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An innovative and environmentally friendly alternative: Automobile air conditioning systems with CO₂

Federal Environment Agency appeals to vehicle manufacturers for speedy switch to carbon dioxide as refrigerant

As of 1 January 2011 the air conditioning systems of new passenger car models must make use of a refrigerant that has a low ozone depletion potential. The European Mobile Air-Conditioning Directive prescribes this, yet a climate-friendly alternative for air-conditioning in cars already exists. It is carbon dioxide (CO₂), also called R 744 as a refrigerant. The Federal Environment Agency (UBA) is appealing to the German automotive industry to use CO₂ in air-conditioning systems as quickly as possible. It is less harmful to the climate than other substances previously used, is ready to go into production, available worldwide, and present in innovative installation engineering. "The German automobile industry now has the opportunity to take the initiative in contributing to climate protection in cars by opting for CO₂ technology. There is no other place in a car where it is so cost-efficient to mitigate climate change", said UBA President Prof. Dr. Andreas Troge. The alternatives to CO₂ are various new artificial mixtures of organofluorine compounds, but there has been little research done on them.

Up to now mobile air-conditioning systems have been real climate sinners. They contain the refrigerant R-134a (tetrafluoroethane, a fluorinated hydrocarbon). R-134a has an ozone depletion potential which is 1,300 times greater than that of CO₂. The air-conditioning system alone of a car with average driving performance releases an estimated 7 grammes CO₂ in additional emissions per kilometre driven. For the year 2005, a total of roughly 2.6 million tonnes of CO₂ equivalents were released into the atmosphere in Germany. This is a volume of carbon dioxide emissions which corresponds to that of 1.5 million smaller vehicles with a driving performance of 15,000 km/year.

In order to produce fewer greenhouse gas emissions, in addition to the compulsion of the deadline imposed by 1 January 2011, CO₂ presents itself as the first alternative which has also

has other benefits as a refrigerant. It is already available worldwide in the necessary quality, is cost-efficient, and at the time of scrapping or repairs, can simply be re-released into the atmosphere where it had come from. Air-conditioning systems with CO₂ are ready for mass production and already on a par with systems using R-134a in terms of performance and energy consumption. In some cars manufacturers have demonstrated clear advantages, namely quicker cooling of the vehicle interior and better fuel economy.

Additional costs can also be contained. A reputable manufacturer estimates that for a small-sized vehicle in serial production, the additional cost amounts to less than 30 euros per vehicle. The automobile industry can therefore quickly start designing new cars with CO₂ air-conditioning systems, for turning our backs on dirty R-134a technology is feasible.

Various mixtures of organofluorine compounds made by chemical companies offer yet another alternative. Little is as yet known about these recently developed refrigerant mixtures. Information and knowledge is spotty, especially as concerns toxicology, their environmental behaviour, technical properties in various climate conditions, long-term behaviour in air-conditioning systems, and costs. Toxicological testing alone can take three years. "Just how the automobile industry plans to abandon R-134a and use these substances given the deadline on its abandonment, I don't know", said UBA President Troge, and continued to say, "Additional development costs to all stakeholder industries and avoidable pollution are a given.

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