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Photofuel - Biocatalytic solar fuels for sustainable mobility in Europe

Deliverable 5.4

## **Injection spray characterisation and single cylinder characterisation**



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<b>Editorial</b>	
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Responsible beneficiary:	IFPEN
Authors:	Patricia Anselmi, Matthieu Cordier
Contributors:	IFPEN
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## Publishable Summary

Butanol fuel blends have been studied in an optical accessible pre-combustion vessel and in a single cylinder direct injection engine, in order to analyse the impact of isomers iso and n-butanol, and their concentration, on the injection spray, combustion and engine-out emissions. Blending rates have been set to ensure a comparison at equal RON levels. RON 95 butanol blends are to be compared to a reference fuel at 10% vol ethanol (E10). RON 101 fuel blends are compared to a stronger ethanol blend, at 25% vol (E25). Results indicate that the substitution of ethanol by butanol at comparable RON values is feasible, without negative impact on the engines' efficiency or engine-out emissions. Moreover, at 2000 rpm, and same RON level, the blends have no negative impact over the maximum torque obtained. If butanol isomers present a lower MON value, at high concentrations of 45% vol and above, they allow a faster end of combustion which favours performance. Only operation at 4000 rpm, full load, is reduced for fuel blend iso-butanol at 20% concentration. Overall, the engine-out emissions do not increase for butanol blends, being similar or rather lower than those measured for ethanol references. Furthermore, particle emissions are reduced with butanol blending, and this at both warm and low temperature operation. The reduction is stronger than that obtained for ethanol fuel blends.

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