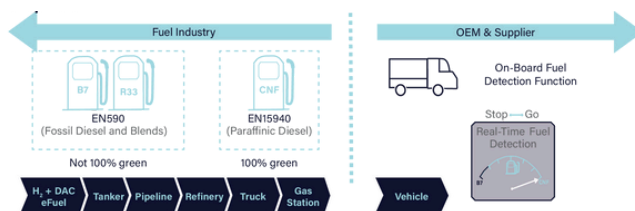


Option 5 – On-Board Fuel Detection Function



Description of Technology

A fuel detection function could be implemented based on the existing vehicle and engine system technology without new sensors or interfaces. It is based on the difference in physical properties between regular, fossil fuels and future, Carbon-Neutral Fuels (CNF). With this function, it is also possible to alter engine operation when a non-carbon-neutral fuel is used. Several levels of alteration could be considered, from warning the driver to limiting or stopping vehicle operation, similar to those used in modern diesel cars/vans/trucks with SCR technology to control NOx emissions. It could be implemented without requiring further data connections or services in a data cloud. This would protect the owner's data privacy while being resilient against cyber-attacks, IT fraud and tampering. This detection function could be easily integrated in new vehicles or even be implemented on existing vehicles in the market. The low complexity of a detection function allows for a fast realization and effective implementation in a vehicle, without modifications to the current infrastructure. In cases where CNF is chemically identical to fossil fuel, e.g. HVO, MtG, Compressed Natural Gas (CNG), LPG, the proposed detection methodology may be limited.

Customer & Retail Perspectives

Advantages:

- Enhanced fuel security [AL1]
- Cost-efficiency and fast implementation
- Privacy and security protection
- Compatibility with legacy fleet

Disadvantages:

- Restricted cross-border functionality
- Incompatibility with gaseous fuels
- Operational risks with sensor malfunction
- In-vehicle sensors yet to be proven as detection thresholds still require thorough validation

Implementation requirements:

- Early established system that allows for inducement
- Vehicles must detect fuel quantity and misfuelling events, and be able to monitor and report it through software
- Additional regulatory geofencing software for outside the EU
- Established test procedures for inspections (measurement per fuel)

Regulatory Assessment

The vehicle on-board fuel detection function enables the use of CNF in modern vehicles by detecting the correct fuel without significant changes to infrastructure or the vehicle. This solution utilizes existing sensors, making it practical and requiring fewer regulatory changes. There should be a harmonisation of the standards for carbon-neutral diesel and gasoline fuels to ensure that this technology can reliably detect fuel properties, similar to what is currently applied with certified fuels (Diesel EN 590 or Gasoline EN 228). This standard alignment is essential for maintaining vehicle performance and emissions compliance, regardless of the specific carbon-neutral fuel used.