California Energy Commission
DOCKETED
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AUGUST 1 2013

California Natural Gas Vehicle Coalition

CEC IEPR Workshop

July 31, 2013

CA NGV Coalition 2013

Clean Energy

SDGE
Southern California Gas Company
Sempra Energy utilities

CHART

Westport INNOVATIONS INC.

HONDA

WM WASTE MANAGEMENT

Trillium Making CNG Work for You.

Ford

CHRYSLER

LANDIRENZO

ups

REPUBLIC SERVICES

IMPCO AUTOMOTIVE

FREIGHTLINER

BAF TECHNOLOGIES

NCI

COSMODYNE A Cryogenic Industries Company

Creative Bus Sales

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
- Impco Technologies
  - www.impcotechnologies.com
- BAF Technologies
  - www.BAFtechnologies.com

NGV Upfits

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

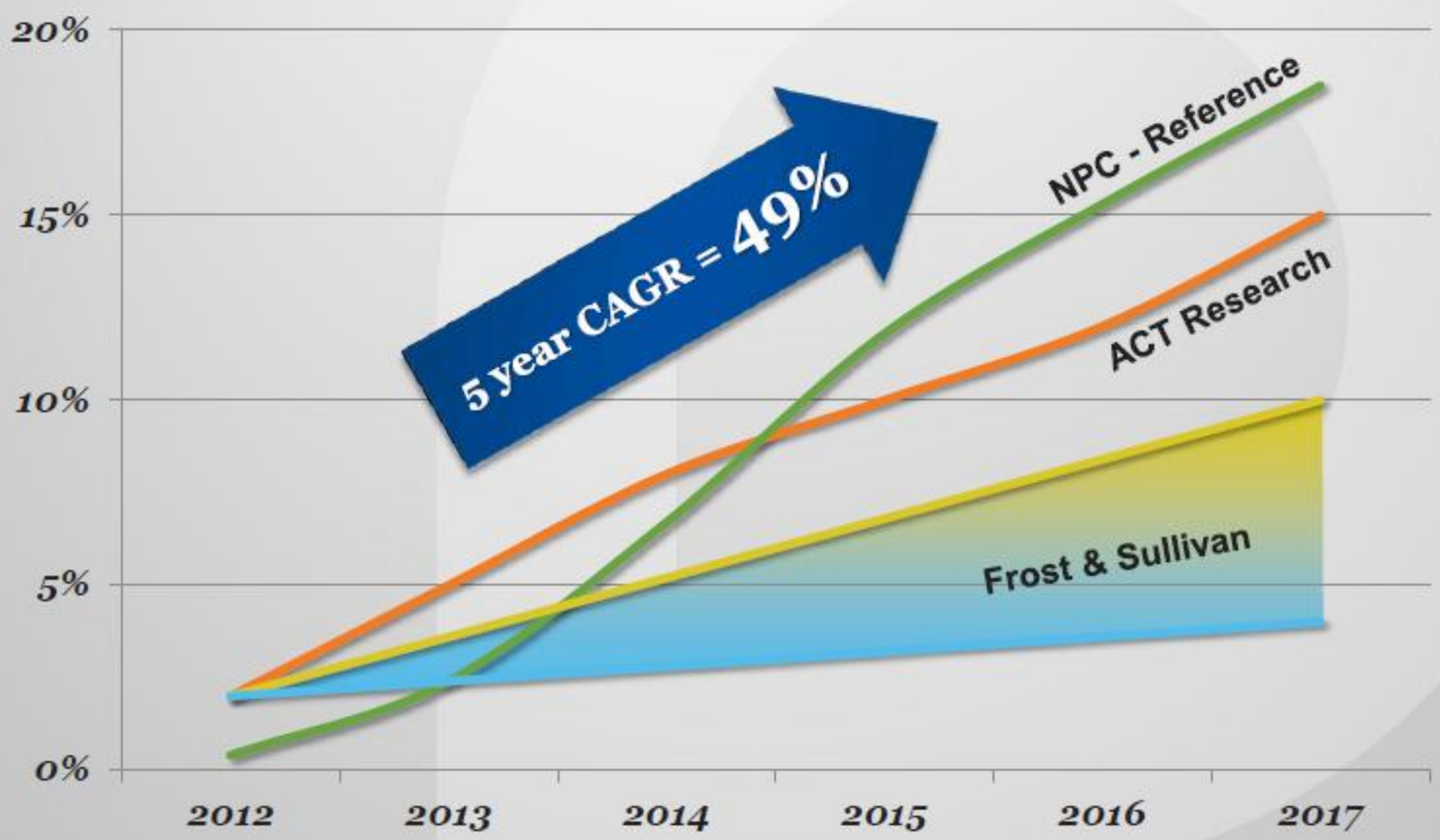
2020 Natural Gas Potential in CA

- 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

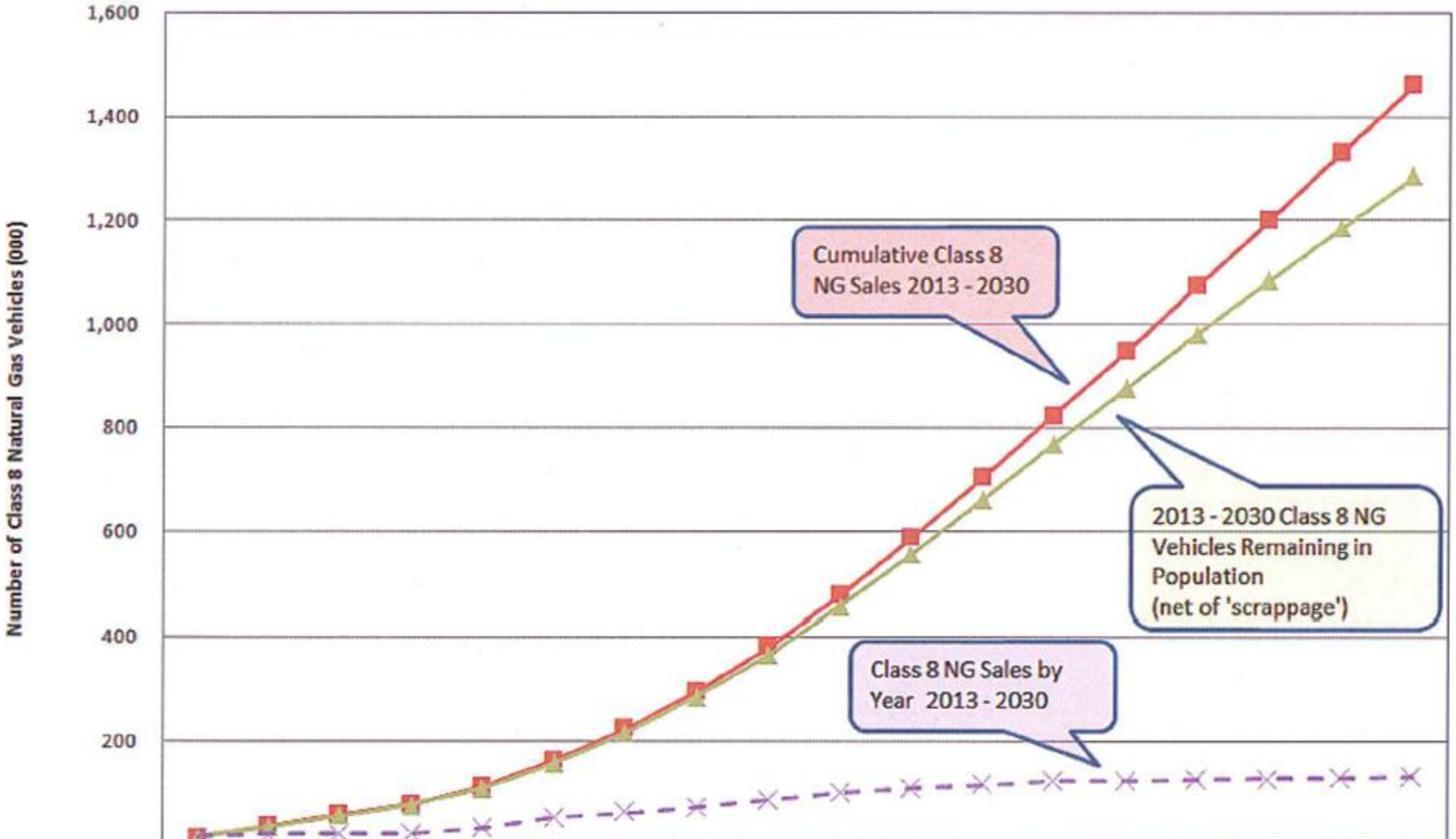
- NPC projects that NGVs can capture just under 40% of the heavy duty (Class 7 and 8) trucking market by 2020 in a high oil price case and nearly 50% of the market by 2040.
- ACT Research projects about 1/3 of U.S. Class 8 vehicles powered by NG in 2020, increasing to about 50% NG penetration 5 years 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.

Market Forecast
North American Class 8 Natural Gas Trucks



http://www.westport.com/company/media/presentations/corporate-update/corporate-update.pdf

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
Cum Sales	15	35	57	78	110	161	223	295	381	479	588	703	825	948	1,074	1,201	1,330	1,461
Pop Of 2013 +	14	35	56	76	107	157	216	285	366	458	558	662	770	876	981	1,084	1,185	1,284
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

	2013	2014	2015	2016	2017	2018	2019	2020	2025	2030
FOR HIRE:										
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%
PRIVATE	5%	8%	8%	9%	13%	23%	33%	45%	65%	67%
VOCATIONAL:										
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%
TRANSIT BUS	50%	55%	67%	67%	67%	67%	67%	67%	67%	67%
NG SHARE OF CLASS 8 TRUCK AND BUS SALES	**6%**	**9%**	**10%**	**12%**	**15%**	**21%**	**27%**	**35%**	**50%**	**51%**
SALES OF NG TRUCKS AND BUSES (000)	**15**	**20**	**22**	**21**	**32**	**51**	**62**	**72**	**121**	**131**

Memo:	2009	2010	2011	2012
Total NG Vehicles 2009-12	4	7	8	12 e

ACT Research

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)

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.

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