



Renewable Diesel Standards in Canada

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Agenda

- Renewable Diesel Definitions & “Map”.
- National Standards in Canada.
- The Canadian General Standards Board (CGSB) Petroleum Committees.
- Relevant CGSB Standards.
- The Proposed Canadian B100 Standard.
- Issues with Biodiesel blends.
- Conclusions.

Some Renewable Diesel Sources



Canola
(often called Rapeseed in
Europe)



Palm



Soy
(common in the US)

Renewable Diesel can be made from many different biological sources, and can be manufactured into a fuel suitable for diesel engines by a variety of technologies.

Renewable Diesel Definition Map

Renewable Diesel (RD)

Hydrogenation Derived
Renewable Diesel
(HDRD)

Hydrotreated
Vegetable Oil (HVO)

Canola, Palm,
etc

Biomass To Liquid
(BTL)
via
Fischer-Tropsch
(FT)

Biodiesel
(B100)

Canola/Rapeseed,
Soy, etc

Yellow, Tallow, etc

Renewable Diesel Definitions: Biodiesel

- Biodiesel is a term in common usage in North America that specifically means Fatty Acid Alkyl Esters (FAAE) of which the most common type is FAME or Fatty Acid Methyl Ester.
- FAME is produced by reacting an oil* such as Canola or Tallow or Soy with Methanol, typically with a catalyst, to produce an ester & glycerin, any methanol remaining can be separated & recycled in the process.
- Notably the type of oil used in the process has a major impact on the properties of the finished FAME such as cold operability (i.e. cloud point) and stability.

***These oils are far too viscous to use in a diesel engine and also have very poor thermal stability so they must be modified**

Renewable Diesel Definitions:

Hydrogenation Derived Renewable Diesel (HDRD)

- As shown on the “map” HDRD is not the same as Biodiesel.
- HDRD takes an oil (such as canola, soy, palm, tallow, etc) and converts the oil into a paraffinic hydrocarbon plus typically propane. The propane can be used in the process or sold separately.
- HVO is a type of HDRD that was made using a vegetable oil.
- The paraffinic hydrocarbon can be further processed to yield iso-paraffins that have better low temperature operability (i.e. A colder cloud point).
- HDRD is commercially available today.
- In general there is less “connection” between the feedstock and the properties of a commercial quality HDRD as compared to Biodiesel.

Renewable Diesel Definitions: Biomass to Liquid (BTL)

- It is possible to convert any type of biomass to synthesis gas (Hydrogen & Carbon Monoxide) and then using the Fischer-Tropsch process further convert the H_2 & CO to middle distillate fuels.
- The Fischer-Tropsch process is used commercially today, but the feedstock used is either natural gas or coal (so “GTL” or “CTL”).
- The fuel produced in this process can be paraffinic hydrocarbons. *Typically the properties are somewhat similar to HDRD.*
- The European Standards Setting Organisation (CEN) is currently developing a specification that will hopefully cover the following types of paraffinic fuels: BTL, CTL, GTL & HDRD.

National Standards in Canada

- The Standards Council of Canada (SCC) accredits Standards Development Organizations (SDOs) in Canada to write National Standards of Canada*.
- The Canadian General Standards Board (CGSB) has the mandate from SCC to develop Fuel Standards in Canada.
- National Standards of Canada have to meet a total of 52 criteria that are defined by the SCC.

These criteria include the use of a consensus process using a balanced committee. National Standards of Canada shall address the national public interest by considering to the extent possible as appropriate to the subject of the standard:

- *advancing the national economy,*
- *supporting sustainable development,*
- *benefiting the health, safety and welfare of workers and the public,*
- *assisting and protecting consumers, and,*
- *facilitating trade.*

**The term "National Standard of Canada" has been registered by the SCC under the Trade Marks Act.*

CGSB Petroleum Committees

- As noted CGSB has the mandate to develop National Fuel Standards for Canada.
- CGSB Fuel Standards are used in both Provincial & Federal Regulations as well as in Customer & Company Exchange Contracts.
- There are five Petroleum Committees in CGSB:
Aviation, Gasoline, Middle Distillate, Test Methods & Coordinating.
These Committees meet twice per year.
- The secretariat for CGSB is part of a Federal Government department: Public Works & Government Services Canada .
- I chair both the Middle Distillates & Coordinating Committees.

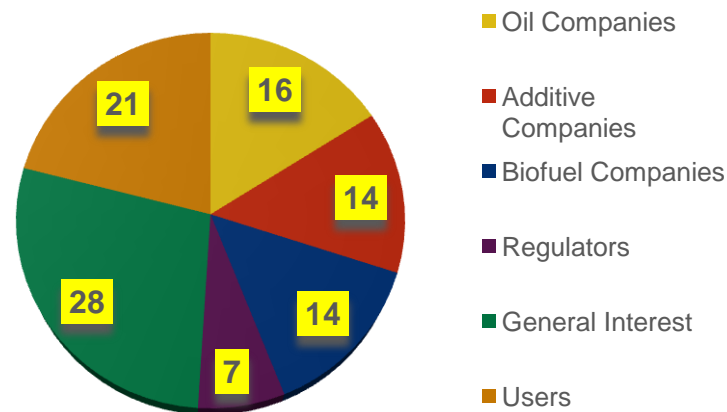
CGSB Middle Distillates Committee

- Currently there are 43 members on this Committee.
- CGSB requires that the Committee be “balanced” in that no one category can have more than 50% of the vote.
Currently: *producer@44%, user@21%, general interest@28% & regulator@7%.*
- All Standards are required to be developed in a consensus process.

Consensus:

General agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments.

**CGSB Middle Distillates
Committee Membership, %**



Current Relevant CGSB Middle Distillate Standards - 1

- **CAN/CGSB-3.520 Automotive Low-Sulphur Diesel Fuel Containing Low Levels of Biodiesel Esters (B1-B5).**

There is a parallel On-Road Diesel Fuel (CAN/CGSB-3.517) as well as a parallel Off-Road Diesel Fuel (CAN/CGSB-3.6) that do not include biodiesel blends.

- **C**/CGSB-3.522 Automotive Low-Sulphur Diesel Fuel Containing Biodiesel Esters (B6 to B20):**

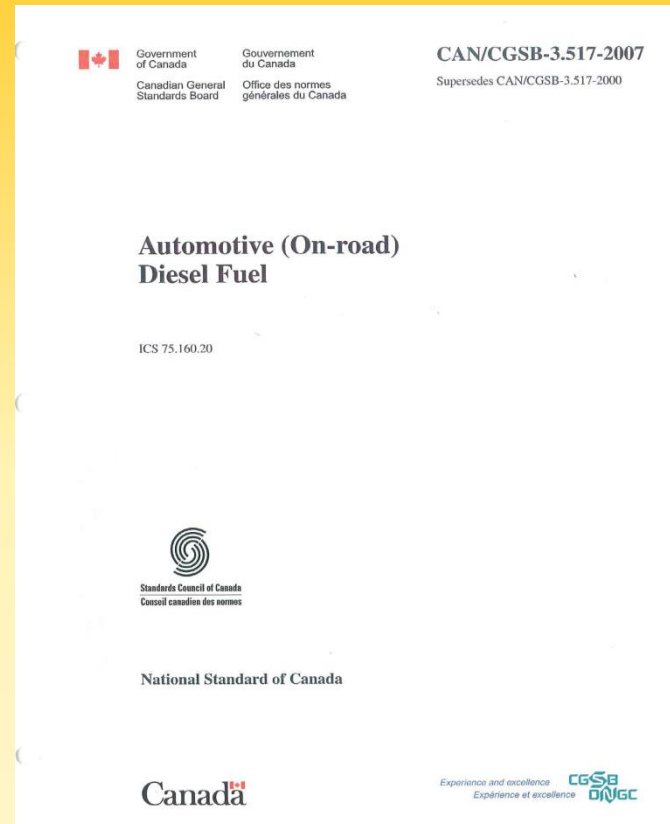
The Committee Draft has two Classes: *B6 to B11* & *B12 to B20*.

- **CAN/CGSB-3.2 Heating Fuel Oil:**

ONLY Type 2 will allow up to 5% Biodiesel once the new Edition is published.

- **Notably the following Standards do not currently allow biodiesel esters: Mining Diesel, Locomotive Diesel & Naval Distillate.**

Current Relevant CGSB Middle Distillate Standards - 2



Current Relevant CGSB Middle Distillate Standards - 3

- C**/CGSB-3.524 Biodiesel (B100) Blend Stock for Use in Middle Distillate Fuels:
- The Committee has concluded that **neither** ASTM D6751 **nor** EN14214 are appropriate Specifications for Biodiesel use under Canadian conditions.
- Proposed modifications (as compared to ASTM D6751) include:
 - Lower water: 400 ppm max;*
 - Lower Cold Soak Filtration Time (CSFT): 240 seconds max;*
 - Lower metals: 4 ppm Phos, 4 ppm Na + K, 2 ppm Ca + Mg max;*
 - Higher Rancimat (Oxidative Stability): 8 hr min;*
 - Addition of Cold Soak Filter Blocking Test (CSFBT) a new test method via an Appendix with a maximum limit of 1.8.*

Biodiesel & Biodiesel Blend Concerns

- The new B100 Standard, when passed will help to ensure that the resulting biodiesel blends in Canada are suitable for use.
- However there are a number of well known issues that will require more investigation:

Impact of Minor Components such as plant sterols, saturated mono-glycerides.

Biodiesel & Biodiesel Blend Stability, test methods and limits.

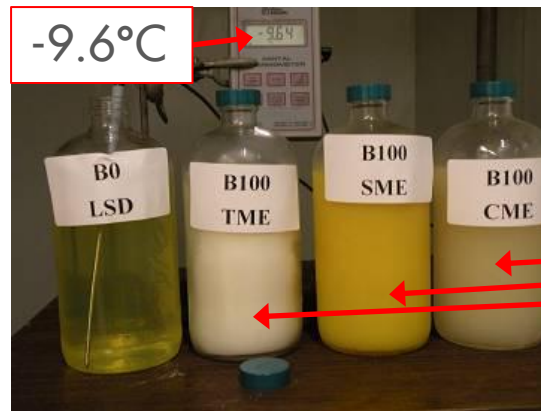
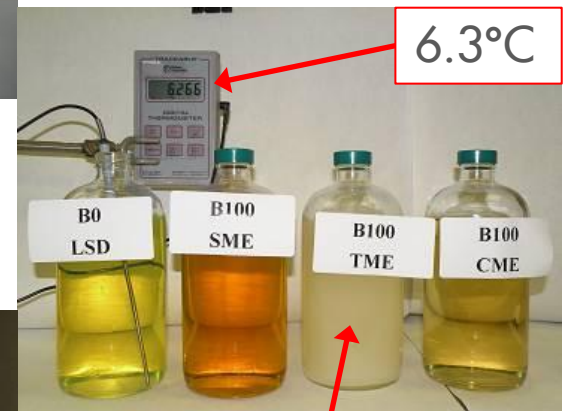
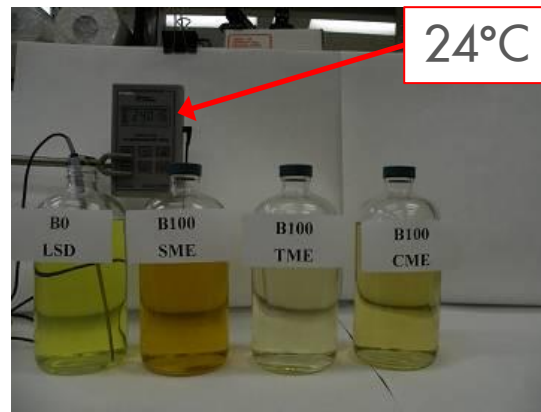
Compatibility with After-Treatment Devices.

Microbial Concerns.

It must be noted that CGSB does no research, it basically acts as a forum where data can be presented and discussed in order to develop suitable tests and limits to ensure that fuel is suitable for use in Canada.

Biodiesel & Biodiesel Blend Concerns

- These photos show samples of Diesel & three types of Biodiesel (B100): Soy, Tallow & Canola after a few hours storage at 24, 6.3 & -9.6°C.
- Photos courtesy of Imperial Oil Research.
- Please note that Imperial Oil Research refers to "ULSD" as "LSD".



Solid

Summary

- There are different types of “*Renewable Diesel*” which have differing sources, manufacturing routes and so properties.
- There is an existing system and process that has been developing Fuel Standards in Canada for many decades.
- This consensus process has helped to ensure that fuels in Canada are of appropriate quality.
- Use of this existing process is the appropriate way to develop Standards for both renewable fuels and their blends to ensure that their introduction is successful.
- However a pre-requisite of this process is the development of unbiased data regarding the fuels and their usage.

