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| Docket Number: | 17-IEPR-10 |
| Project Title: | Renewable Gas |
| TN #: | 220233 |
| Document Title: | CNGVC Presentation on Benefits on RNG in CA |
| Description: | N/A |
| Filer: | System |
| Organization: | Thomas Lawson |
| Submitter Role: | Public |
| Submission Date: | 7/14/2017 4:58:49 PM |
| Docketed Date: | 7/17/2017 |

Comment Received From: Thomas Lawson

Submitted On: 7/14/2017

Docket Number: 17-IEPR-10

CNGVC Presentation on Benefits on RNG in CA

Additional submitted attachment is included below.



**Thomas Lawson, President
California Natural Gas Vehicle
Coalition (CNGVC)**

**Natural Gas Vehicles: Leading the
way in technology and innovative
solutions for cleaner emissions**

A yellow and blue tanker truck is parked in a modern, brightly lit industrial facility. The truck is the primary focus on the left side of the slide, with its large cylindrical tank and multiple axles visible. The background shows a clean, white floor and blue structural elements of the building. The overall scene is well-lit and professional.

Who We Are

- CNGVC is an association of natural gas vehicle and engine manufacturers, utilities, fuel providers and fleet operators serving the state.
- Our mission is to get more NGVs in action moving goods, transporting passengers and picking up trash; to support a robust fueling station network; and to spur development and use of RNG.





2016 Accomplishments

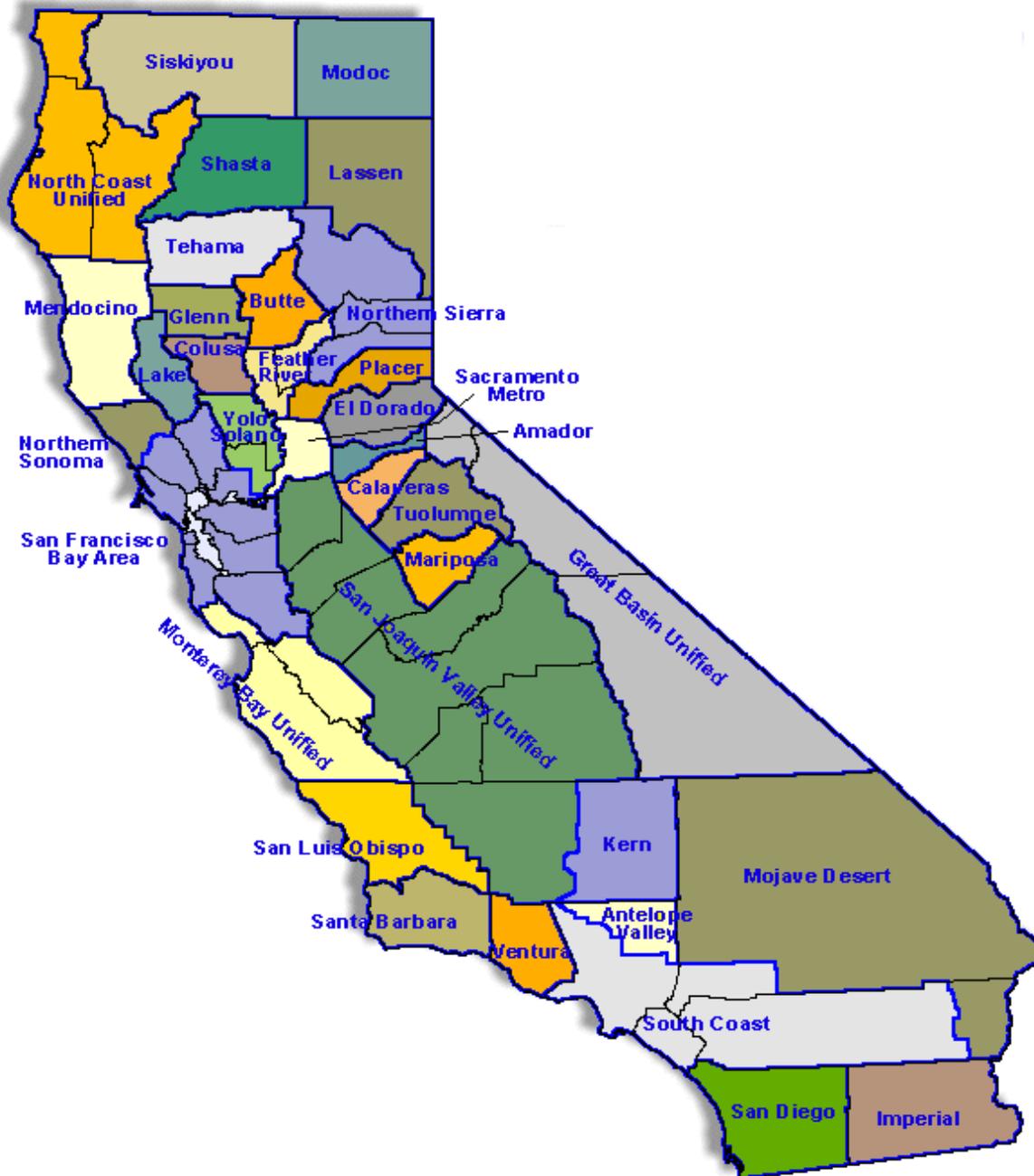
Regulatory

- Secured \$23 million in incentives for the Low NOx engine; increased the per engine amount to \$25,000
- Changed and postponed harmful regulations for NG as a transportation fuel

Legislative

- Supported SB 32/AB 197, which extend the LCFS to 2030
- Supported SB 1383, which forces regulatory agencies to incorporate RNG in its plans to meet climate goals
- Supported AB 1613, which allocated \$150 million to heavy duty trucks

California Air Districts





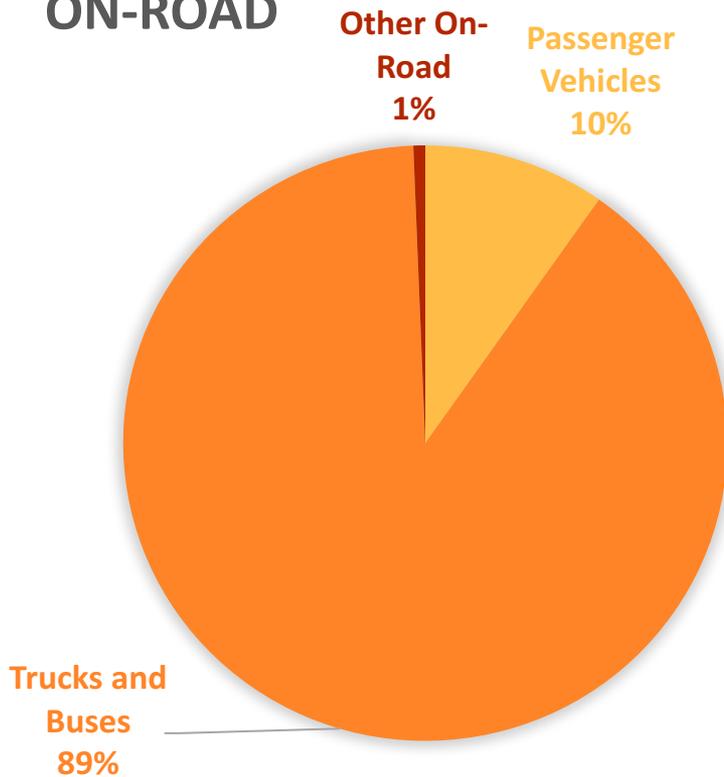
Main Goal in California



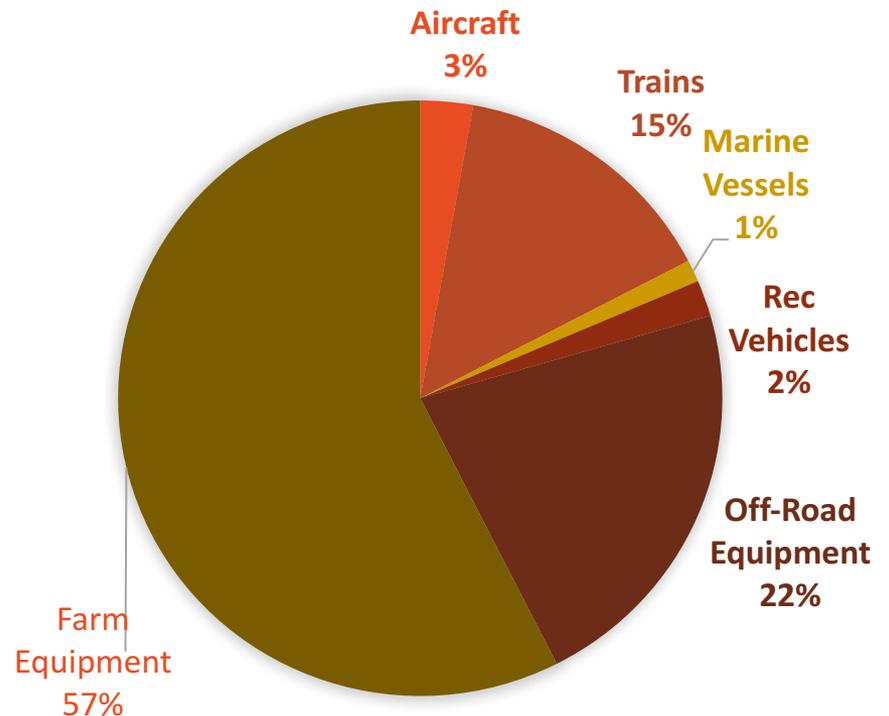
**NO_x & GHG
Emissions**

San Joaquin Valley Dominant NOx Emission Sources (2012)

ON-ROAD



OFF-ROAD



Source: CA Air Resources Board

Game Changer Technical White Paper

Next Generation Heavy-Duty Natural Gas Engines Fueled by Renewable Natural Gas

- Released in Spring of 2016
- This White Paper explores the need—and leading approaches—to immediately start deploying near-zero-emission heavy-duty vehicle (HDV) technologies on a wide-scale basis in the United States.
- In order to combat global climate change, the United States must aggressively reduce greenhouse gas (GHG) emissions from HDVs, which are the fastest growing segment of US transportation for energy use and emissions.





Get your copy!

- You can download the Executive Summary and/or the Full Report at:

www.ngvgamechanger.com

A yellow and blue tanker truck is shown in a warehouse setting. The truck is positioned on the left side of the frame, with its large cylindrical tank and multiple axles visible. The background is a bright, clean industrial space with white walls and a light-colored floor. The truck's tank has a yellow section and a blue section, with a white 'A' logo on the blue part. The truck is parked on a yellow ramp or platform.

NATURAL GAS VEHICLE TECHNOLOGIES & INNOVATIONS

1. American Power Group
2. Cummins Westport Inc.

The logo for American Power Group features a yellow background with a white, stylized mountain range silhouette. The text "American Power Group" is written in a bold, black, sans-serif font across the top of the yellow area.

American Power Group

- Dual Fuel technology is the simultaneous combustion of two fuels. In the case of APG's Turbocharged Natural Gas[®] Dual Fuel System, natural gas is used in conjunction with diesel fuel to power the engine. After the conversion, the engine can operate on either a mixture of diesel fuel and natural gas or on 100% diesel fuel.
- APG's conversion technology is designed to allow for in-field retrofit of diesel engines without the need to change or modify the design of the base OEM engine.



Cummins Westport Inc.

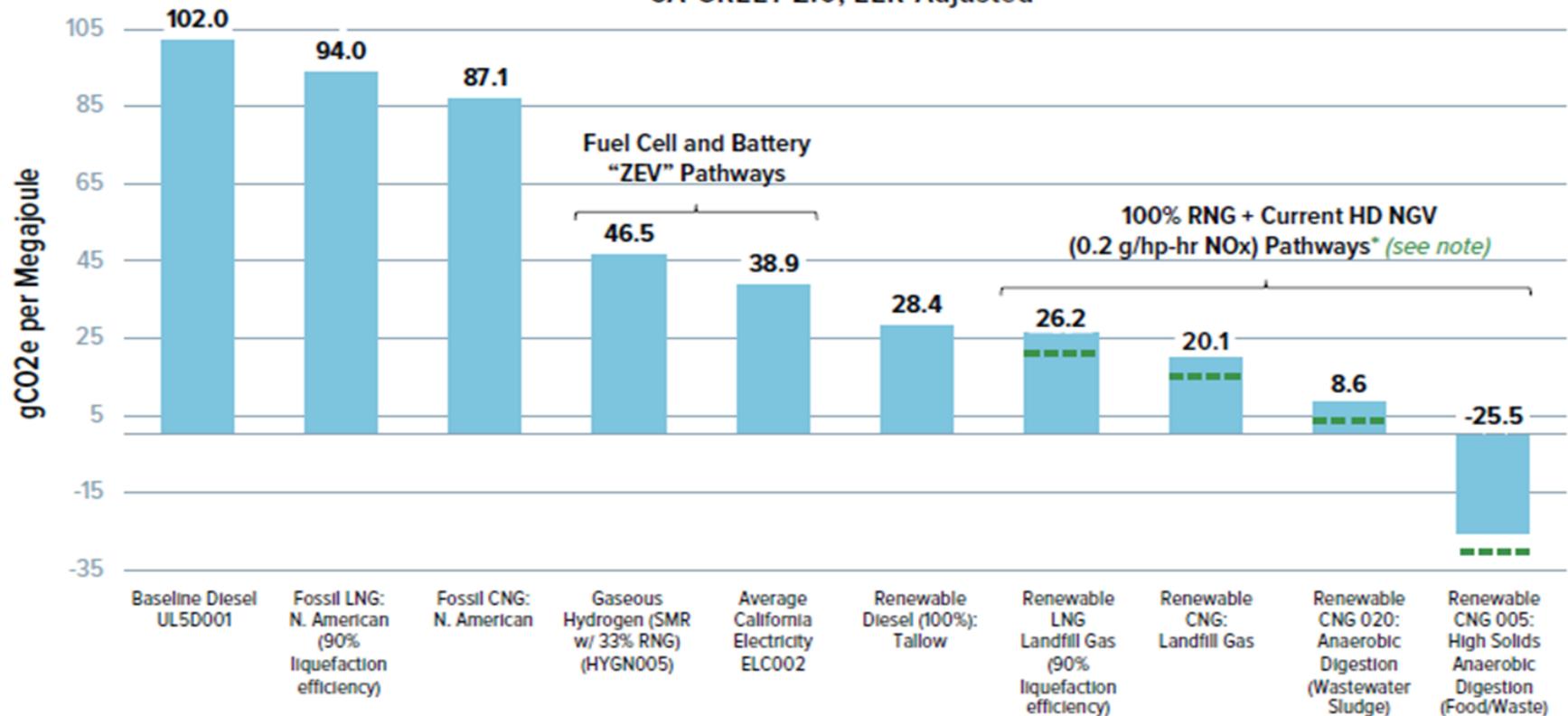
ISL G **NZ** (8.9L)
Now CARB & EPA Certified
to **90% below existing standard**

ISX12 G **NZ** (11.9L)
To be CARB & EPA Certified
(2018) to **90% below existing
standard**



Fuels Matter too. Benefits of using RNG

Carbon Intensity Scores for Heavy-Duty Truck Pathways
Final California Low-Carbon Fuel Standard, 2015
CA-GREET 2.0, EER-Adjusted



----- * Note: using the new "NZ" NG engine (0.02 g/hp-hr) will further reduce the CI scores of these RNG pathways by about 4 gCO₂e/MJ (closed crankcase ventilation reduces methane by 70%).

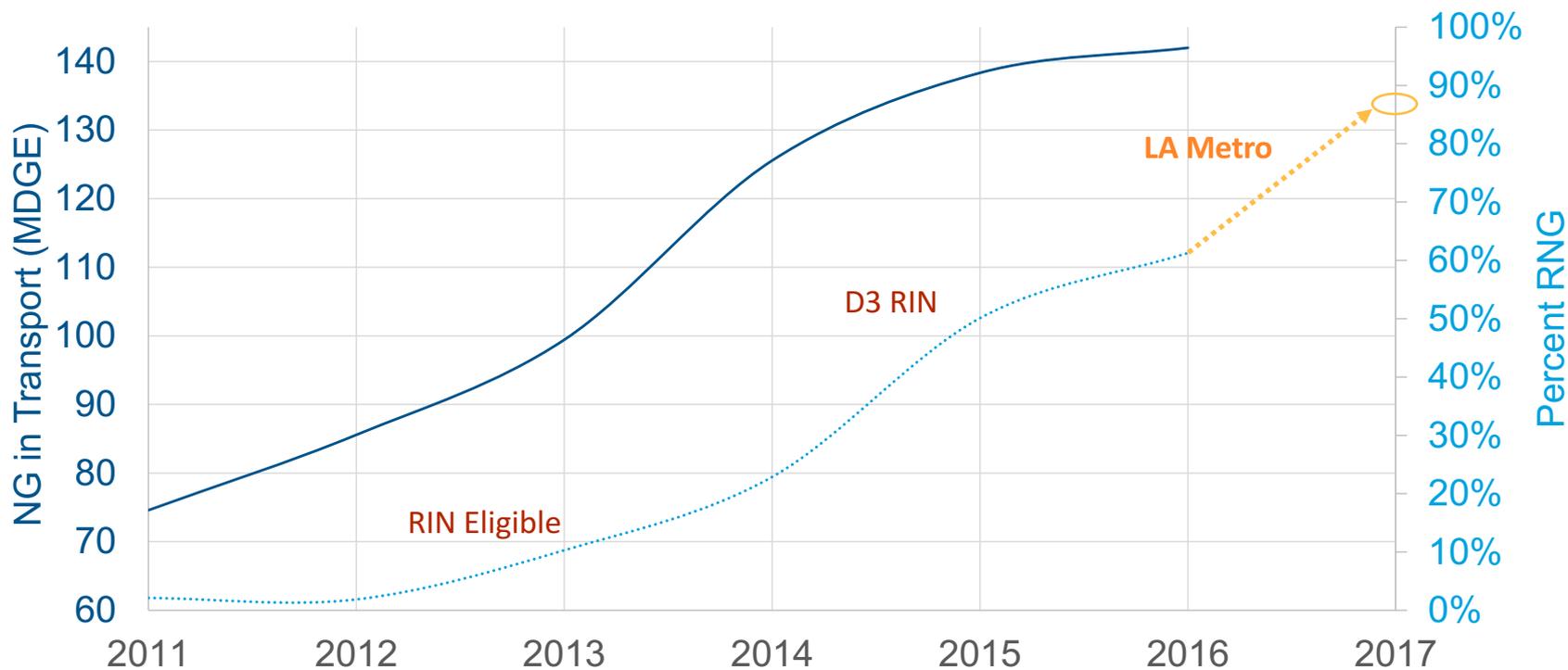
Source: California Air Resources Board, "LCFS Illustrative Fuel Pathway Carbon Intensity Determined using CA-GREET2.0," discussion presented by staff on 9/17/15 and/or CARB LCFS Final Regulation Order, Table 6; note that "HSAD pathway is EER-adjusted by the CARB formula (-22.93 base CI divided by EER of .9), even though this improves its CI score.



Fueling Infrastructure

- Here in CA and other states, we have companies like TruStar, Clean Energy, Trillium and ampCNG that have created a robust refueling network for these trucks.
- As these companies spend money on projects to procure and dispense RNG, the heavy duty trucking fleet in this state will provide exponential clean air benefits

RNG in the Transportation Sector

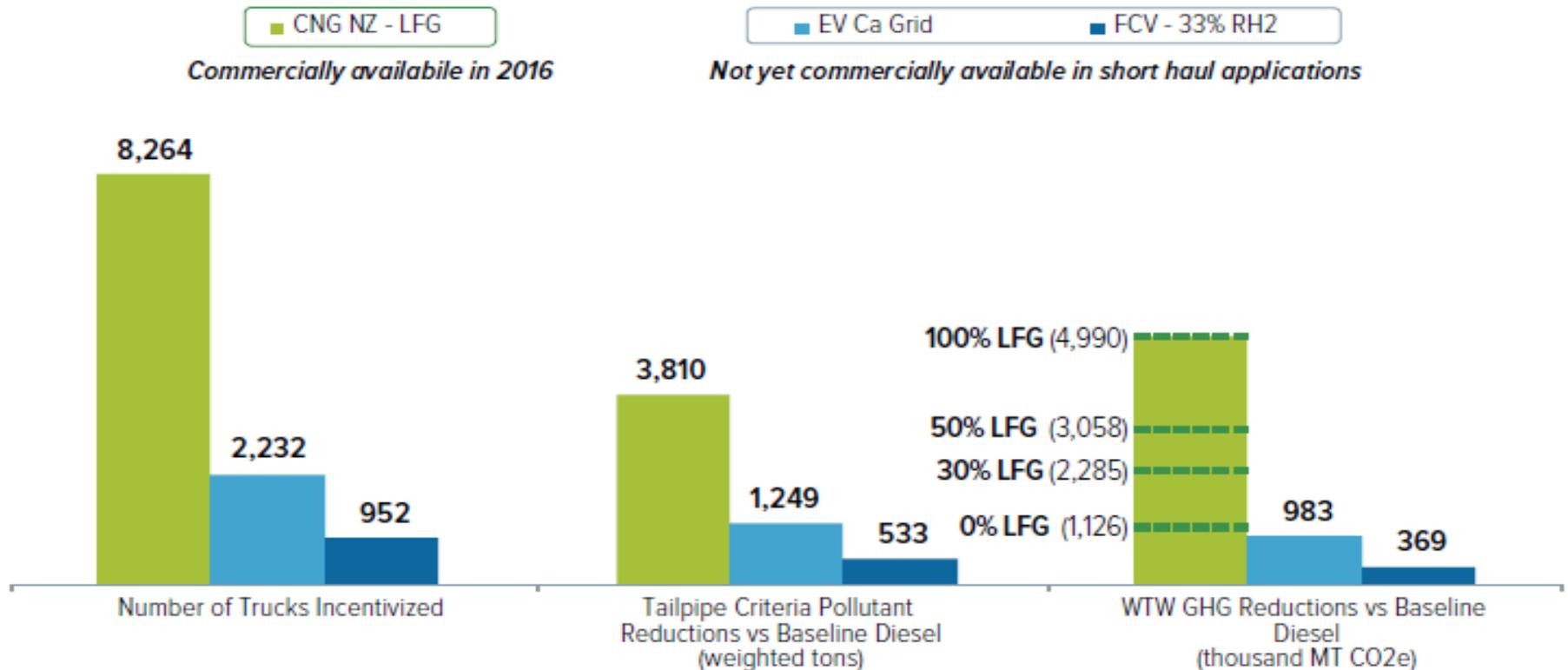


CARB, LCFS Quarterly Reported Data, April 2017

Comparison of Truck Deployments & Benefits

Short Haul Truck Incentives

What does \$500 million buy?



Incentive amounts based on incremental purchase cost of advanced heavy-duty short haul trucks over baseline diesel truck
Based on emissions and vehicle activity data from CARB EMFAC 2014

Weighted emissions = $\text{NO}_x + 20 \cdot \text{PM}_{10} + \text{ROG}$

GHG emissions based on illustrative fuel pathways calculated by ARB Staff using CA-GREET 2.0

Cost effectiveness uses Moyer program capital recover factors based on typical retention period of first owner



Conclusion

- As you can see the Natural Gas Industry is leading the way with a suite of options in the light-duty all the way through to the heavy-heavy duty classes to provide cleaner alternatives to diesel.
- Using RNG as a transportation fuel provides the most cost-effective choice.
- Natural Gas technology is ready TODAY to provide cleaner emissions.



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