





Written on 06 November 2017 2 minutes of reading  
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**IFP Energies nouvelles (IFPEN) has developed CIGAL, a concept based on the simultaneous injection of gas and gasoline that is highly efficient in terms of reducing CO<sub>2</sub> and pollutant emissions. To test it in real operating conditions, IFPEN has just signed an agreement with the French Group, Warning. Three urban delivery vehicles will be used for the trials, scheduled to last one year.**

The CIGAL concept delivers improved efficiency and low CO<sub>2</sub> emissions in vehicles operating in real conditions with levels of performance identical to those of a gasoline engine. Simple to install and affordable, CIGAL generates a 14% reduction in CO<sub>2</sub> emissions, a target similar to that of diesel engines. An additional and tremendous reduction in CO<sub>2</sub> emissions throughout the vehicle's lifetime is also possible thanks to the use of bioNGV (purified biogas). A 10-fold reduction in particulate emissions has also been observed in comparison to the commercial gasoline direct injection version.

Within the context of the project conducted with Warning and financed by Ademe Auvergne-Rhône-Alpes, IFPEN is working to optimize the concept's environmental performance. The vehicles will use bioNGV supplied by Engie, targeting an 80% reduction in CO<sub>2</sub> emissions.

Field trials are also aimed at validating user acceptance in terms of drivability and access to fuel. The information collected concerning the respective consumption of each of the fuels will be used to optimize the size of the two tanks.



### **How does the CIGAL concept work?**

CIGAL consists in injecting two fuels - one gaseous and one liquid - simultaneously, and optimizing, in real time, the ratio of the two fuels in order to maximize engine performance. The use of gas alone can be considered in geographic zones where pollutant emissions are heavily restricted. The use of gasoline alone is reserved for backup mode for circumstances where there is no access to gas. CIGAL apparaît comme une technologie d'avenir pour les entreprises du transport en recherche d'un meilleur compromis performances de conduite / empreinte environnementale. »

For Eric Bonnac, CEO of Warning, "CIGAL is proving to be a technology of the future for transport companies seeking a better driving performance / environmental footprint compromise." Gaëtan Monnier, Director of

IFPEN's Transport Business Unit, adds "in a context in which access to town and city centers is becoming increasingly restricted, CIGAL represents an important step in the energy transition prior to the all-electric."

#### **About IFP Energies nouvelles**

*IFP Energies nouvelles (IFPEN) is a major research and training player in the fields of energy, transport and the environment. From research to industry, technological innovation is central to all its activities, based on three strategic priorities: sustainable mobility, new energies and responsible oil and gas. IFPEN's research in the field of mobility is conducted within the context of the IFPEN Transports Energie Carnot Institute.*

#### **About Warning**

*Warning is owned by W Group, the last mile logistics specialists. Established in the early 1990s, Warning handles all aspects of urgent transport. For 20 years, it has been deploying its expertise across high added value land transport sectors, incorporating a new service dimension with delivery. Social and technological changes drive permanent innovation and adaptation.*

*This perpetual agility is central to Warning's philosophy. <http://www.warning.fr>*

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06 November 2017

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