

# Port Stakeholders Summit



## Natural Gas in Port Operations

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Clean Energy Fuels  
April 8, 2014

# Agenda

- **Clean Energy Overview**
- **Successes at POLA/POLB**
- **Adoption Rates**
- **OEMs Options**
- **America's Natural Gas Highway**
- **Financial Drivers**
- **Policy Drivers**
- **Policy Recommendations**

# About Clean Energy

Largest Alternative  
Transportation  
Fuel Provider



700+  
FLEET  
CUSTOMERS



9000+  
TRANSACTIONS  
PER DAY



30000+  
NGVS  
FUELED DAILY



400+  
NATURAL GAS  
FUELING  
STATIONS

# About Clean Energy

The Leader in Both **CNG** and **LNG**

CNG



TAXIS



REFUSE  
FLEETS

AIRPORT  
TRANSIT



PUBLIC  
TRANSIT



LNG



REGIONAL  
FLEETS

HEAVY DUTY  
TRUCKING



# Success at San Pedro Bay Ports

- **POLA/POLB Clean Truck Program**
  - Pre-1989 trucks banned by Oct. 2008 and progressively banned all trucks that do not meet 2007 emission standards by 2012.
  - 1,000 NG trucks deployed
  - Truck replacement program financed by port levy on loaded containers (\$35 per loaded 20' equivalent unit) and SCAQMD Incentive funds.
  - SCAQMD estimates monetary premature death benefits alone range from \$4.7 to \$5.9 billion over 18 years.
  - Helped generate over \$1 billion in private investment

# CARB Executive Order for NG Engines: ISL G (8.9) and ISX12 G (11.9)

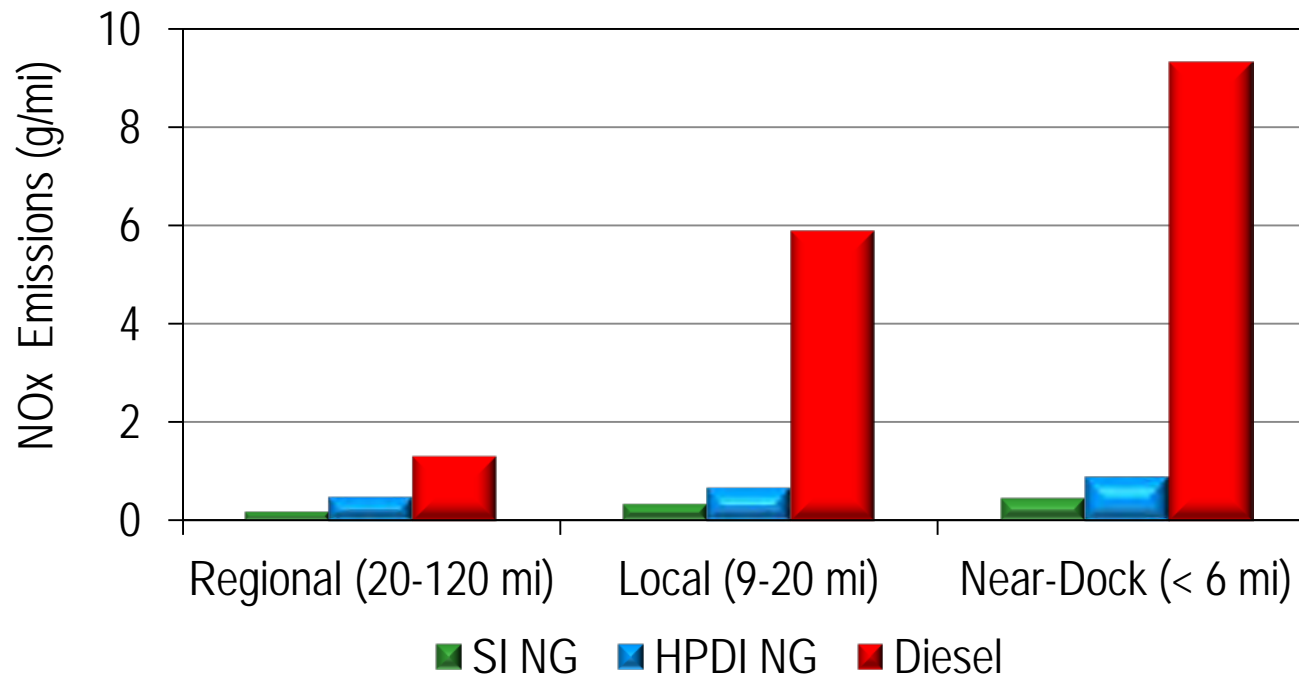
**IS Series is below 2010 NO<sub>x</sub> and PM regulations**

	NMHC		NO <sub>x</sub>		CO		PM	
	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO
<b>STD</b>	0.14	0.14	<b>0.20</b>	0.20	15.5	15.5	<b>0.01</b>	0.01
<b>CERT</b>	0.06	0.06	<b>0.13</b>	0.01	9.8	8.0	<b>0.002</b>	0.001

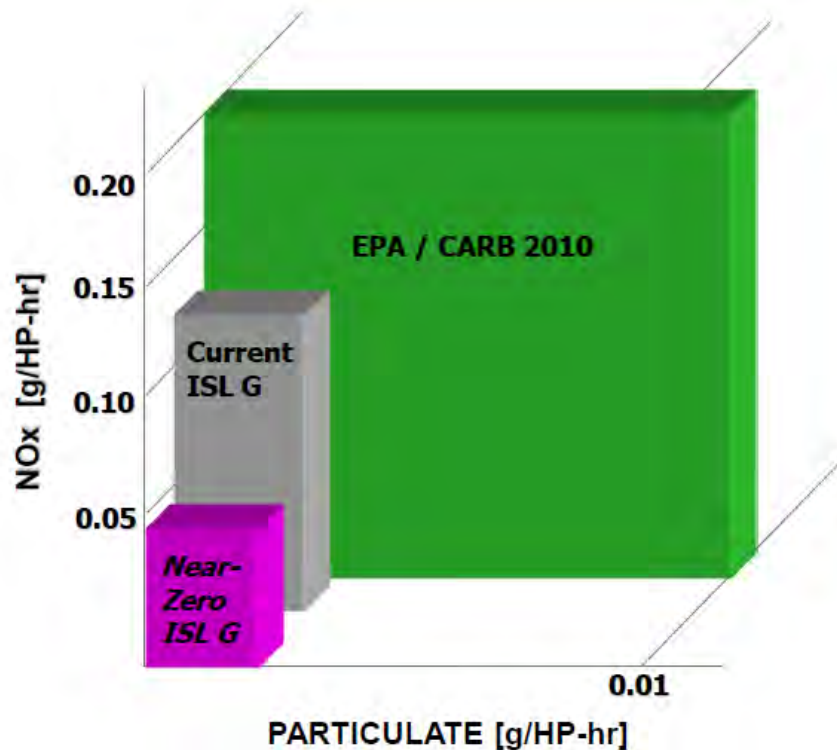
- PM Is 80% below the standard
- NO<sub>x</sub> is 35% below the standard
- GHG emissions are 23% below diesel
- Adding RNG blends will reduce GHG emissions up to ~90%

# AQMD Preliminary In-Use Emissions Measurements of HDVs

*Diesel NOx Emissions Highly Dependent on SCR Performance*

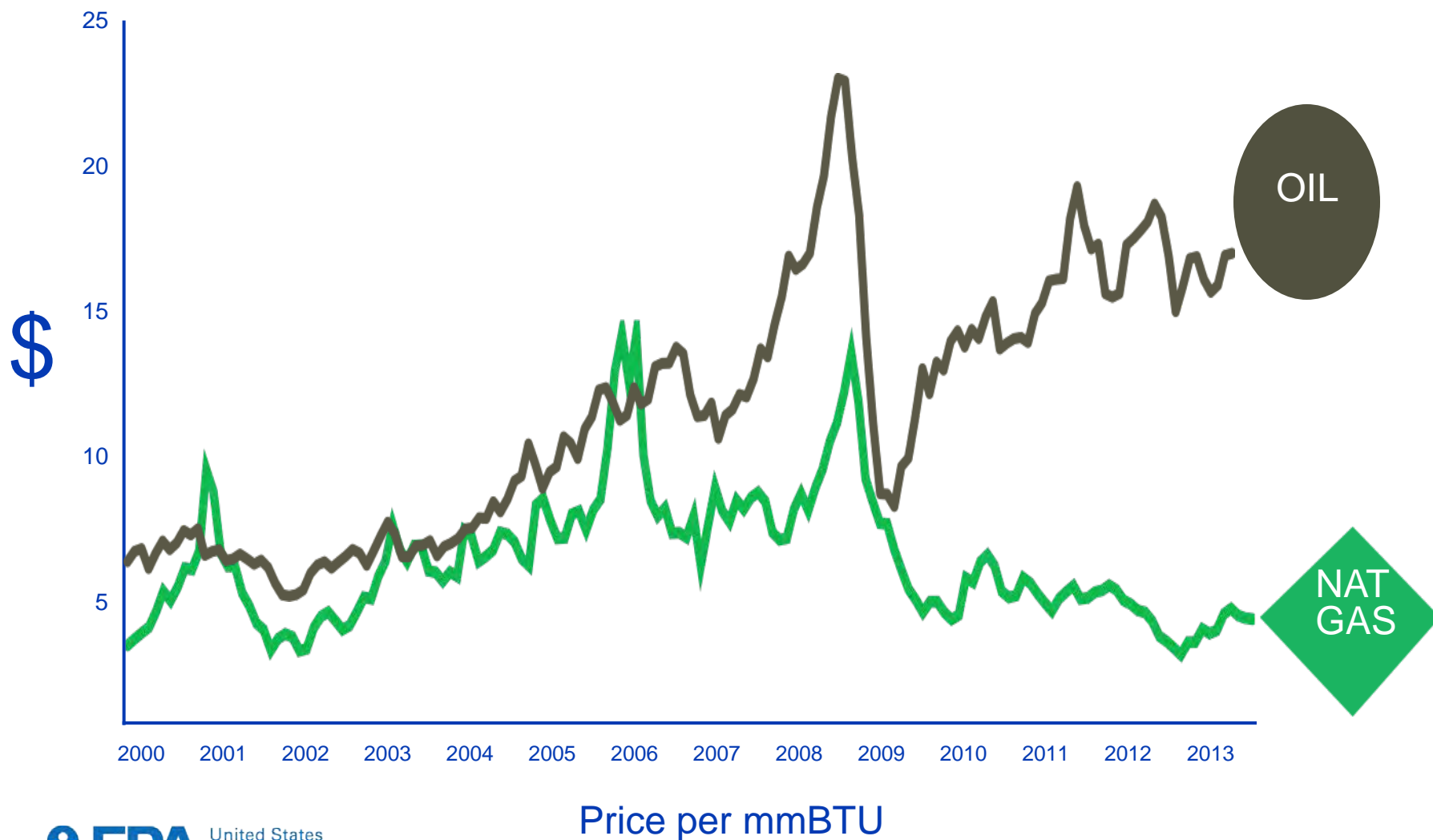


# Near-Zero NO<sub>x</sub> Internal Combustion Engine incentivized by CARB Optional NO<sub>x</sub> standards



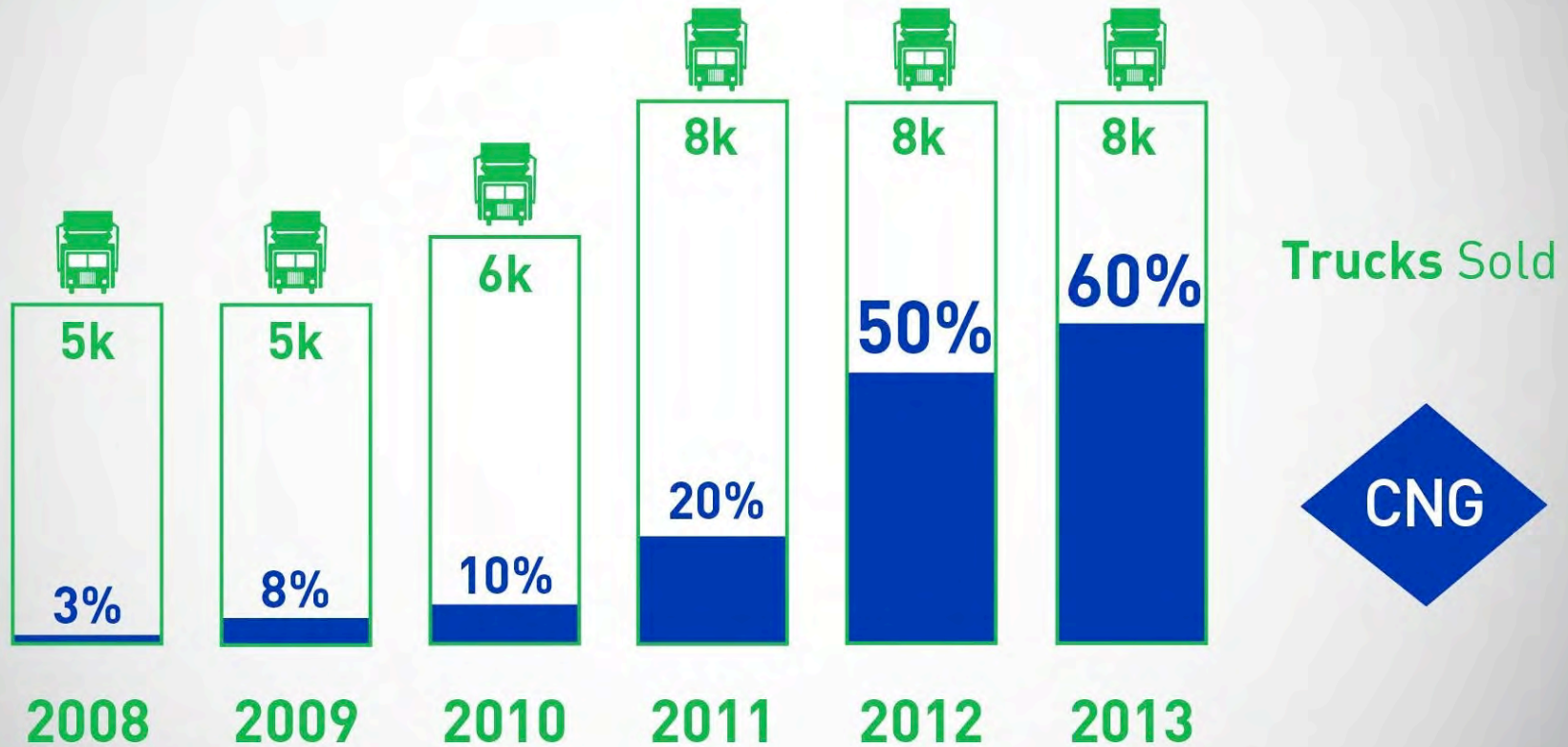


# Cost of NG vs. Oil



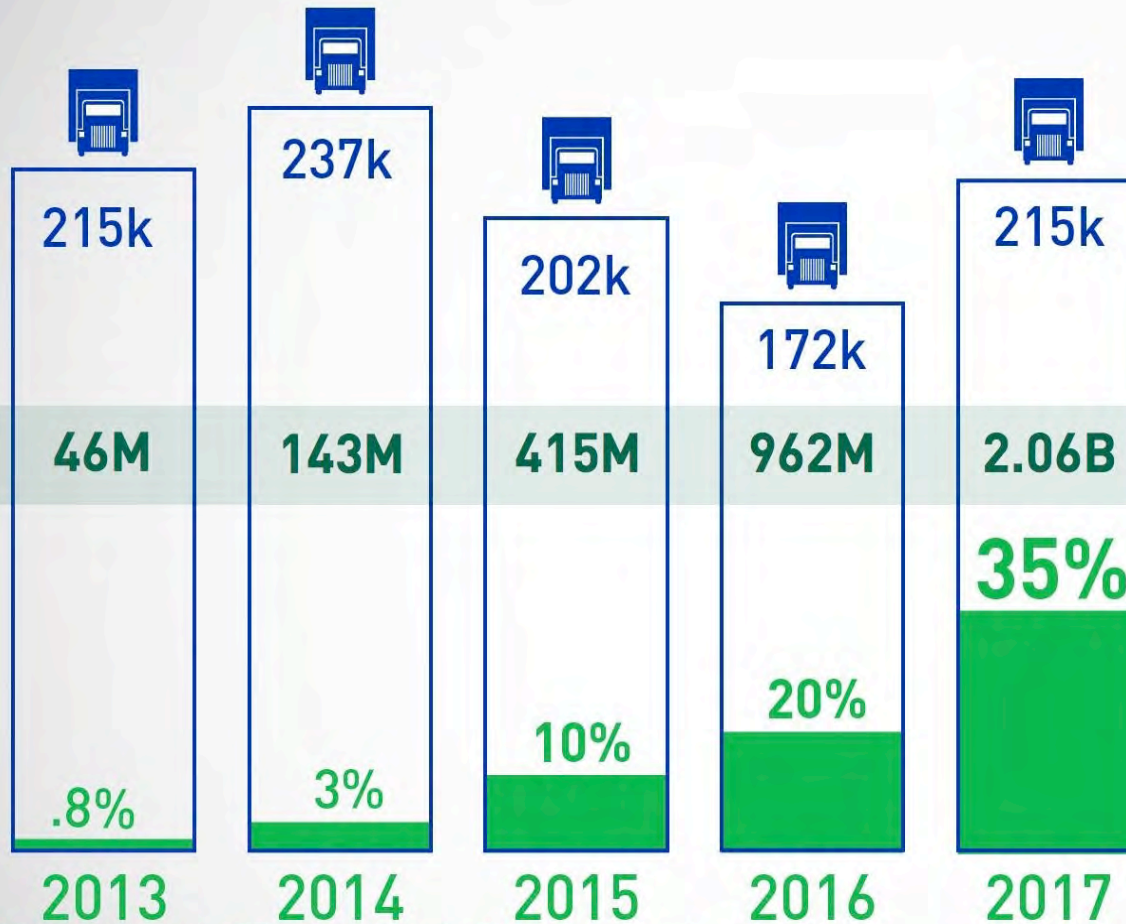
# NGV Adoption Rates

## Refuse Truck Adoption



\*9 Liter Introduced

# NGV Adoption Rates



## Heavy Duty Truck Adoption Potential

DGEs

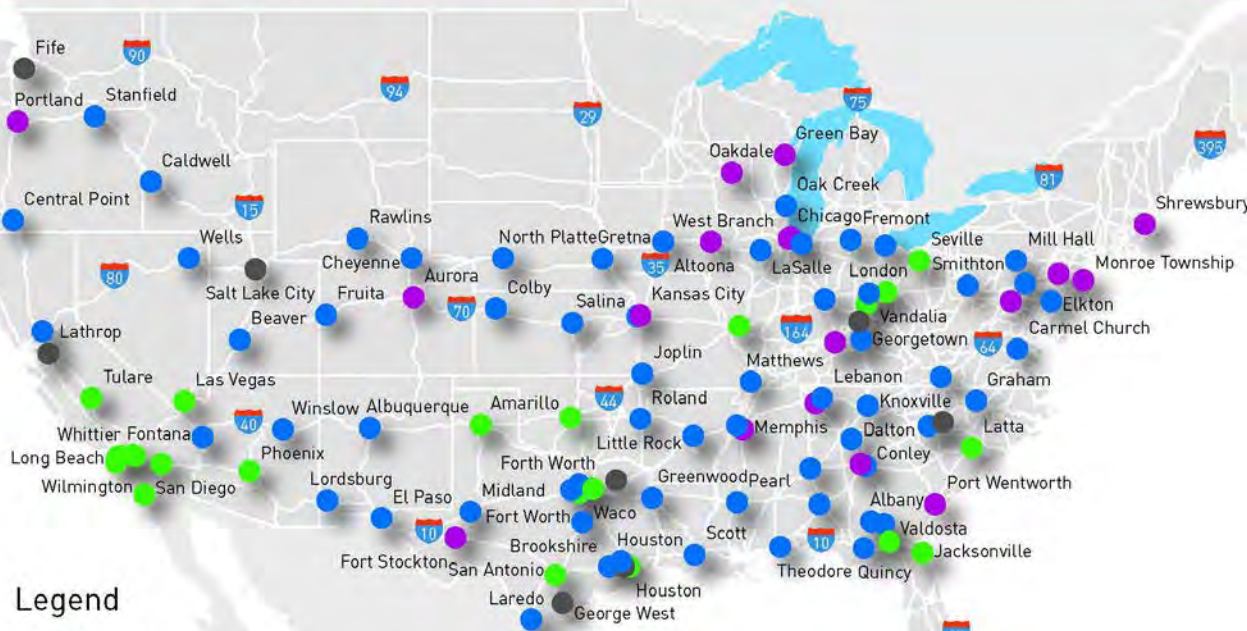
LNG

\*12 Liter Introduced \*13 Liter Introduced \*15 Liter Introduced

Annual truck rates based on Americas Commercial Transportation (ACT) Research. These figures are for illustrative purposes only and are not a prediction or estimate of results by Clean Energy.

# America's Natural Gas Highway

ANGH Station Development - April 2014

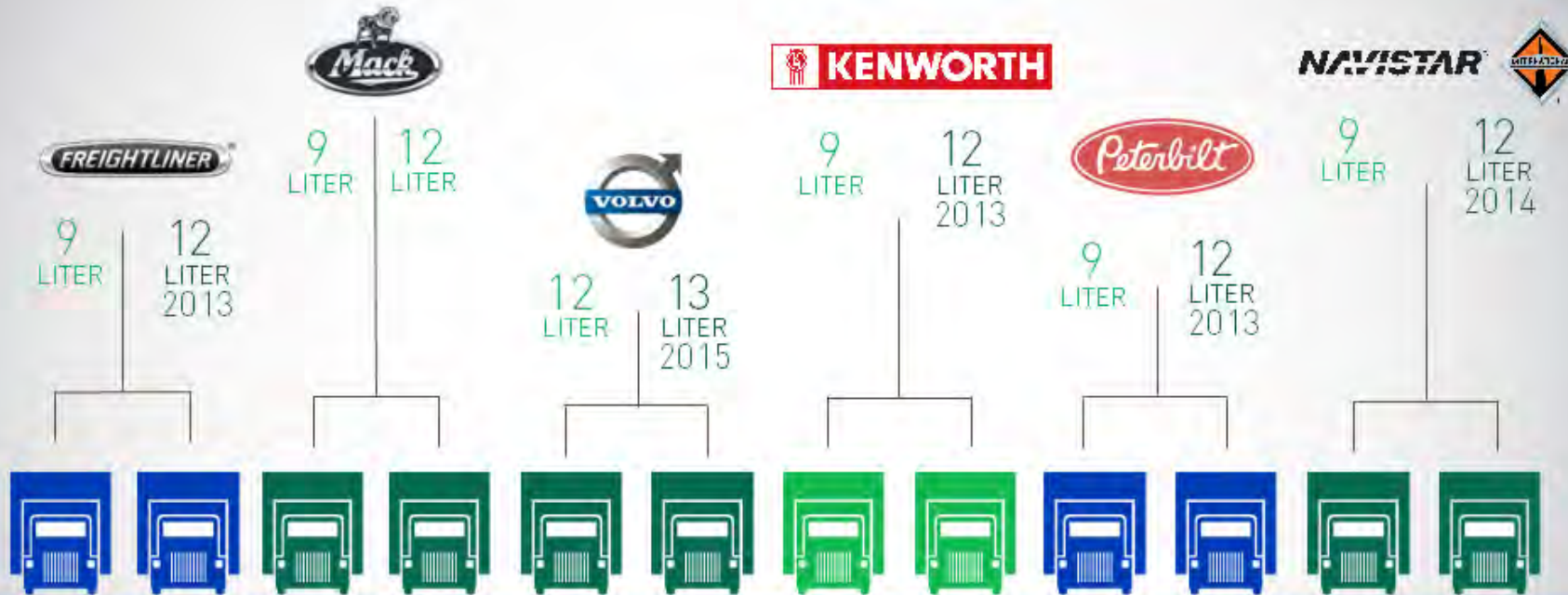


## Legend

ANGH - 112

- Open - 25
- RT0 - 61
- In Development - 8
- Proposed - 18

# Expanding OEM NGV Options



Every Major Truck Manufacturer  
Offers Natural Gas Trucks

# NGV Financial Drivers

- The incremental cost of the vehicle
- Spread of diesel and natural gas
- Annual fuel consumption

Incremental Cost	\$60,000	\$40,000	\$20,000
Fuel Spread	\$1.00	\$1.00	\$1.00
Fuel Consumption	20,000	20,000	20,000
ROI	36 Months	24 Months	12 Months

Drivers of Incremental Cost			
Incremental cost of NG Tanks	\$21,000 78DGE	\$42,000 125DGE	\$45,000 155DGE
Estimated Incremental cost of ISX12 G	\$15,000	\$15,000	\$15,000
Methane Detection Incremental	\$2,000	\$2,000	\$2,000

# Policy Recommendations

- **Incentives to drive down the incremental costs of NGVs, not stations**
  - **Show us the customers, fuel providers will build you the stations**
- **Port levy on containers delivered by Pre-2010 Heavy Duty Trucks**
  - **Higher incentives for cleaner trucks that burn domestic fuel**
- **Priority Green Lanes**
  - **A “TSA PreCheck” lane for Trucks that meet stringent environmental performance standards**

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# Appendix

- **Simple Payback Calculator**
  - **ROI over time**
- **Value Simulator**
  - **Cost/mile calculator**
- **Fueling Services**
  - **Time Fill**
  - **Fast Fill**
  - **LNG**

# Simple Payback Analysis

## Simple Payback Analysis

			Metric
The return on investment target		36	payback in months/truck
The truck lifecycle		72	months
<b>Fuel</b>			
Fuel consumption		1,000	DGE/truck/month
Fuel spread (diesel - LNG)	\$	1.25	savings/DGE
Savings per month based on spread	\$	1,250	monthly savings/DGE
<b>Truck</b>			
Cost of the base diesel truck	\$	110,000	cost/truck
Cost of a NG truck (tankless)	\$	130,000	cost/truck
Cost of installed NG tank system	\$	25,000	cost/truck
The incremental cost of the NG truck over diesel	\$	45,000	cost/truck
Incremental cost per month over lifecycle	\$	625	Incremental cost/month/truck before fuel savings
Incremental cost per month over investment target	\$	1,250	Incremental cost/month/truck before fuel savings
<b>Payback</b>			
Savings per month based on spread	\$	1,250	monthly savings/DGE
Monthly savings required to hit the payback target	\$	1,250	
True payback period		36	months
The monthly difference between the target payback period and the actual payback period	\$	-	

# Value Simulator - Inputs

 Clean Energy <small>North America's leader in clean transportation</small>		Fleet Total Cost of Operations Simulator Prepared for <b>Busch Trucking</b>		
Variables		Monthly Variables	Diesel	Natural Gas
Base Truck	\$100,000	Collision Insurance	\$475	\$475
Incremental Cost	\$50,000	Health Insurance	\$220	\$220
FET	12%	Licenses	\$130	\$130
Sales tax	8.0%	Permits	\$37	\$37
Term	60	Accounting Services	\$45	\$45
Interest Rate	3.0%	Maintenance	\$375	\$455
Miles Per Year	100,000	Repair	\$450	\$470
NG Estimated MPG	5.80	Truck Wash	\$55	\$55
NG Estimated Cost Per Gallon	\$2.65	Telephone	\$125	\$125
Diesel Estimated MPG	6.50	Lodging	\$100	\$100
Diesel Estimated Cost Per Gallon	\$4.00	Loading/Unloading Charges	\$75	\$75
Work Days (Year)	255	Fines	\$50	\$50
Fleet Size	25	Tire Repair	\$250	\$250
Labor Cost/Hour	\$30.00	Drivers Income	\$3,000	\$3,000
Out of Route Fueling Miles (Round Trip)	0	<b>Annual Variables</b>		
Average Drive Time Round Trip to Natural Gas Station (Minutes)	0	Shop Modifications	\$0	\$0

# Value Simulator - Output

Total Cost Analysis Prepared for Busch Trucking		Analysis Shows a Savings of	\$ 0.019	Per Mile	Savings Over Term	
Based on Annual Miles Per Truck of	100,000		\$ 1,918	Per Truck/Year	Per Truck	\$9,592
Based on Trucks in Fleet to run on NG of	25		\$ 47,959	Per Fleet/Year	Per Fleet	\$239,794

Variables	Base Truck	Incremental Cost	FET	Sales Price	Sales Tax	Amount Financed	Interest Rate	Term	Truck Monthly Payment
Nat Gas	\$ 100,000	\$ 50,000	\$ 18,000	\$ 168,000	\$ 12,000	\$ 180,000	3.0%	60	\$ 3,234
Diesel	\$ 100,000	0	\$ 12,000	\$ 112,000	\$ 8,960	\$ 120,960	3.0%	60	\$ 2,173
Variables	Miles Driven A Year	Miles/Month	Estimated MPG	Fuel Usage (DGE/Mo)	Estimated Cost Per Gallon	Monthly Fuel Cost	Monthly (Payment + Fuel)	Fuel Cost Per Mile	# Trucks in Fleet
Nat Gas	100,000	8333	5.8	1437	\$ 2.65	\$ 3,807	\$ 7,042	0.457	25
Diesel	100,000	8333	6.5	1282	\$ 4.00	\$ 5,128	\$ 7,302	0.615	25

# Fueling Services

## Design, Construct and Operate

### CNG Time Fill



# Fueling Services

## Design, Construct and Operate

### CNG Fast Fill



# Fueling Services

## Design, Construct and Operate



LNG