



100 innovations for a new world of energy

Innovation Book 2015





ENGIE ENGIE develops its businesses (power, natural gas, energy services) around a model based on responsible growth to take on the major challenges of energy's transition to a low-carbon economy: access to sustainable energy, climate-change mitigation and adaptation, security of supply and the rational use of resources.

The Group provides individuals, cities and businesses with highly efficient and innovative solutions largely based on its expertise in four key sectors: renewable energy, energy efficiency, liquefied natural gas and digital technology.

ENGIE employs 152,900 people worldwide and achieved revenues of €74.7 billion in 2014. The Group is listed on the Paris and Brussels stock exchanges (GSZ) and is represented in the main international indices: CAC 40, BEL 20, DJ Euro Stoxx 50, Euronext 100, FTSE Eurotop 100, MSCI Europe and Euronext Vigeo (World 120, Eurozone 120, Europe 120 and France 20).

Key figures (at December 31, 2014)



152,900

employees throughout the world

- inc. 58,200 working in power and natural gas
- 94,700 in energy services

€74.7

in 2014 revenues

Operations in
70 countries

€6-7 billion of net investment per year over 2014-2016

900 researchers and experts at **11** R&D centers

Editorial

Renewable energy, decentralized production, data collection and interpretation, energy storage and the emergence of digital technologies are just some of the aspects of the upheavals facing today's energy industry.

Against this backdrop, ENGIE has set its sights on becoming the leader in the energy transition, an undertaking that will require major inventions and a multitude of innovations.

For more than 20 years, the Innovation Trophies have been a key event for innovators in the Group. They provide an opportunity for each of ENGIE's 152,900 employees to present their ideas. Every year, over 500 applications from around the world are submitted and examined, and of those, around fifteen are awarded a prize.

For the first time ever, we have decided to open up this event to new audiences by presenting all the shortlisted projects. The following pages provide a glimpse of the vitality of ENGIE's innovation and are the best proof of the dedication of our employees to reinventing the world of energy.

Happy reading!

Gérard Mestrallet
Chief Executive Officer



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For more than 20 years, the Innovation Trophies have been a key event for innovators in the Group.

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Innovation at ENGIE

A major utility for over 150 years, ENGIE is convinced that the world of energy is undergoing a profound and lasting transformation. In this context, the Group has set itself the goal of becoming Europe's leader in energy transition, in particular by focusing on innovation. This drive is at the core of the Group's efforts to transform good ideas into operational services for the benefit of its customers.

Three key sectors have been identified:

Demand-side Management, Decentralized Power Generation & Energy Storage ;
Cities, Territories, Mobility ;
Home Comfort & Energy Efficiency.

Key figures (May 2015)



Over **8,000** employees members of Innov@ENGIE,
the Group's internal social network for innovation

Over **250**
ideas of innovations
put forward by
employees on
Innov@ENGIE

A network of more than **50**
innovation managers across the Group

9 employee-led
projects in incubation in
5 of the Group's
partner incubators
in Europe

€ **100** million
current investment budget
of ENGIE New Ventures

7 calls for projects
launched on **Open
Innov by ENGIE**,
the Group's open
innovation platform

Innovation Trophies 2015

The Innovation Trophies reward innovations by employees in the Group.

The selection process is organized in several stages and results in a shortlist of projects. The list of nominations is then handed over to a Grand Jury, which chooses the final recipients of the various awards.

Projects fall into one of six categories:

“Success Story” Trophies reward those projects nominated in previous years that have generated the strongest value creation over time. The other prize categories are Business Development, Sales and Customer Relations, Management, Operations Performance and New Fields of Business.

495

applications submitted
for consideration

100

applications reading Group level

53

nominations of which

9 *Success Stories*

14

winners selected



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To find any file on the ENGIE intranet, use the full file no. preceded by 2015, i.e. 2015-0000**426**.

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HANDLING DISCHARGE



EXPLORATION & PRODUCTION



21ST CENTURY GAS



GREEN ENERGY



CITIES AND MOBILITY



THE ENERGY TRANSITION



E-BUSINESS



GAMIFICATION



PROJECT MANAGEMENT



HEALTH AND SAFETY



FIELD TRAINING



INTERNET OF THINGS



WIND ENERGY



PROFESSIONAL MOBILE
APPLICATIONS



PROCESS WATER



3D TECHNOLOGIES



DRONES

Flourishing through Success

Success Stories

The biggest value-generating innovations from previous editions

01



SLEM (Smart Local Energy Management)

THE TEAM
 Marcel DIDDEN,
 Roland SCHNEIDERS,
 Marcel DEKKER

SST-01 //
 Laborelec,
 Cofely Nederland

ADAPTING TO THE INTRODUCTION OF RENEWABLE ENERGIES AND NEW USAGE PATTERNS

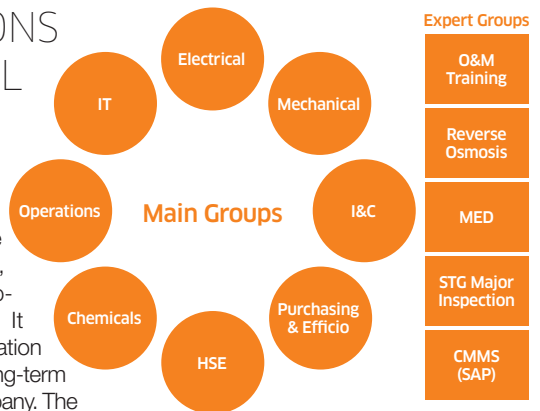
The electricity network in developed countries has to adapt to the introduction of renewable energy and new usages that generate production and consumption peaks. In this context, Smart Local Energy Management (SLEM) offers customers the benefit of attractive prices by reducing their consumption when demand is high. SLEM has a unique ability to combine different price mechanisms. It covers more than 80% of flexible industrial loads. Pilot projects conducted internally in Germany, the Netherlands and France in 2012 proved satisfactory, with day-to-day variability for gas and even hour-to-hour variability for electricity. In three years SLEM has become a commercial success. Several ENGIE BUs have adopted it in their commercial offering.

META Networking Groups

MAKING MAJOR CONTRIBUTIONS TO TECHNICAL AND FINANCIAL PERFORMANCE IN THE META REGION

The networking groups in the former META (Middle East, Turkey and Africa) region help promote information sharing, identification of best practices and the achievement of ambitious results in the region. Based on a vast network of experts in all plants and the center, and a web-based collaboration platform, this knowledge management program (CMP*) contributes considerably to the region's technical and financial performance. The

CMP has a positive impact on practices, equipment and supplier management. It leads to standardization that improves the long-term maturity of the company. The groups capture innovation and formalize the idea of networking. More than 100 ideas have been shared by the different networking groups.



THE TEAM
 Shawn MADORE, Stefan VERLEE,
 Carmen VIDAL, Bruno DEVINCK

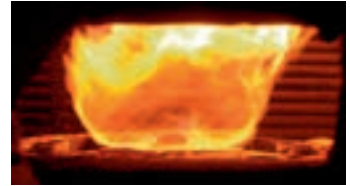
SST-02 // ENGIE South Asia, Middle East, Africa

* Category Management strategies in Procurement

BruMo

OPTIMIZING THE OVERALL PERFORMANCE OF THE BOILER ROOM

The BRuMo, a modulating gas torch burner, helps extend the load modulation range of existing burners. Developed by Cofely Services, this original technical solution enables the burner to adjust constantly to demand, thus optimizing the overall performance of the boiler room. By enabling equipped gas boilers to function at extremely wide load ranges (from 1 to 100% for certain projects), the BruMo optimizes the use of renewable resources while maintaining a high performance level. It also avoids premature wear and tear of installations.



THE TEAM

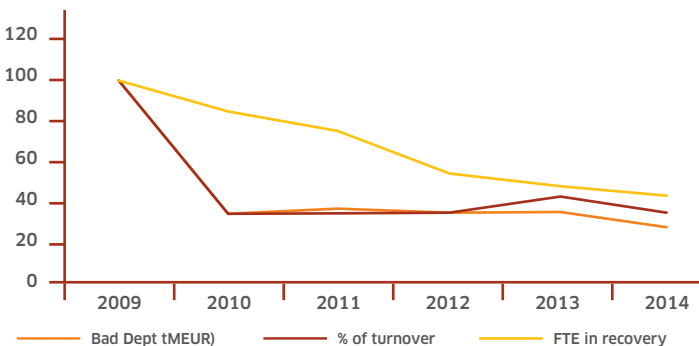
Bruno PETIT,
Michel CARMONA,
Olivier MORISOT

SST-03 //
Cofely Services

Maximizing Collection and Recoveries in the B2C Market

RECOVERING OUTSTANDING PAYMENTS AND INCREASING CUSTOMER SATISFACTION

The economic crisis of 2008 limited the ability of residential and small professional customers to pay their energy bills. Given the sharp increase in unpaid invoices, a program was launched in mid-2009 to recover accumulated "bad debt" and control future flow. Between 2009 and 2014, "bad debt" fell by 75%. The program initially consisted essentially of dynamic credit risk scoring, a redesign of the dunning process, operational guidance and intelligent management of work and available resources. ENGIE has outstripped the competition in the Belgian residential energy market, with a lower ratio of "bad debt" to sales and the highest customer satisfaction rating.



THE TEAM

Mieke VAN WESEMAEL,
Ann KETELEER,
Marc DE WREEDE,
Thierry VANCASTER,
Jan DE SMET

SST-05 //
Marketing & Sales
Europe

HANDLING DISCHARGE



Innovative Flue Gas Treatment to Meet New Mercury Emission Limits



THE TEAM

Frans VAN DIJEN,
Prof. Heinz KÖSER (*University of Halle-Wittenberg*),
Johannes MAYER (*E.ON*)

066 // Laborelec

OPTIMIZING EQUIPMENT TO REDUCE MERCURY EMISSIONS

The UN, the European Union, and the United States have decided to sharply reduce mercury emissions. Mercury is present in various types of fuels used to generate electricity. For solid fuels, the preferred approach is to extract the mercury from flue gas. The system developed by Laborelec, in cooperation with the University of Halle-Wittenberg and E.ON, can reduce mercury emissions by 90% solely by optimizing the operation of existing equipment. It is a world first. By reducing the temperature of the Fabric Filter (FF) or Electrostatic Precipitator (ESP), we increase mercury removal using fly ash. The use of Selective Catalytic Reduction (SCR) and Flue Gas Desulfurization (FGD) increases mercury capture. In addition, operation of the FGD is optimized (by adjusting the air injection, reducing the operating temperature, etc.). Mercury chemistry and content of the gypsum can be controlled, limiting mercury evaporation during thermal processing, as desired by gypsum purchasers. By adjusting these operational parameters, flue gas residues meet both emission standards and buyers' demands.



In-house SCR deNOx Efficacy Methodology

AN INDEPENDENT METHODOLOGY FOR EVALUATING AND OPTIMIZING COST AND PERFORMANCE OF SCR deNOx EQUIPMENT

A constantly increasing number of thermal power plants throughout the world must reduce their emissions and install catalytic SCR deNOx technology. To do this, Laborelec has developed an independent methodology for evaluating and optimizing the cost and performance of SCR deNOx equipment. Initially applied in a targeted manner in Europe, this in-house

technology was then extended to the full ENGIE fleet, and even outside the company to B2B customers. The costs already saved are in the order of tens of millions of Euros. The Rodenhuize plant in Belgium is the flagship of this success: in 2011 the scaled-up deNOx SCR system enabled, for the first time ever, a switch from coal to firing 100% wood.

THE TEAM

Xavier HENRY,
Frédéric MERCIER,
Frans VAN DIJEN

SST-06 // Laborelec



Advanced Emissions Solutions for Solid-Fuel Plants in the United States

STAYING AHEAD OF LEGISLATION ON MERCURY EMISSIONS

The project and the commercial approach can reduce mercury emissions from coal-fired plants by over 90% and give rise to an agreement ahead of forthcoming legislation. Solid fuel fired power facilities in the United States face material changes to environmental regulations in upcoming years. One such change is the Utility MACT law, which imposes a 90% reduction in mercury emissions from coal-fired plants by May 2016. The Coletto Creek Refined Coal Facility uses two patented chemical products. When they are injected with the fuel, they reduce mercury emissions by 40% and NOx by 20%. The project nets the plant, which has signed an agreement with the refined coal supplier, \$1 dollar per ton of solid fuels burned.



THE TEAM

John GIVENS, Will DAVIS,
Chris WASHINGTON, Robert STEVENS,
Arnaud LAMBERT

023 // ENGIE North America



LNGENERATION



THE TEAM

Karine VERNIER, Quentin RAGETLY,
Joseph WEISS, Jérémie LERICHE

005 // LNGENERATION

HELPING OUR CONSUMERS REDUCE THEIR BILLS AND CO₂ EMISSIONS

LNGENERATION has successfully positioned ENGIE on the French retail LNG market for industry customers not connected to the grid. The market is a springboard for growth: it has an estimated size of 50 TWh in France, representing 10% of the natural gas market. Two years after being established, LNGENERATION is already one of the top three companies in the market. LNGENERATION has signed around ten agreements, and in late 2014 it put several regasification/storage facilities into operation. In six months, LNGENERATION has established a natural gas solution that helps consumers reduce energy bills by up to 25% and reduce CO₂ emissions by 15 to 25%.

Retail LNG

A TURNKEY FORMULA

Retail LNG is a rapidly expanding market in industrial sites that are not linked to the gas grid. The product offering is based on a turnkey formula comprising the operator capacity and LNG. ENGIE secures supplies for its customers and provides the expected flexibility. LNG has less of an environmental impact than competing energies and reduces CO₂ emissions by up to 20%. Over 1,500 deliveries have been made to date.



THE TEAM

Joseph JAKERIAN, Aurélie BALCOU,
Laurent STRUILLLOU

SST-04 // Global Gas



LNG Tanker Reloading Service

GIVING OUR CUSTOMERS
THE FLEXIBILITY
AND OPERATIONAL
PERFORMANCE
TO OPTIMIZE THEIR
LNG PORTFOLIO



In order to diversify the activities of Elengy's LNG terminals, a new reloading service was set up in 2012 at the Montoir-de-Bretagne and Fos Cavaou terminals (France). The commercial transformation of the LNG terminals of Elengy and Fosmax LNG into LNG hubs offered our customers the flexibility and

operational performance required to optimize their LNG portfolio and maximize value creation on gas markets. Value creation for Elengy since 2013 has increased seven-fold. Value creation for customers is considerably greater, given the arbitrage margins made possible by these operations.

THE TEAM

Pierre BERNOUX,
Mehdi BENMENI,
Raphaël PUJOL

SST-07 //

Elengy, Global Gas



ONBOARD RELIQUEFACTION UNIT: A WAY TO SAVE BOIL-OFF GAS

The fumes emitted by tankers (boil-off gas) are usually recovered and used to power ships. However, the excess is lost, at an average rate of 11,700 tons of LNG per year per tanker. The innovation allows us to recover this gas, saving money and reducing a ship's CO₂ emissions.

THE TEAM

Dimitri NOHE, Éric LEPESAN,
Frédéric BLANC

262 // LNG



A NGV PARTNERSHIP TO SERVE THE ENERGY TRANSITION

The innovation lies in bringing together the three essential links in the expansion of the use of natural gas vehicles – local authorities, transport fleet managers and GrDF – to develop a refueling network and provide support to new users.

THE TEAM

Pascal BOMBARDIER, Jean-Luc DELBOSC

359 // GrDF



Bunkering Agreements



CONVERTING OBLIGATIONS INTO OPPORTUNITY

In order to support the deployment of the future LNG Bunkering Vessel for maritime transport, ENGIE has drawn up and signed the first bunkering agreements adapted to the specificities of LNG. ENGIE estimates that the LNG market could reach 20 to 30 million tons by 2030. The opportunities are in Europe and the United States, where new environmental regulations are set to be introduced starting in 2015. To convert this obligation into an opportunity, ENGIE signed on with two partners to develop the natural gas “bunkering” market worldwide via the launch of an LNG bunkering vessel, which will allow all types of vessels to store and deliver liquefied natural gas without disrupting their operations when at port. ENGIE signed its first bunkering agreements in 2014.

THE TEAM

Laurent RAMBAUD, Gabriel TOUCHARD, Soizic LE GOFF, Dominique INGRAIN, Damien COLONNA DISTRIA, Douglas VILELA

500 // LNG

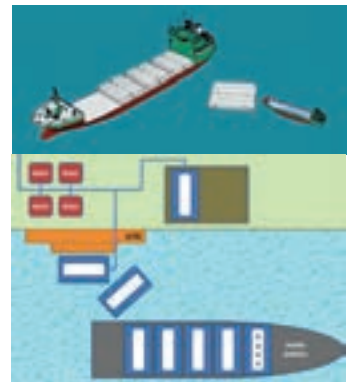


LNG Lift, a Breakthrough in Small Scale Business

CHEAPER, FLEXIBLE SUPPLY

The LNG Lift Vessel is an innovative ship design intended for use in the supply of LNG to high-growth island markets in a manner more flexible and less expensive than that provided by traditional solutions. The LNG Lift Vessel will transport floating tanks filled with LNG, which will be delivered to adapted, modular and flexible regasification terminals on the islands. This innovation will help adjust the quantities delivered, reduce unit costs for tanks and regasification units, through structural standardization, and reduce construction costs for

the terminals, which will no longer have to accommodate only LNG barges. In addition, this solution combines supply optimization and flexibility by allowing delivery to multiple clients at a time.



THE TEAM

Frédéric DEYBACH, Benoît PORTANNIER, Yacine ZELLOUF, Hugues MALVOS, Marc VANHAEREN

373 // LNG



ElectroProject SoftTorque

REDUCING THE DURATION OF DRILLING OPERATIONS

Drilling is a costly operation, and each day gained can save hundreds of thousands of Euros. Our patented technology, the ElectroProject SoftTorque solution developed by Cofely Nederland, reduces the duration of operations by 10 to 30%. By controlling both the speed of rotation and the pressure on the drilling head, ElectroProject SoftTorque (EPST) eliminates the stick-slip phenomenon (where the drilling head jams and then springs free). The EPST system reduces drilling time and vibrations, extending the lifespan of the equipment. As of 2015, 65 EPST systems are being used throughout the world.

THE TEAM

Angel CATENA ORTEGA,
Mario JASPER,
Palmiro STISSI

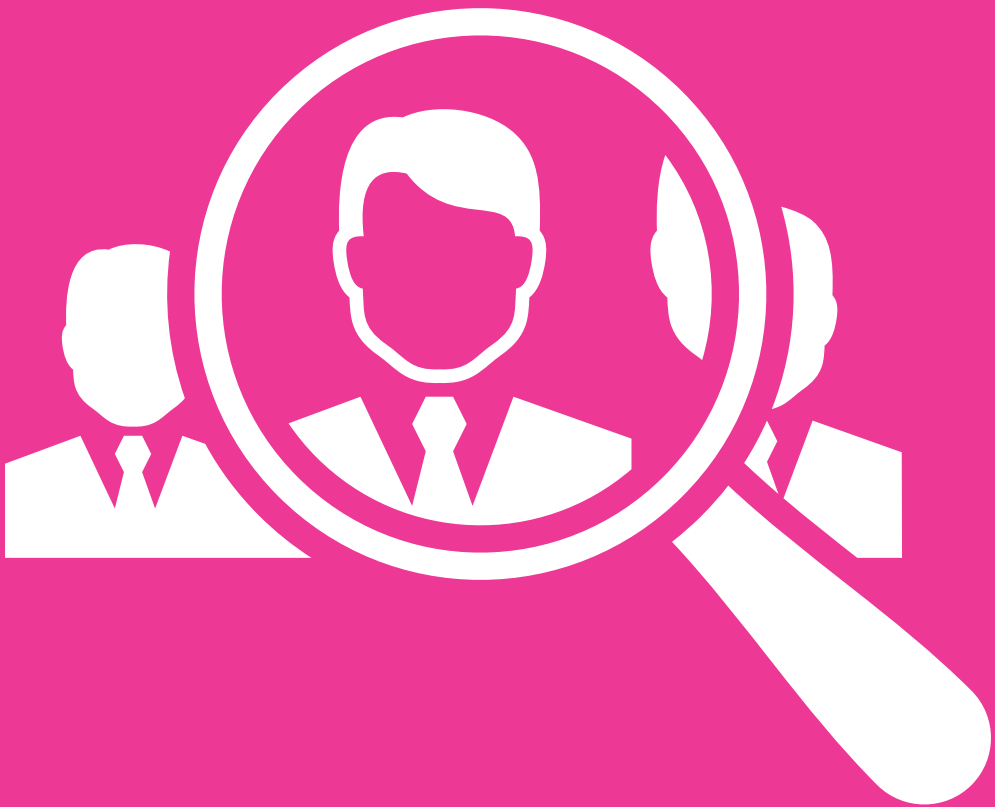
SST-09 // Cofely
Nederland



Going for Growth

Business development

02



EXPLORATION & PRODUCTION



DIONISOS, When Natural Gas Genesis Investigation Leads to Discovery!

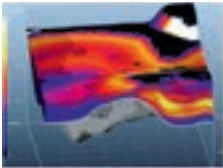
THE TEAM

Isabelle MORETTI, Bertrand COUREAUD, Olivier THIBON, Guy DESAUBLIAUX, Astrid FOSTER

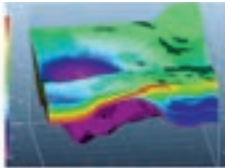
078 // Exploration & Production

OPTIMIZING HYDROCARBON EXPLORATION CAMPAIGNS

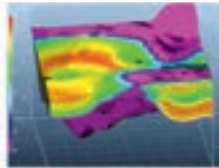
To improve hydrocarbon exploration campaigns, DIONISOS develops models of interactions between factors that determine the final quality of parent rock and the rock's organic matter content. The company is the first in the world to create 3D models of these kinds of deposits. DIONISOS software (developed in conjunction with IFPEN) can be used to locate "good" parent rock with great accuracy using paleo-shorelines and model parent rock characteristics so that users can be more selective in choosing exploration permits and focus on areas with the best features.



Good parent rock, may produce hydrocarbons



Low oxygen, the organic matter is preserved



High hydrogen index, will generate more oil than gas

Kathu CSP

A 100 MW SOLAR POWER PLANT IN SOUTH AFRICA

The Kathu Concentrated Solar Power project (100 MW) is the first of its kind for ENGIE. Both profitable and flexible, the project features innovations that help implement operation production chains to supply Eskom with renewable energy for 20 years. The Kathu project encompasses several innovations, including parabolic troughs and a thermal energy storage system. The project will create high-performing, flexible, profitable manufacturing and operating processes.

THE TEAM

Wim ALEN, Tom BEACH, Kartik BALASUBRAMANIAM, Ross KRIEL, Desnei LEAF-CAMP

374 // ENGIE South Asia, Middle East, Africa

GridPow'ER



A SMART, MODULAR, AND CONNECTED ENERGY STORAGE SOLUTION

GridPow'ER is a smart, modular and connected energy storage solution that helps boost production of renewable energy without destabilizing electricity grids. GridPow'ER is structured around three elements: containers with high-capacity batteries, containers that perform conversions to alternative energy and Profil'ER software that optimizes the production/storage ratio and pilots the units. The novel solution helps customers guarantee renewable energy production as well as revenues earned from it.

THE TEAM

Jean-Gabriel
STEINMETZ, François
NAJAC, Jean DOS
SANTOS, Éric CAHUET,
Pascaline RIVENQ

256 //
Cofely Ineo

Tank Maintenance Service

COMPREHENSIVE MAINTENANCE OFFERING FOR PETROLEUM STORAGE TANKS

THE TEAM

Laurent BOYER, Géraldine
MARCHAL-BONNART

113 // Cofely Endel

Cofely Endel has developed a comprehensive maintenance service for petroleum storage tanks. With a network of operation specialists and patented equipment, the company's service has already captured considerable French market share. The multi-site, multi-disciplinary, multi-business service uses New Beetle, a patented, autonomous load-handling system that helps reduce the number of employees required to handle tank-bottom sheet metal. The service helps customers save time on required operations while ensuring compliance with the regulatory framework (inspections and audit files).



GREEN ENERGY

BIODIN

ENCOURAGING BIODIVERSITY AT NATURAL GAS STORAGE SITES

The BIODIN project (BIODiversity INtegration) is backed by Storengy and aims to encourage the preservation of local biodiversity at underground storage sites for natural gas. Its objective is to initiate a dialog around positive values with local stakeholders and establish the social acceptability of its industrial facilities. Storengy has introduced an adapted management plan for the green spaces on its sites. It involves creating new wetlands, using bees as bio-indicators, delaying mowing, and abandoning the use of phytosanitary products. Three hundred sheep were introduced to certain sites to maintain the grassy areas. Goats can clear bushes from less accessible areas. By implementing adapted management strategies for green spaces, we can anticipate likely regulatory changes in Europe while developing specific know-how which can be leveraged in the markets of developing countries.



THE TEAM

Denis LECA, Cécile OTTO-BRUC (*Conservatoire d'espaces naturels de la région Centre*), Philippe BRAUD, Pascal MANTE

011 // Storengy



WASTE COLLECTION BARGES: A GREEN SOLUTION FOR THE CITY OF THE FUTURE

Developed in partnership with SUEZ Environnement, the waste collection barge boat consists of a specially-equipped barge and a tugboat that runs on electricity and renewable hydrogen. The tugboat will eventually eliminate all carbon entirely and run on a fuel cell powered by renewable hydrogen.

THE TEAM

Vincent BOREL, Alexis GERTZ, Frédéric STORCK

058 // CNR



GREEN HYDROGEN PRODUCTION USING ANAEROBIC DIGESTION FACILITIES

Anaerobic digestion facilities that use injection and cogeneration often experience difficulties with the quality of inputs and the availability of cropland on which to spread digestate. The innovation is to produce hydrogen using leftover energy in the digestate using recent technology.

THE TEAM

Didier CROCHETET, Sandra CAPELA, Jérôme NGUYEN

112 // ENGIE Europe



A New SIGnal for the Biodiversity and Quality of GrDF Sites

ANTICIPATING THE IMPACT OF CONSTRUCTION TO PRESERVE BIODIVERSITY

SIGnal is a unique tool, based on scientific methodology developed with the French National Museum of Natural History. It allows GrDF to preserve biodiversity on its sites, while optimizing the costs, by identifying the potential impact of construction on the environment. Thanks to its scientific methodology, software tool and stakeholder dialogue process, SIGnal identifies the potential impact of work on biodiversity before it is carried out. It helps to avoid or mitigate risks by adapting work procedures if necessary. Using the site outline extracted from GrDF's Geographic Information System, SIGnal indicates any regulatory requirements and prioritizes them, from the ecological sensitivity of the environment to the recommended preservation actions. Of all the sites that GrDF works on each year, around 1,000 are thought to be sensitive. The experiments carried out have demonstrated that detecting such sensitive sites in advance, thanks to SIGnal, made it possible to engage in a productive dialogue with stakeholders and avoid additional costs.



THE TEAM

Frédérique LE MONNIER, Éric CHABERT, Denis CAMPILLO, Bernard RIGAUX, Louis-Philippe MARTIM, Jean-Anet JOLY, Elvia MARCELLAN, Marie BERTRAND, Nathalie MACHON, Morgan ENSMINGER

451 // GrDF



GREEN PELLETS

The innovation lies in the use of a press to transform any type of green waste into pellets through mechanical friction and without going through the drying step. The objective is to develop this technology for local authorities (thereby lowering costs and increasing local value).

THE TEAM

Olivier RACLE,
Michel BOYADJIAN,
Clotilde GALEOTTI
COURNOU

180 // Cofely networks,
SOVEN



NOEMI NO EMISSION

When stored in fuel tanks at atmospheric pressure, liquefied natural gas produces fumes (boil-off gas) that are condensed and injected into the transport grid at high pressure. Otherwise, boil-off gas is flared, destroying value for customers and negatively impacting the environment. Evaporation recovery systems installed at the Montoir-de-Bretagne terminal in 2014 have helped save millions of Euros in unflared gas.

THE TEAM

Antoine BALLEREAU, Éric GERARD, Adeline BILLARD,
Bernard MICHON

377 // Elengy



REPLACING DIESEL WITH LNG AT STANDBY PLANTS IN CHILE

E-CL, a subsidiary of ENGIE in Chile, has developed a way to replace diesel with liquefied natural gas (LNG) in standby power plants, which are used during times of peak energy demand. In addition to lowering costs and improving the carbon footprint of LNG, the technology has allowed E-CL to generate supplementary revenue through the sale of regasified LNG.

THE TEAM

Nicolas VAN DEN
ABEELE, Enzo QUEZADA,
Saska STEVKOVSKA,
Juan MUÑOZ

365 // E-CL, Latin America



Reduction of Short-Circuits in Transmission Lines Caused by Vultures

PROTECTING POWER GRIDS IN CHILE

After trying different methods to avoid short-circuits caused by vultures on high-voltage lines, the team found an effective solution by modifying the design of the tower structure. In the Atacama desert in Chile, American Black Vultures can cause short-circuits when they land on pylons or power lines, causing disconnections. The solution that was found was to extend the structure by installing an extension on the crossbar between the phases and by replacing the electric jumpers with dampers that increase the vertical distance between the structure and the phases.

THE TEAM

Luis PAREDES, Juan
VALLEJOS, Juan LEÓN

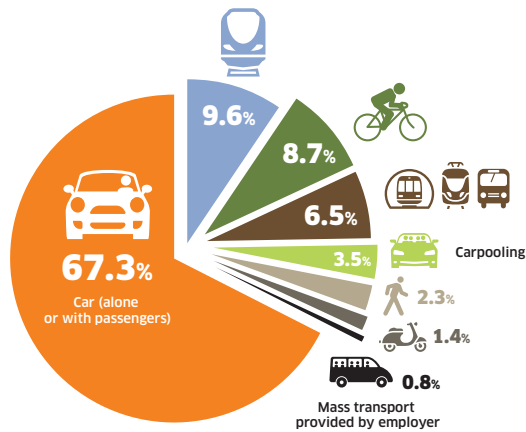
484 // E-CL,
Latin America



Mobil2040: Brussels Refreshed

COMBINING NEW MOBILITY SOLUTIONS

This innovative scheme, entrusted to the Technum consortium, addresses mobility in Brussels as a driving force for change to prepare for the economic, environmental and sociological challenges facing the Brussels-Capital Region, whose population will increase by 20% by 2040. Using a forward-looking and multi-disciplinary approach, Mobil2040 has developed a participative and internationally-applicable method to combine new mobility solutions. After three exhibitions, several international conferences, several thousand interactions on social media and more than 10,000 visits to the Mobil2040 site from a hundred or so countries, the scheme has established itself as a benchmark and can be applied to other cities.



THE TEAM

Salima ABU JERIBAN,
Bram VANDENBOOM,
Sébastien RODESCH

411 // Tractebel
Engineering

EV meets Building

A SMART VEHICLE CHARGING STATION

“EV Meets Building” is a flexible and decentralized solution to optimize infrastructure costs for electric-vehicle charging stations. The concept is based on a smart charging station created by Powerdale and an optimization algorithm developed by Laborelec. Currently one of a kind, the technology combines two of ENGIE’s guiding strategies: green mobility and demand-side management. It is based on unique digital architecture made up of independent modules interacting on an open platform.



THE TEAM

Daniel MARENNE, Emily DHONDT,
Laurent DE VROEY, Maarten VAN AERDE

160 // Marketing & Sales Europe



THE CITY HALL OF PARIS: A BUILDING THAT MAKES OF ALL ITS RESOURCES

The project recycles energy within an urban ecosystem, making use of and sharing recovered energy available locally. Using a mini-grid, an entire community in a building or neighborhood can enjoy the benefits of recovered energy. For the time being, only the city hall of Paris will be connected to the system. The energy recovered will serve 34% of the building’s heating and 100% of its cooling needs. Furthermore, the technology will result in a rate of 75% renewable energy for the heat produced and will reduce CO₂ by 250 tons per year.

THE TEAM

Djamal TOUATI, Antonio DI CECCA,
Alexis TAWFIK, Grégoire DE BRIE,
Marc ESCAILLAS

356 // CPCU, Climespace, Cofely Axima



A HIGHLY-EFFICIENT HEAT GRID AND THERMAL PLANT

The city of Aosta in Italy had no infrastructure for producing or distributing heat. Cofely Italia suggested making use of the residual heat produced by a steel plant by transferring the heat across an urban heat grid using a heat pump coupled with a gas cogenerator. The system’s exceptional energy yield (180%) is a major competitive advantage and has already resulted in a hundred or so customers connecting to the grid.

THE TEAM

Jean-François CHARTRAIN,
Stefania SARTOR, Mélanie OEHMICHEN,
Alessio CIOCCA

476 // Cofely Italia

Architect of the Energy Transition

EVALUATING THE IMPACT OF RENEWABLE ENERGY ON EXISTING ELECTRICAL SYSTEMS

Tractebel Engineering is offering its clients a new consultancy service to help them assess the impact of renewable energy penetration on their existing electrical systems. This multi-disciplinary approach represents a powerful tool that will help the company further its vision of the ongoing energy transitions. The firm's expertise is rooted in advanced simulation tools that use new technological concepts, including smart grids, demand flexibility and storage. From the planning stages through to implementation, the platform's expertise draws on the company's internal skills and support from an ecosystem of partners.



THE TEAM

Sébastien WAGEMANS,
Laurence CHARLIER,
François DEPIERREUX,
Tim HOFFMANN

311 // Tractebel
Engineering

Enhancing the Customer Experience

Commercial and Customer Relations

03





A Natural Gas Heat Pump in Single-Family Homes



MORE ENERGY FOR A SIMILAR INVESTMENT COST

GrDF and CRIGEN, in partnership with the manufacturer Robur, are developing the first natural-gas heat pump (HP) for the single-family homes market. This work was supported by a European project involving the suppliers ENGIE, E.ON and British Gas. The heat pump is particularly compact (one piece, installed outside) and has higher energy gains than an electric HP for a similar investment cost, as well as offering greater reliability. In addition, unlike an electric HP, its installation and maintenance are particularly suitable for plumbing and heating engineers: no need for a refrigeration specialist, no initial fluid load and maintenance similar to a boiler.

THE TEAM

Ludovic THIEBAUX, Thomas CASCARRE, Emmanuel BAVOUX, Juliette PROMELLE, Pierre DESENFANT

216 // GrDF, CRIGEN



THE EASY ESCO ACCELERATOR

The Easy Esco platform allows users to remotely calculate the difference between a building's expected energy consumption and its actual consumption. The platform converts the large amounts of raw data that the company has on a building into information that can help optimize energy performance.

THE TEAM

Giel VAN GIERSBERGEN, Bert ELKHUIZEN, Guido FRENKEN, Niek MULLER

119 // Cofely Nederland



AN ENERGY EFFICIENCY INITIATIVE

Energy costs eat up a significant portion of OPEX at Storengy's gas storage sites in Germany. With Cofely's help, the team implemented an energy efficiency project that reduces costs by 12% and greenhouse gas emissions by 50% using a comprehensive, sustainable solution.

THE TEAM

Joern UFER

047 // Storengy



THE TRIGENY PROJECT: DATA CENTERS AT FULL THROTTLE

In France, data centers represent nearly 7% of the country's electricity consumption. With its TrigenY project, GrDF is contributing to the growth of the digital economy, making it more environmentally friendly through the combined production of heat, cold and electricity using natural gas and biomethane together. One 15 MW data center equipped with this technology will begin operating in the second half of 2015—a first in France.

THE TEAM

Daniel LHERITIER, José GUIGNARD, Julien MORESMAU

060 // GrDF



THE ENGIE GREEN BOND: A CUTTING EDGE FINANCING SOLUTION FOR THE ENERGY TRANSITION

An alternative method for financing the energy transition to renewable energy, as well as energy efficiency projects that help diversify investor bases.

THE TEAM

Marie GERARD, Maxime PAULUS DE CHATELET, Grégoire DE THIERS, Vianney DE LAVERNEE

469 // ENGIE Corporate



D'EFFI: SUSTAINABLE BEHAVIORAL IMPROVEMENTS TO AID THE ENERGY TRANSITION

D'EFFI is the first comprehensive system that helps change the behavior of occupants to smooth the energy transition. Built in partnership with the customer, this modular system uses smart technologies and a new type of coordination: the eco-community management.

THE TEAM

Cathia MASCARAU, Karine LE BOURG, Élise DREUX, Jocelyn MOULIN

371 // Cofely Services



BREATHING NEW AIR: IAQ MEANS COMFORT, HEALTH AND REDUCED ENERGY USAGE

Indoor Air Quality (IAQ) is regulated in France at sites that take in children and is addressed in many building standards. The innovation in this solution consists of a new range of packaged services that are constantly updated to address and target the IAQ problem in a comprehensive manner for Cofely Services customers.

THE TEAM

Sandrine VILON, Priscilla PETINGA, Martial ARCHENAUULT, Stéphane GROUT

261 // Cofely Services, Cynergie

THE RESOURCE BENCHMARKING REPORT

Companies operating at thousands of different locations can find themselves needing information management abilities. The Resource Benchmarking Report (RBR) gives multi-site companies an instant, comprehensive snapshot of their business and provides a competitive in-house benchmark.

THE TEAM

Patrick EVERITT, Joe SINGLETON, Rick CLOUGH, Jeremy MOHR, Alison LIABOE

317 // Ecova



A Successful Lead-To-Revenue Growth Model Through Digital & Data Innovations

MAKING OPERATIONAL MARKETING ONE OF THE COMPANY'S CORE COMPETENCIES

To drive its growth and find new customers, Ecova has engineered a technology-driven lead-to-revenue model. Based on an innovative combination of two customer relationship management systems, Pardot and Salesforce, Ecova has succeeded in making operational marketing one of the company's core competencies. By combining these programs, the operational marketing team was able to roll out a comprehensive technology-driven marketing system (monitoring website and social network activity, multi-channel publications, search engine optimization), in conjunction with the sales teams and with Ecova's 1,400 employees.

THE TEAM

Shannon R. SCHEIWILLER, Joy FRYER, Colleen MOORE, Becky BATEMAN

089 // Ecova



PACKAGED OFFERS TO SATISFY INDIVIDUAL CUSTOMERS

The innovation lies in **synergetic construction** and the implementation of four comprehensive programs that cover energy, services, and financing to aid commercial development and meet the needs of individual customers.

THE TEAM

Laure RICHALET, Nathalie COSTE, Élisabeth TROCARD, Brigitte FAGUET

372 // Marketing & Sales Europe



COMPLEMENTARY SERVICES: INCREASED DIVERSIFICATION OF DOLCEVITA'S BUSINESS

The range of **complementary services** was developed to fulfill a need for **reduced energy usage and energy security** by offering a complete energy and service package to DolceVita customers.

THE TEAM

Sophie DEVOISIN-LAGARDE, Anaïs PIGEON, Florence AUDARD, Nicole BELLANGER, Jean-Christophe CHAMPARNAUD

211 // Marketing & Sales Europe



BENEFITTING FROM INTERNET USER EXPERIENCES TO BOOST DIGITAL PERFORMANCE

The first application of **Google Seller Ratings to a website** of one of the Group's entities (Biencheznous.fr). The tool is being used to improve the performance of digital actions both in terms of traffic volume and conversion rate in gas development.

THE TEAM

Céline KNECHT, Johanna NOWAK, Caroline GAULIN

039 // GrDF



InfoCoupure: How to Make our Customers Happy!



GRID INFORMATION IN REAL TIME

When grid incidents cut off their gas supply, anxious customers look for information on the internet and on social media. The InfoCoupure digital service developed by GrDF allows customers to find out, with just a few clicks and in real time, what is happening and when their gas service will be restored. Customers can find the service on the web quickly and intuitively by searching for “gas cut-off” or “gas leak” on a search engine. Some city councils have also listed this service on their websites and it is regularly tweeted by the local press. Customers have then real-time information on the impact of the incident, the progress of the repair work and the expected time at which gas service will be restored. Clever use of cartographic databases allows GrDF to guarantee its customers top-quality information.

THE TEAM

Xavier CHARLES, Vincent GAILHAGUET,
Pierre NGUYEN-TRONG, Patrick
CAYSSIALS, Frédéric CAMUS

080 // GrDF

GAMIFICATION



GAMIFICATION: ENGAGING OUR CUSTOMERS

ENGIE Energy Italy has used the concept of gamification to modernize its *vinciEnergia* loyalty program. Customers are encouraged to complete “missions” that promote good behavior. The initial results are in: 35,000 new members have signed up for the customer section at www.gdfsuez.it.

THE TEAM

Roberto MILAN, Giovanna FADDA,
Roberta DE FELICE

265 // ENGIE Energy Italy



THE GREEN QUEST

Green Quest is a fun, cooperative program that offers companies consultancy services for the energy transition. The program is a manifestation of ENGIE’s green philosophy and is supported by a partnership between Cofely Nederland, ENGIE Energie Netherlands and SUEZ Environnement.

THE TEAM

Frans VAN DEN BOORN, Vanessa PEETERS,
Eric HAVEMAN, Arno WURKUM,
Jannette DE LANGE

253 // ENGIE Energy Netherlands,
Cofely Nederland

Boosting Performance

Management

04



Towards a Collaborative Culture in BEI

THE TEAM

Brian HOLNESS,
Jonathan THOMSON,
Steve BELFORD,
Juan-Pablo ARCE

269 // ENGIE
Energy International



FACILITATING INTER-DEPARTMENTAL COLLABORATION AND SPREADING GOOD PRACTICES

The BEI Knowledge Management (KM) program aims to share available knowledge, best practices and expertise and promote collaboration between departments, functions and geographical areas. Its originality lies in strong managerial support and the power of a web collaboration platform which is truly accessible to all of the teams and is rolled out virally. The Energy International Business Line (BEI) has a vast amount of knowledge, expertise and experience which is not easily accessible to the rest of the organization due to the dispersed nature of its activity. However, transparency and sharing of information are vectors of collaborative performance and good governance both locally and globally. BEI's KM program provides everyone with easy access to the best knowledge, experts and expertise available in the branch and within the company. It promotes collaboration across the various departments, functions and geographical areas.

HAPPY MEN: A MANAGERIAL INNOVATION THAT PROMOTES EQUALITY AT WORK

Getting men involved in questions of equality at work is a new project. The goal of forming Happy Men Circles is to spark a dialog with women, including women's groups, on issues of manager quality, organization of work and personal and family growth.

THE TEAM

Sabine LUNEL-SUZANNE,
Arnaud TIRMARCHE,
Albert PEREZ

064 // ENGIE Energy
Services

INNOV'ASSIST: THE NETWORK FOR ASSISTANTS SEEKING DISCUSSION AND CO-DEVELOPMENT

A 3-in-1 project consisting of an organized network that aims to grow the assistant position. The program consists of a forum for discussions on advanced skills and of services located on an intuitive collaborative platform.

THE TEAM

Nawal GUEMMAR,
Kathy BONNARENS,
Erika VANZEEBROECK

424 // ENGIE Corporate

PEER-TO-PEER CO-DEVELOPMENT

The Knowledge Management Practice Community (COP KM) was formed in 2004 to promote transversal collaboration within the Group. It has developed a series of initiatives intended to professionalize network and community management. Based on innovative management practices, new co-development workshops trigger synergies and provide practical solutions. Attendees become actors in the transmission of skills and expertise through true cooperation forums.

THE TEAM

Monique RIBESSE,
Florence BLANCO, Valérie
GIBERT, Céline LESAGE,
Olivier SERVOISE

288 // ENGIE Europe

DigitALL: Employees Commit to Customers on Digital Channels

IMPROVING THE IMAGE OF GAS ON SOCIAL MEDIA

DigitALL is a self-formed group of GrDF employees intended to enhance direct expression on Twitter. Their “tweets” can now help to shape the positive image of natural gas on social media. Prior to the existence of DigitALL, the background noise for natural gas on social media was negative with 6.5 million mentions/month made by daily press, media and customer accounts. Now, employees and customers can interact on social networks. Thanks to the community of 400 employees active on

Twitter, the hashtag #TwittosGrDF has increased four-fold and its influence has increased sixteen-fold (as measured by the mentions on Twitter), becoming much greater than the official @GrDF account.

THE TEAM

Vincent GAILHAGUET
(#TwittosGrDF)

290 // GrDF



DIGITALL (di-dji-to);
c.n. (from Ancient Geek, Digital for All)

1. Activity conducted by motivated employees to enliven and share their experience of social and digital media.
2. A social community striving for a great digital cause with very limited resources.

Saltend Power Station Business Survival 2014

RENEGOTIATING AGREEMENTS MORE FLEXIBLY

Prompted by increased competition and short-term commercial deadlines, Saltend Cogeneration Company Limited (SCCL) had to innovate in terms of flexibility, efficiency and negotiating maintenance agreements. SCCL was faced with significant losses in January 2014 due to increased competition. A competitive auction for the UK capacity market that it had to win opened in December 2014. SCCL proceeded to make fundamental changes to its production chain in order to be successful in this auction process. It renegotiated its maintenance contract for the gas turbines in such a way that there is now more production flexibility. At the same time, all of the maintenance aspects were optimized to reduce costs and adapt to the market, including payment schedules, outages and prices. Besides maintenance, SCCL modified its gas supply agreement. This combined set of negotiations gave SCCL a competitive position in the British market to win the competitive auction.

THE TEAM

Mick FARR

401 // ENGIE
Energy International



PROJECT TOOLKit, the Project Manager's library

THE TEAM

Corinne BEAUFILS,
Olivier BURGER,
Patrick HARNOU,
Arnaud HENOUX

249 // Exploration
& Production



A DIGITAL LIBRARY FOR PROJECT MANAGEMENT

More than 60% of the capital-intensive oil and gas projects carried out around the world exceed their initial budget, especially because of project management shortcomings. To address this problem, ENGIE Exploration & Production International has developed a digital project management library that is accessible to everyone around the world and which could help cut budget overruns by 30%. The PROJECT TOOLKit provides immediate, simple and user-friendly access to more than 220 documents, case

studies, technical standards, project experience feedback, best practices and job descriptions. The reference system is based on the principle of central issuance and is distributed by a single entity, the depositary of expertise in this field. The PROJECT TOOLKit can be used in conventional, shared and secure digital environments. This innovative project provides real image benefits as well as a competitive edge to partners and contributes to employee satisfaction.



PROJECT MANAGEMENT EXCELLENCE IN THREE DIMENSIONS

ENGIE's projects in Jirau (in Brazil), Cameroon and in nuclear facilities are complex, involving numerous partners, many calendars, projects within projects, and various companies/players. This complexity led Tractebel Engineering to innovate by creating new tools and methods to resolve problems immediately. Whether a project involves a project management office (PMO), quality management system (QMS) or contract management, the same objective is achieved: a problem is converted into an opportunity to improve the quality and professionalism of service to the end client.

THE TEAM

Denis DUMONT, Jacintho ALVARES MOREIRA NETO, Rogério ZAMPARO, Xavier DANSE, Béatrice DESCAMPS

182 // Tractebel Engineering



SCORA* AND RISK EVALUATION OF COUNTRIES FOR PROJECTS

This innovation provides a comprehensive methodology for performing standard evaluations of country risk to estimate risk exposure in a specific country. The program provides support to the project team and contributes to decision-making by improving the comparability of projects in different countries.

THE TEAM

Coline LAPERCHE, Magdalena PIETRZAK,
Nicolas SPILLIAERT, Yoann MATOT,
Anne-Gaëlle COUTRIS

403 // Global LNG

* Standard COuntry Risk Assessment



CREATING VALUE BY COMBINING SPECIALIZED SKILLS

Combining skills from various entities in the company generates opportunities to provide overall maintenance solutions and helps us penetrate new markets in different countries and sectors. By combining our strengths, we can unlock more value both for the customer and for ENGIE.

THE TEAM

Niko CORNELIS, Jan MARTENS, Rudy CASIER, Simon EDWARDS

325 // ENGIE Energy Europe

WeTransform

THE TEAM

Romain PETIT,
Laurent FUREDI,
Laura KWIATOWSKI,
Denis RIEFFEL,
Emmanuel DIONNET

353 // ENGIE
Corporate

DEVELOPING A CULTURE OF CHANGE AND INNOVATION



ENGIE has set up WeTransform, the first internal MOOC (Massive Open Online Course) developed by a major company to mobilize its executives and managers on the issue of transforming the company. WeTransform is a MOOC that helps develop a culture of change and innovation, it informs and mobilizes the 30,000 executives and managers of ENGIE. It tests their level of knowledge of the company and allows them access to video courses produced by experts. The system also gives them access to other external MOOCs and lets them interact with the learning community. Just two weeks after its launch, more than 11,000 people had connected to it and over 13,000 courses had been viewed.

HOW TO INTEGRATE INNOVATION INTO COMPANY CULTURE

Prior to the Innovation Hub, there was no forum for discussing the latest technical, managerial or operational ideas whether ongoing or from previous Innovation Trophies. Employees had no way to review proposed ideas or projects. The Innovation Hub was launched in mid-2013 to fill this gap. This web-based platform helps users discover in-house innovations and talk with other employees about innovative projects. Another initiative that promotes innovative subjects is Innovation Tuesdays, a web-meeting that occurs twice a month to address a particular topic of innovation.

THE TEAM

Jennyfer BESSON, Catherine RICOU, Guillaume CASTELLAN

480 // Cofely Services

OPEN INNOV: THE COMPANY'S INNOVATION RADAR

Open Innov is an open innovation platform that gives ENGIE a direct channel to startups around the world, so the company can send out a calls for ideas and startups can reach out to the company directly.

THE TEAM

Olivier SERVOISE,
Ludovic PARISOT, Godefroy
SCOTT DE MARTINVILLE,
Nicolas VERNEY,
Vincent GASCHIGNARD

461 // ENGIE Corporate

HEALTH AND SAFETY



FIRE SIMULATION TOOLS

A new Royal Order requires a fire hazard analysis to be created and updated for all industrial installations in Belgium. Tractebel Engineering's nuclear division has used its knowledge and expertise in fire management to develop new calculation algorithms. A version for tablet captures data during site visits and performs real-time simulations that help save an estimated 70% in time and reduce the risk of errors. Using software to perform the calculations and processing allows massive numbers of calculations to be performed in parallel. The process ensures better traceability and reproducibility of results.

THE TEAM

Louis KWAHOU KEZEMBO, Xavier LEBLANC,
François-Xavier BOUCHEZ, Étienne CLAUS

343 // Tractebel Engineering

THEMIS: SALARY MANAGEMENT SOFTWARE TO IMPROVE MANAGERIAL PRACTICES

THEMIS was developed on the web to support managerial decisions when it comes to pay raises, making raises more equitable and improving recruitment. The software helps managers visualize the impact of their decisions and position employees in relation to their counterparts.

THE TEAM

Camille LE PEMP,
Carine BEAUSSIER,
Jean-Michel PIERRON

095 // GrDF



AN EMERGENCY RISK ANALYSIS PEN

This pen helps assessors save time on individual general risk evaluations. LMRAs now take only a minute and require no additional bureaucratic procedures.

* Last Minute Risk Analysis

THE TEAM

Herbert SNOECK, Henk WEITS, Gabry DE KOVEL,
Martijn VAN DER STEEN

109 //

Exploration & Production



VPS DIGITALE

ENGIE managers use Preventive Safety Visit (VPS) software to improve employee safety. The software processes behavioral observations by managers of employees in action. Managers share their observations with their employees, and together they work to find solutions to eliminate risky behavior. VPS Digitale uses modern technology and devices, including the iPhone and iPad, voice recognition, and digitization. Managers dictate their observations and their immediate or recommended actions into their iPhone or iPad, and the software automatically converts them into the digital ENGIE document format, complete with photos of hazardous situations.

THE TEAM

Philippe WOLFF,
Joseph SOEIMA

048 // Cofely Services

FIELD TRAINING



Successfully Integrating Young People from Overseas

A PROGRAM TO PROMOTE EQUAL OPPORTUNITIES

The Ultramarine project is a system for hosting young people from underprivileged backgrounds in French overseas territories on work-study courses in mainland France. By pooling the Group's public and internal expertise, this program provides an answer to the issues of employment and the development of French overseas territories.

Born from exchanges between the Directorate General for Electricity of Tahiti in French Polynesia and the HRD of the Energy Service Branch in 2012, the Ultramarine project was developed in close collaboration with public partners. This program has enabled 14 young people to complete their degrees after 20 months of studies and work in six of the branch's business units. Nine of them have been hired on permanent contracts by ENGIE, including four in their home territories. Five of them have decided to continue with their studies. A second promotion of 15 young people has been involved in the process since October 2014, demonstrating the potential of the system. This could be extended to all the sectors of activity.

THE TEAM

Olivier HEROUT,
Valérie SOK, Lien NGUYEN

308 // ENGIE
Energy Services



VOCATIONAL TRAINING IN COOLING

This is a training program whose curriculum and teaching methods diverge from traditional methods. A virtual platform that provides employees with fun, interactive learning tools and allows them to share good practices and communicate with their peers.

THE TEAM

Angélique BERNHARDT, Frédérique PFUND,
Jonathan LEGUIL

272 // Cofely Axima



CAP COMPETENCES, NORTHWEST NETWORK

Cap Competences is a program that helps oil and gas employees grow professionally throughout their careers. It promotes the safety of assets and employees and boosts performance at GrDF.

THE TEAM

Émilie VIAUD, Sébastien ERASIMUS,
Grégory VISSAC

455 // GrDF

Imagining the Future

New Fields of Business

05





Energy-Health

HELPING THE ELDERLY AND DEPENDENTS STAY IN THEIR HOMES

THE TEAM

Julien PATTIN, Gwenaëlle SAMYN, Salvatore GIULIANA, Stéphanie MERGER, Jean ROUSERE

523 // ENGIE
Corporate

Fostering a better home life for dependents and elderly persons, focused around a winning trio: energy renovation, housing adaptation, and connected technologies. ENGIE and the Mulliez group are building a project that will combine energy efficiency and comfortable amenities to provide home care for elderly and dependent persons thanks to smart devices. The offer-

ing will include a housing health/energy diagnosis, installation work and its financing, as well as in-home health and wellness services via a connected platform of retail services offering a full range of solutions to professionals working with their clients, coordinating caregivers, doctors, food companies and associations.



USING SMART DEVICES TO IMPROVE ENERGY EFFICIENCY: THE SIGFOX NETWORK

French company **Sigfox** is proposing a **low-speed, long-range wireless cellular network**. The network has a range of several kilometers in town and several dozen kilometers in the country. It will be used with devices that send signals and sensors that transmit only small amounts of data (no more than 140 12-byte messages per day). The project's innovation lies in the use of the long-range wireless network with sensors, making it significantly easier to install energy and environmental tracking instruments at sites that Cofely operates.

THE TEAM

Igor PERRET, Hervé BIDOU, Richard BRY, Yves GARNIER

086 // Cofely Services, Cylergie



NEMO (NEURAL MONITORING)

According to the World Health Organization, **there are more than 372,000 drownings every year**. The NEMO project team and its partners spent more than two years working on a technological system designed for swimming safety. The team developed a secure, proprietary coastal air/sea communication network that senses smart devices in hostile environments, coupled with a predictive neuronal system. The well-known initial phase is built for professional rescuers, but there is potential for greater development for the general public.

THE TEAM

Laurent RENAUDON, Pierre MONGET, Reza MOOSUN, Stéphane POLLATO

345 // Cofely Ineo



STRONG SIGNALS FOR SMART GRIDS

Because stations work as Faraday cages, they require an outdoor GSM antenna in order to transmit signals. This requirement makes stations vulnerable to damage and weather effects. Poor signal transmission can affect industry security and lead to costly corrective measures. To remedy this, the innovation consists of coating the GSM antenna in an epoxy resin to protect it from impacts and chemical damage, resulting in improved signal quality and durability against the environment.

THE TEAM

Pascal BALLON,
Christine MIEL

379 // GrDF



Energy transition at home

MANAGING HEATING BUDGETS

Featuring a smart thermostat and an intelligent plug-and-play gas meter, Homni is the only product in the world that lets users see their consumption, estimate their usage for the current month, manage their household temperature from afar and control their budget. Homni comes with a thermostat, a switch that controls the water heater and an optical sensor that attaches to the gas meter. Through its choice of technologies, Homni is compatible with almost all water heaters and gas meters. Homni is protected by three patents, including one for managing heating budgets.



THE TEAM

Florent BERGERET, Stanislas DE CREVOISIER, Pierre DUGNETON

254 // Marketing & Sales Europe



Silver Serenity

THE TEAM

Marie-Annabelle
QUILLON, Joëlle GITTON,
Jean-Claude BENISTI,
Valerie GIBERT, Catherine
MANTEL

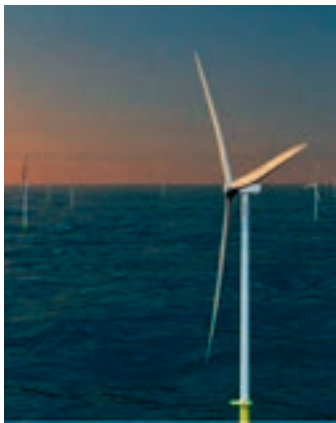
260 // Marketing
& Sales Europe

SERENITY AT HOME

The world of connected objects (in this case, light bulbs) is opening up to the elderly, for in-home support and peace of mind. Thanks to the new technologies of the Internet of Things, if the resident does not pass by the various locations where the bulbs are installed for a certain period of time, an alert is triggered. The resident will then be contacted by phone, and if they do not answer, relatives will be contacted by text message. If no response is obtained from either, an emergency plan will be activated.



Offshore Wind Farms: an Alternative to Direct Current



REDUCE CAPEX AND MAINTENANCE COSTS

For the Gemini project, an offshore wind farm, Cofely Fabricom and Tractebel Engineering have devised an innovative technology for offshore High Voltage Alternating Current (HVAC) lines. This solution circumvents the installation of a more expensive and more complicated High Voltage Direct Current (HVDC) line. The wind farm project (600MW) is

located 100 km off the coast of the Netherlands. Over such distances, traditional offshore HVAC lines cannot be used. Therefore, only the installation of a Direct Current line was originally planned. The innovation consisted of a new design for an offshore HVAC line, combining a newly-developed high-voltage AC power cable (220kV) and responsive voltage regulator systems. The solution has reduced the CAPEX on this export line and also reduced line maintenance costs and losses.

THE TEAM

Willy MARTENS, Pascal BRUNET, Guy VAN HEURCK,
Gerard VAN MOSSEVELDE, Francisco SANTIAGO-CAROU

268 // Cofely Fabricom, Tractebel Engineering



PORTABLE ICE PROTECTION ROOF

During winter months, ice can accumulate on wind turbine blades. During this time, approaching or entering wind turbines is prohibited due to the risk of ice falling. Consequently, turbine repairs cannot be performed, resulting in a loss in energy production. The solution consists of a hydraulic mast that positions a roof structure so that workers can safely enter the turbine. The roof is affixed to a sled that can be towed by tracked vehicles.

THE TEAM

Mark HACHEY, Raphaël ROY

042 // ENGIE North America



USING WIND TECHNOLOGY IN HYDROELECTRICITY

The full renovation of the Saint Géry hydroelectric plant combines some of the latest technical innovations –including a new type of alternator, whose permanent magnet technology is traditionally used in wind turbines and fish-friendly turbines– with local expertise. The renovation demonstrates that hydroelectricity development is compatible with even the strictest environmental and societal requirements.

THE TEAM

Serge PEREZ, Alain MALBERT,
Loïc LARRANDABURU, Serge CLERENS

107 // SHEM



How 3D Printing will Considerably Impact ENGIE Production and Maintenance

EXPANDING THE USE OF METAL 3D PRINTING

The aim is to pilot a research and development program working on metal 3D printing and its applications within the company. The rewards will be considerable for the company, particularly in terms of the production, storage and supply chain of spare parts. Laborelec has been charged with leading a four-year research and development program. This includes the construction of two complementary working cells (the 3D Printing Lab at the University of Leuven and the Fab Lab at Cofely), each equipped with a metal 3D printer, which will develop the know-how and skill necessary for the use of metal 3D printing within ENGIE's business activities.

THE TEAM

Steve NARDONE, Sigrid GIJBELS, Bruno DEPPE, Vincent CHAUVIN

339 // Laborelec, Cofely Fabricom



Continuité 3D

A FASTER, ACCURATE DESIGN AND INSTALLATION PROCESS

THE TEAM

Vincent CHAUVIN, Olivier GARTISER, Olivier SIMON, Gérard LE NIN, André JOUET

394 // Cofely Endel



Cofely Endel has developed a specific system for piping installation: Continuité 3D. The process is based on 3D surveys for millimeter-level preparation of assembly. It constitutes a break with the state of the art and a patent has been filed. Cofely Endel is one of the pipefitters selected for the EPR project in Flamanville. It is in charge of installing 120 km of pipes and over 35,000 supports. The civil engineering for such projects does not always match at 100% theoretical 3D digital models. Any discrepancies that exist, as minor as they may be, can lead to delays and major cost overruns. Faced with this challenge, Cofely Endel has revolutionized the pipeline production chain from design through to production, enabling it to operate without any delays. The process is 50% faster than those of competitors.



DIGITAL 3D MODELS OF REINFORCEMENTS FOR THE HINKLEY POINT EPR

A significant portion of delays and cost overruns in recent prototypes of new nuclear reactors is caused by building and construction. After receiving feedback on the EPR Flamanville project, it became apparent that there was a need for digital 3D building models that include reinforcements for the concrete's framework and equipment anchoring parts. The innovation is two-fold: in the methods used (the development of specific tools to create digital 3D models of reinforcements) and in the finalization of the models (the consistent resolution of interferences before the construction stage).

THE TEAM

Thierry JOSSERON

415 // Tractebel Engineering

Concertis

COORDINATING ROAD CONSTRUCTION

Today, optimizing the coordination of road construction is often still an impossible dream for communities, network operators and residents. Concertis is the 2.0 solution, available for mid-sized communities (population 5,000 to 100,000). The challenge faced by Concertis is to coordinate all kinds of roadwork projects, both those carried out by municipalities and by network operators. Concertis meets three objectives: reduced nuisance for local residents, reduced costs and time savings. Concertis guarantees these results by providing its clients with a consultant to mobilize those involved and bring together their points view and a web platform developed to collect and process construction timetables.

THE TEAM

Tristan RIGOU,
Emmanuel FRANCE

327 // GrDF

SPRINT: SMART PIPE IN LINE TOOL

In order to repair transport pipes without interrupting flow, operators must divert the stream, a difficult and complicated process requiring a specific plug called a "Stopple", which has a virtual monopoly on the market. The objective of SPRINT is to offer an innovative, patented, alternative technical solution that uses the SPRINTool piston, which allows pipes to be worked on more quickly and safely and without interrupting the flow.

THE TEAM

Benoît ACKER, Charles FERNANDEZ,
Melissandre BONNAUDET

419 // ENGIE Corporate

ESPRIT SERVICES COLLABORATEUR

Esprit Services Collaborateur (ESC) works as an independent agency that boosts performance. At any time, ESC can collect anonymous employee feedback on services rendered by the company, rate products and processes, and make recommendations. ESC also provides a process for handling complaints and a blog of corrective measures, analyzes anonymous data from the company, and detects weak signals and social trends.

THE TEAM

Bruno SANCHEZ

166 // ENGIE Energy Europe

Robotics at the Service of Buildings and their Occupants



ROBOTICS AT THE SERVICE OF ENERGY PERFORMANCE

Cofely Services and Partnering Robotics have developed a partnership to promote new services through the DIYA ONE robot. They will be working toward the development of innovative applications to improve the energy performance of buildings and the well-being of their occupants, combining robot intelligence and human intelligence. This non-humanoid robot is self-learning and can interact with its environment. The goal is to develop services associated with this robot such as the energy consumption record, the dissemination of information to occupants, or acting directly on electrical devices in sleep mode.

THE TEAM

Laurent FLEURY, Jennyfer BESSON, Anne-Laure PATÉ, Alain MOISSANNE

349 // Cofely Services

EasyPower

AN ALL-INCLUSIVE ANNUAL FIXED CHARGE FOR GUARANTEED GREEN ENERGY

The EasyPower offering consists of an all-in green electricity supply contract, at a competitive price with long-term predictability, which includes the provision of a decentralized production capacity, the provision of the residual commodity and related services. This concept, based on the principle of an annual, all-in flat fee, is the first of its kind in the world. EasyPower offers, along with handling administrative procedures, consulting, technical consumption monitoring systems, third-party financing for all equipment (PV, batteries, smart meters), insurance, and a loyalty program. EasyPower customers thus have the benefit of a sustainably competitive offer, without the up-front equipment-related expense. Unlike the offers currently available on the market, EasyPower covers all of its customers' energy needs without making them bear the risk of a failure in the decentralized system.

THE TEAM

Fabrice TALIFRÉ, Frédéric DARDENNE, Hervé DELAS, Robert MUHLKE, Philippe BOURGUIGNON

266 // Marketing & Sales Europe

Building Sustainable Solutions

Operations Performance

06





World First: Pipeline connection using high-pressure isolation

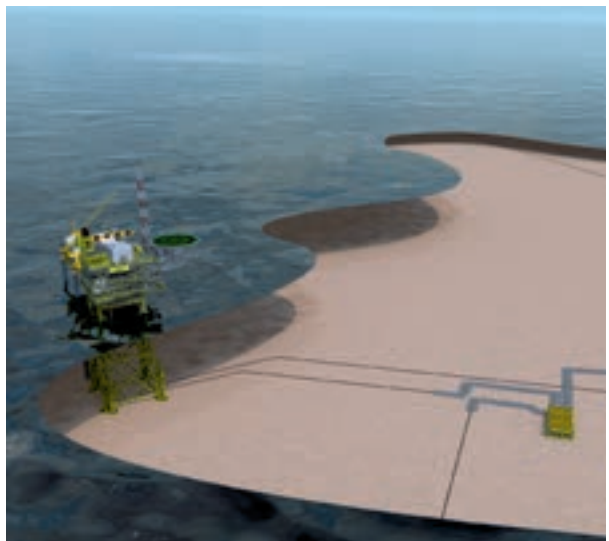
CONTINUOUS UNDERWATER CONNECTION

The Cygnus gas platform, installed in the UK North Sea, was tied into the underwater Esmond Transportation System (ETS) network via a 50 km long pipeline. The traditional connection method was discarded in favor of an innovative high-pressure isolation system, thereby avoiding interruptions to the operation of the network. A mechanical isolation device, composed of pistons, was introduced into the pipeline in order to stop the hydrocarbon flow at the location where the connection is to be made. These pistons produced a double barrier isolating a section of about one kilometer, without depressurizing 165 km of pipeline which was under 72 bars of pressure. The second step consisted of retrieving the pistons which could not advance or retreat due to the configuration of the pipeline. The innovative solution implemented by the team revolves around the design and installation of a custom-built piston blow joint attached to the collector located at the bottom of the sea. This operation, performed in a mere 19 days, is the first of its kind. The team's ingenuity enabled this to be achieved for a lower cost and with an operation time cut to a fifth of that for the original solution.

THE TEAM

Duncan RAITT, Mike GRAY,
Ryan McPHERSON,
Derek GRIMSHAW

040 // Exploration
& Production





The Gas Well Resuscitator



IMPROVING THE PERFORMANCE OF END-OF-PRODUCTION GAS WELLS

ENGIE E&P Germany (DExPro) has adapted and improved the Well Head Compression (WHC) concept by developing a small mobile compressor which can considerably improve the performance of end-of-production wells. Installing WHC devices enables end-of-production wells to be boosted by decoupling them from the rest of the field on a case by case basis. Gas production is sharply increased. In addition, the technology is suitable to a broad spectrum of wells, both in terms of pressure and flow rate. In 2014, the first WHC was tested in Germany. It was able to increase the gas flow from 300 Nm³/hour to 470 Nm³/hour (or over 50%).

THE TEAM

Thomas JÜRRIENS, Eckhard BLEUMER, Andreas BOCK

218 //

Exploration & Production



SmartAnalog

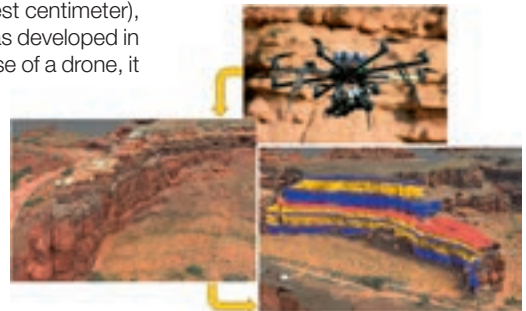
IDENTIFY HYDROCARBON DEPOSITS USING 3D

SmartAnalog is an innovative tool for acquiring low-cost, ultra-high resolution 3D geological models that is unrivaled in the industrial or academic world. The objective of SmartAnalog is to establish advanced “analogies” between the sedimentary outcrops observable on the surface and geologically comparable layers located several hundred, or even thousand meters deeper, and likely to contain hydrocarbons. To do this, SmartAnalog relies on a complete acquisition, processing, and interpretation chain for 3D ultra-high-resolution digital models of outcrops (to the nearest centimeter), that has no equivalent in the world today. This technology was developed in partnership with IFPEN* and Acute3D. Combined with the use of a drone, it can study sites that are difficult to access. The innovative geological analysis software was developed to exploit this extremely information-rich data.

THE TEAM

Bertrand COUREAUD,
Thomas SCHAFF, Ross
CATTO, Gautier DANIAU,
Guy DESAUBLIAUX

273 // Exploration
& Production



* IFP Energies nouvelles



CARE: Inspecting boilers by drones and robots



THE TEAM

Marc EYCKMANS, Gregory MEYS, Mike FEDOSIUK, Jan VANOUDENDYCKE

010 // ENGIE
Energy Europe



DRONES AND ROBOTS FOR BOILER INSPECTIONS

The “CARE” project is intended to develop visual inspections of pipes and boilers by drones and robots. By eliminating safety risks such as high temperatures, confined spaces, and difficult environments and reducing inspection time, the project intends to improve the performance of visual inspections of pipes and boilers. Initial tests have shown that drone and robot inspections can save tens of thousands of euros in scaffolding costs. Maintenance costs are reduced by four days for an internal boiler inspection.



OPTIMIZE EMBANKMENT INSPECTIONS USING DRONES

By loading a high quality mass market camera on a drone or ultralight, it is now possible to track soil movement in 3D – 100% automatically with an accuracy of several millimeters.

THE TEAM

Paul-Henri FAURE, Laurence DUCHESNE

062 // CNR



A DRONE SKILLS RESOURCE FOR THE GROUP

The goal of “ENGIE Expert Drones Lab” is to develop drone solutions adapted to the specific needs of different applications within the Group. Its drone system expertise as well as the historical expertise of CRIGEN means that it can offer three solutions: Research and consulting, Training for Remote Controlled Aircraft, and High Value Added Assignments. Its sphere of activity covers Europe as well as the rest of the world.

THE TEAM

Solène DE FERRIERES, Philippe LOUVEL, Jean-Louis DEVEAUTOUR, Erwin GEORGE, Maxime LECCHI, Andrés GALNARES, Patrick COMONT

393 // CRIGEN



SECURITY FOR INDUSTRIAL FACILITIES AT SEA, IN PORTS, AND ON SHIPS

The use of smart naval drones equipped with means to identify and intervene with a hostile craft, is a first in maritime transport. Today, this project consists of a single solution capable of responding to maritime terrorism anywhere.

THE TEAM

Jean-Philippe BERILLON,
Jean-Charles DUPIRE, Marc DAUMAS,
Jean-Louis DEVEAULTOUR

499 // Global Gas



INSPECTIONS BY ROTARY-WING UAVs

Ineo RHT is the first company to have offered RTE inspections of pylons by UAVs, thus providing a quicker, safer and cheaper solution! The great advantage that Ineo RHT has is its ability to combine its core-business expertise with expertise in UAVs and thus offer a turnkey solution (inspection, data analysis, adapted, targeted maintenance further to observation) that stands out from the competition thanks to the company's technical expertise.

THE TEAM

Jérôme AGUILHON, Gwénaél RIOUAL

494 // Cofely Ineo

INDUSTRIAL WATER



Biopolymers: innovative treatments against biofouling of water systems

TWO PATENTS FOR A PROMISING SOLUTION

The use of biopolymers as anti-fouling agents is a world first. ENGIE has filed two patents. This green solution is applicable to all industrial processes that include a water system. CRIGEN found a biotechnology based on the use of exopolysaccharide biopolymers from marine bacterial strains to be promising. These biopolymers

form a very thin film on the surface, which interacts with bacterial adhesion processes. Outside LNG terminals, biopolymers can give the group a competitive edge in thermal plants, heating and cooling networks, tubing for exploration wells, production or storage, even offshore wind turbines.

THE TEAM

Marianne GALLARDO,
Philippe BOUCHY,
Mailys PALE

133 // CRIGEN



TWINZAPP TREATMENT, BETTER QUALITY WATER TO INCREASE GAS PRODUCTIVITY

ENGIE and Parker Hannifin developed a radical innovation by using electrooxidation to treat wastewater discharged from production platforms. This new application was subjected to numerous modifications to adapt the process and make it as efficient as possible.

THE TEAM

Ronald ROMIJN, Fred VOLDERS,
Pierre-Yves CHAMPAGNE

103 // Exploration & Production



SEDIMENT ELIMINATION SYSTEM AT THE JIRAU 1 HYDROELECTRIC PLANT

When the Jirau hydroelectric plant was commissioned, the panels forming the cofferdam around the water intake for the plant needed to be removed. The considerable accumulation of sediments made it necessary to find an alternative solution to dredging. The innovation was to transform the sediments into suspended matter, freeing the areas of interest for removing the panels. The method involves injecting air.

THE TEAM

Claudiney CHAVES FREITAS,
Pedro Henrique GUALBERTO FARIAS,
Alfredo CABRAL BERNARDO

326 // ENGIE Latin America



OPTIMIZING SEAWATER PRE-TREATMENT PROCESSES AT REVERSE OSMOSIS PLANTS

In seawater desalination plants that use reverse osmosis, it is essential to maintain good water quality for the water entering the membranes in order to preserve their quality. The pre-treatment process parameters must be monitored at all times and optimized to reach and maintain the best process water quality. The project was able to reduce the use of cartridge filters (CF) by 50%, to cut waste by 50% and to limit costs of CFs.

THE TEAM

Abdullah AL RAWAHI, Muhammad Haseen SADIQUE,
Younis AL RAWAHI

187 // ENGIE South Asia, Middle East, Africa

MOBILE PROFESSIONAL APPLICATIONS



Opérateur Connecté®

SHAPED FOR DEMANDING INDUSTRIAL ENVIRONMENTS

THE TEAM

Géraldine MARCHAL
BONNART, Jean-Pierre
LAURENT-MENNESSON
Arnaud RAT, Netty ROSIER

414 // Cofely Endel

Opérateur Connecté® is the flagship project in the digital transformation of Cofely Endel and provides a unique set of digital applications embedded in mobile tablets and smart objects. Specially fitted for industrial environments, Opérateur Connecté® is a patented solution. By building on the Internet of Things (camera, connected harness, etc.) and a reinforced tablet, Opérateur Connecté® can already be used

on numerous applications: Nurse (digital assistance through all the stages of a file), TED (provision of expertise on sites by videoconferencing), and ARGOIA (managing concurrent activity on sites to maximize safety and productivity). ENDY Home, Smart Warehouse, etc. Deployed to 60 operators by 2014, Opérateur Connecté® uses its applications on a daily basis, generating a productivity gain of over 8%.



COFELY
MOBILE FOR
OPERATIONAL
EFFICIENCY

A total and radical overhaul of the mobility of all 4,000 Cofely technicians, in just one year, transforming a very technically limited solution (single platform, proprietary) into a user-friendly, agile multi-device system.

THE TEAM

Marie YMELE-LEKI,
Annick RUFF,
Jean-Nicolas MARNET,
Emmanuel FOUCHE,
Hervé KERLEGUER

245 // Cofely Services



PUTTING
QR CODES
TO WORK
FOR OUR
STAKEHOLDERS

QR Code technology paired with the use of smartphones and applied to GrDF industrial processes enables us to improve the traceability of documents exchanged and the quality of the information sent, improve the ease of document exchange for better operational performance and client satisfaction.

THE TEAM

Mickael HAGUE,
Joël PELLAT,
Benoît DE LA SALLE

337 // GrDF



REMOTE
ADVICE WITH
CONNECTED
GLASSES

The project proposes using connected glasses, in combination with one or more business experts in order to benefit from support, information sharing, advice and feedback, all over the world and in real time.

THE TEAM

Yannick LUIS,
Luc DE GREGORIO,
Vincent PLAGÉ,
Philippe GILLINO

384 // ENGIE Energy
Europe

Mapping using Mobile LIDAR



THE TEAM
Boris LUSETTI,
Fabian MORELLE,
Daniel COLLOUARD

426 // GrDF



MODELING AND UPDATING THE GrDF NETWORK

By combining LIDAR (Light Detection And Ranging - Remote Sensing using Lasers) with a vehicle, GrDF can model its urban base maps in 3D and then connect them to the georeferencing for its natural gas distribution network. This extremely economical and reliable system can keep GrDF's maps updated. After a change in regulations, GrDF needed to georeference its network on 750,000 maps which must be updated very regularly in order to take into account changes in the external environment. In order to reduce costs, GrDF uses mobile LIDAR: a light wave sensor placed on a moving vehicle can model the urban environment. A scatterplot with centimeter-level precision is generated in a fraction of a second enabling connections to be made between several maps, and altitude to be reported (Z). Lidar is combined with a GPS, an embedded computer and an inertial measurement unit which can provide all of the coordinates in a precise manner in areas where GPS does not work.

Gas Turbine Air Inlet Filtration Optimization



THE TEAM
Stuart BLACKBURN, Neil JACKSON, Miklós ALMASY DE ZSADANY, Hannes LAGET, Arnaud LAMBERT

497 // ENGIE
Energy International

MAXIMIZE PLANT PERFORMANCE AND RELIABILITY

The Energy International branch manages over 250 gas turbines. The fleet is diverse and each air filter manufacturer offers specific filters. The team launched an initiative to optimize the filtration of air inlet systems in order to maximize plant performance, availability, and reliability while reducing operational costs and CO₂ emissions. Optimization is based on a total cost of ownership

methodology which takes account of filter costs, availability of turbines, capacity and heat rate impacts. An experienced multidisciplinary team was mobilized to use all of the technical and commercial expertise of the Group. To date, optimization of filtration systems for gas turbines has been conducted successfully on four turbines, and represented savings of several million euros per year.

ELENA Piscines

THE TEAM

Martial ARCHENAUULT,
Marie-Ève GSTALDER,
Stéphane SAINTOT,
Sandrine VILON

294 //

Cofely Services

ADJUST VENTILATION IN REAL TIME ACCORDING TO YOUR NEEDS

ELENA Piscines is an innovative energy optimization offering dedicated to aquatic centers and using specific automation which is the subject of a European patent. For a local authority, the municipal pool is one of the buildings that consumes the most energy with average energy consumption of 1 GWh of heat and as much electricity. Developed by Cylergie for Cofely Services, the ELENA Piscines solution can adjust ventilation in real time based on the needs of the pool area. It takes all of the constraints into account to ensure overall optimization of a system as complex as an indoor pool. It is based on existing facilities, avoiding additional CAPEX. Launched in 2014, ELENA Piscines has achieved savings of 10% on electricity consumption and 5% on heat consumption.



REDUCE MAINTENANCE COSTS WITH THE "EVENT MANAGEMENT TOOL"

The control system for an industrial site gathers alarms for different production events. The innovative feature of the system is being able to retrieve these alarms to conduct real-time statistical analysis. These analyses are used to optimize maintenance while keeping up the same level of reliability and lowering costs.

THE TEAM

Julien ZAMARRENO, Philippe MOREL,
Samuel ETRILLARD, Vincent JOUIN,
Christophe MERCIERE

051 // Elengy

CONNECTED SENSOR/ACTUATOR TO SECURE DOMESTIC GAS INSTALLATION

Over 11 million people in France are connected to a natural gas network and about 10 million use liquefied petroleum gas. The project to boost customer confidence consisted in installing one or more detectors near domestic gas facilities. If an abnormal concentration of gas is detected, a signal will be sent automatically to the actuators installed on the domestic network, resulting in immediate shut-off of the natural gas supply.

THE TEAM

Arnaud FOISSAC, Baptiste GENIAUT

395 // CRIGEN

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