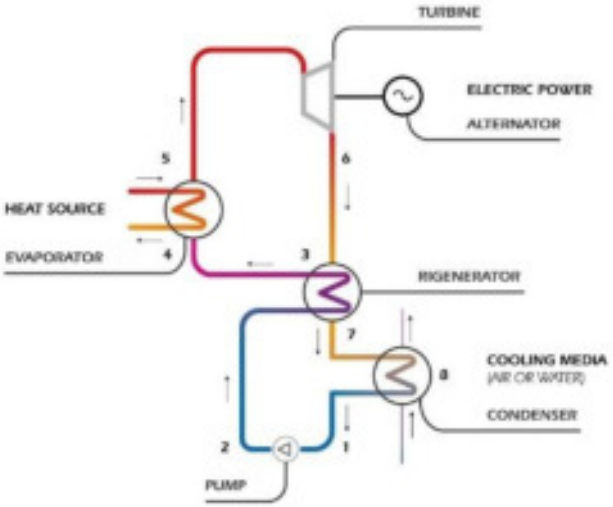
ORC (Organic Ranking Cycle) turbine installations

In order to reduce the amount of electricity taken from the national grids, the Saint-Gobain Group has opted for self-consumption by installing ORC turbines to meet part of the needs of its sites in Pisa (Italy) and Chennai (India).

Starting date of the project	2019
Project Localisation Places of implementation of the project at this stage and targeted geography if replicable.	The ORC turbines have been installed in the flat glass production line in Pisa (Italy) and in the flat glass production plant in Chennai (India). Such an installation is replicable on all flat glass production lines, with particular interest in those located in countries with high electricity cost and CO2 emission factors.
Project objectives Type of climate innovation of the project with a description of the problem/issue addressed	Reducing electricity consumption from the grid at the Pisa and Chennai sites by installing Organic Ranking Cycle (ORC) turbines, using the waste heat from furnace fumes.
Detailed project description	In order to improve the energy efficiency of its production sites and limit their carbon impact, the Saint-Gobain Group has chosen to install ORC (Organic Ranking Cycle) turbines, which use the waste heat from furnace fumes to produce electricity. An ORC turbine recovers about 5MW of thermal heat from the furnace fumes, which allows the production of about 1MW of electricity. As the electricity is self-consumed by the plant, this electricity production limits the consumption of electricity from the national grid. The application of this ORC technology is a first for the Saint-Gobain Group. 
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)	Replacement of electricity taken from the grid with electricity generated by waste heat recovery
☐ Energy Decarbonisation	
☐ Energy efficiency improvements	
☐ 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	See table below
Modality of verification of the quantification	**Calculation standard used (ADEME base, GHG protocol, etc.):** GHG Protocol **Verification of the calculation (internal or external):** Monitoring of electricity production via monitoring of the ORC turbine
Other environmental and social benefits of the project	This ORC turbine project impacts the average CO2 emission level of the national electricity grid, by switching the corresponding consumption to ORC electricity production. The project also contributes to the achievement of the Saint-Gobain Group's CSR objectives, in particular the objective of carbon neutrality for 2050.
Project maturity level	☐ Prototype laboratory test (TRL 7) ☐ Real life testing (TRL 7-8) ☐ Pre-commercial prototype (TRL 9) ☒ Small-scale implementation ☐ Medium to large scale implementation **Remarks**: Mature technology, applied in other industries. Among the first installations on the Float process (flat glass production furnace)
Capacity and conditions of the project reproducibility, with associated climate impact mitigation potential	Reproducibility compatible on all float lines, with a particular interest on those located in countries with a high CO2 electrical emission factor. The level of available waste heat in the flue gas of the float process must be adapted to the technical and economic dimensioning of this type of technology.

	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		
Scope 1 *Direct emissions generated by the company's activity.*		
Scope 2 *Indirect emissions associated with the company's electricity and heat consumption.*		9,4 ktCO2/year
Scope 3 *Emissions induced (upstream or downstream) by the company's activities, products and/or services in its value chain.*		
Increase of carbon sinks		
Emissions Absorption *Carbon sinks creation, (BECCS, CCU/S, …)*		
GHG emissions avoided by the company at third parties		
Avoided Emissions *Emissions avoided by the activities, products and/or services in charge of the project, or by the financing of emission reduction projects.*		

Clarification on the calculation or other remarks:
The ORC turbine partially meets the electricity needs of the sites. On average, an ORC system produces about 8,500 MWh/year of electricity.
Considering that the average emission factor of the Italian grid is 0.4 tCO2/MWh and that the Indian grid is 0.7 tCO2/MWh, this amounts to a CO2 gain of 3.4 ktCO2/year for the Italian site and 6 ktCO2/year for the Indian site.

	Sufficient availability of the waste heat from the furnace flue gas, which is variable depending on the capacity of the furnace, and good maintenance of the installation over time are two factors that determine the success of such a project.
Amount of investment made (in €)	CAPEX = approx. 5 M€ per installation
Economic profitability of the project (ROI)	☐ ST (0-3 years) ☒ MT (4-10 years) ☐ LT (> 10 years) **Remarks:** • Economic profitability linked to the reduction of the energy bill (electricity) of around 430 k€/year (hyp. 50 €/MWh). • Very autonomous and automatic operation of the installation. Limited personnel requirements for operation and low maintenance costs.

Engaged partnerships	Several partners were involved in the installation of the ORC turbines in the Saint-Gobain plants:
	• Contractors: GEA Group AG (project management) and TURBODEN S.P.A. (supplier of the ORC turbine)
	• Local contractors for various supply and assembly works
	• Public aid:
	  ○ Pisa: State via Italian subsidies White certificates
	  ○ Chennai: no public aid

Open comments from the project owner	/
More about the project	
Contact the company carrying the project	dehs@saint-gobain.com
Project URL links	Saint-Gobain Universal Registration Document 2019, page 83 https://www.saint-gobain.com/sites/sgcom.master/files/saint-gobain2019_urd_en_pdf.pdf
Illustrations of the project