BACKGROUND: WHY TAKE ACTION IN THE FIELD OF ENERGY?

In France, 43.6% of energy is consumed by buildings and the tertiary sector, and 31.5% by transport. In a country where 80% of the population is urban, French cities are thus major energy consumers. In addition to the economic aspect, for the citizen who pays the bill in various forms, the said consumption also has a major environmental dimension, in particular due to the percentage of energy that comes from fossil energies and the greenhouse gas emissions that result from this. Across the world, cities today are responsible for 71% of CO₂ emissions. The global impact on the climate is often the result of local pollution and deterioration in the quality of the air.

Lowering energy consumption in cities, in particular from fossil energies, has multiple benefits, for the inhabitants' health and quality of living, the fight against climate change, the operating costs for the municipality and the expenses that bear upon its inhabitants - in a nutshell, for the attractiveness of cities.

WHAT ARE THE MAIN AREAS FOR INNOVATION WHEN IT COMES TO ENERGY?

The energy-related innovative ideas can be classified into 3 + 1 main categories:

- **Innovation aimed at lowering energy consumption**, regardless of origin (fossil or other), applicable to any number of areas: energy efficiency in buildings, both new and or renovated; decreased energy consumption by modes of transport, whether individual or collective; less traffic congestion thanks to the development of mass transit, low-impact modes of transport, and better-regulated traffic resulting from better information for all players; lower energy consumption in all urban services, from public lighting to water or waste management; shifting toward a reduction in mobility needs thanks to the opportunities opened up by digital technologies;

- **Innovation aimed at developing local power generation in the form of renewable energies**: newly-deployed systems incorporated into the city's infrastructures, enabling photovoltaic power generation, or more marginally, wind-powered electricity; the use of wasted heat and/or renewable sources of heat, from better management of waste, waste water and locally-specific resources (geothermal, marine, data centre, etc.);

- **Innovation in legal (e.g.: SEM energies), organizational and technological aspects aimed at expanding local consumption of locally-generated power**: a system enabling self-consumption of power generated either directly (in the building, lighting, thanks to heating grids, etc.), or with a storage system that “adjusts” intermittent power generation sources (electrical vehicle battery, hydrogen-based and methane production from green electricity, etc.);

- **“Cross-cutting” innovation** which facilitate the implementation of the first three types of energy, by combining energy efficiency, RWE production and local energy consumption thanks to the deployment of smart grids, making it possible to opti-
mally manage at all times offshore and diffuse energy resources, by pooling and allocating them based on needs, between users and uses in a neighbourhood combining residential and office activities, a tertiary zone, a campus, etc.

Most of the innovative ideas shown in the pamphlet fact sheets reflect multiple categories of innovation that often buttress each other, resulting in greater overall effectiveness for each action carried out.

/// WHAT KINDS OF INNOVATION ARE INVOLVED?

The innovative ideas presented generally combine several different types of innovation:

- **technological**: there are many forms of technological innovation when it comes to energy, which are neither the norm nor the most frequent choice;

- **digital**, in other words, based on the use of sensors, data exchange and optimisation systems integrated into the usual structures and services;

- **economic and legal**, to enable the development of new business models and facilitate the integration of urban functions that require the development of smart grids and self-consumption, to name only two; the economic aim (reducing the cost of energy) of innovation is another important aspect that should not be overlooked;

- **in the field of governance**, so that very different types of players (State, regulator, enterprises, local authorities, universities, citizens, etc.) become involved in joint energy management projects that can even aim for energy autonomy at the local level.

Most of these innovative ideas require *behavioural change* on the part of the relevant players, especially the citizens, and thus will need compelling initiatives to educate, explain and train.

/// WHAT ACTION IS BEING TAKEN IN FRANCE TO SUPPORT THIS INNOVATION?

For many years now, France has designed its public policy to support developing and experimenting with innovative ideas in energy as applied to cities. In 2016, the following programmes were of note:

- **the Investments for the Future Programme (PIA)** from the Commissioner General on Investments, implemented by ADEME, which supports such initiatives as institutes for the energy transition and renewable energy demonstrators, digital innovation and smart grids, energy renovation at the neighbourhood level, etc.;

- **the “Positive Energy Territories” programme** run by the Ministry of the Environment, Energy and Maritime Affairs, which supports and provides assistance to municipalities that have committed to generating more power than they consume;

- **the “sustainable city” solution for the New Industrial France**, from the Ministry of the Economy, which supports for instance the development of smart grids and energy efficiency in the building (construction and operation);

- **the “Industry Demonstrators of the Sustainable City” (DIVD)**, by the Ministry of Housing and Sustainable Housing and the Ministry of the Environment, Energy and Maritime Affairs, which are all championing one or more innovative products in the field of energy and circular economy (the latter promotes the exchange of flows between city stakeholders in order to cut back on the use of primary resource).

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Work group run by Michèle Pappalardo, Vivapolis network coordinator, with: Maud Lelièvre, Eco Maires, Fabrice Bonnifet, Bouygues, Claude Thouvenin et Franck Lesueur, Enekio.
In a context of communities, endowments decrease and energy price increase, reducing the electricity bill is a real issue.

Enekio proposed to 10 municipalities in the Drôme and Isère areas to install a smart lighting system. It decreases light intensity on traffic lane until car or pedestrian passage.

This project fits in Enekio’s smart cities deployment in France to curb global warming and enhance the digital city in rural municipalities and urban areas.

Saint-Jean-en-Royans approved Enekio’s solution deployment on his commune.

Based on the results and as part of the project in Enekio City, 30,000 luminaires on the 10 requested municipalities are in the financing and the deployment phases.

**INNOVATIONS**

- The project consisted in building a smart lighting network which serve, as a first basis, for the digital city and the smart city deployment with higher energy efficiency, for the benefit of the inhabitants.
- Each smart luminaire can be managed independently. A minimum and a maximum light intensity can be defined for each space depending on visibility and security needs. Commissioning schedules also can be customized according to the seasons or events.
- The luminaire is equipped with a radio technology allowing it to collect, transmit and use city’s information to reduce energy consumption. It provides and reports useful information for preventive maintenance. Thus, maintenance services can permanently anticipate failures and ensure lighting’s functionality.
- On user’s side, the increase of the light intensity is progressive and simultaneous on the road to optimize both drivers and pedestrians experience and comfort.

**STAKEHOLDERS**

- **SAINT-JEAN-EN-ROYANS CITY**
  - ENEKIO - Urban Contracting Owner.
  - Consultation with municipality, the municipal council, the mayor, the technical managers of the city and inhabitants.
  - During consultations, the constraints associated with mobility-impaired persons were taken into account.

**KEY DATA**

- Municipalities : 2,500 to 15,000 people
- Public spaces surface: 1,500 km of roads mainly in rural and peri-urban areas.
- Space between luminaires : 50 m
- Areas concerned : industrial, residential, commercial et tertiary.
In terms of municipality strategy to come up with the digital city features, smart lighting solution deployment showed up as a relevant and challenging project.

Integrated complete solution deployed and delivered by Enekio.

Enekio invested through a partnership with Saint-Jean City and The Canton of Royans, subsequently supported by the General Council of Drôme.

IMPLEMENTATION

To reduce the consumption of some municipalities, they have started to completely switch off certain streets or neighborhoods. However, this method meets residents’ reluctance who then feels insecure.

Reducing the intensity of luminaires without switch them off completely until a car or a pedestrian comes by is an alternative that make pedestrians feel safe and comfort.

The minimum or maximum light intensity can be adapted independently on each luminaire. Maximum intensity can be reached at pedestrian crossing. The most dangerous places are reported and the municipality is sure not be incur liability in case of accident.

The light intensity can also be kept at a maximum around bars and restaurants to make them visible.

Finally, light emitting diodes (LED) offer better lightning quality. Users comfort is improved and this minimizes biodiversity impact by reducing light pollution.

RESULTS

The initiative contributes to raise awareness of people about the changes that can occur to limit unnecessary consumption and adopt a more sustainable lifestyle.

The reduction in electricity of municipality can fund new economic development projects or new residents services as a part of the digital city.

The network created by the different radio base stations witch equipped luminaires is open and can be used for the functioning of other application. If Enekio offers some of them as a part of Enekio City Project, municipalities can also develop them applications based on the initiatives they want to launch: water, electricity and gas meter reading for the energy efficiency of buildings, air quality; complementary currency system witch rewarding residents for waste sorting.

Offering technological breakthroughs, Enekio offers a real reduction of environmental footprint associated with municipalities and industries.

FINANCIAL ASPECT OF THE OPERATION

The total investment cost (excluding tax): € 15,030,000

Investment amount at the expense of municipality: € 30,000

Subsidies detail (€ excluding tax):
- Saint-Jean-en-Royans: K€ 30
- Enekio City: M€ 15