Natural gas vehicles

- Natural gas and LPG vehicles have had vehicle, fuel and infrastructure related subsidies, but the vehicle and infrastructure subsides have expired in 2010
- Vehicle sales have declined over the last 2 decades from about 20,000/yr in the early 1990s to about a tenth of that level for natural gas light duty vehicles.
- Recently, there has been more interest with GM re-entering the market with factory authorized CNG conversions, but there has no been no major increase in demand in spite of the wide spread between oil and natural gas prices.
- Total funding for NG vehicles in the 2008-2010 time frame has been almost $1billion. Funding concentrated on infrastructure ($514 million) and vehicle purchase subsidy ($302 million)

Natural Gas Funding by Year (Millions)

	2008	2009	2010	Total
Federal (1)	**$239**	**$397**	**$63**	**$699**
Non-ARRA	$239	$235	$63	$537
ARRA	$0	$162	$0	$162
Within CA	*$7*	*$20*	*$0*	*$27*
State (1)	**$47**	**$39**	**$65**	**$151**
Nationwide	$47	$39	$65	$151
Within CA	*$22*	*$14*	*$31*	*$67*
Private (2)	**$48**	**$56**	**$0**	**$104**
Corporate	$20	$46	N/A	$66
Venture Capital	$28	$10	$0	$38
Within CA	*$1*	*$12*	*$0*	*$13*
Total	**$334**	**$491**	**$128**	**$954**

Issues for Natural Gas Vehicles

- Vehicle conversion cost is a major issue since high fixed cost of certification ($1 million)is borne only by a few hundred units per model.
- Loss of trunk space and range are major issues for light vehicle penetration and for non fleet buyers.
- Centrally fueled fleets face hurdles in vehicle resale, and are typically very cost sensitive. In addition, the total market for centrally fueled gasoline vehicle fleets is quite small.
- Diesel truck conversions have high first cost, payload reductions due to tank weight and reduced energy efficiency due to conversion of diesel engine to spark ignition.

NG Refueling Infrastructure

- Public NG refueling infrastructure expansion has proved difficult due to space and cost issues.
- No new gas stations are being opened so that NG must compete with a gasoline pump for space in a refueling station.
- Low throughput of vehicles for NG refueling in the near future makes NG pumps economically difficult for gas station owners
- Owners are being squeezed already by very thin retailing margins so that all infrastructure cost must be borne by gas supplier.

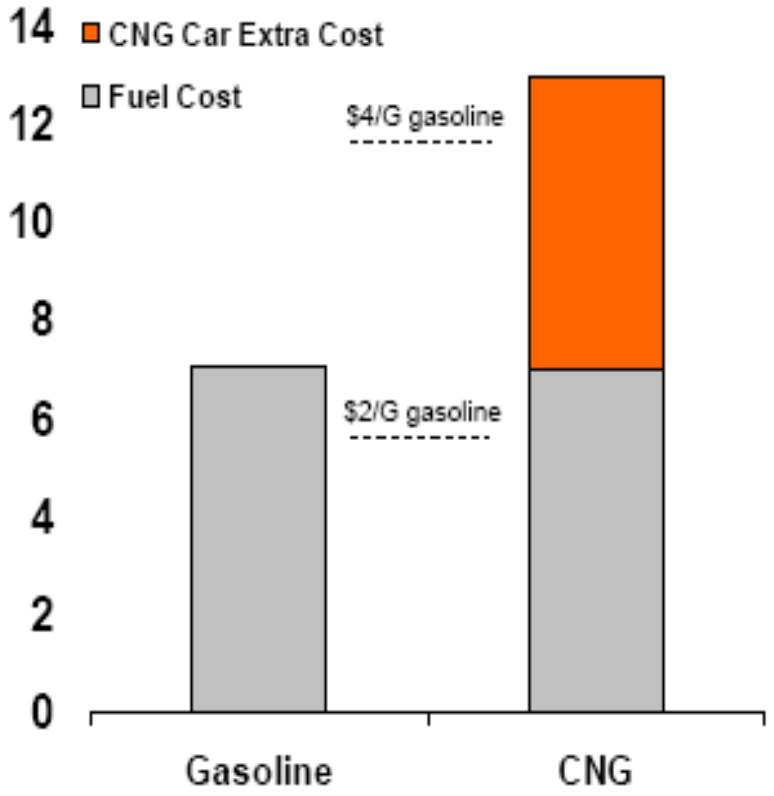
Economics of NG Light Vehicles (from ExxonMobil)

CNG Assumptions - 2010

	Gasoline	CNG
Fuel Price, $ per gasoline equivalent gallon	2.50	2.45
Fuel Price to Retailer*	1.80	0.80
Retailers expense and margin	0.20	0.25
Capital charge for CNG station	0.00	0.90
Fuel taxes	0.50	0.50
5-YR Fuel Costs, $K	7.1	7.0
Incremental Vehicle Costs, $K	Base	+6.0

CNG Vehicles vs. Conventional

Incremental 5-yr costs, $k



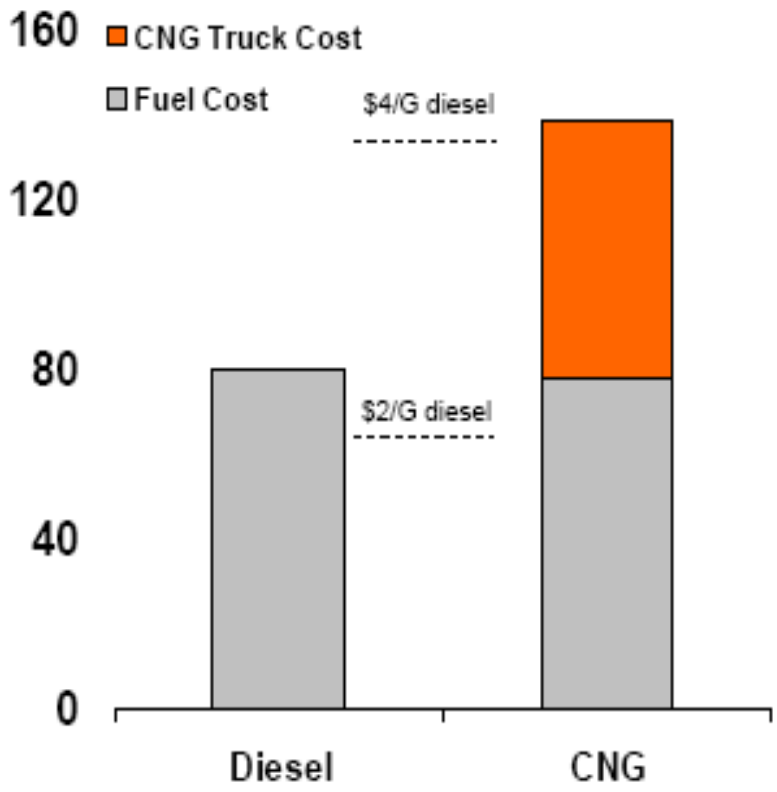
Heavy Truck CNG Economics (from ExxonMobil)

CNG Assumptions - 2010

	Diesel	CNG
Fuel Price, $ per diesel equivalent gallon	2.40	2.30
Fuel Price to Retailer*	1.70	1.00
Retailers expense and margin	0.20	0.20
Capital charge for CNG station	0.00	0.60
Fuel taxes	0.50	0.50
5-YR Fuel Costs, $K	80	78
Incremental Vehicle Costs, $K	Base	+60

CNG Truck vs. Conventional

Incremental 5-yr costs, $k



Summary for the US

- Prospects for NG light vehicles appear poor even at $4/gallon gasoline due to high vehicle cost and vehicle attribute loss.
- Prospects for CNG trucks marginal even at $4/gallon diesel but may be useful for some centrally fueled fleets
- LNG is a new option but faces several difficulties with distribution, boil-off, refueling and economics. Greenhouse gas emissions may be an issue with gas venting from boil-off and refueling.