

*GREEN POWER*  
*Feeds Your Engine*



**2<sup>nd</sup> VegOil**

# **Demonstration of 2<sup>nd</sup> Generation Vegetable Oil Fuels in Advanced Engines**

## **Final conclusions**

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## Final conclusions of the 2ndVegOil project

2ndVegOil has met the challenges of using pure plant oil as fuel in advanced diesel engines. This success was achieved by adapting advanced engine hard- and software and developing 2<sup>nd</sup> generation pure plant oil (2G-PPO) fuels along with suitable additives and lubricants. 2G-PPO fuels are characterised by an extremely low content of alkali metals, earth alkaline metals and phosphorous. Tests with 8 different plant oils – 4 of them outside the 2ndVegOil project – have shown that diverse plant oils can be used as fuel if the 2<sup>nd</sup> generation quality can be ensured. The in-situ oil cleaning methods developed in the project allow use of the oil cake as animal feed and can be practised in small agricultural enterprises.

The developed engine concepts, 2G-PPO fuels with selected additives, and two appropriately formulated lubricants were subjected to comprehensive, scientific field tests and a fleet demonstration and monitoring programme in Germany, France, Austria and Poland. 16 tractors were tested in the field, under a broad range of operating conditions, with 8 different 2G-PPO fuels, for a total of 24,000 operating hours, thus proving the viability of the technology. The concept is now mature enough to be widely adopted in agricultural applications.

A major result of the project is a European Standardization Committee (CEN) Workshop Agreement. This CWA defines minimum requirements for two classes of pure plant oil for use as fuel in engines with and without exhaust gas after-treatment systems. It has been published on 7 December 2011 as CWA 16379, *Fuels and biofuels — Pure plant oil fuel for diesel engine concepts — Requirements and test methods*. It can be used on a voluntary basis for engine, fuel, and where necessary, fuelling station clearance. It may also assist development of local regulation and national alternative energy targets.

2ndVegOil assessed the saving of Green House Gas (GHG) emissions and concluded that it can be more than 60% for a tractor fuelled with 2G-PPO from rape seed, if the 2G-PPO is also used as fuel in the cultivation of the crop. The GHG saving could be up to 70% for 2G-PPO from false flax (*Camelina sativa*) seed if it is produced in mixed cultivation with wheat. This is further evidence supporting the fact that pure plant oil used as engine fuel in the agricultural sector offers potentially the maximum ecological, economic and social benefits of all biofuels.

As with all alternative and not widely familiar technologies, a favourable policy framework is required for widening the use of environmentally and socially sustainable motor fuel. In the course of this work, the consortium noticed an inconsistency in the use of the Green House Gas Emission (GHGE) reference value for diesel fuel within the Fuel Quality Directive (FQD) and its implementation. The consortium requests that this be corrected in the forthcoming revised FQD and suggest using 87.64 g CO<sub>2-eq</sub>/MJ as the value of the GHGE of the fossil fuel comparator instead of 83.8 g CO<sub>2-eq</sub>/MJ when a bio-fuel replaces diesel fuel. This value is already used in the latest public version of the BioGrace GHG Tool for the GHGE of diesel when it is used as auxiliary fuel in a bio-fuel production process.

In addition, the consortium advocates a threshold for considering carbon stock changes caused by indirect land use changes (ILUC factor) for bio-fuels, when they are produced by an agricultural enterprise for own use or local consumption. We are of the view that an upper limit of 10% of the agricultural land of an area could be set for the production of bio-fuels for such use, beyond which the ILUC factor may be considered. Regional marketing initiatives, which certify the regional origin of products and similar criteria in relation to sustainability aspects, may be entrusted with certifying adherence to the above limit.

Finally, the consortium would like to propose a tax exemption for PPO if it is used by the producer agricultural enterprise itself as fuel to be considered in view of the multiple benefits of use of such fuel. The exemption may apply even if part of the processing (e.g. oil pressing) is conducted by another local enterprise (regional clusters).