



Canadian Natural Gas Vehicle Alliance
Delegation to City of Richmond
January 21 2004

Sarah Smith



Why is the Canadian Natural Gas Vehicle Alliance (CNGVA) here today?

- Introduce the CNGVA and Clean Energy to the City of Richmond's Mayor and Councillors
- Use of Natural Gas in transportation today
 - Reliability
 - Costs
 - Emission reductions
- Natural gas and hydrogen
- Natural gas and TransLink
- Natural gas and City of Richmond – opportunities



Who is the CNGVA?

- An alliance of natural gas vehicle industry partners including natural gas utilities, fuel providers, vehicle manufacturers, compressor and dispenser manufacturers, NGV component and parts companies, governments, and R & D firms
- CNGVA brings all NGV expertise together, particularly in the areas of market development and promotion, to collectively build and maintain an environment that encourages the further deployment of natural gas vehicles in Canada.



Clean Energy

- #1 provider of vehicular natural gas (CNG and LNG) in North America, with 145 fueling stations across U.S. and Canada
- We build, own, and maintain natural gas stations
- Serving high-volume fleets & consumers
- Privately held company
- Corporate office in Seal Beach, CA
- Canadian offices in Burnaby and Toronto
- 80 employees in North America
- 2003 fuel sold 150 million litres
- We are City of Richmond's partner for your CNG refuelling station



Backed by Believers: Our Investors

- Terasen Inc. (TSE: TER.TO), formerly BC Gas (Vancouver, with worldwide energy operations)
- Westport Innovations, Inc. (TSE: WPT.TO), an advanced NG heavy-duty engine manufacturer
- Perseus 2000 LLC, a fund specializing in energy investments
- Boone Pickens, a private investor



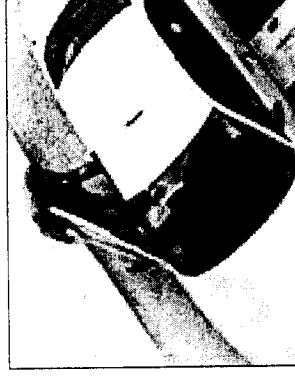
More NGVs on the Road

- Over 130,000 NGVs now on the road in North America, two million worldwide
- Over 1,300 fueling stations operating, half for public use (vs. dedicated fleet stations)
- 50 manufacturers produce 150 models of light-, medium- and heavy-duty vehicles (including Ford, Honda, Daimler-Chrysler) and engines (including Caterpillar, Cummins, Deere, Detroit Diesel, Mack Truck)



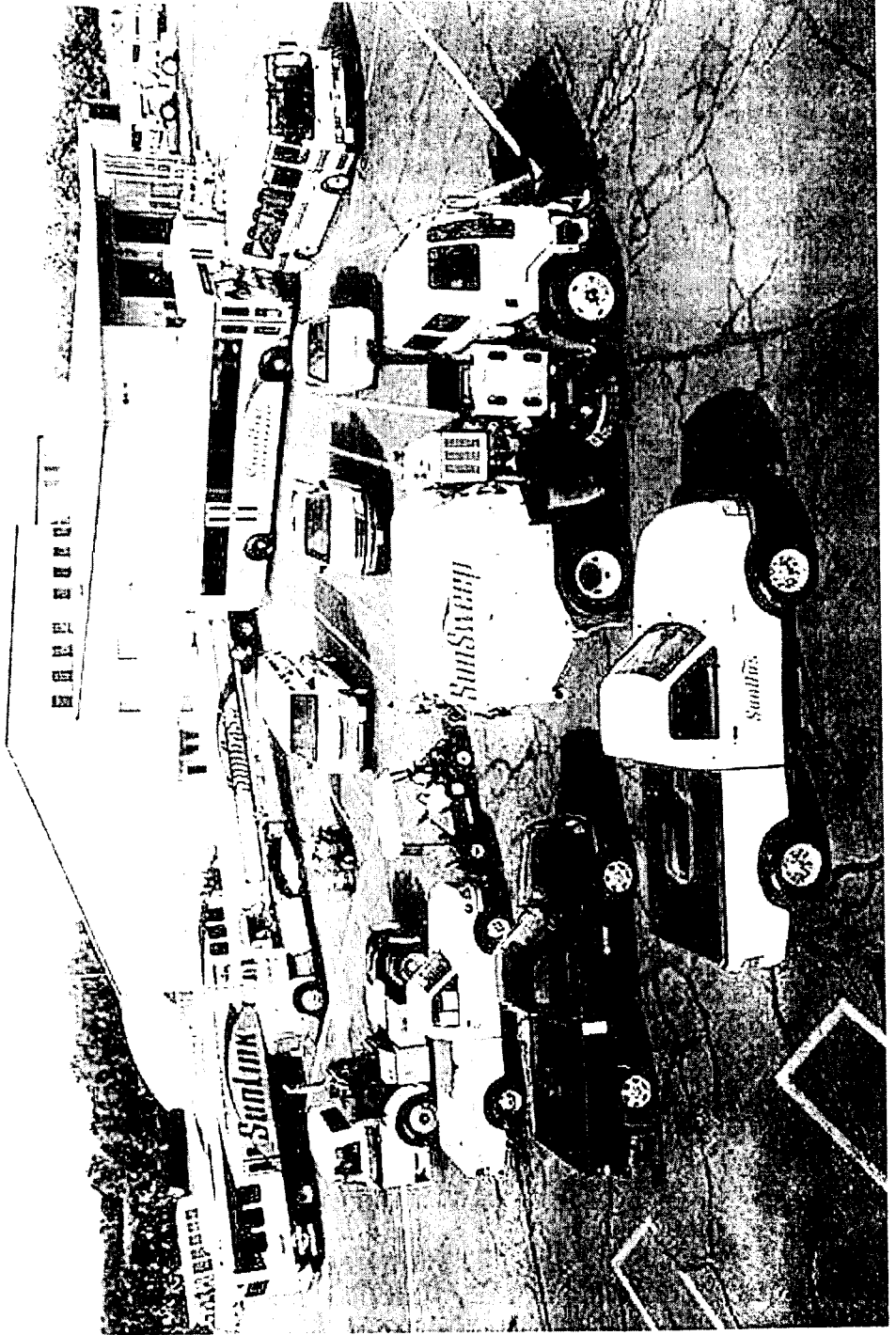
A Growing Variety of Vehicle Options

- Light-, medium- and heavy-duty vehicles for a range of uses





Today's Model for Tomorrow's World





CE Transit Bus History : CNG/LNG

- Operate 9 facilities serving more than 950 buses
 - MBTA : 285 buses, design/build/operate - \$30M contract
 - Tempe Transit : 135 buses, design/build/fuel contract
 - San Diego MTDB : 325 buses, operate/fuel contract
 - Foothill : 66 buses (124 future), design/build/operate & fueling contract
 - SunLine : 60 buses design/build/operate contract
 - Phoenix Transit : 12M Annual Gallons LNG
 - TransLink / Coast Mountain Bus: 50 buses available

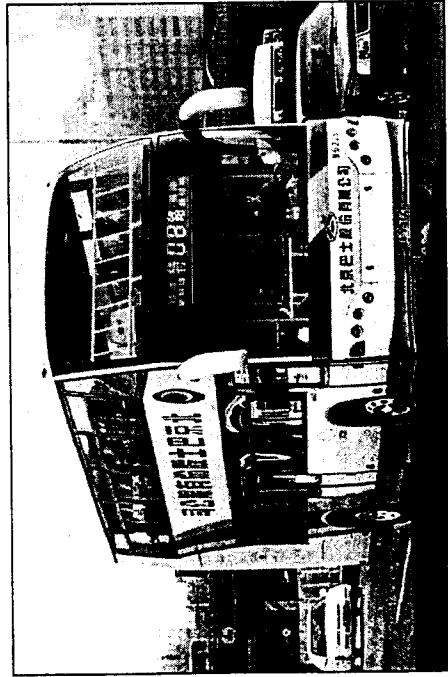
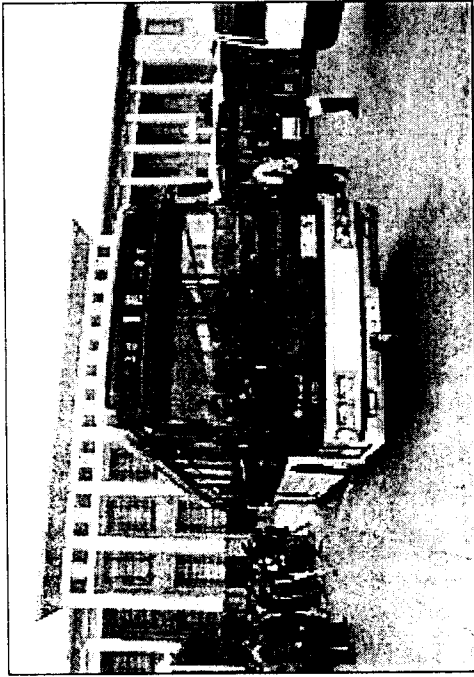


Transit Buses : Fast Facts

- 25% of all new transit bus orders in North America are CNG
- Over 75 transit agencies have begun shift from diesel to CNG
- Diesel PM contains 40 known human carcinogens
- Clean diesel buses emit up to 10 times more PM than CNG buses
- CNG viewed as pathway to Hydrogen Economy



Beijing Success Story



- 1990 natural gas buses make it the largest LBSI CNG bus fleet in the world
- Running 18 hr per day, 7 days per week
- 90% of 18,000 bus fleet to be operating on “clean engines” by 2008 Olympics



C Gas Plus Satisfaction Survey Customer Ranking

- Majority of customers rated the C Gas Plus excellent or good on 7 of 8 criteria.
 - » **Low Emissions**
 - » **Ease of Servicing**
 - » **Safety**
 - » **Driver Satisfaction**
 - » **Low Noise Levels**
 - » **Availability of Parts**
 - » **Frequency of Engine Breakdowns**
- Engine is rated by 88% of customers as an improvement over its predecessors C8.3G and L10G.
- 70% of managers reported that the C Gas Plus has improved their perception of natural gas engines overall.
- 90% of managers are likely to repurchase the C Gas Plus



Pierce Transit – Success Story

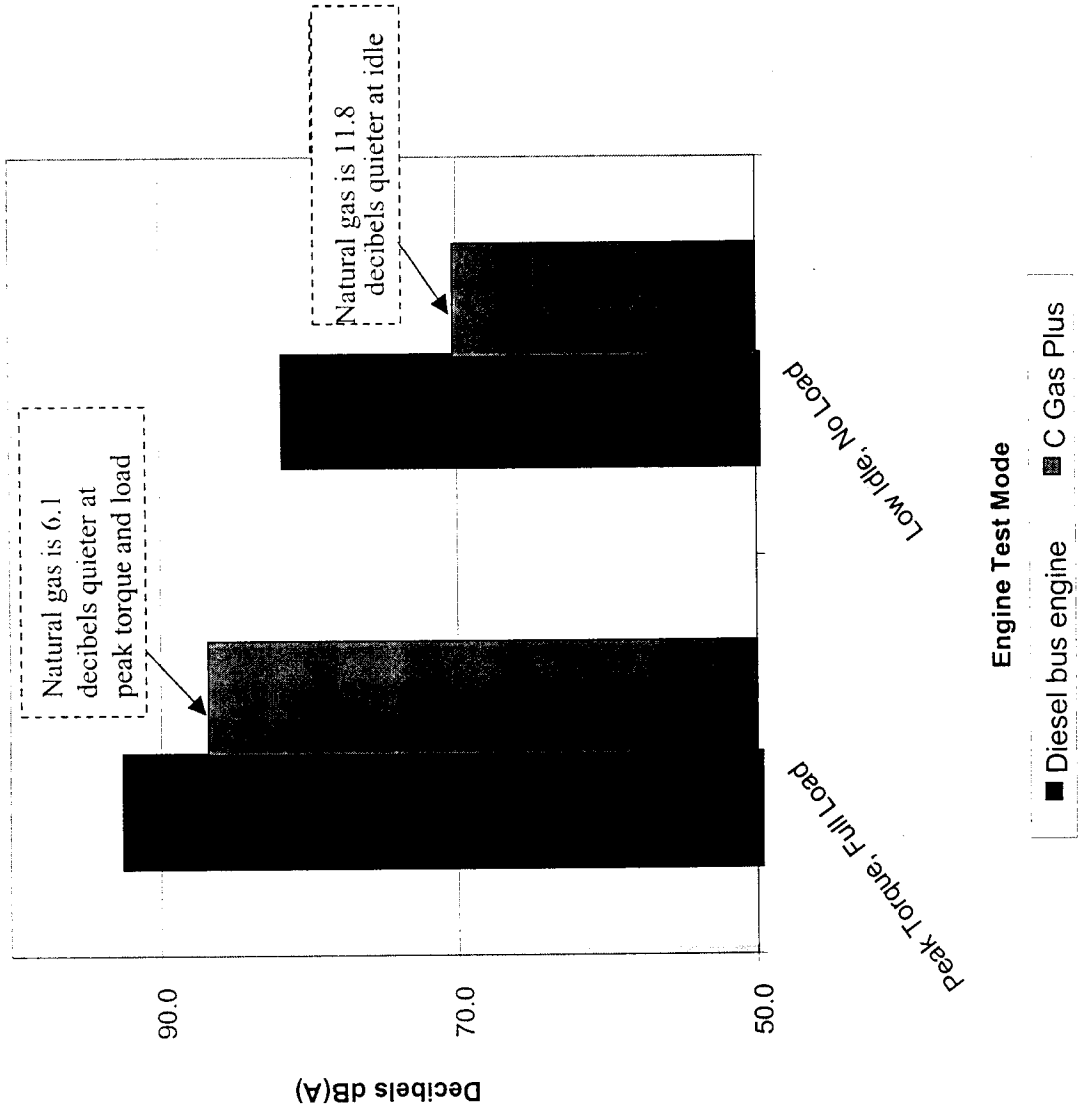


- Operating in Tacoma, WA
- In 1990, Pierce Transit introduced their first natural gas bus
- By 2005, Pierce Transit intends to operate only buses that run solely on compressed natural gas (CNG) – currently operate 176 NG buses
- Natural gas operating costs for Pierce's latest delivery of C Gas Plus engines (2002 MY) were \$0.36 per mile compared to \$0.57 per mile for diesel operating costs



Natural Gas Engines Reduce Urban Noise Pollution

- Communities notice the natural gas noise advantage
- ONE Diesel engine idling is louder than TEN natural gas engines idling together

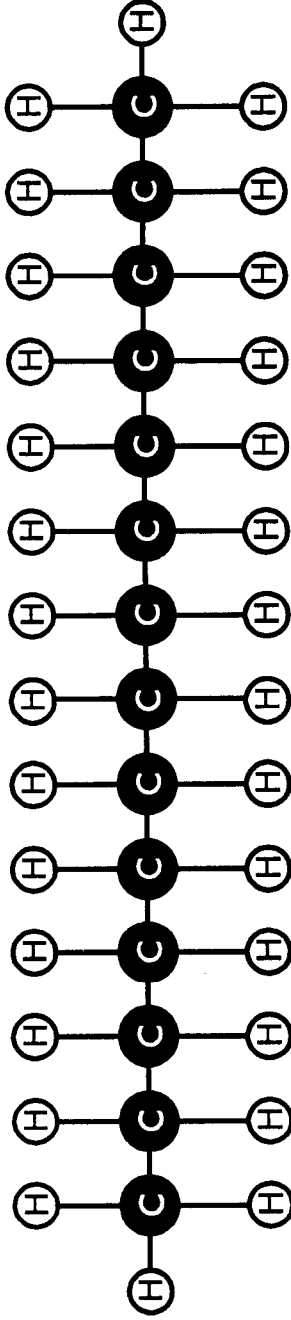




CNG – A Simpler Cleaner Fuel

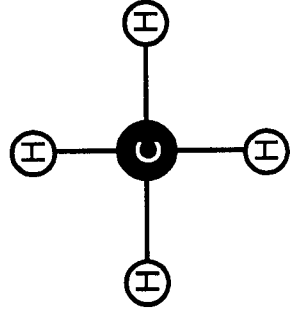
Diesel C₁₄ H₃₀

Complex Hydro Carbon



Methane CH₄

Simplest Hydro Carbon



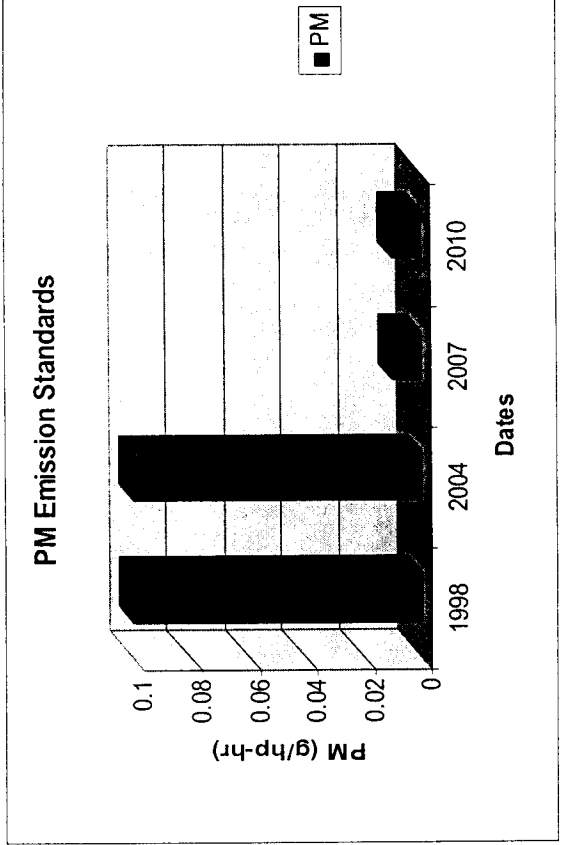
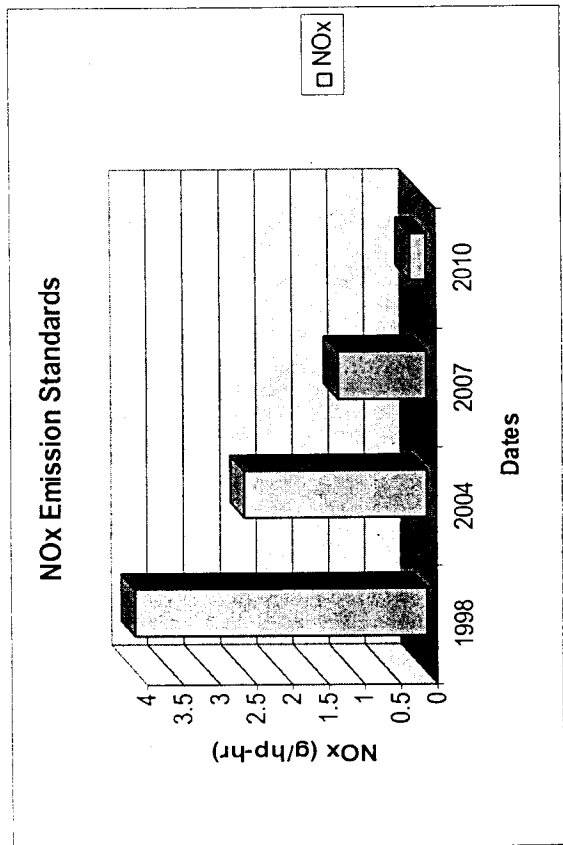


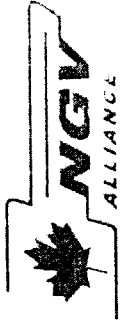
Diesel Bus Emissions

Two critical air contaminants measured in diesel emissions:

1. Nitrogen Oxides (NOx) – Main precursor to ground level ozone
2. Particulate Matter (PM) – Over 40 known carcinogens in diesel PM

Please note: Both contaminants are measured by (g/hp-hr)





So what does that mean?

- A natural gas bus saves more than a metric ton in NOx emissions over a 10 year span, compared to diesel
- A natural gas bus powered by today's CWI C Gas Plus engine emits 90% less PM than a diesel bus



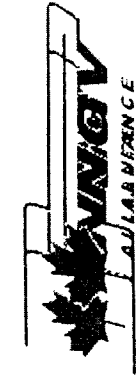
CNG : Pathway to Hydrogen Economy

- Preferred feedstock for producing economically viable hydrogen today
- Pathway Issues
 - High-pressure gaseous fuels
 - Blended Fuels
 - H2/CNG Opportunities
 - Technology Experience
 - Infrastructure Upgrade Advantages



Opportunities for City of Richmond

- Position for a Natural Gas/Hydrogen Future
 - Require that TransLink include a CNG requirement for all bus tenders planned in future
 - Request that TransLink repower existing 50 CNG buses w/ new CNG engines
 - NRCan program – 9.9 million
 - City of Richmond own vehicles
 - What other areas can City influence?
 - Terasen Gas Utility Medium/Heavy Duty Demo
 - Support Sustainable Transportation Goals of 2010



Thank you