On-board carbon capture for cars

Capturing carbon dioxide at source from vehicles in the transportation sector and small-scale power plants could significantly cut overall carbon emissions to the atmosphere in the short-term, while playing a strategic role in the development of a sustainable carbon economy in the longer-term.

New research suggests that it is feasible to capture and store CO₂ emissions at the point of generation from widely distributed, small energy-producing sources, such as motor vehicles and diesel power generators. Carbon emissions from such small-scale polluters account for about two thirds of global CO₂ emissions.

Alternative technologies to reduce or eliminate carbon emissions from motor vehicles have focused on the production of electric vehicles, or using hydrogen as a fuel. Hydrogen has the advantage that it is a clean fuel, producing no CO₂ emissions, when used to power vehicles. However, most hydrogen technologies would require the development of a new distribution network, with its associated costs. The study suggests it may be practical to continue using current networks for refuelling vehicles if new on-board carbon capture technologies are employed.

Researchers in the USA have developed a new on-board fuel processor capable of capturing CO₂ emissions from fuels in a dense, liquid form. The processor uses a liquid hydrocarbon fuel, but converts the fuel into hydrogen, which is used to power the vehicle, and CO₂ which is captured and stored in liquid form. The processor can use liquid hydrocarbon sources, such as petrol, or synthetic fuels. The researchers suggest that the liquid CO₂ could be discharged at the same station used for refuelling and then shuttled to a long term storage site.

In the longer-term, the liquid CO₂, which is a carbon-rich source, could be reprocessed as a synthetic, liquid fuel and used to power vehicles. Such a system would be an integral part of a sustainable carbon economy where fossil fuels have been phased out and replaced with renewable sources of energy.

There are a number of technical advances required to practically implement such schemes, as well as developing consumer friendly use of the technology. While these developments cannot compete with the way the current system is operated, the energy costs of capturing on-board CO₂ emissions could be balanced in the future by processing these emissions into alternative liquid fuels which can be reused.


Contact: andrei.fedorov@me.gatech.edu

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