS

The standardized follow-up allows also to compare the differences in systems, and to propose upgrades, as due and expected in a continuous improvement strategy.



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## Water Management Priorisation



Company name	SANOFI
Location	Worldwide
Keywords	Management, scarcity, preservation
Company contact	jean-christophe.bligny@sanofi.com

### GENERAL BACKGROUND

As a worldwide responsible company, Sanofi is committed to manage water as a sustainable local resource. In addition to requesting all facilities to have a site's water management plan, Sanofi worked out its appropriate approach to identify facilities with potential specific concerns for water scarcity.

### SOLUTIONS IMPLEMENTED

Assessing which of our facilities could be concerned by water scarcity has been a stepwise approach, with fine-tuning methodology.

Our first approach identified facilities potentially concerned either by absolute or by relative water scarcity according to different published references (GRI/Aqueduc, Water Stress Index...). As a great number of our facilities could be concerned, we decided to fine-tune this desk-top approach.

Hence we also considered factories producing major or "life-saving" products, which helps us reducing the list by half.

Then, together with concerned facilities, we analyzed their real situation for water and business continuity concerns regarding water availability, in order to list "high priority" and "watch list" facilities.

### RESULTS ACHIEVED/FIGURES

GRI : 63 facilities for 60 % of group's water usage.

WSI : 54 facilities for 49 % of group's water usage.

In common were 39 facilities, but 22 facilities were considered for specific water risk in relation to business continuity concern (around 30 % of group's water usage).

Further, dedicated studies at each facility level help consider the relationship to local water conditions ; thus we kept 4 facilities as "Priority" and 13 as "Watch list".

### DEPLOYMENT PROSPECTS

There are several Water risk management methodologies. Thus the conducted exercise brought a true understanding and ownership at company level.



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## Micropollutant scientific program



Company name	SANOFI
Location	Worldwide
Keywords	Technology, treatment, ecological impact
Company contact	romain.journal@sanofi.com

### GENERAL BACKGROUND

Micropollutant impact assessment and treatment of effluents is an emerging concern and, thus, scientific research is strongly developing in these fields and numerous technological developments are on-going, covering wide ranges of approaches (effect-based tools, advanced wastewater treatment technologies...).

Since 2010, Sanofi has been following these domains and is supporting different approaches, both externally and internally, to get a better understanding of the issues and concrete applicable possibilities.

### SOLUTIONS IMPLEMENTED

The strategy of the group relies on complementary approaches :

- Supporting research and testing new approaches for biological impact assessment of micropollutants and effluents, with universities and start-up companies, and through leading a network of several companies.
- Supporting dedicated external scientific research projects, both in France, with university teams in Poitiers, and abroad (Israel & Palestine) together with the Peres Center for Peace. Those programs deal with various micropollutant treatment opportunities, assessing implementation, efficiency...
- Conducting pilot tests with different technologies for effluent treatment & biomonitoring and for river biomonitoring, in relation to real on-site cases.

### RESULTS ACHIEVED/FIGURES

Concerning biological impact assessment evaluation, our conclusions are that a holistic approach should be implemented without relying on single tests, and take into account effluent water matrix.

The main lessons about technological approaches for micropollutants treatment are that there is not a unique technology for micropollutant treatment in effluents, and that solutions should be tailored for each specific effluent case : types and combination of substances to be treated and their physico-chemical properties, interactions with other constituents in the effluent (water matrix), removal efficiency level. Our requirement is to conduct pilot tests for each case one key aspect is to be sure not to generate toxic degradation products mixes.

Other potential environmental impacts are also considered (e.g. energy consumption, waste generation...) when selecting treatment technologies for implementation.

### DEPLOYMENT PROSPECTS

This holistic program feeds the strategy of Sanofi for specific micropollutant effluent treatment solutions and impact assessment when necessary.



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## Modelling pesticide transfer in a catchment area



Company name	AGROSOLUTIONS (INVIVO)
Location	Etaples (62), France
Keywords	Pesticides, transfers, modelling, agriculture
Company contact	miaquinta@agrosolutions.com www.agrosolutions.com

### GENERAL BACKGROUND

Agrosolutions and Veolia EAU have teamed up to address quality issues in the Rombly catchment area located in the commune of Etaples, which supplies the city of Le Touquet-Paris-Plage.

This site is dealing with desethylatrazine contamination on a regular basis, which raises several questions:

- Where does the desethylatrazine pollution in the catchment come from?
- How long will it take to eliminate this molecule from the boreholes?
- Is there a risk of pollution from other molecules?

### SOLUTIONS IMPLEMENTED

Desethylatrazine is a by-product of atrazine, an herbicide that was widely used (especially for corn) before being banned in France in 2003. Nevertheless, its continued presence in the environment is an established fact, as too is the presence of its daughter molecules. That is why today we still find residue in drinking water catchments, including Rombly's.

Using MACRO 5.2<sup>[9]</sup> software, Agrosolutions modelled transfers of the molecule into the catchment's intake. Agricultural land use (little changed since 2003) and a history of application practices involving atrazine at those sites were used to populate the model. Once the modelling results were obtained, they were injected into a conservative hydrodynamic model (Watermodel), pre-calibrated to make it possible to deduce the arrival time at the drinking water catchment and the quantities expected.

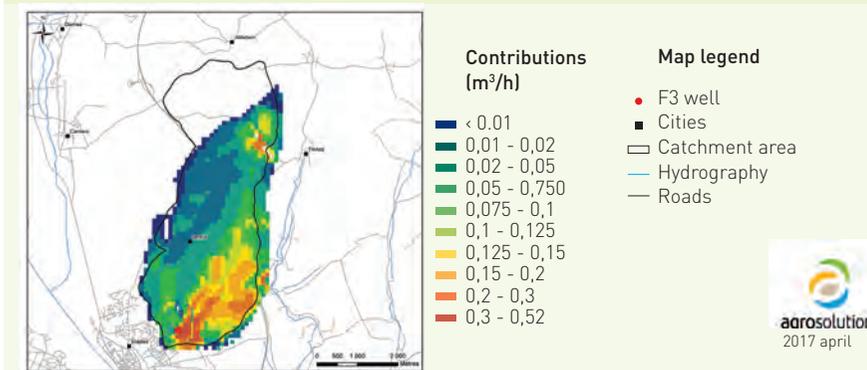
[9] M. Larsbo, "MACRO (v5.2): Model Use, Calibration, and Validation", Transactions of the ASABE 55, no 4 (2012): 1413-23, <https://doi.org/10.13031/2013.42251>.

## RESULTS ACHIEVED/FIGURES

After interpreting the results from the coupled models, several points can be put forward:

- Agricultural practices alone do not explain the excess of desethylatrazine in the boreholes. Agricultural use of atrazine cannot by itself account for the contamination observed in the catchments, given the doses employed and the usage of the land.
- The presence of atrazine and its derivatives can be estimated at approximately 30 years, with a risk of exceeding the limits over the next 4 to 13 years.
- The risk of pollution from other agrochemical molecules - such as isoproturon, chlortoluron, metazachlor and metamitron, which were also modelled - is low, except in the case of a major accident.
- Current contamination comes primarily from an area where the unsaturated zone is thick and from which the stock of atrazine and its derivatives continues to flow towards the aquifer.
- The recharge areas of each catchment show the places where catchment intakes are most vulnerable to pollution.

### Water intake areas for one of the boreholes in the Rombly catchment. The areas that contribute the most (by volume) are in red.



### DEPLOYMENT PROSPECTS

The results of the study conducted by Agrosolutions and Veolia Water have led to a better understanding of the sources of, and activities leading to, the pollution observed in the catchment. Tighter control could be exercised over an area smaller than that of the entire catchment, delivering savings as well as improvements in catchment water quality.

Among possible agricultural practices such as the use of organic methods or increased mechanical weeding, mention should also be made of rotation diversification to reduce the use of the same molecule in the intake area. Indeed, the more diverse the crops, the less the same molecule will be used in a concentrated manner in the catchment intake areas.

## Stewardship plans for crop protection products to protect water resources



Company name	BASF FRANCE DIVISION AGRO
Location	France
Keywords	Product stewardship, water protection, expertise, trainings
Company Contact	isabelle.de-paepe@basf.com

### GENERAL BACKGROUND

Public expectations on water resources are getting higher, meaning that the economic activities have to reduce, as low as possible, their impact on the environment. For crop protection products, the challenge is to avoid any residues to reach water resources after products application on crops.

### SOLUTIONS IMPLEMENTED

As part of the global Basf the Responsible Care policy, Basf France Division Agro has regularly developed an environmental expertise and several Best Management Practices tools for farmers and agricultural advisors.

In river basin areas, in order to finely adjust the crop protection recommendations to local specific territorial features, such as soil properties or hydrogeological characteristics, Basf has developed since 2010 a network of four environmental regional experts. Their mission is to investigate the agro environmental conditions of crop protection products use at local level in order to be able to provide adapted recommendations to farmers and key local agricultural stakeholders.

The audit and agricultural recommendations are carried in close relation with water stakeholders, drinking water producers, water agencies and health authorities.

### RESULTS ACHIEVED/FIGURES

Actions have been succeeded in securing the use of herbicides products containing bentazone or metazachlor actives substances.

Number of brochures / documents: 5 000 leaflets for bentazone, 6 000 facts sheets for metazachlor and one video.

Number of drinking water wells audits : 120.

Number of action plans with local stakeholders : 12.

### DEPLOYMENT PROSPECTS

Cover all products of the Basf portfolio.



## Protect water quality during the treatment of phytosanitary effluents



Company name	BAYER SAS
Location	Farm
Keywords	Quality
Company contact	celine.ballesteros@bayer.com

### GENERAL BACKGROUND

With a view to preserving the ecological and chemical quality of water, farmers are legally required to treat phytosanitary effluents in the field, in the farm or through a licensed professional.

### SOLUTIONS IMPLEMENTED

Phytobac®, developed by Bayer, recreates closed-loop soil conditions to accelerate the degradation of effluents thanks to micro-organisms. The process is based on a natural principle, the purifying power of micro-organisms that are naturally present in the soil, and two physicochemical phenomena: degradation and evaporation.

The 650 or so Phytobac® experts trained by Bayer assist farmers at every step to ensure the effectiveness of the device:

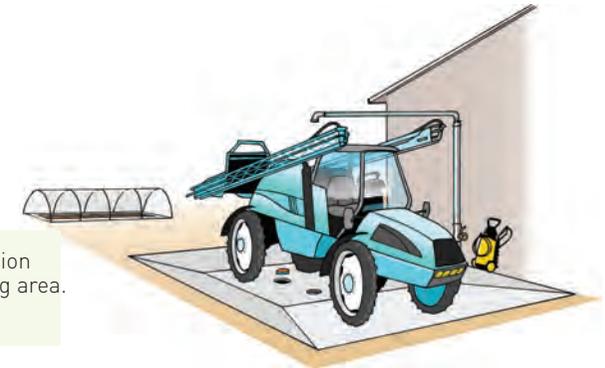
- preliminary diagnosis (operational constraints, annual volume of effluents to be purified, site configuration);
- sizing and support for the installation of Phytobac®, which the farmer purchases from partners duly accredited by Bayer or realizes himself;
- advice on administrative procedures and project implementation;
- device certification;
- monitoring to optimize its operation.

### RESULTS ACHIEVED/FIGURES

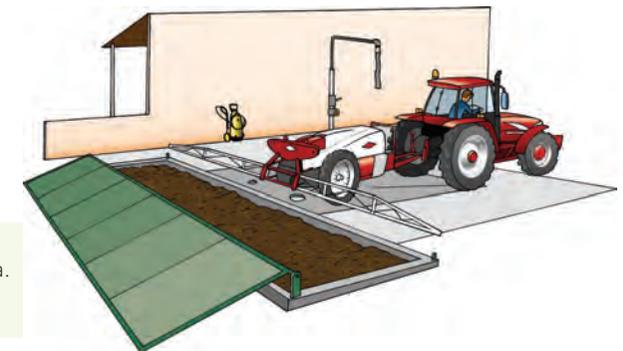
Phytobac® helps preserve natural resources as well as the quality of the water. The device is also energy efficient and does not produce Special Industrial Waste (SIW). To date the 4,500 Phytobac® installed in France have already proven their effectiveness.

### DEPLOYMENT PROSPECTS

Several approaches are being considered to further develop Phytobac®: worldwide deployment, collective and territorial approaches, update of experts and industrial approach.



Phytobac® configuration away from the washing area. Field crop.



Phytobac® configuration close to the washing area. Field crop.

## Water issues in plastic recycling



Company name	PAPREC
Location	Two sites
Keywords	Recycling, industry
Company contact	Sebastien.RICARD@paprec.com

### GENERAL BACKGROUND

The recycling of plastics raises important economic and environmental issues. Proof of this can be found in the French government's goal of "100% of plastics recycled" which, though economically unrealistic, is at least ambitious and sends a positive message to industry.

Water is essential in plastic recycling, especially when it comes to regeneration, since it is used in the bottle washing process. Bottle washing produces pollutants including detergents, additives and lye, as well as residue from the bottoms of bottles, be it organic or chemical (4 % of incoming material at Paprec plants). These pollutants may not be released into the natural environment without being processed.

### SOLUTIONS IMPLEMENTED

The Paprec group, as a leader of the French recycling industry (notably as the biggest recycler of plastics, treating 350,000 tonnes per year), has decided to build water treatment stations at some of its plants including the Paprec Plastiques 71 HDPE recycling plant and the FPR food grade PET recycling plant. These internal treatment plants are of strategic value in the treatment of waste water discharged by the industrial processes of plastics recycling.

Water leaving the plant is reused in a closed circuit. A portion of it is discharged into the external environment. Daily checks are therefore carried out by the plant's operators and the in-house laboratory; these are supplemented by quarterly regulatory checks conducted by a certified external laboratory. To ensure that water quality meets discharge standards, it is essential to improve responsiveness and adaptability when faced with a variable incoming flow.

### RESULTS ACHIEVED/FIGURES

Closed circuit reuse of water in the industrial process after the water has passed through the purification plant makes it possible to control production quality and water consumption, while integrating recycling into the loop of the circular economy.

### DEPLOYMENT PROSPECTS

This solution will be adopted in future plastic recycling plants.



© Paprec

## Rainwater harvesting for water reduction in energy production



Company name	ÉLECTRICITÉ DE FRANCE (EDF)
Location	Brasil
Keywords	Water-Energy nexus, Combined Cycle Gas Turbine Power Plant, Rainwater harvesting
Company contact	laurent.bellet@edf.fr

### GENERAL BACKGROUND

EDF Norte Fluminense – 826 MW Combined Cycle Gas Turbine Power Plant commissioned in 2004 - is responsible for about 22 % of the electric energy consumed in the Rio metropolitan area. The power plant withdraws water from the Macaé river which is used for multiple purposes.

The increasing pressure on the water resources due to global change including climate change, led EDF to develop an innovative solution to reduce its water consumption and withdrawal from the river.

### SOLUTIONS IMPLEMENTED

The purpose of the project was to collect and recover rainwater for use in the cooling tower. Installing a rainwater filtration system next to the basin of clarified water used for the cooling tower would allow the power plant to use the same system to recirculate and filter this water when it is not raining - improving its quality and reducing the purges. Savings in chemical products (around USD 15-20K) and energy savings are also two other benefits from this innovation.

The new system was commissioned in March 2012 and estimated investment in the project was 2.5 MBRL (the equivalent of around USD 1.47M). The aggregated O&M OPEX (maintenance for pumps, filters, etc. and human resources) is very low and easily absorbed by the established resources of the power plant organisation.

### RESULTS ACHIEVED/FIGURES

The results showed that an area of around 37,000m<sup>2</sup> can, on rainy days, recover up to 225m<sup>3</sup>/h of water, which represents 30 % of the company's process water needs. In addition, by using the rainwater filters to recirculate the cooling tower make-up water, this system allows an annual saving of around 2 % of the water taken from the Macaé River (around 100,000 to 130,000m<sup>3</sup>). The project received a "Mention of Honor" in the Awards "Prêmio TOP ENERGIA" held by Petrobras.

### DEPLOYMENT PROSPECTS

This experience can be easily replicated in any Combined Cycle Gas Turbine Power Plant, and not only new ones, where water scarcity is an increasing issue.



© EDF

## Rainwater recovery and treatment for industrial use

**GROUPE  
RENAULT**

Company name	GROUPE RENAULT
Location	Maubeuge, France
Keywords	Rainwater harvesting, treatment, reduction cost water consumption, industry
Company contact	violaine.poulain@renault.com

### GENERAL BACKGROUND

Preserving water resources is an ongoing concern for Renault, both to ensure longterm supply and to reduce its impact on ecosystems.

For this reason, the group has set a goal of minimizing the impact of its activities on this precious resource through the implementation of the following five objectives :

- reduce water consumption at source as well as the quantities of wastewater through well-designed processes and optimized management ;
- reuse water where possible for the same use ;
- recycle water for other compatible uses, with or without additional treatment.
- minimize the impact of residual waste on the environment through efficient and strictly controlled treatment processes ;
- control the risk of accidental pollution of water resources by installing the means needed to confine water from accidental spillages and that used for fire fighting.

### SOLUTIONS IMPLEMENTED

On Maubeuge (Kangoo) assembly plant, the installation collects rainwater and treats it through a water production plant to use in process.

The annual capacity of the rainwater recovery and treatment facility is 150,000 m<sup>3</sup> (depending on rainfall), which covers more than 50 % of plant's needs.

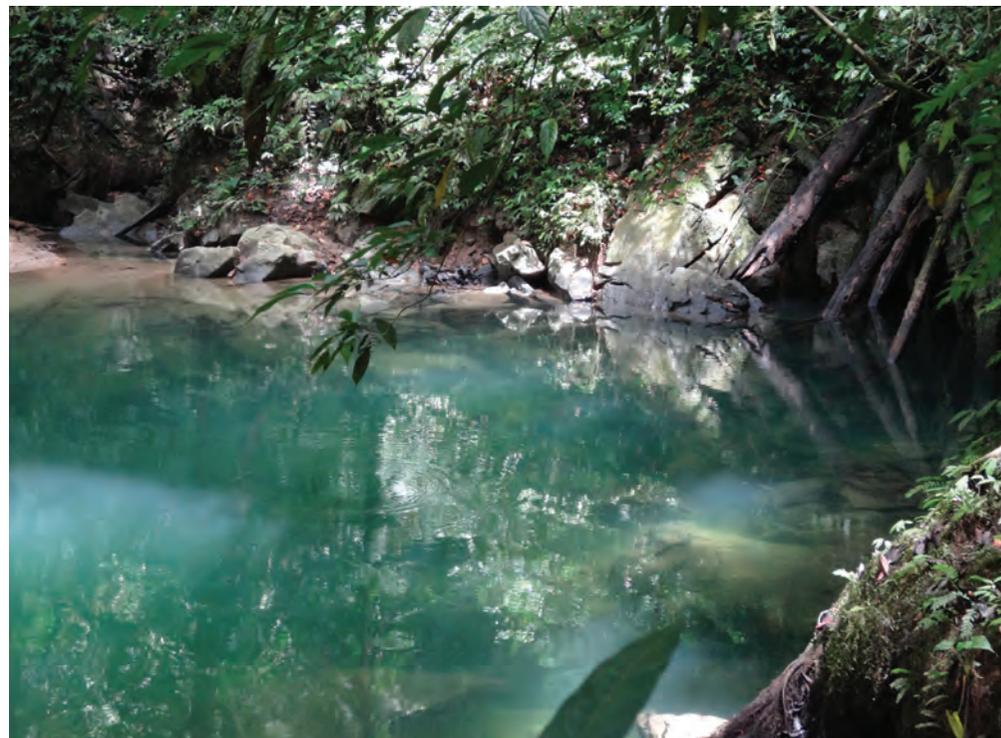
Rainwater coming from the waterproofed areas of the site (roofs, roads, etc.) is collected in the rainwater retention basin. After decantation, water passes through an installation composed of a physicochemical treatment, a sand filter, an activated carbon filter and a chlorinated disinfection. This treated water is then used in the process.

### RESULTS ACHIEVED/FIGURES

The installation of rainwater collection and treatment had a cost of 1 million € of investment. Its production capacity let the installation and operating costs to be amortized in 10 years.

### DEPLOYMENT PROSPECTS

On sites where the cost of water consumption is high.



© Christophe Simoes

## Establishment of a circuit for the collection and treatment of storm (monsoon) and rainwater (roofing) and reuse of wastewater

**GROUPE  
RENAULT**

Company name	RENAULT NISSAN ALLIANCE INDUSTRIAL PRIVATE LIMITED
Location	Chennai, India
Keywords	Rainwater harvesting, storm, treatment, wastewater reuse, cost reduction ; industry
Company contact	violaine.poulain@renault.com

### GENERAL BACKGROUND

The Chennai Nissan plant is collecting rainwater from the roof and monsoon waters and then processes them for use in its manufacturing process. The plant also re-uses its wastewater.

### SOLUTIONS IMPLEMENTED

The Chennai mechanical and assembly plant in India (Kwid, Duster ...) recovers in two basins its rainwater from the roof and storm waters during the monsoon. The water recovered in the storm basin is treated before its transfer to the storm water basin. The water from the storm water pond after a second treatment is used to supply water for the entire plant (manufacturing processes). This water recovery, equivalent to 400,000 m<sup>3</sup> (annual) covers more than 70 % of the needs of the plant.

In addition, a treatment facility (filtration) allows reuse of raw water from the site for domestic use (flushing, green spaces). The reuse of these raw water saves 46,000 m<sup>3</sup> (flushing) annually.

### RESULTS ACHIEVED/FIGURES

The use of rainwater in the manufacturing process saves 180k€ annually. The reuse of raw process water saves 21k€ annually. The monsoon water filtration installation required an investment of 34k€.

### DEPLOYMENT PROSPECTS

Plants where the cost of water consumption is high.



© Groupe Renault

## Reuse of industrial waste water to preserve fresh water resources



Company name	ENGIE KWINANA COGENERATION PLANT
Location	Australia
Keywords	Water reuse, valuation, benefits
Company contact	ken.ferguson@au.ENGIE.com

### GENERAL BACKGROUND

The Kwinana Cogeneration Plant (KCP) power plant is located 40 kilometers south of Perth, Western Australia.

This area is subject to a dry climate and water resources have dwindled over the past years. With a view to reduce impact on water reserves and secure supplies for industrial expansion in the area, the local water supply authority, Water Corporation, installed the Kwinana Water Recycling Plant.

### SOLUTIONS IMPLEMENTED

Accordingly to the situation, Kwinana cogeneration has modified its process so that it can substitute 80 % of its fresh water with recycled industrial process water.

We took the opportunity to assess the benefits of this initiative with a wider selection of stakeholders, and identified the potential value that this analysis could bring to future project identification and planning.

This work was done with the consultant Valuing Nature.

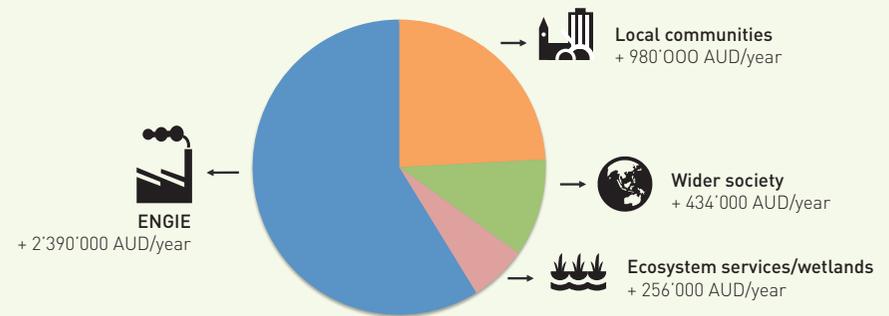


© ENGIE

### RESULTS ACHIEVED/FIGURES

The overall water saving from this water recycling project reaches nearly 4,000 m<sup>3</sup>/day just for ENGIE. Four main benefits were identified for the group and for associated stakeholders, which are: - private sector, - local communities, - wider society, - ecosystem (wetlands).

When summing up the benefits experienced by the various identified stakeholders, we get an overall benefit of 3.27 AUD/m<sup>3</sup>. More than half of the total benefit is captured by ENGIE, as illustrated within the figure behind.



### DEPLOYMENT PROSPECTS

The benefit assessment demonstrates that one driver for similar future projects might be the cost reduction for the private sector, in addition to resilient water supply sources and more general reputation benefits.

Those results show that it is possible to estimate the impact of a water management project on a wider range of stakeholders, in monetary units. The benefits are mostly experienced through reduced costs for all stakeholders groups.

This information could influence the way such projects are identified, planned, negotiated and financed in the future.

## Increase of water reuse rate at Saint-Gobain PAM plant



Company name	SAINT-GOBAIN
Location	Pont-à-Mousson, Meurthe-et-Moselle, France
Keywords	Water reuse, closed loop, water footprint
Company contact	nicolas.baglin@saint-gobain.com,

### GENERAL BACKGROUND

The Saint-Gobain PAM site withdraws mainly surface water for cooling blast furnaces and spinning machines used for producing iron pipes.

Before 2016, water reuse rate was not optimized, whereas the plant is a major contributor of the water footprint of the Saint-Gobain group, representing 18 % of the water withdrawals and 30 % of the water discharges.

### SOLUTIONS IMPLEMENTED

Due to the great complexity of the existing water network (rain water and industrial water) and to very little available space in the plant, it was not possible to implement a conventional solution on each process. A global solution of treatment and recycling was therefore implemented, also enabling to build equipment without stopping or slowing down the plant production.

The solution consisted in building appropriate mud decantation & water treatment reservoirs including water cooling towers, creating the conditions for reusing water from decantation.

### RESULTS ACHIEVED/FIGURES

Water reuse rate has strongly increased jumping from 25 to 75 % after the project implementation. This represents the annual saving of some 8 million of m<sup>3</sup> withdrawal, equivalent to the annual consumption of a 150,000 inhabitants city.

The project enables the whole Saint-Gobain group to reduce their water withdrawal by 12 % and their discharge by 20 % reduction of discharged water. In addition, the water treatment divides the pollutant flow by 3 ; rain water is now recycled and muds are dryer and suitable for further use than storage in landfills.

### DEPLOYMENT PROSPECTS

This global solution of water treatment at plant level is achievable in many historical and landlocked plants with a complex water network. It is considered as a show case for water reuse within Saint-Gobain.



© Saint-Gobain

## In Durban, a water stressed area, industries run on recycled water



Company name	VEOLIA
Location	Durban, South Africa
Keywords	Water reuse, wastewater, water stress, circular economy
Company contact	amelie.rouvin@veolia.com

### GENERAL BACKGROUND

Durban (3.6 million inhabitants) is growing fast. It is now the second most populated urban area in the country and the second industrial center. The city is facing a tremendous pressure on resources: water stress, growing demand from farmers, industries and a growing population.

Moreover, Durban houses the second largest township in South Africa where access to water and sanitation for all is not yet a reality.

### SOLUTIONS IMPLEMENTED

Within the frame of a public-private partnership signed in South Africa, Veolia ensures not only the wastewater treatment plant operation but also the sale to local industries of the treated wastewater for their processes. The Durban Water Recycling plant has been in operation since 2011 and recovers around 98 % of the Durban's industrial and municipal wastewater.

Every day, some 47.5 thousands m<sup>3</sup> of effluents get into the plant and are treated to be reused. The plant can supply several industries in the city with recycled water 60 % less expensive than the water from traditional supply; its quality is good enough to ensure the running of manufacturing processes.

Wastewater offers an alternative for industries and contributes to limiting usage conflicts between various actors, especially in water stressed areas, and to improving access to drinking water for Durban inhabitants. A strong social aspect is therefore attached.

### RESULTS ACHIEVED/FIGURES

Veolia recycles 98 % of Durban's wastewater for local industrial purposes. Such lessening of water withdrawal from the environment allows dedicating 40,000m<sup>3</sup> additional drinking water to city dwellers, representing 13 olympic swimming pools. When using recycled water, industries reduce costs by €5 million a year.

### DEPLOYMENT PROSPECTS

Such a solution is contributing to the mitigation to climate change in water stressed areas, where the water demands many actors may lead to potential conflict over the use of the resource.



© Veolia

## Reuse of industrial water from a power plant to a mine



Company name	ENGIE CHILE
Location	Mejillones, Chile
Keywords	Valuation, benefits
Company contacts	Elio.Cuneo@cl.ENGIE.com Jimmy.Aranibar@ENGIE.com

### GENERAL BACKGROUND

The Antofagasta area is an arid and low water availability area in the Atacama Desert, with intensive use of water by mining activities. In this area, Chile major mining companies are continually increasing their activities, raising the use of water for their processes. Sierra Gorda mining company is located in this area and produces copper, molybdenum and gold ore by open pit methods. Downstream processing includes crushing, grinding, flotation and drying to obtain copper and molybdenum concentrates. The mine priority is to secure water supply and to eliminate the risk of depletion of this resource in the region. An important design innovation was made to incorporate the re-use of sea-water used in the cooling system of ENGIE's power plant located in Mejillones and to transport the water to the mine site through a pipeline.



### SOLUTIONS IMPLEMENTED

In ENGIE, a customer's need was identified beyond usual services offered, recognizing that ENGIE has important advantages for the provision of seawater to other users. The main advantage for Central Térmica Mejillones (CTM) is the right to use seawater for the cooling system of the power plant process and to provide this resource to the mine from the power plant cooling water outlet. Both are environmentally approved and fully operational, instead of discharging the water to the sea.

To organize the water reuse process, Sierra Gorda had to build a water pipeline (length of 142.57 km) which transports water from the power plant to the mining field. Another key infrastructure includes the coastal station and two inland pump stations. Additionally, port facilities and a fiber optic cable all along the pipeline were provided. Seawater pumping to a basin of 750,000 cubic meters capacity started in March 2014

ENGIE secured an environmental permit in October 2012, obtaining the authorisation to reduce the discharge of water to the ocean by up to 47 %, reduction equivalent to 15,120 m<sup>3</sup>/h (4.2 m<sup>3</sup>/s), which comfortably covers the needs of Minera Sierra Gorda (1.5 m<sup>3</sup>/s or 1,500 l/s).

Sierra Gorda mine system had been designed not to discharge effluents into the environment, ensuring that the quality of groundwater is not affected. Wells have been installed to monitor the levels and quality of the underground water and allow any seepage to be immediately detected and collected.



© ENGIE

### RESULTS ACHIEVED/FIGURES

Operations of the Sierra Gorda mine require permanent access to large quantities of water :

- 99.98% of the water used by the mine is coming from the Mejillones power plant ;
- Important time and investment optimisation were reached according to water infrastructure and legal requirements ;
- Design is made so that no effluents is discharged locally, ensuring that the quality of groundwater is not affected ; the water used by the mine is sent back to the sea.
- Good agreement to optimize start-stop of pumps, taking into account the spot price difference for taking electricity from the grid.

### DEPLOYMENT PROSPECTS

Meetings are held with local authorities to promote the use of seawater by the cooling system of other plants. More clients can benefit from this experience and in addition ENGIE is optimizing its production capacity by installing renewable and different environmental solutions to provide energy and services to clients. Power Demand-Side Management allows to share the benefits of taking electricity from the grid in valley hours (normally at low cost) instead of rush hours (normally at high costs).

## Reusing water, reducing water footprint



Company name	SUEZ
Location	Worldwide
Keywords	Water footprint, water scarcity, wastewater
Company contact	camille.richard@suez.com

### GENERAL BACKGROUND

By 2035, an estimated 40 % of the global population will live in hydric stressed areas. Several countries and urban areas such as Australia, Israel, Singapore, Jordan, have announced their ambitions to satisfy from 10 to 60 % of their water demand with treated wastewater reuse.

### SOLUTIONS IMPLEMENTED

Suez is proposing a water reuse offer to reduce cities and industries' water footprint while reducing costs. The objective is to protect the resource, by reducing underground water extraction and even replenishing groundwater tables with recycled water.

#### Securing drinking water through reuse in California

To overcome the water scarcity issue in the Los Angeles area, the West Basin Municipal Water District built 20 years ago the first water recycling facility of its kind in the country, operated by Suez. The plant produces 5 different qualities of waters, enabling over 300 customers, industrial and municipal, to meet environmental challenges and water needs.

#### Reduce water footprint of the Delta Electricity power plant in Australia

Delta Electricity's wastewater recycling plant produces fresh water to the Vales Point power station, enabling the site to save resources and improve its environmental impact. Suez upgraded the wastewater treatment process to achieve a level of purity that enabled more effective reuse in the demineralisation unit supplying the power plant. The optimisation work saved an additional 20 000 m<sup>3</sup>/year of water.

### RESULTS ACHIEVED/FIGURES

Water reuse allows to turn treated wastewater into a resource suitable for agricultural needs, groundwater recharge and industrial process.

### DEPLOYMENT PROSPECTS

Water reuse is no longer a choice, it is a must and will indeed remain one of the best answers to water scarcity issues, to add to or to replace the use of drinking water and natural resources in industries, cities and agriculture.



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## Environmental Assessment Program for Marketed Products



Company name	SANOFI
Location	Worldwide
Keywords	Pharmaceuticals, environmental risk assessment, patients
Company contact	romain.journal@sanofi.com

### GENERAL BACKGROUND

An environmental risk assessment (ERA) is required for the marketing authorisation of new medicines in Europe and several other countries. Beyond this regulatory requirement, Sanofi also investigates its older active pharmaceutical ingredients through a dedicated environmental assessment program.

### SOLUTIONS IMPLEMENTED

The group has implemented a voluntary program to improve its knowledge about the environmental fate and effects of its “legacy” compounds, and to assess the potential environmental risks related to the main source of pharmaceuticals in the environment: their use by patients. This program was initiated in 2005. It has evolved over the past years to cover more compounds and to take into account new ERA tools & practices. It is supported by a specific methodology derived from regulatory ERA guidance documents. A minimum amount of relevant and reliable environmental data is required.

Following a review of all available data, a product specific testing program is implemented when needed, to fill data gaps. This testing program may include standard environmental fate, acute and/or chronic aquatic ecotoxicity studies on various species. In addition, the data generated through this program are also used to define internal environmental target concentrations for managing potential emissions to the environment from manufacturing activities.

### RESULTS ACHIEVED/FIGURES

To date voluntary environmental assessments have been conducted for 49 marketed compounds at Sanofi. Additional environmental fate & effect studies were carried out on 14 compounds.

### DEPLOYMENT PROSPECTS

This program aims at assessing an increasing number of marketed products. Additional legacy compounds will be assessed every year through this program. The environmental assessments are periodically revised to take into account new relevant data.



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## Water risk assessment approach



Company name	TOTAL
Location	Worldwide
Keywords	Local Water Tool, assessment.
Company contact	steven.dickinson@total.com

### GENERAL BACKGROUND

Due to their nature, the activities of Total are likely to have impacts - and be dependent - on water resources, particularly when such operations are taking place in a water-sensitive environment.

### SOLUTIONS IMPLEMENTED

Total, in its water risk assessment approach as set out in the group's environmental charter, observes the following basic principles of action :

- Identification of high-priority sites in terms of water resource issues, especially sites with withdrawals above 500,000 m<sup>3</sup> a year ;
- Overall assessment of risks to, and impacts on, water resources and the host environment, using the specially developed Local Water Tool for Oil and Gas (from IPIECA and GEMI<sup>(10)</sup> The tool takes into account i) site and ii) local environment criteria, including regulatory context, industrial/farming use, socio-economic data, relations with local communities, the physio-ecological conditions of resources and the environment, and finally trends associated with climate change. This tool is also designed to guide risk reduction actions towards optimising water use at the assessed sites.
- Depending on the level of risk and impact, a mitigation action plan is drawn up, implemented, and monitored.

### RESULTS ACHIEVED/FIGURES

In late 2017, the level of water risk either had already been assessed or was being assessed at 18 different group sites or projects : 11 Refining & Chemicals sites, 5 Exploration & Production sites, and 2 Gas, Renewables & Power sites. Additional and more extensive studies can subsequently be associated with this approach for at-risk sites, including water reuse studies, based on tools developed by Total (Wat-R-Use tool).

### DEPLOYMENT PROSPECTS

This water risk assessment approach is gradually being extended to other priority sites. To date, seven such sites have been identified. Depending on the nature of the risks and their impacts, either a water usage optimisation plan or specific water-related actions will be put into place.



(10) <http://gemi.org/localwatertool/>

## "Good Water" program in the region surrounding Salto Santiago



Company name	ENGIE Brasil Energia
Location	State of Paraná, Brasil
Keywords	Water source preservation, water quality
Company contact	Jose.Magri@ENGIE.com

### GENERAL BACKGROUND

ENGIE Brasil Energia has been developing since 2010 the River Source Protection Program Located in the region of Salto Osorio and Salto Santiago Power Plants, in the State of Paraná : the project is based on a partnership between ENGIE Brasil Energia and various local stakeholders, such as Rotary Club, City Hall, Rural Family Schools , to engage local population and preserve the springs quality.

### SOLUTIONS IMPLEMENTED

The protection of river spring aims to contribute to the improvement of the quality of the water consumed by the community and, consequently, reduce the incidence of diseases caused on children and adolescents by pathogenic organisms.

Hence a concrete cap is built to protect each source, and the local population is trained to control the water quality and to implement actions upstream to prevent bacteriological contaminations from human activities.

### RESULTS ACHIEVED/FIGURES

These engagement efforts contribute to the sustainability of spring protection measures and have received international recognition : in 2012 the Award of Casa Brasil França (Maison France Brésil ; LIF – Portuguese acronym for Liberté, Egalité, Fraternité), the American Commerce Chamber of Brazil Award and the Expressão Ecologia Magazine Award in 2013.

Since the program was launched in 2010, approximately 1200 springs have been protected, benefitting 1500 families.

### DEPLOYMENT PROSPECTS

The success of the project encouraged ENGIE Brasil Energia to expand the program to 4 other cities in the region.

The experience can be replicated via a similar partnership model, based on private, governmental and non-governmental institutions, involving the community, especially its children and teenagers, having education as a pillar.



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## A global water stewardship strategy for local relevant actions



Company name	DELOITTE SUSTAINABILITY
Location	Worldwide
Keywords	Risks, impact, industry, governance, stakeholders
Company contact	Olivier Jan ojan@deloitte.fr

### GENERAL BACKGROUND

For companies using significant water resources in their operations, the licence to operate is increasingly linked to water availability and quality, not only for the company itself but also for other local users and communities. Designing a water stewardship strategy is a key opportunity for a company to look beyond its fence, and engage its supply chain partners, other local companies and external stakeholders. This is however a long-term journey, in a world where many businesses still underestimate the real value of water and the potential impact on business of water supply disruption.

### SOLUTIONS IMPLEMENTED

Good water stewardship does not only require reliable tools, strong commitment from the top management and dedicated resources. It takes roots, first and foremost, into a profound change in mind-set from ground operations to headquarters. Deloitte Sustainability has been working for several years with sector leaders from the food and the paper industries, to support them in their transition towards more sustainable water management, based on a better understanding of local risks, through five actions:

**Collect** objective facts through water risk assessments, to raise awareness on water risks and opportunities and to trigger meaningful actions

**Co-build** mitigation plans for industrial sites with representatives of corporate functions, local teams and experts in the field of water, through global and local workshops

**Transfer** knowledge and share best practices, through the connection of operational teams with experts in the field of water or stakeholders' consultation, with the objective to build a community of water ambassadors.

**Consult** external stakeholders, to better understand challenges and needs from local stakeholders (stakeholders' mapping, joint interviews), identify win-win strategies and make the most of available synergies.

**Adapt** governance, through targets, processes, clear roles and responsibilities, in order to respect water commitments, escalate local needs for expertise and/or financing, and ensure continuous improvement.

### RESULTS ACHIEVED/FIGURES

Amongst the first outcomes of this approach :

**Awareness raising** about water risks across functions and geographies : in a food company, risk assessment trainings will be provided to operational teams in more than 30 countries in 2018. In a paper company, several sites have already implemented actions to diversify their sources of water and reduce their discharge.

**Identification** of hotspots where local action needs to be supported by corporate teams (through resources, expertise, CAPEX). Sites which were most at risk from a food company benefited from the expertise of a full taskforce including hydrologists, to work on the contamination protection strategy of their main water source, to improve security of supply through alternative resources (well drilling, rainwater...), and to design an exhaustive external stakeholders engagement strategy (authorities, farmers), etc

**Development** of trustworthy relationships with external stakeholders : e.g. a corrugated cardboard facility was chosen by the regional water treatment authority to later host regular official visits. Both companies are now planning to seize new business opportunities around waste recycling through external partnerships.

### DEPLOYMENT PROSPECTS

These good practices will be progressively implemented in areas where it would matter most, with increasing collaboration with external stakeholders.



## Corporate Water Program



Company name	MICHELIN
Location	Clermont-Ferrand, Group
Keywords	Program, strategy
Company contact	Christophe.simoes@michelin.com

### GENERAL BACKGROUND

Since 2005, Michelin has been measuring, by a composite KPI (Michelin Environmental Footprint), the main impacts of its industrial activities based on water consumption volume vs production volume. In 2016, it introduced a program-based strategy, supported and monitored by the Executive Committee, to ensure and accelerate progress to 2020 and pave the way for post-2020 objectives.

### SOLUTIONS IMPLEMENTED

The program involves 25 different group departments and covers all geographical zones. As much stakeholder input as possible has been gathered through a series of interviews and workshops.

The resulting program is organised into three sections (organisation, awareness and concrete actions) and two dimensions (internal and external stakeholders).

The members of the program, backed by a 'Water Expert Team', ensure the implementation of 14 drivers:

- Knowledge of the latest technology and of competitors' initiatives
- New method of assessing water issues (today and tomorrow)
- Digital plant
- Quality and treatment
- Quality and regulations
- Business continuity and suppliers
- Value creation
- Life cycle analysis
- Awareness and significance of actions
- 2020 performance target
- Volume: process and utilities
- Water and industrial projects
- Practices and experience: internal and external
- Development of our 2030 and 2050 targets and indicators

A quarterly monitoring committee was set up to oversee progress made and to define the group's strategy.

### RESULTS ACHIEVED/FIGURES

This organisation made swift headway between 2015 and 2017, improving performance by some 19 % and cutting annual water consumption by approximately 5 million m<sup>3</sup>.

It was also decided that new impetus would be given to addressing future issues in a more comprehensive manner.

### DEPLOYMENT PROSPECTS

This program has been deployed across the group through the relevant teams and networks (Engineering, Production, Purchasing, Legal, R&D, Training, Communication, Public Affairs, Standards and Regulations, HSE, Maintenance & Fluids, Toxicologist and Ecotoxicologist, etc.).



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# TRUE COST OF WATER



## Evaluating the “True Cost of Water” by monetizing risks and opportunities



Company name	VEOLIA
Location	Worldwide
Keywords	Risks, evaluation, monetization, cost
Company contact	johann.clere@veolia.com

### GENERAL BACKGROUND

Over the coming decades, projected population and economic growth levels will, locally, push the stress on water resources to the limit. Freshwater availability could become the main growth limitation factor for cities and industries. The availability of drinking water could therefore become a major factor of limitation for cities and industrial players.

### SOLUTIONS IMPLEMENTED

Veolia developed the “True Cost of Water” which is an approach combining traditional investment and operational costs calculation with a risk analysis relying on a financial evaluation; The “True Cost of Water” takes into account: direct costs linked to water management (investment and operational expenditure of water infrastructures), indirect costs linked to water management (legal costs for instance), financial consequences from risks linked to water management during operations but not anticipated.

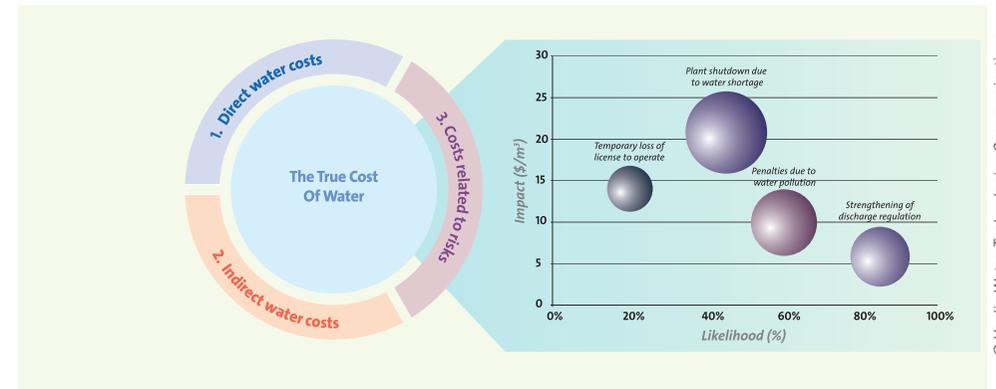
These elements are organized in four categories: operational (e.g. water scarcity); financial (increase in the cost of capital); legal requirements (obligation to meet ecological standards) reputational (such as temporary loss of license to operate).

### RESULTS ACHIEVED/FIGURES

The tool is designed to help industrial decision-makers make pragmatic decisions based on the monetary cost of water and the effects of scarcity on their operations. It provides insights for strategies; it also lessens water related risks such as recycling wastewater.

### DEPLOYMENT PROSPECTS

Such an innovative assessment of the water issue through a risks and costs approach may be of interest for enterprises for which water is not just a commodity or an adaptation matter but also a financial performance issue, calling for stakeholders’ involvement and value sharing.



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The graph represents an example of identified risks during the analysis. Each risk is plotted on a graph based on its probability and potential economic impact.

## Wastewater : a renewable energy source with greenhouse gas



Company name	VEOLIA
Location	France (Marseille, eco-friendly neighborhood Cap Azur (06), etc.)
Keywords	Renewable energy, reduction, circular economy
Company contact	amelie.rouvin@veolia.com

### GENERAL BACKGROUND

The energy sector is the first greenhouse gas source of local authorities. "Energido" is an innovative solution developed by Veolia which provides heating (or cooling) needs for aquatic centers, eco-neighbourhoods or commercial malls ; it replaces fossil energy with renewable energy from wastewater.

### SOLUTIONS IMPLEMENTED

The innovation is using a heat exchanger to convey the calories generated by the sewer system to a reversible heat pump which gives the energy back by producing water to feed either the heating or the cooling network.

Unlike similar processes, the heat exchanger is not located in the collector, which usually leads to installation and maintenance restrictions.

"Energido" offers enhanced control of the system's thermal performance.

### RESULTS ACHIEVED/FIGURES

In Arras (North of France) the solution is used to heat the Aquarena aquatic centers. With a power of 1,000 MWH, the solution helps reduce the center's fossil fuel dependence by covering 75 % of its annual needs in gas. The proportion of renewable energy in its supply has gone up to 80 %, which in turns means a 60 % reduction in greenhouse gas emissions.

"Energido" has also been implemented in a prestigious swimming club in Marseille, where the pool water is maintained at 27°C all year round and grey water is preheated. Substantial savings are made: 35 % on the annual energy bill and 230 metric tons of CO<sub>2</sub> /year.

Another illustration: in Roquebrune-Cap-Martin, the new eco-friendly district 'Cap d'Azur' retrieves calories from wastewater running in the municipal water treatment plant discharge pipe, to supply hot grey water, heating during winter and air conditioning in summer to 300 dwellings spread over 20,000 m<sup>2</sup>.

### DEPLOYMENT PROSPECTS

Using wastewater calories is particularly interesting for large heat consumers such as aquatic centers. There is a large development potential for industrial and municipal buildings. For this local renewable energy source as soon as local use is close enough to be connected.



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## Assessment of water footprint of ENGIE's activities



Company name	ENGIE
Location	Worldwide
Keywords	Water scarcity footprint
Company contact	anne.prieur-vernat@ENGIE.com

### GENERAL BACKGROUND

ENGIE is working on the water footprint of its activities since 2011, in particular for electricity production, and has set in 2013 internal rules and commitments with regards to water risks, including a focus on risks or impacts on water resources associated to the supply chains.

In 2015, ENGIE has started the assessment of the virtual water, consumed by its activities, in the supply chain.

### SOLUTIONS IMPLEMENTED

ENGIE is sponsor of the WULCA initiative (Water Use in Life Cycle Assessment) since 2014. WULCA works as an international working group focusing on water use assessment and water footprinting, taking a life cycle perspective.

The main objective of the group is to develop a general assessment framework for water use including indicators that measure the environmental impacts on human health, ecosystems and freshwater resources. A first assessment method was released in 2016, AWARE, to assess water scarcity footprint.

ENGIE has also developed with ETH and Quantis International a method and a dedicated tool allowing to assess impacts of the release of cooling water from thermal power plants into rivers, taking into account the increased temperature level of the water. With those different studies, ENGIE now owns a set of indicators, methods and tools allowing to assess accurately its impacts on water resources

### RESULTS ACHIEVED/FIGURES

Water scarcity footprint has been assessed for all thermal power plants of ENGIE. It has been used to identify and prioritize action plans, together with other environmental criteria

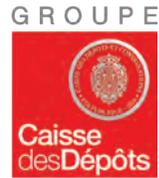
### DEPLOYMENT PROSPECTS

Together with other environmental indicators, such as impact on climate change, water footprint indicators are a useful tool for decision making. Those assessment methods can be deployed at world scale for all ENGIE activities, beyond thermal electricity production, in order to monitor environmental performances and identify potential improvement opportunities.



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## Restoration of wetlands



Company name	CDC BIODIVERSITÉ
Location	France
Keywords	Ecological restoration, long term, CSR, adaptation to climate change
Company contact	Jean.clinckemaillie@cdc-biodiversite.fr

### GENERAL BACKGROUND

Nature 2050 is an action programme supported by CDC Biodiversité which aims at strengthening territories' adaptation to climate change by 2050 and improving biodiversity through the implementation of nature-based solutions.

### SOLUTIONS IMPLEMENTED

Run in partnership with scientists and environmental associations, this programme is based on the voluntary commitment of economic actors. It stems from the idea that biodiversity and natural solutions are the best defence against the effects of environmental shocks on natural and man-made areas. Ecosystems play a buffering role in climate regulation by reducing the effects of chronic and extreme events, the frequency and/or intensity of which are accentuated by climate change.

Wetlands, for example, regulate floods and protect water resources during droughts. As part of actions targeted at aquatic environments, an initiative conducted by LPO France focuses on ecological restoration of the Bay of Aiguillon coastal ecosystem, which serves as a passage and wintering ground for migratory birds; another project aims to restore continuity of watercourses in Limousin in partnership with the water agency Adour-Garonne.

### RESULTS ACHIEVED/FIGURES

Nearly 30 partners have already been mobilized. Their commitments have made it possible to launch 16 projects over a surface area of more than 300 hectares, including a wide variety of natural, agricultural, forest, urban and marine environments.

### DEPLOYMENT PROSPECTS

CDC Biodiversité seeks to attract as many potential partners as possible to Nature 2050, extend the scope of its operations throughout France and nurture the development of local, nature-based solutions.



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## Restoration of an old branch of the Rhine



Company name	ELECTRICITÉ DE FRANCE (EDF)
Location	France
Keywords	Water-energy nexus, biodiversity, natural infrastructure
Company contact	laurent.bellet@edf.fr

### GENERAL BACKGROUND

The Kembs hydroelectric facility, commissioned in 1932, was the first of ten developments put in place on the French side of the Rhine and the Great Alsace Canal (170 km.) It is located where the Swiss, German and French borders meet.

The Old Rhine downstream of the Kembs dam has, since the middle of the 19th century, been strongly affected by major containment and rectification work intended to provide protection from flooding and to promote shipping. Before its canalisation, the Rhine formed an inland delta in the Alsatian plain, and its swells brought alluvial deposits conducive to rich biodiversity.

### SOLUTIONS IMPLEMENTED

Under the new concession for the Kembs hydroelectric facility, EDF has proposed various environmental measures that would restore the alluvial activity of the Old Rhine and increase its biodiversity over a 50-km stretch. EDF and its partners have decided to restore a 7 km-long branch of the Rhine and, to help this ecosystem recover some of its original features, to restore the entire agricultural plot through which it flows, in what will be one of Europe's largest land restoration projects.

This 100 hectare plot was in fact used for several decades for intensive agriculture, as part of the Alsatian Petite Camargue Natural Reserve. Recreating the ecosystem through redevelopment and reliance on ecological engineering has allowed animals and plants to reclaim their crucial role in long-term protection of the environment. It has also enabled local communities to enjoy a long abandoned territory and rediscover the ecological heritage of the Alsatian Petite Camargue with the development of an environmentally responsible tourism industry.

### RESULTS ACHIEVED/FIGURES

The presence of this 'new' river (the Small Rhine) has thus permitted the restoration of the surrounding area by recreating a mosaic of wet and dry habitats, grasslands and forests conducive to the growth and hosting of typical Rhine plants and animals.

After a year and a half of work, the removal or displacement of over 380,000 cubic meters of earth, the planting of 150,000 plants or trees, and the restoration of 100 hectares, the old branch of the Rhine was replenished with water in September 2014 and now serves as a haven of biodiversity that greatly enhances the value and potential of the natural reserve, particularly in today's context of climate change. Other ecological engineering measures, such as the planting of hedges along the banks as protection against soil erosion, have also been implemented under the project.

### DEPLOYMENT PROSPECTS

This is an example of how innovative solutions can help to reconcile existing industrial infrastructure and natural infrastructure in the quest for balanced and sustainable development. This kind of solution is of course reproducible and by no means confined to hydroelectric projects.



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This brochure is the result of the Water Working Group during 2017-2018. It brings together EpE members' experience and best practices in terms of water stewardship.

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