FOCUS

ENGIE & DIGITAL INNOVATION

November 2019

contents

Digital innovation, a driver of transformation for ENGIE

Our convictions

ENGIE, a major energy player that is firmly committed to achieving harmonious progress, is using all its research and innovation capacity to take up this challenge and provide its customers with more advanced, greener services.

ENGIE is currently focusing its innovation efforts on the following specific areas:

- *Sustainable mobility*
- *Decentralized energy*
- *Smart buildings*
- *Managing towns and regions*
- *Developing hydrogen*
- *Energy storage solutions*

The digital revolution has not only revolutionized the way we use technology, but it has also profoundly transformed how companies operate and their approach to technology. From artificial intelligence through to infobesity and the Internet of things (also known as IoT), we therefore invite you to discover ENGIE's solutions to achieve more harmonious progress, so that digital innovation can go hand in hand with sustainable development and energy efficiency.

Digital technology is all around us, in our daily life and in the economy. An increasing range of technologies now permeate the daily functioning of our society. What are we referring to? What are the challenges and limits of these topics? How can they be applied to the energy sector and in particular to ENGIE?

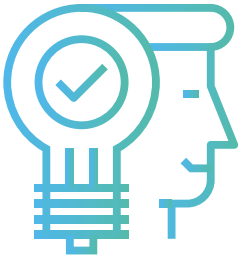
Key figures:

22,000

members of the in-house Innov@ ENGIE social network

10

external incubators in 6 countries



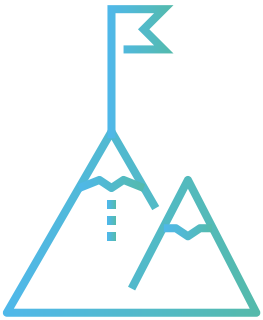
50

innovation managers throughout the group

€ 165

million euros of investment capacity for ENGIE New Ventures

17



investments made
at year-end 2017 (€65M)

1 billion

euros of investment in
innovation and digital
technology

90

more
than
calls for
projects

2,700

more
than
applications
from
startups

Expert opinion

Managing data at ENGIE is the role of **Chief Data Officer, Gérard Guinamand**

And for Gérard, being Chief Data Officer of ENGIE means orchestrating the Group's data transformation.

To do this, he defines a strategy on how to use data so that it adds value, he provides support for data users and he develops technologies to improve data processing.

Data is derived from all available information flows, from the electricity consumed by your desk lamp, to changing temperatures in winter, to the production of a wind turbine.

By analysing all this data, we can produce exactly the right amount of power to heat and light your home.

On the one hand, this data will enable us to take more intelligent, efficient decisions and thus increase the Group's productivity, and on the other hand, more importantly, it will also allow us to create new products and services.

The Chief Data Officer therefore plays a central role in ENGIE's digital transformation, by ensuring that all

the company's various entities work together and share their data.

This involves breaking down barriers between data sets.

Today, data is trapped in each section of the organization and must therefore be decompartmentalized.

The goal is for ENGIE to become a data driven company that is able to harness its own data and use it to create value.

A data driven company is an organization that manages its data like an asset, in the same way as it manages its industrial sites or provides services for its customers.

To achieve this objective and create value from data, the key word is sharing.

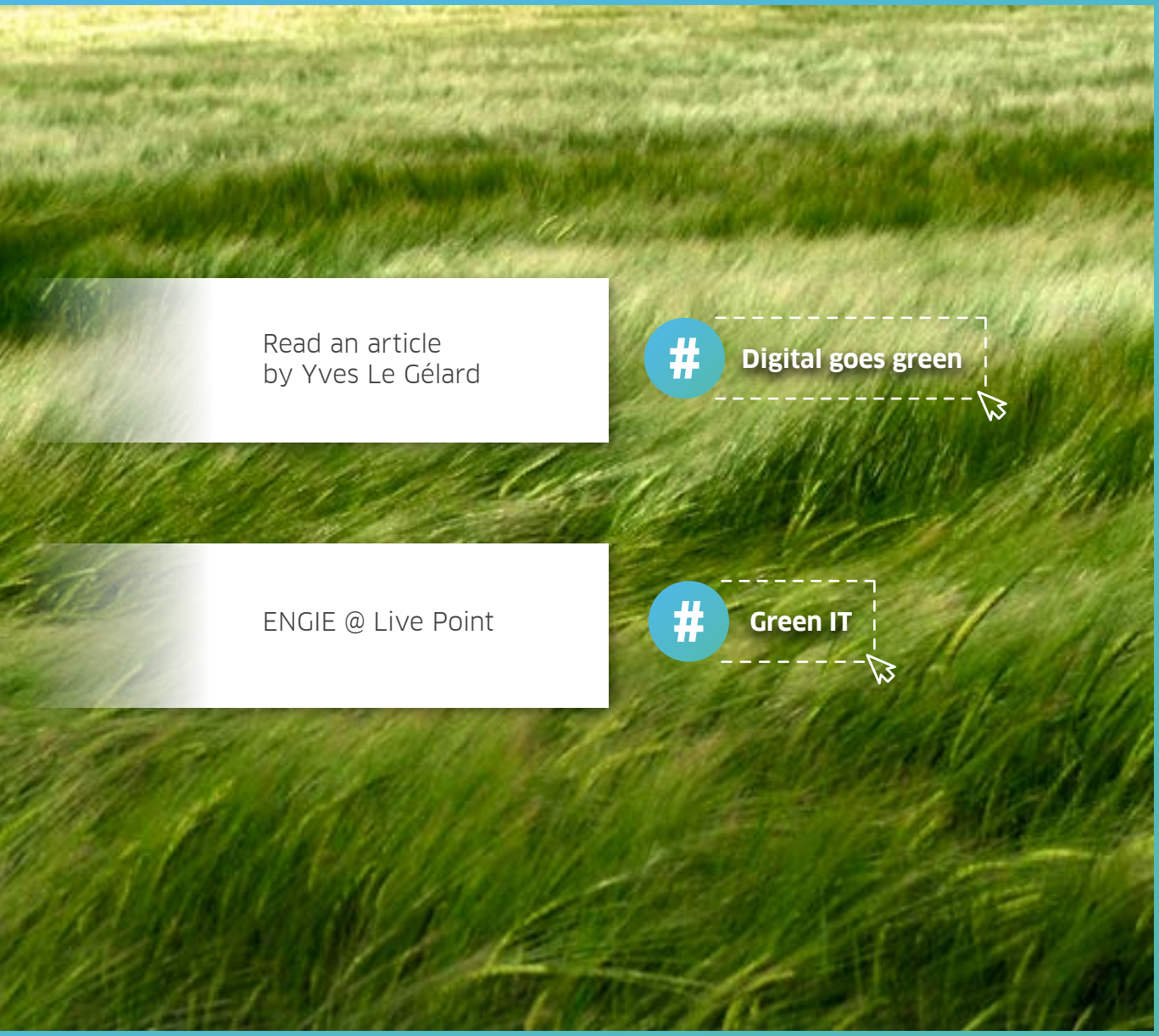
One of the key elements of my strategy is to inform and convince managers that data is important for their business.

It is then their responsibility to promote this approach among their staff and thus create value.

Green IT:
digital technology in support of ecology

Digital technology can be used more sustainably and more responsibly. As mankind's digital footprint continues to grow dangerously, there are simple, very effective actions that can be taken to reduce an information system's ecological and financial footprint while improving its social performance.

Discover ENGIE's Green IT solutions to serve our clients.


Read an article
by Yves Le Gélard
Digital goes green
ENGIE @ Live Point
Green IT

Livin': Intelligent infrastructure to improve daily life

The Livin' Platform is devoted to Smart Cities and includes a range of products to manage infrastructure intelligently, for example parking and traffic, CCTV surveillance systems or public lighting.

This platform provides services to connect various infrastructures, to remotely manage their various functions in real time, and to simulate possible scenarios as the town evolves.

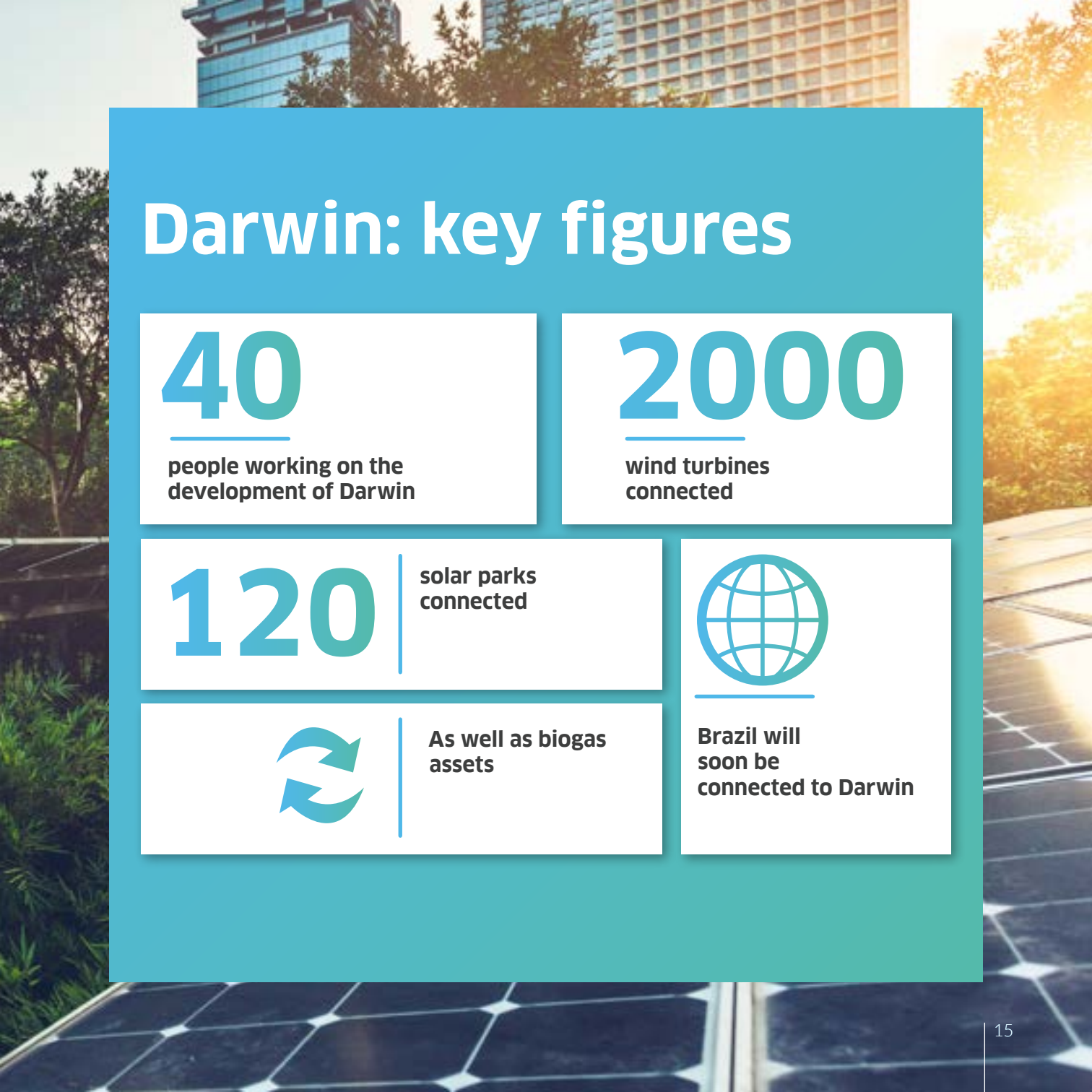
Visit the Niteroi Harmony Project platform:

ENGIEHarmonyProject

Darwin: Big Data serving renewable energy

DARWIN is a unified digital platform devoted to renewable energy production facilities. Its role is to collect, analyse and interpret real-time (24/7) data received from production sites, as well as external data such as the price of electricity or the weather forecast.

In this way, it can optimize performance, manage operating and maintenance contracts, carry out real-time monitoring of facilities and provide local managers (ENGIE and non-ENGIE) with clear-cut information on the availability of production facilities.



Darwin: key figures

40

people working on the development of Darwin

2000

wind turbines connected

120

solar parks connected

As well as biogas assets

Brazil will soon be connected to Darwin

Infobesity:
a call for the end of email supremacy

Digital technology is now an integral part of our daily lives, so much so that we are no longer merely connected: we are very often hyperconnected.

The continuous flow of information from an ever-expanding array of sources (emails, text messages, professional and personal instant messaging, social media, monitoring feeds, etc.) and the constant stimulation (often in the form of notifications) make it harder to prioritize information and to distinguish between the important and the unimportant.

This flow of information constantly distracts us, prevents us from communicating effectively with our peers and blurs the boundary between work and personal life. How can we overcome this in our completely connected world? What are the solutions?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GLOBAL
NEWS

Discover ENGIE's initiative: "A CALL FOR THE END OF E-MAIL SUPREMACY"

As ENGIE intends to become a more digitally-driven company, there is a need to adapt collaboration practices and embrace a digital mindset and culture.

Thus, ENGIE initiated a new approach to improve practices on infobesity, hyperconnection and digital collaboration. The aim of this approach is to increase our teams' productivity, creativity and quality of life at work (and outside work).

This is being done collaboratively: each action is suggested and managed by volunteers from various BUs and entities.

 # Read the White Paper on Infobesity

WORLD

121
emails received per day per employee
(source Radicati)

205
million emails sent per day worldwide
(source Radicati)

3%
annual growth of emails sent per day worldwide
(source Radicati)

150
checks of one's smartphone per day
(source Tmobili)

USA

7/10 check emails **while watching TV**

5/10 check emails **in bed**

4/10 check emails **in the toilet**

2/10 check emails **while driving**

4.5/10
check emails **during a phone call**
(source TedCrunch)

FRANCE

5.6
hours a day spent on email by French executives

99
days spent each year by French people on emails

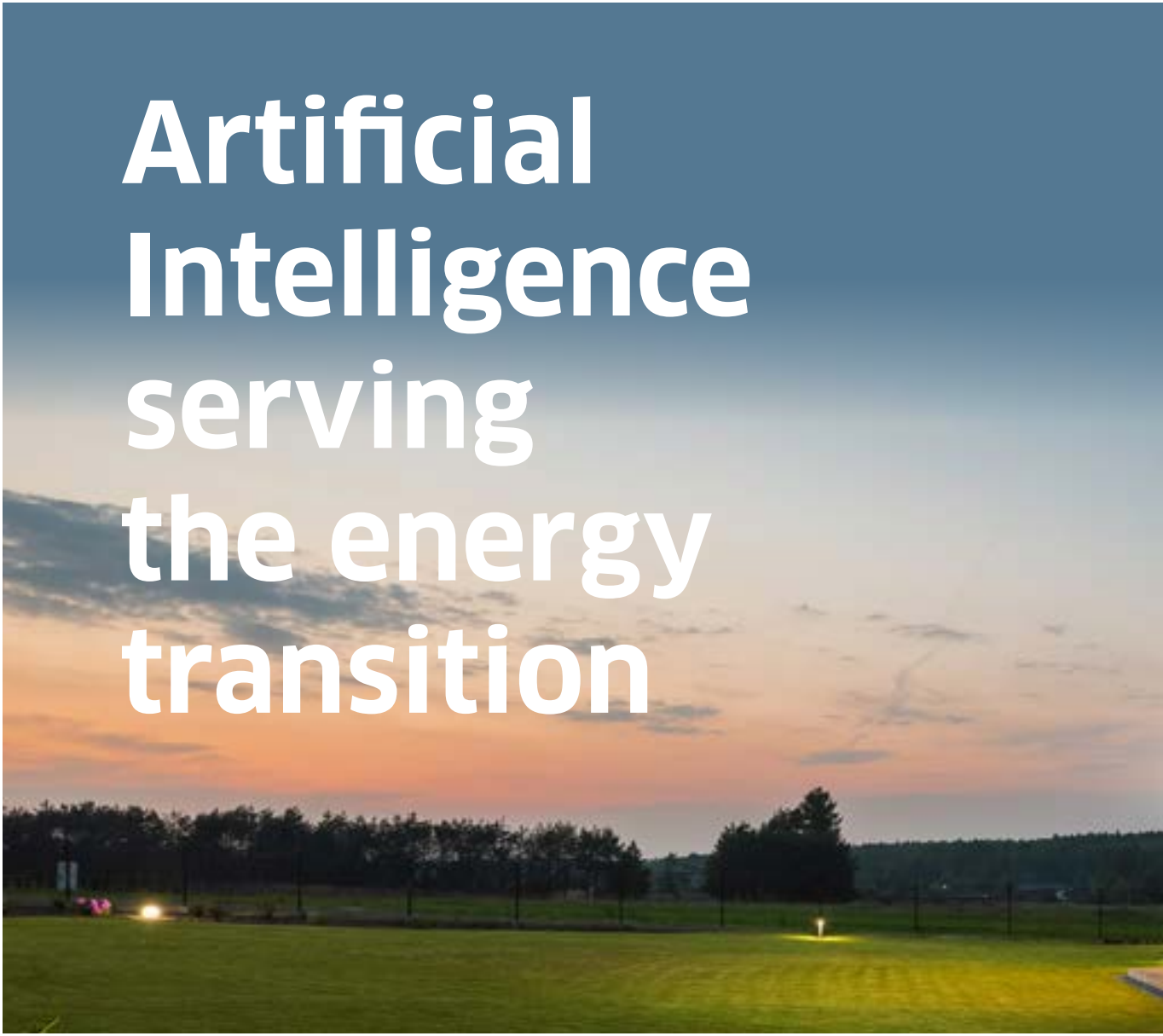
5/10 declare being contacted for professional matters **while outside the office** (source Eleas)

8/10 connect **during their leisure time** (source IFOP/Securex)

6/10 consider that **IT increases stress in their professional life** (source DONETIC)

8/10 declare that hyperconnection is **negative and causes anxiety** (source IFOP/Securex)

4/10 declare they are **addicted to their smartphone**
(source BVA / Digital Society Forum and Psychologies Magazines)


Artificial
Intelligence
serving
the energy
transition

Today, AI is serving smart living – smart homes, smart cities, smart buildings, smart energy, etc. At ENGIE, we rely on Artificial Intelligence to provide a more seamless, tailored customer service, to collect and analyse data on energy consumption to enable users to exercise better control, and to advance the energy transition through smart tools that are accessible to both our clients and our employees. Although a lot has already been accomplished using Artificial Intelligence, it also offers many possibilities for the future. A future where IoT and Big Data go hand in hand with energy efficiency and optimized usage.

Discover ENGIE's solutions that use AI on a daily basis to achieve more harmonious progress.

Read the booklet on AI

eCare, a digital assistant to take care of your home:

eCare is the first Smart Home energy management platform for BUs and their customers. eCare aims to become a reference for Smart Home services and efficiency in countries operated by B2C.

To achieve this, the platform is developing new products and services in order to:

» Enhance customer relations tools and experience for digital energy retailing (“Digital Retailer”)

» Bolster our range of services for residential and professional clients (“Service Integrator”)

» Optimize decentralized sources of energy production in the long term (“Energy Optimizer”)

 # Discover e-care

Optimizing data processing with Predity from ENGIE Cofely:

Predity is a smart platform to supervise and improve energy performance. A pool of experts behind their supervision screens, together with ENGIE Cofely technicians, rely on real-time data that is collected and transmitted 24 hours a day, 7 days a week, then consolidated in a secure information system using the latest digital technologies (IoT, range of connected PLCs, Business Intelligence, Artificial Intelligence, etc.).

This enables them to target, view and monitor all the facilities very easily.

This information system is mainly based on real-time supervision tools and analytical tools.

Key figures:

- *36 Predity control rooms in France*
- *25,000 connected facilities*
- *100,000 IoT*
- *50 million pieces of data collected*

Read Thierry Lahaye's article: "Mankind and data"

PREDITY

The real story behind data


3D
modelling
to serve towns
and regions

3D modelling is currently an essential tool for visualizing the impact of various changes to a town or region (City Information Modelling), in order to offer smoother services, better performance or improved quality of life.

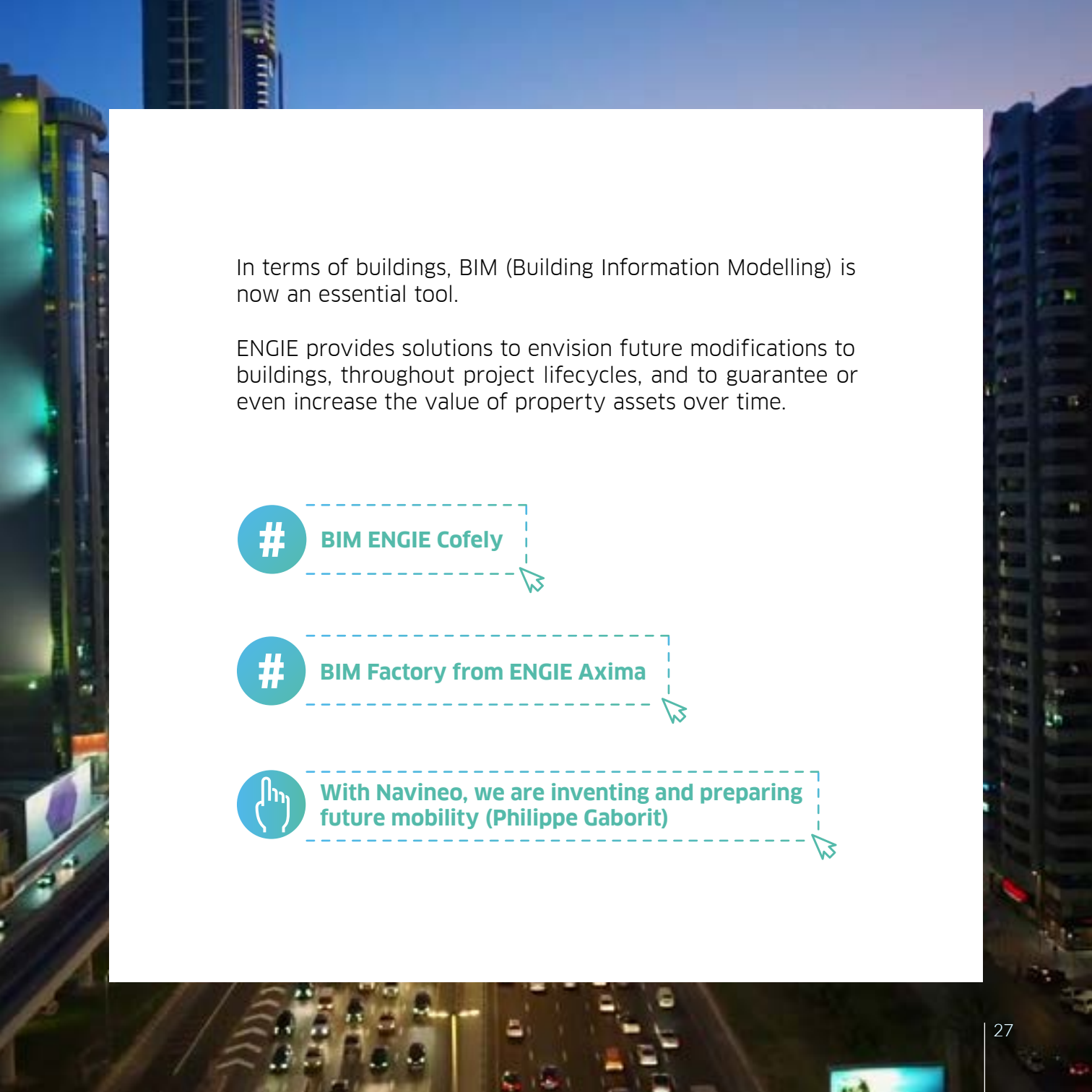
ENGIE assists its partners and clients throughout the processes of structuring, creating, generating, sharing, analysing, managing and processing smart data.

Discover ENGIE's 3D modelling solutions.

Smart Platform 2030, a real 3D “digital duplicate” of the Ile-de-France region.

Together with its subsidiaries SIRADEL and ENGIE Ineo, ENGIE will design and manage a platform called Smart Platform 2030, a real 3D “digital duplicate” of the Ile-de-France region.

This collaborative project will involve developing and adapting many use cases to suit the requirements and orientations of the region, especially regarding its projects for urban development, risk management, and to fight pollution and socio-economic and/or spatial disparities.



In terms of buildings, BIM (Building Information Modelling) is now an essential tool.

ENGIE provides solutions to envision future modifications to buildings, throughout project lifecycles, and to guarantee or even increase the value of property assets over time.

 # BIM ENGIE Cofely

 # BIM Factory from ENGIE Axima

With Navineo, we are inventing and preparing future mobility (Philippe Gaborit)

Beyond energy

Science and innovation beyond energy: When human and artificial intelligence join forces to advance genetic science

In October 2018, 14 ENGIE engineers and 14 scientists from the Pasteur Institute came together for 48 hours to improve a tool for measuring DNA. Three teams, each comprising both Pasteur scientists and ENGIE employees, competed during a hackathon to develop a mathematical algorithm that could analyse specific genetic data.

By bringing together mathematics and genetics, this experience once again demonstrated ENGIE's practical commitment to achieving harmonious progress, even beyond energy.

During this event, ENGIE Global Energy Management (GEM) teams provided their specific expertise on machine learning to assist these scientists, and this enabled the development of an algorithm that researchers will use in their daily work.

#GEM BU