

Setting up a carbon zero project to reduce a factory's direct and indirect emissions



The carbon zero project established at the Settimo factory aims to achieve carbon neutrality by working on an innovative energy mix – the factory is heated in winter and air-conditioned in summer by the town's district heating network to which it is connected. Thermal energy needed for production processes is produced with biogas, two thirds of the electricity needs are met by a biomass boiler (the same one that supports the district heating network), and the remaining third by 14,000 photo-voltaic panels on the factory roof.

Starting date of the project	2015
Project Localisation Places of implementation of the project at this stage and targeted geography if replicable.	The L'Oréal Settimo Torinese factory, Italy: <ul style="list-style-type: none"> • Installation of photo-voltaic panels – on the factory roof (Settimo Torinese) • Biomass plant < 1km from the factory (partnership) • Biogas – 15 km from the factory (partnership).
Project objectives Type of climate innovation of the project with a description of the problem/issue addressed	Through the carbon zero project, L'Oréal aims to reduce the Settimo factory's direct and indirect CO ₂ emissions (Scopes 1 and 2).
Detailed project description	<p>Established in 1959, the Settimo factory specialises in make-up and haircare.</p> <p>It achieved carbon neutrality (by improving energy efficiency and using 100% renewable energy) in 2015 thanks to measures implemented on the site:</p> <ul style="list-style-type: none"> • The installation of a biomass plant to produce electrical and thermal energy for local needs (for the factory and town) at less than a kilometre from the factory. The boiler is managed by a third-party business (Riesco) and its feedstock is exclusively biomass (for example, wood and organic residues, and wood derived from forest maintenance, rather than purpose-grown) generated in the 30 kilometres surrounding the site. The production has a capacity of around 33 GWh/year of thermal energy and 9 GWh of electrical energy. The factory uses 10 GWh/year and 7 GWh/year of thermal and electrical energy, respectively. The thermal energy produced by the biomass plants is injected into the district heating network and replaces the use of methane boilers. Additionally, the renewable electricity produced by this plant replaces the consumption of electrical energy from the national grid (of which the mix is still carbon-based – emission factor in Italy is 0.331 kg CO₂/kWh – source IEA). What is not consumed by the factory is injected into the network (heat and electricity). • The optimisation of renewable thermal energy use (the installation of heat exchangers to heat buildings in winter and absorption chiller unit for the air-conditioning of buildings in the summer). This technology has an advanced efficiency, which has enabled us to make 30% energy savings (compared to the old methane boilers). • Photovoltaic panels on the factory roof (14,000 panels) for direct use on the site (35% of electrical energy consumed by the factory – 3 GWh/year). The excess (during the factory's downtime) is injected into the grid (around 0.5 GWh/year). • Partnership with a local biogas supplier (biogas obtained via the treatment of wet urban waste – 6 GWh/year). This biogas is used to produce technological steam at 140°C to heat and sterilise the production and packaging lines (the heat from the district heating network didn't allow for this, as it was between 80°C and 100°C). The supplier also provides heat and electrical energy (cogeneration) to the surrounding population (the town of Pinerolo). • Reduction of energy consumption – optimising processes (for example, cleaning processes for production equipment), LED lighting throughout the whole factory (1,110 LED bulbs), high efficiency electrical installation (for example, more efficient engines in case of replacement or new installations), recapture of the compressor heat and the boiler exhaust, as well as involving and raising awareness among employees. <p>In conclusion, since establishing the carbon zero project, the site's thermal energy is comprised of 45% biogas (biogas from the treatment of urban waste) needed for production processes. The remainder (heating and air-conditioning of buildings) is ensured by the district heating network to which it is connected. Two</p>

thirds of electricity needs are met by a biomass plant. The remaining third is delivered via 14,000 photovoltaic panels on the site (self-consumption).

In 2018, the factory became a 'Waterloop Factory'. The concept of 'Waterloop Factory' consists in only using public water supplies for human consumption and for the production of high quality water used as a raw material for the composition of products. All the water needed for production (cleaning equipment, production of steam, etc.) comes from water reused or recycled (through the site's wastewater treatment facility) in a closed loop (<https://www.loreal.com/en/news/commitments/turning-loreal-sets-torinese-plant-into-a-dry-factory/>). The factory has also improved its energy efficiency by taking advantage of its water consumption reduction programme. The heat of water used for cleaning is recovered and reused, and the wastewater treatment station's energy needs have been reduced by two thirds.

Main project's drivers for reducing the greenhouse gas emissions	Reduction levers	Details on the aspects of the project
	<input checked="" type="checkbox"/> Energy and resource efficiency (including behaviour)	Awareness-raising days for employees on environmental issues, and in particular, energy (reducing consumption, renewable energy, etc.). Organised challenges for employees with a direct link to energy on site through their daily work ('good behaviour on the energy side').
	<input checked="" type="checkbox"/> Energy Decarbonisation	Choice of alternative energy by means of partnerships with local suppliers and self-consumption (PV panels on site).
	<input checked="" type="checkbox"/> Energy efficiency improvements	Reduction of energy consumption through specific investments (LED lighting for the whole factory), machines with high energy efficiency, working culture and employee training).
	<input type="checkbox"/> Improving efficiency in non-energy resources	
	<input type="checkbox"/> Emissions absorption: creation of carbon sinks, negative emissions (BECCS, CCU/S, ...)	
	<input type="checkbox"/> Financing low-carbon producers or disinvestment from carbon assets	
	<input type="checkbox"/> 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
	Please follow the quantification methodology used in the Afep guidelines .		
	Reduction of the company's carbon dependency		
Scope 1 <i>Direct emissions generated by the company's activity.</i>	Use of heat from the biomass unit (through the district heating network). Use of local biogas. Improvement of the site's energy performance.		16GWh/year x 205*kg CO ₂ /MWh = 3,280 tonnes CO ₂ *205 kg CO ₂ /MWh= Emission factor for natural gas (source : ADEME)
Scope 2 <i>Indirect emissions associated with the company's electricity and heat consumption.</i>	Replacing electricity taken from the grid (in Italy) by: <ul style="list-style-type: none"> On-site energy self-consumption through roof-mounted solar PV panels Electricity produced by the biomass unit (through the network) 		10GWh/year x 331*kgCO ₂ /MWh = 3,310 tonnes CO ₂ *331 kg CO ₂ /MWh = Emission factor Italy (source: AIE)

	<ul style="list-style-type: none"> Improvement of the site's energy performance. 		
	<p>Scope 3 Emissions induced (upstream or downstream) by the company's activities, products and/or services in its value chain.</p>		<p>0.5 GWh/year x 200*kg CO₂/MWh = 100 tonnes CO₂**</p> <p>*200 kgCO₂/MWh= CO₂ emission factor avoided by the injection of renewable electricity in the grid (local source: supplier or manager of the grid).</p> <p>**The gains linked to the heat and renewable electricity injected into the network by the biomass plant and not consumed by L'Oréal have not been included here, as L'Oréal does not have operational control over the plant.</p>
<p>Increase of carbon sinks</p>			
	<p>Emissions Absorption Carbon sinks creation, (BECCS, CCU/S, ...)</p>		
<p>GHG emissions avoided by the company at third parties</p>			
	<p>Avoided Emissions Emissions avoided by the activities, products and/or services in charge of the project, or by the financing of emission reduction projects.</p>	<p>Agricultural emissions linked to the storage of feedstock outside (conventional practice) avoided on the site.</p>	
<p>Clarification on the calculation or other remarks: click here to specify</p>			
<p>Modality of verification of the quantification.</p>	<p>Calculation standard used (ADEME base, GHG protocol, etc.): GHG Protocol (the methodology followed by the L'Oréal Group to calculate its Scope 1, 2 and 3 carbon impacts).</p> <p>Verification of the calculation (internal or external): The verification of data relative to the site's energy consumption and CO₂ emissions (bills, meter readings, emission factors, among other things) is assured through the audits established by L'Oréal and through the verification of non-financial data by the L'Oréal Group's statutory auditors (Deloitte and PwC, in line with European and French regulation, as a result of including this data in the L'Oréal Group's Universal Registration Document).</p>		
<p>Other environmental and social benefits of the project</p>	<p>This project within the Settimo factory enables us to reduce the environmental impact of the factory and the town. It contributes to SDG 7 Clean and affordable energy, SDG 9 Industry, innovation and infrastructure, and SDG 12 Responsible production and consumption.</p> <p>The biomass plant used for the factory and the town of Settimo's district heating contributes to SDG 13 Climate action. In addition, it enables the creation of employment and therefore contributes to SDG 8 Decent work and economic growth.</p> <p>This is a model and a case study of a zero emission factory (creation, culture).</p> <ul style="list-style-type: none"> SDG 7: Clean and affordable energy <p>The factory is 45% heated by biogas (biogas obtained by the treatment of urban waste). The rest comes from the town's district heating network, to which it is connected and of which the feedstock is uniquely biomass (for example, wood and organic waste) generated from within a 30km radius of the site. Two thirds of its electricity needs are covered by a biomass plant, with the remainder coming from 14,000 solar PV panels installed on the site (self-consumption).</p> <p>The installation of biomass produces more energy (electricity and heat) than is needed for the operation of the site. As a result, this represents 23GWh/year of renewable heat injected into the district heating network, and 2GWh/year of electricity injected into the national grid. During the site's periods of inactivity (particularly at the weekend), the excess production arising from the solar PV panels is injected into the grid, contributing to its decarbonisation (around 0.5 GWh/year).</p> <ul style="list-style-type: none"> SDG 8: Decent work and economic growth <p>The projects established by the Settimo factory (partnerships and investments) have enabled the creation of employment in the clean energy sector (for example, the running of the biomass plant employs at least two</p>		

	<p>full-time staff), but also the development of other sectors (for example, to collect the organic waste). In addition, the construction and maintenance of the assets required a specific type of labour (for example, the installation of 14,000 solar panels on the site took nearly six months).</p> <ul style="list-style-type: none"> • SDG 9: Industry, innovation and infrastructure <p>The factory achieved carbon neutrality in 2015 thanks to its innovative energy mix. It is 45% heated by biogas, with the remainder coming from the town's district heating network, to which it is connected. Two thirds of its electricity needs are covered by a biomass plant, with the rest derived from 14,000 solar PV panels installed on the site. In 2017, the Settimo plant was able to further increase its energy efficiency by taking advantage of its programme to reduce water consumption. The heat from the cleaning water is now recaptured and reused, and the energy needs of the wastewater treatment station's fans have been reduced by a third. In 2018, the factory became a 'Waterloop factory'.</p> <p>The concept of 'Waterloop Factory' consists in only using public water supplies for human consumption and for the production of high quality water used as a raw material for the composition of products. All the water needed for production (cleaning equipment, production of steam etc) comes from water reused or recycled (through the site's wastewater treatment facility) in a closed loop on the site.</p> <ul style="list-style-type: none"> • SDG 12: Responsible production and consumption <p>Through the <i>Sharing Beauty With All</i> (2013-2020) and <i>L'Oréal for the Future</i> (2020-2030), the L'Oréal Group encourages, among others, its businesses to produce sustainably and significantly reduce their impact on the environment.</p> <p>By 2020, all the Group's production sites were tasked with reducing their consumption of water, waste and GHG emissions by 60%, compared to 2005.</p> <p>In terms of figures, in 2020, the Settimo plant reduced its water consumption in litres per finished product by 44% compared to 2005 and is a 'Waterloop factory'. It creates value from 100% of its waste, and uses 100% locally produced renewable energy (hence it is carbon neutral).</p> <p>Through the <i>L'Oréal for the Future</i> programme, the Group is continuing its efforts and has set itself ambitious new goals to achieve by 2030.</p> <ul style="list-style-type: none"> • SDG 13: Climate action <p>The L'Oréal Group and all its businesses take important measures to reduce their impacts on the environment and on our planet. Having sought to reduce the Group's direct impact by 2020 through its <i>Sharing Beauty With All</i> programme, L'Oréal is going even further in its environmental ambitions through its <i>L'Oréal for the Future</i> programme. This is a strategic programme through which the Group aims to assume a greater responsibility, mobilise its entire ecosystem (employees, suppliers, customers etc) and show that businesses can be part of the solution, in the face of the challenges confronting the world.</p> <p>This programme is based around three pillars:</p> <ul style="list-style-type: none"> - Transforming our activity to respect planetary boundaries. - Engaging our ecosystem in our transformation, helping our partners transition to a more sustainable model. - Contributing to addressing planetary challenges by addressing the most pressing social and environmental needs. <p>The Settimo factory has been carbon neutral since 2015.</p>
<p>Project maturity level</p>	<p><input type="checkbox"/> Prototype laboratory test (TRL 7)</p> <p><input type="checkbox"/> Real life testing (TRL 7-8)</p> <p><input type="checkbox"/> Pre-commercial prototype (TRL 9)</p> <p><input checked="" type="checkbox"/> Small-scale implementation</p> <p><input type="checkbox"/> Medium to large scale implementation</p> <p>Remarks: click here to enter the level of maturity of the project</p>
<p>Capacity and conditions of the project reproducibility, with associated climate impact mitigation potential</p>	<p>The project could be replicated in another area of activity depending on the available resources on the ground, the site's energy needs and energy market conditions/opportunities (by region or country).</p> <p>Many factors determine the project's success:</p> <ul style="list-style-type: none"> • Strong relationship with the territory • The teams' technical expertise • Passion for the subject.
<p>Amount of investment made (in €)</p>	<ul style="list-style-type: none"> • Photovoltaic panels: 20-year contract with our supplier (no L'Oréal investment) • More high-performing machines on the site (around €1,000,000 – pumps, boilers, air treatment units, LEDs, engines, compressors) • Heating/air conditioning – 20-year contract with our supplier (no L'Oréal investment) • Biogas – Supplier contract renewed every four years (no L'Oréal investment).

Economic profitability of the project (ROI)	<input type="checkbox"/> ST (0-3 years) <input checked="" type="checkbox"/> MT (4-10 years) <input type="checkbox"/> LT (> 10 years) Remarks: click here to enter the information
Engaged partnerships	We have developed many partnerships with: <ul style="list-style-type: none"> • Settimo's town council • Engie (district heating operator) • Acea pinerolese (biogas) • Riesco (biomass plant operator) • Enersol (PV panels and renewable electricity network).
Open comments from the project owner	/
More about the project	
Contact the company carrying the project	alexandra.vickery@loreal.com
Project URL links	https://www.youtube.com/watch?v=zcsHAhRSsAw
Illustrations of the project	 