The Status and Future of the Natural Gas Vehicle Market

Alternative Fuel Vehicle Conference
Montreal, PQ

September 27, 2012

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Growth in World NGV Market

- 2003: 2.8 million
- 2007: 7 million
- Today: 16.4 million

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Notable NGV Growth

Country	NGVs 2003	NGVs 2012	Stations '03	Stations '12
Iran	*	3,100,000	*	1,800
Pakistan	350,000	2,850,000	200	3,300
Argentina	1,000,000	2,050,000	1,000	1,900
Brazil	550,000	1,700,000	535	1,800
India	137,000	1,100,000	116	700
Italy	400,000	761,000	490	860
China	69,300	600,000	270	2,500
Colombia	*	348,000	*	650
Global Total	**2,814,438**	**16,400,000**	**6,455**	**20,700**

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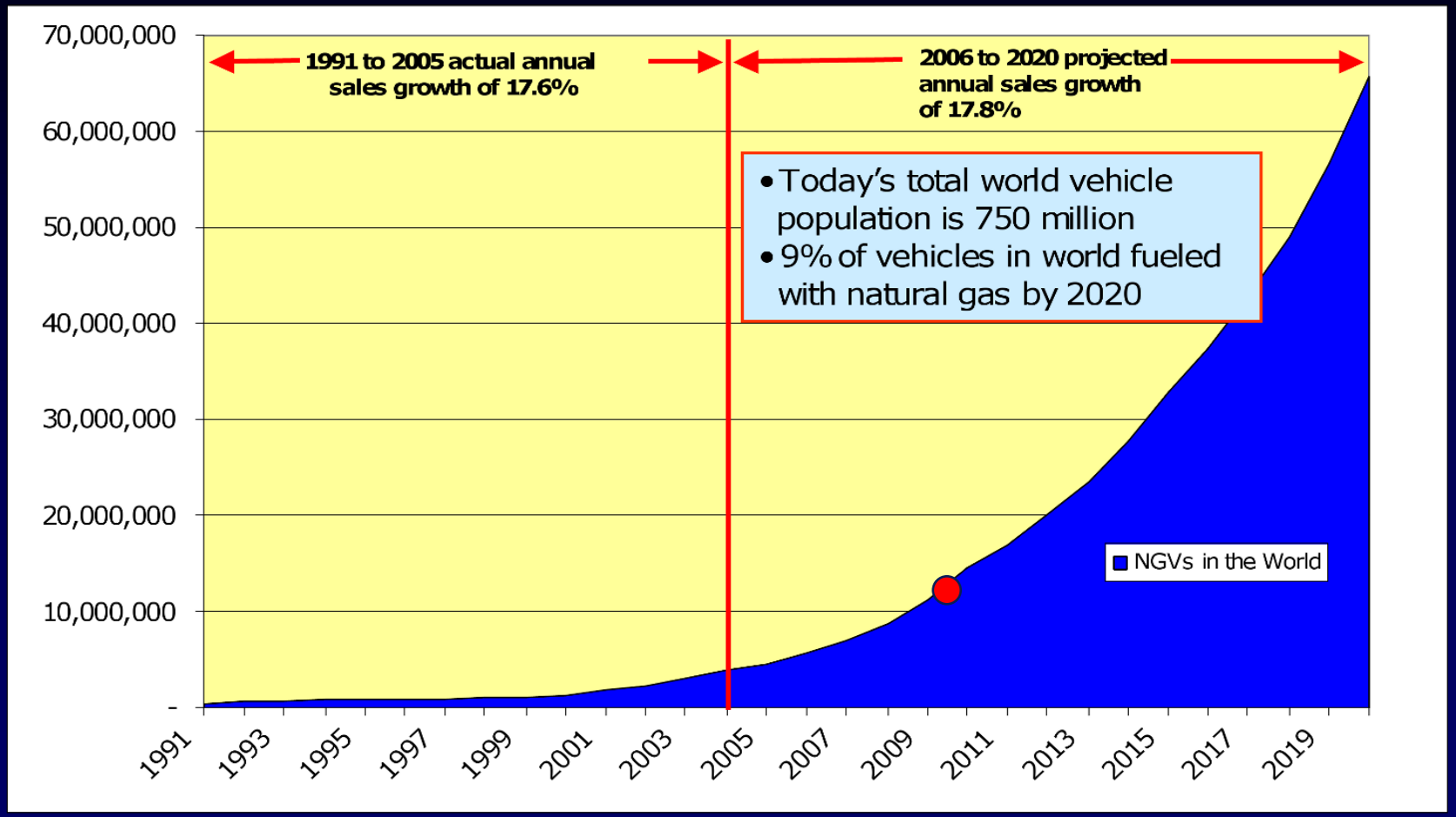
International Vehicle Availability

- Every major car manufacturer is making natural gas vehicles for some market somewhere:
  - GM/Opel – Chevrolet – Ford – Mercedes
  - Volkswagen – Fiat – Citroen – Hyundai
  - Renault – Peugeot – Tata – Mitsubishi
  - Toyota – Honda – Nissan – Isuzu
  - Skoda – Volvo – Geely – Lifan

World Wide NGV Growth Actual/Projected



Snapshot: NGVs Today

- Existing NGV inventory is estimated at ~120,000
  - Pace of attrition of older LDVs is gradually declining; total counts are increasing
  - Steady growth in MDV/HDV inventory due to expanded truck OEM options
    - **~25-26,000 HDVs**
      - 11,000 transit buses/shuttles
      - 4,000 school bus
      - 5,400+ refuse
      - 2,200 ports/regional haul
      - 2,800 municipal/F&B/Misc
    - **~72-74,000 LDVs**
      (fleet and consumer use vehicles)
      - 35,000 Cars/SUVs
      - 39,000 trucks/vans
    - **~17-20,000 MDVs**
      - 7,500-8000 gov't
      - 1,800 package delivery
      - 1,700 airport shuttle
      - 1,000 transit/CTAA
      - 4, 500-6,000 utilities, F&B, commercial services, household goods, construction, misc

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Snapshot: NGV Fueling Today

- Station count is ~1100 vs 150,000 gasoline stations:
  - Count is less than the late 1990s peak of ~1350
  - But number has grown steadily in past 12-18 months
  - Attrition of older stations built in 1990s is finished;
  - New investment/upgrades to older stations
  - New stations are based on better economics, higher throughput with anchor accounts or aggregated loads (multiple fleets, consumers)
- Potential for 200-250 new stations in 2012!

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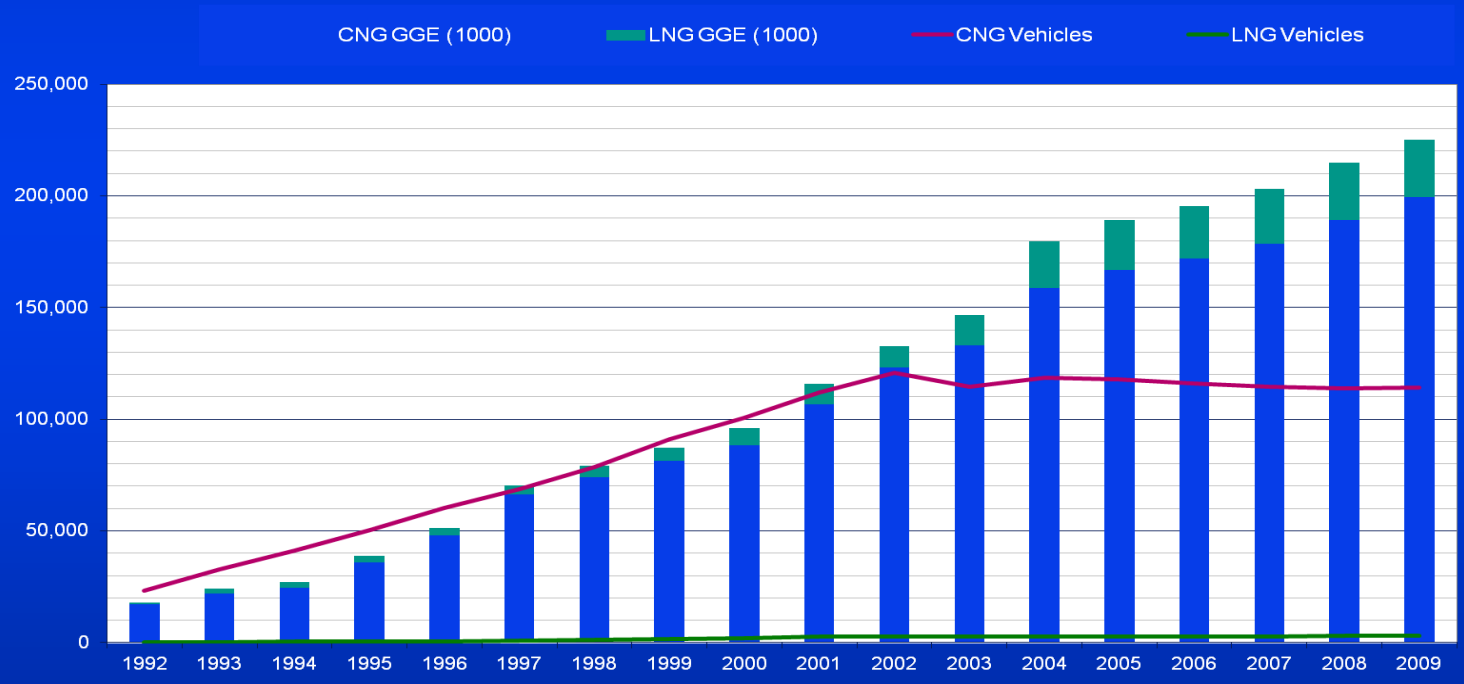
Snapshot: NGV Fuel Use Today

- Vehicular natural gas consumption:
  - ~10-12% AGR past 6 years
  - In 2005, ~200 million GGE; In 2010: ~350 million GGE (44Bcf)



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Energy Use in On-Road Transportation

- Total energy usage: 21.97 quads or Tcf (2010):
  - Light-duty: 16.7
  - Heavy-duty freight: 4.41
  - Commercial light trucks: 0.59
  - Buses: 0.27

  } 5.27 Tcf

- About 25% of total is diesel

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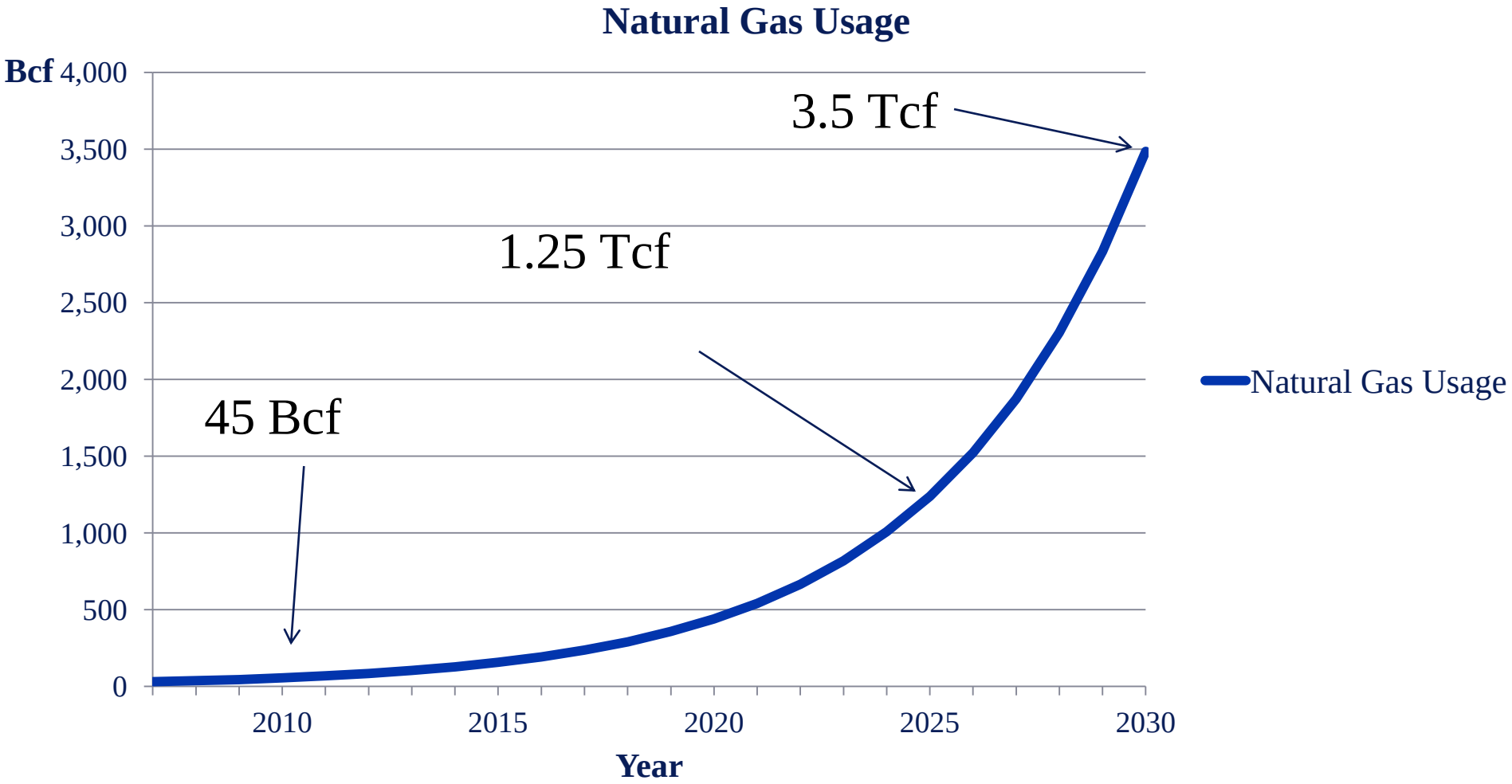
Achievable NGV Gas Usage and Vehicle Growth



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Why the NGV Market Will Grow

- We Have the Fuel – And It's Ours
- Substantial Air Quality: Urban Pollution
- Substantial Air Quality: GHGs
- Biomethane Makes GHG Case Stronger
- Only Natural Gas Can Displace Diesel
- NGVs are a Here-and-Now Technology
- Government Policymakers are (Finally) Recognizing the Value of NGVs
- Money!!

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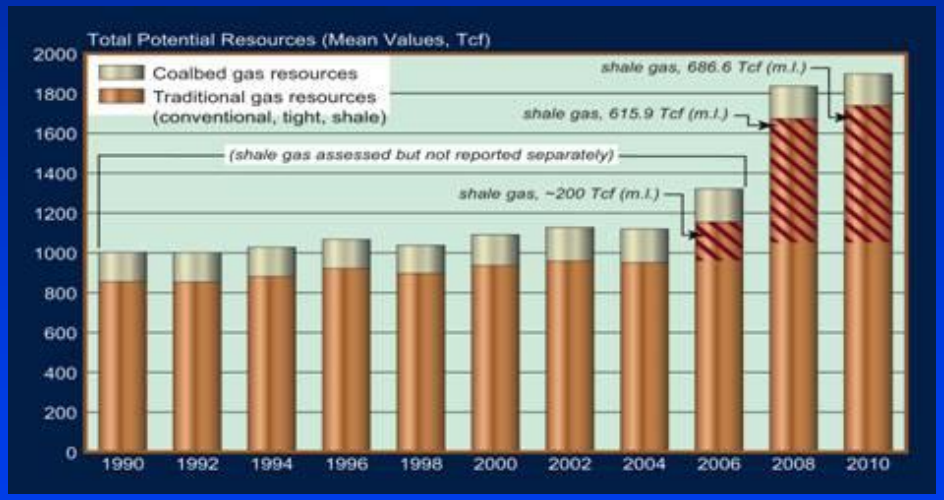
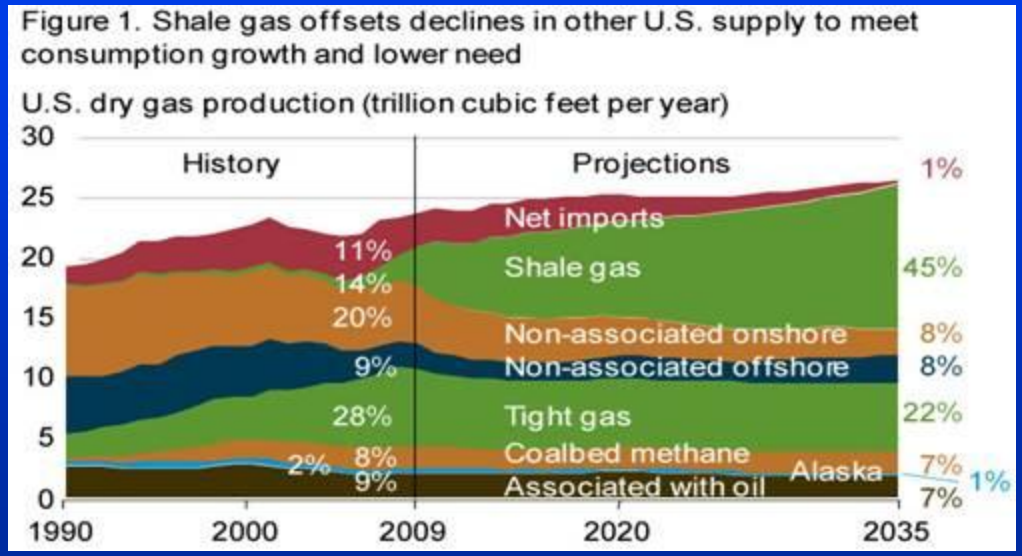
We Have the Fuel – and It's Ours!



PGC Resource Assessments, 1990-2010

- 98+% from North America
- Well-developed distribution infra-structure;
  - ~300K miles of interstate pipeline
  - 1.2 million miles of LDC distribution lines
- Technology improvements expand recoverable base. Shale gas is major player
- Supply is now estimated @ 115+ years!

Shale Basins and the U.S. Pipeline Grid



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Source: American Clean Skies Foundation.

Substantial Air Quality Benefits

- NGVs produce less criteria pollutants than gasoline and diesel vehicles (NOx, CO, VOCs, PM)
- NGVs produce less greenhouse gases (GHG):
  - 22% less than diesel vehicles
  - 29% less than gasoline vehicles
  - These are well-to-wheels numbers developed for CARB:
    - Includes methane

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Only Natural Gas Can Displace Diesel

- Many options for LD vehicles:
  - e.g., natural gas, ethanol, electricity, plug-hybrids
- Only two available options for HD diesel trucks and buses: biodiesel and natural gas
- Biodiesel is limited and has small diesel displacement benefits
- That leaves natural gas as only option

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NGVs are a Here-and-Now Technology

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Growing Selection of NGVs from OEMs, SVMs

OEMs

- American Honda
- General Motors
- Chrysler
- VPG/MV-1
- Thomas Built Bus
- Blue Bird Bus
- Optima/NABI
- El Dorado
- New Flyer
- Orion
- Foton America
- Gillig
- Elgin
- Allianz/Johnston
- Schwarze
- Tymco

OEMs

- Freightliner Truck
- International/Navistar
- Kenworth
- Volvo
- Peterbilt
- Mack
- ALF Condor
- Crane Carrier
- Autocar Truck
- Capacity

OEM/Repower Engines

- Cummins Westport
- Emission Solutions Inc
- Westport Innovations
- Doosan America

SVMs (LDV/MDV/HDV)

- Altech-Eco
- BAF Technologies
- Landi Renzo/Baytech Corp
- IMPCO Technologies
- NGV Motori
- NatGasCar
- Auto Gas America
- GoNatural CNG
- Westport LD
- Green Kraft

  - GM, Ford, Dodge
  - Workhorse, Isuzu, FCCC

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Fueling Infrastructure

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CNG Infrastructure Strategy

- Bottom up (organic growth) strategy
- Focus on local, high fuel-use fleets:
  - Return-to-home vehicles
  - Point-to-point vehicles
- Adding 20-25 stations per month

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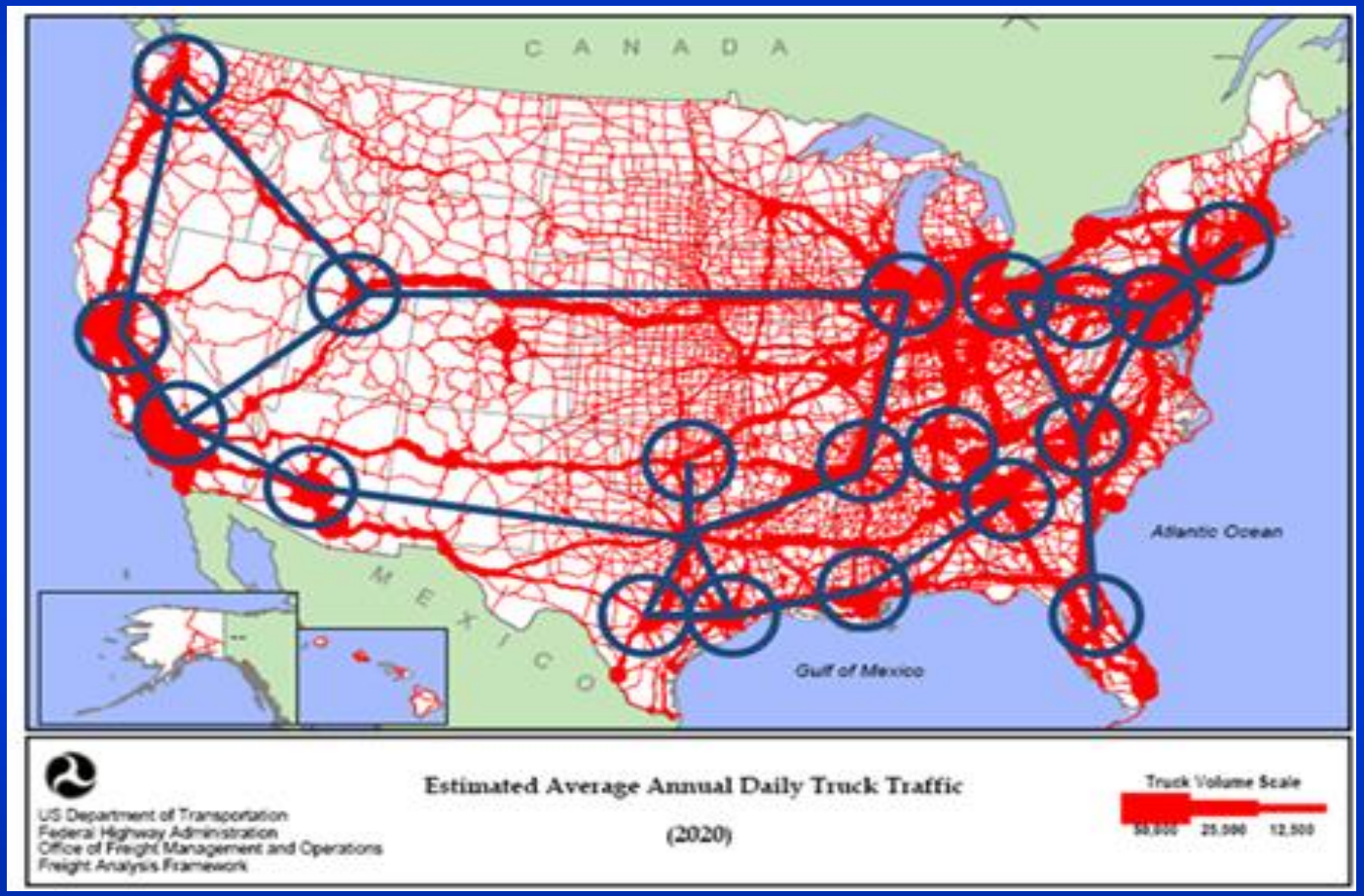
CNG Infrastructure Strategy

Step 1:
Serve local/regional fleets within hub. Build confidence for consumer adoption.

Step 2:
Serve spokes that connect the hubs



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What Has Worked:
Urban & Return-to-Base Commercial Fleets

Mumbai

Vancouver

Las Vegas

Los Angeles

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LNG Infrastructure Strategy

- Primary focus: Over-the-road trucks
- Started with bottom up strategy but now shifting to national, top down strategy
- Clean Energy:
  - 150 LNG stations at Pilot/Flying J truck stops by end of 2013
- Shell:
  - 100 LNG stations at Travel Centers

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LNG Infrastructure Corridors

(Dec. 2012 Projected)

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Robert Transport

- Large fleet in Eastern Canada
- 180 Peterbilt trucks with Westport HD 15 L
- LNG trucks supports long-term contracts for IKEA & others
  - Operates 1,100 tractors
  - Eastern Canada corridor between Montreal and Toronto

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UPS

- Largest private fleet in USA
  - environment, energy security concerns
- 48 new Kenworth trucks with Westport HD 15L
  - Operating between Los Angeles, Las Vegas and Salt Lake City DCs
- 688 mile (1107 km) corridor with 3 fuel stations

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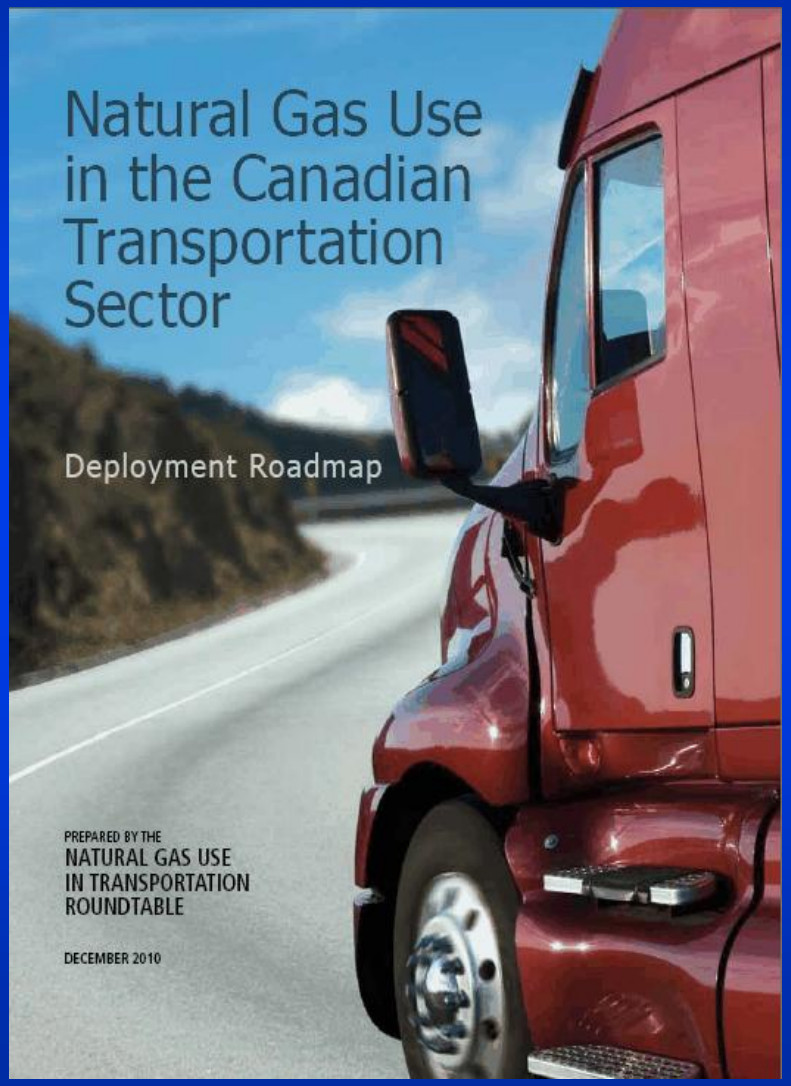
Deployment Roadmap Initiative



- Roundtable process in 2010 initiated by Natural Resources Canada
- Quebec 1of 3 participating provinces
- Implementation Committee in place as recommendations being implemented
  - Addressing technical barriers including codes, standards, and regulations
  - Education and outreach including Eastern Canadian Outreach Hub to launch in late 2012

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Government Policymakers are Recognizing the Value of NGVs

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Federal: NGV Incentives Legislation

- The "New Alternative Transportation to Give Americans Solutions" (NAT GAS) Act introduced in the House and the Senate (HR 1380; S. 1839)
- For five years would:
  - Extend 50 cent per GGE fuel credit
  - Expand infrastructure credit to 50% or $100,000
  - Implement a vehicle purchase credit:
    - From $7,500-$64,000 depending on weight of vehicle
- House: 181 bipartisan co-sponsors

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Federal: Administration Support

- On January 26th, President Obama unveiled his "Blueprint to Make The Most of America's Energy Resources"
- Four sections:
  - Two on increasing natural gas supply
  - Two on increasing use of NGVs

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State NGV MOU

- 14 states have signed MOU in support of NGVs:
  - Begun with 4 states in November 2011
- Purpose:
  - To urge OEMs to manufacturer light- and light-medium-duty NGVs
  - To commit to phasing NGVs into state fleets
  - To possibly reach out to municipalities to phase in NGVs
- Letter sent by 21 states to 19 OEMs requesting NGV information

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State, Regional and Local Government Support

- California leads the way:
  - Carl Moyer Program
  - SCAQMD
  - LA/LB Ports Program
- Texas TERP Program
- Tax and other incentives:
  - Utah; NY; Oklahoma; Louisiana; others
  - 250 pieces of alt fuel legislation introduced since January

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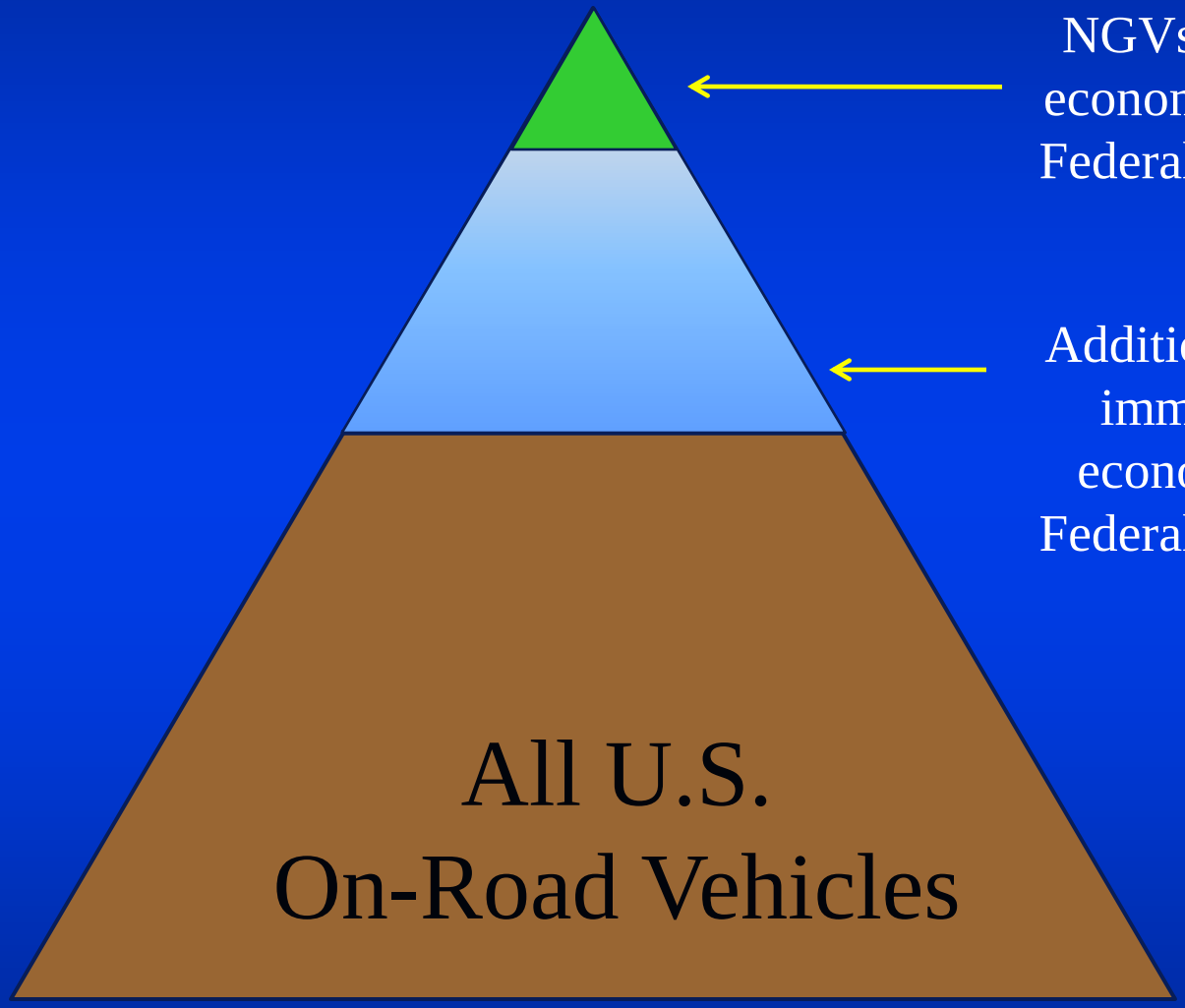
NGV Market Pyramid

Most

Fuel Used Per Vehicle

Least



NGVs currently economic *without* Federal incentives

Additional NGVs immediately economic *with* Federal incentives

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Refuse Truck Economics

- Crane Carrier LET, Autocar Xpeditor, Peterbilt LCF 320 , Condor , Mack TerraPro
- MPG: 2.5 – 3.0 (lots of idle and PTO time)
- Fuel Use:
  - 35-40 GGE/day
  - 8500-10,000 DGE/yr
- CNG/LNG Premium: $32,000
- Simple Payback: 2.1-2.5 years
  (based on 1.50 savings /DGE)
- Life-cycle cost savings: $80 - $87K+
  (based on 8-year life)

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Exploring New Market Opportunities

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