RISK OF COVID AND RESPIRATORY DISEASES: THE CONTRIBUTION TO PUBLIC HEALTH FROM NEW TECHNOLOGIES THAT PREVENT THE FORMATION OF FINE PARTICULATE IN DIESEL ENGINES

Andrea Demozzi (*)

ABSTRACT

Research studies correlate lung cancers, respiratory diseases and transmission of viruses to the spread of fine particulate (like PM10 and PM2.5), mainly generated by internal combustion diesel engines.
There are new technologies able to drastically reduce these pollutants, with beneficial effects to public health.
These are devices that, when applied to diesel engines, determine an important increase in efficiency in the fuel combustion process, and consequently:

- fuel saving;
- reduction of particulate emissions and other pollutants;
- improvement of environmental air quality, with benefits for public health;
- improvement of air quality in confined spaces (for example in tunnels), with benefits for the health of workers and for safety in the workplace (the risk of overheating and particulate fire is reduced).

These devices are not "filters": they are installed before the high-pressure pump, in the fuel supply hose, and (thanks to their working principle) they prevent the formation of unburned particles (“particulate-preventing” devices).
Particulate filters, on the other hand, retain said particles, which are accumulated in the filter and require oxidation treatment before being released into the environment anyway.

The working principle can be briefly defined as an innovative liquid fuel conditioning method, to improve performance.
Experimental studies have shown that the additives introduced into the fuel during the refinement phase act as "oxidizing catalysts" and therefore:

- improve the spread of the flame inside the cylinder,
- lower the carbon oxidation temperature,
- determine the reduction of the emitted particulate.

That is, nano-sized additives improve the surface / volume ratio, providing more contact surface for faster oxidation.
The device helps to increase the dispersion in the fuel of additives useful for improving combustion efficiency.
In summary, the following pollutant reduction ranges have been obtained:

- CO (Carbon monoxide) -30 / -60%
- CO2 (Carbon dioxide) -4 / -8%
- HC (unburnt hydrocarbons) -30 / -40%
- NOx (Nitrogen Oxides) -5 / -15%
- NO2 (Nitrogen Dioxide) -10 / -25%
- PM10 -20 / -40% (up to 50%)
- smoke opacity (proportional to thin PM) -40 / -80% (up to 95%)

with the following advantages:

- increase in torque and engine power
- reduction of maintenance costs and extension of the engine’s life
- reduction of FAP regenerations
- fuel savings from 4% to 10%

(*) Author:
Andrea Demozzi, CEO IRIS LAB SRL (Trento, ITALY), www.irislab.it