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TODAY, ADEME AND IFP ENERGIES NOUVELLES ARE PUBLISHING THE RESULTS OF AN “ECONOMIC, ENERGY AND ENVIRONMENTAL STUDY FOR FRENCH ROAD TRANSPORT TECHNOLOGIES” (E4T)

While the transport sector emits more greenhouse gases than any other in France, with 30% of the country's total emissions, this study analyzes the major trends in the field of vehicle electrification, its efficiency and its capacity to reduce the environmental impacts of transport.

CONVENTIONAL ICE (INTERNAL COMBUSTION ENGINE) VEHICLES, THE END OF THE ROAD BY 2030*

Following the announcements made concerning the French Climate Plan by Nicolas Hulot a year ago, France has set about working towards an ambitious objective aimed at reducing greenhouse gas emissions. In particular, the Climate Plan sets an objective of ending the sale of gasoline and diesel passenger cars by 2040. Moreover, the European Union is imposing increasingly restrictive emission thresholds on manufacturers. A first objective set for 2021 will require them to market a vehicle fleet emitting under 95 gCO₂/km on average, failing which they will have to pay significant "penalties". Discussions underway at the European Commission may lead to the imposition of a further consumption reduction of between 30 and 50% between 2021 and 2030, compelling manufacturers to incorporate additional innovations in their vehicles and powertrains.

What was analyzed?

Vehicles studied:

- Private vehicles, commercial vehicles, heavy trucks and buses
- ICE, hybrid, plug-in hybrid and all-electric (battery) powertrains

Evaluation, for each vehicle category, of:

- Energy consumption
- Economic viability (total cost of ownership)
- The environmental impacts **throughout the entire lifecycle** (including the energy production required to operate the vehicle as well as to manufacture it).

In this context, electrification is becoming a necessity in order to be able to address climate and public health challenges. Hence, setting aside heavy trucks, the electrification of which appears to be a complex solution to roll out, the conventional IC powertrain will face considerable competition from electric technologies, both in terms of the environmental impact and overall cost.

THE PLUG-IN HYBRID, AN ECOLOGICALLY RELEVANT SOLUTION IN THE MEDIUM TERM FOR PRIVATE INDIVIDUALS

For private vehicles as well as commercial vehicles, the plug-in hybrid solution has the potential to reduce local pollution and greenhouse gas emissions. However, these vehicles **must be used very regularly in order to absorb the impact of manufacturing the battery. The latter must be charged daily** to maximize the use of the vehicle in electric mode. For everyday journeys (under 50 km), this technology improves the environmental impact compared to the other vehicles studied, thanks to the battery size - smaller than that of an all-electric vehicle - and the integral use of electric mode provided the battery is charged daily. Currently, the mass roll-out of this technology is hampered by the high cost of manufacturing the battery on top of that of a conventional powertrain and the low purchase incentive. **This cost should have fallen by 2030, enabling large-scale usage as it becomes genuinely competitive.**

ELECTRIC, MORE SUITABLE FOR INTENSIVE USE AND PUBLIC TRANSPORT

Electric vehicles are effective solutions for reducing local pollution and greenhouse gas emissions, especially if they are widely used (as is the case with buses and service offers) so as to absorb the impact of manufacturing the battery. Nevertheless, the economic viability of these solutions remains limited currently (although they are supported by help-to-buy initiatives) but should improve by 2030 thanks to the probable reduction in the cost of the batteries. However, the current trend towards bigger battery sizes in order to increase the range of private electric vehicles is detrimental to the environmental impact of these vehicles. Further research will need to be conducted in this area in the future.

Among the vehicles studied, for urban journeys, the electric bus is the solution associated with the lowest environmental impacts, taking all impacts into account. Apart from the fact that it is a public transport solution, traveling thousands of kilometers (an average of 40,000 km/year) makes it possible to absorb the impacts of manufacturing the battery. But while it is the most environmentally-friendly vehicle, the all-electric bus remains an expensive solution to roll out. In the short term, therefore, the hybrid bus appears to be an intermediate solution representing a good alternative to conventional diesel buses.

NEW TRANSPORT TECHNOLOGIES TO SUPPORT THE NECESSARY EVOLUTION OF USAGES

Above all, it is a more global change in habits and the roll-out of mobility services adapted to end users that will make it possible to address environmental challenges in the transport sector. These new technologies, alongside other alternative fuels such as NGV/BioNGV and hydrogen, are ideally suited to supporting these transformations since they make it possible to address each need with a suitable transport type and **shift to new mobility modes, more closely linked to usage than ownership**.

** The study will be supplemented by evaluating other energy systems based on hydrogen, biofuels and NGV (excluded from this study), for existing segments and others, such as 2 and 3-wheel vehicles for example. It will also be necessary to integrate the cost of infrastructures (electric charging stations, hydrogen stations), particularly for these new sectors.*

To find out more :

 **"Economic, Energy and Environmental study for French road transport technologies" (E4T), the complete report**

The French Environment and Energy Management Agency (ADEME) contributes to the implementation of public policies in the fields of the environment, energy and sustainable development. It draws on its expertise to advise companies, local authorities, the government and the general public, enabling them to improve their environmental approach. The Agency also helps finance projects, from research through to implementation, in the following fields: waste management, soil conservation, energy efficiency and renewable energies, raw material savings, air quality, tackling noise pollution, the transition to the circular economy and tackling food waste.

ADEME is a public body under the joint authority of the French Ministry for the Ecological and Inclusive Transition and the French Ministry for Higher Education, Research and Innovation.

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[Study] Vehicle electrification: an effective solution aimed at reducing the environmental footprint associated with transport

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