

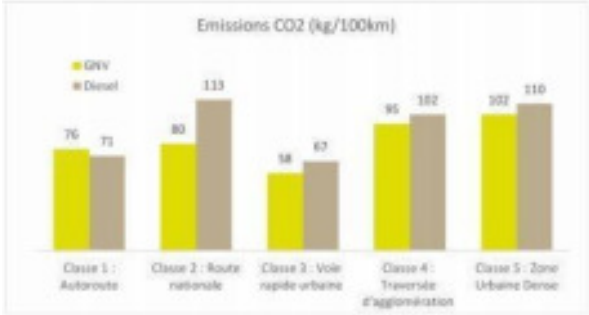
Uniting the entire biomethane value chain in the same territory



Air Liquide is a member of a group of partners which brings together in the same territory several players in the biomethane value chain, from producer to consumer. This grouping makes it possible to supply a biogas plant with biomass and to inject the biomethane produced into the GRDF network and to supply a bioNGV service station.

Starting date of the project	15 March 2018
Project Localisation Places of implementation of the project at this stage and targeted geography if replicable.	Cestas, Gironde (33)
Project objectives Type of climate innovation of the project with a description of the problem/issue addressed	<p>The objectives of the project are as follows:</p> <ol style="list-style-type: none"> 1. Replace part of the natural gas (fossil) with biomethane in the GRDF network; 2. Replace part of the fuel (Diesel) consumed by the automobile fleet of the large local area; 3. Valorisation of intermediate crops for energy and the use of digestates from the anaerobic digestion process as fertilizer.
Detailed project description	<p>The project aims to bring together the actors of a territory in an innovative circular economy system. More precisely, it consists of:</p> <ul style="list-style-type: none"> • Supply a 100% methanation unit with biomass from intermediate crops for energy use (CIVEs) such as rye and corn used in the context of crop rotation involving other cereals. • Inject the biomethane produced into the GRDF network - decreasing with equal demand from the network, the proportion of natural gas consumed (after a ramp-up phase, 250 m³ / h of biomethane are injected into the network) - and a CNG station installed nearby for the automobile fleet of local supermarkets - reducing the share of diesel consumed by this fleet (in 2020, 1,445t of bioNGV were sold). • Use the digestate resulting from anaerobic digestion as a fertilizer to improve the yield of the CIVEs themselves. <p>Air Liquide, a world leader in gases, technologies and services for industry and health, is today a major player in biomethane. A shareholder of the company Pot-au-Pin Energie via its subsidiary Biogas Solutions Europe, Air Liquide operates the sites for the production of biomethane and the distribution of bioNGV. The company also helped finance the biogas purification unit and the gas station.</p>

Main project's drivers for reducing the greenhouse gas emissions	Reduction levers		Details on the aspects of the project	
	<input type="checkbox"/> Energy and resource efficiency (including behaviour)			
	<input checked="" type="checkbox"/> Energy Decarbonisation		Decarbonization of energy via 1 / the injection of biomethane into the GRDF network and 2 / the conversion of a fleet of trucks from diesel to bioNGV	
	<input type="checkbox"/> Energy efficiency improvements			
	<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>			
	Scope 2 <i>Indirect emissions associated with the company's electricity and heat consumption.</i>			
	Scope 3 <i>Emissions induced (upstream or downstream) by the company's activities, products and/or services in its value chain.</i>			
	Increase of carbon sinks			
	Emissions Absorption <i>Carbon sinks creation, (BECCS, CCU/S, ...)</i>			
	GHG emissions avoided by the company at third parties			
	Avoided Emissions <i>Emissions avoided by the activities, products and/or services in charge of the project, or by the financing of emission reduction projects.</i>		The construction of an anaerobic digestion unit allows the production of biomethane, the use of which replaces that of diesel and natural gas - ~2,2 ktCO _{2eq} /year	
	Clarification on the calculation or other remarks: click here to specify The Life Cycle Analysis of the site shows a reduction in GHG emissions of 41% from biomethane compared to natural gas of fossil origin: <ul style="list-style-type: none"> Estimates of emissions generated (kgCO_{2eq} / Nm³): <ul style="list-style-type: none"> Natural gas of fossil origin: 0.39 (supply + 2.12 (combustion)) Biomethane IPO (supply): 1.47. Unlike fossil gas, the combustion of biomethane does not add emissions to the carbon cycle. Only emissions linked to the production / supply of biomethane are therefore taken into account. 			
	All other things being equal, compared to the annual production (250Nm ³ / h or of the order of 2.0 to 2.2MNm ³ / year depending on the performance of the installation), this then represents a gain of ~ 2.2 ktCO_{2eq} / year . This gain is slightly higher if the substitution of diesel by biomethane in Carrefour's vehicle fleet is taken into account.			
	However, further analysis is needed to determine the impact. As an indication, the graph below produced as part of the Equilibre Project (April 2018) , represents an order of magnitude of the potential emissions savings.			

	
Modality of verification of the quantification.	<p>Calculation standard used (ADEME base, GHG protocol, etc.): Methodology IPCC PRP 2013 100a</p> <p>Verification of the calculation (internal or external): Life Cycle Analysis carried out on the Pot au Pin Energie biomethane production unit.</p>
Other environmental and social benefits of the project	<p>On the part of biomethane production, several environmental co-benefits can be highlighted:</p> <ul style="list-style-type: none"> The inclusion of CIVE in the rotation is generally associated with certain benefits on the ecosystem (cf. LE VERDISSEMENT DU GAZ, CRE's Prospective Committee, July 2019), namely: <ul style="list-style-type: none"> Reduction in water pollution by nitrates Ecological improvement of the yield of main crops Preservation of biodiversity Carbon storage in soils Conversely, controlling the impact of fertilization of intermediate crops and emissions linked to digestate must be improved in order to increase the overall environmental benefit of the incorporation of CIVE. In addition, other benefits associated with the production and recovery of biomethane have been put forward and, for some, still under study: <ul style="list-style-type: none"> Local employment Energy independence Resilience of farms The recovery of biomethane for mobility use as a replacement for diesel finally has many advantages (source: AFGNV / ADEME, Equilibre Project April 2018): <ul style="list-style-type: none"> Almost elimination of fine particles (-95%) Reduction of harmful chemical pollutants (NOx: -50%) No smell or smoke Reduced engine noise
Project maturity level	<p> <input type="checkbox"/> Prototype laboratory test (TRL 7) <input type="checkbox"/> Real life testing (TRL 7-8) <input type="checkbox"/> Pre-commercial prototype (TRL 9) <input type="checkbox"/> Small-scale implementation <input checked="" type="checkbox"/> Medium to large scale implementation </p> <p>Remarks: click here to enter the level of maturity of the project</p>
Capacity and conditions of the project reproducibility, with associated climate impact mitigation potential	<p>If the financial conditions are met, reproducibility is high given the potential for production of biomethane in France of ~ 150TWh by methanization, including 51TWh from CIVE (source: <i>100% renewable gas mix in 2050?</i>, ADEME, January 2018).</p>

	<p>FIGURE 2: DISPONIBILITÉ EN RESSOURCES ET PRODUCTION POTENTIELLE</p> <p>The key to success rests on the one hand on the common vision shared by the actors of a project in the service of the environment and the territory and, on the other hand, on effective economic interests for each of the partners.</p>
Amount of investment made (in €)	<ul style="list-style-type: none"> • Methanization unit: ~ 6M € • Service station: ~ 1.8M €
Economic profitability of the project (ROI)	<p><input type="checkbox"/> ST (0-3 years) <input type="checkbox"/> MT (4-10 years) <input checked="" type="checkbox"/> LT (> 10 years)</p> <p>Remarks: Given the structure of costs, public support is necessary in the short and medium term for the replicability of the project. This can be done on the one hand by the establishment of a purchase obligation for the production of biomethane, on the other hand by investment subsidies for the construction of bioNGV stations.</p>
Engaged partnerships	<p>This circular economy project brings together a group of unique partners to bring together on the same territory the entire biomethane value chain:</p> <ul style="list-style-type: none"> • Pot-au-Pin, supplier of vegetables (carrots, leeks) via its Planète Végétale brand in Cestras, cultivates intermediate crops for energy use (CIVE) incorporated in a digester for the production of biogas. Pot-au-Pin is indirectly the majority shareholder of the company Pot-au-Pin energy, which produces biomethane. • Carrefour, a major retailer, has a logistics warehouse in the region and has made it possible to build a bioNGV service station by converting its fleet from diesel to gas and ensuring a minimum of volume consumed at this service station. Carrefour is also one of Planète Végétale's main customers for the distribution of its vegetables. • In addition, other partners participated in the realization of this project, in particular the Nouvelle-Aquitaine Region, ADEME, the State and the GRDF network manager.

Open comments from the project owner	/	
More about the project		
Contact the company carrying the project	agnes.renard@airliquide.com	
Project URL links	https://youtu.be/VqRgd5xOHX8	
Illustrations of the project	