Biodiesel in the US – Current Challenges and Future Opportunities

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History

- 1936 Mercedes-Benz introduces 260D, the world’s first diesel sedan

- Mercedes-Benz is the only manufacturer with the history offering diesel passenger cars in US in each decade since 1950s

- First factory B5 fill starting 2005 MY at DCX Jeep Toledo Assembly
What Biodiesel means to Mercedes-Benz

- Light duty diesel is an important part of our company strategy for GHG reduction and biodiesel can play a positive role in that effort.

- Biodiesel poses greater challenge to light duty diesels than heavy duty diesels regarding GHG reduction.

- Good customer experience is critical for the success of light duty vehicles.

- Biodiesel issues can undermine good customer experience.
Current Biodiesel Environment in US

• Improvements in biodiesel quality ongoing thanks to such organizations as SAE, NBB, ASTM and CRC

• RVO achieved for 2011 with YoY B100 production on the increase

• New feedstocks under development to provide greater opportunity for increased B100 volumes

• Key enabler to reducing GHG and provides renewable fuel source
Technical Challenges

- **Quality:**
  - production ➔ retail level (impurities, water, unknown blend level)

- **Composition:**
  - different feedstocks result in different fuel properties

- **Constituents:**
  - byproducts of transesterification (soaps, gums, varnishes), acids from oxidation, metals, precipitates (above cloud point)

- **Blend level:**
  - B5 can pose operational and durability issues for engines and aftertreatment systems (oil dilution, filter clogging, injector deposits etc.)

- **Standards:**
  - timely development of standards in sync with biodiesel feedstock development which address unique needs of LDD as compared to HDD and reflect unique characteristics of biodiesel from those differing feedstocks
Regulatory Challenges

- RFS2
  - RVO is the fuel producer obligation set by EPA which provides the impetus to maintain/increase B100 production
  - One unfortunate byproduct of RVO are individual state mandates for retail biodiesel content >B5
  - As tax or other financial incentives expire, states look to mandates as pathway to continued biodiesel production
Biodiesel Mandates USA – Today and Future Trends

- No mandate
- ≤ B5 Mandate
- B10 → B20/B25 Mandate

Introduction as soon as local production allows

Colored state area: Future mandate
Commercial Challenges

• Technology introduction lags mandate implementation for blends >B5 resulting in difficult manufacturer and customer climate

• Locations with mandates >B5 result in inability of customers to find appropriate fuel for current and legacy vehicles (warranted only to B5)

• Diesels are one key tool to reducing GHG and meeting EPA requirements and mandates for >B5 hinder ability of manufacturer to comply
Opportunities

• National B5 standard (similar to EU B7)
  • Economy of scale results in improved production quality, technology growth curve and provides maintainable and scalable biodiesel production
  • RVO standards more readily achieved (100% demand of all biodiesel production would yield national average of <<B5)
  • As both automotive and biodiesel technology mature, biodiesel blend levels can increase and B100 production levels can increase
  • Provides incentive for biodiesel production in all areas of US as B100 demand will be increased due to nationwide application of B5
Opportunities

• Complementary Bio Fuel Options for Diesel Engines
  
  • Other bio fuels than biodiesel that can be run in a diesel engine
    
    – Hydrogenated Vegetable Oil or Biomass to Liquid as a blend component
    – Co-processed vegetable oil
    – Others

• A fuel with Biodiesel and HVO can be designed to have
  
  – a very high bio content
  – superior properties for the engine
  – maximum benefit for user