

Minnesota's E20 Program

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 - Minnesota Department of Agriculture
- Governor's Ethanol Coalition Meeting
 - October 3, 2006
 - Kansas City, KS

Minnesota's E20 Program

- Minnesota Statutes 239.791, requires gasoline in Minnesota contain at least 10% denatured ethanol
- Under the new language 20% ethanol will be required on 8/30/2013 **unless** by 12/30/2010:
 1. 20% of gasoline volume is replaced by ethanol -or-
 2. EPA declines a 211 (f)(4) waiver application to certify E20 as "gasoline"

Minnesota's E20 Program

- Law requires 20% ethanol in MN gas August 30, 2013
- **Unless** in December 2010, either:
 - E85 replaces an additional 10% of gasoline
 - OR
 - EPA does not approve 211(f)(4) waiver

E85 Route to Solution

- **In order to add 10% to the volume of gasoline now replaced by E10 we estimate:**
- Minnesota would have to use 460 million gallons of E85 annually by 2010
- E 85 use would have to more than double (factor of 2.37) each year from 2004 on.
- By 2010 there would have to be 1,840 stations (61%) selling 200,000 gal. / year!
- Estimate that 1.8 million FFVs have to use E85 50% of the time in MN.
- Add 287,000 more FFV's in MN per year.

E85 Route to Solution

- **Estimated schedule of sales necessary to reach gasoline replacement goal:**
- 2004- 2.6 million gal. E85 sales
- 2005- 6.1 million gal. E85 sales
- 2006- 14 million gal. E85 sales
- 2007- 34 million gal. E85 sales
- 2008- 82 million gal. E85 sales
- 2009- 194 million gal. E85 sales
- 2010- 460 million gal. E85 sales

E85 Route to Solution

Historical E85 Sales

Year	# Stations Year-End	Total Yearly Volume
1997	11	5,933
1998	12	37,521
1999	17	74,959
2000	56	301,152
2001	65	706,228
2002	70	1,262,318
2003	85	2,185,905
2004	101	2,611,218
2005	180	8,085,720
2006	257	9,357,050 (YTD)
2006	300+	20,000,000? (ESTIMATED)

Source: MN Dept. Commerce July, '06

E85 Route to Solution

- So far so good?
- E85 prices must sustain retail margin
- More FFVs will have to be provided
- Public opinion will have to stay strong
- Other _____?

EPA Waiver Route to Approval

- EPA will have to approve waiver for E20 before it can be considered “gasoline”
- Approval, will apply on a national level
- EPA will seek guidance from engine manufacturers, (is E20 OK?)
- ASTM D4814 now considers 10% blend = “Spark Ignition Motor Fuel” (gasoline).
- E20 will be considered a “new additive” and will have to be certified by EPA

EPA Waiver Route to Approval

- EPA normally expects industry to apply for any waiver and provide data demonstrating the feasibility of the new “fuel additive” (E20)
- RFA is the most logical entity to make application to the EPA and therefore must develop the plan and decide if and when to file an application.
- MN. is working with RFA in a process that may take years and cost \$ millions.

EPA Waiver Route to Approval

- **The RFA Plan**
- First step is preliminary testing to identify any show stoppers for automotive market
- Tests must eventually be performed on small engines also
- Begin to assemble preliminary data addressing main components of 211(f)(4) waiver process.
- If no “show stoppers” arise from preliminary tests additional tests must be designed and funded before full application to EPA can be made.

EPA Waiver Route to Approval

- In order to certify E20 under 211(f)(4) EPA must receive documentation in five areas:
 - 1. **Materials compatibility** of fuel system components with E20. (Preliminary testing at MN. State Mankato)
 - 2. **Drivability** with E20. (Preliminary testing at U of M Engineering)
 - 3. **Exhaust and evaporative emissions** with E20. (Preliminary test RFA & independent lab)
 - 4. **Health effects** testing on E20 fuel. (EPA report pending on E10)
 - 5. **Durability** (high mileage) Testing.

Materials Compatibility Phase 1

- Minnesota State University, Mankato
- **Three phase test plan**
- **1. Metals used in fuel system components**
 - Include some metals used 40 years ago
 - Use ASTM standard methods for corrosion
 - Consider changes in mass and appearance
 - Use ASTM fuel "C" as "gasoline" (Indolene)
 - Use "Aggressive Ethanol" as a blend agent.
 - E0, E10, and E20 fuels will be tested

Materials Compatibility Phase 1

- Soak sample plates above, below and at surface level of the fuel. Exposure levels are submerged, semi-submerged and vapor.
- Fuel "C" and "aggressive ethanol" are considered "worst case scenario for both gasoline and ethanol fuels.
- "Aggressive ethanol" includes 1% water and small amounts of salt & sulfuric and acetic acid.
- Fuel "C" is ½ toluene and ½ Iso-octane.
- Soak for 2,000 hours at 103° F

Materials Compatibility Phase 1

- Much testing is finished but report is not ready for distribution.
- Significance of results has not been determined.

Materials Compatibility Phase 2

- **2. Similar liquids as in Phase #1 but test will include plastic components in normal use conditions.**
- This phase 2 is just under way.
- **3. Phase 3 including elastomer “rubber” components will be initiated at a later date.**

Drivability Study

- U of M Engineering/University motor pool
- 80 existing vehicles in motor pool 2000 through 2006 vehicles.
- Maintenance department keeps records
- Individual vehicles restricted to use of E0 or E20 fuel by coded “credit” cards
- Driver log sheets submitted each week
- Fueling data available through card data system

Drivability Study

- Wide range of vehicle and engine types
Including:
 - Passenger and “light duty” trucks.
 - Ford, Chrysler, GM and Toyota
 - V8, V6, L4 and hybrid power.
 - Vehicles from rental pool and assigned to police, security and other drivers.
 - 1/4 to 1+ ton trucks used by tradesmen.

Preliminary Drivability Study

- Recent feature added to drivability study
- Fleet driver reports to be supplemented with 4 seasonal evaluations by trained raters on a ½ mile test track
- 20 of the 80 test vehicles are to be evaluated
- Professional ratings scheduled October, '06 and January, April & July '07

Preliminary Emissions testing

- RFA testing emissions using facilities in independent laboratory.
- Three vehicles representing range of older and new vehicle technologies are being tested including carbureted, and fuel injected closed loop systems
- Tests will include exhaust and evaporative emissions

Emissions testing

- Additional vehicles will have to be tested before application can be made to EPA.

Health Effects Testing

- Potentially the most extensive and expensive part of testing program
- Currently waiting for results from tests being conducted by EPA on E10
- There may be correlation with E20
- Results were expected in December '05 but report is not available at this time, possibly later in 2007

In Conclusion

- All data results are subject to review by EPA
- Additional tests may be required and some test parameters are subject to change
- Full approval will require considerable time and investment
- Thanks to MN Legislature, RFA, MN Corn Growers and GLGC. For funding preliminary studies so far.