



EFCTC position

Brussels, 6 February 2012

The European Fluorocarbons Technical Committee (EFCTC), a sector group of the European Chemical Industry Council (CEFIC), wishes to comment on the ENDS Europe newsflash of 26 January suggesting that the breakdown of HFO-1234yf used in mobile air conditioning (MAC) systems, could generate sufficiently high atmospheric/aquatic TFA-levels to cause environmental problems. The ENDS Europe authors base their conclusions on the figures presented in a peer-reviewed paper on the future emissions and atmospheric fate of HFO-1234yf from mobile air conditioners in Europe (Henne et al. 2012¹).

HFO-1234yf is a fluoro-olefin introduced as an alternative to HFC-134a which was recently banned in MAC² applications due to its high global warming potential. When released into the atmosphere, both molecules are known to form TFA as a breakdown product, so the formation of the molecule is not new. It is true, however, that for HFC-134a the transformation into TFA is relatively slow and relatively low conversion, whereas it is known to be nearly complete and rapid for HFO-1234yf. This high conversion speed caused the fluorocarbon industry to co-fund an EMPA/University of Bristol study with the specific purpose to understand the potential environmental impact of the introduction of HFO-1234yf. This study was published as Henne et al. 2012.

EFCTC emphasizes that, **according to Henne et al. (2012)**, even in a **worst case** European HFO-1234yf emission and subsequent TFA formation and distribution **scenario**, the **calculated TFA levels remain an order of magnitude below safe limits**. Their conclusions imply that, unless future monitoring would prove their prediction models wrong, the aquatic concentrations will remain well below the no-effect level of the most sensitive algae, even in the most extensive HFO-1234yf European use conditions in MAC.

¹ Henne S., Shallcross D.E., Reimann S., Xiao P., Brunner D., O'Doherty S., Buchmann B. Future Emissions and Atmospheric Fate of HFC-1234yf from Mobile Air Conditioners in Europe. Environ. Sci. Technol., in press, DOI: 10.1021/es2034608

² Mobile Air Conditioning systems in new vehicle types pursuant to Directive 2006/40/EC

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TFA is a naturally occurring substance, of which the environmental impact has been extensively studied and was considered negligible. Moreover, in accordance with the consensus among the scientific community, the Environmental Effects Panel of the Montreal Protocol came to the following conclusion in its 2010 UNEP Assessment Report:

The decomposition of substitutes for ozone-depleting substances can lead to a range of chemical species, however with little relevance expected for human health and the environment. The hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs) used as substitutes for ozone-depleting CFCs can break down into trifluoroacetic acid (TFA), which is very stable and will accumulate in the oceans, salt lakes, and playas. However, based on historical use and projections of future uses, including new products entering the market such as the fluoro-olefins, increased loadings of TFA in these environmental sinks will be small. Even when added to existing amounts from natural sources, risks from TFA to humans and organisms in the aquatic environment are judged to be negligible.

Taking the above together, the EFCTC is convinced that there currently is no need to advise against the use of the low global warming potential alternative HFO-1234yf in mobile air conditioning from an environmental point of view. The Henne et al. 2012 study provides additional arguments in favor of the negligible environmental risk related to an increasing European MAC use of the molecule. Regular measurements of atmospheric and aquatic TFA levels are envisaged to strengthen this position.

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2

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