PHIL FATHERS
VICE CHAIRPERSON
NGV GLOBAL

UNECE

Jan 2013

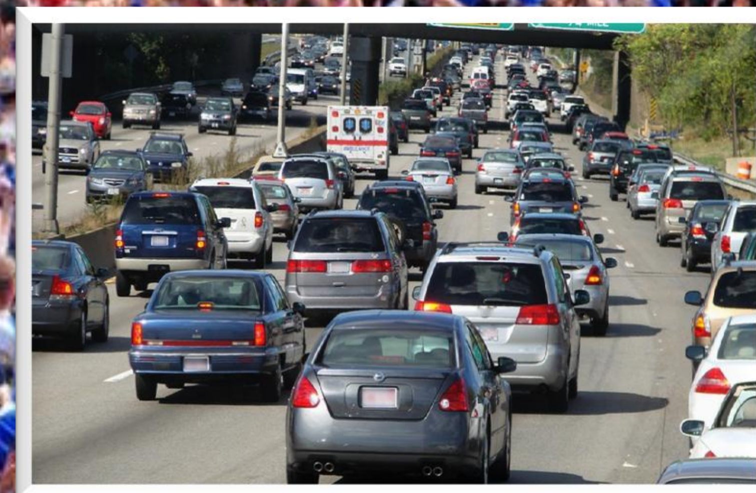
Geneva, Switzerland

United Nations WP Gas
Ad Hoc Group on Experts on Supply & Use of Gas

Current & Future NGV Market Development: Challenges to be Addressed (focus on UNECE Region)

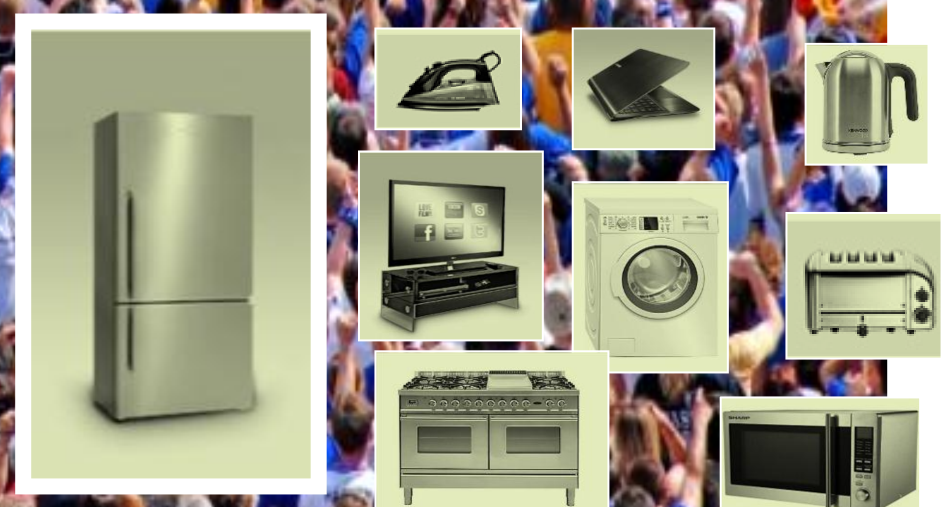
Lets Look to the Future..........It's Now 2050 !!

The world population has expand from 7B to 9B

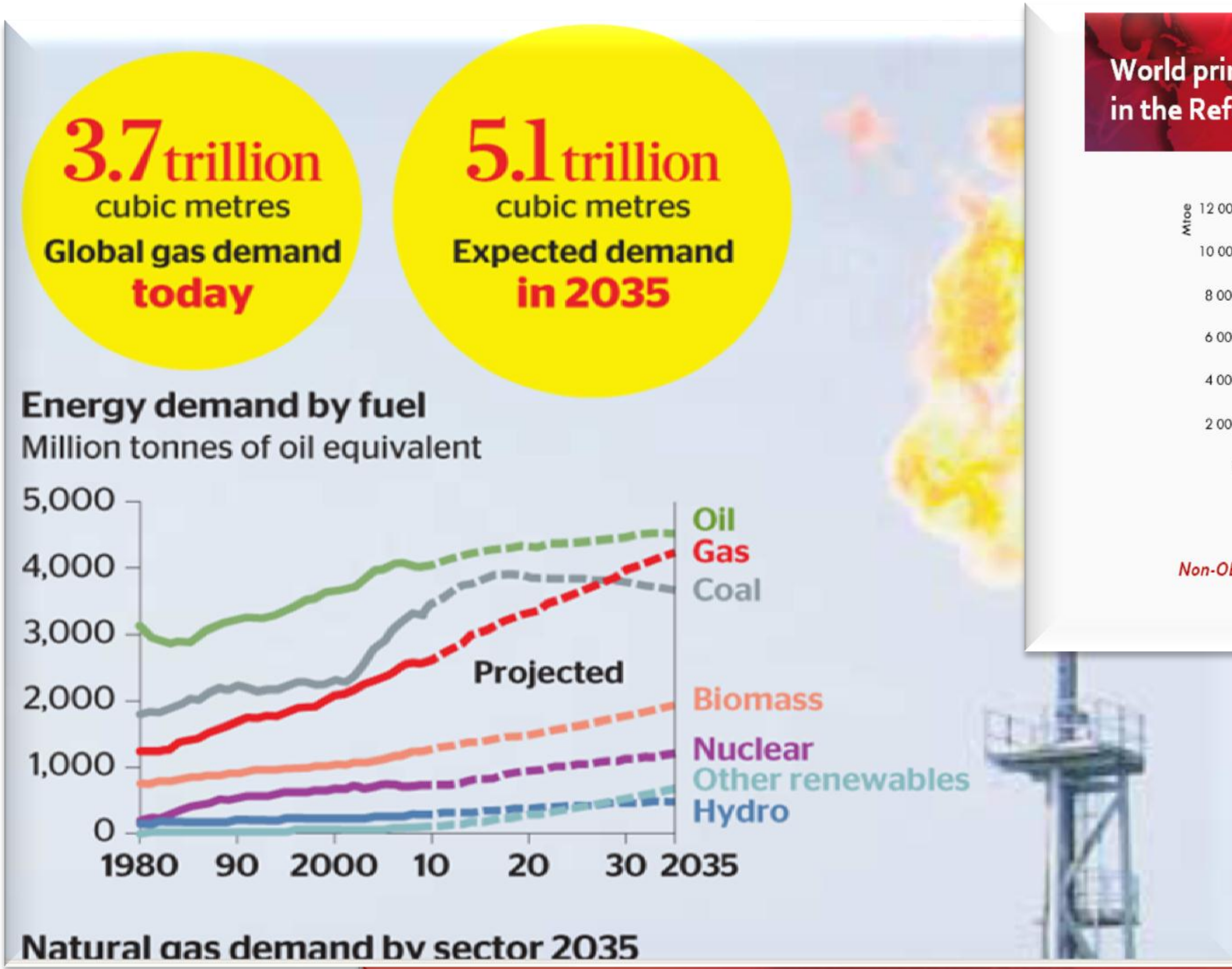


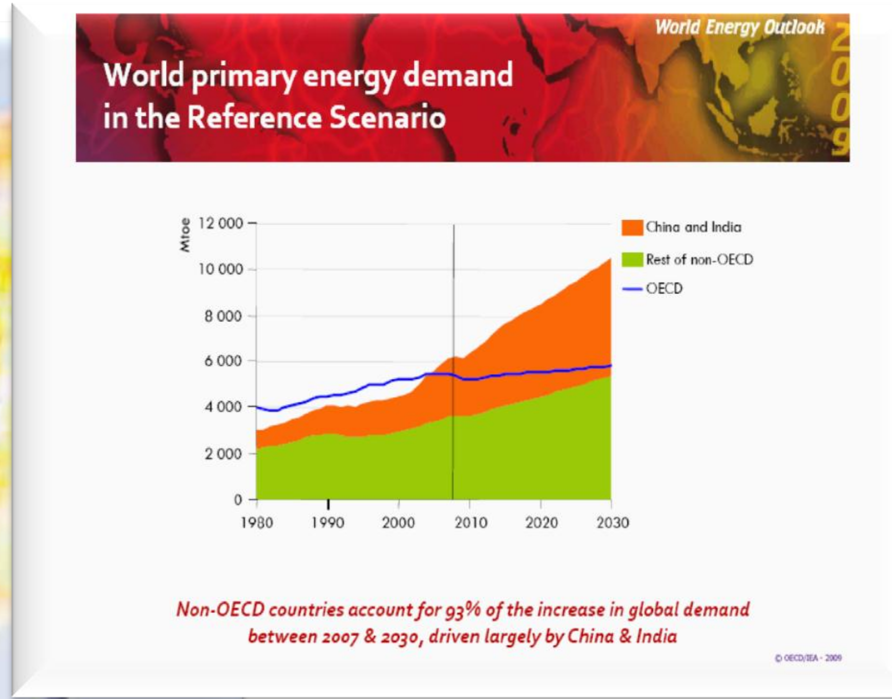
The number of cars & appliances has doubled.

The energy demand has increased two / three fold



IEA – World Energy Outlook





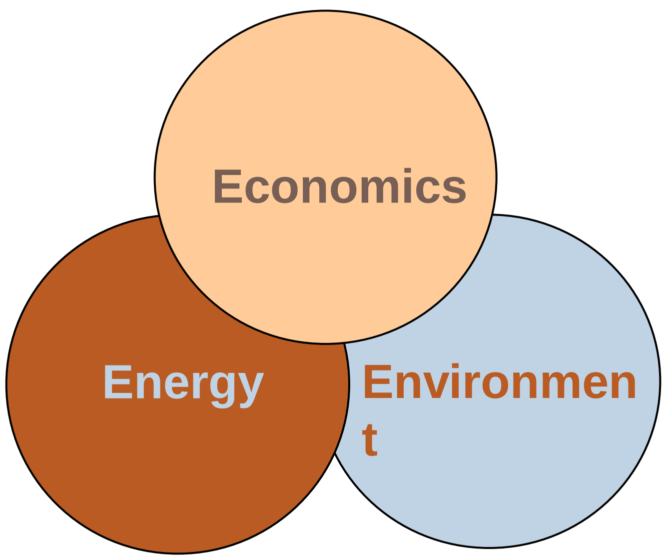
Alternative Fuels – Key Messages

- No Single Alt Fuel will Replace Oil
- NGV Market growing at a faster rate
- Oil + Diesel vs Gas pricing continues to decouple
- China, India and USA will drive the market
- LNG/LCNG/CNG are and will continue to be inextricably linked

NGV Market Drivers Have Moved

Key Drivers

2000 - Environmental



2013 - Economical
- Energy security
- Energy diversity

(macro for governments & micro for fleet operators)

Key Success Factors

Government Support & Policies

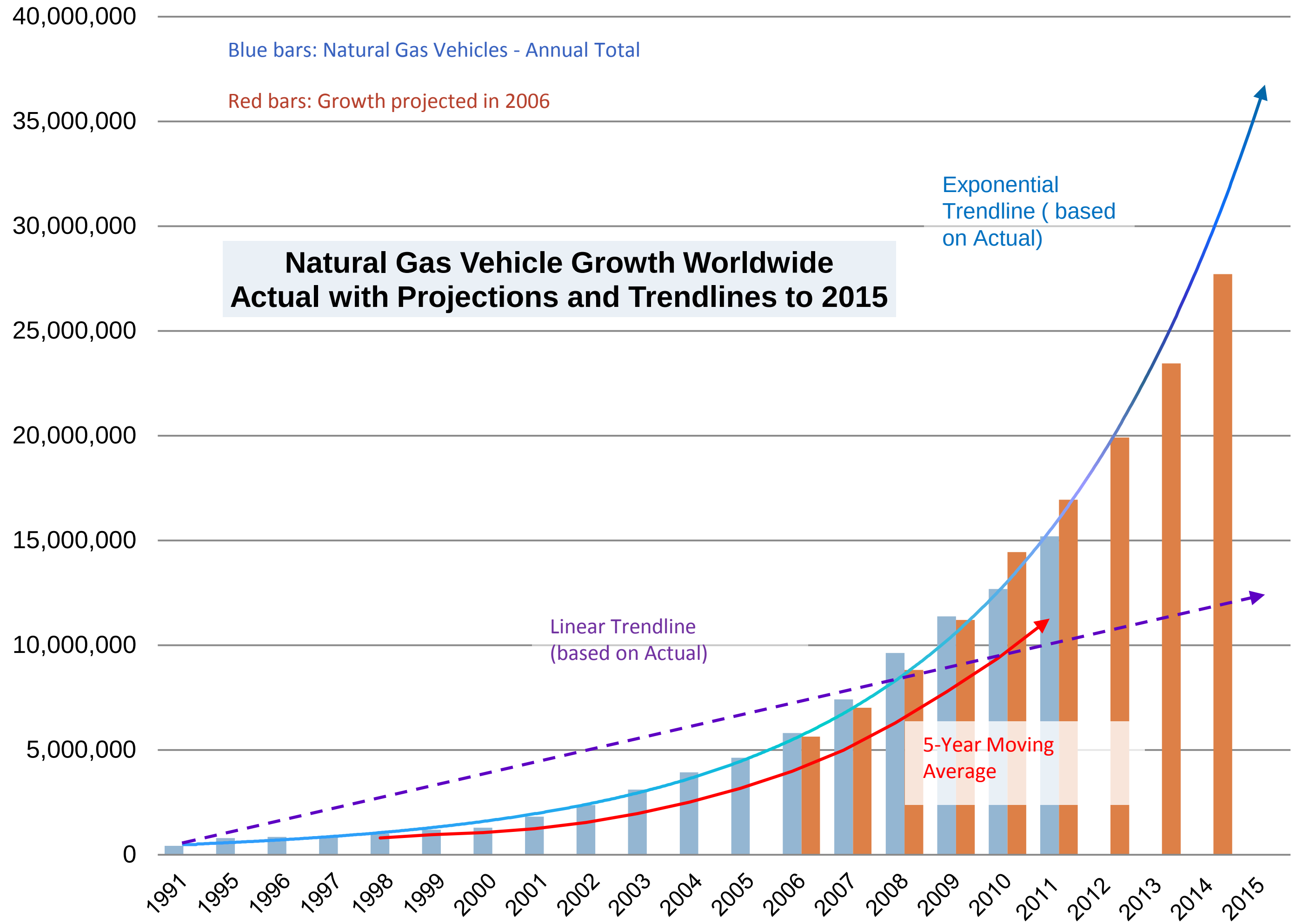
Benefits to Key Stakeholders

Challenges

(for long term development, growth & sustainability)

- Safety
- Refueling Infrastructure
- Gas Price
- Gas Supply
- Technology & Know-how
- Awareness & Education

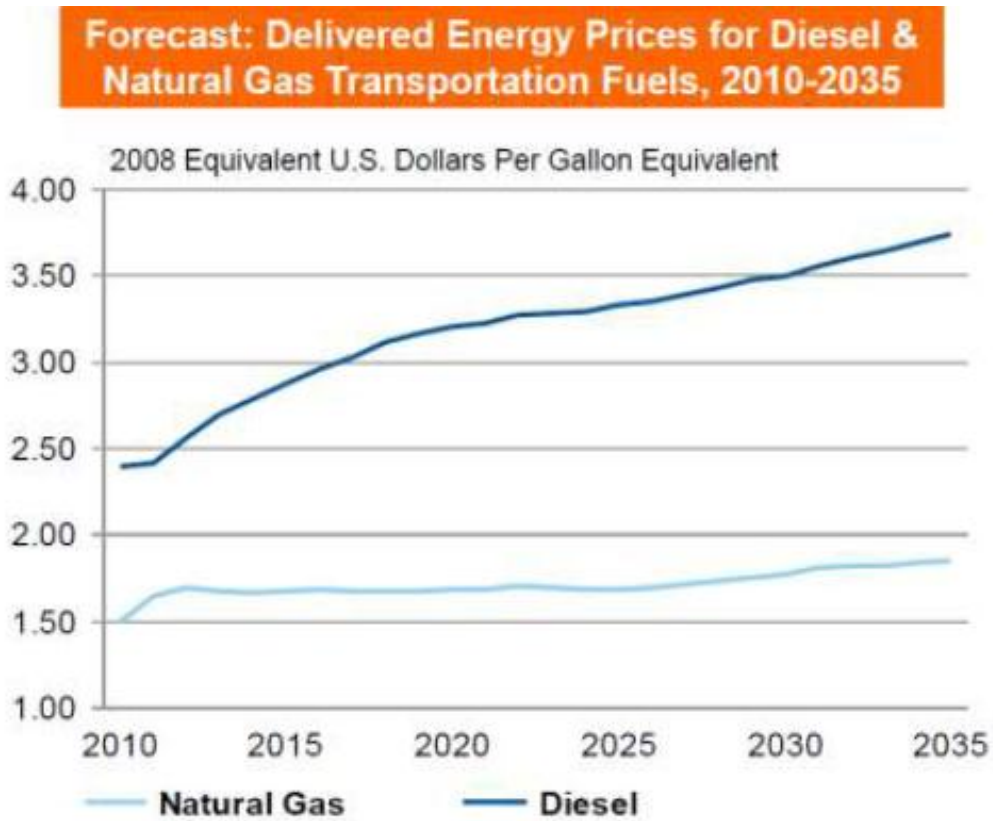
Natural Gas Vehicle Global Growth



Key Contributors to Continuous Growth

- Over Supply of Natural Gas
- Reserves of Natural Gas
- The Decoupling of Oil/Diesel vs Gas Pricing
- Gas Engine Development
- Vehicle Development
- Infrastructure Development

Oil + Diesel vs Gas Pricing Continue to Decouple and Forecast to Widen



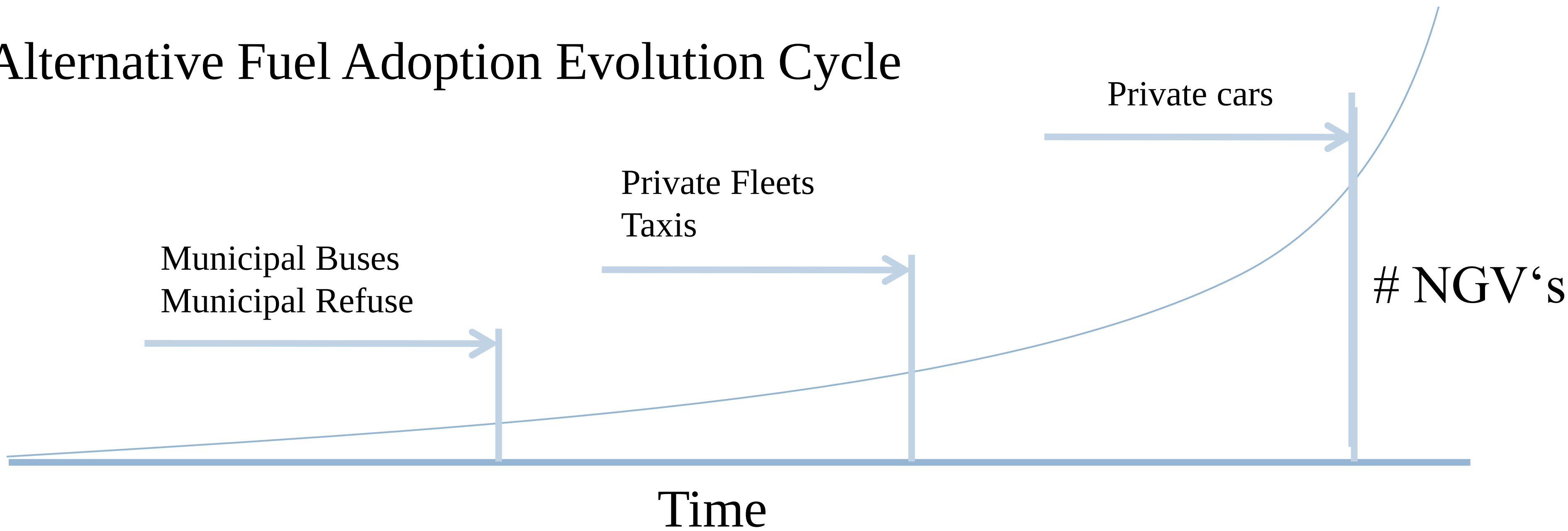
Source: IEA Energy Outlook

Evolution: Bus Fleets moving Rapidly to AF

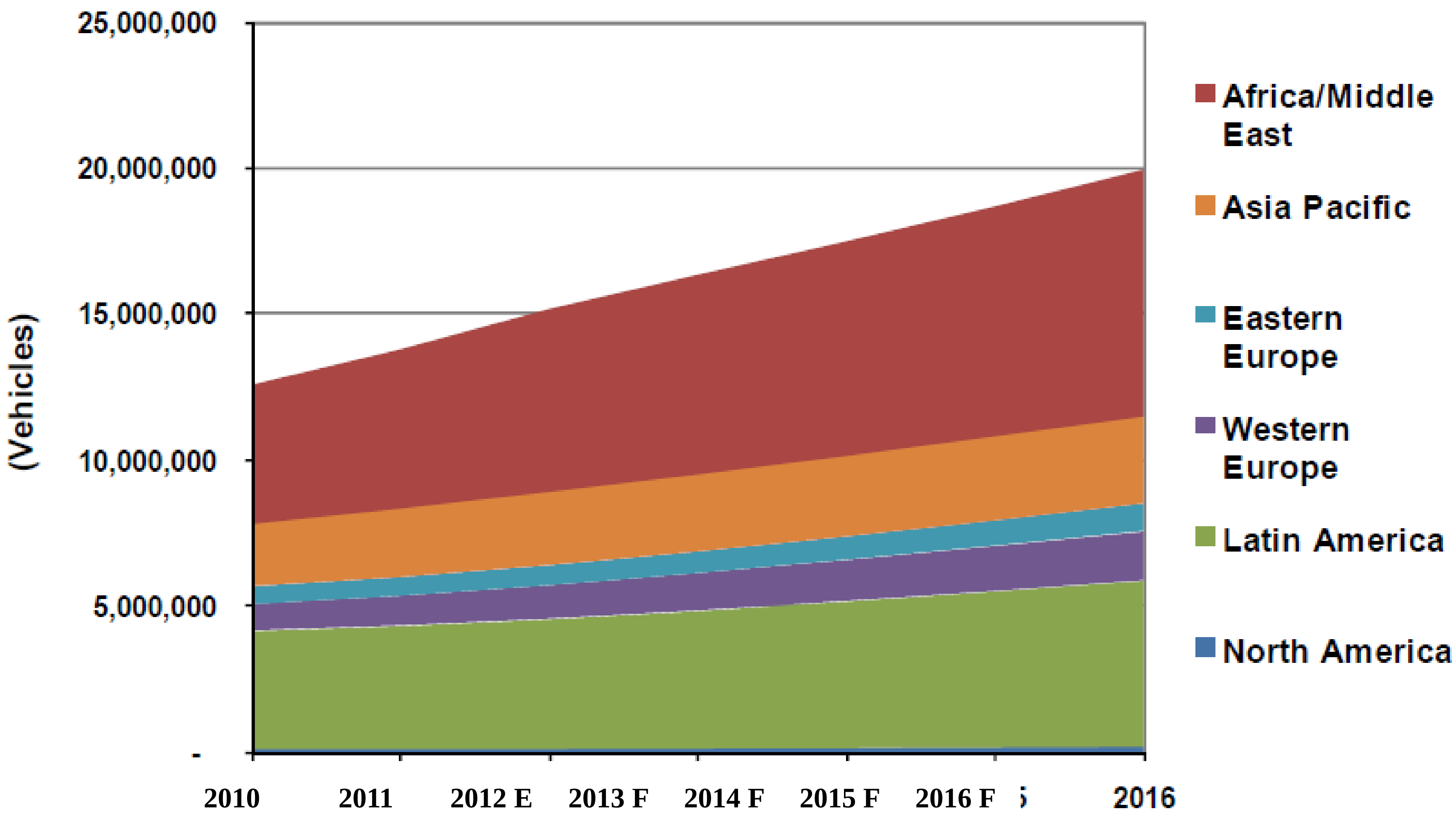
Alternative fuel vehicles to represent 50% of total transit bus deliveries by 2015

The trend toward cleaner transit buses will continue over the next years, and by 2015 it is forecasted that alternative fuel vehicles will represent more than half of the 64,000 total vehicles that will be delivered worldwide during that year, up from 28% of total bus deliveries in 2010. CNG, LNG and hydrogen –among other options- are gaining significant traction in this sector, which has long been an important early adopter market for low-emissions drive trains.

Alternative Fuel Adoption Evolution Cycle



World Area NGV’s



Primary Markets Today ……and Tomorrow

- Road Vehicles
  - Light Duty Vehicles
  - Heavy Duty Trucks and Buses
- Non-Road Vehicles
  - Marine applications
  - Railway applications
- Off-Road Vehicles
  - Construction
  - Agricultural (also compatible w/biogas)

Light Duty Vehicles still challenged by the 'chicken & egg' syndrome

- OEM production expanding, particularly for Western Europe
- Retrofit suppliers filling gaps and very active in Eastern emerging economies where the first cost of OEMs is a deterrent
- To achieve 10% penetration a 'European Solution' will be required.*
- The current development is country-by-country.

* Market Development of Alternative Fuels, European Commission 2003.

European fuels, fuelling stations & vehicles per station

FUEL	VEHICLES	STATIONS	VEHICLES PER STATION
PETROLEUM[1]	234 million	134,282 (+)	1,743
NATURAL GAS[2]	1.42 million	Total = 3,964 (2,706 public & 1,258 private)	358
LPG[3]	7 million	25,519	279

1. Europia Annual Report 2011, from the National Oil Industry Associations (NOIA)
2. Gas Vehicles Report October 2011
3. European LPG Association (AEGPL) as of 2007

Clean Fuels CONSULTING

Huge European NGV Opportunities

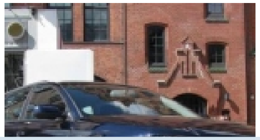
Gazprom Creates New Company to Consolidate NGV Interests

December 14, 2012 – 2:00 pm | Russia

Gazprom's push to develop the Russian natural gas vehicle (NG fuel market has further

develop mark well as expan equipment, in

Audi celebrates topping-out ceremony for its cutting edge e-gas plant in Germany



UK firms are committed to the widespread adoption o biomethane for HGVs

The newly released report "Opportunities each commercial vehicle duty cycle" finds haulage well-to-wheel emissions by up to by up to 65 per cent.

Growing NGV Refueling Stations Sweden

December 11, 2012 – 8:43 am | Sweden

Sävsjö biogas plant generating fuel for NGVs

Fordo a new supply gas ve southe station new bi Septer produ from lo

waste, grass and other organic waste, results in reduced use of gasoline and diesel in transport. It is expected to supply approximately 19 GWh of biogas per year, representing approximately 2.1 million gallons of gasoline. Read More »

Logistics with CAP Dual-Fuel for Ham Group

December 5, 2012 – 11:00 pm | United Kingdom and Spain

Clean Air Power, developer of dual-fuel combustion technology that enables heavy-duty diesel engines to operate on a combination of diesel and natural gas, last month received a Genesis Edge systems order from Spain's Ham Group, a European logistics operator. Ham ordered 50 Renault Magnum compatible Genesis Edge Dual-Fuel™ retrofit system systems in April 2012 and has now followed this with an order for another 30 systems. Read More »

Gas Natural Fenosa Reports on EC GARneT Project for LNG Refuelling Infrastructure

November 30, 2012 – 11:00 pm | Spain

Gas Natural Fenosa, the multinational energy firm based in Spain, and HAM Criogénica, part of Spain's Ham Group, presented the European GARneT (Gas as an Alternative for Road Transport) project this week in Brussels at a conference organised by the European Commission. The project allows for the creation of a network of Liquefied Natural Gas (LNG) stations that provide service to long-distance vehicles that use this fuel. Read More »

New encouraging statistics for the industry 27.12.12 Markets

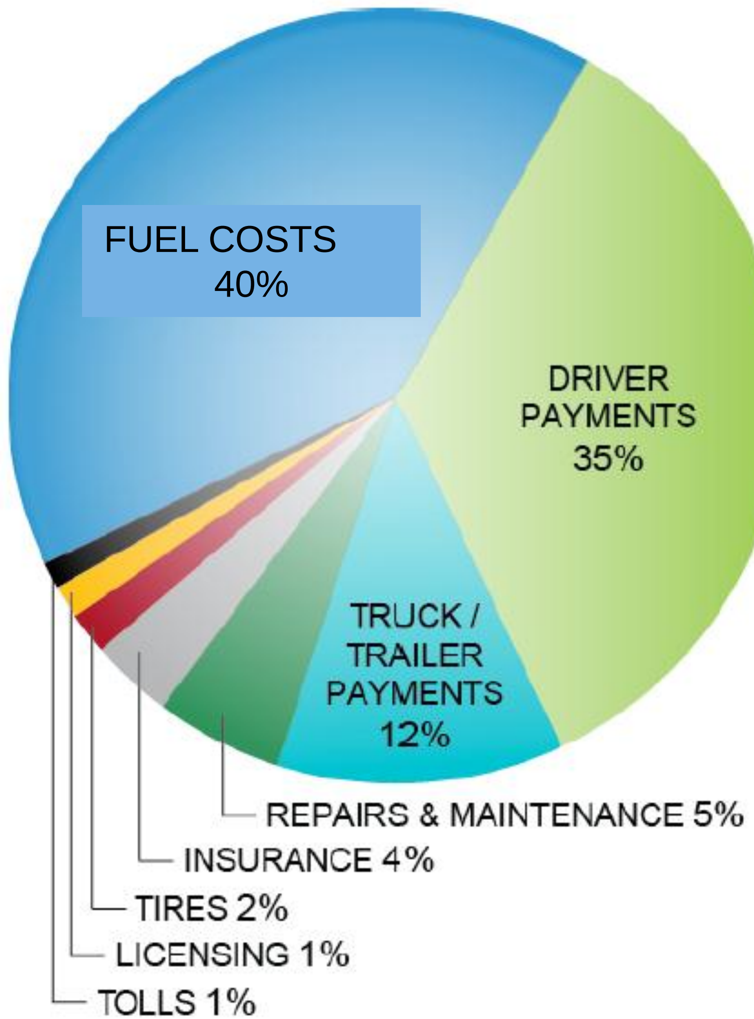
European natural gas vehicle market continues to grow despite economic crisis

Current Global View: HDV NGVs

REGION	TOTAL NGVs	MD/HD BUSES	MD/HD TRUCKS	% MD/HDV of TOTAL NGVs
ASIA	9,733,192	390,849	155,207	5.6%
EURASIA	336,862	32,200	52,760	25.2%
AFRICA	188,220	1,463	85	0.82%
EUROPE*	1,426,494 (1,038,494)	245,934 (13,146)	141,530 (5,737)	27.2% (1.8%)
S & CENTRAL AMERICA	4,608,799	13,920	9,660	0.51%
N. AMERICA	131,036	13,230	2,506	12.0%
WORLDWIDE	16,424,603	697,596	361,748	6.45%
** UKRAINE*	*388,000*	*232,788*	*35,793*	*95%*

Source: Gas Vehicle Reports, Aug/September 2012

Typical Operating Cost Breakdown: US Class 8 Truck Fuel is the Largest Expense



Source: Advancing Technology for America's Transportation Future: Fuel and Vehicle System Analysis,
Natural Gas Analysis, (Draft) National Petroleum Council, August 1, 2012

Payback Case Study #1: UPS

- Largest private fleet in USA – environment, energy security concerns
- 82 new LNG tractors – operating between Los Angeles, Las Vegas and Salt Lake City Distribution Centres
- 688 mile (1107 km) corridor with 3 fuel stations
- ~5100 tonne annual GHGe reductions
- 4 fuelling stations – public access
- Cost reductions result in ~13 month payback

Payback Case Study #2: Vedder Transport

- Largest fleet in British Columbia, Canada – high environmental commitment
- 50 new LNG tractors
- Hauling milk, food, forestry and was
- products in dedicated service
- 3500 tonne annual GHGe reduction from implementation
- Cost reductions result in ~16 month payback

Heavy Duty NGVs require fleet-based fuelling or “fuelling corridors” (likely LNG or L-CNG)

- EU sponsoring ‘Blue Corridor’ LNG project
- Russian Blue Corridor yet-to-be-created
- LNG growth and availability will foster greater development of HD NGVs
- HD OEM L-NGVs provides a market-opener

L-NGV regulatory activities will have a positive effect on HDV growth

- New UNECE rules being developed for dual-fuel trucks (also running on LNG) will facilitate the market
- Amendments to UNECE Regulation 110 lays the foundation for putting LNG components on trucks
- ISO rules developing for LNG fuelling stations and will facilitate LNG and L-CNG outlets

Marine & Rail Potential is huge: Standards & Regulations required to advance these markets

- International Maritime Organization (IMO, within the UN structure) will need advocacy from the NGV stakeholders to create a full suite of standards and regulations for fuelling; fuel connectors; bunkering; fuel storage on-board ships; etc; etc;
- Inland shipping regulations need to be examined
- Role for UNECE might be to perform a ‘gap analysis’ of maritime & railway regulatory requirements for the sector
- Full study of the market potential (European & globally) also is required

People don’t know you can run a vehicle on natural gas

- When the going gets tough, the tough advertise!
- The unknown is un-liked. Make the unknown known and it will be liked!
- Gas industry can be the intellectual leaders and market drivers of a long-term revolution in the vehicle transportation market.
- UNECE might want to create a ‚’model’ NGV Roadmap for its gas industry members.

Evolution or Revolution?

Evolution: Takes to long

- USA took 20/30years to arrive at current growth

Revolution: Imperfect but pragmatism has its place

- India
- Iran
- China

NGV Global
International Association for Natural Gas Vehicles

Phil Fathers

Vice Chairperson, NGV Global

Thank you

Any Questions

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