

# Vision Motor Corp.

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# Vision Industries Solution

- Why settle for reduced emissions if you can have ZERO emissions today?
- 2009 Freightliner Tyrano
  - Plug-in electric/ Hydrogen fuel cell heavy duty truck
  - Regenerative breaking
  - No energy consumed while idling
  - Zero emission
  - 5 miles per pound of hydrogen consumption
  - 35% cheaper per mile than diesel or LNG
  - More torque than diesel or LNG

# Alternative Vehicle Solutions

## Comparisons of Short Haul Trucks (Annual)

(City and Highway combined 50,000 miles per year)

	2007 Diesel	LNG	Freightliner Tyrano
Horsepower	450 peak	450 peak	402
Torque (foot/lbs)	1,350 peak	1,350 peak	3,200 Continuous
Fuel	12,500 Gal.	16,700 Gal.	10,000 lbs
Particulates	15.46 lbs	4.6 lbs	0
NMHC	216 lbs	0	0
MHC	0	66.5 lbs	0
NOx	1,856 lbs	570 lbs	0
CO2	272,250 lbs	142,145 lbs	0
Noise Pollution	Yes	Yes	No
Cost of Fuel	\$2.85 Gal.	\$2.39 Gal.	\$1.95 lb
Cost per mile	\$0.712	\$0.79	\$0.39
Annual Fuel Cost	\$35,6254	\$39,913	\$19,500
Gross Purchase Price	\$93,000	\$197,000	\$250,000
Net Price w/ Subsidies	\$18,600	\$92,000	\$10,000

# Attractiveness of transaction to Ports:

- Benefits of Hydrogen as a Zero Emissions Fuel
  - If the entire short haul fleet converts from 2007 Clean Diesel standards to Hydrogen, annual:
    - Particulate emissions would be reduced by 415,000 pounds!
    - Hydrocarbon emissions would be reduced by 5,800,000 pounds!
    - Nox emissions would be reduced by almost 50,000,000 pounds!
    - CO2 emissions would be reduced by a minimum of 3,500,000 tons!
    - The entire fleet can be refueled from 3 stations within the Port.
- Ports would be the first to implement “zero emission” transportation solution.
- Ports can set the worldwide standard for an environmentally friendly port operation.

# Hydrogen usage at Ports

## Environmental Benefits of Converting Short Haul Diesel Trucks to Hydrogen

# of Trucks Converted	Daily/lbs of Hydrogen Consumed	Monthly/lbs of Hydrogen Consumed	Yearly/lbs of Hydrogen Consumed	Fuel cell cars replaced at 350 lbs/year	Annual CO2 Reductions in tons
1	30	900	10,950	63	103
<b>500</b>	<b>15,000</b>	<b>450,000</b>	<b>5,475,000</b>	<b>31,286</b>	<b>51,500</b>
1,000	30,000	900,000	10,950,000	62,571	103,000
<b>1,500</b>	<b>45,000</b>	<b>1,350,000</b>	<b>16,425,000</b>	<b>93,857</b>	<b>154,500</b>
2,500	75,000	2,250,000	27,375,000	156,429	257,500
<b>5,000</b>	<b>150,000</b>	<b>4,500,000</b>	<b>54,750,000</b>	<b>312,858</b>	<b>515,000</b>
7,500	225,000	6,750,000	82,125,000	469,286	772,500
10,000	300,000	9,000,000	109,500,000	625,714	1,030,000
12,500	375,000	11,250,000	136,875,000	782,143	1,287,500
15,000	450,000	13,500,000	164,250,000	938,571	1,545,000
<b>16,800</b>	<b>504,000</b>	<b>15,120,000</b>	<b>183,960,000</b>	<b>1,051,200</b>	<b>1,730,400</b>

# Why hydrogen?

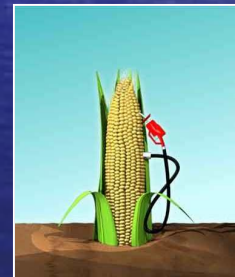
- Offers several benefits over Diesel and Natural Gas
  - Cheaper per mile
  - ZERO greenhouse gas emissions
  - No noise pollution
  - Increase of Torque
  - Domestic and secure energy source
  - Renewable and non-depleting
  - Can be made from a wide variety of resources
- OEM adoption
  - All major OEMs will offer hydrogen powered vehicles by 2010
- State and federal support available

# Hydrogen is more cost effective than Diesel

- As a result of technological breakthroughs, we have passed an inflection point at which hydrogen is cheaper per mile than diesel as a transportation fuel
- Fuel cell technology promises 100% efficiency gain over diesel-based combustion engines
  - Each Pound of hydrogen gets you as far as 1 gallon of diesel.
- Hydrogen costs are expected to stabilize at \$1.50 to \$2.75 per lb (they currently range from \$0.90/lb in Santa Monica to \$4.09/lb in Palm Springs)

# Hydrocarbon feedstock progression

Hydrogen is the natural progression of hydrocarbon fuel from complex hydrocarbon chains to simple ones



**Reducing Complexity**

# **Vision Motor Corp.**

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Contact: Rudy Tapia, Business Dev.

310.454.5658 x203

Rudy@VisionMotorCorp.com