Renewable Diesel:
Opportunities for Oregon Now

Keith Wilson
President & CEO
TITAN Freight Systems

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

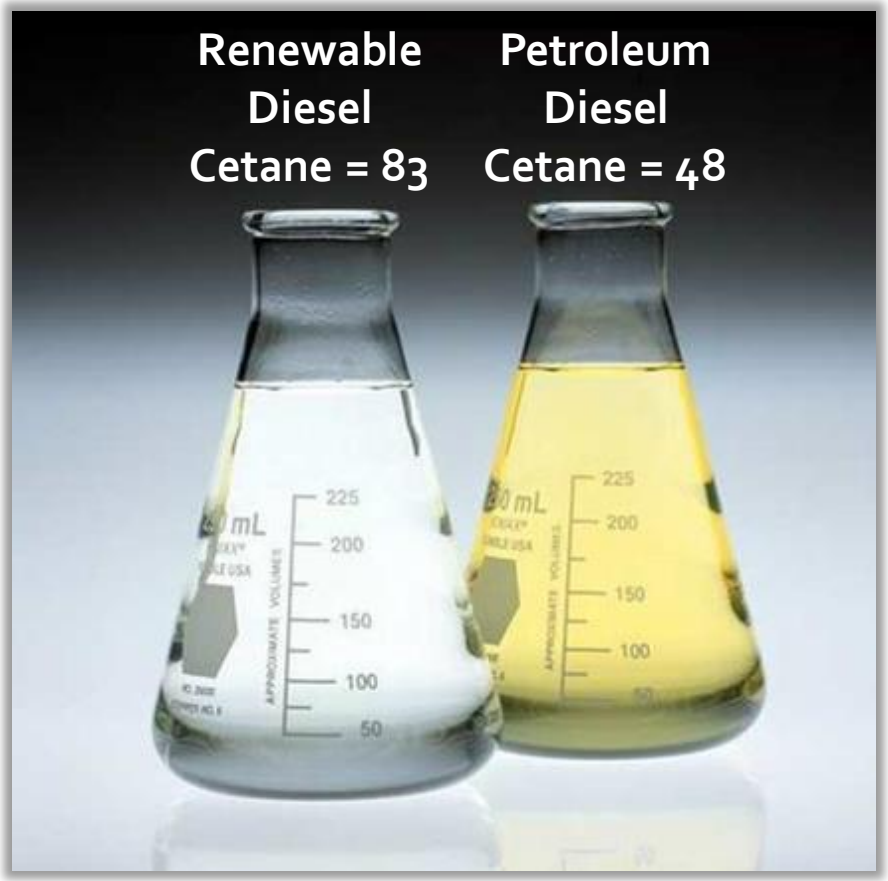
Artificial Intelligence

West Coast Alternatives to Petroleum Diesel

Diesel Application Energy Options	Energy Type	Carbon Intensity [g CO2e / MJ]	CI Reduction vs. Petroleum Diesel	ASTM (American Society for Testing and Materials)
Petroleum Diesel (B5)	**Fossil**	**97.79**	---	D975
Biodiesel (B20)	Fossil / Renewable	88.96	9% ←	D6751
Natural Gas (Compressed)	Fossil	79.98	18% ←	WK40094
Natural Gas (Biogas)	Renewable	20.55	79% ←	WK40094
Electricity (hydro, coal, natural gas, wind, nuclear)	Fossil / Renewable	25.35	74% ←	
Renewable Diesel (R99)	**Renewable**	**36.98**	**60% to 85%** ←	**D975**

DEQ 2022 Oregon Clean Fuels Program: Estimated Lifecycle Carbon Intensities of Common Fuels and Blends

Renewable Diesel is Ultra-Clean Burning



UP to 40% less soot & black carbon

Renewable Diesel = Lower Operating Costs

TITAN® FREIGHT SYSTEMS

- More than one cent (>$.01) per mile maintenance cost reduction
- $20,000 Annual Savings
- Since 2020, ZERO Diesel particulate Filter (DPF) cleanings or failures

- Penske is 'Huge Proponent of Renewable Diesel' CCJ Jan 23, 2023
- "We agree with the majority of the studies that are showing around a two cent ($.02) per mile maintenance (savings) when compared to traditional diesel."

EWEB
Eugene Water & Electric Board

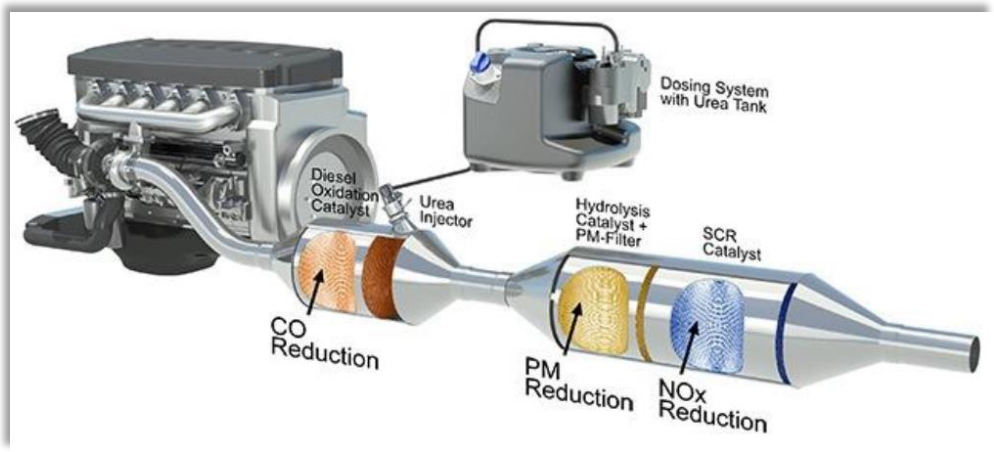
- "It's been a miracle fuel. Not one Diesel Particulate Filter has needed cleaning or replacement since 2015 using Renewable Diesel."

Gary Lentsch, Fleet Manager

$66 million in lower costs to diesel owners = $39 for every household

"EPA confirms widespread emission tampering"

Diesel Exhaust Emission System …



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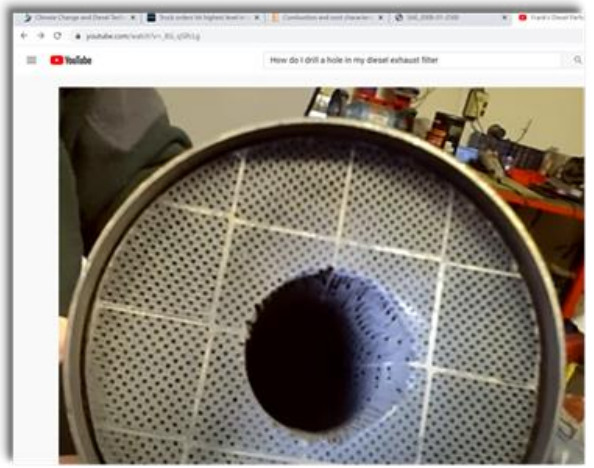


More than 17,436 (20%) of Oregon diesel pickup trucks have emission systems completely removed

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

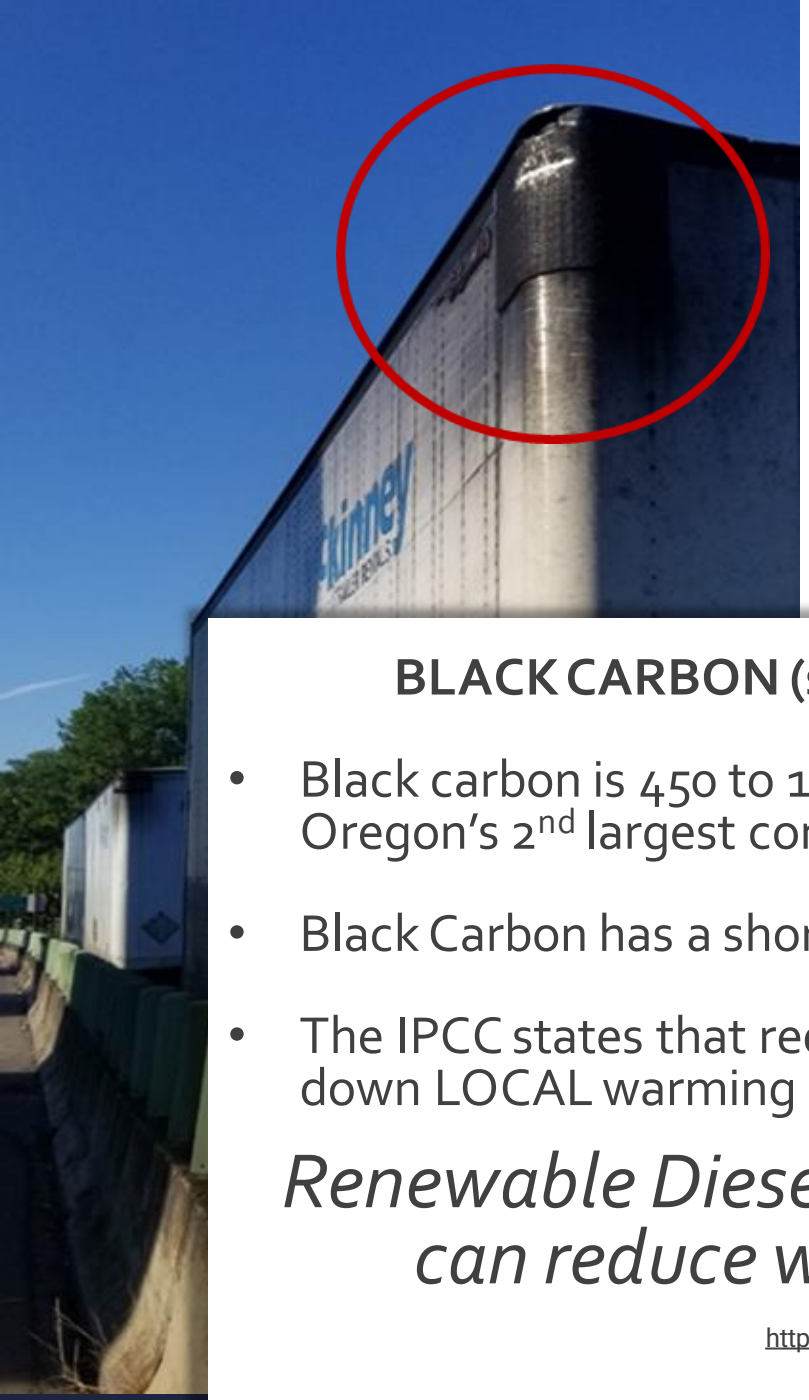
"Renewable diesel beating conventional diesel on price"

Commercial Carrier Journal, June 29, 2022

Diesel Price, Production Cost, Credits & Profit Per Gallon

Per Gallon	Petroleum	Renewable
Price - Diesel Wholesale (1)	**$3.31**	**$3.17**
Production Cost (2)	$2.81	
Production Cost (3)		$3.75
US Blenders Credit (3)		-$1.00
US Renewable Fuels Standard RIN Credit (4)		-$2.04
Oregon Clean Fuels Program Credit (5)		-$1.11
Profit Per Gallon	$0.50	
Profit Per Gallon		**$3.57**

(1) TITAN Freight Portland terminal price, March 1, 2023
(2) Production Cost (excluding Selling, distribution and administrative expenses) Shell Annual Report and Accounts 2022
(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, 04/14/2021
(5) Oregon Clean Fuels Program, Program Review, Submitted to 2022 Oregon Legislature, Feb. 1, 2022



60% of Black Carbon Emissions Come From Diesel Engines

BLACK CARBON (soot) CAUSES PREMATURE SNOWMELT AND DROUGHT

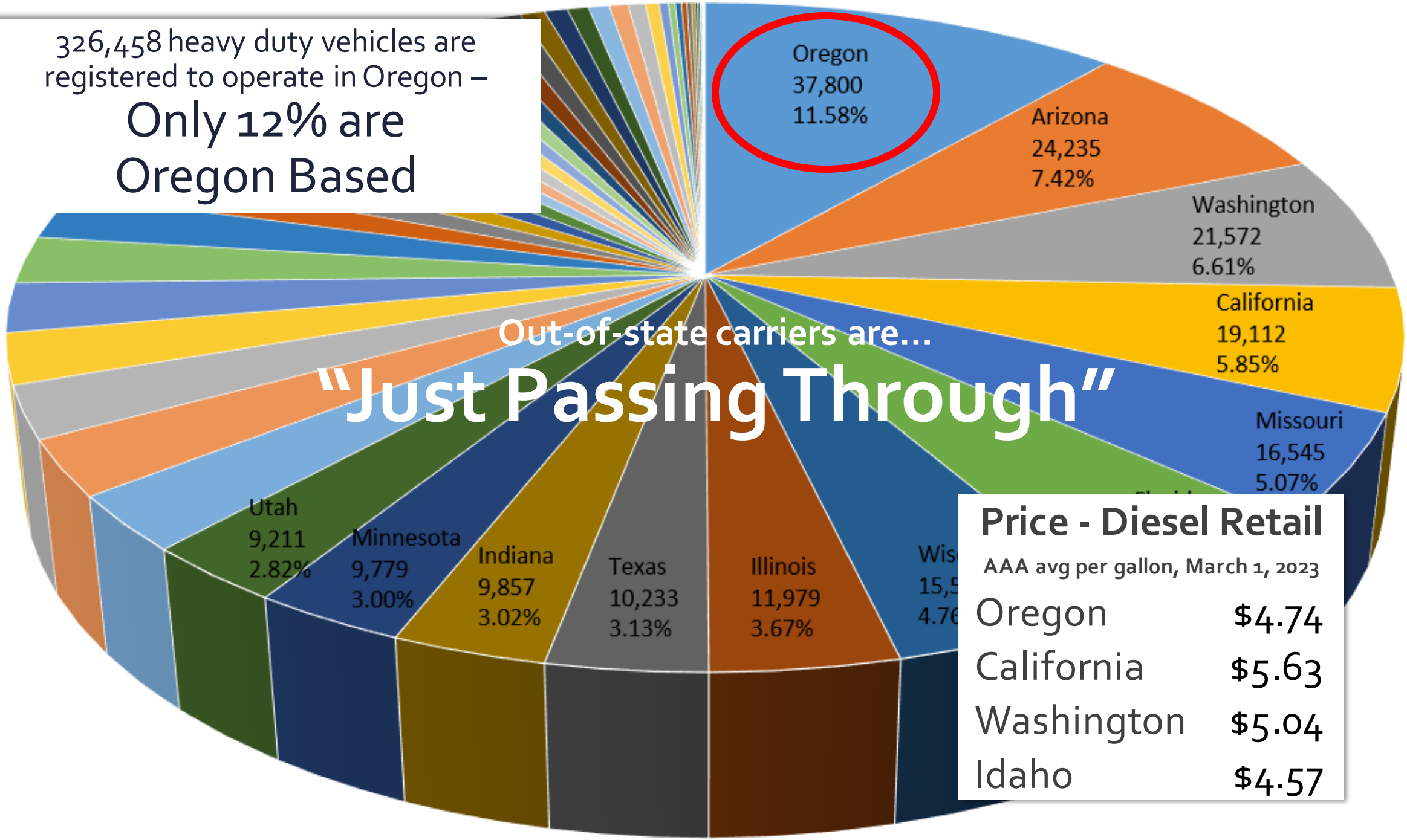
- Black carbon is 450 to 1,500 times more potent greenhouse gas than Co2 emissions – Oregon's 2nd largest contributor to global warming
- Black Carbon has a short life span and dissipates in ONE to SIX weeks
- The IPCC states that reducing black carbon is one of the FASTEST & EASIEST ways to slow down LOCAL warming

*Renewable Diesel, which emits up to **40% less Black Carbon**, can reduce warming and snowmelt TODAY in Oregon*

https://pdxscholar.library.pdx.edu/cgi/viewcontent.cgi?article=1047&context=hgjpa
REG99 Sales Fact Sheet_FINAL_5-17-22

326,458 heavy duty vehicles are registered to operate in Oregon –

Only 12% are Oregon Based



Out-of-state carriers are…

"Just Passing Through"

Price - Diesel Retail

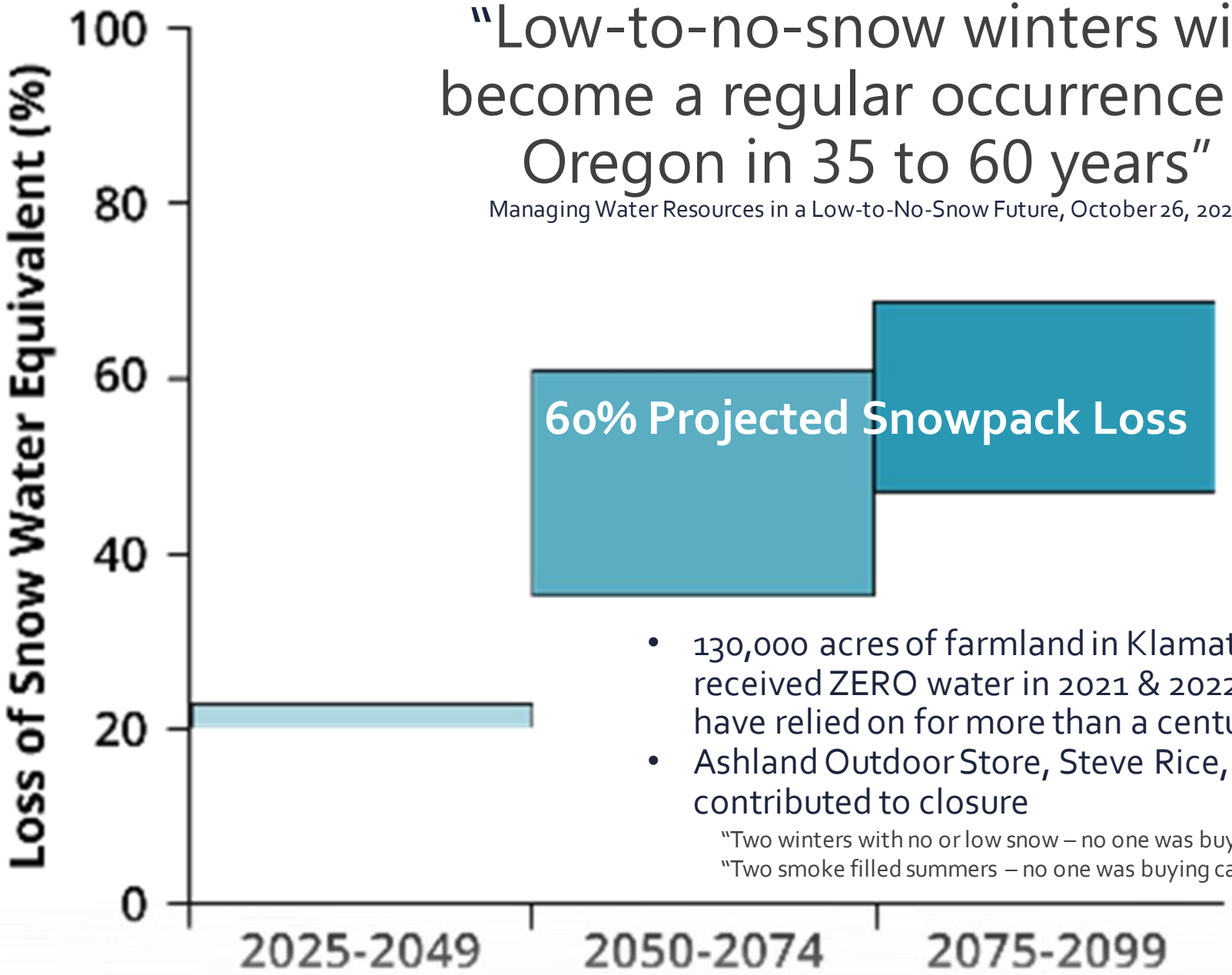
AAA avg per gallon, March 1, 2023

Oregon	$4.74
California	$5.63
Washington	$5.04
Idaho	$4.57

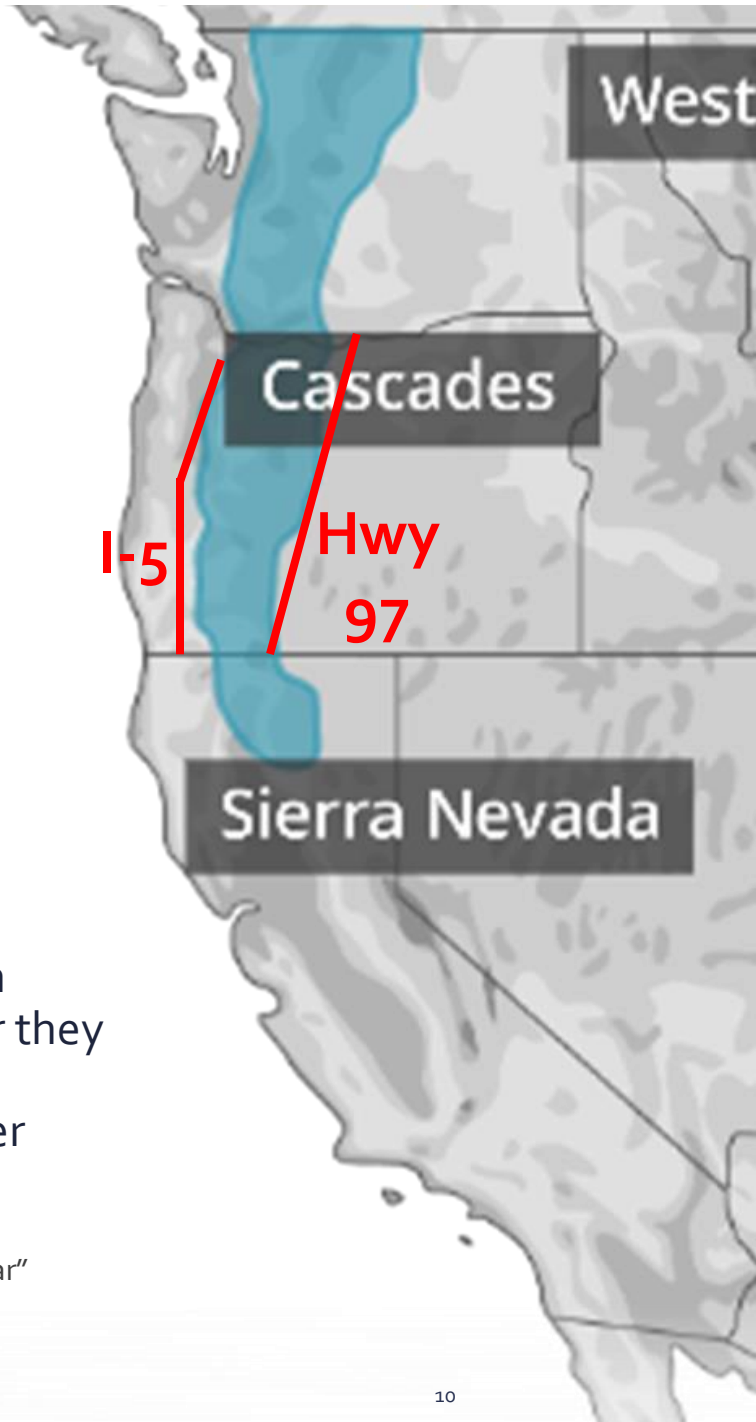
Cascades

"Low-to-no-snow winters will become a regular occurrence in Oregon in 35 to 60 years"

Managing Water Resources in a Low-to-No-Snow Future, October 26, 2021

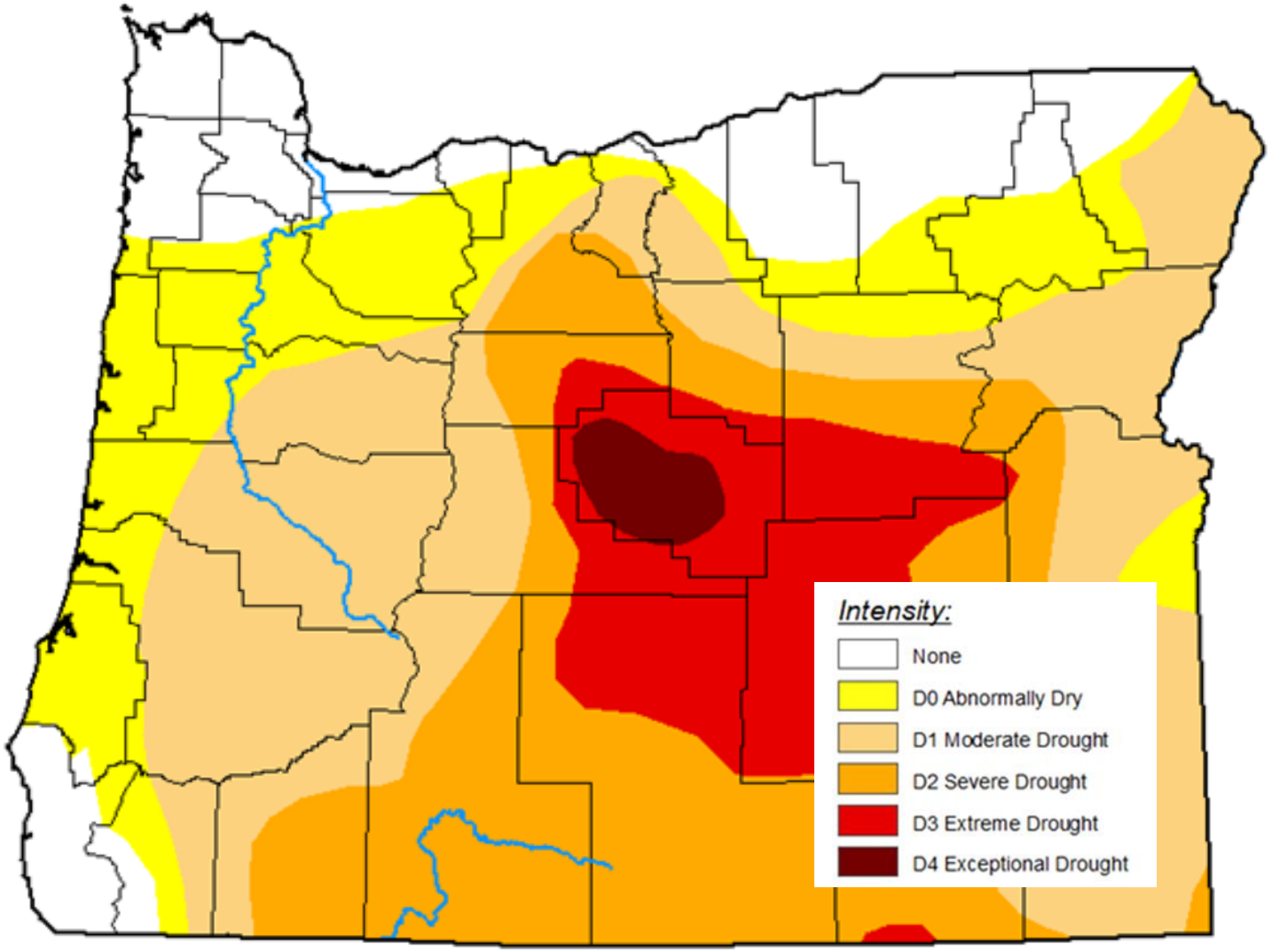


- 130,000 acres of farmland in Klamath Basin received ZERO water in 2021 & 2022, water they have relied on for more than a century
- Ashland Outdoor Store, Steve Rice, weather contributed to closure
  - "Two winters with no or low snow – no one was buying skis"
  - "Two smoke filled summers – no one was buying camping gear"



39% of Oregon is in Severe Drought or Worse

Drought Monitor Conditions for Oregon – February 7, 2023



"There is nothing we can do about drought!"

OPB, August 29, 2022

We are not powerless –

"Control of black carbon offers a significant opportunity for slowing, possibly even reversing climate change"

Health Effects of Diesel Exhaust, DEQ

"State Leadership Must Take Action to Protect Water Security for all Oregonians."

Advisory Report, Oregon S.O.S. January 2023

Renewable Diesel: Opportunities for Oregon Now

Thank You

Oregon Organizations Using 100% Renewable Diesel

TRIMET

TITAN FREIGHT SYSTEMS

EWEB
Eugene Water & Electric Board

Oregon Department of Transportation

MME
Midwest Motor Express, Inc.

PCC STRUCTURALS

Metro

CITY OF PORTLAND, OREGON 1851

Multnomah County

PORT OF PORTLAND

Tillamook

Bob's Red Mill
To Your Good Health®

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Phase In's are Normal

1978

- U.S. Consumer Product Safety Commission banned **lead** (poisons) from **paint** – *We still use paint*

1996

- EPA completely phased out **lead** (poisons) from **gasoline** - *We still use gasoline*

2008

- EPA completely phased out **Low Sulfur Diesel** – *We still use diesel*

2026 – Better Fuels Oregon Senate Bill 803

- Oregon begins to phase out **fossils** from **diesel** fuel to reduce GHG, Black Carbon and Poisons in our communities – *Because we still use diesel*

Testimonials & Research Papers

Gary Lentsch, City of Eugene, Eugene Water and Electric, Fleet Manager

"It's been a miracle fuel. Not one Diesel Particulate Filter has needed cleaning or replacement since 2015 using Renewable Diesel."

Lynn Peterson, Oregon Metro Council President

"it was easy to make the switch; no changes to engines or equipment were needed. And due to this fuel's superior performance, this winter we did not need to add fuel additives for winterizing, saving on some typical costs. We are now switching to renewable diesel in the rest of our operations including at the Oregon Zoo. This switch was the single most impactful climate action that Metro could take to reduce emissions from our internal operations. This one move reduced those trucking emissions by at least 65%, and cut Metro's overall emissions by 20%."

City of Knoxville - Renewable Diesel Test - Testing an Alternative Fuel in the City of Knoxville Fleet

"Hearing terms like "**miracle fuel**" & "eliminates DPF issues" did not seem realistic. We are extremely pleased to report that Renewable Diesel exceeded everything that we were told."

Richard Battersby, City of Oakland, Oakland Public Works, Bureau of Maintenance, Assistant Director - Fleet Perspective - Renewable Diesel

"Renewable Diesel seems too good to be true but delivers as promised."

Luci Moore, ODOT State Maintenance and Operations Engineer

"We have had very positive experiences with our use of 99% Renewable diesel to date. It has eliminated regens of the exhaust system resulting in major efficiency gains for equipment and staff time."

Rob Bennett, Maintenance Supervisor, TITAN Freight Systems

"No more toxic fumes, no smell, washes off with water, very little exhaust system maintenance needed anymore, it has led me to enjoy my job so much more."

Chris Efird, Executive Chairman, NEXT Renewable Fuels, Partnering with BP & Shell to build a 700 million gallon a year renewable diesel production facility in Columbia County, OR

"You make good money on renewable diesel."

"It's all about logistics. Being near Oregon and California, the only two states with clean fuels programs, makes great economic sense."

"We will provide $91,000 per year average wages and benefits for 285 full time jobs."

Angus Duncan, Chair Emeritus, Oregon Global Warming Commission

"While different clean fueling options continue to be explored for highway trucks, we don't have to wait on the results to realize the operational and economic value today of cleaning up fossil diesel by switching to its renewable twin. We know this value accrues to truckers, to trucking firms and to Oregon communities deserving cleaner air to breathe. Introducing renewable diesel into our fleets brings these immediate benefits while it also drives down greenhouse gas emissions today, not ten or twenty years in the future. That alone makes the renewable diesel bill worth passing this year."

Nicholas Antoine, Chairman, Midwest Motor Express

"We switched over our entire Oregon fleet to renewable diesel and our exhaust system maintenance issues have reduced. Super easy switchover."

Research Papers & Presentations:

City of Eugene & City of Oakland – Gary Lentsch & Richard Battersby: The New Alternative Fuel of Choice - Renewable Diesel

Do Oregonians Support Renewables?

- 80% of Oregonians largely favor government interventions that promote and incentivize renewable energy sources
  - https://www.oregoncapitalinsider.com/news/poll-66-of-oregonians-predict-unstoppable-climate-change/article_871a7d36-1d63-11ec-aec1-734648a2a628.html

Why not just let the market decide?

- The market doesn't care about people or the planet, so at times good governance means intervention into the market. When people decided lead was unacceptable, we removed it from paint and gasoline fuel. We did it with ultra-low Sulphur too. Frankly, it's not a new concept, we're just removing the fossils from diesel fuel. But let's get one thing straight - it's a farce to call our market free, because our government currently subsidizes fossil fuels over renewables 7 to 1. What we are doing is pivoting now and allowing renewable fuels to punch above their weight class, establish market share, and give Oregon a massive economic advantage over late adopters.
- We can slow snowpack melt by reducing emissions, both black carbon and CO2
  - Droughts and water scarcity in Oregon are ravaging our farming and agricultural rich areas. Klamath Basin and 130,000 acres were denied water from Klamath Lake in 2022 because of chronic and severe drought.
- Wildfires – 2020 was the most destructive in Oregon history: 11 dead, thousands of homes lost, millions of acres burned. 19 of past 20 years have been hottest on record.
  - Black Carbon, 60% of which comes from diesel emissions, is a local pollutant that causes snowpack melt on the Cascades, respiratory conditions and warming. If we remove this locally, we realize the benefits locally.
  - Black Carbon only lives in the atmosphere for 1-6 weeks, so if we reduce black carbon emissions locally, we could reduce warming relatively quickly unlike CO2 which takes about 100 years.
- We need to speed up the transition in order to meet our state goals. We exceed emissions target by 26% and getting worse. This is a low-cost, reliable step toward our GHG targets.
  - Renewable Diesel lowers CO2 by 60% vs petroleum diesel.
- Smaller market participants who use diesel engines are not always aware of economic benefits
  - Using Renewable Diesel very nearly eliminates exhaust system maintenance. Using petroleum diesel in these systems results in constant maintenance, sometimes costing up to circa $10,000.

Will Oregon have enough Renewable Diesel to replace the 650 million gallons of petroleum diesel we use today?

- Yes. There are three Renewable Diesel refineries planned for Oregon in the coming years with a combined production of 860 million gallons per year. The largest at 765 million gallons a year is NEXT Renewable Fuels, a partnership with BP and Shell, expected to break ground in 2022 in Columbia County, OR, and will provide 285 jobs at $91,000 per year.
- Even if these Oregon refineries are delayed, United States refineries are expected to supply 5 billion gallons by 2024, most of these supplies pointed to Oregon and California.
- Clean Fuels Programs, that are only operational in California and Oregon, have been designed to make renewable energy options lower price than environmentally harmful petroleum diesel. Renewable Diesel producers earn an outsized profit in Oregon and California and producers will make sure our two states are supplied before distributing to others.

What happens if supply did run out?

- In Oregon and California, suppliers have met current demand. Carson Energy, OR, and City of Oakland, CA, two of the largest suppliers and users have experienced zero shortages
- Renewable Diesel is the good stuff. if by chance, supplies did run low, a pivot to petroleum diesel would be easy.
  - Renewable Diesel is like winning a basketball championship, you always start your best players and put in the reserves only when they are tired. Let's win a championship in Oregon today.

How long has Renewable Diesel been available in Oregon?

- Eight years – the market has been slow to adopt but more people are beginning to realize the overwhelming benefits.
- TriMet, Oregon's largest diesel user, switched to Renewable Diesel in 2021

Why is Renewable Diesel and petroleum diesel the same price in the Portland region but not in other parts of Oregon?

- The southern half of the state receives their diesel from the Eugene storage terminals, which receives it stock via the Kidder Morgan, Portland to Eugene, pipeline. Once demand increases for Renewable Diesel in southern Oregon, producers will replace petroleum diesel in this pipeline with Renewable Diesel and prices will match or be lower.