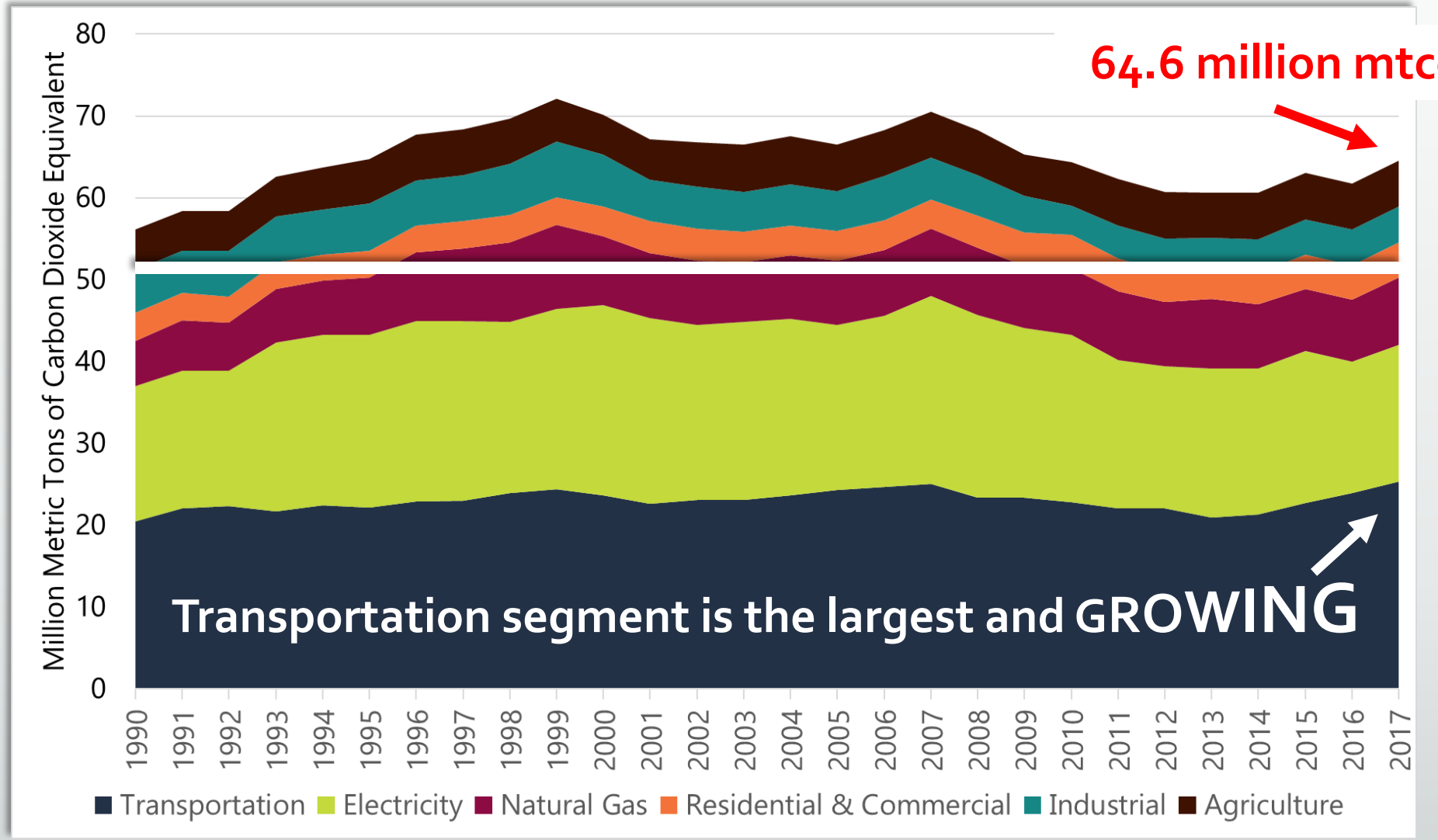
Removing Our Dependence on Petroleum Diesel

Oregon Global Warming Commission's Biennial Report to the Legislature

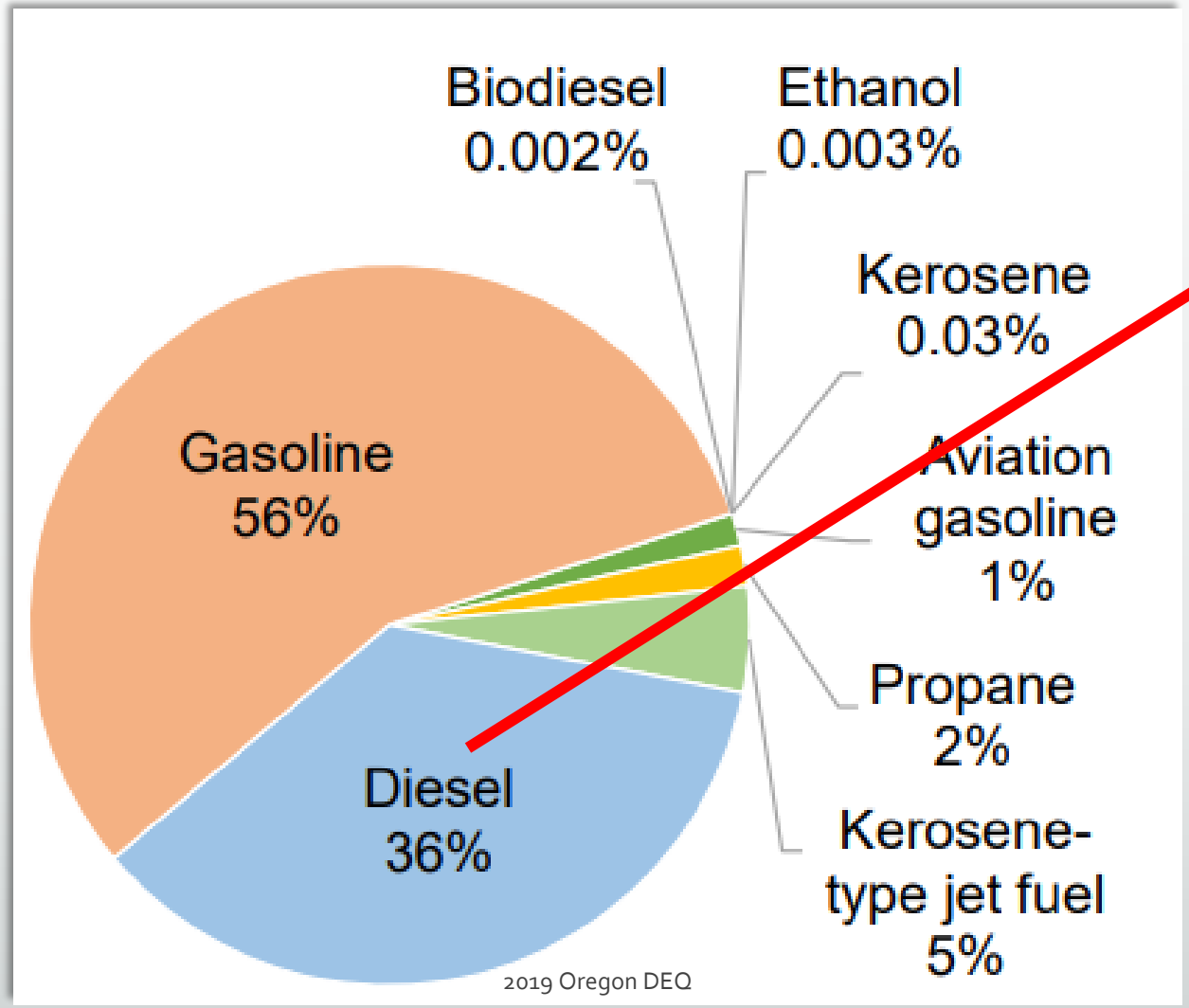
"Oregon not on track to meet GHG reduction goals"



2020 goal
51 million
mtco2e

Transportation Fuel Types

25.4 Million Metric Tons CO2e in 2019



6% of Oregon's vehicles use diesel

2% of Oregon's vehicles are heavy duty trucks and consumed

55% of diesel

TITAN Missed GHG Reduction Goals by Wide Margin

Reduce Emissions 20% by 2020

Vision 2020	2010	2019	Change
Fleet MPG (Class 6, 7 & 8)	6.84	7.26	6%

Missed Target Despite Every Available Add-On

Air Deflectors

Trailer Side Skirts

Aerodynamic Wheel Covers

Low Rolling Resistant Tires

Aerodynamic Mud Flaps

Engine Idle Shutoff

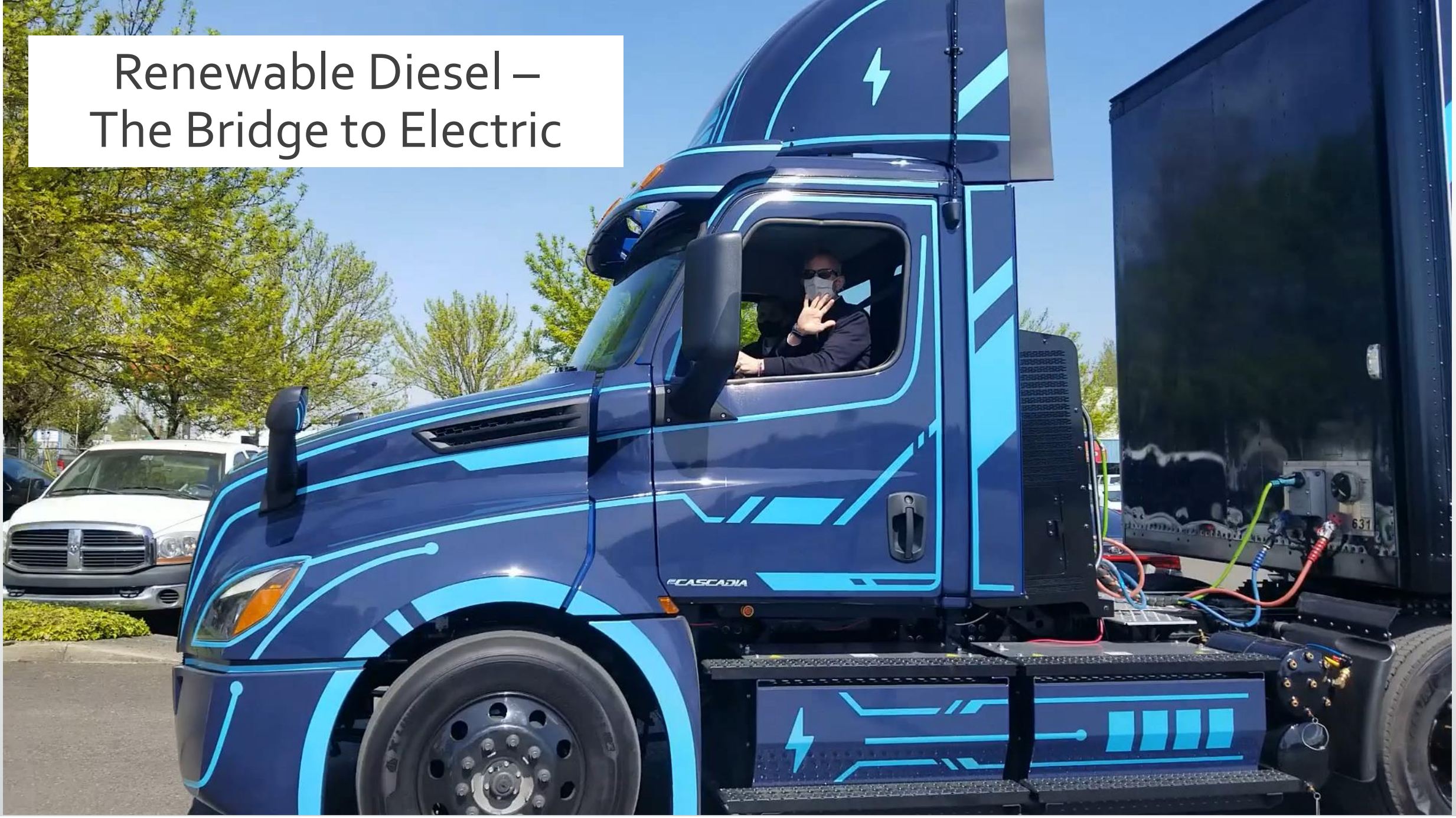
Artificial Intelligence

Alternatives to Petroleum Diesel

Diesel Application Energy Options	Energy Type	ASTM (American Society for Testing and Standards)	Carbon Intensity [g CO2e / MJ]	CI Reduction vs. Petroleum Diesel
Petroleum Diesel (B5)	Fossil	**D975**	**97.64**	---
Natural Gas (Compressed)	Fossil	WK40094	79.98	18%
Natural Gas (Biogas)	Renewable	WK40094	50.00	49%
Biodiesel (B99)	Renewable	D6751	35.40	64%
Electricity (hydro, natural gas, coal, wind)	Oregon Mix		32.15	67%
Renewable Diesel (R99)	**Renewable**	**D975**	**30.02**	**69%**
Electricity (local charging wind & solar)	Renewable		0.00	100%

Oregon Department of Energy; OAR 340-253-8010 (4)

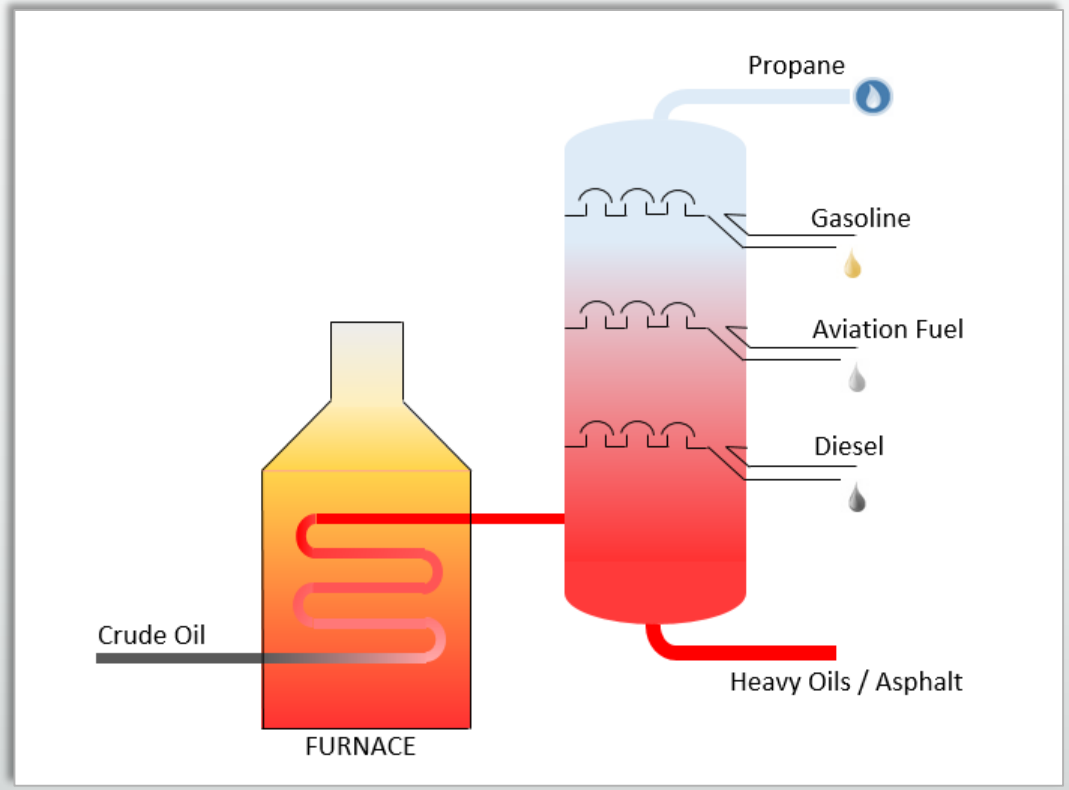
Renewable Diesel – The Bridge to Electric



The Petroleum & Renewable Diesel Difference?

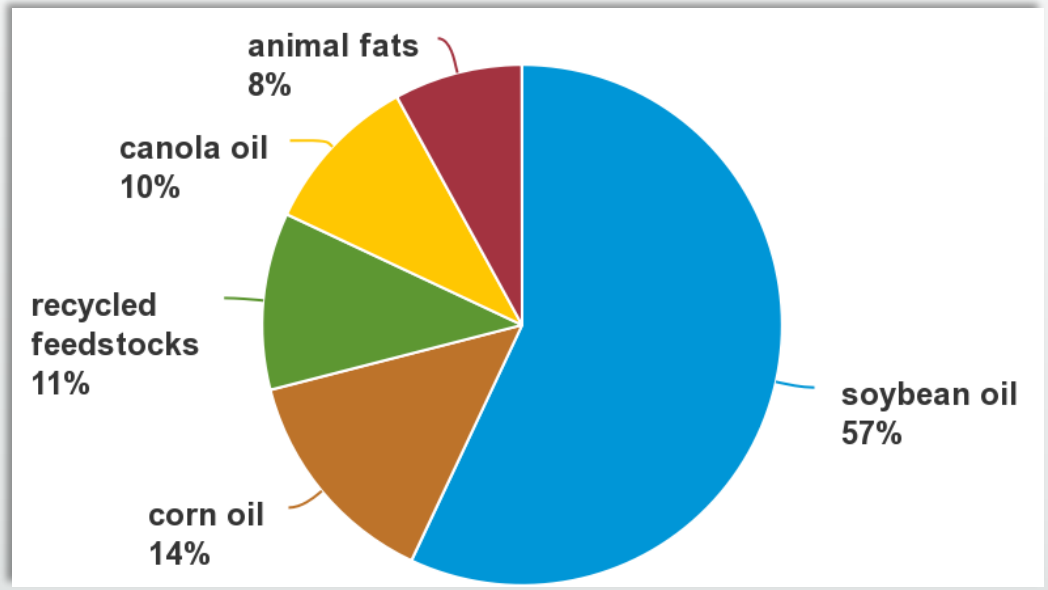
Same Process, Same Chemical

Both use Fractional Distillation in the same existing production facilities



Millions of Years

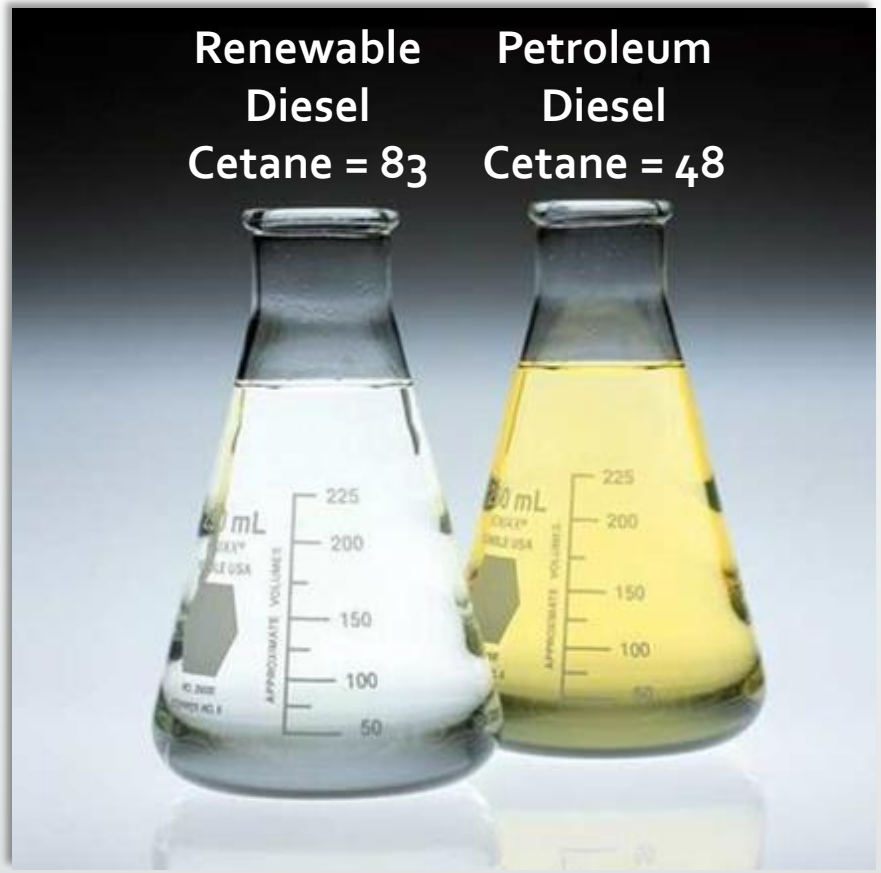
Harvesting today's renewable waste and crop oils in place of carbon intense crude oil



Next Feedstocks

- Used cooking oil
- Municipal garbage & agricultural waste
- Wood scrap waste from forest-rich Oregon

Renewable Diesel is Ultra Clean Burning



33% Less Soot

Renewable Diesel Scorecard

Diesel Application Energy Options	Petroleum Diesel (B5)	Renewable Diesel (R99)
ASTM (American Society of Testing Measurement)	D975 ⟷	D975 "Drop In" replacement
Carbon Intensity (g CO2e / MJ)	97.64 →	30.02 Bridge to electric
Truck Cost (class 8)	$130,000 ⟷	$130,000
Energy Density (MJ / KG)	43	44 ←
Oxidative Stability (Water content)	Baseline 12 months	Excellent Indefinitely ←
Cold Flow Properties	Baseline	Excellent ←
Lubricity	Baseline	Similar ←

Renewable Diesel – Price & Profit

September 2020

Per Gallon	Petroleum	Renewable
Price - Diesel Wholesale (1)	**$1.43**	**$1.46**
Production Cost (2)	$1.36	
Production Cost (3)		$3.75
US Blenders Credit (4)		-$1.00
US Renewable Fuels Standard RIN Credit (4)		-$2.04
Oregon Clean Fuels Program Credit (DEQ)		-$1.11
Profit Per Gallon (2)	$0.07	
Profit Per Gallon		**$1.86**

(1) TITAN Freight Portland terminal contract price, 09/24/2020
(2) Profit Per Gallon operating income (5%), Shell Annual Report and Accounts 2019
(3) "Analysis: High credit values outweigh cost of production for US renewable distillates," S&P Global, 09/21/2020
(4) "Renewable Diesel Rising," Ethanol Producer Magazine, 04/19/2021

Renewable Diesel – Price & Profit

June 2020

Per Gallon	Petroleum	Renewable
Price - Diesel Wholesale (1)	**$2.57**	**$2.57**
Production Cost (2)	$1.36	
Production Cost (3)		$3.75
US Blenders Credit (4)		-$1.00
US Renewable Fuels Standard RIN Credit (4)		-$2.04
Oregon Clean Fuels Program Credit (DEQ)		-$1.11
Profit Per Gallon (2)	$0.13	
Profit Per Gallon		**$2.97**

(1) TITAN Freight Portland terminal contract price, 06/01/2020
(2) Profit Per Gallon operating income (5%), Shell Annual Report and Accounts 2019
(3) "Analysis: High credit values outweigh cost of production for US renewable distillates," S&P Global, 09/21/2020
(4) "Renewable Diesel Rising," Ethanol Producer Magazine, 04/19/2021

Renewable Diesel – Lower Operating Costs

Energy Source Worksheet - TITAN Freight

Diesel Type	Petroleum	Renewable
Fuel economy (Class 8) - Miles Per Gallon	6.7	6.7

Cost Analysis - Per Mile	Petroleum	Renewable	Reductions
Exhaust system maintenance	$0.022	$0.007	-$0.015
Oil change maintenance	$0.010	$0.005	-$0.005
Renewable Diesel Total Cost Per Mile Savings			**-$0.020**

Clean Energy Calculator – TITAN Freight

Clean Energy Calculator - TITAN Freight	Petroleum	Renewable	Totals
Diesel Gallons Used - Annual	119,273	142,279	261,552
Total Miles Travelled - Annual (Gallons x MPG)	842,629	1,005,155	1,847,784
Savings Calculator			
RD Total Miles Travelled		1,005,155	
RD Total Cost Per Mile Savings		-$0.020	
Total Cost Savings - Annual		**-$20,286**	

Metric Tons of CO2e (MTCO2e) Calculator	Petroleum	Renewable	Totals
Renewable Diesel Use - Gallons		142,279	
MTCO2 = 2,204.6 pounds of CO2	1,868	574	
MTCO2e reduced with switch to Renewable Diesel		**-1,294**	**-69%**

Clean Energy Calculator – OREGON

Clean Energy Calculator - Oregon

Oregon petroleum diesel use	650,147,179
Diesel MPG estimate (est passenger and commercial)	10
Oregon petroleum diesel miles	6,501,471,790
RD Total Cost Per Mile Savings	-$0.020
Total Cost Savings - Annual	**-$131,209,830**

Metric Tons of CO2e (MTCO2e) Calculator	**Petroleum**	**Renewable**	**Totals**
MTCO2 = 2,204.6 pounds of CO2	8,537,495	2,624,653	
MTCO2e reduced with switch to Renewable Diesel		**-5,912,842**	**-69%**

Renewable Diesel – Pollution Scorecard

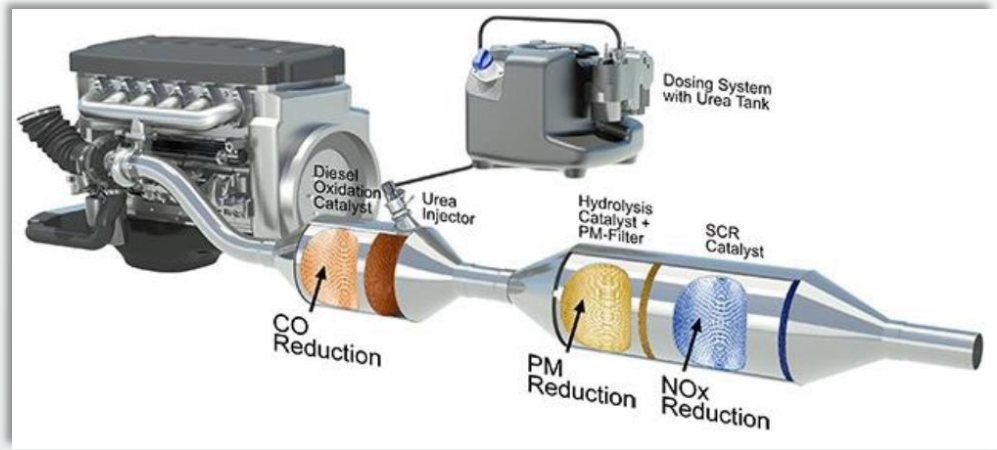
Deadly Diesel Pollution	Why is it Deadly	Petroleum Diesel (B5)	Renewable Diesel (R99)
NOx - Nitrogen Oxides	Causes breathing problems, chronically reduced lung function	Baseline	-10%
PM (2.5 & 10) / Black Carbon	Lung cancer, makes asthma symptoms worse	Baseline	-30%
CO - Carbon Monoxide	Deprives the heart, brain and other vital organs of oxygen	Baseline	-24%
HC - Hydrocarbons	Lung and eye irritation	Baseline	-30%
		Average Pollution Reduced:	**-24%**

Renewable Diesel – We Can Live with That

Diesel Pollution Fatalities	Fatalities (DEQ Estimate)	Pollution Reduced	Oregonians Saved
Oregon	460	-24%	**108**

"EPA confirms widespread emission tampering"

Diesel Exhaust Emission System …



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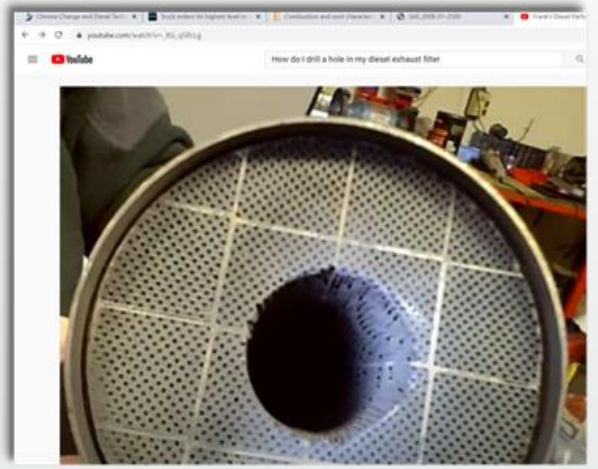
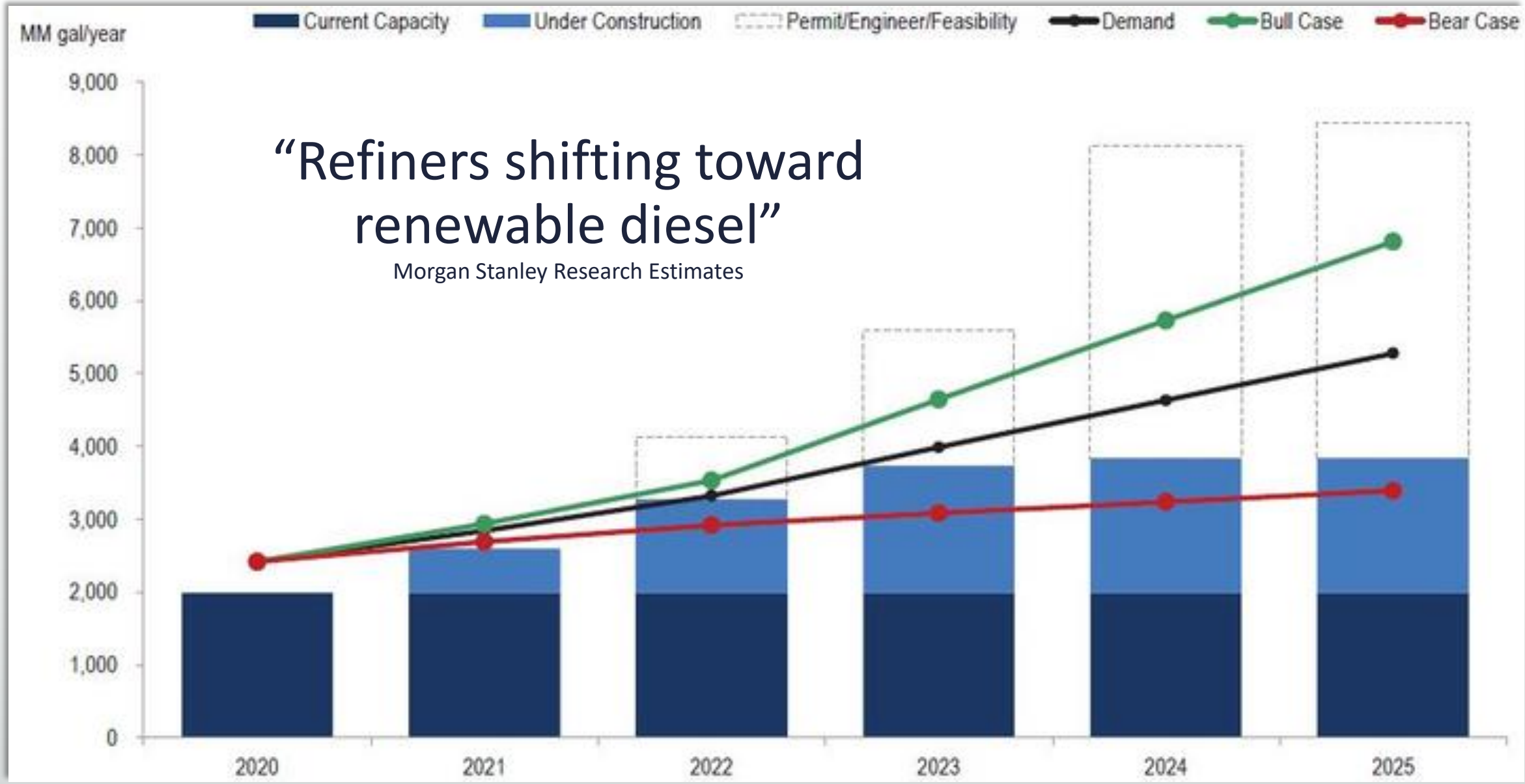


More than 17,436 (20%) of Oregon diesel pickup trucks have emission systems completely removed

"Tampered diesel pickup trucks", Class 2b & 3, EPA report, November 20, 2020

“Refiners shifting toward renewable diesel”

Morgan Stanley Research Estimates



Oil & Gas Journal, Sept 23, 2020

Upgrading from Petroleum Diesel to Renewable Diesel…

Emissions – **REDUCES EMISSIONS 5.9 MILLION MTCO2e**

- Transportation sector emissions reduced 23%

Equity – **108 OREGONIANS SAVED EACH YEAR**

- Significantly reduces petroleum diesel exhaust poisons from our neighborhoods
- Immediately counters the effects of large-scale Exhaust System Tampering
  - "I like the smell of diesel" – The smell of diesel is the smell of poisons in our workplace and community's

Economics - **$131 MILLION IN LOWER OPERATING COSTS FOR DIESEL FUEL USERS**

- All these benefits at essentially no cost

Economic Development – **OREGON AS THE NATIONS LEADER IN CLEAN ENERGY JOBS**

- Self sufficient Renewable Diesel production and Freightliner electric truck manufacturing in 2023


Thank You