

# Renewable Fuels

## West Coast Collaborative

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# Recent DERA Projects in Sacramento



Description	Partners	Dates	Tons Per Year (EPA Estimates)		
			NOx	PM	GHG
Locomotive Repower	Union Pacific Railroad	2012 - 2015	14.9	0.83	30
Electric Agricultural Pumps	Regional Farmers	2011 - 2014	44.6	0.043	4,865
Ag Tractors & RNG Refuse Trucks	Regional Farmers & Atlas Disposal	2013 - 2015	7.49	1.38	249

# Sacramento Renewable Fuel Projects (Unsuccessful so far!)

- Amyris (genetically engineered yeast) – Renewable Diesel (RD)
  - Emeryville
  - Project with VW
- Solazyme (algae) - RD
  - South Sacramento
  - Project with Propel
- Washington State University (Poplar Plantation) - RD
  - Clearksburg
  - Nothing near term



# Sacramento Renewable Fuel Projects (Successful)

- Clean World/Atlas ReFuel®
  - High Solids Anaerobic Digestion
  - Food waste to CNG



- Clean Energy
  - “Nominated” CNG & LNG
  - Landfills in the Midwest



# CARB Carbon Intensities

<b>Gasoline &amp; Gasoline Substitutes<sup>(1)</sup></b>	<b>Pathway</b>	<b>Carbon Intensity</b>	<b>Percent</b>
CA Gasoline	CARBOB	95.86	100%
Ethanol from Corn	Midwest	99.4	+4%
Ethanol from Corn	California	77.44	19%
Ethanol from Cane	Brazillian	73.4	23%
Ethanol from Cane	Brazillian/CHP	58.4	39%
CNG	CA Pipeline	67.7	29%
CNG	Landfill	11.26	88%
CNG <sup>(2)</sup>	High Solids Anaerobic Digestion	-15.29	116%

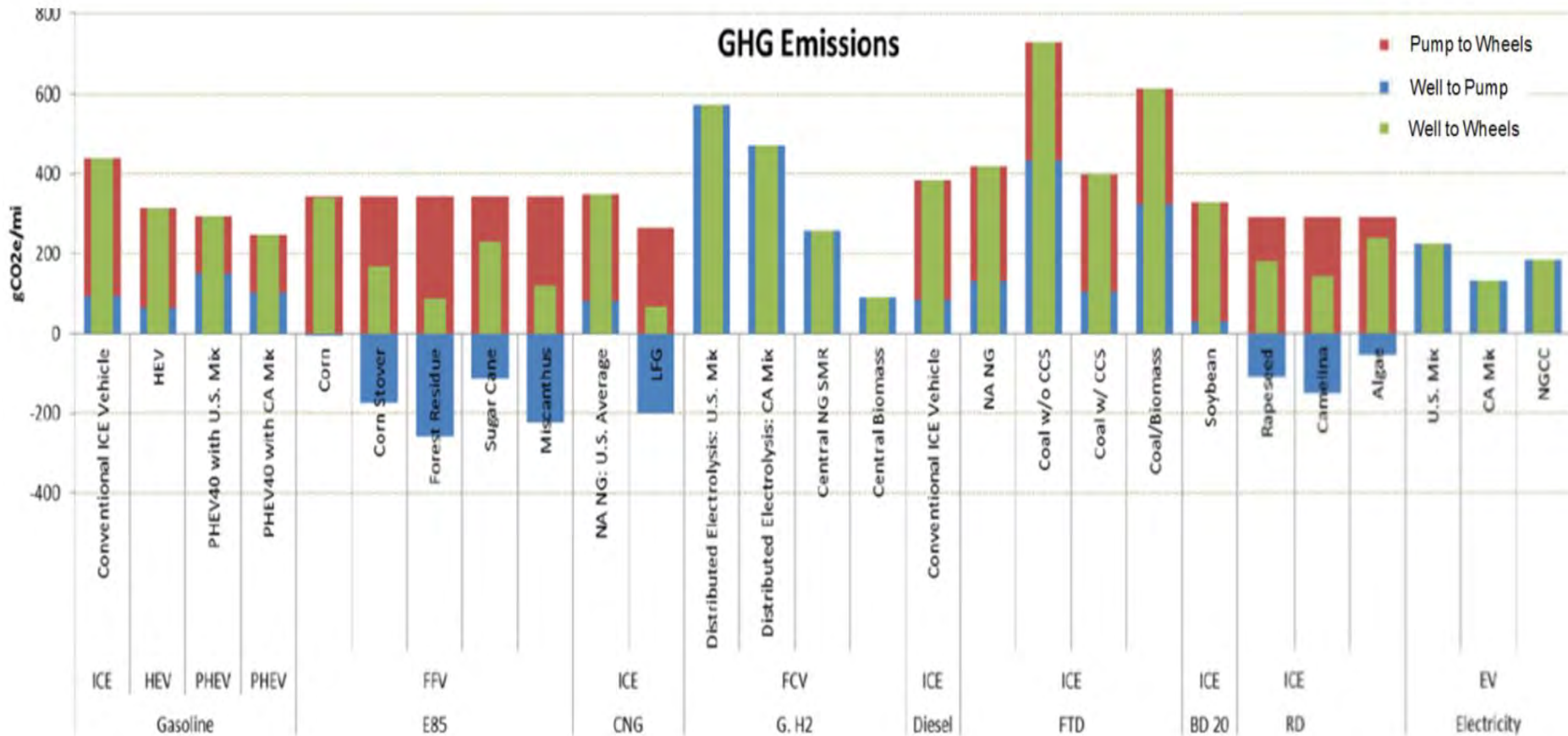
<b>Diesel &amp; Diesel Substitutes<sup>(1)</sup></b>	<b>Pathway</b>	<b>Carbon Intensity</b>	<b>Percent</b>
CA Diesel	ULSD	94.71	100%
LNG	Import/Gasify/Liquefy	93.37	1%
LNG	CA Dairy	17.78	81%
CNG	CA Pipeline	67.7	29%
CNG	Landfill	11.26	88%
CNG <sup>(2)</sup>	High Solids Anaerobic Digestion	-15.29	116%
Renewable Diesel	Tallow – high temp	39.33	58%
Renewable Diesel	Tallow – low temp	19.65	79%
Bidiesel	Waste Oil w/cooking	15.84	83%
Biodiesel	Waste Oil w/o cooking	11.76	88%

1) [http://www.arb.ca.gov/fuels/lcfs/121409lcfs\\_lutables.pdf](http://www.arb.ca.gov/fuels/lcfs/121409lcfs_lutables.pdf)

2) LCFS Biofuel Producers Registration List

# REET Model

Greenhouse gases, Regulated Emissions, and Energy use in Transportation



# Renewables Price

<b>Fuel</b>	<b>Cost Range (DGE)</b>
Fossil CNG	\$0.80 - \$2.95
Landfill CNG	TBD ~<\$1.25
Food Waste CNG	TBD ~<\$1.25
Fossil LNG	\$1.37
Landfill LNG	TBD ~\$<1.00
Renewable Diesel from SF Rack	\$0.02 - \$0.10 Incremental

# RINs & LCFS Values

RINs per DGE: \$2 to \$0.20  
 LCFS per DGE: \$0.41 to \$0.21  
 Fuel Provider's Value per DGE: \$2.41 to \$0.41

## RINs



## LCFS

	LCFS
Boundary	State of CA
Length	2020
Start	2010
Objective	Reduce carbon intensity (CI) of fuels 10% by 2020
Mechanism	Performance-based CI regulation
Tradable security	LCFS credit (tCO <sub>2</sub> e)
Biogas application	Medium BTU, CNG
Historical Prices	\$2.00-\$3.00 per MMBTU

<http://www.epa.gov/agstar/documents/conf13/RFS2%20LCFS%20Incentives,%20Andy%20Dvoracek.pdf>  
[http://www.theicct.org/sites/default/files/publications/ICCTbriefing\\_RINs\\_20140508.pdf](http://www.theicct.org/sites/default/files/publications/ICCTbriefing_RINs_20140508.pdf)



# Moving Fleets to Renewable Fuels

- Marketing “Climate Action Plans” and “Corporate Social Responsibility” Plans
  - California League of Cities
  - Green California Summit
  - Clean Cities Meetings
- Local Ordinances
- Incentives
- Metrics
  - NAFA & Calstart
  - GreenTraks
  - carbonBLU