

**Infrastructure Session
Vehicle and Fuel Use
August 2, 2006**

FOCUS FUEL

Question: Are the following biofuels:

- ♦ *ethanol;*
- ♦ *biodiesel/green diesel; and*
- ♦ *biobutanol*

the only fuels to consider or are there additional fuels which should be consider?

Method: An open discussion was held.

- ♦ The three biofuels listed are accepted biofuels in that regulations do not have to be fought over.
- ♦ Clarification was asked regarding biobutanol and green diesel. It was noted green diesel was part of the 60 billion gallon 2030 target but do not know if industry will “run with it.”
- ♦ EPact states renewable diesel.
- ♦ Do not expand the list to unlimited possibilities but those limited to time i.e., fuel cells and hydrogen integration.
- ♦ What is the difference in biodiesel such as B-20 and B-100? Biodiesel is not alcohol based. USDA is conducting research to get a higher lipid content in biodiesel. As the technology gets better to use higher lipid content it will be economically viable but for now economics give the advantage to B-20.
- ♦ Recognized there are a set of fuels: ethanol, biodiesel, and green diesel and there are other fuels which are similar to ethanol.
- ♦ It was decided to focus on ethanol for it has implications which must be dealt with; less oxygen and robustness which desirable in any system.
- ♦ This should be used as a model to be added upon later.

ISSUE CATEGORIES

Question: Do the four categories:

- ♦ *Vehicle emissions;*
- ♦ *Fuel quality;*
- ♦ *Distribution/fuel availability; and*
- ♦ *Education/communication*

cover the areas pertaining to the end use of biofuels?

Method: An open discussion was held.

- ♦ Price issue – it was concluded the previous day the price of ethanol needs to be 30 percent lower than gasoline.
- ♦ Need to look at vehicle choice or selection before discussion vehicle emissions.
- ♦ You cannot buy a flex fuel economy car. Flex fuel economy vehicles are in production. Models offered are based on market demand. Have to stimulate the customer based in order to create the demand.
- ♦ If a company has a Prius getting 70 miles per gallon why would the company go and change that vehicle to a flex fuel vehicle (FFV)?
- ♦ A large segment of the population has older cars which will need to be converted in order to use E-85.
- ♦ It is projected that by 2025 there needs to be 30 million FFVs on the road in order to meet the 2030 goal.

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VEHICLE AVAILABILITY

Question: Identify the barriers, actions and the timeframe to be address for vehicle availability. Identify actions needed to overcome barrier.

Method: Participants were divided into six groups. Each group posted and presented their responses. Discussions followed each presentation. Participants were given six dots and placed dots on what they thought were the priority barriers (of all barriers posted). The groups then were asked to identify actions to overcome barriers. Groups posted and then presented their actions followed up by a group discussion.

Time	Barrier	# Dots	Action	Roles
2012	Critical mass of FFVs	12	Adjustments to incentize more models (credit dilution)	Federal, Congress; NHTSA
			Replace tax credit for large SUV's with one for all FFVs	
Full funding for FFV purchase incentives for consumers				
Milestones for FFV production				
	<ul style="list-style-type: none"> ◆ Is critical mass of FFVs regional or nationwide? ◆ Need more FFVs offerings. ◆ Need to stimulate the market so people know what they are getting. ◆ Is critical mass of FFVs regional or nationwide? ◆ Need to create a demand. Currently, 5 million FFVs are on the road in order to meet the goal we are going to need 85 FFVs by 2030. ◆ It was noted it takes 15 years for a car to turn over. ◆ FFVs need to available across the entire fleet not just widely available. ◆ Future incentives need to cover more than a base number of FFVs; if reach critical mass then do not need incentives. 		<ul style="list-style-type: none"> ◆ Need to make sure there are enough FFVs to meet the goal. ◆ Automakers need incentives; the current methods only provide disincentives. ◆ Mandates have not worked in the past. ◆ Should conduct fleet life cycle assessments instead of evaluating model by miles per gallon. 	
2012	Extension of CAFE credits or appropriate incentive	8	Extension of CAFE credits through 2030	Federal
			CAFE adjustments to encompass entire fleet	
			Increase FFV CAFE credits Current: 1.2 MPG ~10% Future: ? or supplementary incentives for FFVs that covers incremental cost	Congress
			Modify the CAFE rules to factor in fleet LCA	NHBA/EPA/ Congress
			Phase out CAFE credit and provide alternative incentives	Congress

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Time	Barrier	# Dots	Action	Roles
	<ul style="list-style-type: none"> ◆ Need incentives for FFV fleets. ◆ CAFE is getting ready to expire. ◆ Automakers have hit the upper limit of CAFE. 		<ul style="list-style-type: none"> ◆ Increase CAFE credits; create a 50% fleet incentive then multiple by 5% or 6%. ◆ Dilution of credit; build more vehicles to get credit. 	
2012	Engine optimization to utilize fuel	5	Support research for lowest cost option	DOE – Freedom Car/Industry/ Academia
	<ul style="list-style-type: none"> ◆ Ethanol and gasoline engines performance needs to be similar. ◆ There is a misrepresentation of ethanol having a higher octane level. ◆ There are extra costs to improving FFVs engine performance. ◆ A turbo charge engine will increase performance but increases costs. 			
2007	Future Incentives	0		
2007	Existing Incentives	0		
2007	Automaker goodwill (expensive)	0		

VEHICLE EMISSIONS

Question: Identify the barriers, actions and the timeframe to be address for vehicle emission. Identify actions needed to overcome barriers.

Method: Participants were divided into six groups. Each group posted and presented their responses. Discussions followed each presentation. Participants were given six dots and placed dots on what they thought were the priority barriers (of all barriers posted). The groups then were asked to identify actions to overcome barriers. Groups posted and then presented their actions followed up by a group discussion.

Time	Barrier	# Dots	Action	Roles
2012	Evaporative emissions of E(x) tail pipe emission to near zero level	8	R&D biofuel system materials for extended life time and reduced evaporative emissions	Industry/ Academia
			Modifications of evaporative test protocol (E-0 and E-85 focus)	EPA/CARB
			Run evaporative tests on E-0 and E-85	State
			Offsetting mitigation of emissions issues	
	<ul style="list-style-type: none"> ◆ E-10 is perceived as incompatible in SIP (state implementation) 		<ul style="list-style-type: none"> ◆ SIPs are addressing emission issues. ◆ Do not force test worse case blends; it is not done for 	

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Time	Barrier	# Dots	Action	Roles
	plan).		other fuels.	
2012	PZEV/AT-PZEV certification of FFVs	7	Classify ethanol similar to methane	
			PZEV/tailpipe treat ethanol like methane or discount	
			Meeting PZEV (R&D) with no changes to law	DOE
			Materials R&D on low permeation polymers	DOE
	<ul style="list-style-type: none"> ◆ PZEV codification not compatible with FFVs. ◆ 2012 – 2015: 15% to 20% of vehicles sold will meet standards. This is a barrier to FFV fleet expansion particularly for smaller cars. ◆ Vaporative issues extend beyond FFVs. 			
2012	Increased flexibility in emissions regulations of biofuels	2	Develop E-85 appropriate emissions standards	State
	<ul style="list-style-type: none"> ◆ Is not a barrier to introducing more FFVs into the market but do not hold FFVs to a higher level. 			

DISTRIBUTION/FUEL AVAILABILITY

Question: Identify the barriers, actions and the timeframe to be address for distribution/fuel availability. Identify actions needed to overcome barriers.

Method: Participants were divided into six groups. Each group posted and presented their responses. Discussions followed each presentation. Participants were given six dots and placed dots on what they thought were the priority barriers (of all barriers posted). The groups then were asked to identify actions to overcome barriers. Groups posted and then presented their actions followed up by a group discussion.

Time	Barrier	# Dots	Action	Roles
2012	Critical mass of fueling stations (62,000)	16	Amnesty program when installing tank and committing to ethanol ways	EPA
			Extend infrastructure tax credit through 2030 (ACRS)	
			Government funding early fuel station switch	Federal/State
	<ul style="list-style-type: none"> ◆ Need additional support for E-85 pumps. ◆ The barrier is the cost of installing pumps. Funding support should be \$30,000 or 30% of cost. ◆ Stage II refueling/vapor recovery occurs at the pump. ◆ Retailers resistant to installing E-85 pumps because of EPA regulations – if crack the concrete could be punitive actions. 			

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Time	Barrier	# Dots	Action	Roles
	<ul style="list-style-type: none"> Storage tank costs are a significant expense for retailers. 			
2007	Fuel price at pump	15	<ul style="list-style-type: none"> Make taxes on fuels Btu based Price gasoline (any fuel) on Btu, tax on fossil carbon Carbon tax/fossil carbon tax/a subset on petroleum based carbons Counter cyclical incentives for ethanol (provisions for sunset) 2x \$.51 tax credit for E-85 Retail price incentive for E-85 	IRS
	<ul style="list-style-type: none"> Price at pump is the decision point for consumers Tax on a Btu basis – since cannot go as far on E-85 as gasoline the current tax per gallon means E-85 is taxed more. With Btu tax not relying on product improvement cycle. Ethanol is what it is; the physics is not going to change but need to provide incentives. If E-85 not competitively priced with gasoline then consumers will not buy it. Need to increase consumer awareness of energy content of ethanol vs. gasoline and how it affects the price at the pump. 		<ul style="list-style-type: none"> Introduction of counter cyclical incentives will maintain a lower price for ethanol over gasoline thereby increasing consumption. As oil prices increase incentives decrease and as oil prices decrease incentives increase. No one thinks of biofuels when oil prices decline; when prices decrease consumers buy oil. 2xing the tax credit on E-85 lowers the price of ethanol so it cost 30% less than gasoline. This is easier to implement. After years, \$.51 tax credit has only got us to 700 pumps and consuming 5 billion gallons of ethanol so increasing the tax credit is not going to get us there. A carbon tax only taxes the fossil energy component providing an incentive to buy biofuels; paying the same price for Btu content. The tax should never be repealed. A subset of carbon tax is a petroleum fossil carbon tax – fuel derived from Fisher-Trope would not be taxed at same level as petroleum fuel. Fuel should be priced on Btu content but taxed on fossil fuel or carbon component. This would create an incentive for the fossil fuel industry to create or enter into the biofuels industry stimulating the biofuels market thereby remedying the price barrier. The first objective when talking about taxes is to displace oil consumption another purpose is to decrease green house gas emissions. 	

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Time	Barrier	# Dots	Action	Roles
			<ul style="list-style-type: none"> ♦ Energy equivalent tax may be more soluble idea for it does not change revenues, it applies to all biofuels, and tax per gallon of ethanol would decrease. ♦ Options to raise the price of gasoline may not be politically viable but could replace existing tax. ♦ Consumers do not care, they will buy cheapest fuel. It does not solve the problem; need to educate the consumer. 	
			<ul style="list-style-type: none"> ♦ To get E-10 to more pumps then people have to use it. 	
2012	Maximize E-10 first	13	<ul style="list-style-type: none"> Implement public policy to expand E-10 to all gasoline Mandate nationally all octane fuel to E-10+ Set a national fuel standard of E-10 Investigate/evaluate eliminate tariff to increase E-10 more rapidly 	DOE
			<ul style="list-style-type: none"> ♦ Need a progression to ramp up; cannot just jump right to E-85. ♦ Should encourage not mandate but E-10 emission issues have to be addressed first. ♦ If jump start, ethanol stations will sell E-10 or above. First, have to deal with the E-10 emission standard. ♦ If every station switched to E-10 then can meet target. If investments are made to switch to E-10 equipment can be use for E-85. ♦ Increase renewable fuel standard (RFS) level. Is already mandated. RFS does not mean anything anymore. ♦ Do not need to incentivize E-10 anymore; pricing point is the incentive. 	
			<ul style="list-style-type: none"> ♦ Need to decrease imports so tax imports. Would that include fuel from Canada? That is a public policy question. 	
			<ul style="list-style-type: none"> ♦ Increase renewable fuel standard (RFS) level. Is already mandated. RFS does not mean anything anymore. 	
2012	E-85 installation system cost	6		
2007	Specs for equipment	2		
2007	Stage II issue UL listings resistance from retailers concerning	1		

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Time	Barrier	# Dots	Action	Roles
	punitive action from EPA			
2007	SIP/State issues with E-10	0		
2007	Facilitate investments in tanks/blending so E-10 is everywhere	0		

FUEL QUALITY

Question: Identify the barriers, actions and the timeframe to be address for fuel quality. Identify actions needed to overcome barriers.

Method: Participants were divided into six groups. Each group posted and presented their responses. Discussions followed each presentation. Participants were given six dots and placed dots on what they thought were the priority barriers (of all barriers posted). The groups then were asked to identify actions to overcome barriers. Groups posted and then presented their actions followed up by a group discussion.

Time	Barrier	# Dots	Action	Roles
2007	Refined ASTM E-85 specification fuel consistency	9	R&D on best methods quantifying any impurity at very low levels	Federal & State
			Make ASTM fuel specifications binding	
	<ul style="list-style-type: none"> ◆ Specifically, define the petroleum component. 			
	Vehicle misfueling with wrong/illegal ethanol content	8	Enforce “substantially similar” rule in Clean Air Act	EPA
			Prevent misfueling (SAE)	SAE
	<ul style="list-style-type: none"> ◆ Enforcement focusing on concentration i.e., dial a brew or E-20. These other fuels should not be available. ◆ Problem of people fueling non-FFVs with E-85. This issue is currently being investigated such as making the nozzle a different size. ◆ Fueling with the wrong fuel violates the emission standards and efficiency – not a pump but a car issue. ◆ It was noted SAE is drafting standards. 			
2020	Fuel quality problems – impurities in ethanol	3	States adopt ASTM specifications as law and enforce (use GEC?)	EPA/State
			<ul style="list-style-type: none"> ◆ As people use E-10 it will mobilize other containments in the tank. ◆ E-10 is already randomly mixed into the fuel supply. This issue will pass. When Minnesota mandated E-10 these issues were a concern but the switch over occurred without a hitch. New 	

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Time	Barrier	# Dots	Action	Roles
	Jersey and Pennsylvania switched over to E-10 six months ago and the only problem has been on the marine side with ethanol corroding the fuel lines.			
2012	Fuel quality enforcement harmonization	0		
2015	WW fuel charter for E-85	0		

EDUCATION/COMMUNICATION

Question: Identify the barriers, actions and the timeframe to be address for education/communication. Identify actions needed to overcome barriers.

Method: Participants were divided into six groups. Each group posted and presented their responses. Discussions followed each presentation. Participants were given six dots and placed dots on what they thought were the priority barriers (of all barriers posted). The groups then were asked to identify actions to overcome barriers. Groups posted and then presented their actions followed up by a group discussion.

Time	Barrier	# Dots	Actions	Roles
2007	Lack of consumer awareness	12	National education campaign in support of biofuels	Federal/State/Industry
			Can we market FFVs better?	
			Education campaign consumer guidance on E-10 and E-85	
			Objective to incentivise purchase ethanol price per gallon << gasoline	
			Correct FFV and fuel information	
			“Speakers Bureau” sponsored by DOE to spread the E-85 “gospel” at various functions e.g., Rotary meetings, special “town hall” meetings	DOE/OBP/EERE/Industry & Other Experts
			National pride/imperative advantage by credible voice	
			Educate consumers fuel energy content matters – price on energy content	
			Bio-cities focus on regional opportunities	DOE
			DOE to utilize Clean Cities for education – use private partners	DOE

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Time	Barrier	# Dots	Actions	Roles
			<p>DOE-facilitate regional industry partnerships</p> <p>States to utilize DMV to educate drivers</p> <p>DMV – advertise E-85/FFV option to drivers</p> <p>Educate consumers</p> <p><u>Biofuels help:</u></p> <ul style="list-style-type: none"> ◆ Reduce petroleum use ◆ Improve energy security ◆ Lower green house gas emissions ◆ Improve balance of trade <p>E-85 = high octane → high performance</p>	DOE
			<ul style="list-style-type: none"> ◆ Consumers are very interested; they are interested in the price. ◆ Consumers buy energy for their car; it is all they care about so of course they watch the price. ◆ Offer biofuels at an attractive price but need to education them. ◆ Need to “jazz” it up about biofuels. If the consumer does perceive a cost/benefit then they will not buy. ◆ More of change the awareness of consumers. There is a lack of consumer buy in. Many consumers do not know they are already buying E-10. <ul style="list-style-type: none"> ◆ Create a Bio-cities program parallel to Clean Cities. ◆ Biotown USA, targeted a small rural town which was “carpet” bombed with information such as biofuels are domestically grown and availability of FFVs. Got the residents revved up to become more energy independent. Can replicated elsewhere; show the people they can do something on their own. <ul style="list-style-type: none"> ◆ Create a speakers bureau funded in part by DOE. Speakers would be located regional and would bring experts with them to meetings. The requests would come from the community (grassroots effort) and would address issues such as benefits of biofuels and misfueling. It is going to take a massive communication effort to get acceptance of biofuels. Would be different than Clean Cities program. Would be organized by the community and would decide which issues they wan to discuss. ◆ DOE could create a repository of PowerPoint slide (not 	

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Time	Barrier	# Dots	Actions	Roles
			just text but graphics) which speakers (experts) could download for talks.	
2012	Lack of law maker (Congress) sustained interest	8	To foster optimal positive LCA fuels, market sustainable fuels – that meet performance standards (like Energy ★ appliances)	USDA/DOE
	<ul style="list-style-type: none"> ♦ Is a federal issue not an issue in California which has a sustained political will. May see this on a state by state basis. 		<ul style="list-style-type: none"> ♦ Making life cycle assessments available to consumers because there are consumers who would purchase sustainably produced fuel. ♦ Optimize biofuels environmental benefits by creating a special label. For instance labeling if ethanol is starch or cellulosic. ♦ Noted life cycle assessments are great for trends such as the benefits of starch vs. cellulosic ethanol but cannot get into the details such as crop or water usage. <hr/> <ul style="list-style-type: none"> ♦ Optimize biofuels environmental benefits by creating a special label. For instance labeling if ethanol is starch or cellulosic. ♦ An opportunity for an Energy Star type program; label indicating lower petroleum fuel content. ♦ Idea of green labeling. Never be able to do the accounting if dividing up how green are different biofuels ♦ A program for biofuels similar to the Energy Star program will show them what is in it for them. ♦ Agreed upon a consumer awareness label. 	<ul style="list-style-type: none"> ♦
2015	Energy content issues – awareness of E-85	1	Regulatory compliance Personal transportation (light duty cars, trucks)	

ROLES FOR VEHICLE AND FUEL USE

Question: Identify Federal, state, industry and academia roles in implementing the actions you have listed.

Method: Individuals wrote the entity on a card and posted on the action they thought was that organizations responsibility. Responses were incorporated into the above tables.

ROLES FOR INFRASTRUCTURE

Question: In regards to the entire infrastructure pathway identify Federal, state, industry and academia roles in implementing the actions identified yesterday.

Method: Participants were organized into six groups. Each group posted answers under appropriate heading and presented their answer. Each presentation was proceeded by a group discussion.

Cards	Federal	State	Industry	Academia
NCERC/Universities Feedstock quality				✓
USDA Feedstock floor price	✓			
USDA/DOE Harvesting equipment	✓			
Harvesting Equipment Industry Academia USDA/DOE	✓		✓	✓
Industry Development of harvesting equipment			✓	
DOE/USDA/EPA Sustainable ag. std. with tradable permits	✓			
Fed. \$ for R&D DOE/USDA/Others	✓			
Academia/Industry GMO improved strains of energy crops			✓	✓
OBP <ul style="list-style-type: none"> ◆ Enzymes ◆ Conversion ◆ Water issues 	✓			
DOE/USDA Loan guarantee programs	✓			
State/Fed streamline plant "permitting" process	✓	✓		
Congress → incentives for LCA CO2 ↓ for biorefineries	✓			
Federal & state Streamline right of way process	✓	✓		
Industry → pipelines & DOT			✓	
Industry/FERC Dedicated pipeline, also NRC	✓		✓	

Cards	Federal	State	Industry	Academia
Industry/DOT Rail/Transport. Army Corp. Waterways	✓			
State/Fed Waterway improvement	✓	✓		
Enhance commercialization linkages, as incubators, industry, “seed” financing initiatives	✓		✓	
Fed. \$ for water & rail	✓			
DOT Improve rail efficiency & through put	✓			
DOE Analysis of optimum incentive/tax system to achieve target	✓			
Congress Direct incentives for petroleum saving (LCA) (anti-cyclical?)	✓			
DOE/Industry to track progress	✓		✓	
State/Local Procurement of biofuels and infrs. for refueling		✓		
State/local Incentives for production		✓		
Local gov't MSW collection		✓		
Gov't fleet use		✓		
IGERT or ERC NSF Industry/Academia				

General Discussion

- ♦ National Petroleum Council would have a role in developing a dedicated pipeline for they have the knowledge and database.
- ♦ National laboratories are included under DOE.
- ♦ Historically, universities have not been involved in biomass.
- ♦ Universities involvement is more cross-cutting.
- ♦ All land grant universities are involved on the agriculture side.
- ♦ In Indiana a pipeline is being constructed along the interstate; the state has the right of way by the highway. There are talks of five states expanding interstate 70 so there is a possibility of building a pipeline across those states along the highway.
- ♦ The Office of Science or DOE is undertaking the basic research. Once the research is completed the question is how to apply it and disseminate the information. Universities could play a big role in this area.
- ♦ Progress toward 30x30 needs to be tracked. Need some other entity besides DOE to do this for DOE has other tasks. Could be an industrial type corporation or entity with its own board whose accountability is not related to other duties. There would representatives from all sectors; could be chaired by the federal government.
- ♦ Need to make consumer aware of what is happening. For instance the hydrogen program reviews its programs and produces and annual report.