

The digital revolution at the core of Engie's transformation

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Abstract:

More than two billion people on the planet do not have access to a reliable supply of electricity, even as the goal has been set for greenhouse gas emissions to tend toward zero in the long run. It is urgent to invent an energy system by drawing on current trends in technology and galvanizing political authorities and industrialists. The digital revolution is a tool for accelerating the energy revolution, a catalyst for changes in the energy sector. In 2016, Engie underwent a thoroughgoing transformation in order to become a world leader in the energy revolution. Digital technology lies at the core of this transformation. It provides powerful leverage for cementing relations between the Engie Group and its stakeholders, developing new business activities and making the Group more operationally efficient and agile.

Transition or revolution?

An energy transition or revolution?

The European electricity system used to be decentralized.¹ Electricity systems were gradually integrated in it in order to benefit, on the supply side, from economies of scale and voltage fluctuations. This trend played out in a context where energy resources were abundant and very little thought was given to the industry's environmental impact.

Nowadays, the world energy model has come up against several barriers. According to the International Energy Agency (IEA), more than two billion people lack access to a reliable energy supply. Meanwhile, global warming has become a planetary issue of unprecedented scope. Another key fact is (and has been for a long time) that local installations use different energy resources. We need but think of nuclear power plants and big hydraulic works.

¹ This article has been translated from French by Noal Mellott (Omaha Beach, France).

A new sustainable model must urgently be invented for everyone. The idea of an “energy transition” implies passing from the currently unsustainable state (*A*) toward a desired state (*B*). The first step is to set the objective to pursue rather than the means for reaching it. The points *A* and *B* differ widely depending on the locality. The characteristics of *A* have to do with the points of access to energy, the sorts of energy used, the intensity of demand, etc., while *B* depends on the legacy energy system, the availability of energy resources, the type of growth set as an objective, the local population’s concerns, etc.

Recent (technological, societal...) trends have changed our ideas about energy systems and thus made the energy transition possible. **FIRST** of all, the technology available is much more efficient. **SECONDLY**, renewable sources of energy are breaking records in terms of costs and investments: photovoltaics at less than €30/megawatt hour (MWh) in Chile; wind power from on-land installations at less than €30/MWh in Morocco; wind power from off-shore installations at less than €70/MWh in Denmark, etc. Economies of scale now tend to result from the volume of production rather than the size of production units. **THIRDLY**, the cost of batteries has been divided by four in ten years and might be cut again in half by 2020-2025. **FOURTHLY**, customers are less and less interested in owning goods but more and more in knowing where they come from, whether they suit their needs and uses, whether they can be customized, etc. Since the daunting task is to deal with these issues right away, Engie prefers the phrase “energy revolution” to “energy transition”.

A digital transition or revolution?

The driving force in the digital transition is the new devices and applications proposed by this nascent technology. In brief, this transition comes from our new capacity for measuring and controlling all things at all times. Any object can now be connected to serve as a sensor or a monitor; it thus acquires a degree of “intelligence” and becomes “smart”.

Digital technology has been rolled out in waves. The **FIRST** wave was mobile devices. The first iPhone came on the market in 2007. By 2016, an estimated 2.1 billion people were using smartphones. The **SECOND** wave is big data and the Internet of things (henceforth IoT). Connected devices are proliferating; and the costs of collecting, transmitting and storing data are dropping exponentially. In Europe, 200 million smart meters (for electricity and natural gas) will be installed by 2020. Artificial intelligence is the **THIRD** wave gradually unfurling in transportation (self-driving cars) and energy management (smart thermostats using algorithms to detect the heating patterns and preferences of the occupants of a house or apartment). **FOURTHLY**, blockchain technology, which is now making transactions secure and eliminating intermediaries, is spreading into the field of energy. These waves of digital technology have sparked a revolution in all fields: transportation, the hotel business, telecommunications, banks, insurance companies and, above all, energy.

Two revolutions intertwined

The digital revolution is entering the service of the energy revolution. Digital technology offers three levers for generating virtuous cycles that reduce the quantity of greenhouse gases emitted by the energy sector:

- control the need for energy (limitations on the number or distance of trips, dematerialized economic growth, etc.);
- increase energy efficiency (through standards for appliances, insulation, “energy performance” contracts, etc.); and
- “decarbonate” the current system thanks to energy sources that emit very little CO₂.

Above all, digital technology helps us analyze consumers' needs in detail and improve our understanding of how energy is used. Whereas we used to measure a customer's annual consumption of natural gas, digital technology now enables us to identify the degree of thermal comfort for each room in a house, hour by hour. End-users can, thanks to information and communications technology (ICT), measure how their behaviors affect their energy consumption and adjust their actions in consequence. The recourse to decentralized sources of energy will, also thanks to digital technology, bring energy issues home to end-users.

Furthermore, the generalization of the means for making measurements and optimizing decision-making can significantly improve energy efficiency at all levels in the system.

Finally, digital technology helps us identify decentralized energy resources (production, demand management, storage) and monitor and control them by taking account of the real-time flow of energy in the system. This involves activities ranging from the assessment of how much power will be uploaded from each rooftop equipped with a solar panel to the real-time storage of power from local renewables in vehicle batteries, or even to the control of household appliances.

Digital technology is opening a new frontier for the energy sector. Besides helping us address issues, it is overhauling the energy sector in the economy in at least four ways.

FIRST of all, digital technology is placing customers at the center of attention.

- The user's experience (a private person in the morning, an employee during the day and a resident in the evening) is crucial.
- Users must be seen in relation to the "communities" (local, virtual, etc.) to which they belong.
- It is necessary to move beyond a sectoral approach. Industry will switch from selling commodities to selling energy solutions and then to selling integrated services for improving how customers use energy.

SECONDLY, digital technology is changing business models in the energy industry in line with the models for high tech. This new business model

- is of a "for-free" type.
- is of a peer-to-peer (community) type.
- hinges on the involvement of consumers (the network effects of on-line platforms, where added value comes from user input).
- signals a generalized switch from commodities to services.
- depends on developing worldwide platforms that offer a similar customer experience, but one that can be customized anywhere on the planet.

THIRDLY, digital technology makes organizations undergo in-depth changes:

- since we can now imagine more "horizontal" and "hybrid" organizations, which draw on expertise from inside or outside the firm.
- since the pace of innovation is speeding up. Owing to digital technology, consumers are used to very short periods between product innovations. The cycle of innovations in the energy sector used to be much longer; it is now accelerating.

FOURTHLY, this new situation is changing the lineup of competitors in the energy sector. Industrial groups from other areas of business (such as the GAFAM: Google, Apple, Facebook, Amazon) are entering this field. In some markets, newcomers benefit from lower entry barriers.

At the core of Engie's transformation

Declaring that it wants to become a world leader of the energy revolution, Engie has staked out a position as a pioneer. The three-year plan presented in 2016 foresees:

- organizing the Engie Group and its partners in a decentralized network (24 business units, and plants in 70 countries).
- setting a world benchmark for operational efficiency (more than €1.2 billion in recurrent savings).
- concentrating the Group on activities for creating value that accelerate the energy transition by: *a*) clearing out non-strategic activities (plan for ceding €15 billion of assets related to the production of electricity, in particular from coal) and *b*) investing €22 billion in three activities: energy efficiency, the production of electricity with a low level of CO₂ emissions, and networks (natural gas in particular).
- augmenting the Group's agility and reinvigorating its spirit of innovation.

To speed up its transformation Engie has decided to devote €1.5 billion over three years to digital technology and innovation, and to establish a top-level governance for imparting a new dynamism and welcoming initiatives. Digital technology is a powerful lever along each of these four axes. Let us illustrate this with a few examples.

Digital technology for revitalizing the organization

An organizational, "cultural" issue in Engie Group is its relations to subsidiaries, partners and stakeholders. Digital technology is a powerful tool for reinvigorating these relations so as to shift the Group's focus toward customers. The energy sector must meet up to the standards set by GAFAM and NATU (Netflix, Airbnb, Tesla and Uber) with regard to the customer experience: customers are waiting for clear, simple messages and personalized feedback.

In 2016, Engie reworked the digital pathways for customers to obtain information about its activities:

- for retail customers: services for collecting data from connected devices (owned by the customer or a third party, *e.g.*, smart thermostats) in the household. These data will serve to propose customized services worldwide.
- for business customers: Vertuoz Pilot (in France) for optimizing energy consumption in buildings.²
- for local authorities: tools for presenting urban services to a city's inhabitants (as in Nouméa, New Caledonia) and the acquisition of Siradel, the world leader in 3D simulation and in computer-assisted decision-making tools for urban areas.³

² For a description of Vertuoz in English: <https://innovation.engie.com/en/articles/actualiteAction/vertuoz-pilot-lhumain-au-coeur-de-lefficacite-energetique/4033/general>.

³ On Siradel: see:

<https://innovation.engie.com/en/news/news/sustainable-mobility/siradel-engie-s-3d-simulation-tool-1/3804>.

Digital technology for improving operational efficiency

Setting a benchmark in the energy industry entails modernizing current assets and acquiring new ones. Besides its obvious technological aspects, this objective calls for redefining processes, steering changes, and developing skills and qualifications. To mention a few examples of achievements:

- in the generation of electricity: a new set of tools for load dispatching and for monitoring renewables worldwide, and 3D-goggles for connecting the technicians who work at power stations to centralized data banks (Europe).
- in the natural gas industry: enhanced reality for training technicians at gas installations in an immersive environment (France).
- in customer relations: Ecova, a big data platform for generating a specific energy model for all types of buildings (United States), and software for the real-time optimization of heating and cooling systems (worldwide).

Another key preoccupation at the core of Engie's transformation is cybersecurity.

Digital technology for shifting the focus from commodities to users

For the energy transition, technological innovations must be adopted that have short product cycles and are adapted to specific needs. Digital technology is an essential lever for this shift away from commodities and toward users, specifically for:

- developing technological solutions: whether for solar power (analyzing satellite data to determine the potential of B2C customers in Belgium) or for software for reloading batteries (software developed by Green Charge, a Californian start-up, acquired by Engie in 2016).
- changing business models thanks to more knowledge about customers: *a*) by offering services with more added value: micronetworks for remote payment via PowerCorner in Africa; “building-as-a-service” with the commitment to achieve definite results in the use of buildings in France; and services for “driving electric anywhere”, whence the recent buyout of EV-Box; *b*) by acquiring activities that, close to the Group's historical activities, respond to customers' expectations: a B2C e-commerce platform for connected devices for energy efficiency coupled with a home service platform in Romania and Belgium; cybersecurity services (linking the information systems of management and of current operations) for critical industrial plants in France; and a joint-venture with Sigfox for deploying a low-speed network worldwide.
- by proposing open business models: the Vertuoz platform for a smart management of energy in buildings (by combining innovative solutions, whether in-house or third-party); and the use of blockchains to guarantee the origin of renewables (France).

Digital technology for reinvigorating work methods

Digital technology bears obvious advantages. It activates a “group intelligence” by creating worldwide communities inside Engie Group that are able to provide the best expertise everywhere thanks to virtual work spaces. It also improves employees' experiences through more efficient in-house support services and an individualized approach. It has enabled 150,000 of Engie's employees (in 70 countries) to be immersed in a “digital culture” through exchange programs (Digital Academy, reverse mentoring, flying doctors). Digital technology is a powerful lever for developing agility, openness and a spirit of innovation within the Group.

A perfect illustration is Engie Digital. Inaugurated in 2016, this unit seeks to accelerate the firm's digital transformation by providing top-rank expertise and software platforms in support of operational units and their projects. Engie Digital is diffusing its principles throughout the firm:

- openness. Engie has formed major partnerships with digital operators. This reflects the Group's "open innovation" for developing an ecosystem open toward outside partners (start-ups, research centers, etc.): open bids, hackathons (during which programmers volunteer to work together to invent new applications), suggestion boxes, venture capital, etc.
- agility. The projects developed by Engie Digital use agile approaches that are increasingly diffused throughout the organization.

Conclusion

Issues in the energy sector are immense. The digital transition is an indispensable lever for winning the energy revolution.

Wanting to be a pioneer in this new world of energy, Engie Group has placed digital technology at the core of its transformation. Developing software is a powerful means for capitalizing on the firm's expertise and diversity. To remain close to customers' needs in a decentralized organization, Engie has designed, along with its ecosystem of partnerships, solutions worldwide for reinforcing its position as a leader locally. The transformation is on march. Digital technology's eventual impact is not yet fully known. Who could have imagined fifteen years ago how deeply digital technology would affect our everyday lives?

Several questions are still hanging:

- How will the now announced blockchain revolution affect business models in the energy sector?
- At what level will "intelligence" eventually be decentralized (between embeddedness in connected devices and a systemic vision)?
- How will robotization affect the demand for energy?
- To what point will digital technology make organizations evolve?
- What limits will consumers place on the availability of their personal data?

Engie is exploring these questions by testing concrete solutions. Convictions, agility, its team culture and its close ties in house and with partners are the best guarantees of the firm's capacity for sustainably generating value in stride with the energy revolution.