Re-introduction of CNG as an Alternative Transportation Fuel

Presented by

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Agenda

1. History of CNG in Trinidad & Tobago
2. Current Situation
3. Liquid Fuel Subsidy
4. Conversion Economics
   - From Gasoline
   - From Diesel
5. CNG vs. Gasoline

Definitions

CNG = Compressed Natural Gas

NGV = Natural Gas Vehicle

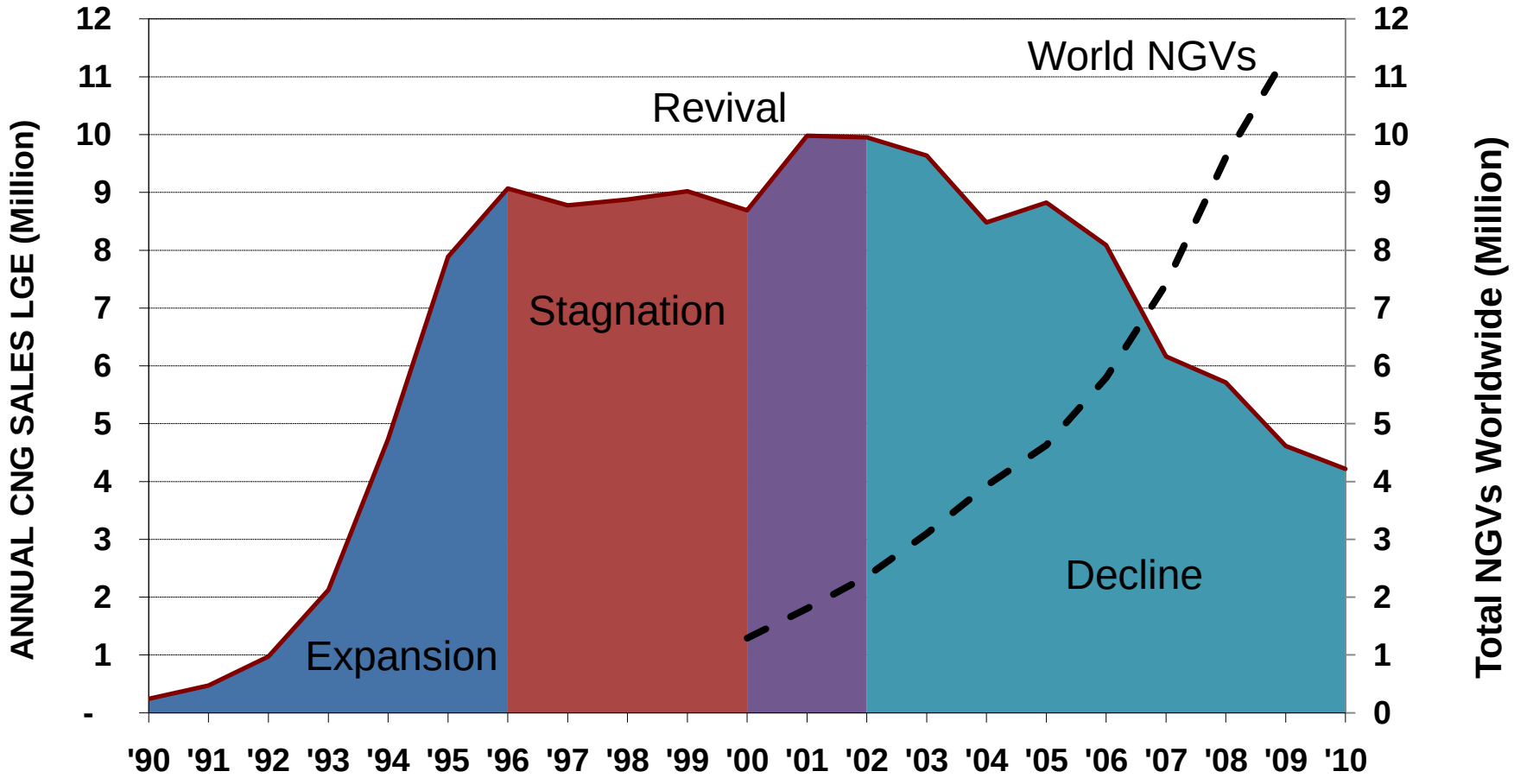
OEM = Original Equipment Manufactured

Bi-Fuel = Use either gasoline or CNG

Dual Fuel = Use Diesel & CNG together

LGE = Litre Gasoline Equivalent
(based on energy content)

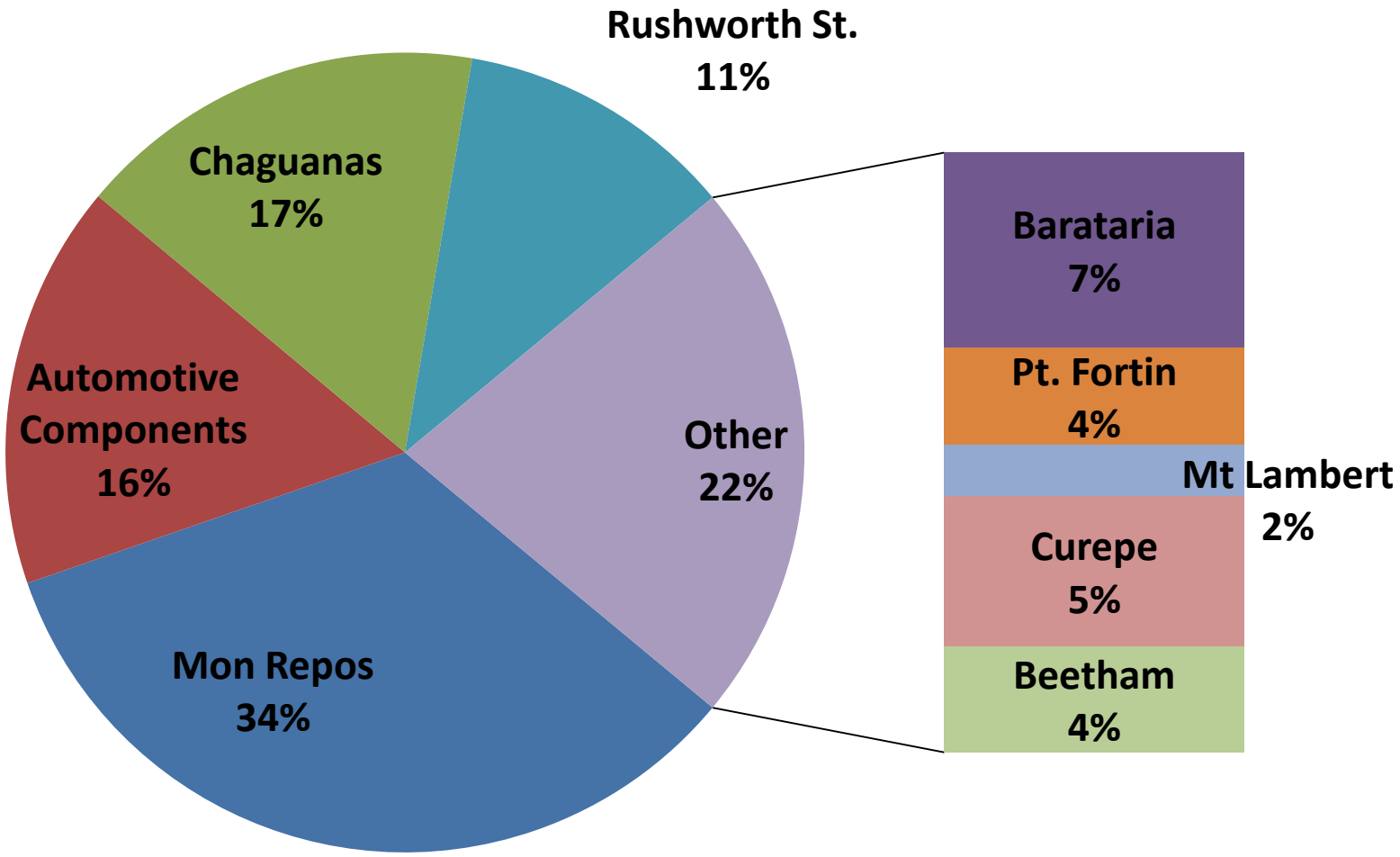
Annual CNG Sales in T&T vs. World NGVs



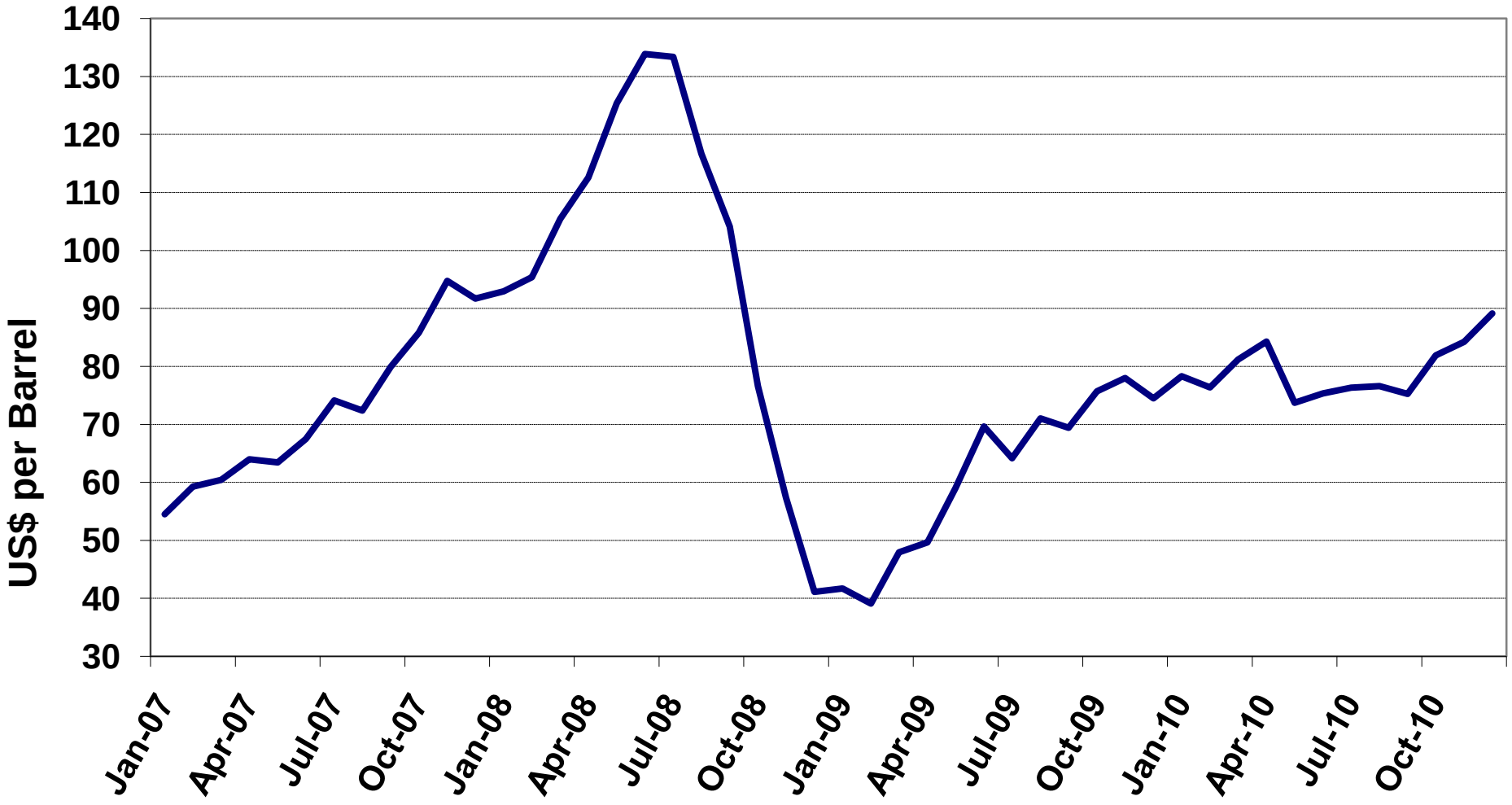
Current CNG Market Summary

- CNG Installers = 1
- Conversions to date = 4,100 (est.)
- Average fill per vehicle = 12.5 lge
- CNG Stations in Service = 9
  - 4 NPMC Multi Fuel, Low Capacity
  - 4 NPMC Multi Fuel, High Capacity
  - 1 ACL Dedicated, High Capacity

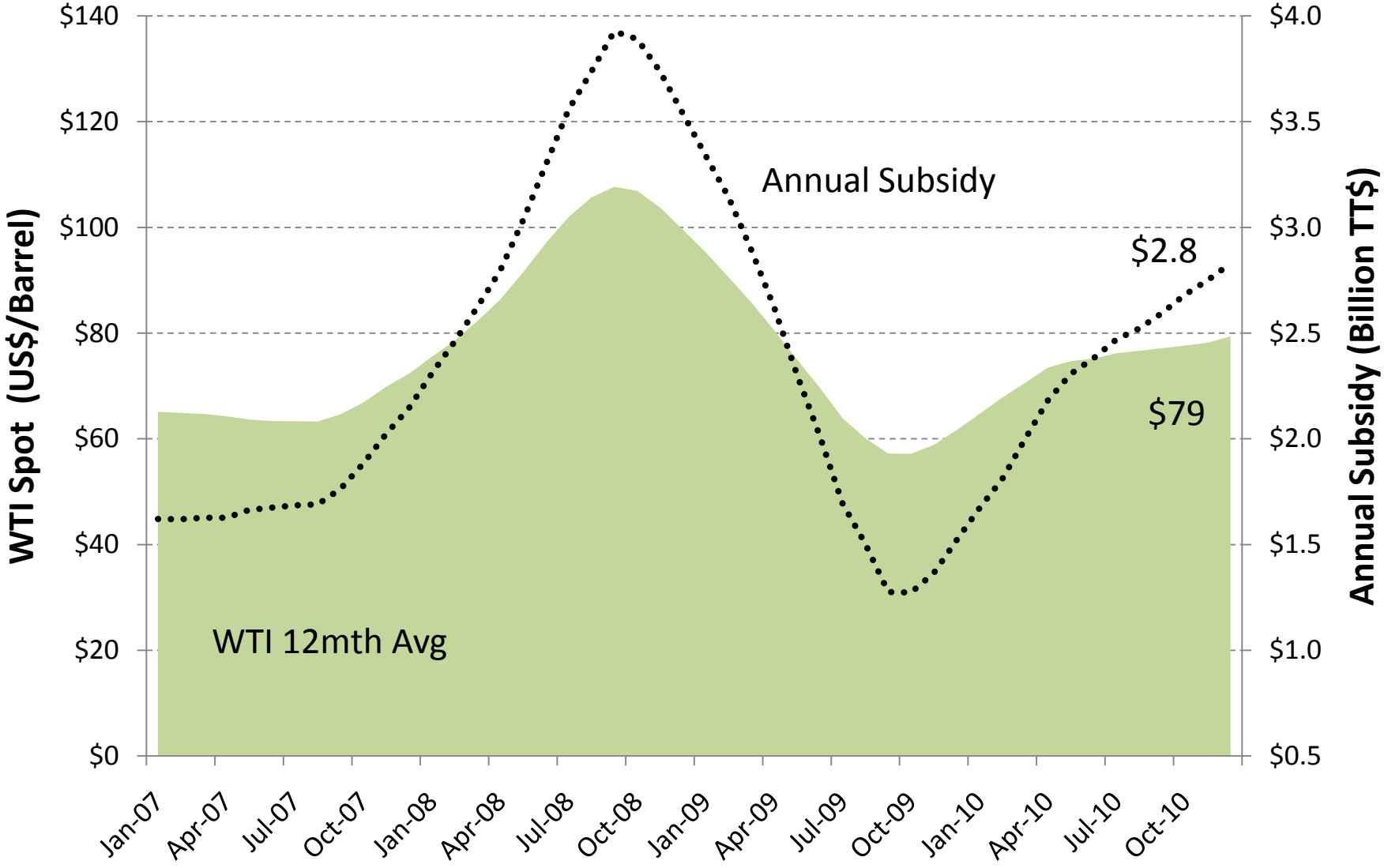
CNG Sales Distribution - 2010



Monthly WTI Spot Prices (US$/barrel FOB)



OIL Prices vs. Annual Subsidy (Billions TT$)



Current Transport Fuel Retail Prices

Fuel	Pump Price (per litre)	CNG % of Fuel Price	Market price @ WTI $77/bbl (Sep'10)	Unit Subsidy (per litre)
Premium	$4.00	27%	$4.72	$0.72
Super	$2.70	40%	$4.52	$1.82
Diesel	$1.50	71%	$4.11	$2.61
CNG	$1.07	-		

Annual Station Volumes by Vehicle

Category	2008 Autos est. (000)	Fuel Use (Lge /day)	Total Gasoline (Mn Ltr)	Total Diesel (Mn Ltr)	Total Volume (Mn Ltr)
Private cars	332	5	470	25	495
Commercial	65	10	10	72	82
Taxis	28	25	140	63	203
Maxis	4	75	0	90	90
PTSC Buses	0.2	100	0	6	6
Total	470		620	250	870

4,000 Maxis x 75 lit/day x 300 days x $2.61/lit = TT$235Mn/yr ~ $59,000/Maxi

Typical Annual Fuel Consumption by Sector

(Mn litres)	Super	Prem	Diesel	Total
Service Stations	465	155	250	870
Goods & Services	0	0	70	70
Industries (Const, Govt, & local Bunkering)	1	1	210	212
Total Volumes	466	156	530	1,152
Unit Subsidy (TT$/ltr) @ WTI $77/bbl (Sep'10)	$1.82	$0.72	$2.61	
Subsidy Cost (TT$Mn)	(848)	(112)	(1,383)	(2,343)

Why is CNG better than Gasoline?

1. **Cheaper**
   - Almost 1/3 the cost of Super = Savings in fuel bill
2. **Reduced Maintenance cost**
   - Contains NO additives
   - Burns cleanly leaving no by-products of combustion to contaminate spark plugs & engine oil
   - Combustion chamber parts function at peak output for longer periods before requiring service
   - Engine oil remains clean which minimizes engine wear & requires less frequent oil changes

Why is CNG better than Gasoline? (cont'd)

3. More Environmentally Friendly

- Engines run quieter due to higher octane rating of CNG
- Less Carbon Monoxide (CO)
- Less Carbon Dioxide (CO2)
- Less Nitrous Oxides (NOx)
- Can be reduced by as much as 95% when compared to gasoline powered vehicles

Why is CNG safer than Gasoline?

- **Natural gas is lighter than air**
  - If released, CNG rises quickly & dissipates, thus reducing the risk of ignition
  - Gasoline stays on the ground & releases flammable vapors which increases the risk of ignition
- **Natural gas has a higher ignition temperature** (580 ^{o}C) vs. gasoline (232 ^{o}C)
  - Needs a much hotter ignition source to cause a fire
  - Only flammable at (5-15%) concentration with air
  - Gasoline vapors flammable at a much wider range

Initial Targets

1. Government Agencies/Ministries
2. State Companies (11 of 20 responded)
   - Sedans – 546
   - SUVs – 106
   - Pickups – 601
   - Est. Total – 2,000 @ 500 renewals/yr (~TT$ 70Mn)
3. Commercial Fleet Owners (Kiss, Nestle, etc.)
4. Maxis
5. PTSC

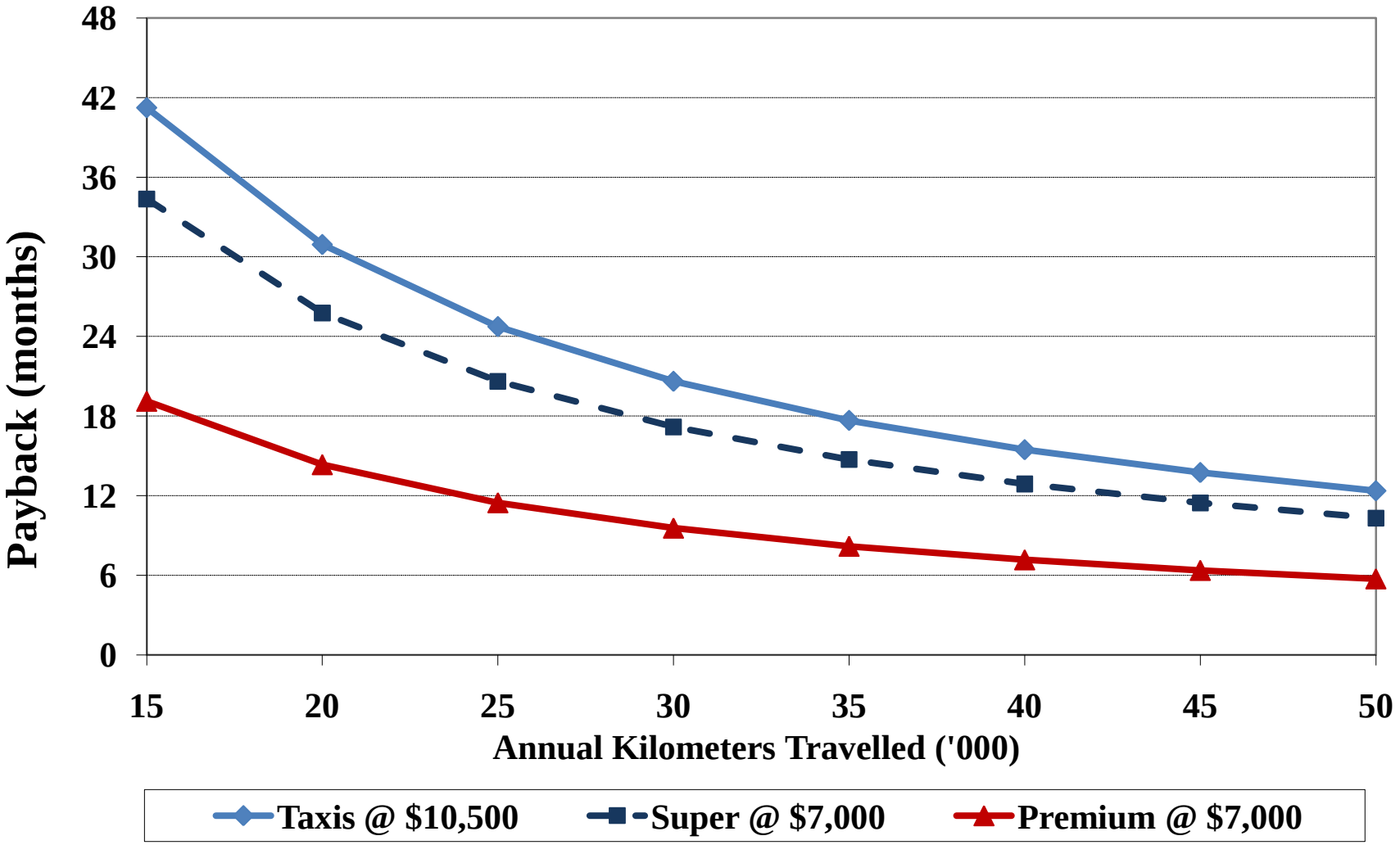
Conversion Economics

Vehicle	Fuel Used	Revised Kit Cost	2yr payback ('000 km) @ 1.07/lge	2yr payback ('000 km @ 0.75/lge
Car	Prem	$7,000	12	11
Car	Super	$7,000	21	18
Taxi	Super	$10,500	26	22
Taxi*	Diesel	$16,000	149	85
Maxi*	Diesel	$21,000	98	56
Commercial*	Diesel	$16,000	112	64 (3yr=43)

*Presumes Engine change out to gasoline & kit

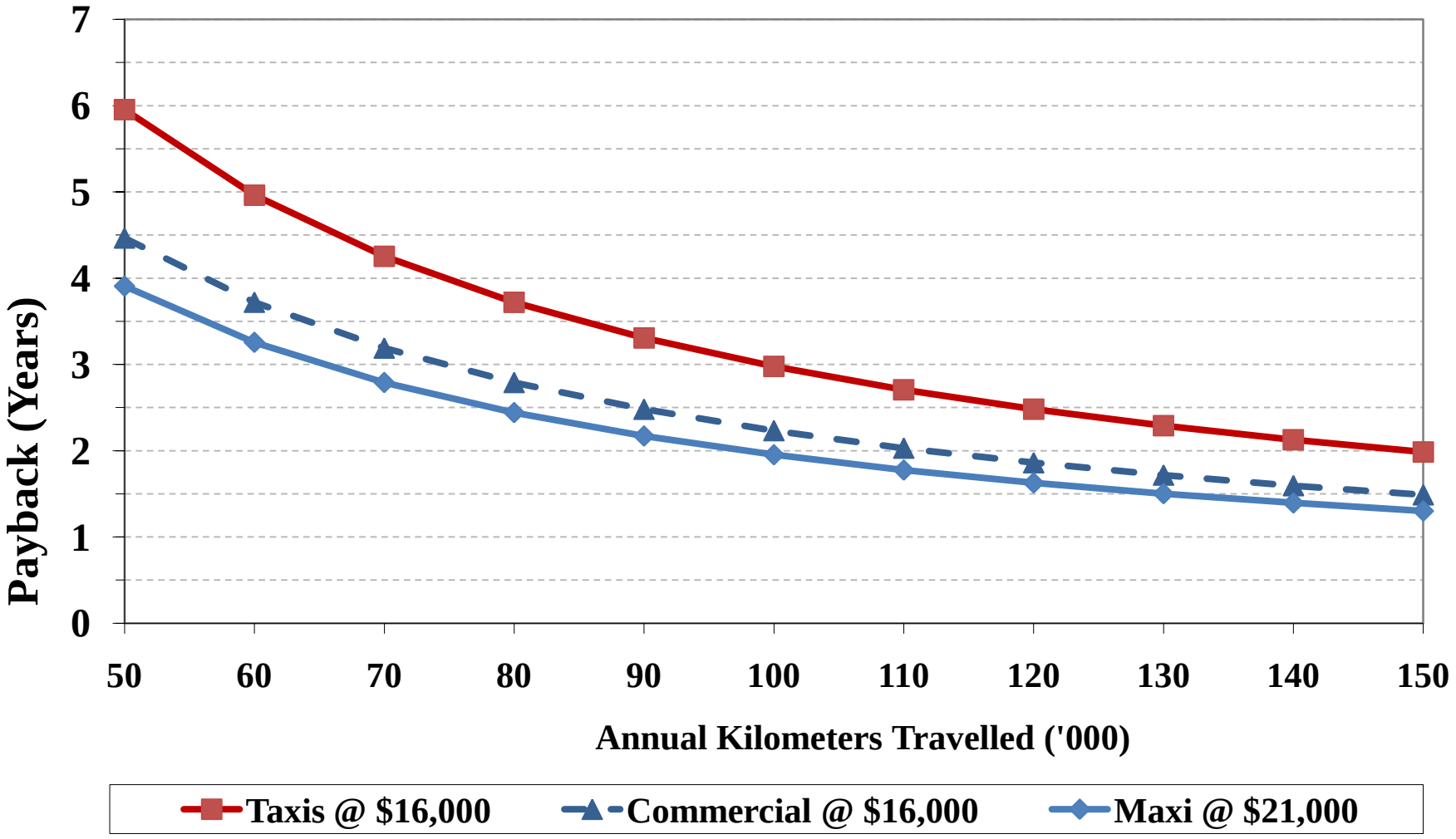
Conversion Economics From Gasoline

Taxis @ 8km/lge, Cars @ 10 km/lge



Conversion Economics From Diesel

Taxis @ 8 km/lge, Commercial @ 6km/lge, Maxis @ 4 km/lge



OEM NGV Examples

- VW Passat & Golf
- Mercedes Benz E200, B190
- Ford Focus 2.0L
- Honda Civic GX
- Hyundai Accent
- Mitsubishi Lancer
- Skoda Octavia
- Toyota Corolla, Camry
- Audi A5
- Volvo S60/V70

CONCLUSION

1. CNG Market is in Decline in T&T
2. Faster dispersed refuelling Stations coming
3. 2010 Liquid Fuel Subsidy ~TT$ 2.8Billion
4. CNG vs. Gasoline is
   - Cheaper
   - Lower Maintenance cost
   - More Environment friendly
   - Safer
5. Initial targets – State Sector & Maxis
6. Incentives provide good Conversion Economics
7. Many OEM NGV available

Thank You…
Any Questions?