Heavy-Duty Engines: An Opportunity For LPG
Lloyd’s Register predicted there will be 653 LNG powered ships of all types built between 2012 and 2025, including 25 cruise ships.
Bunkering of LNG is still made mainly with trailers.

Cruise Ship Powered By LNG Today
AIDA Prima, first of a new generation of energy-efficient cruise ships, has dual fuel capability with traditional bunkers oil or a LNG fuel system.
MSC order four LNG cruise ships for a total cost of US$ 4.5 billion. New cruise ships have a gross tonnage of 200,000, more than 2,700 staterooms capacity.
Majority of today trains using CNG or LNG are equipped with diesel engines converted on dual-fuel operation.
A large mining dumper truck can have a daily consumption of @ 10 tons of diesel equivalent.
Natural Gas Virtual Pipeline

Game-changing patented solution for LNG

LNG Containers

LNGtainer Ltd.'s patented LNG Containers allow the use of existing global infrastructure for handling of ordinary shipping containers in the new and booming LNG energy distribution market. This solution is considerably more cost-efficient than current high-pressure LNG containers.

Considerably more cost-efficient LNG containers and their ability to utilize existing handling equipment in harbours, at sea on ordinary container vessels and for land transport for container trucks are bringing about a new dawn for environmentally friendly energy. The usage of LNG no longer requires extremely expensive purpose-built vessels and large special storage solutions. Thanks to the modularity and scalability of orders, transportation, storage and distribution, LNG is now accessible to a much larger customer group.

- Standard ISO 40/45 feet container
- Optimized LNG capacity due to optimal shape
- Designed for mass production
- Safe low-pressure system
- Integrated boil-off gas collection
- Direct CNG and LNG outlet
- Remote monitored and steered unit

Small power stations

Bunkering system for ships

Gas station for vehicles
Natural Gas Virtual Pipeline
IN THE MIDDLE OF DIFFICULTY LIES OPPORTUNITY
Game Changers As Opportunity For LPG

- Taxis
- Buses
- Trucks
- Trains
- Marine
- Farming
- Forestry
- Refrigeration
- Mining Vehicles
- Power generation
- Construction machinery

LPG

GREAT OPPORTUNITY AHEAD
The power of the future Toyota JPN Taxi comes from an innovative hybrid drivetrain made up of a small electric motor and a four-cylinder engine as range-extender that runs on LPG!
MTU Hybrid Powerpack is an underfloor drive, based on a 6H Series 1800 R75 diesel engine delivering 315 kW at 1,800 rpm, with an electric motor for maximum 400 kW output. Such diesel engine of 12.8 lt. displacement, 6 cylinder in line, has a “gas” twin Otto cycle, with spark-plugs.
A DMU is a train powered by diesel engines. DMU requires no locomotive, as the engines are incorporated into one or more of the carriages.

Typical diesel engine come from truck or off-road machinery use, with power from 200 to 750 kW each unit.
MTU – Rolls Royce has recently presented a new generation of gas engines designed for marine, railway and power generation use, equipped with an innovative fuel system for such size of power units. This solution make easy to feed such engines with liquid LPG.
Game Changer In Super H-D LPG

16-cylinder gas engine covering a power range from 1,500 to 2,000 kW
Ready Projects of H-D LPG Locomotives

- 100% LPG as fuel using dedicated spark-plug engine.
- Comparable power with equivalent diesel engine.
- Modular solution for new or refurbished locomotives.
- Available powers will be between 750 to 2,000 kW.
## Vehicle Energy Consumption

### Annual Demand

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Annual Demand (gallons/vehicle)</th>
<th>Annual Energy Equivalent per Vehicle (MMBtu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIESEL</td>
<td>208,0064 gal</td>
<td>312,010 MMBTU</td>
</tr>
<tr>
<td>RESIDUAL FUEL OIL</td>
<td>678,400 gal</td>
<td>936,19 MMBTU</td>
</tr>
<tr>
<td>GASOLINE</td>
<td>424,000 gal</td>
<td>585,12 MMBTU</td>
</tr>
<tr>
<td>LPG</td>
<td>25,000 gal</td>
<td>27,600 MMBTU</td>
</tr>
</tbody>
</table>

### Conversion Opportunities

- **113 Semi Trucks** or 600 gal
  - 75 MMBTU
  - Diesel

- **4,160 Compact Cars**
  - 585,12 MMBTU
  - Diesel

**From cars to carriers, U.S. vehicles represent an enormous market opportunity for conversion to natural gas.**

Sources: American Clean Skies Foundation, M.J. Bradley

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It is anyway a great opportunity to convert on LPG!
IMMISS/LGI System: more power & torque than Natural Gas, less emissions and with WTW efficiency like Diesel
X-Tech Solution For Super H-D LPG Engines

Twin Double IMMISS as LPG Injection System

Double IMMISS each 4+4 cylinders

Main LPG tanks

Twin Double IMMISS as LPG Injection System
Company Background

- Mercedes Diesel-CNG – Perth 1983
- Henschel Diesel-CNG – Italy 1984
- Astra Diesel-CNG – Italy 1983
- Caterpillar Diesel-LNG – USA 1985
Company Background

Ikarus Diesel-CNG – USSR 1987

Kamaz Diesel-CNG – USSR 1987

Breda Menarinibus/MAN CNG – Italy 1996-2001

Breda Menarinibus/MAN CNG - Italy 1996-2001
Our Chief Engineer, Massimo
Compressed Natural Gas
Liquid Natural Gas
Gasoline-Hybrid
Hybrid Range Extended
Electric
Hydrogen Fuel-Cell
Reformulated Diesel
Biodiesel
Ethanol

LAST TRAIN TO REMAIN IN THE GAME!

THE TIME FOR ACTION IS NOW

LPG?
Knowing is not enough; we must apply. Being willing is not enough; WE MUST DO!
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