The chilled water production system of Gerland's bioproduction facility in Sanofi Lyon is being updated to :

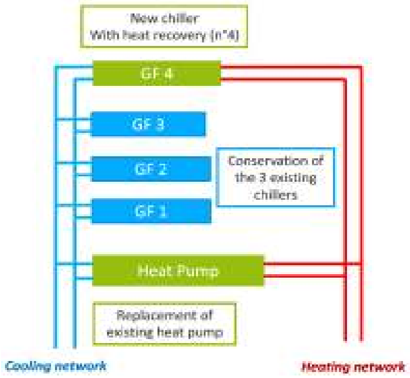
- Meet the ongoing environmental challenges of reducing CO2 emissions
- Optimize its energy productivity ;
- Acquire more robustness and cold production capacity.

Starting date of the project	October 2020: Study phase
Project Localisation Places of implementation of the project at this stage and targeted geography if replicable.	Sanofi Lyon Gerland, 23 bd Chambaud de la Bruyère 69007 LYON **Replicability target:** The target scope includes all French sites where a plan with a strong enough subsidy structure makes the project financially feasible.
Project objectives Type of climate innovation of the project with a description of the problem/issue addressed	Reduce the site's energy consumption and associated CO2 emissions by recovering the heat produced during the production of chilled water for re-use in the heating hot water networks.
Detailed project description	The principle of low-temperature heat recovery is one of the priorities of Sanofi's decarbonization approach. The project involves removing the old heat pump and replacing it with a new heat recovery c hiller that uses modern technology (magnetized bearings). The improvements have the following specific effects on how the site produces chilled water and heating hot water: ➢ **Original system operation** Originally, the system consisted of the following equipment: - A heat pump (Heat pump) that operates continuously to produce chilled water and hot water. - The three current chillers (GF1, GF2 and GF3) take over to produce cold water in addition to the production of the heat pump. The chillers are switched on one after the other with an operating order that ensures an equivalent annual operating time between each chiller. - A steam-water exchanger located in LYG3, fed by the steam produced by the boiler in operation, which provides additional power for the production of hot water. This equipment currently supports the heat pump in order to produce the hot water necessary for heating the premises, mainly in winter. Thus, the overall production of cold water provided by this energy installation is intended to supply equipment such as air handling units (AHU), water loop exchangers, air conditioning cassettes, etc. - As for the production of hot water, it is mainly produced by the heat pump with, if necessary, the LYG3 exchanger as a support in order to heat the premises of the whole establishment (via AHU and air conditioning cassettes). ➢ **Operation of the new water production system** - The project incorporates a new heat pump (620 kWp and 820 kW hot TFP) that will replace the existing equipment and operate to produce both chilled and hot water. This new equipment will be more energy efficient. - A new GF4 chiller (1414 kWp and 950 kW hot) which will be more efficient than the current equipment and will contribute to the production of cold water for the Sanofi Genzyme facility

and will be equipped with a heat recovery system. Thus, via heat recovery, the GF4 will contribute to the production of hot water for the site. This new operation will make it possible to stop using the current steam exchanger during the winter period and thus reduce the consumption of gas from the boilers (carbon neutrality objective to ensure the global heating of the establishment).

- The three current chillers (GF1, GF2 and GF3) will take over to produce additional cold water.

- The two new units, TFP and GF4, will be equipped with an HFO type R1234ze refrigerant (the previous TFP was initially equipped with an R134A fluid).



The project (1.221 M€) was financed by the Energy Savings Certificates (CEE) up to 1.045 M€ and was carried by Engie (Equans) for CEE.

This waste heat recovery facility is fully operational since December 2021.

Main project's drivers for reducing the greenhouse gas emissions

Enter the information in the appropriate boxes

Reduction levers	Details on the aspects of the project
☐ Energy and resource efficiency (including behaviour)	
☒ **Energy Decarbonisation**	Use of waste heat from the new chiller for heating, replacing part of the other modes of hot water production: boilers and steam exchanger.
☒ **Energy efficiency improvements**	Greater energy efficiency of the two new equipments: the new TFP in comparison to the old, and the GF4 in comparison to the GF1, GF2, and GF3.
☐ 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**	substitution of the R134A refrigeration fluid by R1234ZE (with a GWP roughly 200 times lower) in a new thermopompe, dramatically reducing emissions caused by leaks.

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

Indicate the aspects of the project that contribute to the reduction of emissions per category of emissions

	Aspects of the project contributing to the reduction of emissions by emission category	Quantification of associated GHG emissions by emission category Please follow the quantification methodology used in the Afep guidelines.
Reduction of the company's carbon dependency		

<table>
<tr>
<td>considered (left-hand column) and the quantification of associated emissions.

Indicate the main hypotheses and calculation steps in the intended section (below the table)

For further details, please refer to the methodology guidelines.</td>
<td>
<table>
<tr><td>Scope 1
Direct emissions generated by the company's activity.</td><td>Substitution of R134a refrigerant by HFO R1234 ze with 200 times lower GWP.</td><td>Estimated at 40 tCO2 / year (REX accidental leakage 2019 on heat pump)</td></tr>
<tr><td>Scope 2
Indirect emissions associated with the company's electricity and heat consumption.</td><td>Recovery of heat from the new cold group GF4 to heat the building instead of using the steam exchanger and gas boilers.
Greater electrical efficiency from the new TFP and GF4.</td><td>109 teCO2</td></tr>
<tr><td>Scope 3
Emissions induced (upstream or downstream) by the company's activities, products and/or services in its value chain.</td><td></td><td></td></tr>
<tr><td colspan="3">Increase of carbon sinks</td></tr>
<tr><td>Emissions Absorption
Carbon sinks creation, (BECCS, CCU/S, …)</td><td></td><td></td></tr>
<tr><td colspan="3">GHG emissions avoided by the company at third parties</td></tr>
<tr><td>Avoided Emissions
Emissions avoided by the activities, products and/or services in charge of the project, or by the financing of emission reduction projects.</td><td></td><td></td></tr>
</table>
Clarification on the calculation or other remarks: Based on the facility's 2019 consumption data and the outlook for increased activity, it was estimated that the project would result in the following consumption reductions: 738 MWh/year of electricity and 429 MWh/year of natural gas. These estimates resulted in a projected emission reduction of 109 tCO2/year (conversion factor for nuclear energy and natural gas).
</td>
</tr>
<tr>
<td>Modality of verification of the quantification.</td>
<td>Calculation standard used (ADEME base, GHG protocol, etc.):

Verification of the calculation (internal or external): internal factors based on nuclear electricity and natural gas conversion factors.</td>
</tr>
<tr>
<td>Other environmental and social benefits of the project

If possible, list the impacts and Sustainable Development Objectives concerned</td>
<td>The implementation of this project should make it possible to reduce the use of the site's gas boilers and eliminate the possibility of using the vapor exchanger.</td>
</tr>
<tr>
<td>Project maturity level

Tick the corresponding current maturity level</td>
<td>☐ Prototype laboratory test (TRL 7)
☐ Real life testing (TRL 7-8)
☐ Pre-commercial prototype (TRL 9)
☐ Small-scale implementation</td>
</tr>
</table>

	☒ **Medium to large scale implementation** **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	xxx
Amount of investment made (in €)	Project amount of 1,221 M€: - Financing from the CEE at a level of 1,045 M€ - Financing provided by Sanofi up to €176,000.
Economic profitability of the project (ROI)	☒ **ST (0-3 years)** ☐ MT (4-10 years) ☐ LT (> 10 years) **Remarks:** click here to enter the information
Engaged partnerships	RAS – project purchasing
Open comments from the project owner	xxx
More about the project	
Contact the company carrying the project Please specify an ad hoc e-mail address that will allow the reader to contact the project company directly	Aymeric.VIGNON@sanofi.com
Project URL links	xxx
Illustrations of the project 3 photos/videos minimum (in HD format to be attached)