BIODIESEL OUTLOOK

An Engine Manufacturer Perspective

Diesel Engine-Efficiency and Emissions Research Conference

Dearborn, MI

August 7, 2008

Engine Manufacturers Association

Scope of EMA Representation

- Foreign and domestic manufacturers of diesel, gasoline and alternate-fueled internal combustion engines
- Principally, non-integrated manufacturers of loose engines for on-highway and off-highway mobile applications, marine, locomotive and stationary applications
- Wide range of engine sizes, from 1 hp to over 7000 hp

EMA's Technical Position

- Biodiesel only acceptable as a blend component with petroleum diesel fuel
  - B5 generally approved by all EMA members
  - B20 approved by some EMA members
- Biodiesel must meet established standards
  - ASTM D6751
  - EN 14214
- Petroleum diesel fuel utilized can be D1 or D2 meeting ASTM D975 or EN 590
- Finished blend must meet ASTM standards
- EMA Statement is available at:

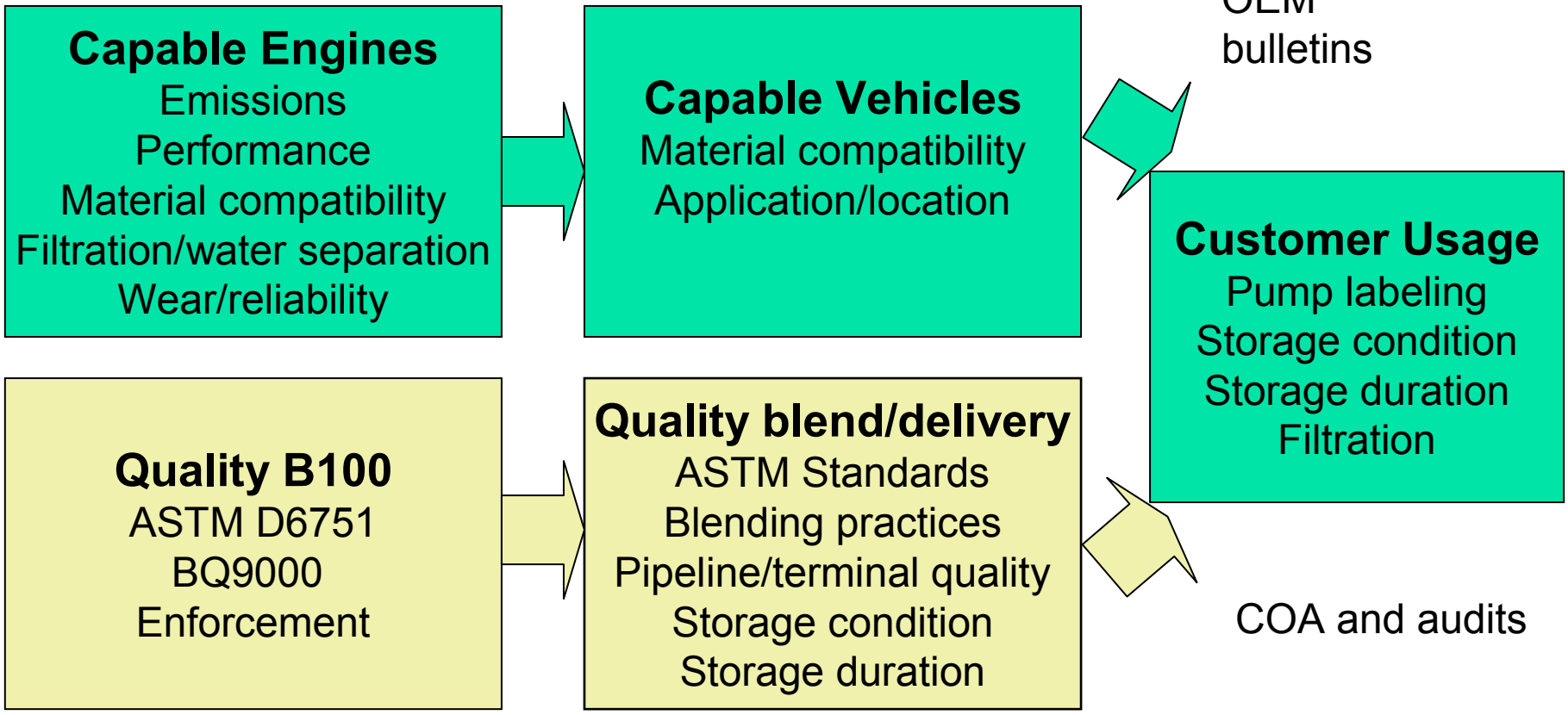
http://www.enginemanufacturers.org/admin/library/upload/297.pdf

EMA's Test Fuel Specification

- Biodiesel only acceptable as a blend component up to B20 maximum
- Biodiesel must meet established standards
- Finished blend must meet EMA Test Fuel Specification standards or new ASTM B6-20 Specification (D7467 when published)
- Fuel to be utilized for testing/evaluation of current and future engine technologies
- EMA Test Fuel Specification is available at:

http://www.enginemanufacturers.org/admin/library/upload/924.pdf

Successful Implementation of Biodiesel Blends



Concerns – Biodiesel Quality

- Biodiesel must meet established standards to assure consistency and quality
  - B100 Specifications when produced
  - BXX Finished Fuel Specifications when distributed
- Biodiesel changes over time
  - Distribution to the final product / vehicle for use
  - Infrequently used product - fuel storage concerns
- National Biodiesel Board's BQ-9000 program is one example of a quality program intended to provide assurance that biodiesel producers are capable of meeting established industry standards

Concerns – Fuel Performance

- Oxidation Stability
  - Peroxides
  - Acids
  - Insolubles / deposit precursors
- Microbial Growth
- Injector Deposits
- Material Compatibility
  - Elastomers
  - Metals including – copper, lead, zinc, etc.
- Cold Flow
  - Compatibility of existing cold flow improvers
  - Precipitants above the cloud point

Concerns – Fuel Systems

- Fuel Injection System Pressure Increases
  - Critical clearance / hole size reductions
  - Fuel temperature increases
  - Fuel viscosity interaction with dynamic system pressure
- Fuel Filtration - Smaller Micron Ratings
  - Increased sensitivity to contaminants
  - Increased sensitivity to temperature (cold flow, precipitants)
- Water Separator Performance
  - Water bypass
  - Media degradation

Concerns – Emission Controls

- Fuel Injection Strategies
  - Dynamic flow differences for multi-injections
  - Post combustion in-cylinder interaction with engine lubricants
- Diesel Particulate Filters
  - Changes in soot loading
  - Changes in regeneration performance
  - Interaction with Alkali and Alkaline metals
- NOx Aftertreatment
  - Interaction with Phosphorus
  - Interaction with Diesel Exhaust Fluid

Next Steps

- Implement finished fuel biodiesel blend standards
  - B5 in D975 / EN590
  - B6-B20 Finished Fuel Specification (D7467)
- Improve B100 standards & test methods
  - Continue to study stability performance & additives
  - Study interaction between Alkali & Alkaline metals and emission control systems
  - Develop improved Phosphorus test methods
  - Change to separate water and sediment specifications
- Promote improved industry practices
  - Develop a biodiesel fuel education program
  - Promote and expand the use of BQ-9000 or similar quality programs intended to provide consistent product