



EPP Rapid Research

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EPP Rapid Research
Biodiesel and Generators
City of Seattle, WA

February 1, 2007

Request:

(City of Seattle, Jason Edens) Explore feasibility of generators using biodiesel.

Key Findings:

Currently the majority of generator manufacturers support up to 5% biodiesel use without voiding the warrantee on fuel related components. Generators that run frequently or continuously can easily run biodiesel, even at higher concentration. However, for standby or emergency generators, potential problems cited are less favorable performance at low temperatures, algae growth when fuel sits over long periods unused and water condensation. Biodiesel also 8% fewer Btu's of energy per gallon than regular diesel fuel. A British generator manufacturer, JS Power Systems however, manufactures generators built and tested using 100% biodiesel while claiming to have none of the problems listed above.

Palm oil tends to grow algae faster than other oils. Some fast food waste cooking oils have a high percentage of palm oil they may promote more algae growth.

Additives are being developed that should alleviate the algae and temperature problems.

Generator Manufacturers Policies Regarding Biodiesel:

Caterpillar

Biodiesel specification is on page 54 in the following document. Caterpillar neither supports nor prohibits the use of biodiesel, but states that it may be used up to 30% in most engines if it conforms to the stated standards.

http://www.biodiesel.org/pdf_files/OEM%20Statements/2005_OEM_CatVersion9.pdf

Cummins

"B5 is approved "without question" for both standby/emergency and prime power/continuous generators. B20 is expected to be approved soon". Randy Wilson, Renton 425-235-3400.

http://www.biodiesel.org/pdf_files/CUMMINS.PDF

Detroit Diesel

ASTM certified B5 is approved for all diesel engines.

http://www.biodiesel.org/pdf_files/OEM%20Statements/2005_DDC_Statement.pdf

FG Wilson (same as Caterpillar)

Generac supports up to B5
John Hecklesmiller 206-763-2530

John Deere fills all new equipment with B2 (2% biodiesel), and supports up to 5% biodiesel without question.
http://www.biodiesel.org/pdf_files/JDEERE.PDF

“Our recommendation not to exceed B5 in our diesel engines also applies to generators. The only issue is the amount of time the B5 diesel would be stored in the generator without operating the engine. If it was stored longer than three months, then we would not recommend using B5. Biodiesel blends have a greater potential for spoilage when sitting unused for a longer period of time.”

Barry

Barry E. Nelson
Manager, Public Relations
John Deere Ag Marketing Center
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J.S. Power, Ltd.

JS Power builds a full range of generators that will run on 100% bio diesel. Mr. Searby reports that their generators are fully tested before shipping and claim that their generators do not run at less power efficiency than regular diesel. They also report no problems with algae growth or gelling at low temperatures because their systems include a heating circuit that keeps conditions consistent in most temperatures. Their systems include water traps that eliminate problems with condensation. Generator sets can be built that match the American ASTM biodiesel standards.

[Jonathan Searby, Director](mailto:jsearby@jspower.co.uk)
jsearby@jspower.co.uk
011 44 8454 309110
<http://www.jspower.co.uk/>

Katolight (doesn't build engine)

Marathon- assembles generator sets using engines made by other manufacturers, so the policies regarding biodiesel use would depend on the engine manufacturers (John Deere, Detroit, Volvo, Mitsubishi and others)

Mitsubishi

MQ Whisperwatt don't manufacture engines- package gensets

Olympian (same as Caterpillar)

Onan (same as Cummins)

Simpower- don't manufacture engines, assembles gensets

Case Studies

“Assessing Biodiesel in Standby Generators on the Olympic Peninsula prepared for the Bonneville Power Administration”

Although the above report’s recommendations were for BPA to move ahead with implementing biodiesel in generators, BPA was not able to move forward with the recommendations in the report. The clean air agency in Olympia determined that the criterion pollutant of choice was NOx, which is the only pollutant that increases slightly with biodiesel use, so they were not in support of this initiative. There was agreement to implement a pilot; however, the participating hospital discovered that to begin to use biodiesel, they would need to bring their electrical system up to code, which they were not willing to do, so the pilot never took place.

In addition, Terry reported that many generators had been installed by “snake oil salesmen” and were not connected to major systems, but were only backing up minor systems, for example, the lighting over exits, so using biodiesel would not have made as large a beneficial effect as originally calculated.

Terry Oliver, BPA 503-230-5853

http://www.transmission.bpa.gov/PlanProj/Non-Wires_Round_Table/NonWireDocs/BiodieselOlympicPeninsula%207_04.pdf

Biodiesel in Texas: Biodiesel Generators Back Up Community

<http://e85.whipnet.net/alt.fuel/texas.biodiesel.html>

Biodiesel for Electrical Generation at University of Southern California, Riverside

<http://www.biodiesel.org/markets/ele/>

Department of Ecology, WA

“I have been running a B20 blend in my generator for about 18 months with no side effects. I do run a no load exercise schedule every week for 30 minutes which may help. We ran solid for over 48 hours during the big power outage here in Puget Sound this winter with no problems”.

7 days is the planned interval between runtimes. We started doing the weekly exercising years ago to increase general reliability of the Generator. I have not seen any algae growth and we run in all types of weather. The generator is outside but the fuel tank (4000 gal) is in a large confined (unheated) vault. I do not know the source product used for the bio blend.

Steven P. Strope
Ecology Headquarters
Facility Manager
407-6089

Lollapalooza uses biodiesel generators on tour!

http://www.biodiesel.org/resources/pressreleases/ele/20030714_lollapalooza.pdf

NASA Ames Research Center

"We used to use B20 in all of our on-site backup generators. Since these run infrequently, the fuel turnover rate was so low that we had fuel clogging issues that caused major repair costs for one of our units. Biodiesel blends generally have a recommended storage life of 6 months. Our facilities group converted backs all generators to regular diesel since this incident. If you run your generators routinely, the storage time limit shouldn't be an issue."

Mark Lacy
ISSi Corporation
NASA Ames Research Center
Mailstop T20G-4
Moffett Field, CA 94035-1000

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State of Iowa

Each facility is different. Are your generators, fuel storage, or fuel delivery lines subject to cold temperatures? Are you talking about a brand new, clean system or an older system that had a lot of diesel run through it already?

Our diesel emergency generation system is fairly new so I don't have a lot of experience to share yet; but I'll share my thinking. We have a pricing deal with our utility provider which assures us we will be running our generators on a fairly regular basis...enough not to worry about bio-diesel aging. However; I tend to be conservative about recommending using bio-diesel in that application. As the name implies generators are needed in emergencies. As highly as I regard bio-diesel, I still don't need to ruin it's good name by risking problems during an emergency. I'm certainly not against it...I just would recommend that if you start, do it at a very low percentage like B2 or B5 to test your system, get your people comfortable, and to test the fuel blending capabilities of your fuel provider. Be on the cutting edge; just don't bleed. The experience Mark Lacy related from California is good testament. If your system is new, I would secure 'buy-in' from the manufacturer of the generator(s) before beginning.

In this northern clime (Iowa), and with our dual-fuel source heating system, we could easily have a far greater consumptive affect by being liberal with the bio-diesel percentage in our furnaces and that could dwarf any amount used in our generators.

With the weather you've had in Seattle this year, generators must be doing overtime,
Doug

In the interest of full disclosure; I was a farm boy, I still own part of a farm, and I call it SOY-diesel.

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Additional Resources:

Biodiesel Fuel Becoming Viable Alternative to Conventional Diesel Fuel, Diesel Service and Supply
<http://www.dieselserviceandsupply.com/Biodiesel.aspx>

Biodiesel Generators: Some FAQ's Answered
<http://www.articlefriendly.com/articledetail.php?artid=4795&catid=238>

Economic Analysis: Co-generation using wind and biodiesel powered generators
http://www.biodiesel.org/resources/reportsdatabase/reports/ele/20061001_ele-001.pdf

Generator Fuel Types: Choices Available
<http://www.articlefriendly.com/articledetail.php?artid=3699&catid=92>

"Improving Air Quality by Using Biodiesel in Generators", University of Minnesota Center for Diesel Research
http://www.state.mn.us/mn/externalDocs/Commerce/Improving_Air_Quality_by_using_Biodiesel_in_Generators_102504114108_b20generatorfinal.pdf

John Deere Biofuels Video
http://www.deere.com/en_US/deerecom/video/phase2/wmphase2_ssm.html?Video=554_m&divisionName=ag

John Deere Biofuels White Paper
http://www.deere.com/en_US/ag/pdf/feature/biofuelswp_12206.pdf

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