

Properties of local produced animal-fat based biodiesel and its blend with fossil fuel

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Abstract. In the near future, more emphasis must be put on reducing greenhouse gas (GHG) emissions in road transportation, house heating, agricultural activities, marine transport etc. This study concentrated on the use of alternative fuels in engine-driven applications of non-road machineries and decentralized energy production. Today, the engines are mainly designed for crude oil derived fuels and liquid renewable fuels are blended with crude oil based fuels to fulfill the requirements of renewable energy usage. Due to the environmental reasons on one hand and to the agricultural needs, on the other hand, different blends of bio- and fossil fuels are becoming more popular. In Europe, the maximum FAME content in diesel fuel is 7 vol% according to the EN 590:2013 but higher percentages are also available and targeted around the world. For example in the United States, the 20% blend fraction is becoming more common. For these reasons, B20 fuels were chosen to be investigated in this study. Special emphasis was put on improving blending issues since fuel blending may cause some operating risks. The main aim was to research widely the properties of animal-fat based methyl ester (AFME) and B20 fuel blend produced from it. AFME is a waste based fuel and produced in Ostrobothnia region, Finland. The aim was to find out in which engine applications the fuels are feasible and investigate if the fuels fit in the quality of automotive fuel Standards. According to the results, AFME is a feasible option to increase self-sufficient energy production in Ostrobothnia.

Key words: Biofuel, blending, FAME, AFME, diesel fuel, B20

INTRODUCTION

In the near future, more emphasis must be put on reducing greenhouse gas (GHG) emissions in road transportation, house heating, agricultural activities, etc. There is an increasing demand to put alternative fuels into operation for engine usage to replace the conventional fossil fuels. Alternative fuel has to be technologically feasible, economic, ecologically beneficial and easily accessible. For diesel engines, biodiesel, produced from vegetable, animal or waste oils, is one of the alternative fuel sources. Today, the engines are mainly designed for crude oil derived fuels and liquid renewable fuels are blended with crude oil based fuels to fulfill the requirements of