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Editorial

Special Issue: Bio-blended Fuels

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There are indications that blending biofuels into fossil fuels make the exhaust more toxic, in comparison with exhaust from pure fuels. The basis for this is not known, but research points to the creation of new types of emission components, facilitating easier entry of carcinogens (e.g. PAHs) into lung cells. It is urgent to provide new knowledge of this unintended consequence of the much adhered to policy of bio-blending for implementation of renewable energy in the transport sector. This reason for the urgency is that this policy is likely to violate the precautionary principle.

The phasing-in of biofuels as energy for transport purposes is to a large extent conducted through blending biofuels into the existing fossil fuel sold at filling stations. Alcohol is blended into gasoline (e.g. E85, i.e., fuel consisting of 15% ethanol and 85% gasoline), while biodiesel is blended into regular diesel (e.g. B7, consisting of 7% biodiesel and 93% fossil diesel). This strategy for increasing the use of biofuels is common in large parts of the EU, in the United States and in Canada. The European Standard (EN590) for automotive diesel fuel states that the concentration of biodiesel in diesel fuel should be 7% v/v. This concentration is expected to rise up to 10% in the near future, based on the current European policy targets, including the "20-20-20" strategy "EUROPE 2020—A Strategy for Smart, Sustainable and Inclusive Growth" by the European Commission [1, 2].

The effect of the bio-blending strategy on exhaust toxicity has been studied by a variety of research groups [3-7]. The topic was also studied in the European Economic Area (EEA) / Norway Grants project "Influence of bio-components content in fuel on emissions from diesel engines and engine oil deterioration—BIODEG" [8].

Through the BIODEG project it was shown that there are some very specific, problematic, toxicological issues that can result from the biodiesel blending strategy [9, 10]. The formation of new types of exhaust emissions were substantiated by the use of molecular dynamic simulation (MDS) studies in the KTH supercomputer facility in Stockholm. Through these studies it was shown that new types of nanoparticles can be formed through the aggregation of uncombusted or partially combusted fatty acid methyl esters (FAME). These nanoparticles are capable of incorporating PAHs. Moisture in the air can carry the PAH-FAME nanoparticles. They can then be carried into the lungs where they can penetrate the cell walls, enter the interior of the cells, and interact with DNA. This can potentially initiate carcinogenic activity. Thus, the blending of biodiesel info fossil diesel has provided PAHs a "vehicle" for easier transport into cells. This problem of increased bioavailability of

PAHs occurs for blended fuels only, not for neat biodiesel or neat diesel. Neat biodiesel does not have high PAH content and neat diesel does not have FAME molecules.

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