

VOLVO

Volvo Group Position on Alternative Fuels for Commercial Vehicles

Volvo and the Alternative fuels

**The Volvo Group products are almost exclusively driven
by fossil diesel fuel**

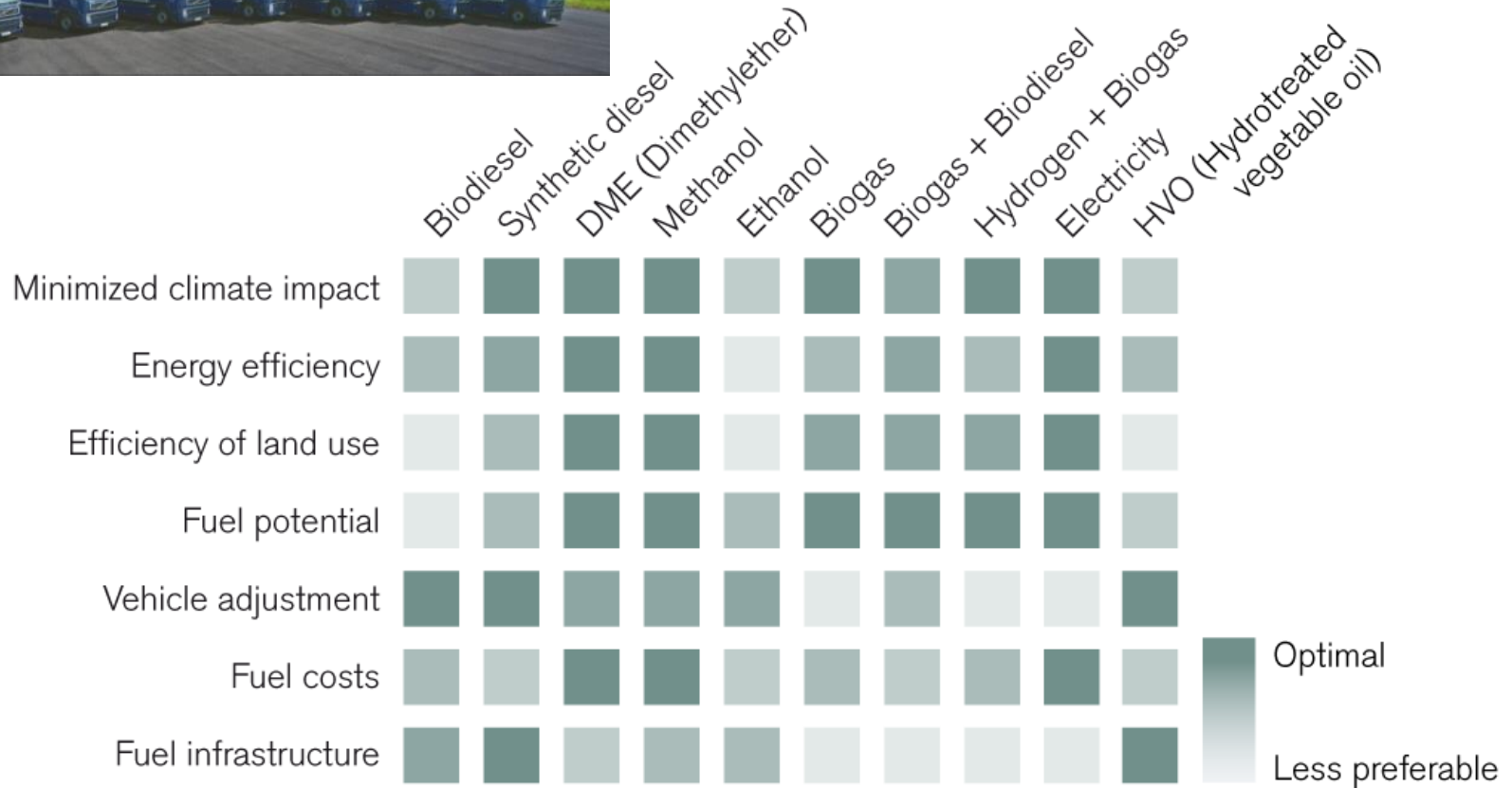
- Improve vehicle efficiency
- Increase the use of renewable fuels

Must be sustainable for all the stakeholders

- ✓ Adapted to customer operations
- ✓ Efficient “well to wheel”
- ✓ Economically viable without subsidies



Evaluation of fuel pathways



Source: Volvo Sustainability Report 2013

Volvo's position on alternative fuels

Trucks and buses

Long distance applications

- Liquid methane and DME are the main prioritized alternatives. Dynamic electric charging is an additional alternative long term.

Medium distance applications

- Compressed methane and DME are the main prioritized alternatives. Dynamic electric charging is an additional alternative long term.

Urban applications

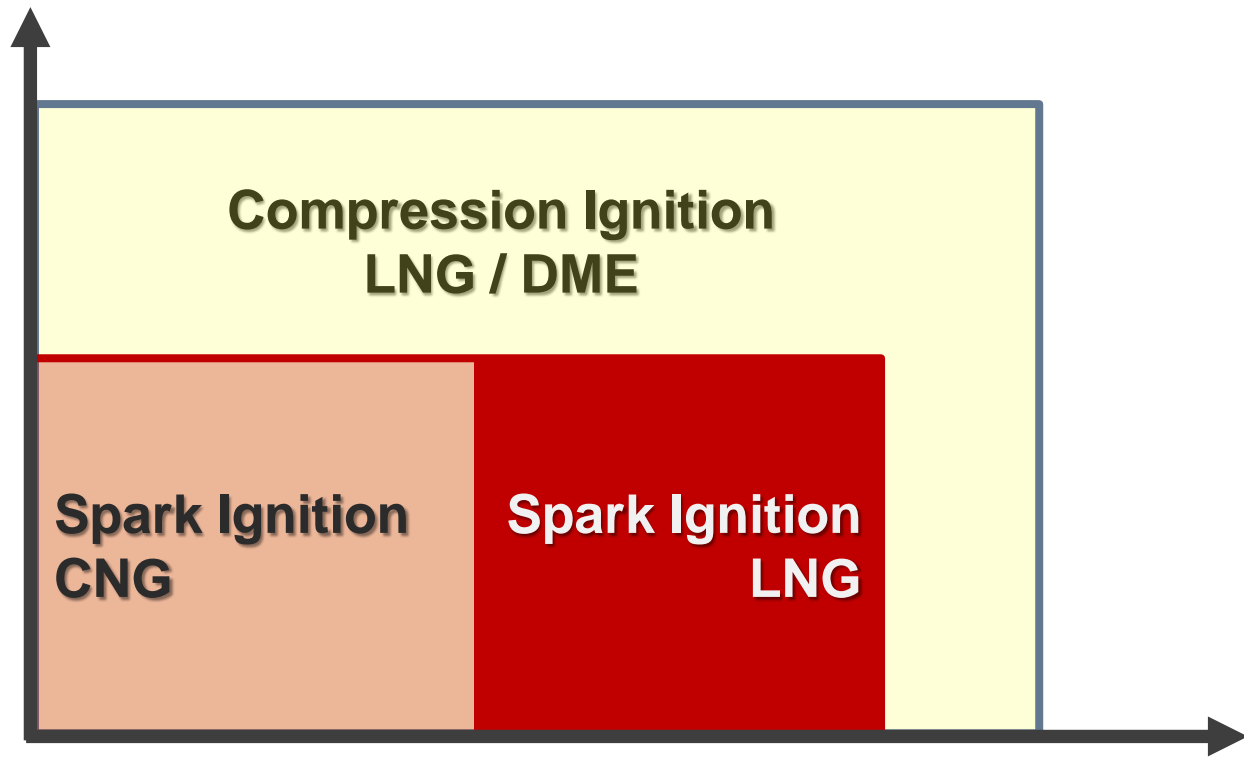
- Electricity and compressed methane are prioritized



Trucks need range and power to deliver



Horsepower / Torque



Distance traveled before refueling

Not to Scale

Operational efficiency

- Alternatives must be compatible with HD truck applications
 - Clear back of Cab
 - Fast fill
 - Same maintenance intervals as Diesel
- Truck efficiency in operations
 - No significant weight increase
 - Engine efficiency
 - Short wheelbase
- On-truck fuel stability and venting management to limit GHG impact (no venting preferred)



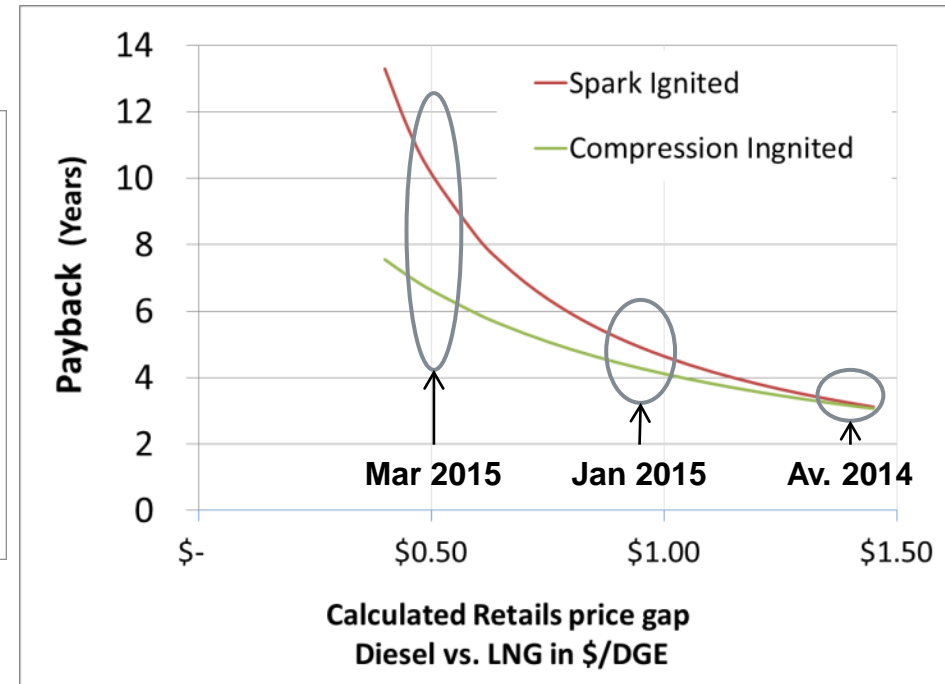
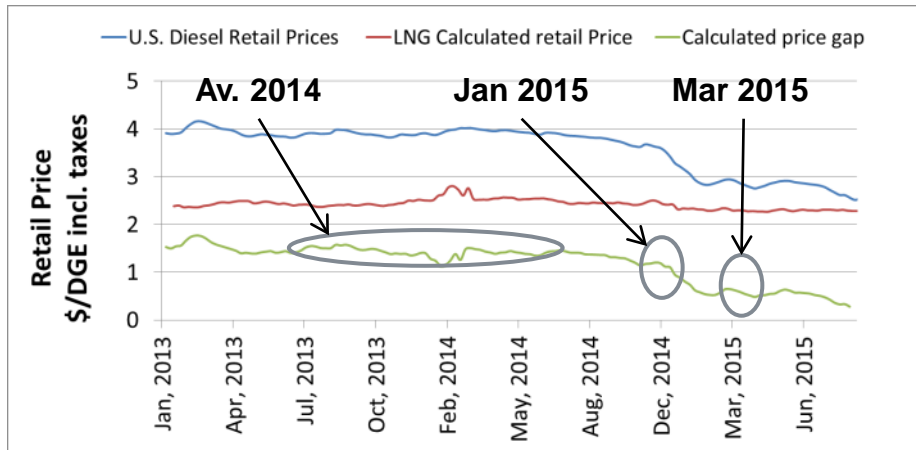
HPDI on FH - Europe



DME on VNL - US

End customer payback sensitivity

- Hypothesis
 - Typical regional haul application using LNG
 - LNG retail price calculated from Henry Hub spot prices
 - No incentive taken into account



- ➔ Compression ignition for more stable ROI
- ➔ Need at least 2015 price scenario for decent payback

Takeaways and key messages

- GHG emission reduction is a must
- Same or improved operational efficiency as today's solution
 - Fuel and truck cost
 - Transport capacity
 - As simple as possible

→ Overall efficiency is mandatory