



# Biodiesel ASTM Update and Future Technical Needs

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- ◆ ASTM D6751 is the approved standard for B100 for blending up to B20 in the US
  - ASTM has approved D6751 for B100 use only for up to B20 in the final blend
  - Higher blends upon consultation with the OEM
- ◆ D6751 was not designed for higher levels than B20
- ◆ European EN14214 specs are for neat B100 use
- ◆ This is why D6751 has different limits for some properties compared to the European Specs
  - i.e. D6751 stability is 3 hours, EN14214 is 6 hours



- ◆ To pass blended specs that provide 'fit for purpose' fuel, changes to B100 were needed so no changes would be needed for B5 in D975, D396:
  - Lowered acid number from 0.8 to 0.5
  - Add stability parameter for B100 targeted for acceptable B20 and B5 performance
  - Added limits for calcium and magnesium
  - Added limits for sodium and potassium
  - Most recently: Add filtration test to pick up minor contaminants
- ◆ Changes to D6751 have been the major hold up to passing the blended fuel specs
  - The actual values for the finished blended fuel have been set for some time and have not changed for several years.



# Cold Soak Filtration Test (CSFT)

- ◆ Purpose is to insure cloud point is still an accurate measurement for B20 and lower blends
  - This test has nothing to do with the actual cold flow properties of the B100 or its blends
  - Results are independent of the cloud point of the B100
  - The test has no meaning for blends of biodiesel and diesel fuel
- ◆ 300 ml of B100, chilled to 40F for 16 hours, allowed to warm to room temp, filtered under vacuum using 0.7 micron glass fiber filter with stainless steel support



# Cold Soak Filtration Test (CSFT)

- ◆ Ballot to add the CSFT to D6751 passed D02
- ◆ Test method in mandatory annex—same method that was balloted in December 2007
- ◆ NO OTHER VARIATIONS OR PREVIOUS VERSIONS OF THE TEST METHOD ARE ALLOWED
- ◆ Two limits:
  - 360 seconds for all times of the year
  - 200 seconds if the seller claims the B100 is fit for purpose to use in blends in temperatures below -12 C (~10 F)



# ASTM Current Status

- ◆ B5 ballot into the petrodiesel specifications:  
D975, D396 (heating oil) passed D02 main.
  - No changes to properties or analytical methods in table 1 of D975 and D396
  - B100 must meet D6751 prior to blending
  - Ballot was linked to the satisfactory resolution of new filterability test in D6751



- ◆ B6 to B20 for on/off road diesel engines will be a stand alone specification, passed D02 main
  - New ASTM number when published, D7467
- ◆ Designed so that if B100 meets D6751 and petrodiesel meets D975, B6 to B20 will meet its specification:
  - Widest of #1/#2 specifications
  - Allow T-90 to be 5 degrees C higher
  - Add stability (induction period 6 hours min.)
  - Add acid number of 0.3 maximum
- ◆ Ballot was linked to the satisfactory resolution of the new filterability test in D6751



- ◆ All D02 main ballots go through ASTM COS review and ASTM Editorial after voting
- ◆ Committee on Standards: review handling of negatives and allows for appeal by negative voter if improperly handled
- ◆ ASTM Editorial: ensure proper form/style
- ◆ Specs officially 'in effect' from ASTM after COS and Editorial review, and publishing on the ASTM web site



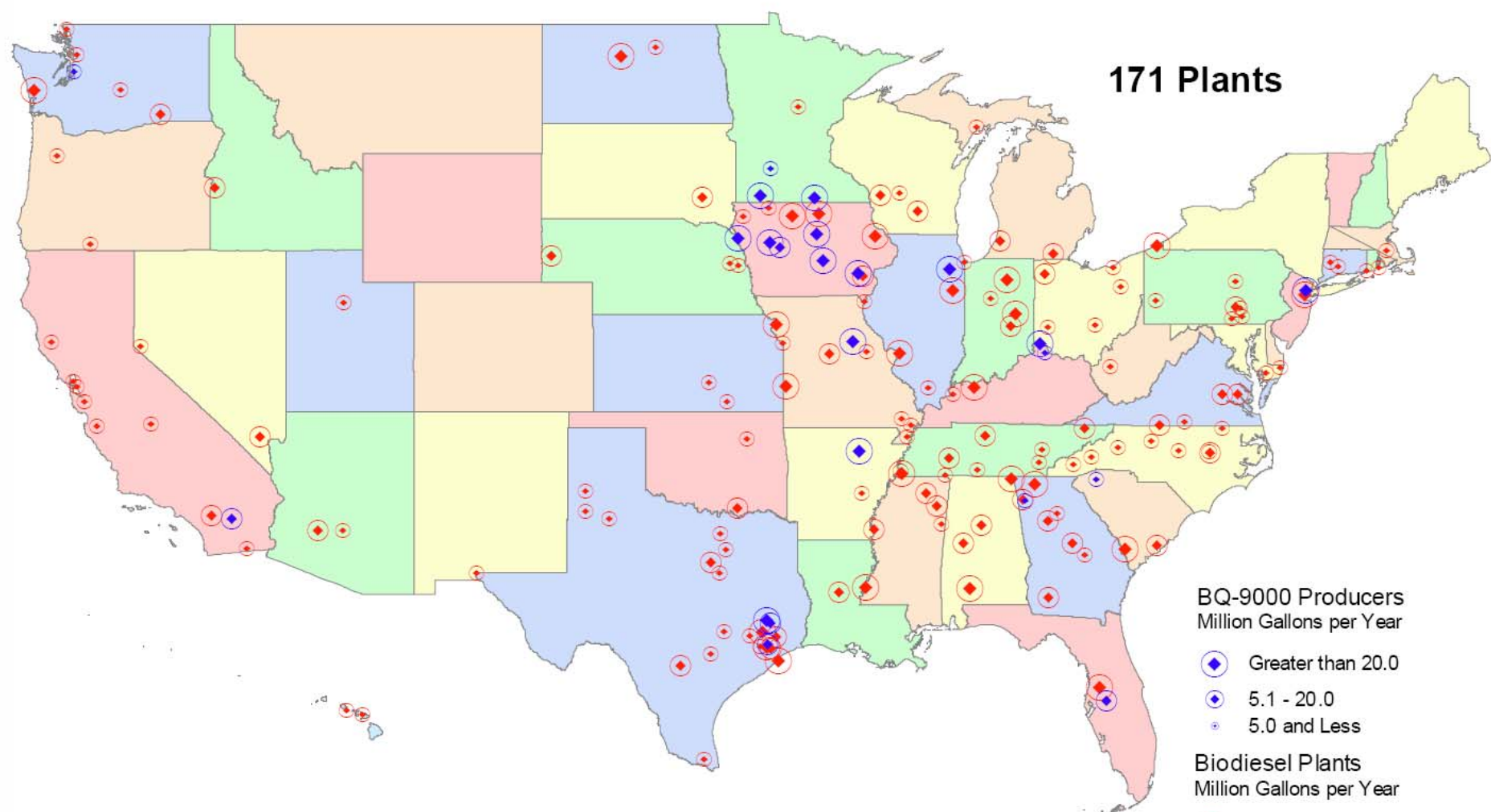


# Future Technical Needs For Biodiesel

June 2008



Commercial Biodiesel Production Plants (Jan. 25, 2008)



BQ-9000 Producers  
Million Gallons per Year

- ◆ Greater than 20.0
- 5.1 - 20.0
- 5.0 and Less

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Million Gallons per Year

- ◆ Greater than 20.0
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- ◆ Biodiesel is a low cost production method for a compatible liquid for diesel fuel
- ◆ The oxygen (11%) in biodiesel provides emissions, biodegradability, and lubricity advantages vs. non-oxygen fuels
- ◆ Trade off between cold flow and stability are based on the level of saturation
  - In general, higher saturation gives higher stability but worse cold flow properties
  - This is true for biodiesel and biomass diesel



## Biodiesel: Food AND Fuel

- ◆ Heightened interest in growing both food and fuel
- ◆ Biodiesel is produced from oils and fats which are a minor by-product of producing food:
  - Soybeans are 80% high protein meal, 20% soy oil
  - Animals (hogs, cattle, chicken) not raised for fat content
  - People don't fry more foods to get used frying oil
- ◆ Current biodiesel on traditional land has very positive energy and CO2 life cycle numbers
- ◆ Future oils and fats will be substantial, and will come from sustainable sources (i.e. higher productivity, algae, etc.)



- ◆ The biodiesel industry has worked hard to build a solid technical basis for the fuel with petroleum and engine interests
- ◆ Most biodiesel technical work is now done cooperatively through committees that involve the traditional fuel companies, engine interests (fuel injection, engine, vehicle), and biodiesel companies
- ◆ This type of cooperative relationship is critical to continued biodiesel success.



<u>Priority</u>	<u>Technical Areas of Highest Priority for 2008</u>	<u># Votes</u>
1	Biodiesel Standards (B100 & Blends)	106
2	Biodiesel Quality Enforcement	63
3	Biodiesel Stability	61
4	New Faster, Better Test Methods	58
5	2007 / 2010 Engine & After Treatment and Durability	57
6	Low Cost / High Volume Oils	55
7	Emissions	50
8	Life cycle benefits, compare to other models, update, feedstocks, land use changes, ghg not just co2, to include petroleum displacement, sustainability	49
9	Boiler and Heating Oil Research	21



- ◆ Significant technical work to verify performance on new emissions technologies:
  - Engine and Fuel System Durability
    - \$5MM per year for 5 years in Energy Bill, not appropriated yet
    - It needs to be!
  - After-treatment
    - Benefits (less PM, lower regeneration temperatures)
    - Verification of specifications (i.e. phosphorous, metals)
  - Taking advantage of biodiesel attributes through optimization of engines on B20 and lower blends with fuel blend sensor
    - FEV work showing lower NOx with optimized B20 engine than possible with hydrocarbon based diesel
    - Potential for fuel savings by not regenerating as often



- ◆ Continued work on enforcing D6751 and continuous improvement on D6751
  - BQ-9000 program, producer component
  - NCWM, IRS, EPA enforcement
  - PPM level contaminants can cause problems in both biodiesel and other renewable diesels
  - Low use applications and long term (i.e. years) stability
- ◆ Implement and enforce biodiesel blend specs
  - BQ-9000 program, blender/distributor component
  - Blend accuracy
  - NCWM, IRS, EPA enforcement
- ◆ Education of mechanics and dealers
- ◆ Education of fuel distributors and blenders

