

Diesel Fuel / Urea Co-Fueling

A Report from the
Diesel Cross-Cut Team

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DEER 2001

Ford Motor Company

The Diesel Cross-Cut Team

Charter

- Information exchange between HD and LD diesel programs
- Propose new topics for diesel research

Members

- Chaired by DOE
- Heavy Duty manufacturers
- Light Duty manufacturers
- EPA

Urea Supply Team

- Caterpillar
- Cummins
- Detroit Diesel
- DaimlerChrysler
- Ford
- General Motors

With assistance from:

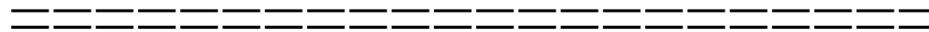
- Mack
- Marconi (Gilbarco)

Urea Supply Team Goals

Identify infrastructure barriers to supply of urea for vehicle use, and develop solutions.

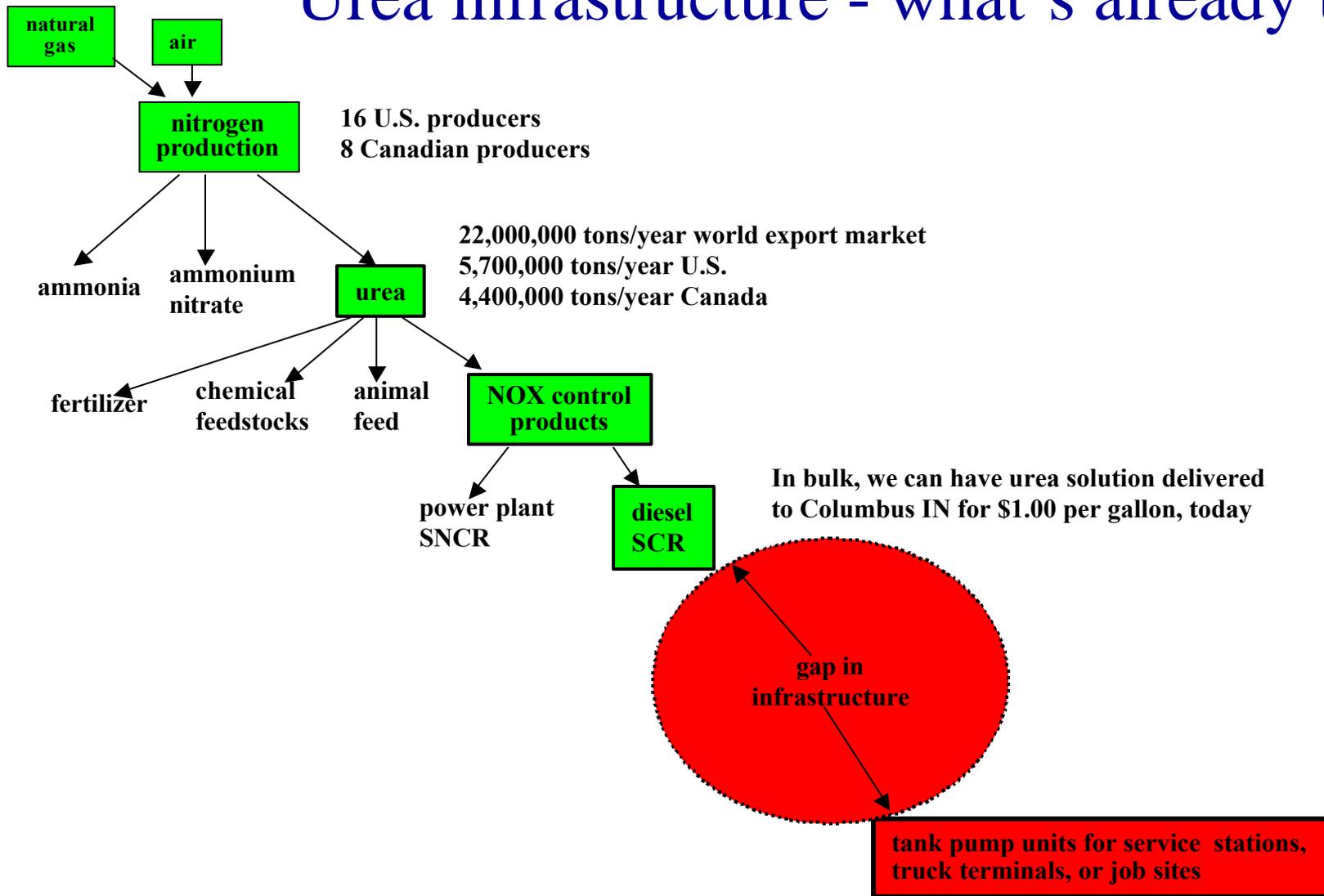
2001 Goals

- Deliver urea to a vehicle with no incremental actions required of the operator
- Demonstrate a system that is suitable for both Heavy Duty and Light Duty applications
- Minimize impact on fuel station equipment



We need to understand your issues

Urea infrastructure - what's already there



The European Truck model does not translate well to North America

Europe

- **A highway truck demonstration is underway with aqueous urea dispensers at terminals**
- **80% of fuel is dispensed at terminals due to short runs**
- **Dispensers at truck stops and local stations will be added later**

North America

- **80% of highway truck fuel is dispensed at truck stops**
- **Light duty approach is linked to heavy duty due to low volume of light duty vehicles**
- **A common design is preferred**

Assumptions for Urea Delivery to Vehicles

- **Operators will not all add a second fluid from a separate supply.**
- **Lights, messages will not assure a second fluid is added since vehicle operation will not be affected.**
- **Actions to de-power will give operators a reason to defeat the system.**
- **Concentrated reagent cartridges must still be serviced at intervals.**
- **Many Light Duty vehicles are serviced at home by owners.**



Urea must be added with no extra actions by the operator

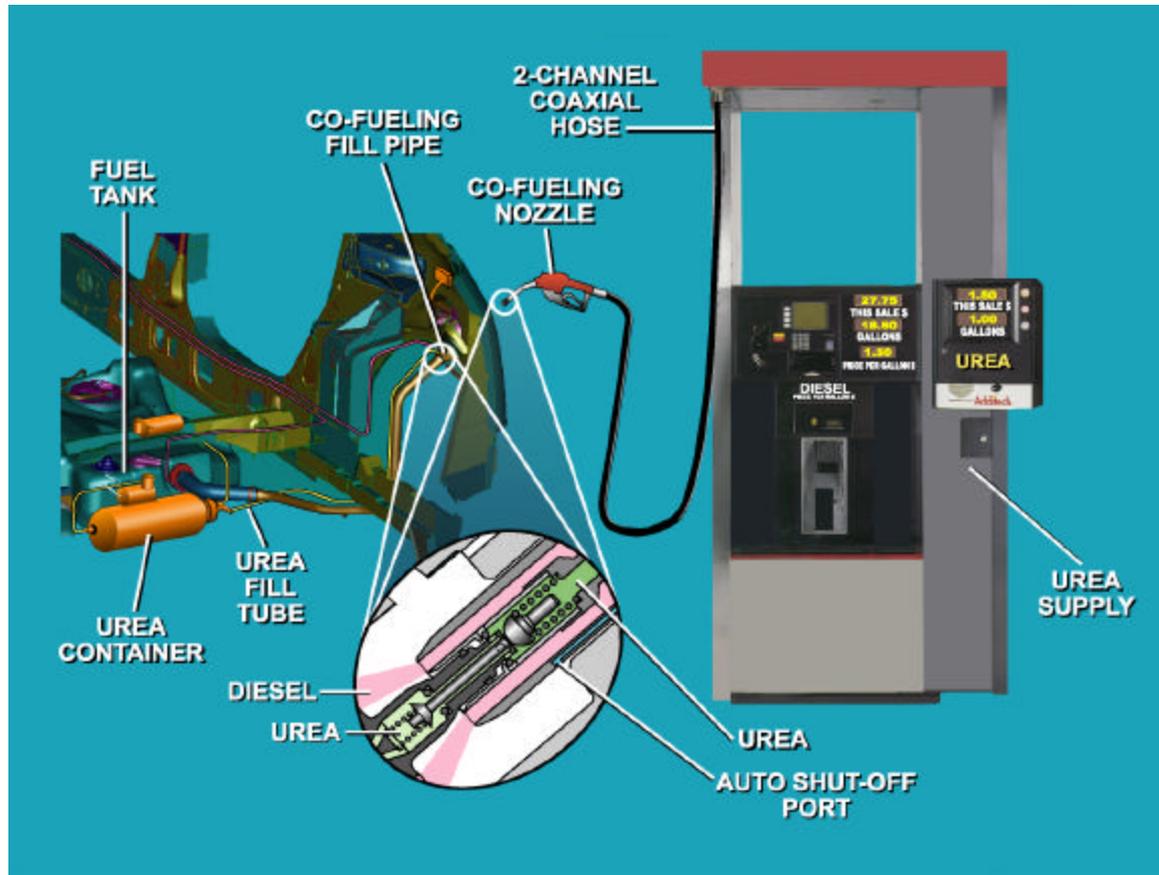
Urea must be added during fuel filling

Co-Fueling Requirements

<u>Requirement</u>	<u>Current Design</u>
• Deliver urea during diesel fueling	✓
• Independent on / off	✓
• Avoid cross-contamination	✓
• Easy to operate / no training needed	✓
• Backward compatibility	✓
• Minimize investment	?
• Avoid dryout, plugging	?
• Manage freezing	?

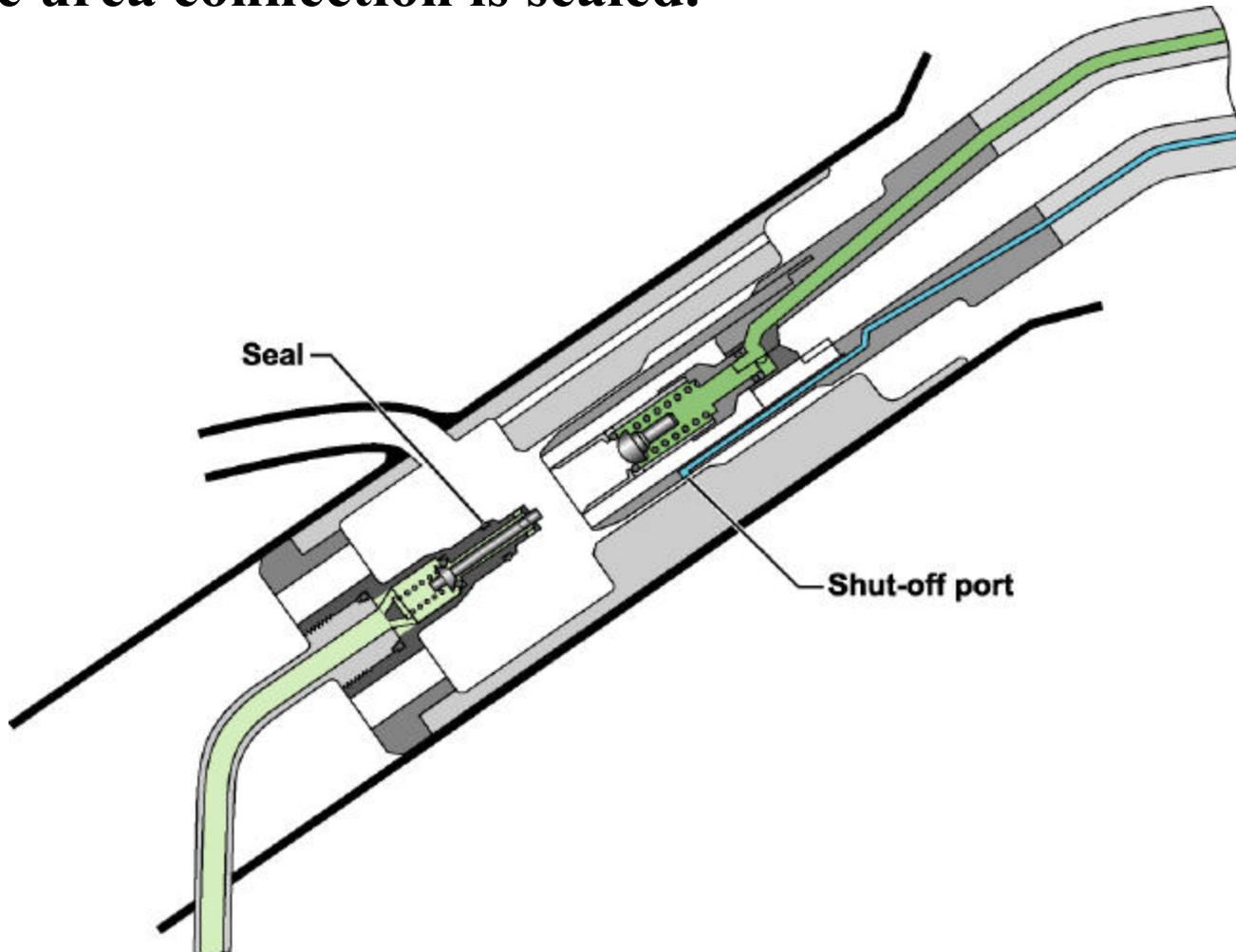
Design Concept

- Existing dispenser with vapor recovery, additive package addition, with materials upgrade
- Gasoline vapor recovery hose and nozzle housing
- New nozzle tube and fill pipe insert



Enable Flow

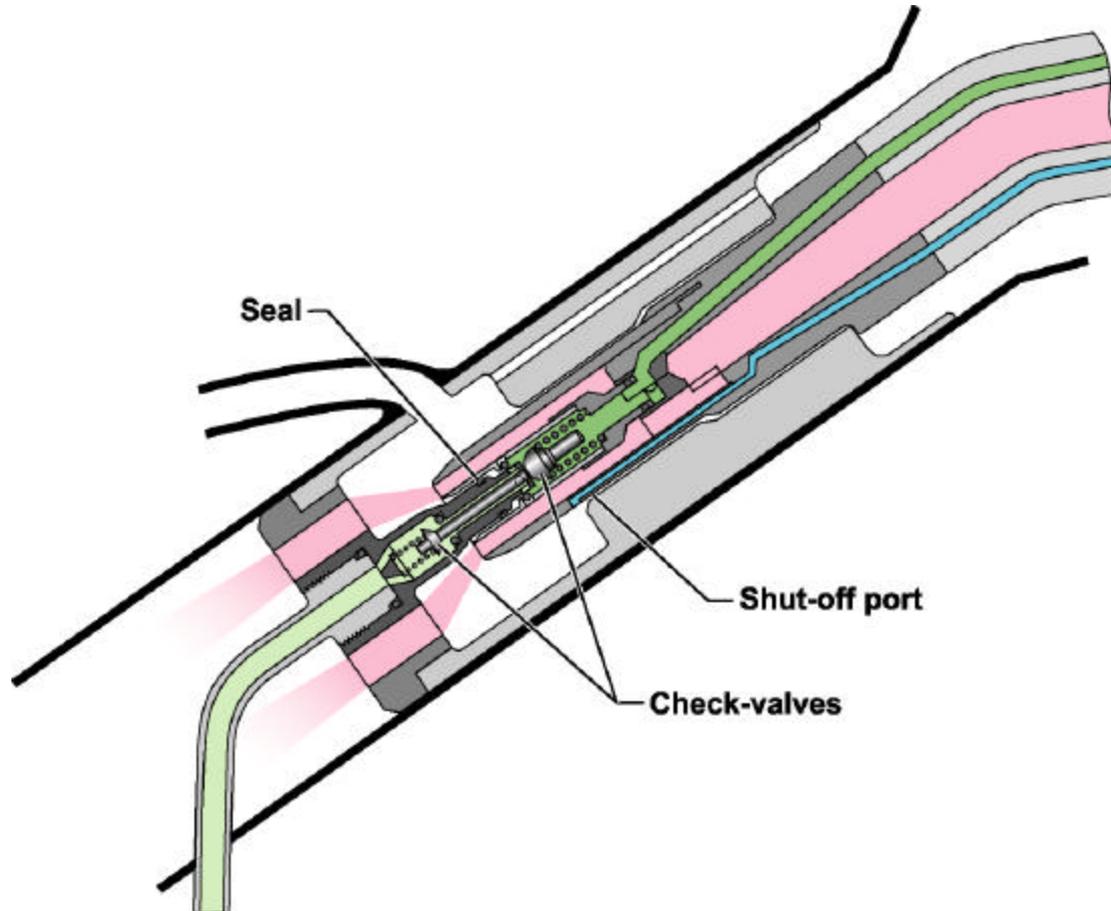
Diesel fuel is not provided until the nozzle is fully inserted and the urea connection is sealed.



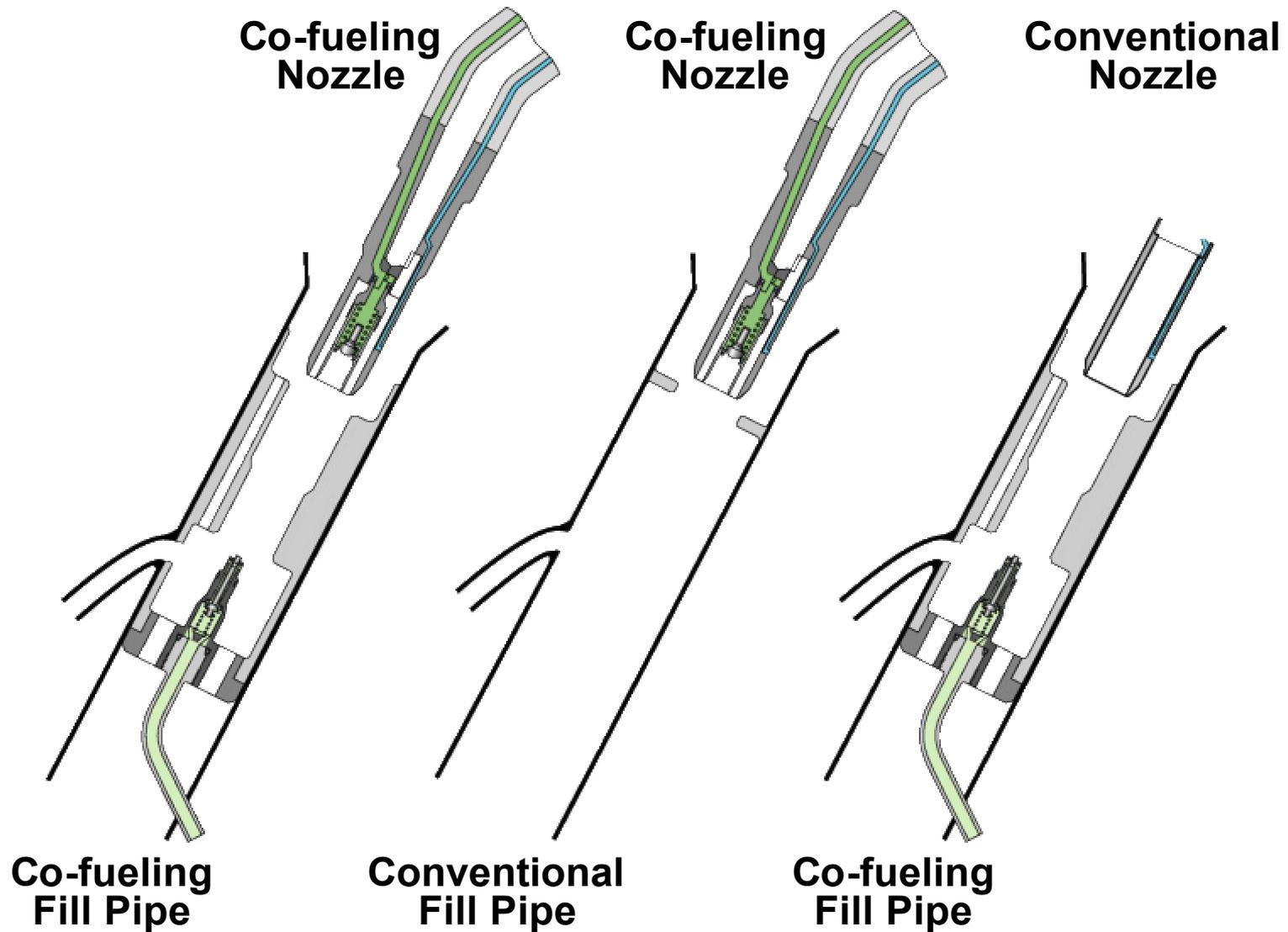
Enable Flow

When the nozzle is fully inserted:

- The urea channel is sealed, and both check valves are open.
- The shutoff port is exposed, enabling diesel flow.



Hardware Compatibility



Demonstration

- A dispenser, modified for co-fueling, is mounted in a trailer.
- A HD nozzle and a LD nozzle are provided.
- A HD and a LD tank and fill pipe rig are provided.



Demonstration



We invite your comments

- **The Urea Supply Team will evaluate this concept for durability and freezing.**
- **We need to identify any obstacles to implementation.**
- **We encourage your participation in the demonstration.**

Identify your issues.

The Urea Supply Team will consider bringing this demonstration to your site and assisting you with co-fueling your test program.