



RNG Insights & Lessons

Trucking, Transit & Waste Perspective

September 26, 2017
AGA/EPA Workshop Panel

Presented by Charles Love

Love's Family of Companies



- 440 locations / 41 states
- One of largest private companies in America
- Gemini Trucking
- Tire Care / Truck Service
- Musket Corp.
- Biodiesel / Renewable Diesel
- Trillium CNG



Founded in 1964 by Tom & Judy Love

Trillium Turn-Key RCNG solutions

- Engineering
- Design
- Construction
- Operations & Maintenance
- RNG / CNG Fuel Supply Management
- Own/Operate over 170 Stations
- National Footprint (stations / service)
- Over 20 years experience
- Financing
- Grant Assistance
- Logistics for Virtual Pipeline Solutions
- Own/Operate Fleet of Tube Trailers
- Mobile CNG / RCNG Fueling Stations

Transit



Class-8 Trucking



Municipal Gov't



CNG & RCNG Fueling Locations



National Footprint, Resources, Personnel, Infrastructure & Experience

The Bottom Line



The CNG Value Proposition for Fleet Owners and Operators

For businesses, it always comes down to the bottom line.

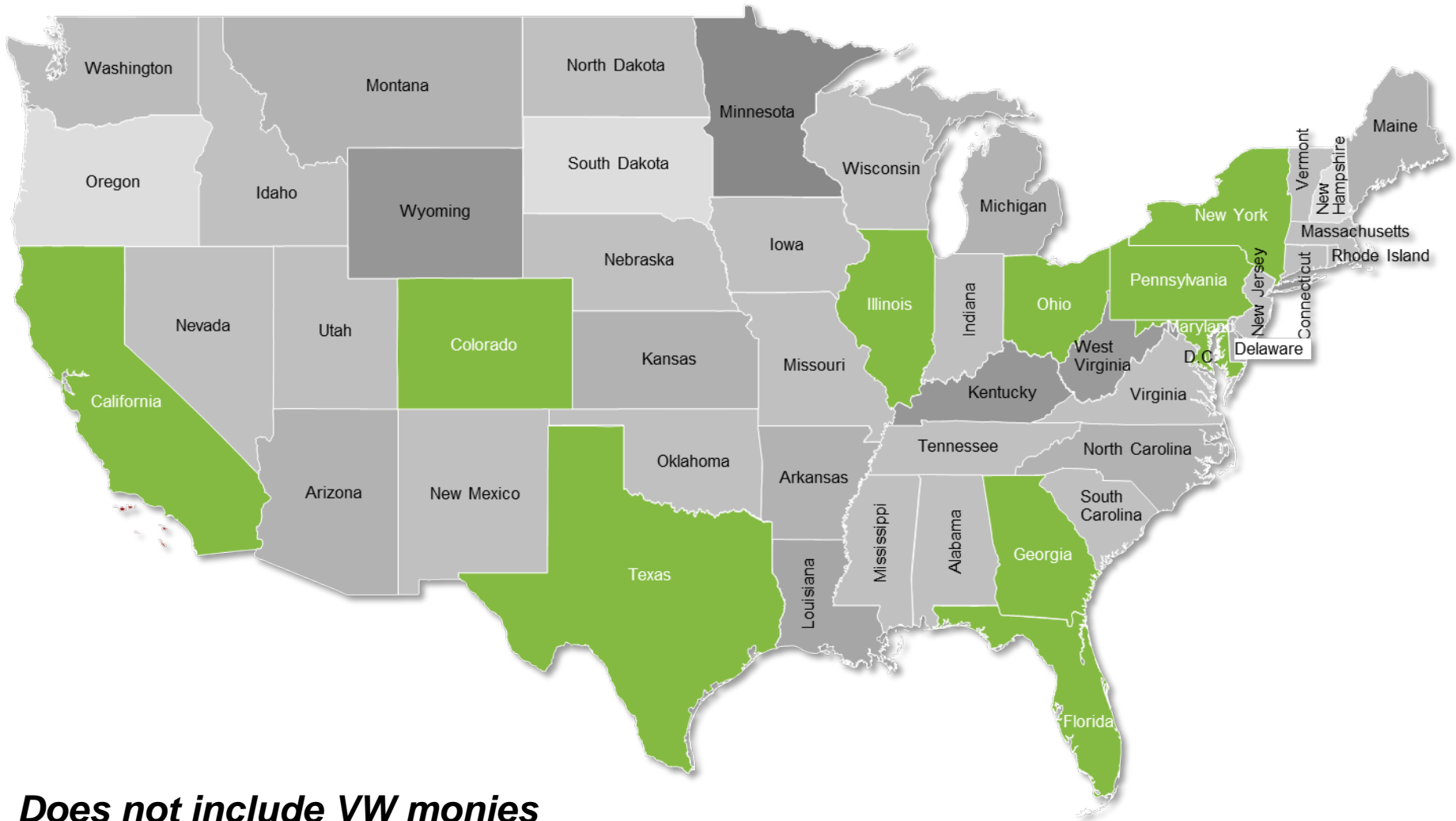
Challenges

- Education (CNG 101)
- Cost (conversion & station)
- Locations (private / public)
- Convenience
- Training
- Facilities (NFPA 52)
- Pipeline Access (end user)



Everything needs to line up for a fleet to switch to CNG or RCNG.

Top 10 Grant States Supporting CNG Conversions



Does not include VW monies

Trucking fleets using public access stations have the greatest challenge.

CNG Engine Technology



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



Deployment Begins

2016

ISB6.7 G (6.7L)
To be CARB & EPA Certified to
50% below existing standard



Deployment Begins

2017

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



Deployment Begins

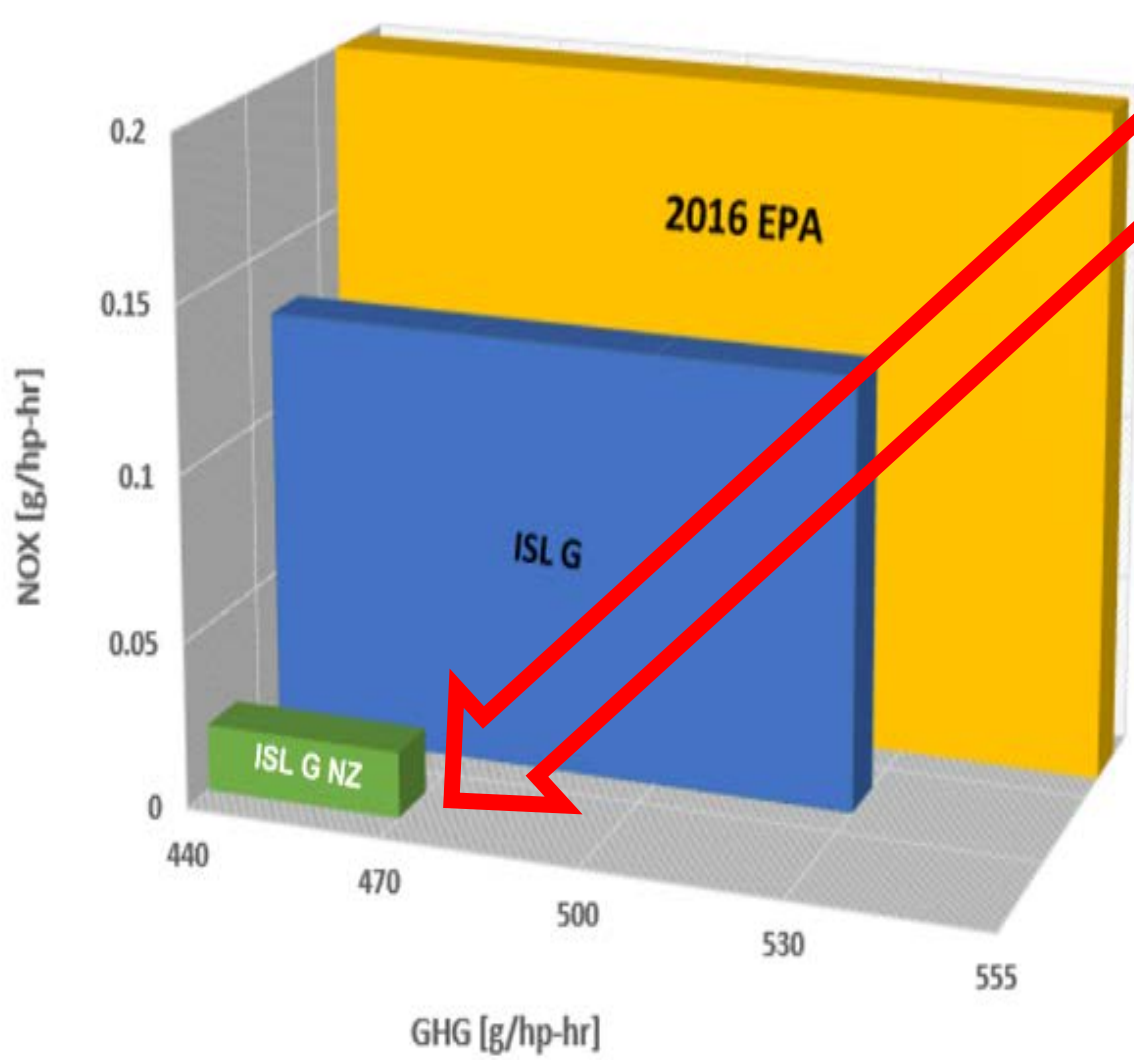
2018

CWI heavy-duty ultra-low-NOx engines: anticipated timeline for certification and deployment

**Information provided by Cummins Westport*

Cummins Westport has played a key role in developing the right technology.

Cleanest HD Fuel in Market

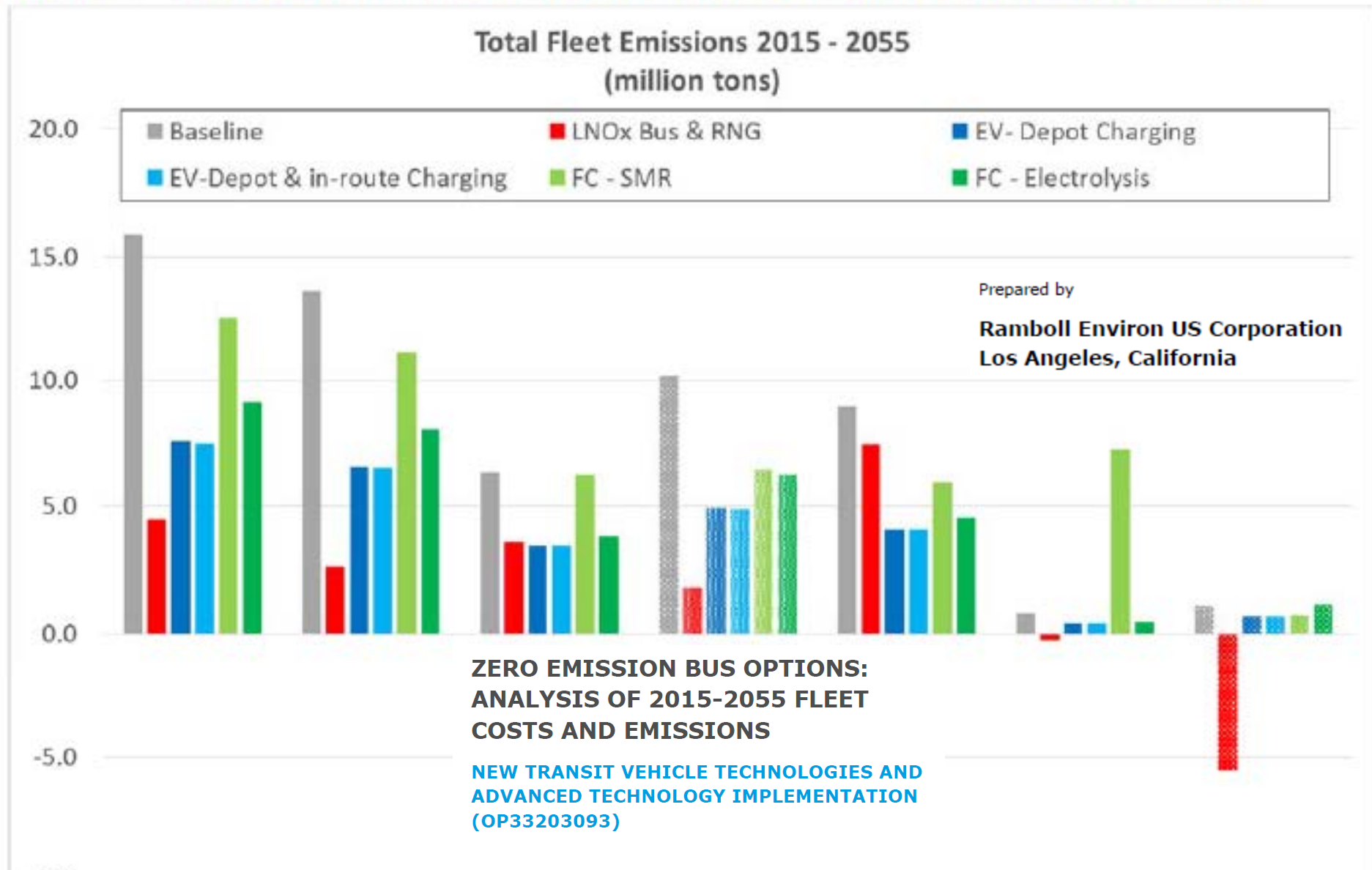


ISL G NEAR ZERO

*Information provided by Cummins Westport

The ISL G NZ engine combined with RNG delivers substantial results.

Figure 1. LACMTA Zero Emission Bus Estimated Total Fleet Emissions 2015 – 2055



GHG	CO2	NOx (x1000)	NOx (x1000)	CH4 (x 100)	PM (x10000)	PM (x10000)
Total	Total	In-basin	Out-of-basin	Total	In-basin	Out-of-basin
15.8	13.5	6.2	10.1	8.9	0.8	1.0
4.5	2.5	3.5	1.8	7.5	-0.2	-6.0
7.5	6.5	3.5	5.0	4.0	0.5	0.8
7.5	6.5	3.5	5.0	4.0	0.5	0.8
12.5	11.0	6.2	6.5	5.8	7.2	1.0
9.0	8.0	3.8	6.2	4.5	0.5	1.0

Opportunities

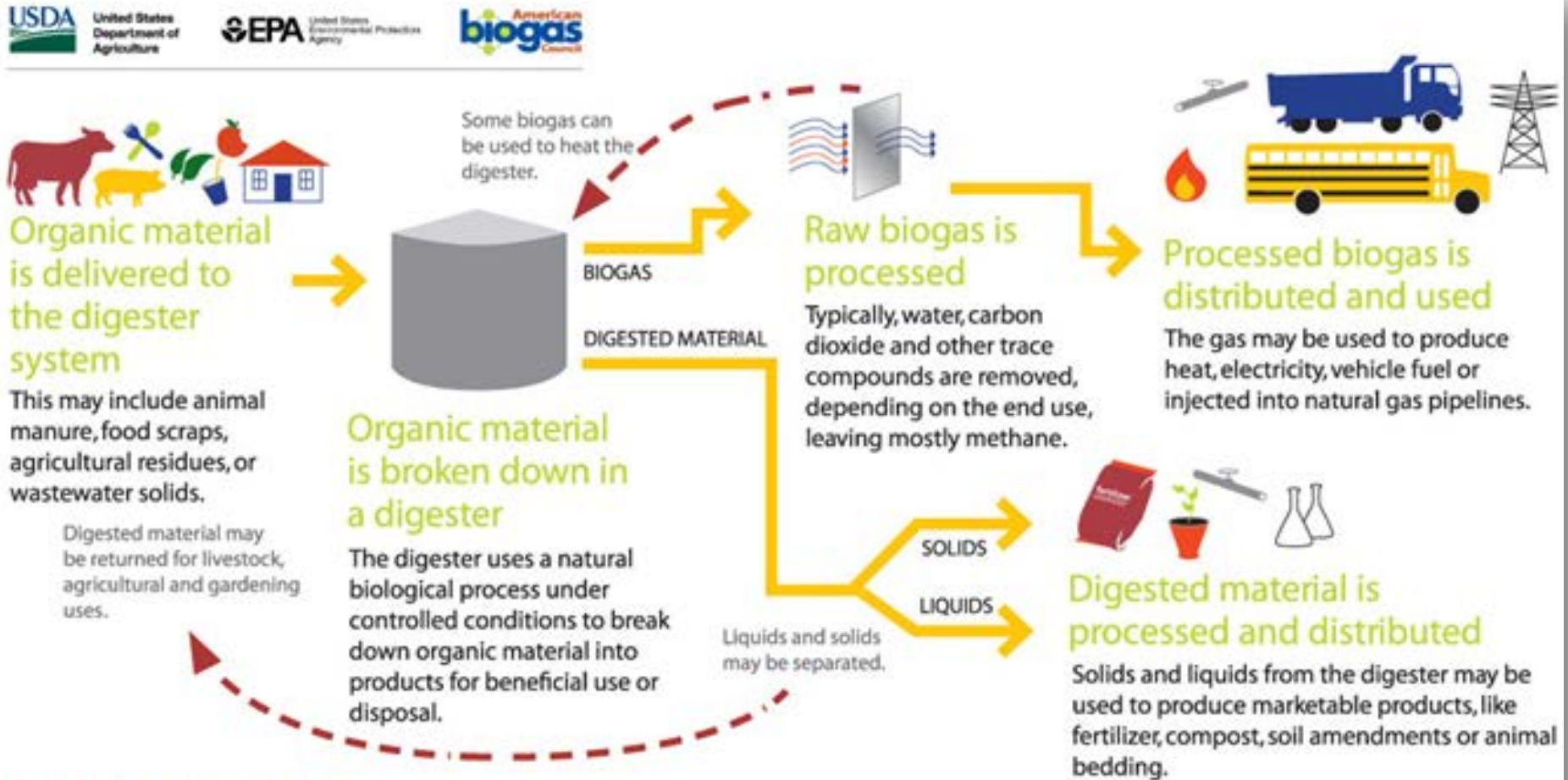


Image Courtesy of American Biogas Council

RNG has a great story to tell and can play a vital role shaping clean transportation.

Advantages of RNG

What is RNG used to make?

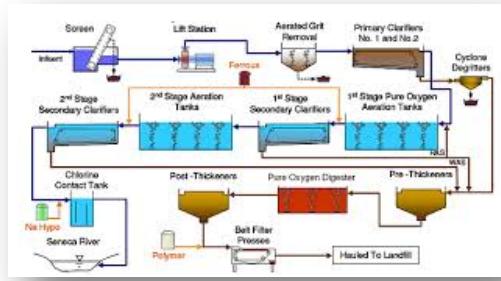
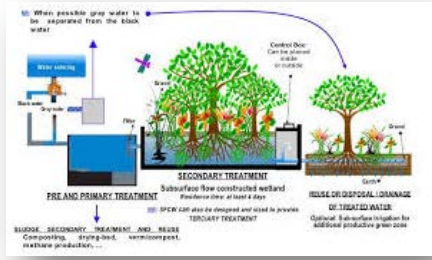
RNG can be used to ALL other alternative fuels:

- RNG to hydrogen for 100% renewable H2 vehicle fuel (SMR)
- RNG to electricity – fuel cell, power generation 100% renewable
- RNG to LNG – 100% renewable
- RNG to CNG – 100% renewable



What are some of the benefits of RNG?

- RNG provides American energy independence
- RNG creates high paying domestic clean energy jobs
- RNG captures short lived climate pollutants (SLCP)
- RNG costs can be managed and effective
- RNG is abundant (billions of gallons wasted annually)
- RNG technology is reliable / available
- RNG is the fuel of the future / today
- RNG is the cleanest transportation fuel in the world
- RNG is leaving the planet in a better place for the next generation



RNG is the feedstock for the future of HD transportation fuels.

Thank you.

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