Topics

- Corporate Overview
- What Is Propane Autogas?
- Fleet Research
- Current & Future Product
- System Overview & Performance
- Return on Investment Analysis
- The ROUSH CleanTech Difference
- Customer Case Studies
- Q & A
• Privately Held
• Founded in 1976
• Over 2,500 employees worldwide
• Primary Activities: Engineering, Testing, Prototyping and Manufacturing
Corporate Overview

Corporate Wheel of Capability

- Concept Design & Styling
- Body Engineering
- Chassis Engineering
- Powertrain Engineering
- NVH Engineering
- Technical Communications
- Vehicle Integration
- Testing
- Prototype Development
- Tooling & Manufacturing
- Vehicle Assembly
## Corporate Overview

<table>
<thead>
<tr>
<th>Core</th>
<th>Capabilities</th>
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<tbody>
<tr>
<td>Engineering</td>
<td>Concept and Design</td>
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<tr>
<td></td>
<td>Electrical Engineering</td>
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<td>Body Engineering</td>
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<td>Chassis Engineering</td>
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<td>Powertrain</td>
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<td>NVH Engineering</td>
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<td>Systems Integration</td>
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<td>Program Management</td>
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<td>Tech Doc</td>
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<td>Prototyping</td>
<td>Machining</td>
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<td>Fabrication</td>
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<td>Assembly</td>
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<td>Modeling</td>
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<td>SLA/SLS</td>
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<td>Composites</td>
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<td>Testing</td>
<td>Dyno Testing</td>
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<td>Emissions</td>
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<td>Sound/Vibration</td>
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<td>Brakes</td>
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<td>Electronics</td>
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<td>ORVT</td>
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<td>Production</td>
<td>Injection/Blow Tools</td>
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<td>Molding</td>
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<td>Painting</td>
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<td>Assembly</td>
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<td></td>
<td>Machining</td>
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<td>Fabrication</td>
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<tr>
<td>Sales and Marketing</td>
<td>Direct</td>
</tr>
<tr>
<td></td>
<td>Indirect</td>
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</tbody>
</table>

### Market Strategy
- **Automotive**
- **Performance Products**
- **Military**
- **Entertainment**
- **Life Sciences**
- **Alternative Fuels/Energy**
- **Consumer Products**
WHAT IS PROPANE AUTOGAS?

What Is Propane Autogas?

- **Clean**
  - 24% reduction in Greenhouse Gas (GHG) emissions
  - 20% reduction in Nitrogen Oxide (NOx) emissions
  - 60% reduction in Carbon Monoxide (CO) emissions

- **Domestic**
  - 90% of propane used in U.S. comes from U.S.
  - 7% of propane used in U.S. comes from Canada

- **Abundant**
  - Most refueling infrastructure of any alternative fuel
  - Major natural gas shale found in northeast U.S.
  - Powers over 15 million vehicles worldwide

- **Safe**
  - Low pressure (~ 200 psig)
  - Narrow flammability range
  - Fuel tanks are 20x’s more puncture resistant than gasoline
What Is Propane Autogas?

The Propane Supply Chain
What Is Propane Autogas?

The Price of Diesel, Gasoline, and Propane Autogas

IN JUNE 2010 WHOLESALE PROPANE WAS $1.04 CPG LESS THAN GASOLINE.
What Is Propane Autogas?

On-Site Refueling:

- Ford Michigan Assembly Plant (MI)
- Positive Connections (MN)
- Shell (AZ)
- Portland Schools (OR)
- ROUSH CleanTech (MI)
- Prosper Schools (TX)
FLEET RESEARCH:
What Do Fleet Managers Want In An Alternative Fuel Vehicle Solution?
Fleet Research

• Reduced Operating Costs
  – Propane autogas costs ~ 40% less than gasoline
  – Significant tax credits available

• Reliability
  – Five years in development
  – Significant engineering & testing

• Performance
  – Horsepower, torque, towing capacity unchanged
Fleet Research

• Warranty & Serviceability
  – 3 year / 36,000 mile warranty
  – Ford alt. fuel prep package
  – Uses standard Ford diagnostic equipment

• Positive Environmental Impact
  – 24% reduction in Greenhouse Gas (GHG) emissions
  – 20% reduction in Nitrogen Oxide (NOx) emissions
  – 60% reduction in Carbon Monoxide (CO) emissions
  – EPA and CARB certification
Fleet Research

• Fuel Availability
  – Over 3,000 public fueling stations
  – Infrastructure available for little- to no-cost

• Operating Range
  – Under-body tanks: 250 – 300 miles
  – In-bed Tanks: 450 – 500 miles
  – Factory fuel gauges work with system
PRODUCT OVERVIEW:

Pickups | Vans & Wagons | Cutaway Vans
# Product Overview - Pickups

## Ford F-150

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model Years:</strong></td>
<td>2007.5 – 2008</td>
</tr>
<tr>
<td><strong>Engine Size:</strong></td>
<td>5.4L V8 (3V)</td>
</tr>
<tr>
<td><strong>Applications:</strong></td>
<td>All bed lengths</td>
</tr>
<tr>
<td></td>
<td>All axle configurations</td>
</tr>
<tr>
<td><strong>Tank Sizes:</strong></td>
<td>In-Bed – 46 gallons</td>
</tr>
<tr>
<td></td>
<td>Under-Bed – 20 gallons</td>
</tr>
<tr>
<td><strong>Order Availability:</strong></td>
<td>Conversion Kits</td>
</tr>
<tr>
<td><strong>Certification:</strong></td>
<td>EPA</td>
</tr>
<tr>
<td></td>
<td>CARB</td>
</tr>
</tbody>
</table>
# Product Overview - Pickups

**Ford F-250 / F-350**

<table>
<thead>
<tr>
<th>Model Years:</th>
<th>2009 – 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Size:</td>
<td>5.4L V8 (3V)</td>
</tr>
</tbody>
</table>
| Applications: | All bed lengths  
All cab except chassis cab  
All axle configurations |
| Tank Sizes: | In-Bed – 55 gallons  
Under-Bed – 23 gallons |
| Order Availability: | Conversion Kits |
| Certification: | EPA  
CARB |
Product Overview – Vans & Wagons

Ford E-150 / E-250 / E-350

Model Years: 2009 – 2011

Engine Size: 5.4L V8 (2V)

Applications: All cargo configurations
All passenger configurations
Single rear wheel cutaway

Tank Sizes: Under-Floor – 25 gallons

Order Availability: Ford Ship Through
Conversion Kits

Certification: EPA
CARB (pending)
Ford E-350 DRW Cutaway

Model Years: 2010 – 2011*

Engine Size: 5.4L V8 (2V)

Applications: Dual rear wheel cutaway
5-speed auto transmission

Tank Sizes: Under-Floor – 41 gallons

Order Availability: Ford Ship Through Conversion Kits

Timing: Late Q1, 2010

* = 2007 – 2008 Retrofit also available
Product Overview – Vans & Wagons

Ford E-450 DRW Cutaway

Model Years: 2009 – 2011

Engine Size: 5.4L V8 (2V)

Applications: Dual rear wheel cutaway
5-speed auto transmission

Tank Sizes: Under-Floor – 41 gallons

Order Availability: Ford Ship Through Conversion Kits

Timing: Available Now
Product Overview - Future

• Ford F-450 / F-550
  6.8L V10 (3V)

• Ford F-250 / F-350
  6.2L V8 (3V)

• Ford F-650
  6.8L V10 (3V)

• Ford F-59 / F-53 Strip Chassis
  6.8L V10 (3V)

• Ford Transit Connect
  TBD Powertrain

• Ford F-150
  TBD Powertrain
SYSTEM OVERVIEW & PERFORMANCE:
The Zero Compromise Alternative Fuel Solution
System Overview

- Fuel Rail Assembly
  - Fuel Rails
  - Fuel Injectors
  - Injection Press. / Temp. Sensor

- Fuel Line Assembly
  - Fuel Lines
  - Flow Control Solenoid

- Fuel Tank Assembly
  - Fuel Tank
  - Fuel Pump
  - Fuel Level Sensor

- Powertrain Control System
  - PCM Calibration
  - Wiring Harness
Performance

2011 Ford E-250 w/ 5.4L V8 Engine

Gasoline/Propane Power and Torque Comparison

Torque (ft-lbs) / Power (hp)

RPM

Gasoline Torque
Gasoline Power
Propane Torque
Propane Power
RETURN ON INVESTMENT:

A Positive Return, Even Without Government Incentives
### 2011 Ford E-250 Pass. Van

#### Capital Costs
- **Base Ford Vehicle Purchase Price:** $28,400.00
- **ROUSH Propane System Conversion Price:** $10,900.00
- **Federal Alternative Motor Vehicle Tax Credit (propane only):**

**Total Capital Savings or Investment to Convert:** $28,400.00

#### Operating Costs (fuel)
- **Total Vehicle Life (miles):** 200,000
- **Average Miles per Gallon:** 11.6
- **Gallons of Fuel Used Over Life of Vehicle:** 17,285
- **Fuel Price (per gallon):**
  - **Gasoline:** $3.15
  - **Propane:** $2.15
- **Cost of Fuel over Life of Vehicle:**
  - **Gasoline:** $48,461.54
  - **Propane:** $28,322.04
  - **Savings or Cost to Convert:** $19,939.50

#### Operating Costs (misc.)
- **Maintenance Rate per mile (tune-ups, oil, engine life, etc.):** $0.030
- **Maintenance Costs:** $6,000.00
- **Fuel Loss from Pillage & Theft ($100 per year):** $0.00

**Total Misc. Savings or Costs Over Life of Vehicle:** $3,500.00

**Gross Vehicle Lifetime Savings or Loss:** $23,439.50

**Net Vehicle Lifetime Savings or Loss:** $12,539.50
## Savings Calculator

### 2011 Ford E-450 Cutaway

#### Capital Costs
- Base Ford Vehicle Purchase Price
- Roush Propane System Conversion Price
- Federal Alternative Motor Vehicle Tax Credit (propane only)

Total Capital Savings or Investment to Convert: **$30,175.00**

#### Operating Costs (fuel)
- Total Vehicle Life (miles):
- Average Miles per Gallon: 8.0
- Gallons of Fuel Used Over Life of Vehicle:
- Fuel Price (per gallon):
  - Gasoline: $3.15
  - Propane: $2.15

Total Fuel Savings or Cost Over Life of Vehicle: **$70,000.00**

#### Operating Costs (misc.)
- Maintenance Rate per mile (tune-ups, oil, engine life, etc.)
- Maintenance Costs
- Fuel Loss from Platerege & Theft ($100 per year)

Total Misc. Savings or Costs Over Life of Vehicle: **$6,500.00**

**Savings or (Cost) to Convert:**

<table>
<thead>
<tr>
<th></th>
<th>Gasoline (6.8L V10)</th>
<th>Propane (6.8L V10)</th>
<th>Savings or (Cost) to Convert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Ford</td>
<td>$30,175.00</td>
<td>$30,175.00</td>
<td></td>
</tr>
<tr>
<td>Conversion</td>
<td>$18,000.00</td>
<td>$18,000.00</td>
<td></td>
</tr>
<tr>
<td>Federal</td>
<td>$0.00</td>
<td>$0.00</td>
<td></td>
</tr>
<tr>
<td>Tax Credit</td>
<td>$13,900.00</td>
<td>$13,900.00</td>
<td></td>
</tr>
</tbody>
</table>

**Gross Vehicle Lifetime Savings or Loss:** **$32,301.50**

**Net Vehicle Lifetime Savings or Loss:** **$18,401.50**
# Emissions Calculator

## 2011 Ford E-450 Cutaway

<table>
<thead>
<tr>
<th>Emissions Reductions</th>
<th>Gasoline</th>
<th>Propane</th>
<th>Difference (Gasoline - Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Vehicle Life (miles)</td>
<td>200,000</td>
<td>200,000</td>
<td></td>
</tr>
<tr>
<td>Average Miles per Gallon</td>
<td>8.0</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Gallons of Fuel Used Over Life of Vehicle</td>
<td>22,222</td>
<td>24,069</td>
<td>(2,747)</td>
</tr>
<tr>
<td>Carbon Mass per Gallon Fuel (lb / gal.)</td>
<td>5.10</td>
<td>3.47</td>
<td></td>
</tr>
<tr>
<td>Mass of CO2 per Gallon Fuel (lb / gal.)</td>
<td>18.70</td>
<td>12.72</td>
<td></td>
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<tr>
<td>Total Lbs of CO2 Produced During Vehicle Life:</td>
<td>415,458</td>
<td>317,558</td>
<td>97,900</td>
</tr>
</tbody>
</table>

**Fewer Lbs of CO2 Produced Using Propane Autogas:** 97,900

## Assumptions:

<table>
<thead>
<tr>
<th>Fuel Properties Used</th>
<th>Gasoline</th>
<th>Propane</th>
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</thead>
<tbody>
<tr>
<td>C8H18</td>
<td></td>
<td>C3H8</td>
</tr>
<tr>
<td>Fuel Density (lb / gal)</td>
<td>6.07</td>
<td>4.23</td>
</tr>
<tr>
<td>Energy Density (BTU / gal)</td>
<td>114,100</td>
<td>84,300</td>
</tr>
<tr>
<td>Main Consituents (% by weight)</td>
<td>84C 16H</td>
<td>82C 16H</td>
</tr>
</tbody>
</table>
Federal Incentives

• Alternative Fuel Excise Tax Credit
  
  $.50 / gallon
  
  - Must be liable for reporting and paying the federal excise tax on the sale or use of the fuel in a motor vehicle
  - Tax exempt entities such as state and local governments that dispense qualified fuel from an on-site fueling station for use in vehicles qualify for the incentive
  - The incentive must first be taken as a credit against the entity’s alternative fuel tax liability; any excess over this fuel tax liability may be claimed as a direct payment from the IRS.

• Alternative Fuel Infrastructure Tax Credit
  
  30% of cost, up to $30,000
  
  - Fueling station owners who install qualified equipment at multiple sites are allowed to use the credit towards each location.
  - Unused credits that qualify as general business tax credits, as defined by the Internal Revenue Service (IRS), may be carried backward one year and carried forward 20 years.

Alt Fuels & Advanced Vehicles Data Center

A website maintained by the U.S. Department of Energy that lists incentives for propane autogas and other alternative fuels state-by-state.

http://www.afdc.energy.gov/afdc/fuels/propane_laws.html
THE ROUSH CLEANTECH DIFFERENCE:

Why Propane Autogas?
The ROUSH CleanTech Difference

• Over 35 Years of Engineering Experience
  – CNG
  – Electric / Electric Hybrid
  – Hydrogen

• Rigorous Customer Research and Development

• Seamless Customer Experience
  – Serviceability
  – Warranty coverage

• Clean & Green
  – Lower emissions
  – Lower operating costs
  – Proven technology
Field Service Network

• National Footprint to Support Customers

• Training Program Includes
  – System overview
  – Service diagnostics
  – Repair procedures
  – Warranty claim process
  – Service manual review
  – Contact information

• Web-Based Training
  – Available Q2 2011

Black = Sales/Service Centers, Red = Trained, Blue = Training Scheduled
Demonstration Vehicles

ROUSH CleanTech Demo Units

– Located around the U.S.

– Vehicles available:
  • E-series Cargo Vans
  • E-series Passenger Vans
  • E-series Cutaway Vans
  • F-series Pickup Trucks

– Contact us for details
Case Study – Wright & Filippis

Industry: Home Medical Equipment
Location: Rochester Hills, MI
Vehicles: 2011 Ford E-350 Cargo Vans
          2011 Ford E-450 Cutaway Vans

By The Numbers:

- **48,000** fewer gallons of gasoline / year
- **931,200** fewer lbs of CO₂ / year
- **$36,000** reduction in fuel costs / year

“Propane autogas is sustainable technology that works. I would encourage any owner that operates a fleet to take a look at the propane autogas solutions that are out there today. I think they will find that this is a very cost-effective solution available that makes sense for their fleets as well.”

- **Tom Hopkins**, Distribution & Fleet Manager
Case Study – King County, WA

Industry: Government
Location: Seattle, WA
Vehicles: 2010 Ford F-250 Pickup Trucks
  2010 Ford F-350 Pickup Truck
  2010 Ford E-250 Cargo Van

By The Numbers:
- 11,200 fewer gallons of gasoline year
- 77,280 fewer lbs of CO₂ / year
- $15,338 reduction in fuel costs / year

“For the driver, it’s pretty much seamless other than you fill up at a propane tank instead of a gas dispenser. Range is approximately the same and fuel economy is approximately the same. A big advantage is that with the federal rebate being offered on propane autogas fuel, the cost of fuel is currently considerably less than the price of gasoline. So right now that’s a big advantage.”

- Robert Toppen, Equipment Supervisor
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