ENGIE capabilities in distributed energy
“As energy solutions become smaller and smaller, so energy itself is becoming increasingly local: looking to the future, more than 50% of energy generation could rely on local sources. Decarbonized energy and digital technology are the lifeblood of ENGIE going forward.”

Isabelle KOCHER, CHIEF EXECUTIVE OFFICER
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, 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 in numbers

21 million energy and services accounts in Europe

Operations in 70 countries around the world

228 urban networks for heating and cooling operated in 13 countries

1,000 researchers and experts in 11 R&D centers

154,950 employees worldwide

117.1 gigawatts of generation capacity by source

8.1 gigawatts under construction

69.9 billion of revenues in 2015

22 billion of investments in 2016-18

Figures at December 31, 2015, including 100% of installed capacity of companies held by ENGIE, regardless of share of ownership.
OUR AMBITION

To be a leader in energy transition and make distributed energy solutions key elements of our offering to individuals, business and territories in the next 5 years.
The three pillars of ENGIE’s transformation

DECARBONIZATION

Decarbonization refers to the development of energy technologies for reducing carbon emissions. These innovations are critical to ENGIE’s strategy to ensure the continuity of clean energy supplies for consumers. The Group is constantly diversifying its power generating base by incorporating sources of renewable energy such as wind power, solar power and biomass.

DIGITALIZATION

The convergence of digital and energy technologies results in energy management being readily available to all (e.g. smart meters).

DECENTRALIZATION

Power generation decentralization prioritizes a large number of small generating units close to end-user consumers over large-capacity generating plants on a single site. This brings local communities, customers and end-users closer together radically changing the energy landscape. This positive development has been made possible through miniaturization.
DISTRIBUTED ENERGY IS

With renewable energy technology costs tumbling, generating your electricity from distributed technologies is frequently cheaper than buying it from the grid in many geographies.

Generating and storing your locally-generated energy ensures you are less exposed to grid blackouts due to natural disasters, maintenance work and other potential threats.

Distributed energy can ensure a reliable electricity supply to isolated populations and businesses like rural villages, remote islands, mining communities and more.

Producing your energy locally from renewable sources means fewer harmful by-product emissions compared to centralised fossil fuel plants.

What makes distributed energy attractive?

AFFORDABLE

ACCESSIBLE

ENVIRONMENTAL

RELIABLE
ENGIE is focusing on **4 key segments** in distributed energy

**ISLANDS AND REMOTE COMMERCIAL & INDUSTRIAL CUSTOMERS**

**REMOTE**

**RURAL ELECTRIFICATION AND TELECOM TOWER SOLARISATION**
With declining and persistently low commodity prices, mining corporations are facing strong budgetary constraints where savings mean maintaining competitive advantage. As electricity can represent ~20% of a mine’s operating expenditure, lowering this through a PV + battery + generator hybrid energy solution is a considerable advantage. Also, outsourcing your energy supply allows you to fully focus on your core business-mining.

### ISLANDS AND RESORTS

Many remote islands and off-grid commercial and industrial sites are looking for cheaper, more sustainable energy solutions to reduce their operating costs, attain corporate sustainability targets and preserve their local environment. These needs can be met through hybrid solutions that include generator kits, PV & energy storage.

### MINING CUSTOMERS

With declining and persistently low commodity prices, mining corporations are facing strong budgetary constraints where savings mean maintaining competitive advantage. As electricity can represent ~20% of a mine’s operating expenditure, lowering this through a PV + battery + generator hybrid energy solution is a considerable advantage. Also, outsourcing your energy supply allows you to fully focus on your core business-mining.
Industrial clients that experience regular blackouts need solutions to “power through” these situations for better cost predictability, maintaining operations and staying competitive. On-site generation and storage allows clients to forget about disruptions and focus on their core business.

**SELECTED REFERENCES**

**MAKATEA ATOLL**

ENGIE’s subsidiary EDT (Électricité de Tahiti) has deployed an island-wide hybrid energy solution in French Polynesia comprising of solar panels, batteries and diesel generators to bring green energy to the island, increase the reliability and decrease the cost of energy supply to local residents. Today, solar PV supplies around 70% of total island energy.
Solutions for rural electrification and telecom tower solarisation

1. RURAL VILLAGE ELECTRIFICATION

Around 17% of the world’s population has no access to electricity. Electrifying villages using hybrid PV, energy storage and diesel generators can increase residents’ quality of life and significantly enable growth of the region.

- **Diesel generator:** Diesel generator intervenes when solar energy is unavailable and there is no energy remaining in the battery.
- **Solar PV:** Solar PV panels allow you to generate electricity from the sun and offset diesel generation.
- **Batteries:** Batteries are installed to store solar and diesel energy plus cover village energy needs.
- **Solar home systems:** Opportunity to sell individual solar home systems to households if conditions are right.
- **Local community:** Local communities benefit and develop by gaining access to electricity.

2. SOLAR HOME SYSTEMS

In many cases, rural electrification requires the laying of cables and wiring that is often impractical. The solution are smaller standalone solar home systems (~25-100W in size) that can fill the gap and provide energy for residents’ main needs.

- **Solar home system:** With a ‘portable’ solar home system, residents can charge their appliances as well as use the ‘built-in’ lamps for lighting.
- **Rooftop PV:** Small rooftop panels allow for residents with more consumption to charge their batteries and use appliances in their houses.
Telecom towers are often located in remote places and require highly reliable energy supply to meet customer expectations. Historically these systems have been fuelled by diesel generators. Adding PV capacity and batteries can yield major savings and improved reliability, allowing the operator to invest in service improvements.

**Selected References**

**ENGIE - ORANGE PARTNERSHIP**

In November 2015 ENGIE and Orange signed a partnership in order to supply electricity to Orange’s telecommunication towers in Africa together with an option in further phases to offer rural electrification solutions like solar kits and small-scale, local electricity networks to rural areas. The service could be billed via mobile using Orange Money.

**POWERCORNER**

PowerCorner is ENGIE’s easy-to-set-up standalone containerised energy solution for rural village electrification. It includes generators, PV systems and lithium ion batteries. A pilot is being tested in a Tanzanian village in which customers pay for electricity via mobile payments.
Solutions for microgrids and commercial & industrial PV

1 C&I ROOFTOP AND GROUND-MOUNTED PV

For C&I customers, reducing manufacturing and operational costs are key factors for success. Clients who install solar PV panels on their roofs or buy their energy through a PPA from a larger PV plant, can significantly reduce their energy bills, lowering overall costs and enhance their environmental credentials.

2 MICROGRIDS FOR CAMPUSES, MILITARY BASES, CRITICAL INDUSTRIES & COMMUNITIES

Microgrids can vary from something as simple as a single diesel generator to a complex network. This can combine heat and power generation, energy storage, load management and renewables. These can create value for the customer as well as upstream in the network. Microgrids all have one thing common - they can operate independently from the grid when needed (e.g. during a blackout).
PV & BATTERY IN FRANCE, CORSICA

ENGIE’s grid-tied PV and energy storage facility in Corsica. The system includes 4.4MW of PV and a 4MWh battery, allowing up to 1,000 customers to use solar energy periodically while easing the strain on the distribution network.

COMMERCIAL ROOFTOP PV IN FRANCE, MARSEILLE

In accordance with the City of Marseille’s Territorial Climate Energy Plan, ENGIE offered to rent the roof space of 8 schools for 20 years. ENGIE installed 4500m² of solar PV modules and sells the electricity back to the grid at a feed-in tariff. 700kW of PV has already been installed and ENGIE has also guaranteed to leak-proof the roofs.

SMART MICROGRID IN FRANCE, TOULOUSE

ENGIE subsidiary SCLE SFE has implemented France’s 1st “autonomous” smart microgrid at its facilities in Toulouse. The system uses: solar, wind, flywheels, batteries and smart energy controls to optimise its energy consumption and to predict and schedule renewable energy dispatch. This feeds into the larger grid and reduces costs by consuming on-site generated energy. It also lessens consumption peaks.
With utility prices increasing, many residential customers are actively seeking alternative, cheaper and cleaner ways to meet their energy needs. Currently, the most popular solution for this is rooftop or community solar solutions. However, if bundled with batteries new sources of value and additional revenues and savings can be created. Falling prices and innovations in other technologies like micro-combined heat and power generation (mCHP) and demand side management are giving consumers an even wider range of options for how to manage their energy bills.

**RESIDENTIAL ROOFTOP/COMMUNITY SOLAR AND NEW TECHNOLOGIES**

- **Micro-CHP:** Customers can choose to also install a micro CHP turbine to generate both electricity and heat to their homes.
- **Rooftop PV:** People generate their own electricity from solar panels on the roofs.
- **Energy Storage:** When a customer installs an energy storage solution at their home they can store excess solar electricity for later as well as be operational during a grid blackout.
- **Feed-in tariff:** Any excess electricity from solar production can be sold to the grid at a feed in tariff.
- **Community solar:** Community solar members can benefit from cheap and green solar energy.

Solutions for residential generation and storage
SELECTED REFERENCES

PV AND BATTERY OFFERING IN AUSTRALIA

In 2016, ENGIE’s retail subsidiary in Australia, Simply Energy, started offering an innovative package for its residential customers that bundled rooftop solar panels with Tesla Powerwall batteries to allow them to increase their use of solar energy produced at home. This innovative business model is helping to pave the way globally as more and more solar energy offers begin to include energy storage.

PV OFFERING IN CHILE

Sunplicity is a Chilean startup founded in 2016 and a joint venture between ENGIE Chile and Tritec-Intervento. The entity was created to sell residential solar PV solutions. The company is a pioneer in proposing financing solutions that offer highly competitive prices to end customers.

PV OFFERING IN BRAZIL

Brazil’s recent introduction of net metering together with excellent solar conditions are expected to create the largest Latin American Residential PV market. ENGIE Solar, founded through acquisition now has a significant market share and is well positioned to become a leader in the solar PV sector in Brazil.
ENGIE, a leading global energy company, covering all continents, operating in 70 countries

€ 69.9 BILLION OF REVENUES IN 2015

ACTIVITIES IN 70 COUNTRIES

154,950 EMPLOYEES ACROSS THE WORLD

117.1 GIGAWATTS INSTALLED

8.1 GIGAWATTS UNDER CONSTRUCTION

Figures at December 31, 2015, including 100% of installed capacity of companies held by ENGIE, regardless of share of ownership.