US Biodiesel Industry Current Status

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ASTM Biodiesel Standards—
Current Status, Recent Progress and Future
November 2012

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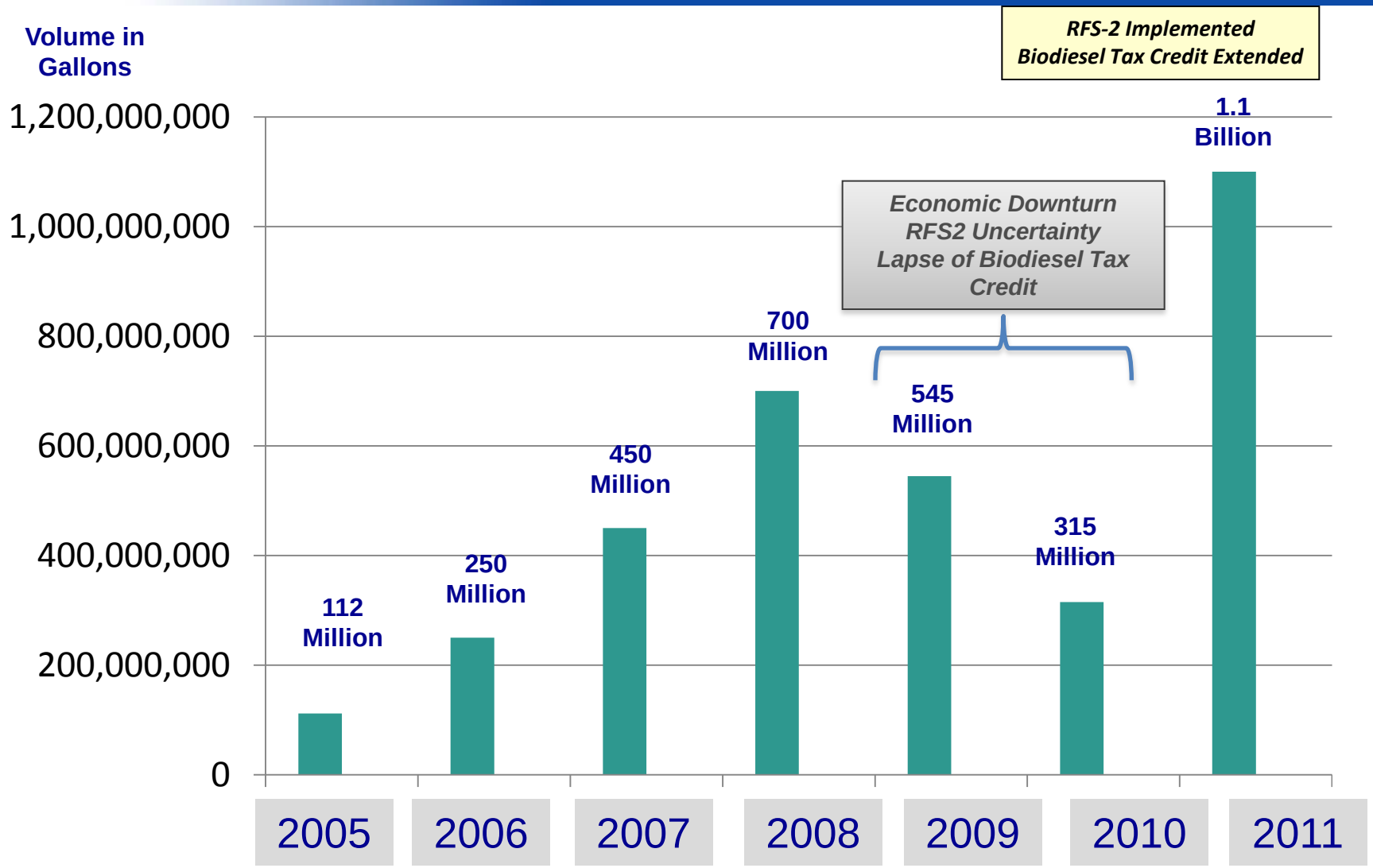
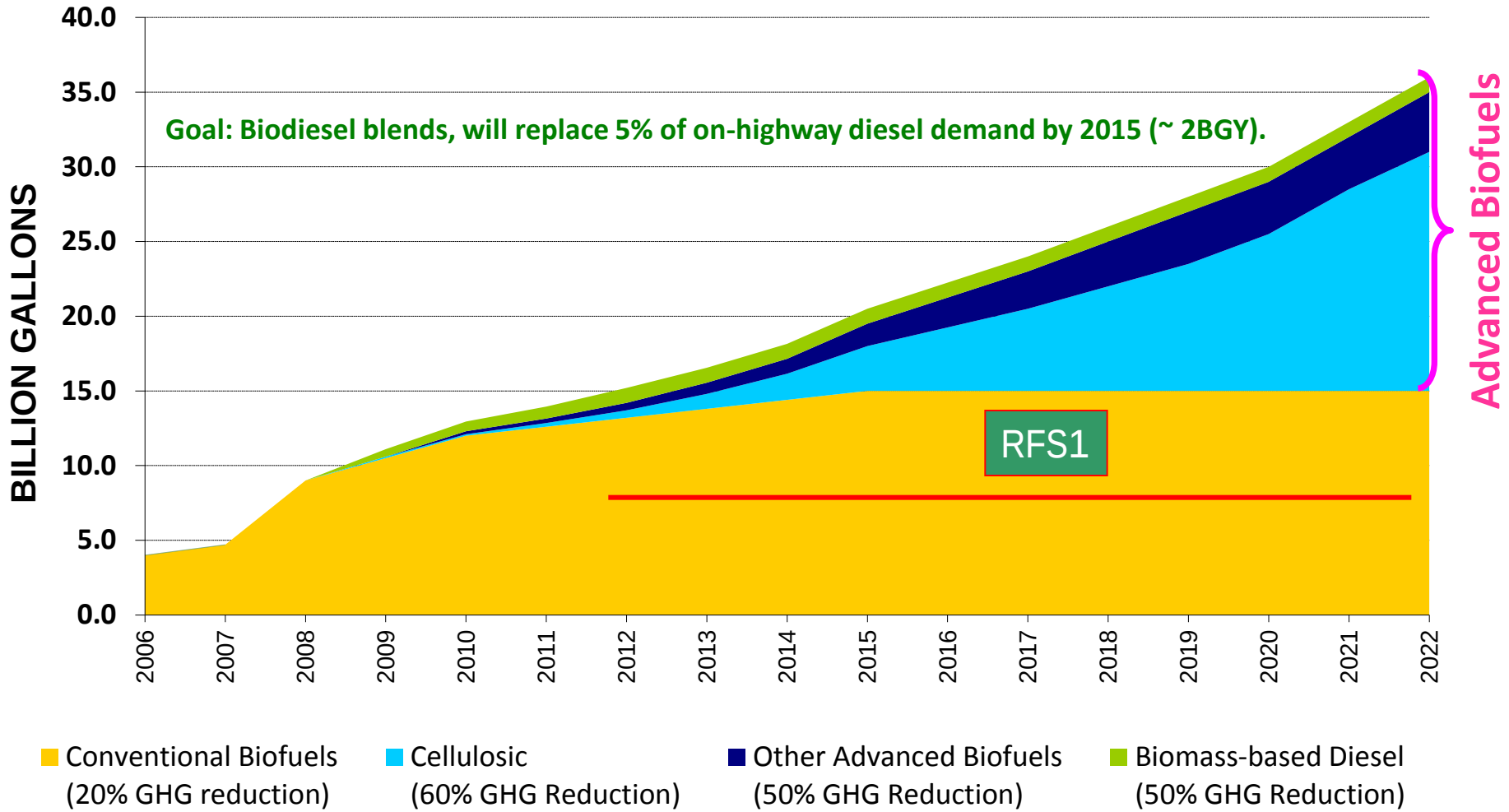
U.S. Biodiesel Production by Calendar Year



Biodiesel Nationally

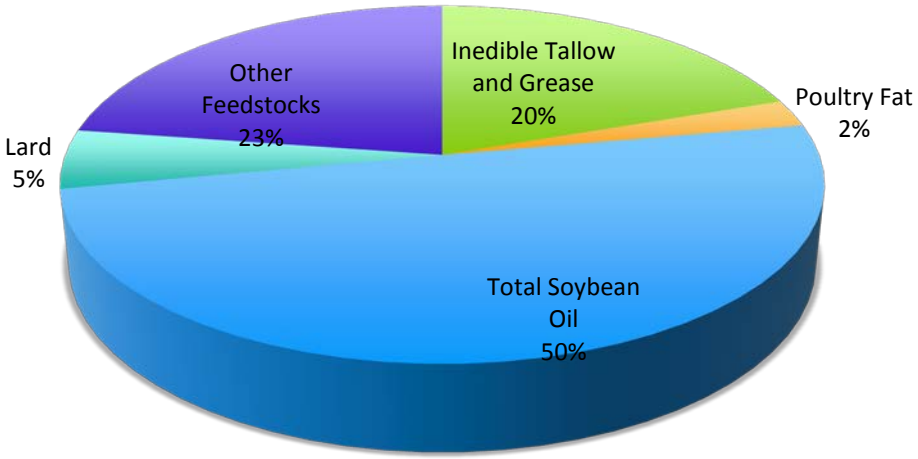


Biodiesel and the RFS-2 – Current Status

- *Advanced Biofuel*: Lifecycle GHG Emissions Must Be At Least 50% Less Than Diesel Fuel

- Better Science is Reducing Indirect Land Use Values
  - Real impacts of USA biodiesel are minimal
  - Due mostly to co-product nature o protein/oil

Feedstock Used in Biodiesel Production (Jan to Dec 2010)



Market Diversity Makes for Flexible Biomass-based Diesel RFS-2 Compliance

BIODIESEL
America's Advanced Biofuel

ON-HIGHWAY USERS

- Trucking
- Fleets
- Passenger Vehicles

MINING

- Underground operations
- Meets MSHA specs

HOME HEATING

- Bioheat as new opportunity vs. natural gas

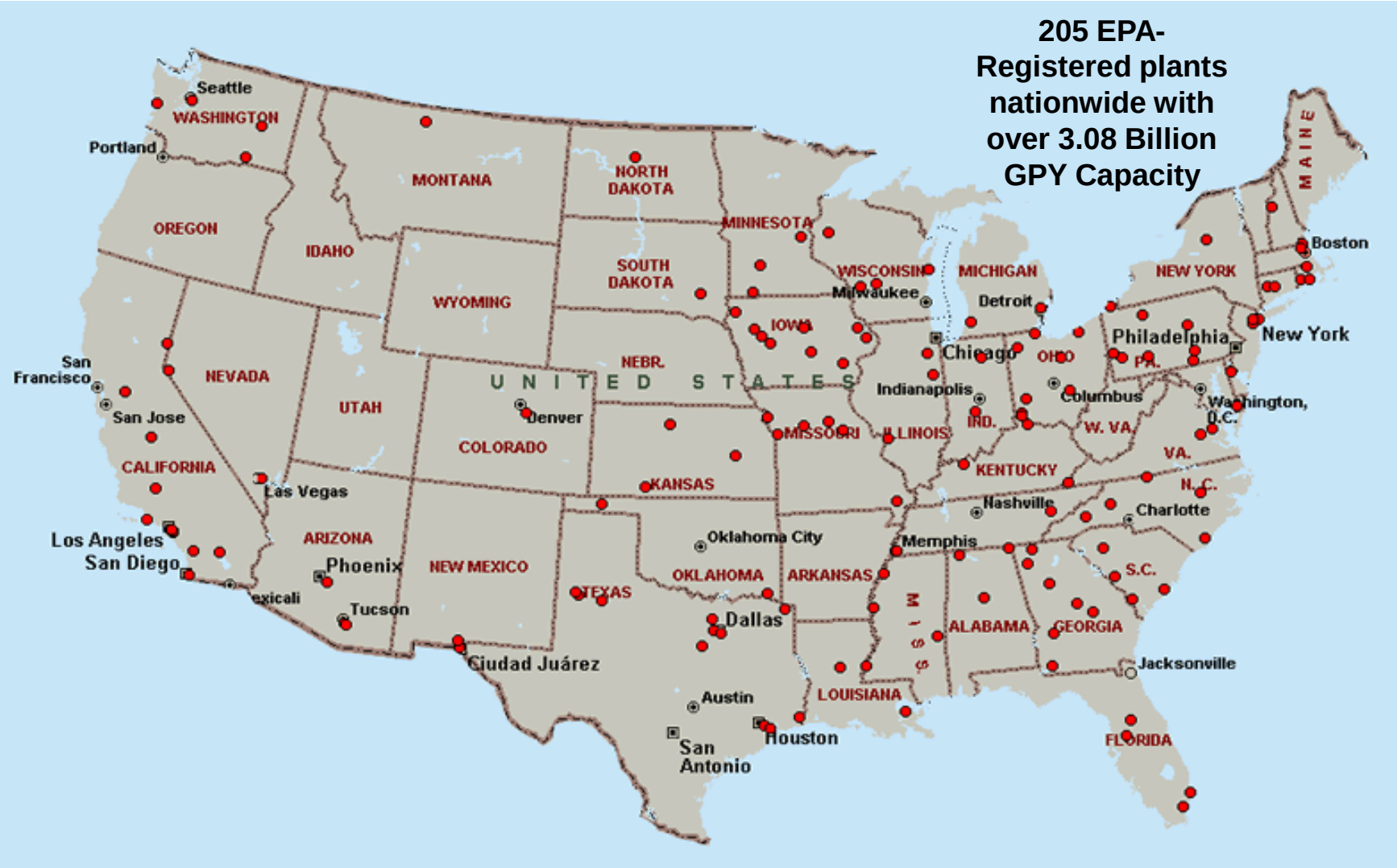
AGRICULTURE

RAILROADS

MILITARY

- Jet fuel applications
- U.S. bases

Biodiesel: An "Advanced Biofuel" Available Now



ASTM Biodiesel Standards

ASTM INTERNATIONAL
Standards Worldwide

ASTM D6751 Blend Stock Specification

November 2011

SPECIFICATION FOR BIODIESEL (B100) – ASTM 6751-11a

*Biodiesel (B100) and the petroleum diesel must meet their respective ASTM specifications before blending.

Property	ASTM Method	Limits	Units
Calcium & Magnesium, combined	EN 14538	5 maximum	ppm (µg/g)
Flash Point (closed cup)	D 93	**93 minimum**	°C
Alcohol Control (one to be met)			
1. Methanol Content	EN 14110	0.2 maximum	mass %
2. Flash Point	D93	130 minimum	°C
Water & Sediment	D 2709	**0.05 maximum**	% vol.
Kinematic Viscosity, 40 C	D 445	1.9 – 6.0	mm^2/sec.
Sulfated Ash	D 874	0.02 maximum	% mass
Sulfur			
S 15 Grade	D 5453	**0.0015 max. (15)**	**% mass (ppm)**
S 500 Grade	D 5453	**0.05 max. (500)**	**% mass (ppm)**
Copper Strip Corrosion	D 130	No. 3 maximum	
Cetane	D 613	47 minimum	
Cloud Point	D 2500	**report**	°C
Carbon Residue 100% sample	D 4530*	0.05 maximum	% mass
Acid Number	D 664	**0.5 maximum**	**mg KOH/g**
Free Glycerin	D 6584	**0.020 maximum**	**% mass**
Total Glycerin	D 6584	**0.240 maximum**	**% mass**
Phosphorus Content	D 4951	0.001 maximum	% mass
Distillation	D 1160	360 maximum	°C
Sodium/Potassium, combined	EN 14538	5 maximum	ppm (µg/g)
Oxidation Stability	**EN 15751**	**3 minimum**	**hours**
Cold Soak Filtration	**D7501**	**360 maximum**	**seconds**
For use in temperatures below -12 °C	**D7501**	**200 maximum**	**seconds**

BOLD = BQ-9000 Critical Specification Testing Once Production Process Under Control

ASTM Current Status

- **D975 (on/off road diesel): Up to 5% biodiesel**
  - Performance based for engines
  - Must meet same exact specifications as petro-only
  - B100 must meet D6751 prior to blending
  - B5 is now fungible with diesel fuel, just like other components that can be used to make D975 fuel

ASTM Current Status

- **D7467: Details for B6 to B20 for on/off road diesel engines**
  - Designed so that if B100 meets D6751 and petro diesel meets D975, B6 to B20 blends will meet their specifications

Important quality control is at B100 level!

ASTM Current Status

- **D396 (heating fuels): Up to 5% biodiesel**
  - Performance based for heating oil systems
  - Must meet same exact specifications as petro-only
  - B100 must meet D6751 prior to blending
  - B5 is now fungible with petro-based heating oil, just like other components that can be used to make D396 fuel

ASTM Improvements - 2011/2012

- Balloted and Approved No. 1-B grade of B100
  - Anticipated publish date before December 2012

- A special purpose biodiesel blendstock intended for use in middle distillate fuel applications which can be sensitive to the presence of partially reacted glycerides, including those applications requiring good low temperature operability.

- No. 1-B has:
  - Year around 200 second CSFT value
  - Maximum total monoglycerides of 0.4

- Applied in a similar way as #1/#2 petrodiesel:
  - Most people use #2 fuel, even in the winter
  - If #2 causes cold flow issues, try #1 or various other known fixes for cold flow (heat, additives, indoor storage, etc.)

Additional Fuel Quality Controls

- States' Adoption of ASTM D6751 into law

  2011: 48 states (AK, NJ remain)

- Active Enforcement

  2011:

  – 36 states have authority to regulate fuel quality

  – 20 states do proactive testing

BQ-9000 Program

- Biodiesel Industry's equivalent to an ISO 9000 program for biodiesel production & distribution companies as well as testing labs
- BQ-9000 works hand-in-hand with the ASTM specifications for biodiesel
- Quality Control System covers biodiesel manufacturing, sampling, testing, blending, storage, shipping, distribution
- ASTM Grade Fuel, BQ-9000 Companies

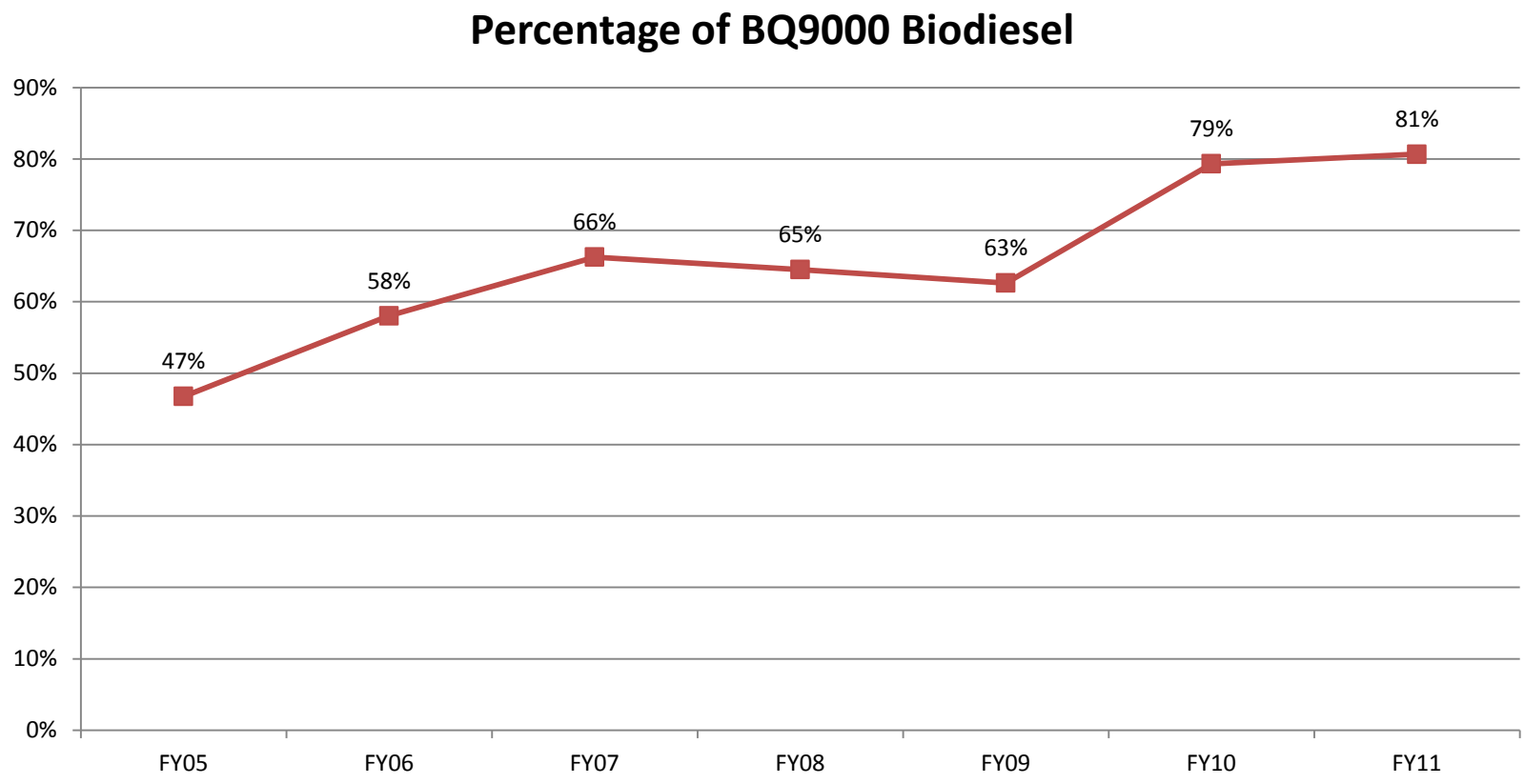
BQ-9000 Program

- NBB implemented BQ-9000 as a means to help instill confidence in biodiesel with users and equipment companies

- There are now three BQ-9000 designations:
  - Producer (make it to spec)
  - Marketer (buy spec, keep it in spec, blend it right)
  - Certified Laboratories (test it to ensure it is in spec)

- Many OEMs are now either requiring or strongly encouraging BQ-9000

The latest numbers show that 81% of biodiesel produced is by BQ-9000 accredited companies.



US Fuel Quality Efforts

- Fuel Quality Efforts are Working!
- 2011 was highest volume on record
  - 2012 on track for similar volumes
- No significant biodiesel problems
  - Other than those associated with conventional diesel

Biodiesel Specification Future Development

- Investigation of recommendations for long term storage (2-4 years) and/or intermittent use
- Investigation into metals specifications:
  - Are the B100 metals set low enough?
  - Is there a need for metals specifications on finished fuel?
    - i.e. petrodiesel
- Approval of other application blend specs
  - i.e. marine, gas turbine, etc.
- Investigation of higher blend specifications
- Support effort in ISO 8217 marine specs for higher biodiesel blends than 0.1%

Thank You!