ENCOURAGING ELECTRICITY SELF-CONSUMPTION

HAZARD

RAINFALL AND FLOODS

COASTAL DYNAMICS

STORMS AND STRONG WINDS

HEAT

IMPLEMENTATION STEP

CONSTRUCTION

RENOVATION

BUILDING IN OPERATION

AREA OF ACTION

ENVELOPE

COST

€ € €

low **medium** high

LEVEL OF SKILL

high

Electricity self-consumption consists in consuming electricity that you produce yourself; the producer and the consumer are therefore the same. Self-consumption can be applied on an individual scale, with a single producer and consumer, or on a collective scale, involving several producers and consumers within the limit of 3 MW of power and 2km (20km when authorised). While self-consumption usually refers to electricity, the practice can also be applied to other domains, such as water networks and food supply (local production).

IMPACTS

Climate change, by increasing the intensity and frequency of climate hazards such as floods, storms and heat waves, increases the risk of network failures and outages. Setting up a self-consumption system **reduces the building's dependence** on energy networks, making them more resilient in times of crisis. The aim is to guarantee a sufficient level of supply to maintain essential activities in degraded mode, including powering servers, lighting and air conditioning. In addition, self-consumption of photovoltaic energy reduces the financial dependence of buildings by protecting them against fluctuating electricity costs, especially in times of energy crisis.

INSTALLATION GUIDE

Whether designed at building or neighbourhood level, electricity self-consumption must be sized to **ensure the building's basic level of consumption, using the most appropriate renewable energy source depending on the territory**: photovoltaic, wind, geothermal or biomass. The sizing of the installation is essential: the aim is not to ensure that the building is completely self-sufficient, which would require meeting needs on a permanent basis, even during occasional consumption peaks, but rather to provide a **sufficient level of electricity to ensure that activities can continue in downgraded mode** in the event of a crisis. It is therefore advisable to call on the services of an engineering consultancy specialising in this field.

Due to its dependence on weather conditions, production from renewable sources is intermittent, making it a good idea to install a storage system to defer consumption of the electricity produced. However, **some users have a consumption profile particularly well-suited to photovoltaic production**, like **commercial buildings**, which need a lot of electricity in very hot weather (for cooling) and during the day (to power servers, office equipment, electric vehicle charging points, etc.).

Photovoltaic power plants require **annual maintenance** to check that the system is in good working order, as well as additional upkeep to remove dust from the panels. While power plants are guaranteed to last up to 25 or 30 years, the inverters, which convert the direct current from the photovoltaic modules into alternating current identical to that from the grid, need to be renewed every 8-12 years.

For a project on an existing building, it's important to **carry out a feasibility study** beforehand, in particular to identify any additional costs associated with installing the new networks (cable routing, space available for safety devices, etc.).

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WEAK POINTS AND STRONG POINTS

⊕ The French Act of 10 March 2023 on accelerating the production of renewable energy projects gives new impetus to the energy and environmental transition by simplifying authorisation procedures for renewable energy projects and mobilising artificialized areas for the development of renewable energies.

⊕ **Third-party financing**, which has been authorised since 2019, facilitates operations without the need for initial investment, which can be a deterrent.

⊖ As the installation of a roof-integrated photovoltaic system limits access to the **waterproofing layers** below, its installation must be scheduled to correspond with the renewal of waterproofing materials.

FIND OUT MORE

ADEME Île-de-France, *EnR'CHOIX - le bon choix thermique pour votre territoire*

Collectif Energies Renouvelables pour tous (2019), *Pour un développement réel de l'autoconsommation collective*

General Directorate for Energy and Climate *(DGEC)* (2014), *Rapport sur l'autoconsommation et l'autoproduction de l'électricité renouvelable.*

OID (2020), *Autoconsommation électrique, Enjeux et pistes de valorisation*

OID (2022), *Autoconsommation photovoltaïque, accélérer son déploiement en France*

Office Franco-Allemand de la Transition Energétique (OFATE), BTCG avocats (2018), *Le développement des centrales photovoltaïques au sol en France.*

MALADAPTATION

Maladaptation can result from the following:

Reduced photovoltaic output at high temperatures

Solar photovoltaic panels are sensitive to temperature, which can lead to a reduction in efficiency as temperatures rise. This can cause problems, particularly during heatwaves, as hot days are often associated with increased demand for electricity for air conditioning, creating higher demand at a time when production is less efficient.

Rebound effect

The success rate of self-consumption depends to a large extent on changes in behaviour. The overall aim is to reduce energy consumption, while avoiding a rebound effect whereby increased usage cancels out energy efficiency gains. The risk is that the adoption of renewable energies might encourage greater use of energy-intensive systems, particularly for heating and air conditioning.

Negative impact on biodiversity

The installation of renewable electricity generation systems can have a negative impact on biodiversity, depending on several factors such as the type of technology, location and project management. Different renewable energy technologies can lead to changes in ecosystems and contribute to biodiversity loss (Gasparatos et al., 2017).

Increased pressure on rare metals

The transition to renewable energies, such as solar panels and wind turbines, is generating growing demand for rare metals, which are essential for their manufacture. The extraction process results in deforestation, water and soil pollution, high energy consumption and conflicts over access to these resources.

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MONITORING INDICATORS

ESSENTIAL RECOMMENDATIONS WORTH THINKING ABOUT

- IDENTIFY RENEWABLE ENERGY SOURCES ACCORDING TO THE AREA'S CHARACTERISTICS
- EMPLOY A SPECIALIST ENGINEERING CONSULTANCY
- CARRY OUT A PRE-FEASIBILITY STUDY FOR EXISTING BUILDINGS

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/- : Quantitative indicator ★ : Qualitative indicator

INDICATORS OF MEANS	INTERPRETATION
+/- Self-generated electric peak power (kWp)	To be maximised
+/- Self-consumed electric peak power (kWp)	To be maximised
+/- Percentage of roofs equipped with photovoltaic panels (%)	To be maximised

INDICATORS OF RESULTS	INTERPRETATION
★ Capacity to continue activities (lighting, cooling requirements, etc.) in the downgraded mode in the event of a crisis	Maintenance of operations in downgraded mode
+/- Self-generation rate (%)	To be maximised
+/- Self-consumption rate (%)	To be maximised

**The control situation is defined by the parameters set to isolate the influence of the adaptive action (similar conditions: weather, time of measurement, space, etc.).*

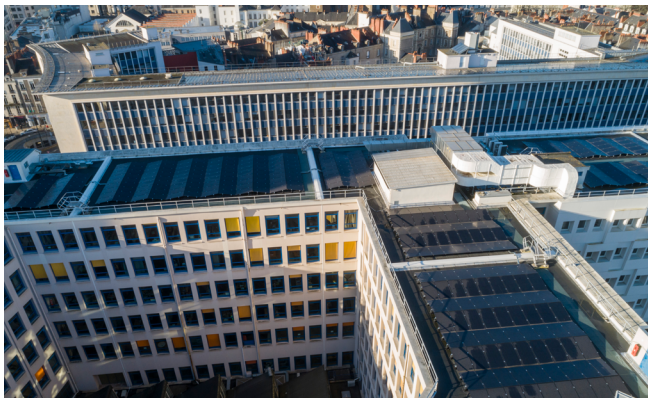
REGULATION / CRITERIA

- According to article 40 of the French Act of 10 March 2023 on accelerating the production of renewable energy projects, outdoor car parks with a **surface area of more than 1,500 square metres must** be equipped, over at least half of this surface area, with shading systems incorporating a renewable energy production process over the entire upper part of the shading area.
- According to Article 43 of the French Act of 10 March 2023 on accelerating the production of renewable energy projects, certain buildings or parts of buildings with a **footprint of at least 500 square metres** must incorporate either a renewable energy production process, or a plant system that only uses potable water to supplement recovered water, guarantees a high degree of thermal efficiency and insulation, and promotes the preservation and recovery of biodiversity, or any other system that achieves the same result.
- In October 2023 the EU Council adopted the new Renewable Energy Directive, which aims to increase the share of renewable energy in the EU's **overall energy consumption to 42.5% by 2030,** with an additional indicative target of 2.5% to help reach the 45% target. The new rules set an indicative target of **at least 49%** renewable energy in buildings **by 2030**.

CONCEPT / DEFINITION

- **Self-generation rate:** proportion of consumption covered by local production. A self-generation rate of 50% means that 50% of electricity consumption is covered by the installation.
- **Self-consumption rate:** proportion of electricity produced that is consumed on the production site. A self-consumption rate of 30% means that 30% of the electricity produced is consumed on site, and the rest is fed back into the grid.

Roof of the Hôtel des Postes, Nantes



REAL-LIFE EXAMPLE

POSTE-IMMO

POSTE IMMO

BUILDING: HÔTEL DES POSTES, NANTES
SURFACE AREA: 32,000M², 5 FLOORS
USE: COMMERCIAL
COST: €230,000 - €260,000

Major renovation work on the Hôtel des Postes building in the heart of Nantes enabled Poste-immo to install a 1,400 m² photovoltaic power plant with a capacity of 256 kWp on the roof. The size of the installation is limited by the available space and the shadow cast by a neighbouring high-rise building, but nevertheless meets 13% of the building's energy needs, with 95% of the electricity produced consumed directly on site. This high rate of self-consumption is thanks to the correspondence between the building's peak production and peak consumption. The project had difficulty gaining acceptance due to the historic nature of the building, and was initially rejected by the *Association Nationale des Architectes des Bâtiments de France* on aesthetic grounds. In the end, the power plant was installed using unobtrusive full black panels. The plant secures between €24,000 and €25,000 in annual charges and will pay for itself after a period of 12 to 14 years, with the photovoltaic installation guaranteed to last for 25 years.

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