

Peer review

By Steve Goldthorpe, Energy Systems Analyst

of

“Acceptance of the Use of Biodiesel Fuels in Vehicle and Engine Applications in New Zealand” by Andrew Campbell

The purpose of the study is to present factual information to assist the diesel engine industry and users to understand the technical issues, so that biodiesel can continue to be introduced appropriately and with confidence. This review aims to clarify some issues concerning the current position of biodiesel blends in New Zealand; the ability of the biodiesel industry to supply quality product; technical issues with the use of biodiesel; and bigger picture issues.

The NZ Engine Fuels Specifications Regulations (EFSR 2008) permit up to 5% of biodiesel derived from non-mineral sources to be included in diesel fuel offered for general purpose retail sale; known as B5. Whilst that regulation provides a very large market for biodiesel, the oil companies have not yet taken up that supply option. Accordingly, commercial biodiesel producers are focusing on niche non-retail markets with B20, B30, B60 and B100 products in order to build experience and confidence. Anecdotal evidence of the unregulated production and use of biodiesel from “home brew” operations is outside of the scope of this study and should not be considered.

Biodiesel produced commercially from common New Zealand feedstock, notably used canola oil, meets the EFSR 2008 specifications for biodiesel. The European biodiesel specification, EN 14214:2009, has some tighter specifications, which may be issue for some biodiesels made from other feedstock.

Biodiesel comprises about 90% carbon and hydrogen and about 10% oxygen, whereas mineral diesel is effectively 100% hydrocarbons. The oxygenated nature of biodiesel fuel results in its lower energy content and greater miscibility with water than mineral diesel. At B5 the oxygen content of the resulting blended fuel would be low, so physical effects would be no more than minor.

The report has a useful detailed discussion of technical issues arising from the inclusion of elevated levels of oxygenated biodiesel in diesel fuel. I concur with the suggestion of the author that biodiesel addition at the 20% level (B20), when combined with good fuel housekeeping and the use of OEM specified parts in fuel systems, should result in satisfactory diesel engine operation. Hence the current legal



limit of 5% biodiesel in general purpose retail fuel should not be considered as a practical limit.

The use of higher concentrations of biodiesel (B30, B60 and B100) will result in practical issues, which may be addressed and accommodated in specific engines in specific applications. However, blends greater than B20 are not a practical prospect for general purpose retail diesel fuel, nor could the biodiesel industry approach that level of supply.

The survey of opinions of OEMs with regard to the use of biodiesel blends in their engines reveals a natural conservatism. However, there is no apparent resistance to the B5 level of biodiesel implementation, with BMW leading the small engine field in signaling that an increase in specification to B7 is acceptable. The manufacturers of large diesel engines are exploring the use of higher biodiesel contents for specific engines in specific applications and are making compatibility bulletins available to fleet users. As experience is gained in the niche markets, a gradual increase in permitted biodiesel content of general purpose diesel might be expected. Confidence would be enhanced by reporting of practical experience by the OEMs with higher biodiesel concentrations.

The inclusion of opinion on the bigger picture merits of the use of biodiesel is beyond the scope of the report. Comments included in Section 6 *Benefits of using Biodiesel* should be balanced by the cautionary words *“However, the bigger picture benefits of using biodiesel need to be considered carefully in the context of the life cycle of the source materials and potential impacts on other applications of biomass resources.”*

In summary, I concur in general with the findings of the report and conclude that:-

- The general purpose applicability of B5 is not in question.
- The general purpose use of diesel fuel blends up to B20, in combination with good practice and adherence to specifications, is expected to evolve over time as more experience with biodiesel is gained in niche markets.
- The use of blends higher than B20 is appropriate in non-retail situations for specific engines in specific applications.

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