# **BYSprong:** massify the energy renovation of housing

**Bouygues Construction is developing an innovative approach aimed at industrializing the energy renovation of housing. The first pilot project was launched in Longueau, with 12 housing which, once the work has been completed, have the performance of a positive energy building, with a 30-year performance guarantee.**

| | |
|---|---|
| **Starting date of the project** | **2019**: start of the renovation |
| **Project Localisation**<br>Places of implementation of the project at this stage and targeted geography if replicable. | Pilot project carried out in Longueau (Picardie, France)<br>Expansion targeted throughout France. Most advanced regions: Pays de la Loire, Hauts de France, Bretagne. |
| **Project objectives**<br>Type of climate innovation of the project with a description of the problem/issue addressed | **<u>Objective:</u> To carry out housing renovations to achieve the performance of a positive energy building, with a guarantee over time and without subsidies, thanks to the industrialization of the process.** |
| **Detailed project description** | While the residential building sector is one of the main sources of GHG emissions in France (largely due to the energy consumption of this sector), the emissions in France (largely due to the sector's energy consumption), the public authorities are pursuing ambitious objectives for the energy renovation of buildings. However, the market for the energy renovation is struggling to scale up.<br><br>Faced with the same situation, the Netherlands has implemented since 2012 a comprehensive and innovative approach called EnergieSprong ("energy leap" in Dutch), which has proven its worth and has created a new dynamic on the subject. The ambition of EnergieSprong is to deploy on a large-scale energy renovation by democratizing access to as many people as possible, starting with social housing, and then benefiting other markets: educational buildings, private housing...<br><br>**BY SPRONG (Bouygues Construction's response to the EnergieSprong challenge) develops and aggregates the best technical and economic solutions for massifying the energy renovation of housing in order to meet the twofold imperative of guaranteed sustainable energy performance and lower costs expected by the market.**<br><br>An initial BYSprong pilot project has been carried out. It covers the design, construction, operation and maintenance phases for the rehabilitation of 12 houses on an occupied site. This is a zero-energy renovation pilot project that will make social housing from the 1960s energy self-sufficient. At the end of the work carried out by Bouygues Bâtiment Grand Ouest, the 12 houses will achieve zero energy for all uses, with a 30-year performance guarantee via a global performance contract.<br><br>The EnergieSprong approach on which the project is based consists in a demanding set of specifications with four key components:<br>• **E = 0**: renovation to a zero-energy level guaranteed over the long term up to 30 years.<br>• **Speed**: work on an occupied site in up to 10 days thanks to the pre-industrialization of some of the elements.<br>• **Affordability**: the extra cost of the work to achieve zero energy is financed by the resale of renewable energy and the reduction of energy expenses.<br>• **Attractiveness**: a strong attention is paid to the satisfaction and comfort of the occupants (aesthetics, ...).<br><br>The project timeframe is as follows: 4 months for design, 6 months for construction and 30 years for maintenance. |

**Main project's drivers for reducing the greenhouse gas emissions**

| Reduction levers | Details on the aspects of the project |
|---|---|
| ☒ Energy and resource efficiency (including behaviour) | Raising awareness of eco-actions among occupants and monitoring of consumption. |
| ☒ Energy Decarbonisation | Installation of photovoltaic panels. |
| ☒ Energy efficiency improvements | Thermal insulation of housing. |
| ☐ Improving efficiency in non-energy resources | |
| ☐ Emissions absorption: creation of carbon sinks, negative emissions (BECCS, CCU/S, ...) | |
| ☐ Financing low-carbon producers or disinvestment from carbon assets | |
| ☐ Reduction of other greenhouse gases emission | |

**Emission scope(s) on which the project has a significant impact and quantification of GHG emission reductions per emission scope**

| | Aspects of the project contributing to the reduction of emissions by emission category | Quantification of associated GHG emissions by emission category<br><br>Please follow the quantification methodology used in the Afep guidelines. |
|---|---|---|
| **Reduction of the company's carbon dependency** | | |
| **Scope 1**<br>*Direct emissions generated by the company's activity.* | | |
| **Scope 2**<br>*Indirect emissions associated with the company's electricity and heat consumption.* | | |
| **Scope 3**<br>*Emissions induced (upstream or downstream) by the company's activities, products and/or services in its value chain.* | | |
| **Increase of carbon sinks** | | |
| **Emissions Absorption**<br>*Carbon sinks creation, (BECCS, CCU/S, …)* | | |
| **GHG emissions avoided by the company at third parties** | | |
| **Avoided Emissions**<br>*Emissions avoided by the activities, products and/or services in charge of the project, or by the financing of emission reduction projects.* | Thermal insulation of the housing reducing the consumption of heating energy, and supply of renewable energy for the residual consumption via the installation of photovoltaic panels. | The construction has reduced GHG emissions related to heating from 1020kgCO2e/m² to 4.8 kgCO2e/m² (over 30 years). Approximately 1015 tCO2e for the 12 housing in Longueau. |

**Clarification on the calculation or other remarks:** E=0 over the guaranteed period (30 years). The energy consumption is equivalent to the energy produced by the photovoltaic panels. The avoided CO2 emissions correspond to the CO2 emissions related to the energy not consumed for heating. The reference scenario is the consumption of the buildings before renovation. The residual emissions (4.8kgCO2e/m²) are related to the emission factor of the solar energy (manufacturing of the PV panels).

**Modality of verification of the quantification.**

**Calculation standard used (ADEME base, GHG protocol, etc.):** ADEME base for emission factors.

**Verification of the calculation (internal or external):** The installation of meters and/or monitoring tools for energy consumption are included in the projects, as well as user awareness of the tools and eco-actions. Metering data and the history of energy consumption and production make it possible to verify the E=0 performance commitment over the guaranteed period. Both the company and the operator (the social landlord) have access to the meter data allowing to evaluate the electricity consumption and production.

**Other environmental and social benefits of the project**

The BY SPRONG project contributes to the following SDGs:

- SDG 7 Clean Energy: The BYSprong project ensures access to reliable and modern energy services at an affordable cost (installation of rooftop PV panels, zero-energy operation). It also reduces the load on energy distribution infrastructure.
- SDG 11 Sustainable Cities and Communities: BY SPRONG addresses this goal by ensuring that as many people as possible have access to energy efficient and affordable housing (i.e. reducing fuel poverty, 11.1); by reducing the negative environmental impact of cities per capita (11.6); and by enhancing the value of heritage.

| | |
|---|---|
| **Project maturity level** | ☐ Prototype laboratory test (TRL 7)<br>☐ Real life testing (TRL 7-8)<br>☐ Pre-commercial prototype (TRL 9)<br>☒ Small-scale implementation<br>☐ Medium to large scale implementation<br><br>**Remarks**: click here to enter the level of maturity of the project |
| **Capacity and conditions of the project reproducibility, with associated climate impact mitigation potential** | To reproduce this project in different French regions, it is necessary to standardize the calls for tender and to massify the consultations to benefit from the leverage effect of industrialization.<br><br>It will also be necessary to manage the impact of additional work specific to each project (e.g. asbestos).<br><br>To fuel and perpetuate the mass renovation process, all the players (designers and users) must make a long-term commitment to this new situation in order to benefit fully from the potential of the EnergieSprong approach on which Bouygues Construction is based.<br><br>At Bouygues Construction, many other BYSPRONG projects are already underway or being studied. |
| **Amount of investment made (in €)** | Le projet BYSPRONG catalyse l'innovation Bouygues Construction (ingénierie, commerce, communication) et est porté par les investissements R&D du Groupe (environ 350k€ sur 3 ans), notamment autour des nouveaux modes constructifs et de la performance énergétique. |
| **Economic profitability of the project (ROI)** | ☒ ST (0-3 years)<br>☐ MT (4-10 years)<br>☐ LT (> 10 years)<br><br>In the BYPRONG project, the different types of profitability are as follows:<br>• For the designer:<br>  ○ CT: Catalyze best practices in energy renovation.<br>  ○ MT: Benefit from the standardization of customer specifications<br>  ○ LT: Gains linked to the industrialization of the renovation process; no financial risk on the "energy" item<br>• For the user (here, the social landlord):<br>  ○ TC: increase tenant satisfaction (e.g. thermal comfort)<br>  ○ MT: reduce energy insecurity<br><br>**Remarks:** Because an EnergieSprong renovation (or new construction) meets the best available energy standards, it uses money that would normally be allocated to pay energy and maintenance bills to pay for the work (i.e. Comprehensive Performance Contracting). |
| **Engaged partnerships** | Within the framework of the BYSPRONG project, two partnerships have been entered into with:<br>• Dalkia, for operation and maintenance<br>• Alterea, a design office for all building trades. |
| **Open comments from the project owner** | EnergieSprong is a vector specifically developed to meet the challenges of the ecological transition and to satisfy the ambitious national objectives in terms of large-scale energy renovation of buildings. |
| **More about the project** | |
| **Contact the company carrying the project** | m.hugonnet@bouygues-construction.com<br>c.denaguard@bouygues-construction.com |
| **Project URL links** | http://www.energiesprong.fr/decouverte-des-coulisses-de-la-renovation-pilote-de-longueau/<br>https://www.youtube.com/watch?v=-SxXahCaCpQ |
| **Illustrations of the project** |  |