Biodiesel: A Terminals Approach

Receipt, Transmission, Storage, Blending and Delivery

Presented by

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PARKING LOT ATTENDANT?

What is a Parking Lot Attendant and who will agree to be the Parking Lot Attendant?

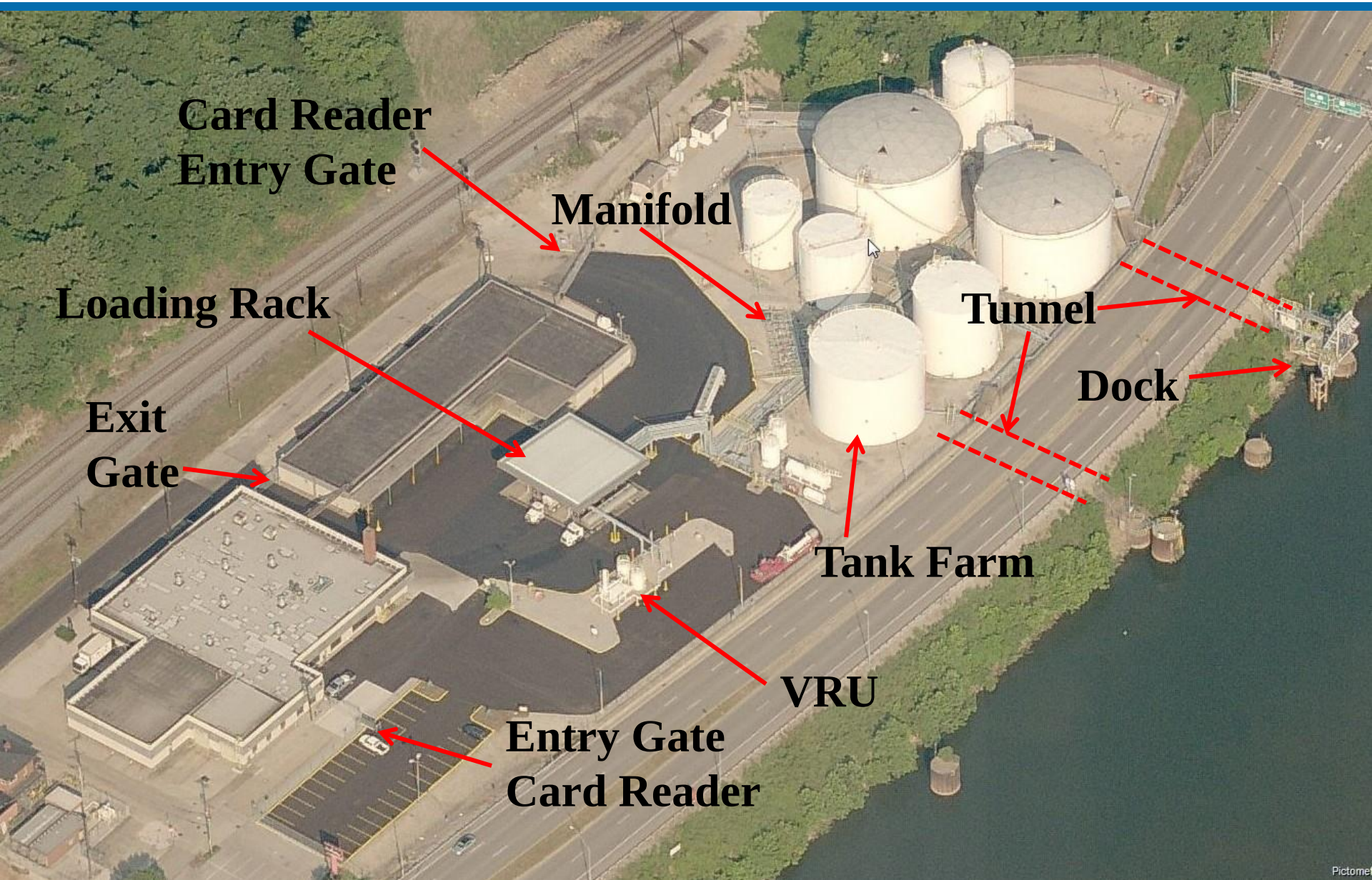
During the presentation, questions and comments are ***ALWAYS*** encouraged.

If a question arises that requires an extensive answer, or if I don't know the answer, we will "park" the question until after the presentation. It will be addressed at that time.

If a question or comment arises that will significantly derail the presentation, then it will be parked until after the presentation.

Do we have a volunteer?…

Typical Loading Terminal




BIODIESEL?

Origin of Alternative Fuels?

As time passes, we consume more and more energy, with most of it coming from fossil fuels, such as coal, oil or natural gas.

Fossil fuels cannot be replenished and using them pollutes the atmosphere with Greenhouse Gases and adds daily to our Carbon Footprint, among other things.

This, along with other reasons such as financial issues and foreign oil dependence, has led to a quest for a suitable alternative, or non-conventional, fuel...

Origin of Alternative Fuels?

This quest also has been fueled by the government (no pun intended) through mandates on the amount of renewable fuels that must be introduced into the nation's motor vehicle fuel supply.

The EPA develops and implements regulations to ensure that transportation fuel sold in the United States contains a minimum volume of renewable fuel. The Renewable Fuel Standard (RFS) program regulates this. This program is monitored by a system that uses RINs.

A RIN (Renewable Identification Number) is a 38-digit number that contains the entire DNA of the fuel it identifies and can be very intricate and complex. It contains year of production, producer ID, facility ID, equivalence value, batch number, cellulosic/non-cellulosic, etc.

Origin of Alternative Fuels?

This system is cumbersome and is susceptible to errors and there is no method to validate RINs.

Also, RINs are similar to carbon credits in that they can be accrued, bought, sold and traded on the open market.

Even though fuel producers and distributers are required to have a certain amount of biofuel in place by a certain date dictated by the government, some have opted to purchase the RINs necessary to meet this requirement rather than dealing with the biofuel itself...

Origin of Alternative Fuels?

Various states also have begun to mandate the use of Biodiesel in all diesel fuel sold within their jurisdiction. This is typically 2% Biodiesel by volume and may be as high as 5% Biodiesel by volume.

There can be tax incentives for higher concentrations as well, such as 11% Biodiesel or 20% Biodiesel.

As these mandates continue to increase, the overall volume of Biodiesel will increase and the need for efficient terminal delivery systems will increase as well….

What is Biodiesel?

Biodiesel is a renewable diesel replacement fuel made from animal fats & greases, as well as, various vegetable oils. These are called feed stocks.

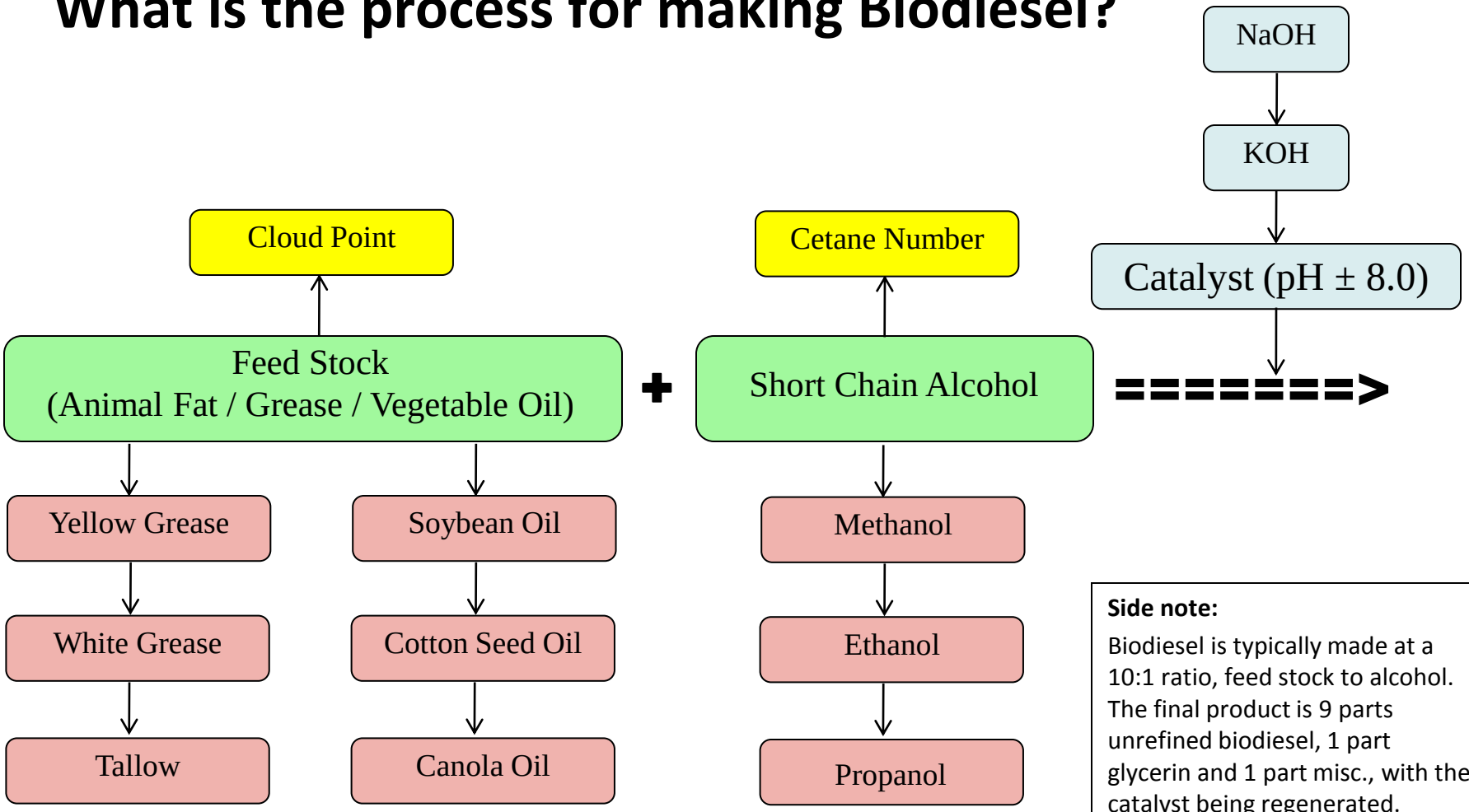
Biodiesel is used in diesel internal combustion engines. It is typically blended with Ultra Low Sulfur Diesel (ULSD) to produce a product with varying percentages of Biodiesel.

Pure Biodiesel is often referred to as a FAME or Fatty Acid Methyl Ester. It has a specific gravity of .88, with ULSD2 being .85 and ULSD1 (Kerosene / Jet) being .82.

Biodiesel is a renewable resource and, in most cases, produces a net carbon footprint of near zero for the Biodiesel component…

TRANS-ESTERIFICATION PROCESS - REACTION

What is the process for making Biodiesel?

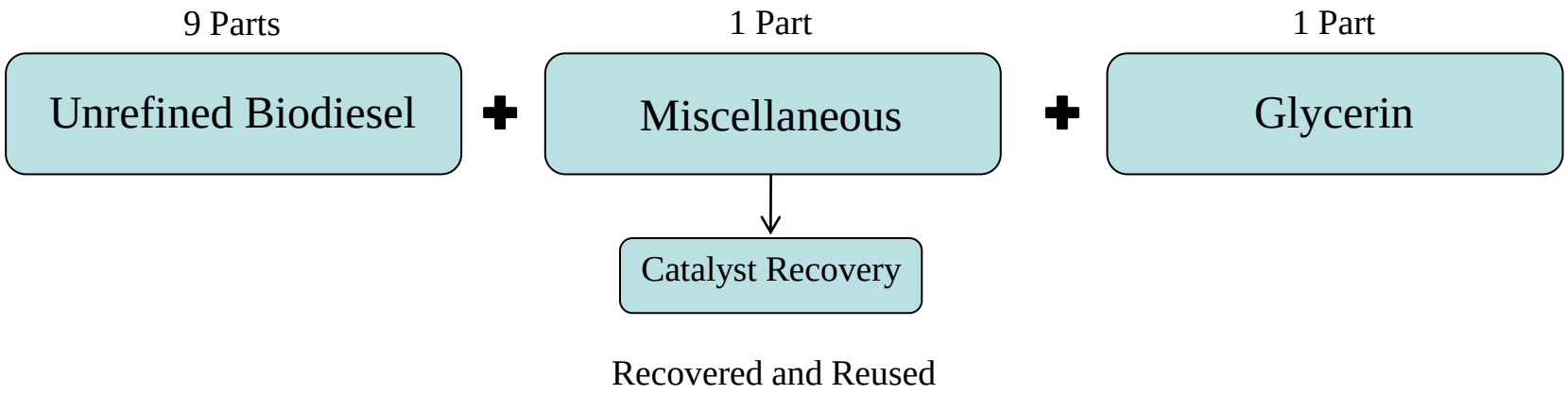


Side note:

Biodiesel is typically made at a 10:1 ratio, feed stock to alcohol. The final product is 9 parts unrefined biodiesel, 1 part glycerin and 1 part misc., with the catalyst being regenerated.

Trans-esterification – Final Product

What are the final, major products of Trans-esterification?



This same process can be done at home. The solution will stratify and have a well-defined interface. The heavier glycerin will go to the bottom in a gelatinous state, while the Biodiesel will float on top.

Side note:

Glycerin is more of a co-product than a by-product. It is used in many beauty products, lotions, mold lubrications, etc.

BIODIESEL AT HOME?

Here is a basic 40 gallon at-home Biodiesel refinery (~$4,000).

Biodiesel At Home?

This is the basic output of the at-home refinery (~ 50 cents per gallon).

Side note:

Although this is technically Biodiesel, it does not meet the ASTM criteria, with respect to quality, for "true" Biodiesel. As such, this may very well void warranties and require engine modifications.

Biodiesel Formulations

How is Biodiesel designated?

There are many formulations of Biodiesel. (NOTE: Do not confuse this with a quality metric such as gasoline grades.) The final product is designated by its percentage volume in the final Biodiesel formulation. These can be tax or government based.

Standard Biodiesel Formulations

- B100 = 100% Biodiesel
- B20 = 20% Biodiesel, 80% Ultra Low Sulfur Diesel
- B11 = 11% Biodiesel, 89% Ultra Low Sulfur Diesel
- B5 = 5% Biodiesel, 95% Ultra Low Sulfur Diesel
- B2 = 2% Biodiesel, 98% Ultra Low Sulfur Diesel

Side note:
Sometimes the physical properties of the Biodiesel control the formulation. Perhaps use B20 for its "diesel-like" properties during storage and transit.

What formulation is ok to put in my diesel car?

Most diesel engine manufacturers have stated that formulations up to B20 are safe and can be used without any deleterious effects.

Some car companies have listed their products compatible up to B11 without any issues.

Some companies, such as Ford, have stated that model year 2011+ is B20 compatible, while prior to 2011 is B5 compatible.

This varies with manufacturer and your manual should always be consulted…

CLOUD POINT

What is Cloud Point and why is it important?

Cloud point is the temperature at which a liquid begins to cloud and form visible, floating wax crystals within it. For Biodiesel, the cloud point temperature is vital information to have, as it controls the overall storage and delivery system.

Biodiesel made from Yellow grease may begin to cloud at 58° F while Biodiesel made from Soybeans may begin to cloud as low as 32° F. This parameter controls the method by which it is handled, stored and delivered, as well as its use from season to season.

Side note:

As of this writing, there is no effective cloud point suppressant for Biodiesel; however, cold-weather diesel can be used in the blend to help lower the overall cloud point. Diesel cloud point suppressants can be used as well to lower the Diesel component cloud point.


Utah Biodiesel Supply
CANOLA OIL
Utah Biodiesel Supply
SAFFLOWER OIL
Utah Biodiesel Supply
CORN OIL
Utah Biodiesel Supply
OLIVE OIL
Utah Biodiesel Supply
SOYBEAN OIL
Utah Biodiesel Supply
PEANUT OIL
BIODIESEL AT 35 DEG F
0
20
40
60
80
100
120
-20
-40
-60
°F
TAYLOR.
Utah Biodiesel Supply 2008

Comparison between Biodiesel and Diesel.

With respect to power, torque and fuel economy, Biodiesel (B20) shows around a 1% - 2% difference as compared to ULSD.

B100 shows a more significant difference in comparison to diesel fuel; however, most people saw little or no difference in lower formulations of Biodiesel.

From a standpoint of energy (BTU/gal), Biodiesel is about 8% less than conventional diesel fuel (ULSD2), on a pound for pound basis, Biodiesel is 12.5% less due to differences in specific gravity….

Is Biodiesel a solvent?

By its nature Biodiesel is a solvent, unlike ULSD.

This causes us to examine the various materials with which it may come into contact.

The two types of materials pervasive in our industry are elastomers (gaskets, o-rings, seals, etc.) and metals (both pure and alloys).

These materials must be scrutinized to avoid a potential hazard....

MATERIALS COMPATIBILITY (ELASTOMERS)

What types of elastomers can and cannot be used with Biodiesel?

Biodiesel, being a solvent, interacts with certain elastomeric materials, with higher concentrations of Biodiesel intensifying the effect.

Natural or nitrile rubber is susceptible to degradation when in contact with Biodiesel. Buna-N, which is a very common material used in gaskets, seals, o-rings, etc., is susceptible to degradation and should be replaced in formulations of B20 or higher. B20 or lower formulations may work, but should have regular inspections.

The recommended material for elastomers is Teflon©, Viton© or Nylon©, with Viton © being the most widely used.

Side notes:

(a) When changing to one of the recommended materials, please note that there may be a marked change in the performance of that material with regard to swell and stiffness.

(b) Per our clients, animal based Biodiesel is worse on elastomers than plant based Biodiesel.

What types of metals can and cannot be used with Biodiesel?

Biodiesel also interacts with certain metals. The higher the concentration of Biodiesel, the greater the interaction.

As a general rule, Biodiesel reacts (oxidizes) with brass, bronze, copper, lead, tin, and zinc to form fuel insolubles, gels or salts . This means that ALL alloys containing these metals should be avoided. This sometimes proves to be difficult in that most rust-proof materials are hot-dip galvanized, which contains zinc.

Lower formulations (B20 or less) have much less interaction than B100.

Stainless steel, carbon steel or aluminum are acceptable substitutes…


RECEIPT &
STORAGE

How is Biodiesel typically received at a terminal?

Depending on the amount of Biodiesel needed, it may be delivered by truck transport. This can greatly increase the truck traffic at the terminal, plus an offload station, containment area and access to an oily water system is required.

B100 can also be received via pipeline to the terminal; however, this is typically not the case due to volume and staging logistics.

Before the Biodiesel is received, the decision must be made as to how the Biodiesel is to be stored, blended and delivered. This is the critical path that will dictate the terminal Biodiesel component configuration.

Side note:

A typical pipeline receipt of Biodiesel may be around 65° F, only 6° above the cloud point of the Tallow feed stock version.

How to store the Biodiesel?

There are several methods for Biodiesel storage. Depending on the terminal configuration (physical layout and loading types provided – truck, rail or barge), the method may differ from other similar terminals.

Many derivatives exist for the primary methods of storage discussed in this presentation. Most of these are simply variations on a theme. Only the primary storage methods will be discussed in this presentation.

Let's take a look at some of these methods of storage…

Method 1: Store B100

Incoming Biodiesel is simply sent to a tank to be stored as B100.

Pros:

- Biodiesel is stored as B100, no chance of an off-spec product
- Can be blended to virtually ANY formulation on demand…

Cons:

- Must heat trace line from receipt area (manifold or transport offload area) to tank
- Must heat trace supply line from tank to blending point
- Must heat trace tank, clean and modify tank and add agitation
- Must be alert to materials incompatibilities
- Must provide loading/blending scheme at the delivery point
- Increased hygroscopic nature of pure Biodiesel
- Increased exposure to biological contaminants (rancidity)…

Method 2: Store blended mixes

Incoming Biodiesel is blended at the manifold and stored as a specific formulation (e.g. – B5, B11, B20, etc.).

Pros:

- Typically no need to heat lines to tank or blending points (< B20)
- Less need to agitate tank (depends on turnover time and temp.)
- Product is already blended for delivery at specific formulations (can be down-blended with ULSD for less formulations)…

Cons:

- Limited formulations available at the terminal, no upblending
- Must have tanks to store the various formulations (reduces ULSD tanks available) and B100 truck delivery is not an option
- Blending skid required at manifold, with heat tracing
- No easy way to deal with off-spec product in tank…

Method 3: Store Single Blend Used for Down blending

Incoming Biodiesel is blended at the manifold and stored as a specific formulation (i.e. – B50) and "down-blended" for other formulations.

Pros:

- May not need to heat trace line to tank or blending point
- Less need to agitate tank (depends on turnover time and temp.)
- Storage and transmission issues are mitigated…

Cons:

- Must have tanks to store the mix (reduces ULSD tanks available) and B100 truck delivery is not an option
- Up-blends of Biodiesel are not an option
- Blending skid required at manifold (or other method of blending)
- No easy way to deal with off-spec product in tank…

Are there any special guidelines regarding spills or storage of Biodiesel?

It is my understanding that there are no special guidelines that apply to Biodiesel.

Two statutes essentially control the discharge of “oil” in the nation’s waters: the Federal Water Pollution Control Act (FWPCA) and the Oil Pollution Act of 1990 (OPA 90).

Under SPCC (Spill Prevention, Control and Countermeasure) rules, Biodiesel is an oil and is subject to the same guidelines as diesel fuel (the definition of “oil” is broad enough to encompass this).

I have seen articles regarding the attempts to classify it differently than diesel fuel because of its differences in solubility, biodegradability, etc., but nothing has been done, as of this point in time, regarding the laws that govern it.

How should a tank be prepared for Biodiesel storage?

Biodiesel, unlike ULSD, is a solvent. It will dissolve deposits/varnishes left in tanks, lines, pumps, meters, valves, etc. As a result, all tanks and associated connections must be properly cleaned prior to B100 storage or deposits or particulates will end up in filters and/or deliveries. The lower the concentration of Biodiesel, the fewer the issues with residual contaminants.

Biodiesel (B100) will stratify if left in a stagnant tank. The installation of a tank agitation system and inline mixers or jet/mixing nozzles are highly recommended…

How should a tank be prepared for Biodiesel storage?

Biodiesel is hygroscopic. Safeguards must be used, such as added water draws and desiccant vents, to prevent moisture buildup.

Please note that this hygroscopic issue deals with unconverted molecules. These may combine with moisture in the air to form a sort of emulsion instead of a pool of water at the bottom of the tank…

How should a tank be prepared for Biodiesel storage?

Biodiesel is susceptible to microbial degradation. Excess exposure to air will cause the Biodiesel to become rancid. A biocide may be required for long-term storage (6 months or more).

Heaters should be used (>B20) to keep the Biodiesel at least 10° - 15° above the cloud point. (Remember the cloud point varies according to feed stock and using a Soy based feed stock may eliminate heating in summer.) Heating elements may not be sufficient due to tank size. Hot oil may be necessary.

With the right feed stock, some warm-climate Terminals may not require heating of the Biodiesel.

Side note:
Heaters produce convection currents within the tank, causing some agitation; however, the use of heaters in lieu of tank agitators is not recommended


Lines,
Pumps &
Meters

How should supply lines be prepared for use with Biodiesel?

Lines should be properly cleaned or flushed (remove deposits) for higher concentrations of Biodiesel (B50 – B100).

Lines (including valves, meters, etc.) should be checked for materials compatibility prior to being placed in Biodiesel service.

Lines supplying Biodiesel above a B20 blend should be heat traced, especially in harsher climates. Care should be taken when choosing a heating system, basing it on local extremes and expected feedstock.

Lines supplying B20 (questionable) or less need not be heat traced except possibly in harsh climates.

Static mixers may be required in the delivery system for proper blending…

How should pumps be prepared for use with Biodiesel?

Pumps should be properly cleaned from deposits, especially with higher concentrations of Biodiesel (B50 – B100).

Pumps should be checked for materials compatibility prior to being placed in Biodiesel service.

Pumps supplying Biodiesel above a B20 formulation should be heat traced if local conditions and feedstock used warrant it.

Pumps supplying B20 (questionable due to feedstock issues) or less need not be heat traced except in harsh climates…

How should pumps be prepared for use with Biodiesel?

If the pumps being used for Biodiesel are existing, then special care must be taken when assessing the formulations offered at the terminal.

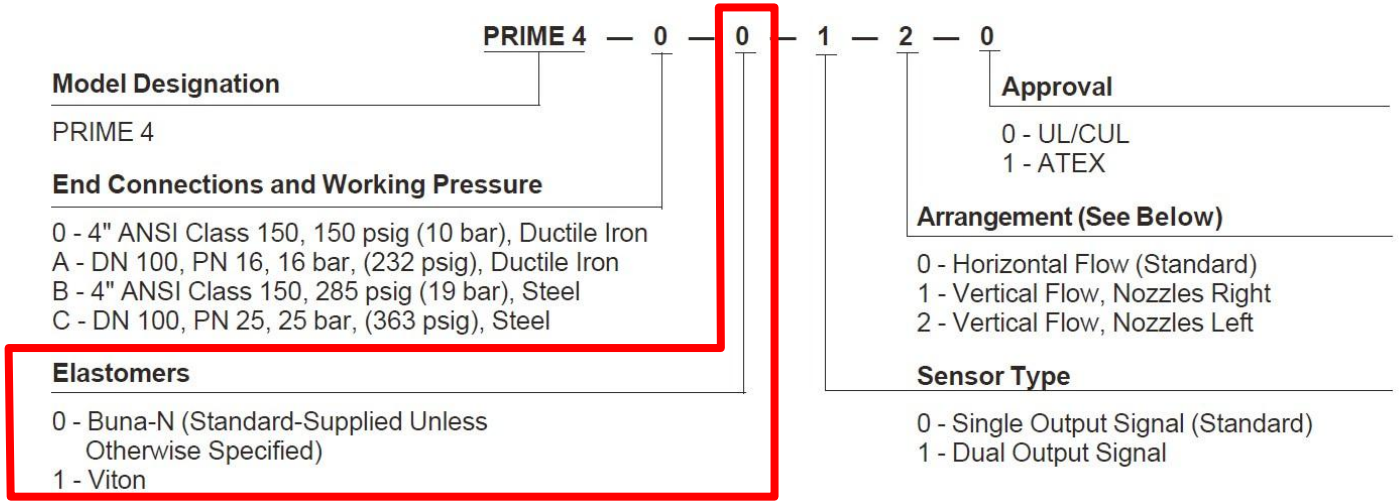
If several formulations are desired and B100 is used as an individual stream, then the pump must be able to withstand the mechanical stresses associated with delivering a paced 2% Biodiesel concentration up to possibly a 20% Biodiesel formulation.

This is dependent upon the loading scheme used (splash blending, ratio blending, etc.)…

How should meters be prepared for use with Biodiesel?

Meters should be cleaned for higher concentrations of Biodiesel.

Meters should be checked for materials compatibility prior to being placed in Biodiesel service. Upgrade kits are typically available for changing out seals, gaskets, etc. The part number on the meter will typically indicate the type of materials used in the meter.



How should meters be prepared for use with Biodiesel?

Meters with Biodiesel above a B20 formulation should be heat traced if local conditions warrant (based upon climatology and feedstock).

As with pumps, if several formulations are desired and B100 is used as an individual stream, then the meter must be able to accurately pace the Biodiesel being delivered from 2% up to possibly a 20% Biodiesel formulation…

Heat Tracing

What type of heating / heat tracing is required?

Depending on the formulation of the Biodiesel blend, various methods of heat tracing are used.

Lines are typically traced with self-regulating tape, designed to maintain temperatures at least 10° - 15° above the cloud point of the Biodiesel. Tanks typically use bayonet or “stab-in” heaters. Large tanks, 30,000 gallons or higher for example, may require hot oil heating.

If Biodiesel is stored as a pre-mixed blend of less than 20%, no tank or line heat tracing is required (barring extreme climates.) With this formulation, the Biodiesel takes on the properties (controversial) of the diesel, provided the blend is properly mixed (mixed well and quickly)…

What type of heating / heat tracing is required?

In a hypothetical winter scenario, if B100 is injected into a diesel stream, then the Biodiesel (stored at 70°) may have issues with shock crystallization when it encounters the diesel fuel (stored at 20°) during blending .

Possible ways to mitigate this is to heat the diesel fuel in the supply line to the loading rack prior to Biodiesel injection.

Install a static mixer immediately after the Biodiesel injection point.

Any Biodiesel stream (B20 or above) should be heat traced all the way to the riser in the loading rack to ensure no clouding or gelling takes place…

Blending

What should be considered when choosing a blending scheme?

There are several methods of blending Biodiesel. Most are variations on a theme and some work well in certain situations, while others fail miserably.

There are several major factors to assess when choosing a blending Scheme.

- Climate
  - What is the seasonal temperature differential?
  - How cold does it get in winter?
  - Can you change Biodiesel feedstock from the provider? If so, what about assurance of minimum cloud point.
  - Are there snow-induced power outages? If so, for how long? Biodiesel may take quite some time to de-gel...

BLENDING CONSIDERATIONS (CONTINUED)

What should be considered when choosing a blending scheme?

- Existing Infrastructure
  - How are tanks situated relative to the delivery point?
  - Is main line metering (ULSD) in place?
  - What types of pumps are available (new or existing)?
  - Is room available for a blending skid?
  - Is sufficient electrical capacity available for heat tracing?
  - How “tight” is the fit inside the loading bays?
  - What type of loading is performed (i.e. – truck, barge, rail)?
  - What is the existing control scheme and how does it function?...

What types of blending methods are available?

There are four basic types of blending used in Biodiesel delivery, with site-specific variations on these types. Each type has pros and cons associated with it and should be matched to site-specific conditions.

1. In truck, rail or barge ratio blending (splash / sequential)
2. Pre-Blend (product stored in tank as final formulation)
3. Inline Blending prior to loading rack
4. In-rack ratio blending while loading…

Blending Methods – Type I

In truck, rail or barge ratio blending (splash / sequential).

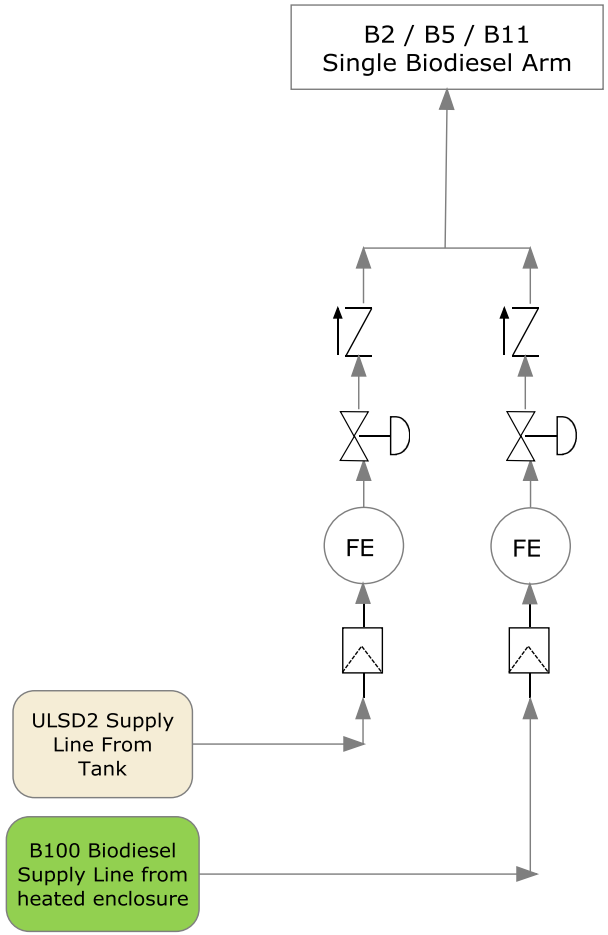
When Biodiesel is stored as B100, it is often blended in the transport vehicle using splash or sequential blending methods.

This type of blending is when the automation system (or manual system) first loads a layer of B100 into the vehicle corresponding to the amount of B100 required for the final, desired formulation. Once this is complete, the remainder of the vehicle is filled using ULSD.

Mixing occurs in the vehicle by way of the loading action and product shifting during transport.

The following schematic illustrates this basic system…

RACK BLENDING (SPLASH / SEQUENTIAL)



Side note:

This can also be accomplished with two separate loading arms.

The pros and cons for splash blending….

There are several pros associated with this method.

Pros

- Simplicity of loading, one product after the other
- Easily change blends from load to load
- B100 pump, meter & control valves can run at rated capacity
- No blending skid or static mixer required
- Reduced cost of installation
- Can be achieved by adding one stream to existing automation system
- Can easily be integrated into a multiple car rail loading system with minor procedural details…

Blending Methods – Type I Cons

The pros and cons for splash blending….

There are several cons associated with this method.

Cons

- Loading action and transport action may not fully mix the blend
- Storage of B100 required (tank and line heat tracing)
- Tank preparation issues
- Cannot load B100 into a cold vehicle due to gelling
- Shock crystallization in cold climates or during winter months…

Pre-Blend of Biodiesel in storage tanks.

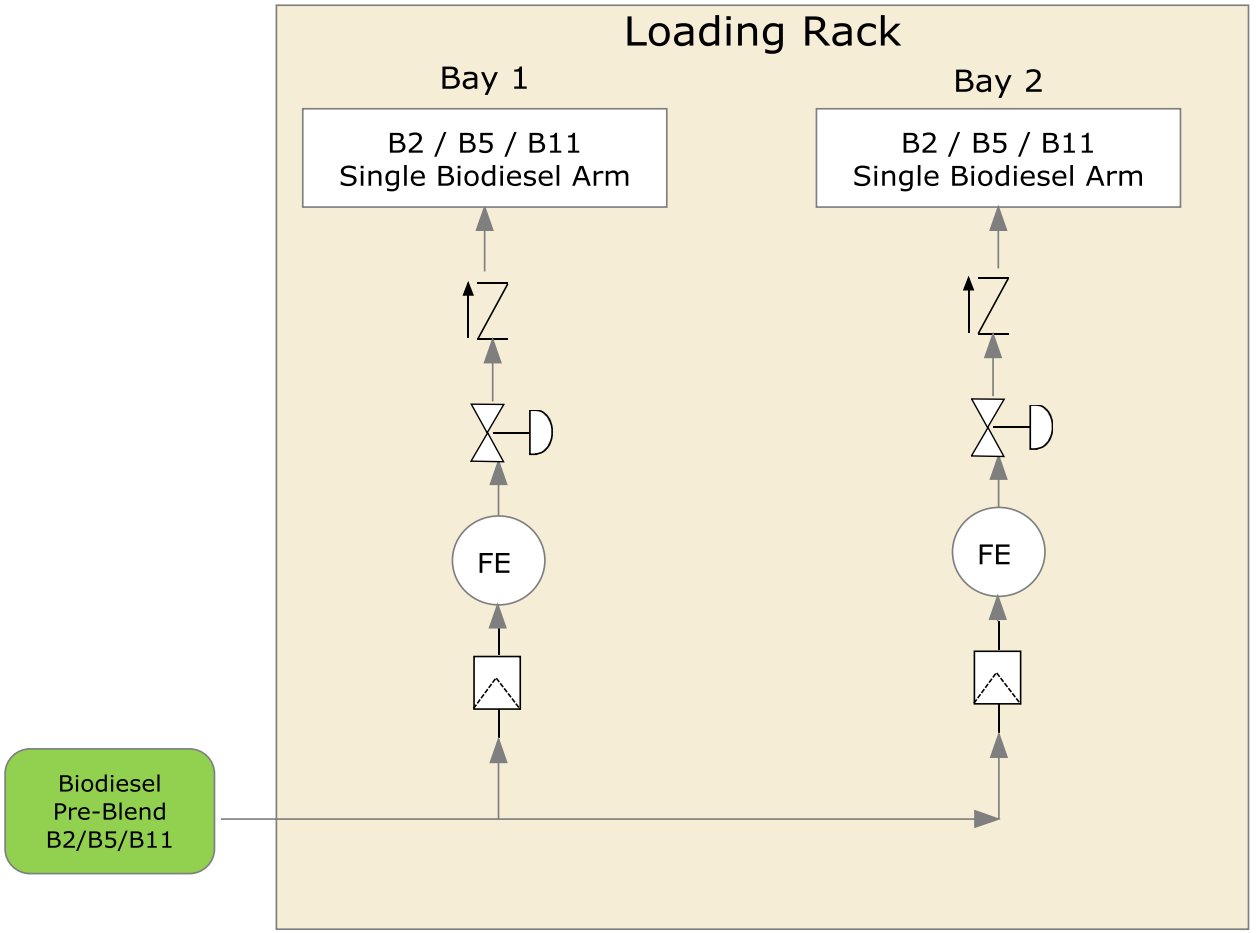
By storing pre-blended Biodiesel (B5, B11, B20), not B100, in storage tanks, many benefits can be obtained.

A notable benefit is the ability to treat the fuel in the tank similarly to ULSD, with no heat tracing required.

By using this blending method, the fuel is delivered from the tank to the loading point as a single stream, just like conventional ULSD.

The following schematic illustrates this basic system…

PRE-BLEND (STRAIGHT FROM TANK)



BLENDING METHODS – TYPE II PROS

The pros and cons for pre-blend (blended in tanks)….

There are several pros associated with this method.

Pros

- Simplicity in loading, requiring only one stream
- No heat tracing of tanks or lines required except on receipt lines and receipt line blending skid
- Automation equipment remains unmodified
- Single static mixer is required at blending skid at receipt manifold
- Blends are homogeneous
- Cold weather handling becomes a non-issue (barring extremes) except at blending skid
- Easily add additional streams to more bays…

Blending Methods – Type II Cons

The pros and cons for pre-blend (blended in tanks)….

There are several cons associated with this method.

Cons

- Little, or no, variety of blends available
- Possible issues with off-spec product in tanks
- Possible issues with pipeline staging
- Coordination of switching of tanks during receipt
- Cost of blending skid at manifold to pre-blend fuel…

Blending Methods – Type III

Inline blending (Wild Stream or Side Stream) of Biodiesel prior to delivery point.

By blending B100 with ULSD prior to the blend entering the loading rack, many benefits can be obtained.

This method allows for minimal work to be done within the loading rack and allows for variations in Biodiesel blends.

This method also allows for the blending “station” to be located away from the loading point, thereby allowing flexibility for placement…

Blending Methods – Type III (continued)

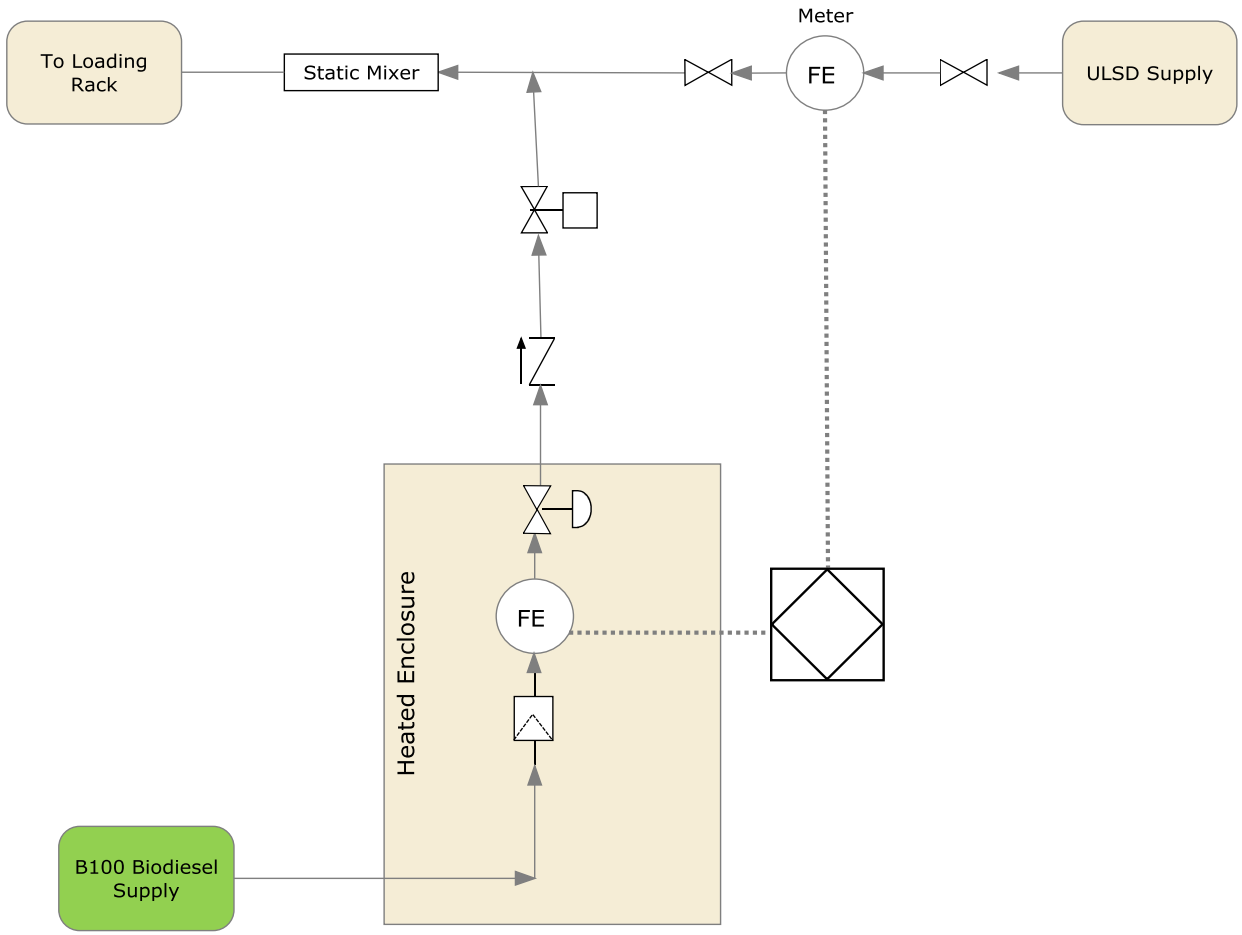
Inline blending (Wild Stream or Side Stream) of Biodiesel prior to delivery point.

This type of blending can be done with a specific blending station that mixes B100 with ULSD for delivery, controlling both streams.

Many choose to use Wild Stream or Side Stream blending with the Inline Blending scheme. This entails pacing B100 into a flowing ULSD stream. For this, you need an existing ULSD stream with meter. You simply add a blending skid and pull the pulses off the existing ULSD meter. This allows for the pacing of the B100 into the ULSD, but no control over the ULSD locally.

The following schematic illustrates this basic system…

INLINE BLENDING (INJECTED INTO ULSD STREAM)



The pros and cons for Inline blending….

There are several pros associated with this method.

Pros

- No change required to the loading points
- Simplified loading at the loading point
- Variety of blends available depending upon skid, pump and meter configuration
- No heat tracing from the skid to the loading rack…

The pros and cons for Inline blending….

There are several cons associated with this method.

Cons

- Possible off-spec product due to lack of control of main ULSD stream
- Possible limited variety of blends due to equipment selection, line flush length and recipes allowed
- Requires heated skid with automated controllers
- Storage of B100 required (tank and line heat tracing, tank prep issues)
- Shock crystallization if not properly mixed
- More difficulty in varying blends from load to load. May require procedural modifications to deal with flushing.
- Different blends cannot be loaded at the same time
- Routing of thermal relief valves in piping system. This is often designed to cascade back to the ULSD supply tank. Contamination issues?…

Blending Methods – Type IV

Rack blending.

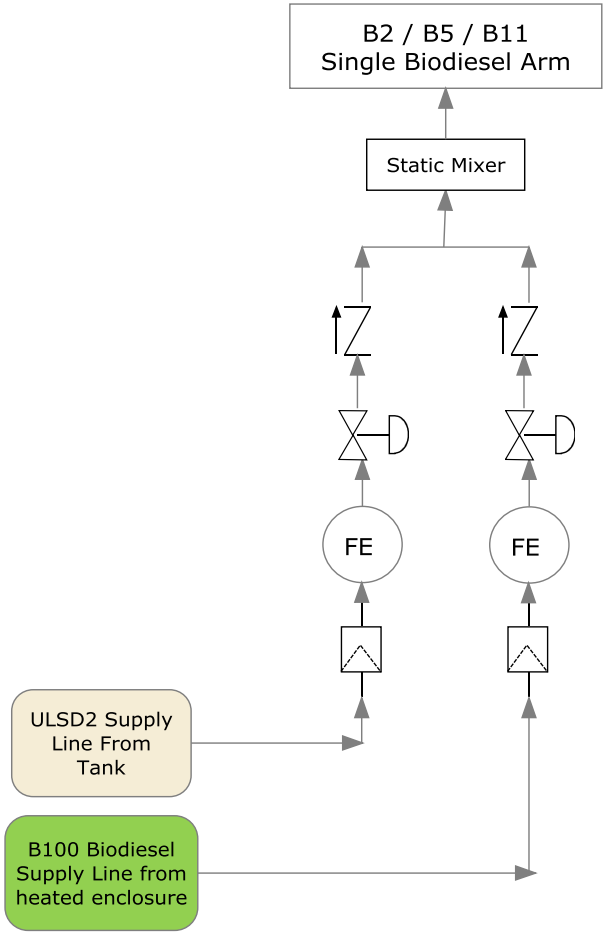
By supplying B100 directly to the loading rack, the Biodiesel blends can be ratio blended at the rack in a manner that parallels typical ethanol blending.

This allows greater control of the blends offered and uses the existing automation system.

A static mixer can be added to aid in ensuring a homogeneous blend.

The following schematics illustrate this basic system…

RACK BLENDING



Blending Methods – Type IV Pros

The pros and cons for Rack blending….

There are several pros associated with this method.

Pros

- Virtually unlimited blending options depending on meter, pump and control valve configurations
- Use existing automation controllers
- Reduced cost of installation
- Homogenous blends
- Ability to deliver B100 if necessary
- Little, to no, possibility of off-spec blends

Blending Methods – Type IV Cons

The pros and cons for Rack blending….

There are several cons associated with this method.

Cons

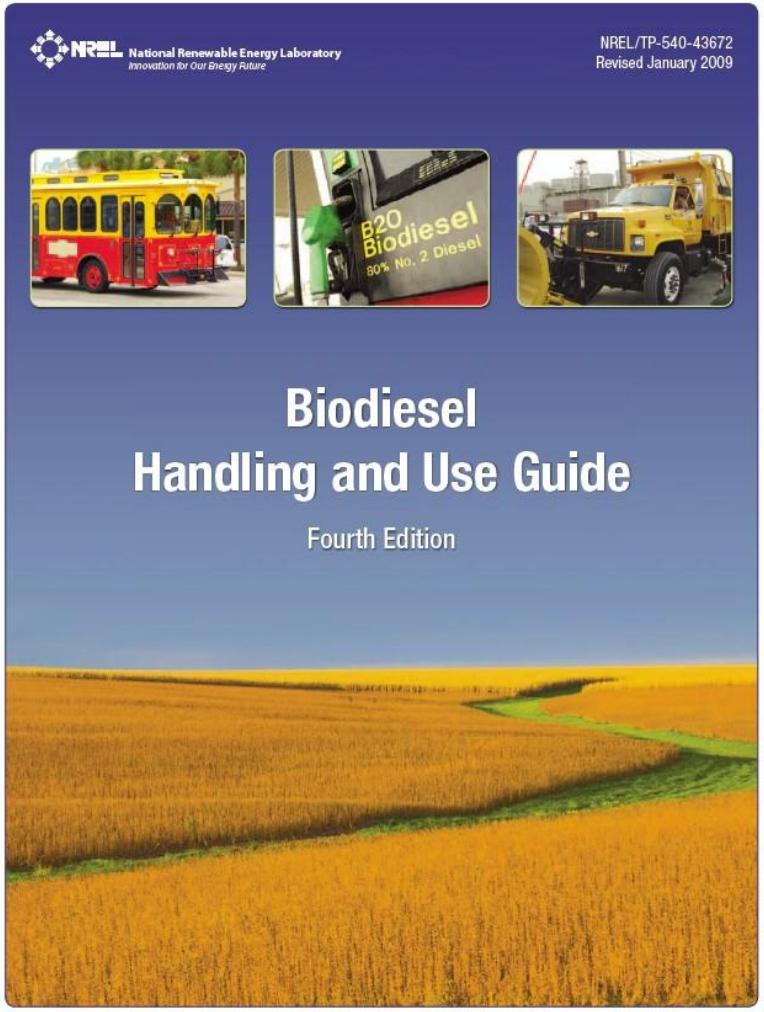
- Heat tracing required all the way to the blend point inside the rack
- B100 pump, meter and control valves specifically designed for certain blend ranges (B5 – B11)
- Storage of B100 required (tank and line heat tracing)
- Tank preparation issues
- Blending skid may be required for multiple bays…

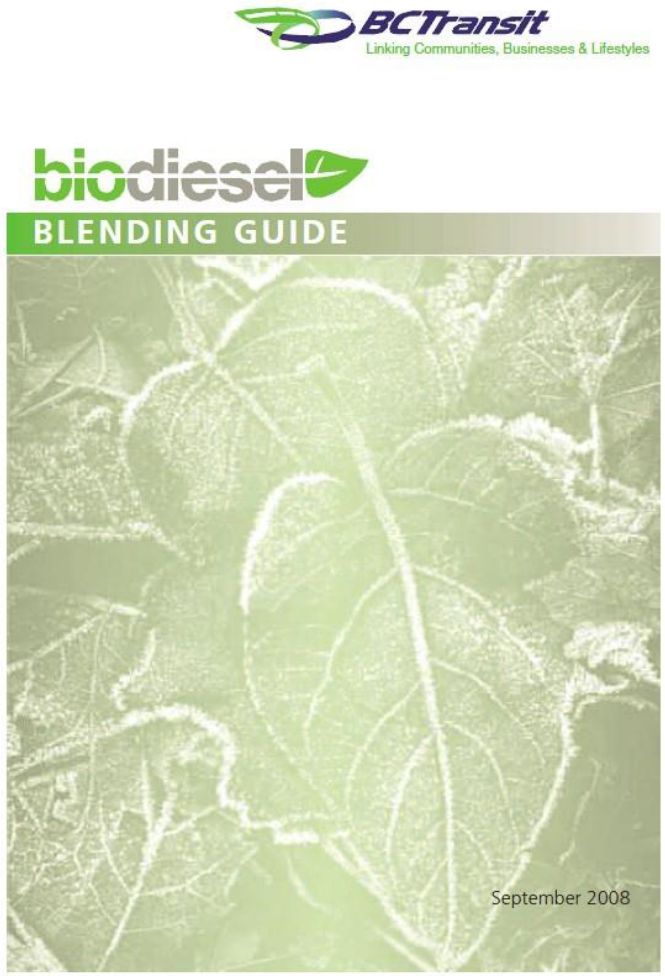
Reference Documents

The information contained within this presentation has been compiled from documents and information found in multiple places online.

A large portion of the material has been paraphrased or taken from the Biodiesel Handling and Used Guide (Fourth Edition), which can be found at www.biodiesel.org

REFERENCES


National Renewable Energy Laboratory
Innovation for Our Energy Future
NREL/TP-540-43672
Revised January 2009
B20 Biodiesel
80% No. 2 Diesel
Biodiesel
Handling and Use Guide
Fourth Edition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HANDLING

Biodiesel Blending Techniques Key to Quality Fuel

By Joe Gallehugh

Establishing confidence with consumers is a critical step in the success of any new product or fuel. Consumer confidence is measured many ways—availability, on-time delivery, flawless service—but the most important is product quality. According to engineers from one technology company that supports the biodiesel supply chain, those seeking to capitalize on biofuels might evaluate the impact processes such as blending can have on product quality.

Marketers and distributors of biodiesel have a variety of different blending options available to them. Splash, sequential, hybrid, in-line, ratio and sidestream blending can have a huge impact on product quality and the consumer's level of confidence in biodiesel. Each type of blending carries with it a variety of costs and benefits.

"Blenders know that the most important part of product quality after good feedstock is to get the final product blended correctly," says Chuck Myers, electronics product manager for FMC Technologies in Erie, Pa. "They want to make sure the product is mixed correctly so they don't have their customers coming back to them with issues like failing engines and rough running. The preferred blending method will assist with a properly mixed product."

What are the different blending techniques and which ones contribute to producing high-quality biodiesel? Splash blending is when a marketer first pumps B100 into a tank, followed by diesel fuel. It could also be when a marketer first pumps diesel fuel into the tank, followed by B100. Either way, splash-blended products can have a tendency to stratify, failing to mix thoroughly unless some type of static mixer is used after the products are loaded.

"The biggest issue with splash blending is that if it doesn't get properly mixed, you dump it at a service station and it is still stratified when customers fill their tanks," Myers says. "One vehicle may get straight diesel and the next one may get a majority

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Questions?

Thank you for attending!!

Biodiesel: A Terminals Approach

Receipt, Transmission, Storage, Blending and Delivery

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