Smart
Water

Veolia approach to sustainable and smart city

Today, natural resources are becoming increasingly scarce while our needs are growing in an ever more densely populated and urbanized world facing climate change issues.

The world has to rethink its relationship with resources and come up with new social and economic growth models that are more efficient, better balanced and more sustainable.

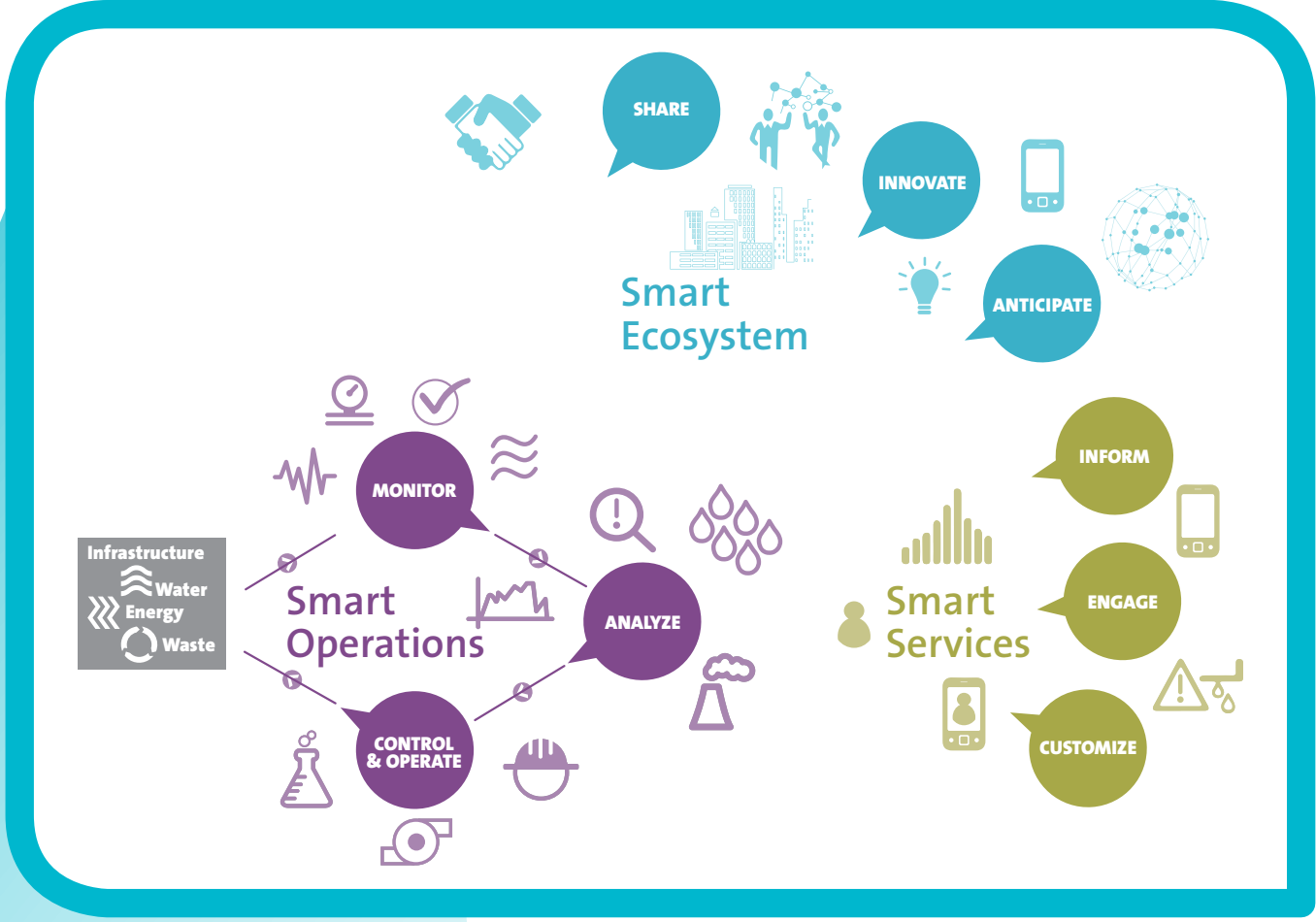
With 160 years of expertise in the areas of water, energy and waste, Veolia applies its capacity for innovation to pursuing human progress and wellbeing, and improving the performance of businesses and regions.

To make the switch from a resource consumption rationale to a use-and-recover approach in today's circular economy, Veolia designs and implements solutions aimed at improving access to resources while at the same time protecting and renewing those same resources.

Veolia accompany cities in their smart development through a network of companies and experts at three levels of integration:

- **Smart operations**
- **Smart services**
- **Smart ecosystem**

Veolia key figures 2013



Our proposal for Smart Cities

Using its extensive return of experience in being a partner to cities for 160 years, Veolia can develop and deliver innovative services tailor made to cities, using technologies as enablers, to support the achievement of the goals of city leaders for Smart Cities. These services include design and implementation of innovative solutions and assistance to leverage value from data and take action.

THREE AREAS OF FOCUS
have been identified where we consider Veolia would deliver the highest value to Cities:

1 WATER — Making the most of water resources by leveraging data for action

2 ENERGY — The city is connected to an energy efficiency platform

3 URBAN PLANNING & MODELLING — A new way to plan the sustainable city

WATER

SMART=

Making the most of water resources by leveraging data for action.

To us smart water services means **improving water efficiency** for the benefit of the city and its residents, using data and technologies as enablers, to increase **efficiency of irrigation networks** and **reuse of water**, allow for **deferred investment** in water production plants and **optimization in pipe renewal,** as well as **preserve resources** (energy and water) by **enhancing leakage management** and **enabling demand response programs.**

Activities to reach these targets concern three levels:

Performance

Customer experience

Multiple benefits

1. **Utility level:** monitoring water quality, reducing non-revenue water, benchmarks of operation, optimizing capital spending and return on asset, real-time control of operations to optimize resources

2. **End-user level:** enhance customer satisfaction and bring new services to them, while raising awareness about resource conservation and facilitate the introduction of new tariff schemes, and supporting VIP/ large consumers in decreasing their water footprint

3. **Stakeholders outside the water sector:** multiply the benefits of sharing data to reduce costs, enhance innovation and increase the overall smartness of the city

We propose a **long-term partnership** with **quick wins** and **commitment on performance,** where Veolia could assist in all phases: **designing, implementing** and **operating innovative solutions.**

Water management in the Smart Cities agenda

Ensuring the adequate provision of water to city end-users is a **major challenge,** especially in water scare regions experiencing a sustained high influx of urban residents and high per capita consumption. As clean and safe water is fundamental to any socioeconomic development, city leaders need to **adapt their water resource management** and their reliance on technologies to support sustainable development and cater for rapidly growing water needs.

With this objective, several programs related to Demand Side Management can be developed, which sets targets in terms of **water consumption savings.**

Programs concern in particular:

- **Leakage reduction.**
- Implementation of **water reuse and efficient irrigation program.**
- **Demand response and introduction of new tariff structures.**

Veolia has identified and selected a first series of 4 major added-value services to support your city on these aspects.

Our proposal: Priority actions for Smart Cities

1 Setting up a pilot area for leakage management and automated meter reading

To successfully design and implement innovative services, we recommend developing a **pilot area for leakage management and automated meter reading for the distribution networks of potable water and Treated Sewage Effluent (TSE).** This pilot will help develop a **tailor-made solution** adapted to **local specificities,** test **new services,** and identify how to **adapt operational procedures.**

Criteria to select the pilot area should ideally include:

- Emblematic area with plants using large quantities of water and spare green areas: This has to be in line with the implementation of other initiatives linked to efficient landscaping practices such as xeriscaping.
- In both potable and TSE networks, 500 to 2,500 connections could be isolated easily from the rest of the network.
- Connections for water consumption are metered
- High per capita water consumption in the area
- Easy access to the networks
- Presence of sensitive customers such as hospitals, nurseries, schools...

Audit & design

Understanding of the potable water and recycled water networks of the pilot area.

Review of customer meter databases.

On-site hydraulic validation of the DMA.

Design of the data collection system.

Implementation

Deployment of Automated Metering Infrastructure (water meters, water quality probe, radio modules...)

Instrumentation of District Metered Areas (DMA)

Configuration of a web portal for data display and alert threshold

Setting up of new services for customers of potable water

Baselining

Operation

Monitoring (flow, pressure, water quality) and analysis

Enhanced leak detection

Actions in the reduction of apparent losses

M2M networks operations

Customer awareness: Demand response programme and testing of new tariff structures based on time of use

Measured objectives

Treated water saved due to reduction in leaks

Volumes of potable water saved due to reduction in leaks (pipe bursts)

100% automatic collection of readings (no need for readers) in the pilot area

New services offered (SMS, leakage alert, quality alert for sensitive customers,...)

% availability of the communication service

2 Focus on VIP / large water consumers

Monitoring of water consumption from approximately 100 VIP / largest water consumers near real time helps water utilities take **more informed decision on water operations, reinforce relationship** with such **consumers** (secure billing, increase customer satisfaction), and identify ways to **increase water efficiency** and **better plan water production.**

1 Monitor Veolia will design and implement an **Automated Meter Reading system** that would collect water consumption data from specific VIP / large water consumers. The selection of these consumers will be carried out in collaboration with local authorities.

2 Analyse Once the AMR is implemented, Veolia would assist in the analysis of water consumption profiles and types of establishment based on the data collected. Veolia will recommend water consumers to be targeted as a first priority in the **development of specific programs with the aim of increasing their water efficiency.**

3 Optimise Veolia experts would carry out a walk-through audit of water consumers selected in collaboration with local authorities in order to **assess potential increase in water efficiency and define corresponding recommendations and action plans.** This could for example include leakage management, water recycling and changes to operational procedures (time of use, type of cleaning...).

4 Check The continuous monitoring of water consumption using automated meter reading will allow for the **follow up and assessment of increase in water efficiency.**

Introduction of special services for this category of consumers including systems to manage and monitor their consumption and offer them special solutions.

This program could also benefit water reuse in your city. Recommendations from Veolia experts could for example result in increased on-site water efficiency and a decrease of pollution discharge to the wastewater networks. This could then alleviate downstream wastewater treatment and help enhance the quality of Treated Effluent and its availability for reuse.

3 Engage with other stakeholders to achieve a smarter management of the city

With new data being collected and new communication systems being available, **sharing of data across different sectors** will support **innovation in the management of the city,** with **potential savings** (eg pooling of resources) and **increased quality of life for residents** (eg less intervention on the road, less congestion, new services).

Based on its extensive experience in partnering with cities, Veolia will assist in the organization of **brainstorming sessions with other city stakeholders** to identify which data from the water sector would be useful to them, and as well which of their data could be shared to help better manage water production, distribution and reuse.

Veolia could then help define a **data framework** that identifies how these data could be shared between the different stakeholders. Protocols for data exchange will have to be adapted to legacy systems and best available technologies. A specific emphasis will be put on **data security**. Some of the data could also be shared via the **ForCity collaborative platform** as presented in Section 3.

4 Data for action at the city scale

Based on the return of experience of the pilot for leakage management and smart metering focus on VIP/large consumers and engagement with other city stakeholders, a **tailor-made service at the city scale could be deployed.** This service would provide **"data for action"** and could for example include:

Availability of data Roll out of a smart water network (metering, leakage, quality) for the whole city for both **potable and TSE networks** and **integration within legacy systems** into control centers to 1/ support utility operations, 2/ provide new services to customers, 3/ share data and information with other city stakeholders. Veolia will help select the **best technico-economical solution** according to specific constraints from your city such as integration with legacy systems, sustainability and operational costs.

SPECIFIC MACHINE TO MACHINE NETWORK:

One of the options could be to design, build and operate a **dedicated Machine to Machine network with Veolia guaranteeing data availability.** Such networks could then be also used for other applications such as monitoring of environmental conditions (air pollution, noise, weather...), as well as other parameters in the city (eg fill level of waste containers).

	Water data	Specific usage	Benefits
	SEWERAGE		
Example 1	Profiles of water consumption	Planning of sewage infrastructure	CAPEX optimisation
	TELECOMMUNICATIONS, ROAD & LIGHTING...		
Example 2	Planned works	Facilitate and pool interventions	Reduced OPEX Reduced nuisance

Data for action

REDUCTION OF APPARENT WATER LOSSES

- Identification of blocked / defective meters: prioritization of work order
- Replacement /renewal of meters
- Meter sizing as per analysis of water consumption profile

REDUCTION OF REAL WATER LOSSES

- Monitoring of flow, pressure and quality within the distribution networks
- Faster response in case of incident: Detection of pipe burst, identification of water quality problem origin, operation rectification / communication with operational team
- Leakage detection: Night flow monitoring, localized leak detection
- Pressure management

OPTIMIZATION OF ASSET MANAGEMENT

- Reduction of water losses to increase water availability and defer investment for water production
- Identification of pipe failure probability
- Pressure modulation to decrease pressure and increase lifespan of equipment
- Real-time monitoring of operations
- New relevant data sent to GIS / received from GIS

CUSTOMER AWARENESS AND DEMAND RESPONSE

- Deployment of mobile app for end-users to receive alerts (leak), to monitor consumption
- Other information to raise customer awareness
- Simulation of modular tariffs (eg seasonal tariff, time of use...)
- Water quality monitoring for sensitive customers
- Extension of VIP services deployment

SHARING OF DATA WITH OTHER STAKEHOLDERS

- Ensure data availability
- Analyze data received from other stakeholders
- Participate to the creation of new services using data from different stakeholders

Key benefits

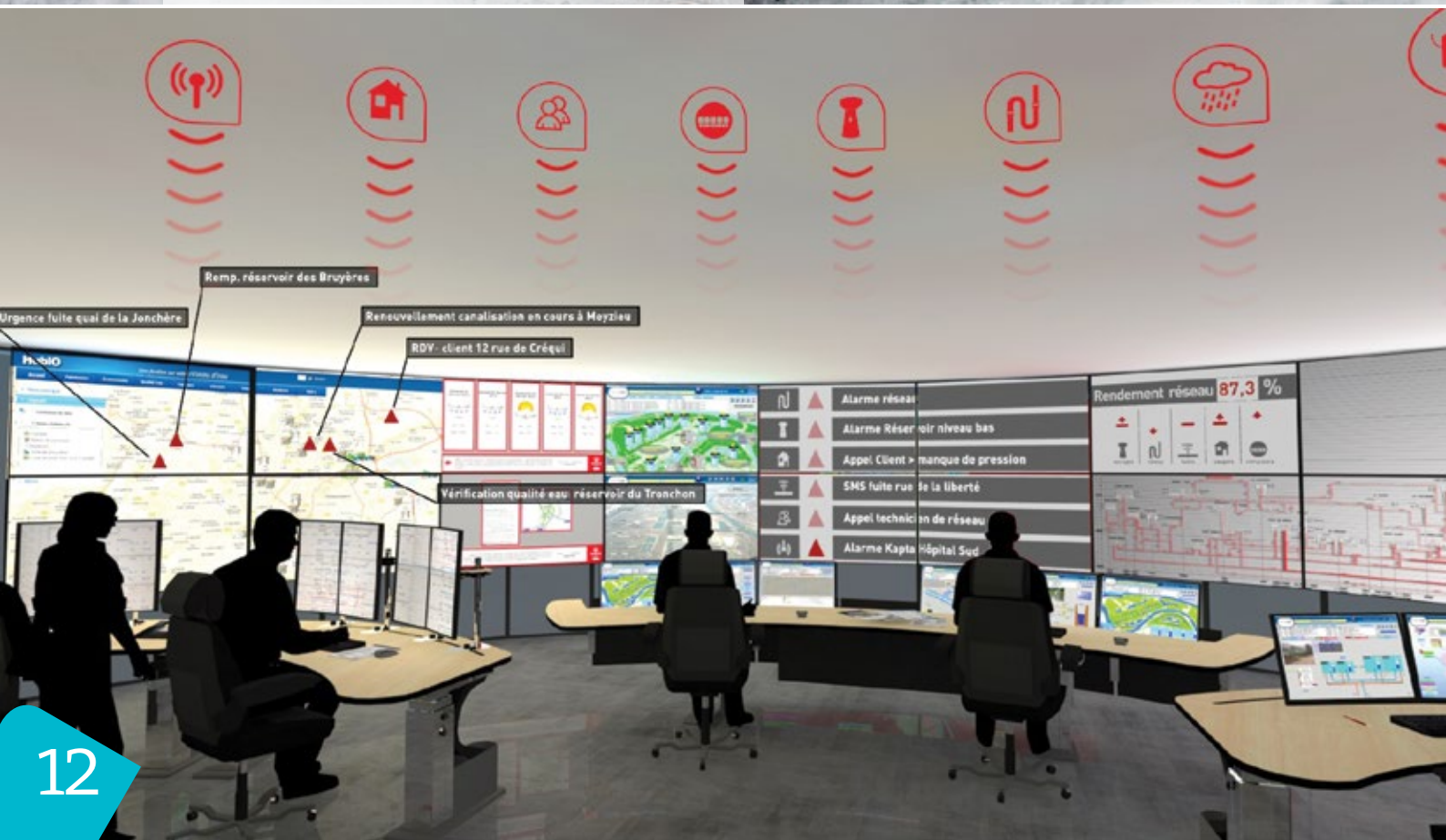
- ☑ Savings of potable water and recycled water (enhanced leakage management, water efficiency program and demand response)
- ☑ Increased availability of recycled water and water reuse
- ☑ Deferred investment in water production and distribution
- ☑ Long-term partnership with quick wins
- ☑ Smooth transition to new services making the most of new technologies and communication services
- ☑ New services to residents
- ☑ Multiple benefits for your city's stakeholders outside the water sector

SELECTION OF BUSINESS CASES

A comprehensive range of high-quality services and innovative solutions – SEDIF, France

Syndicat des Eaux d'Ile-de-France (SEDIF) is the water authority for the Greater Paris region and the largest in France. It is also one of the biggest in Europe. In 2011, SEDIF once again put its faith in Veolia with a new 12-year contract to manage the public water service – a contract that puts the focus firmly on innovation.

Some **250 million cubic meters of water are supplied every year** through **8,800 km of pipes** to more than **4.4 million people** in **149 municipalities** in the Greater Paris area. The service provided is also highly complex due to the quality of the available water resources, consisting of water from rivers, which requires very sophisticated treatment.



The water service in a nutshell

The service uses a **single control center**, the ServO, which is tasked with **optimizing production, network maintenance, emergency call-outs, customer service management** and **risk management.** Considerable efforts to reduce energy consumption, manage emissions and discharge, and pursue an ambitious reforestation program have delivered a **carbon-neutral service**, a world first for a water utility.

Water traceability is based on the model used in the food & beverage industry, guaranteeing consumers continuous control over the sanitary quality of their water. Third-generation meter reading technology, Téléo, will be deployed by 2015, and already provides precise monitoring of consumption for half of the people who use the service, along with **easy leak detection**. The **automated meter reading solution** is **open and interoperable** and **will be the largest in Europe**. Customer relations have also been improved through services adapted to different types of user and close consultation with the public.

High-quality service for all residents

With the service provided by smart metering, water end-users can **follow up their daily water consumption** and will be automatically alerted in case of leakage. Services implemented include an online account to access information on the water services and daily water consumption. For example, water end-users can **set up alerts via email or SMS** to be informed in case their water consumption exceeds the usual level. In addition, **alerts following suspected leakage** at their place will be automatically sent to them. All of these services contribute significantly to raise awareness with customers on the need to preserve water resources through a more responsible behavior.

560,319 subscribers for the first water service to receive the "Customer Relations Center" NF Service mark from French standards organization AFNOR Certification

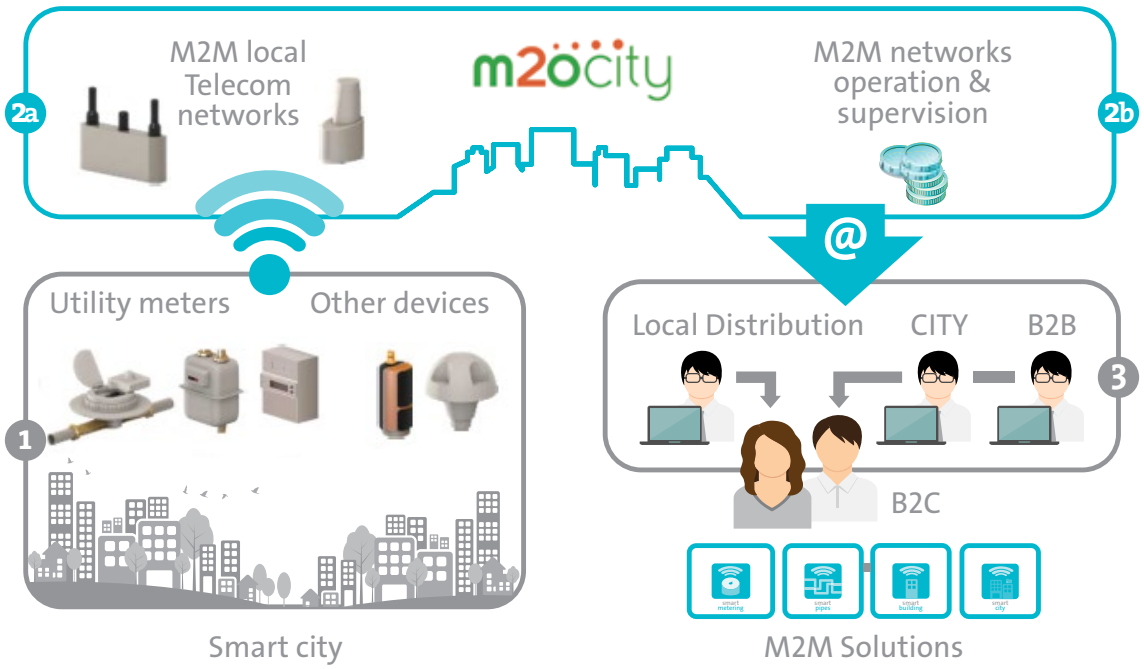
550,000 meters to be deployed **over 5 years**

m2ocity, first Machine to Machine telecom operator in France

In 2010, Veolia and Orange have created m2ocity, an operator specializing in **automated water meter reading and environmental data services.** Capitalizing on the expertise of Veolia, which already had more than 230,000 smart meters in service, and on the know-how of telecom operator Orange, m2ocity offers local public authorities (municipal companies or water service operators), a **complete, turnkey service** based on an ultra-low energy radio network. m2ocity offers an **open and interoperable telecom solution** available to stakeholders concerned by the sustainable development of the city. For example, m2ocity's network is able to collect data from environmental sensors (to combat noise and pollution, for example) in response to public authorities' expectations.

Open & interoperable telecom solution for tomorrow's smart city

Design, roll-out & operations



20 MILLION INPUTS COLLECTED DAILY

1 MILLION END POINTS CONNECTED

Improvement of operational performance and conservation of natural resources – Beaune, France

The urban community of Beaune has 53,000 inhabitants of which 22,000 for the only town of Beaune with 6,500 water meters.

The urban community of Beaune decided in 2008 to include in the specifications renewal of the Delegation of Public Service awarded to Veolia, the implementation of automated reading of water consumption and district metering areas. Smart meters have been installed in the city of Beaune where all end-users can now access new online services to better monitor their water consumption and receive customized alerts, especially in case of leakage.

In 2010, district metered areas (DMA) have been deployed and connected to the automated metering infrastructure (AMI) in place. Automated metering infrastructure hence helps strengthen the operational performance of the water utility. **By choosing to pool the AMI for metering and leakage detection, the water utility has optimized the operation of the water system.**

Hydraulic sectors have been identified, and district flow meters have been connected to the AMI at each boundary. Every day, these flowmeters calculate the volume of water in the pipes. By combining this information with the volume of water actually consumed in each area, **the performance can be monitored on a daily basis.** DMA associated with AMI allows the calculation of the network efficiency and to concentrate leak detection on the areas with lower yield.

In addition, 80 acoustic loggers permanently installed and connected to the AMI allow listening to the flow in the pipes and pinpoint leaks within a 100 m diameter area. The advantage is significant, as **pinpointing the location of the leak reduces the nuisance generated by repair**: Interventions are short and effective, to the great satisfaction of residents.

+10% Network efficiency increase (to reach 77%)

300,000 m3 saved in 2011 equivalent to 80 Olympic swimming pools saved

A global robust track record

Other references across the world include:

Managed Meter Service for **Thames Water (UK)** including meter installation & maintenance, revenue meter reading, sales investigation, developer services in London City and its suburb: 1 million water meters to be coupled with AMR modules (3,3 million households)

Implementation of **single monitoring and operations centers: Shanghai Pudong (China), Prague (Czech Republic),** on-going: **Lyon (France)**

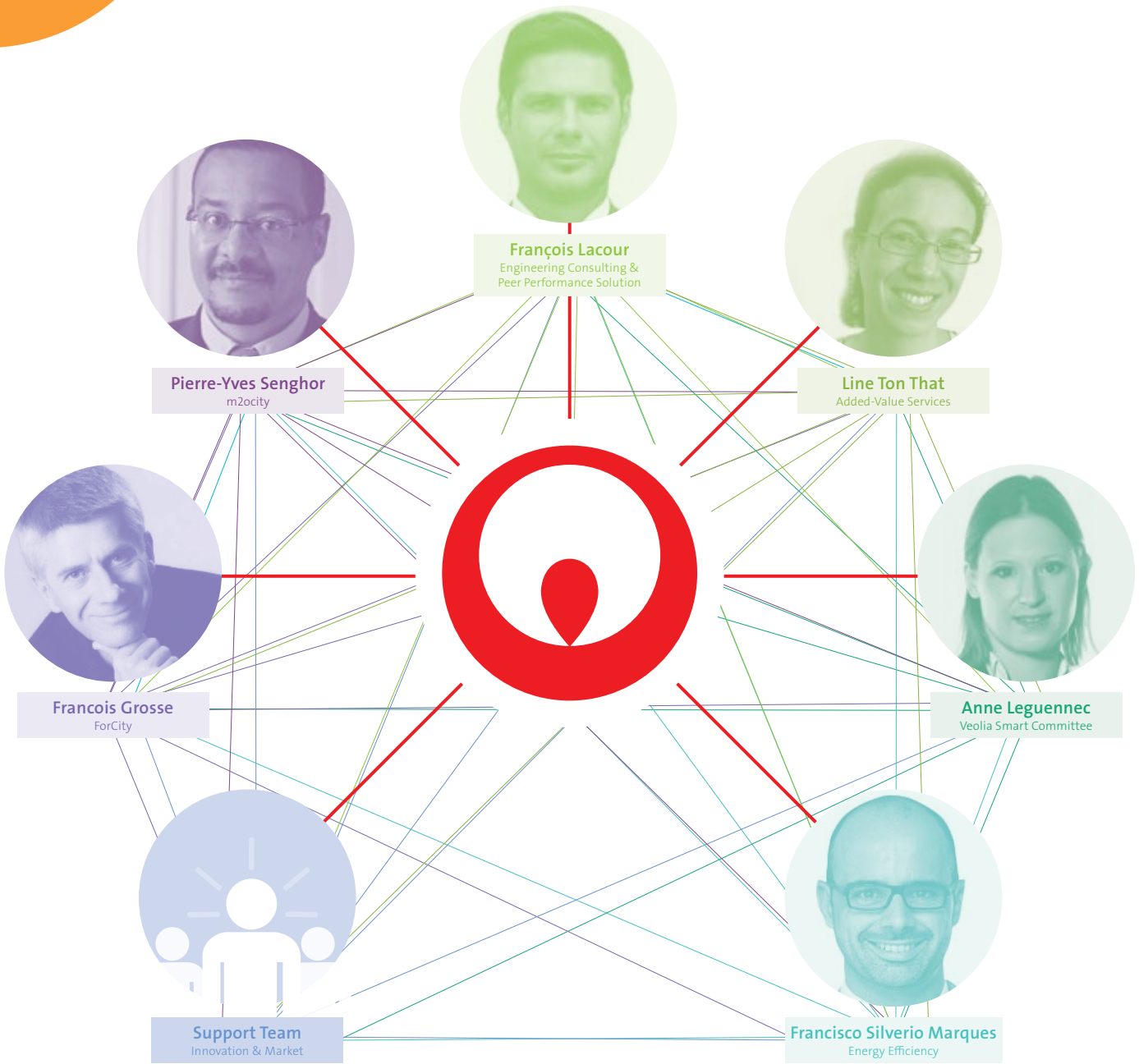
Water losses reduction for **Public Authority for Electricity and Water (PAEW) (Oman):** Implementation of **130 Districted Metered Areas (DMA)** with continuous flow and pressure monitoring in 10 regions: 10,000 km of networks and 350,000 customers

19 million m3 targeted water savings in 2 years: 8.6 million m3 of apparent losses and 10.4 million m3 of real losses.

Team

VEOLIA SMART TEAM

SMART=
global-local dedicated team to support your city.



Resourcing the world

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