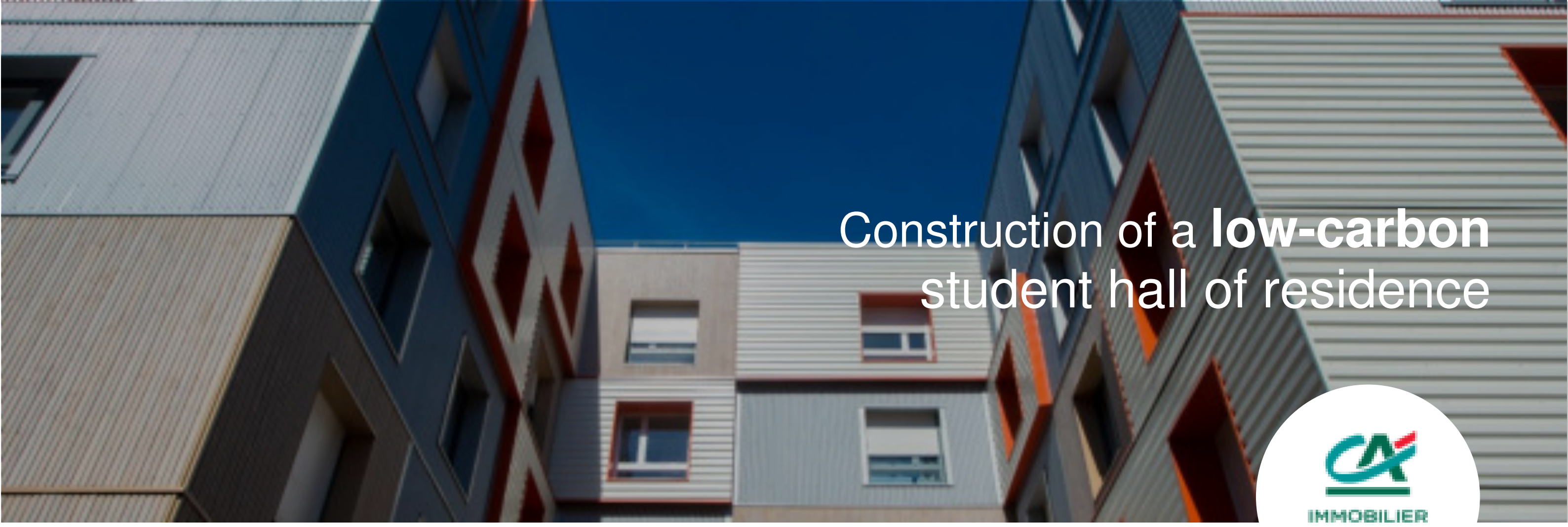

Construction of a **low-carbon** student hall of residence

The Clémence Royer student hall of residence built by Crédit Agricole Immobilier blends meeting the need for affordable rented accommodation with a strong environmental commitment to combating climate change. In both construction and operational phases, certified low-carbon buildings are iconic projects in terms of low emissions. Comfortable, well-insulated and soundproofed, this hall of residence also offers innovative everyday services, including car sharing.

Project start date	**2nd quarter 2016:** Construction start: **August 2018** Delivery of the hall
Project location Locations of project implementation at this stage and target geography if reproducible	Noisiel, in Seine-et-Marne, France. The project is located in the new town of Marne-la-Vallée, a short distance from Paris-Est Marne-la-Vallée university (11,000 students) and the suburban railway (RER line A), in the centre of the Paris-Vallée de la Marne conurbation.
Project objectives Type of the project's climate innovation with a reminder of the problem/challenge addressed	To meet the demand for student accommodation via a hall of residence with a low carbon footprint (both for construction and operationally)
Detailed description of the project	The Clémence Royer hall of residence reflects the consensus between the property developer and the planning authority to build a more sustainable city, helping provide accommodation for all: - Open up the district of Le Luzard - Expand the diversity of functional uses in the urban area - Lead by example in terms of environmental responsibility. This 6-storey, entirely timber-structured building was one of the first 15 buildings to secure France's BBCA (low-carbon building) label when this particular certification came into force in March 2016. The building is also H&E certified (the French Habitat & Environment scheme) under profile A**. This student hall of residence is a real blend of the social and environmental, and also demonstrates the need to seek out innovative solutions in terms of both design and construction, in this case combining re-use of the existing foundations with the use of CLT panels. Covering 6,302 m², the hall of residence comprises 230 student rooms over six floors, premises for the hall warden, a lodge for the caretaker, a common room and various other areas (laundry room, a bins area, etc.). Students live in well-equipped, furnished studios averaging 20 m² in size. The warden's and caretaker's premises are also furnished (bed, desk, table, shelves, lights) and fitted with a kitchenette with a fridge and hobs. The development has an environmental focus, in its construction and operational phases alike. **Sustainable construction** By re-using the foundations of a factory previously on the site, the project was designed to be low-carbon from the outset, with no waste produced by demolition. Making use of the existing structure avoided generating CO_2 from building new foundations. CLT panels to store carbon The timber panels were prefabricated, built and assembled in a factory then erected on the site of the building. This enabled the construction duration to be remarkably short, and the carbon footprint unusually small, with reduced disruption to nearby residents. This lightweight, durable solution, 100% recyclable, offers students highly effective soundproofing and heat insulation. **Operational efficiency** The development is H&E certified (the French Habitat & Environment scheme) under profile A as per the 2012 version of the benchmarks, updated in March 2014. In terms of energy performance, the target for the development was to match the level of the RT2012 French energy regulation standard minus 10% within the meaning of the H&E standard for the accommodation, and

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<td>RT2012 minus 10% for the building as a whole. To be eligible for Ile-de-France regional subsidies, the hall of residence also had to source a minimum of 30% of its heating and domestic hot water requirements from renewable energy via the Soraya system.

Electricity supply options:
The site on which the hall of residence is built has no gas supply. A combination of effective electricity supply systems therefore had to be considered. The energy supply feasibility study showed the most appropriate option to be a heat pump using heat from the CMV system's exhaust air to produce domestic hot water. The heating, meanwhile, is provided by heating panels, which have the advantage of bringing immediate comfort and being individually controlled for each room. Thanks to the effectiveness of the lagging (bioclimatic needs at less than half the regulatory maximum), this combination of systems means the building reaches the RT2012-10% target level.

Smart services for students
Various services are provided to students, including a smart laundry. A smartphone app allows students to see whether washing machines are available without leaving their room, and to be notified when their washing cycle has finished. In addition, the common room allows students to network, and can be used for co-working. The hall benefits from the presence of a hall warden, who lives on-site, and deals with individual requests from the students. Lastly, students are offered a car-sharing service, in partnership with Glide. Two vehicles are available, booked and used solely by means of an app.</td>
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<td>Main project's drivers for reducing the greenhouse gas emissions</td>
<td>
<table>
<tr><th>GHG reduction drivers</th><th>Further details on relevant aspects of the project</th></tr>
<tr><td>☒ Energy and resource conservation (including routine patterns of use)</td><td>Re-using the foundations of a factory previously on the site meant the project was low-carbon and used fewer resources generally, avoiding waste from demolition then building new foundations.

When the building is operational, students are offered a car-sharing service, in partnership with Glide.

A communal laundry room is available to students, avoiding use of individual solutions.</td></tr>
<tr><td>☒ Decarbonisation of energy</td><td>Soraya system: The hall of residence has a heat pump installed that recovers heat from the extracted air that would usually be wasted in a conventional ventilation system, and uses it to produce domestic hot water to meet the building's needs.
The advantage of the heat pump using exhaust air is that the COP (coefficient of performance) is very good, because heat is taken from source that is warmer than the air outside.</td></tr>
<tr><td>☐ Improvements in energy efficiency</td><td></td></tr>
<tr><td>☒ Improvements in non-energy resource efficiency</td><td>A "clean site" process (under the French building federation's scheme) was followed to optimise waste management and traceability, reduce inconvenience to the local community, and protect site staff and the environment.

The car park in the basement of the hall of residence is now shared with the neighbouring office building.</td></tr>
<tr><td>☒ Emission absorption: creation of carbon sinks, negative emissions (BECCS, CCU/S, etc.)</td><td>Carbon is stored in the construction timber (CLT) used (replacing a more conventional concrete/steel structure)</td></tr>
<tr><td>☐ Financing of low-carbon producers, or divestment from carbon-emitting assets</td><td></td></tr>
<tr><td>☐ Reduction in other greenhouse gases</td><td></td></tr>
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<td>Scope(s) of emissions on which the project has a significant impact and quantification of reductions in GHG emissions by scope of emissions</td>
<td>
<table>
<tr><th></th><th>Aspects of the project that contribute to reducing emissions, by emissions category</th><th>Quantification of the associated GHG emissions reductions, by emissions category

Please follow the quantification methodology given in the AFEP guidelines.</th></tr>
<tr><td colspan="3">Reduction in the company's carbon dependency</td></tr>
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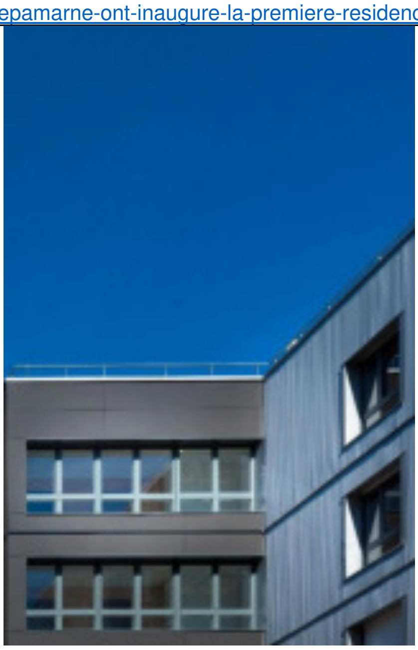
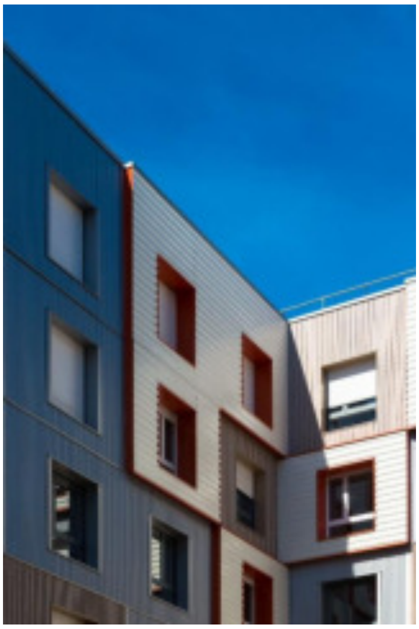
Scope 1 *Direct emissions generated by the company's activities.*		
Scope 2 *Indirect emissions associated with the electricity and heat used by the company.*		
Scope 3 *Emissions generated before or after the company's place in the value chain by virtue of its activities, products and/or services.*	Construction work Heating system with heat pump Use of timber construction (instead of a more usual concrete/steel structure)	-970 kg CO_2/m² (compared with a conventional solution) - 373 kg CO_2/m² (compared with a conventional solution) for operations -174 kg CO_2/m² (compared with a conventional solution) for the materials used
Increases in carbon sinks		
Emissions absorption *Creation of carbon sinks (BECCS, CCU/S, etc.)*	Use of CLT panels	60.5 kg CO_2/m² stored
Other parties' GHG emissions avoided by the company		
Avoided emissions *Emissions that are avoided through the activities, products and/or services of the project-owner company or by the financing of the emissions reduction project.*		

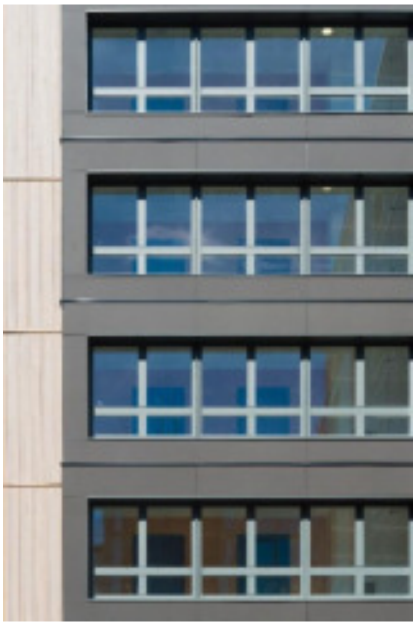
Details about the calculation or other comments:

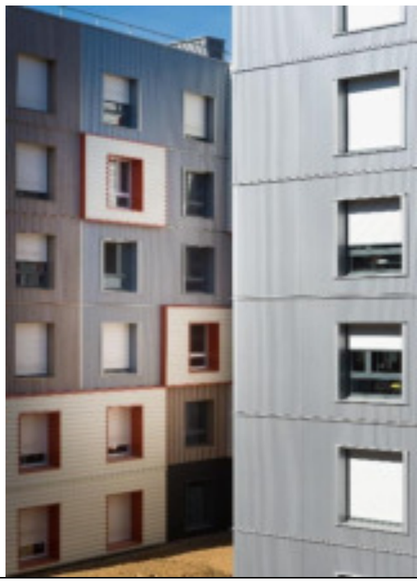
A building of conventional concrete construction, meanwhile, generates an average of 1.5 tonnes of carbon per m² of useable floor area.

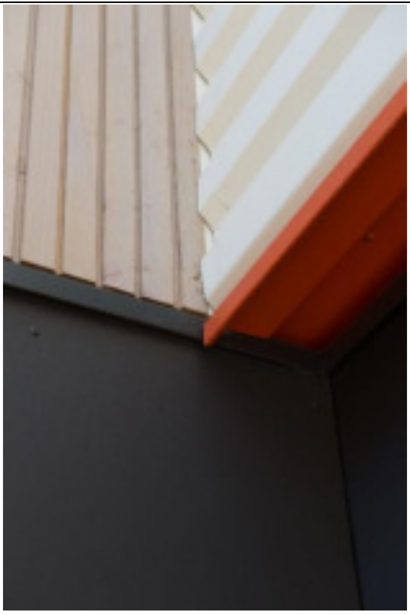
Method of verification of this quantification	**Benchmarks used in the calculation (ADEME resource centre, GHG Protocol, etc):** BBCA standards resources **Calculation check (internal or external):** Reviewed externally by the consulting engineers Géra'nium Environnement, and the low-carbon certificate issuer Cerqual
Other environmental and social benefits of the project	The Clémence Royer hall of residence provides high quality, environmentally-friendly accommodation at a reasonable price to students, a group that often struggles to find accommodation. Aimed in particular at students at Paris-Est Marne-la-Vallée university (11,000 students) in the heart of the Paris-Vallée de la Marne conurbation, the hall is ideally located for students to reach the university campus in under 15 minutes by public transport (suburban railway RER line A). The choice of name for the hall of residence is also significant, Clémence Royer being a 19th century French philosopher and scientist. She was a renowned feminist and free-thinker at the end of the 19th century. The project contributes to the following SDGs: • SDG 11: Sustainable cities and communities • SDG 13: Urgent action to combat climate change
Project maturity level	☐ Laboratory tests on prototype (TRL 7) ☐ Operational tests (TRL 7-8) ☐ Pre-market prototype (TRL 9) ☐ Small-scale implementation ☒ Medium- or large-scale implementation **Comments:** The hall of residence was completed and delivered to the Caisse des Dépôts (CDC Habitat) on 9 August 2018.
Potential and condition of reproducibility of the project with associated potential in terms of climate impact	Crédit Agricole Immobilier also built the Liv'In Bussy residential complex of 221 housing units in Bussy Saint Georges where timber was selected for the construction. This complex also received a BBCA Trophies low-carbon award. The property developer is also involved in other low-carbon tertiary and residential construction projects in Ile-de-France and other regions of France: Consequently, to redevelop the Porte de Montreuil district, the C40 and Paris city council chose the urban development project sponsored by the consortium of Nexity, Engie's property development subsidiary Aire

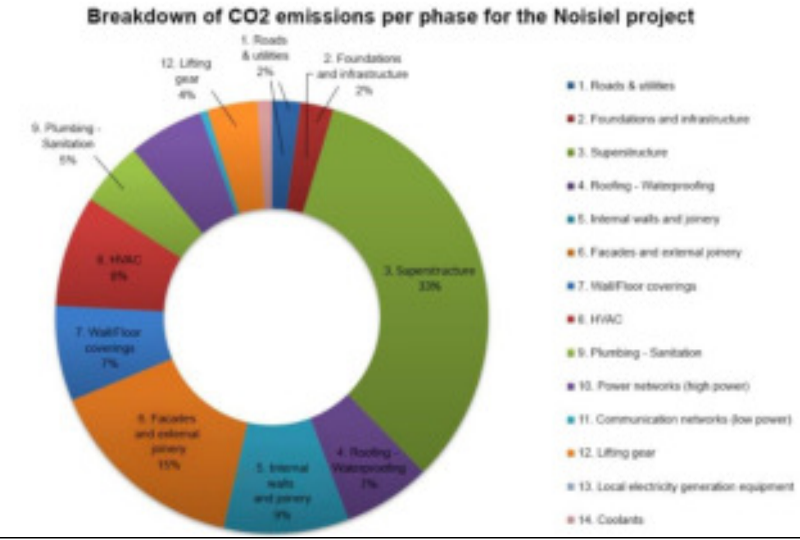
	Nouvelle, and Crédit Agricole Immobilier. In response to the many redevelopment challenges posed by the district, the consortium opted to transform the place de la Porte de Montreuil into a decarbonised district by 2023. The consortium and the architects they appointed designed modular buildings: They are reversible, and can be converted into offices or housing. 80% of the materials used are from the surrounding Ile-de-France region with local raw earth, stone, timber and hemp concrete and all buildings powered by geothermal energy and a portion of the electricity generated by biosolar roofs. In terms of energy consumption, all the buildings will be powered geothermally with some of the electricity generated on-site by means of 3,000 m^2 of biosolar roofs. With the "Nanterre Partagée" project, Crédit Agricole Immobilier, Icade and Novaxia, alongside CDU, were selected by the Métropole du Grand Paris (Greater Paris combined local authority) to redevelop the CASH hospital site in Nanterre. Key features of the scheme are energy performance, optimised management of rainwater and a low-carbon strategy. Materials from demolished buildings will be reused to construct the new buildings and Zinc-air batteries, an EDF innovation, will be used to store the energy generated by the photovoltaic panels. The signing of a partnership agreement by Crédit Agricole Property and Pacifica, the non-life insurance subsidiary of Crédit Agricole Assurances for the low-carbon construction of twenty buildings for claims handling, is also part of the socially-responsible real-estate policy followed, from an energy and environmental point of view. Construction on six of the 2,000 m^2 buildings has already started, at Caen, Dijon, Grenoble, Saint Etienne, La Roche-sur-Yon and Montpellier.
Amount of the investment made (in €)	The construction cost of this student hall of residence was €7.7m, excluding taxes.
Economic return of the project (ROI)	☐ ST (0-3 yrs) ☐ MT (4-10 yrs) ☒ LT (> 10 yrs) **Comments:** Click or tap here to enter text.
Partnerships	• **Project owner:** Crédit Agricole Immobilier, EFIDIS (now CDC Habitat) • **Architect:** Gera Architecture • **Consulting engineers:** Géra'nium Environnement (environmental technical consulting engineers) • **Construction company:** Poulingue (timber house builder) • **Low-carbon certificate issuer:** Cerqual
Free comments from the project promoter	/
To learn more about the project	
Contact the company promoting the project	Catherine Pouliquen – Head of CSR, Crédit Agricole Immobilier Catherine.POULIQUEN@ca-immobilier.fr
Project URL links	https://www.batimentbascarbone.org/bbca-residence-clemence-royer-noisiel-77/ https://www.ca-immobilier.fr/actualites/corporate/le-groupe/credit-agricole-immobilier-cdc-habitat-et-epamarne-ont-inaugure-la-premiere-residence-etudiante-bas-carbone-a-noisiel
Illustrations of the project	 










Breakdown of CO2 emissions per phase for the Noisiel project
1. Roads & utilities
2. Foundations and infrastructure
3. Superstructure
4. Roofing - Waterproofing
5. Internal walls and joinery
6. Facades and external joinery
7. Wall/Floor coverings
8. HVAC
9. Plumbing - Sanitation
10. Power networks (high power)
11. Communication networks (low power)
12. Lifting gear
13. Local electricity generation equipment
14. Coolants