

# Transforming the Grandpuits refinery into a biorefinery – focus on sustainable aviation fuels



TotalEnergies is launching a project to transform its Grandpuits refinery into a biorefinery, by installing a production unit for aviation and road biofuels.

<b>Starting date of the project</b>	Q3 2024 (announced in September 2020)
<b>Project Localisation</b> Places of implementation of the project at this stage and targeted geography if replicable.	Implementation of the project on the Grandpuits platform, Seine et Marne. Project can be replicated in Europe.
<b>Project objectives</b> Type of climate innovation of the project with a description of the problem/issue addressed	Transform the Grandpuits refinery by installing a biofuel production unit
<b>Detailed project description</b>	<p><b><u>The Grandpuits platform transformation project – focus on sustainable aviation biofuels:</u></b></p> <p>To meet demand for sustainable aviation biofuels, TotalEnergies is initially focusing on the technological process for transforming animal fats and used cooking oils into aviation biofuel. This process, involving the production of HEFA (Hydroprocessed Esters and Fatty Acids), is the only one proven on an industrial scale to date, and it is also the most economical way to produce aviation biofuels.</p> <p>In fact, the production of aviation biofuels using HEFA costs 3 to 4 times more than the production of aviation fuel from fossil fuels, and with other technologies, this ratio can be as high as 4 to 6 times and 5 to 10 for E-fuels (synthetic fuels produced from decarbonized hydrogen).</p> <p>The Grandpuits site has the geographical, logistical and industrial characteristics to become the Group's first biorefinery that is predominantly focused on the production of aviation biofuels:</p> <ul style="list-style-type: none"> <li>- Grandpuits is located near the airports in Paris and is linked by rail and then by pipeline to these airports;</li> <li>- Grandpuits has industrial units that can be reused for the selected hydrogenation process.</li> </ul> <p><b><u>Context:</u></b></p> <p>Biofuels represent a key element of TotalEnergies' strategy to meet the challenge of carbon neutrality. Transport generates more than 20% of global greenhouse gas emissions and this growing sector remains largely dependent on liquid fuels.</p> <p>Today, biofuels are the best renewable alternative for producing liquid fuels, whether for road or air transport: they are essential for limiting the greenhouse gas emissions from transportation. Biofuels are a renewable energy source which have a direct role to play in the fight against climate change, guaranteeing a 50% to 90% reduction in CO<sub>2</sub> emissions compared to conventional fuels.</p> <p>TotalEnergies plans to advance the development of a French production chain for sustainable aviation biofuels, an immediate alternative to liquid fossil fuels, in order to reduce the air transport sector's carbon footprint.</p> <p>In Europe and globally, more and more objectives are being set to reduce CO<sub>2</sub> emissions generated by the aviation sector. The voluntary target proposed by the International Civil Aviation Organization to reduce the sector's overall emissions by 50% by 2050, requires a 90% reduction in the average emissions per passenger/km by 2050.</p> <p>In January 2020, the French government published a roadmap, with a biofuel incorporation target of 2% by 2025 and 5% by 2030, as well as a call for expressions of interest for production projects located in France. This roadmap was formalized in September 2020 in the 2021 Finance Bill, which set an obligation to incorporate 1% of biofuels into the volumes released for consumption in mainland France, from 2022 onwards.</p>

**Background:**

The “Commitment for Green Growth” strategy, initiated by the government to develop a biofuel industry for air transport, led to the publication of a roadmap in January 2020, including an aviation biofuel incorporation target of 2% by 2025 and 5% by 2030, as well as a call for expressions of interest for production projects located in France.

TotalEnergies is already using the technology to hydrotreat animal fats and used cooking oils to make aviation biofuels. This process is the only one proven on an industrial scale to date, and it is also the most economical way to produce aviation biofuels.

On September 24, 2020, as part of its strategy to become carbon neutral, TotalEnergies announced its intention to transform its Grandpuits refinery (Seine-et-Marne) into a zero-crude platform, as well as a project to produce biofuels, predominantly for the aviation sector.

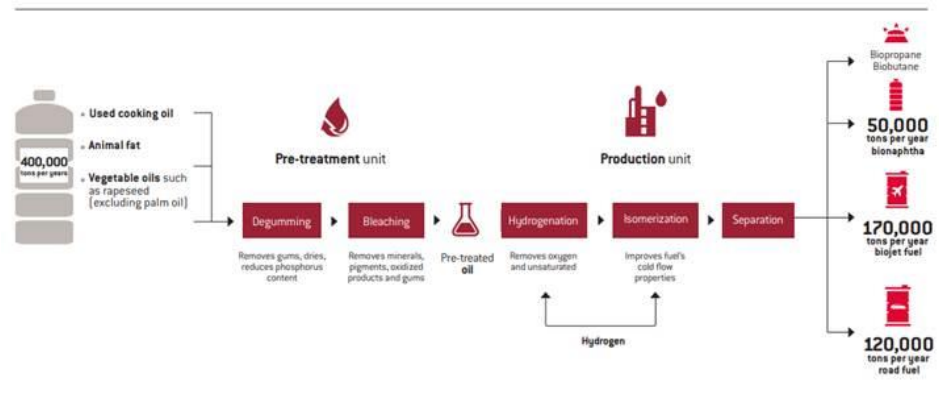
**Technical description of the project:**

TotalEnergies will construct a biofuel unit, mainly for the aviation sector, thus helping to advance the French roadmap for the deployment of sustainable aviation biofuels.

With a processing capacity of 400,000 tons/year, this new unit will be operational in 2024 and will be able to produce:

- 170,000 tons/year of sustainable aviation biofuel
- 120,000 tons/year of road biofuels
- 50,000 tons/year of bionaphtha which is used to produce bioplastics.

It will be supplied mainly by animal fats and used cooking oils for the production of aviation biofuels, which, for the production of road biofuels, will be supplemented with rapeseed-/sunflower-type vegetable oils, with the exception of palm oil.



\* Production of aviation biofuels from used cooking oil and animal fats only.

Three other industrial activities will also be developed at the Grandpuits site:

- Production of bioplastics
- Recycling of plastics

Operation of two photovoltaic solar power plants.

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 air and road fuels
	<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 <a href="#">the Afep guidelines</a> .
<b>Reduction of the company's carbon dependency</b>			
<b>Scope 1</b> <i>Direct emissions generated by the company's activity.</i>	Decarbonization of energy and inputs Energy efficiency	The site's Scope 1 emissions amounted to 0.5 MT CO <sub>2</sub> eq/year in 2020. Scope 1 emissions are estimated at 0.1 MT CO <sub>2</sub> eq/year when the new biofuel production operations start.	
<b>Scope 2</b> <i>Indirect emissions associated with the company's electricity and heat consumption.</i>	Procurement and production of decarbonized electricity	- 5 KT/year of CO <sub>2</sub> eq per year	
<b>Scope 3</b> <i>Emissions induced (upstream or downstream) by the company's activities, products and/or services in its value chain.</i>	Decarbonization of aviation and road fuels	- 0.5 MT/year of CO <sub>2</sub>	
<b>Increase of carbon sinks</b>			
<b>Emissions Absorption</b> <i>Carbon sinks creation, (BECCS, CCU/S, ...)</i>			
<b>GHG emissions avoided by the company at third parties</b>			
<b>Avoided Emissions</b> <i>Emissions avoided by the activities, products and/or services in charge of the project, or by the financing of emission reduction projects.</i>			
<b>Clarification on the calculation or other remarks:</b>			
<p>The Grandpuits refinery will produce 170,000 tons of aviation biofuel and 120,000 tons of road biofuel. We have applied a conservative emission factor for these biofuels of 50% of their fossil alternatives (i.e. 1.59 tCO<sub>2</sub>/t).</p>			
<p>Standard aviation and road fuels have an emission factor of around 3.18 tCO<sub>2</sub>/t.</p>			
<p>All other things being equal, this means a gain in CO<sub>2</sub> emissions of 460 ktCO<sub>2</sub>, of which 270 ktCO<sub>2</sub> are linked to aviation fuel and 190 ktCO<sub>2</sub> to road fuel (170+120 kt x 1.59 tCO<sub>2</sub>/t).</p>			
<b>Modality of verification of the quantification.</b>	<b>Calculation standard used (ADEME base, GHG protocol, etc.):</b> CDP (Carbon Disclosure Project)		
<b>Verification of the calculation (internal or external):</b> Verifications are subject to national and European regulations (RED II Directive and French TIRIB mechanism).			
<b>Other environmental and social benefits of the project</b>	<p>TotalEnergies is committed to working towards the Sustainable Development Goals (SDGs) to ensure a brighter and more sustainable future for all. For this reason, the Group is constructing a sustainable development approach based on four pillars: integrating climate change into its business strategy, preserving the environment, respecting and mobilizing employees and suppliers, and contributing to the economic development of the regions where it operates.</p> <p>To this end, the Grandpuits project, because of its co-benefits, will help to achieve 4 of the SDGs and to meet specific targets:</p> <ul style="list-style-type: none"> <li>• <b>SDG 7: Ensure access to affordable, reliable, sustainable and modern energy</b> <ul style="list-style-type: none"> <li>○ The project will advance the development of new sustainable fuel technologies, including aviation biofuels.</li> <li>○ The overall project will also advance the development of renewable energy (2 solar photovoltaic plants)</li> </ul> </li> <li>• <b>SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</b> <ul style="list-style-type: none"> <li>○ The project will achieve this through the injection of investment to modernize infrastructure and through R&amp;D and innovation initiatives for the development of more sustainable products.</li> </ul> </li> <li>• <b>SDG 12: Ensure sustainable consumption and production patterns</b> <ul style="list-style-type: none"> <li>○ The reuse of materials (animal fats and used cooking oils for biofuels, recycling of plastics) contributes to the development of the circular economy, and promotes a more rational use of natural resources and waste recovery.</li> </ul> </li> <li>• <b>SDG 13: Take urgent action to combat climate change and its impacts</b> <ul style="list-style-type: none"> <li>○ Integration of this program into the 2050 net-zero emissions target, together with society, supports this SDG.</li> </ul> </li> </ul>		

<b>Project maturity level</b>	<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  <b>Remarks:</b> <a href="#">click here to enter the level of maturity of the project</a>
<b>Capacity and conditions of the project reproducibility, with associated climate impact mitigation potential</b>	<p>By 2024, the Grandpuits site will have the capacity to produce 170kt of aviation biofuels, i.e. about 2% of the French aviation fossil fuel market in 2019, which accounted for more than 8 million tons. This project has significant potential and presents opportunities for replicability due to the volume of aviation fuels to be “decarbonized”.</p> <p>The production of aviation biofuels will be developed on condition that national and European legislation is adapted both in terms of demand (mandates, incentive mechanisms, etc.) and in terms of supply (including the conditions of access to raw materials and sectoral development, particularly for raw materials derived from the circular economy). An incentive mechanism for the incorporation of aviation biofuels must be established at French national level to ensure that such a project is successful.</p>
<b>Amount of investment made (in €)</b>	<p>The overall investment required for the Grandpuits transformation is estimated at more than €500M, of which about €240M is for the biofuel project.</p>
<b>Economic profitability of the project (ROI)</b>	<input type="checkbox"/> ST (0-3 years) <input checked="" type="checkbox"/> MT (4-10 years) <input type="checkbox"/> LT (> 10 years)  <b>Remarks:</b> This project has several economic benefits: <ul style="list-style-type: none"> <li>• <b>For TotalEnergies</b>, it supports the growth in demand for a new biofuel, at a time when the conventional refining sector is under pressure due to a structural decline in demand for petroleum products in France and Europe.</li> <li>• <b>For the air transport sector</b>, the biofuels produced using the HEFA process chosen by TotalEnergies for its biorefinery project at Grandpuits offer the least expensive solution compared to other technologies, including E-fuels (synthetic fuels produced from decarbonized hydrogen).</li> </ul>
<b>Engaged partnerships</b>	<p>This project is in keeping with the public/private “Commitment to Green Growth” partnership initiative launched by the government in 2018, to develop a biofuel industry for air transport, bringing together the various French links in the chain to be constructed (Air France, Airbus, Safran, Suez and TotalEnergies), as well as the DGAC (<i>Direction Générale de l’Aviation Civile</i> - French Civil Aviation Authority) and the DGEC (<i>Direction Générale de l’Énergie et du Climat</i> - Directorate General for Energy and Climate).</p> <p>The complementary partnerships entered into for the Grandpuits project concern the securing of supply chains for sustainable raw materials from the circular economy, such as used cooking oil and waste fats from European slaughterhouses.</p>
<b>Open comments from the project owner</b>	/
<b>More about the project</b>	
<b>Contact the company carrying the project</b>	<a href="mailto:rc.rqp-communication@totalenergies.com">rc.rqp-communication@totalenergies.com</a>
<b>Project URL links</b>	<a href="https://www.total.com/media/news/news/energy-transition-total-investing-more-eu500-million-convert-its-grandpuits">https://www.total.com/media/news/news/energy-transition-total-investing-more-eu500-million-convert-its-grandpuits</a>
<b>Illustrations of the project</b>	