



# California Natural Gas Vehicle Coalition

CEC IEPR Workshop

July 31, 2013



# CA NGV Coalition 2013



## Natural Gas is a Great Choice

- **Wide applicability (autos, trucks, buses, forklifts, etc.)**
- **North American fuel supply**
- **High well-to-wheel efficiency**
- **Fuel cost < gasoline and diesel**
- **Wide range of infrastructure possibilities**
- **SULEV / ILEV / AT PZEV capable**
- **Low carbon fuel**
- **Proven performance, known costs**
- **Renewable Natural Gas**



# Light Duty NGVs

- ▶ Honda Civic Natural Gas



- ▶ Chrysler

- Ram 2500 Dual fuel



- ▶ General Motors

- Chevy Silverado Dual Fuel
- GMC Sierra 2500 Dual Fuel



# Light and Medium-duty Upfitting

- ▶ Landi Renzo USA/Baytech
  - [www.landiusa.com](http://www.landiusa.com)
- ▶ Impco Technologies
  - [www.impcotechnologies.com](http://www.impcotechnologies.com)
- ▶ BAF Technologies
  - [www.BAFtechnologies.com](http://www.BAFtechnologies.com)

# NGV Upfits



© 2008 GM



# NGV Upfits cont



# NG HDV Forecasts

- ▶ Based on information from Cummins Westport Innovations, the National Petroleum Council (NPC), the American Commercial Transportation (ACT) Research, CITI GPS Energy 2020 Reports and additional input from the CNGVC membership.
- ▶ Special thanks to Southern California Gas Company, Clean Energy Fuels, and Gladstein Neandross and Associates for their help.

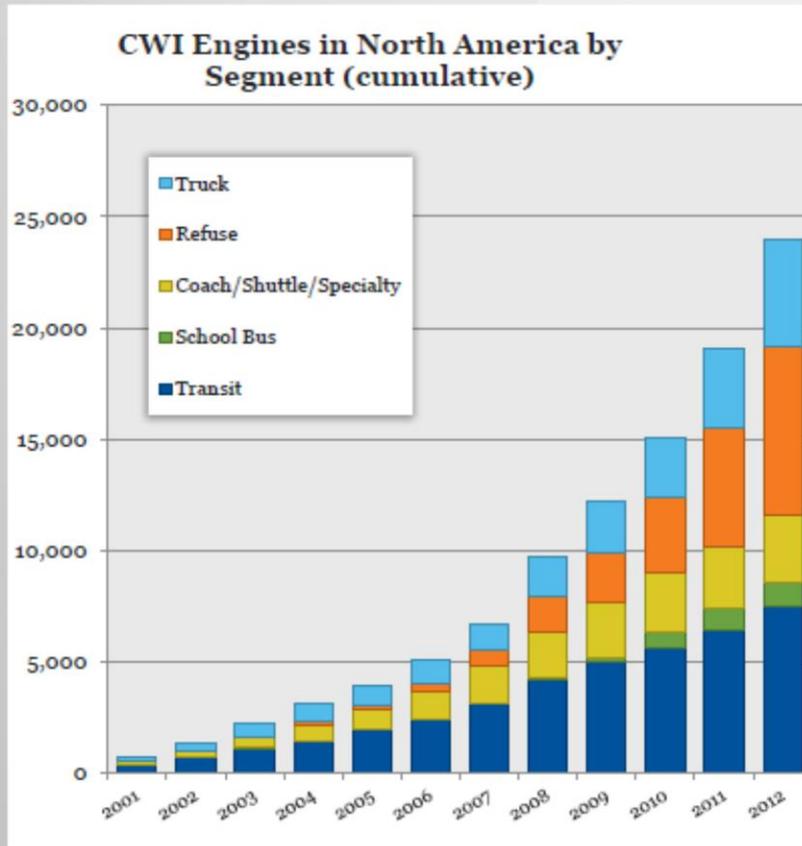
# 2020 Natural Gas Potential in CA

- ▶ **2012 California CNG/LNG usage**
  - = ~160 million GGEs
  
- ▶ **2020 California CNG/LNG usage**
  - Conservative = 900 million GGEs/year
  - Moderate = 1.2 billion GGE/year
  - Aggressive = 1.5 billion GGEs/year

# NPC, ACT & CITI Research Findings

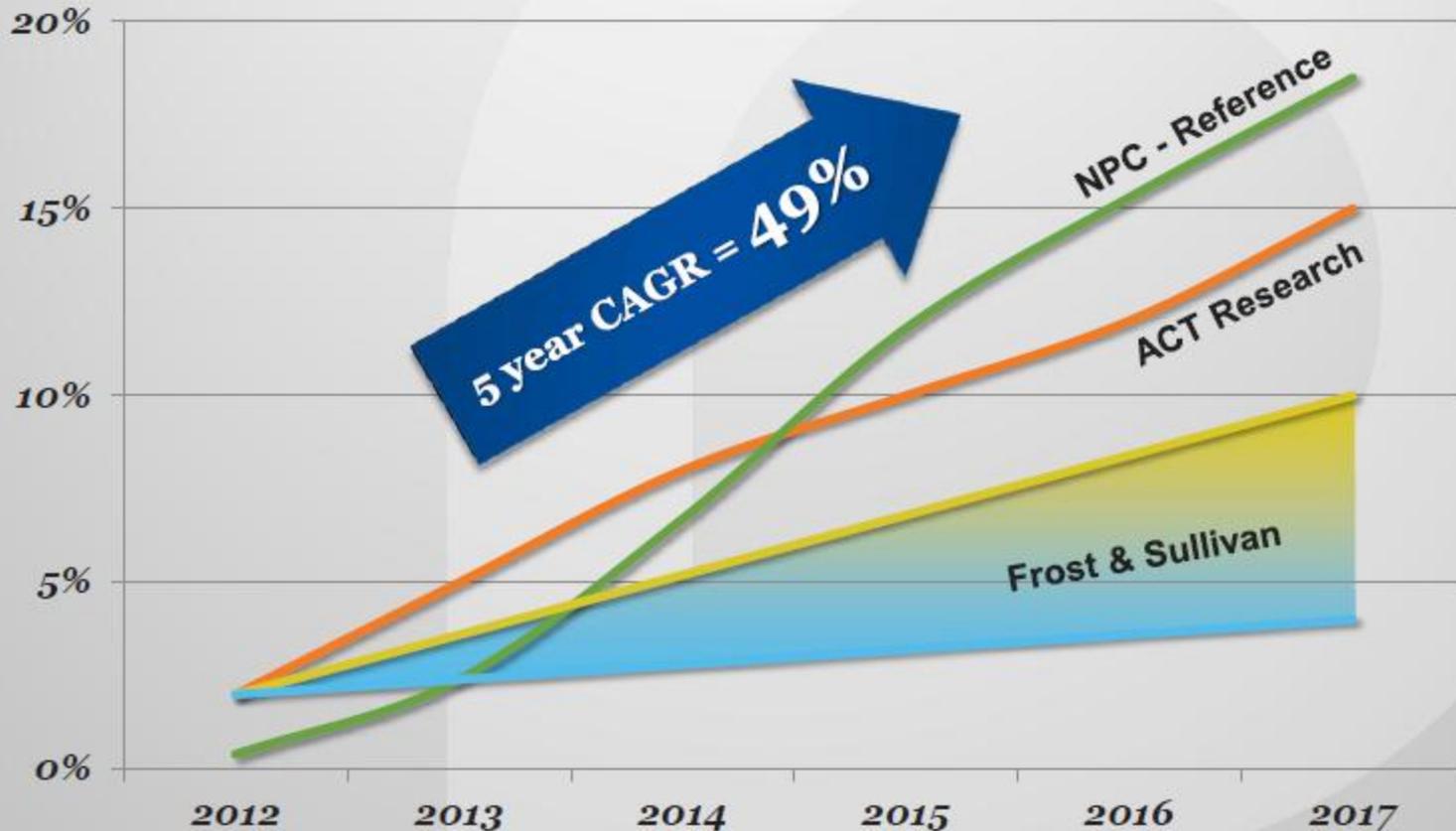
- ▶ NPC projects that NGVs can capture just under 40% of the heavy duty (Class 7 and 8) trucking market by 2020 in a high oil price case and nearly 50% of the market by 2040.
- ▶ ACT Research projects about 1 / 3 of U.S. Class 8 vehicles powered by NG in 2020, increasing to about 50% NG penetration 5 years later.
- ▶ Citi–Energy 2020 Report estimates that given today's technology, roughly 25% of the truck market has the ability to convert to natural gas by 2020.

# Addressable Market: Urban Commercial Fleets in North America

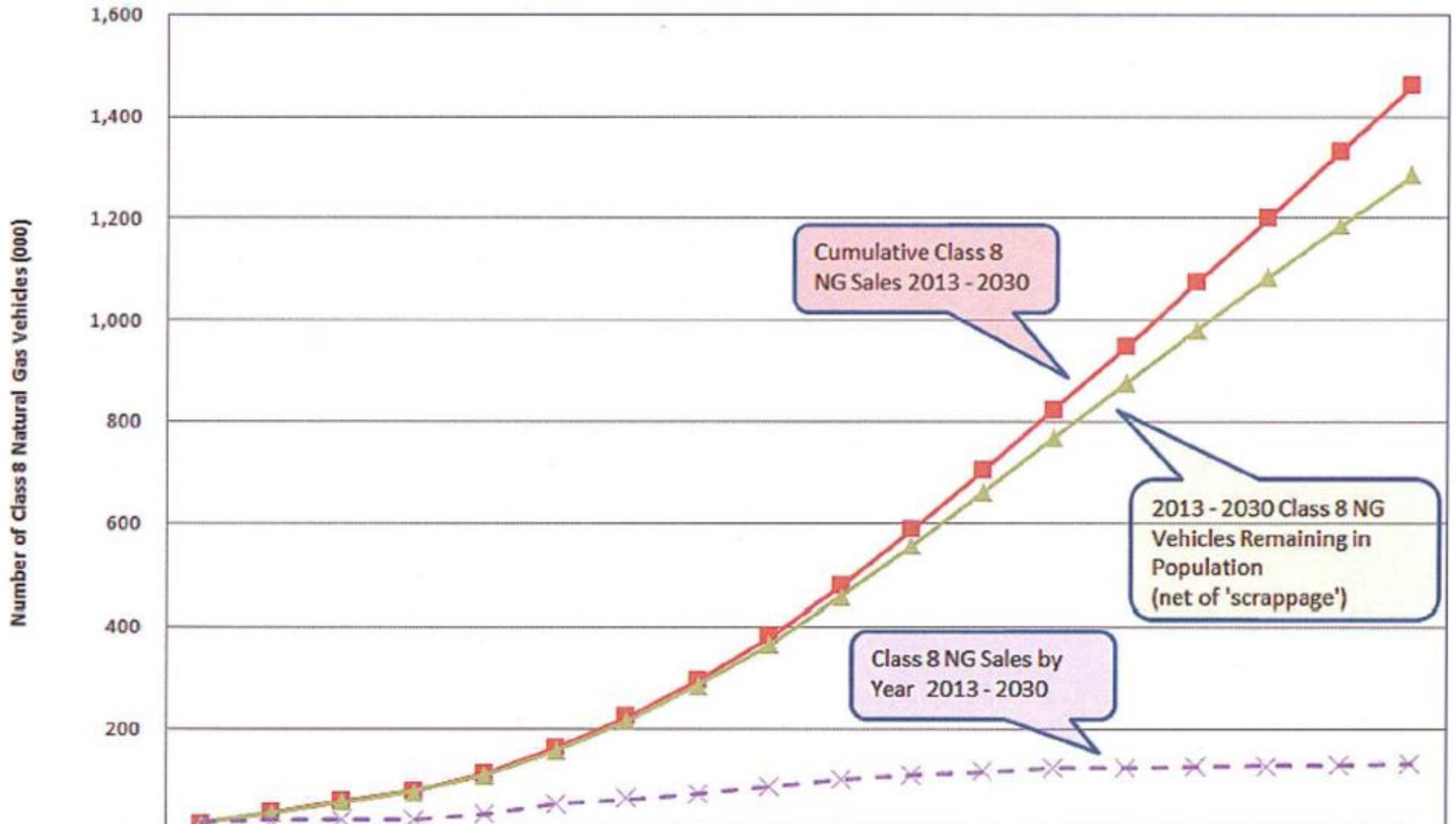


	<i>annual market turnover</i>	<i>current CWI engine</i>	<i>future CWI engine</i>
<b>Transit Bus</b>	5,000 – 6,000 <sup>1</sup>	ISL G	n/a
<b>Coach, Shuttle, Speciality</b>	2,000 – 4,000 <sup>2</sup>	ISL G	ISB6.7 G (2015)
<b>School Bus Type C</b>	20,000 – 30,000 <sup>3</sup>	n/a	ISB6.7 G (2015)
<b>School Bus Type D</b>	3,000 – 6,000 <sup>3</sup>	ISL G	n/a
<b>Refuse Truck</b>	5,000 – 7,000 <sup>4</sup>	ISL G	ISX12 G (2013)
<b>Class 6 &amp; 7</b>	71,000 – 97,000 <sup>5</sup>	ISL G	ISB6.7 G (2015)
<b>Class 8</b>	110,000 – 199,000 <sup>6</sup>	ISL G	ISX12 G (2013)

# Market Forecast North American Class 8 Natural Gas Trucks



# U.S. Class 8 Natural Gas (NG) Retail Sales Projection 2013-2030 (Thousands)



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
<span style="color: red;">■</span> Cum Sales	15	35	57	78	110	161	223	295	381	479	588	703	825	948	1,074	1,201	1,330	1,461
<span style="color: green;">▲</span> Pop Of 2013 +	14	35	56	76	107	157	216	285	366	458	558	662	770	876	981	1,084	1,185	1,284
<span style="color: purple;">×</span> Sales	15	20	22	21	32	51	62	72	86	99	109	115	121	124	125	128	129	131

### U.S. Class 8 Natural Gas Adoption Rates--Baseline Scenario

	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2025</u>	<u>2030</u>
<b>FOR HIRE:</b>										
TL	4%	5%	5%	6%	10%	18%	22%	30%	52%	53%
LTL	2%	2%	3%	3%	5%	12%	20%	25%	35%	40%
Expedited	6%	8%	9%	13%	20%	30%	40%	45%	73%	73%
Owner Operator	0%	1%	1%	2%	2%	3%	3%	5%	6%	7%
<b>PRIVATE</b>	5%	8%	8%	9%	13%	23%	33%	45%	65%	67%
<b>VOCATIONAL:</b>										
Refuse	50%	65%	75%	90%	95%	95%	95%	95%	95%	95%
Municipial	5%	8%	10%	13%	20%	30%	40%	48%	73%	73%
Construction	1%	2%	2%	3%	5%	6%	8%	10%	15%	18%
Other	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%
<b>TRANSIT BUS</b>	50%	55%	67%	67%	67%	67%	67%	67%	67%	67%

<b>NG SHARE OF CLASS 8 TRUCK AND BUS SALES</b>	<b>6%</b>	<b>9%</b>	<b>10%</b>	<b>12%</b>	<b>15%</b>	<b>21%</b>	<b>27%</b>	<b>35%</b>	<b>50%</b>	<b>51%</b>
<b>SALES OF NG TRUCKS AND BUSES (000)</b>	<b>15</b>	<b>20</b>	<b>22</b>	<b>21</b>	<b>32</b>	<b>51</b>	<b>62</b>	<b>72</b>	<b>121</b>	<b>131</b>

Memo:	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>
Total NG Vehicles 2009-12	4	7	8	12 e

# Infrastructure

## ▶ BIG

- Clean Energy and Pilot Flying J (LNG)
- Shell and Travel Centers of America (LNG)
- Trillium building 100 stations (CNG)

## ▶ Medium

- Galileo and GE building CNG and LNG in a box

## ▶ Home

- Half a dozen companies funded by DOE to develop next generation home refueling units

# Key Factors for NGV Penetration

- ▶ Fuel price spread
  - ▶ Truck / engine availability
  - ▶ Availability of Infrastructure
  - ▶ Engine cost to meet the lower emissions requirements
  - ▶ Available incentives
  - ▶ Adoption rate by truck manufacturers and truck users
- 

# Where were we in 2007

- ▶ Only one 9L NG engine for Class 7 refuse trucks and transit buses (NG < 10% of refuse market)
  - ▶ One Small Volume Manufacturer BAF Technologies converted new OEM vehicles to dedicated NG taxis, vans, and shuttle buses
  - ▶ Only one light duty OEM (Honda) that produced a natural gas vehicle
  - ▶ Only one small LNG facility in the west (AZ)
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# Where are we in 2013

- ▶ ALL Class 8 truck manufacturers in the U.S. are offering natural gas Class 8 trucks.
- ▶ EVERY transit bus manufacturer and refuse truck manufacturer (NG is now 50% of refuse market)
- ▶ At least 5 Small Volume Manufactures offering dedicated and bi-fuel NGVs.
- ▶ GM and Chrysler now in the market offering natural gas pickups.
- ▶ Honda continues to produce the Honda Civic Natural Gas
- ▶ General Electric and Caterpillar/EMD are developing natural gas locomotives
- ▶ Lots of activity with marine and mining applications
- ▶ There are now two additional LNG production plants

# Reasons why California may lead NGV market growth

- ▶ Most infrastructure in place today
  - ▶ 400+ out of 1200+ stations nationwide
- ▶ LNG supplies in the state and at the border
- ▶ History of successful NG use in transit, refuse, and at ports
- ▶ Higher gasoline/diesel prices compared to rest of U.S.

Tim Carmichael  
President  
California Natural Gas Vehicle Coalition  
Email: [tim@cngvc.org](mailto:tim@cngvc.org)  
Ph: (916) 448-0015  
Website: [www.cngvc.org](http://www.cngvc.org)