SCHOOL BUS ALTERNATIVE FUELS WORKING GROUP MEETING 2 (P.A. 26-63)

Bureau of Air Management

August 19, 2026

AGENDA (DRAFT)

- **2:30 Welcome and Roll Call**
- **2:35 DEEP – School bus inventory data, Wade Packer, DEEP**
- **2:45 WRI – Resources for school bus electrification and emissions research across fuels, Brian Zepka, WRI**
- **3:00 Green Bank – Case study on electrification incentives programs, Kevin Moss, CGB**
- **3:15 Clean Fuels Alliance - Biodiesel 101, Floyd Vergara**
- **3:30 Discussion**
- **3:45 Adjourn**

ROLL-WORKGROUP MEMBERS

State Gov't: DEEP, DOT, DOE, DPH	Act. Cmr. Emma Cimino, Graham Curtis, Robin Cecere, David Kallander
Connecticut Green Bank	Kevin Moss
School Transportation Provider: DATTCO	Don Devivo
Municipal School Representative: Branford Public Schools	Blaize Levitan
Alt Fuels Industry: Clean Fuels Alliance America	Floyd Vergara
Environmental Organization: World Resource Institute	Brian Zepka, Sue Gander & Alice Kwak
Connecticut Clean Transportation Coalition	Paul Wessel, Daphne Dixon, & Craig Peters
Other Interested Parties	CT Energy Marketers Association (CEMA): Chris Herb Kolmar America, Inc.: Eli Petersen

WORKGROUP NEW MEMBERS INTRODUCTIONS

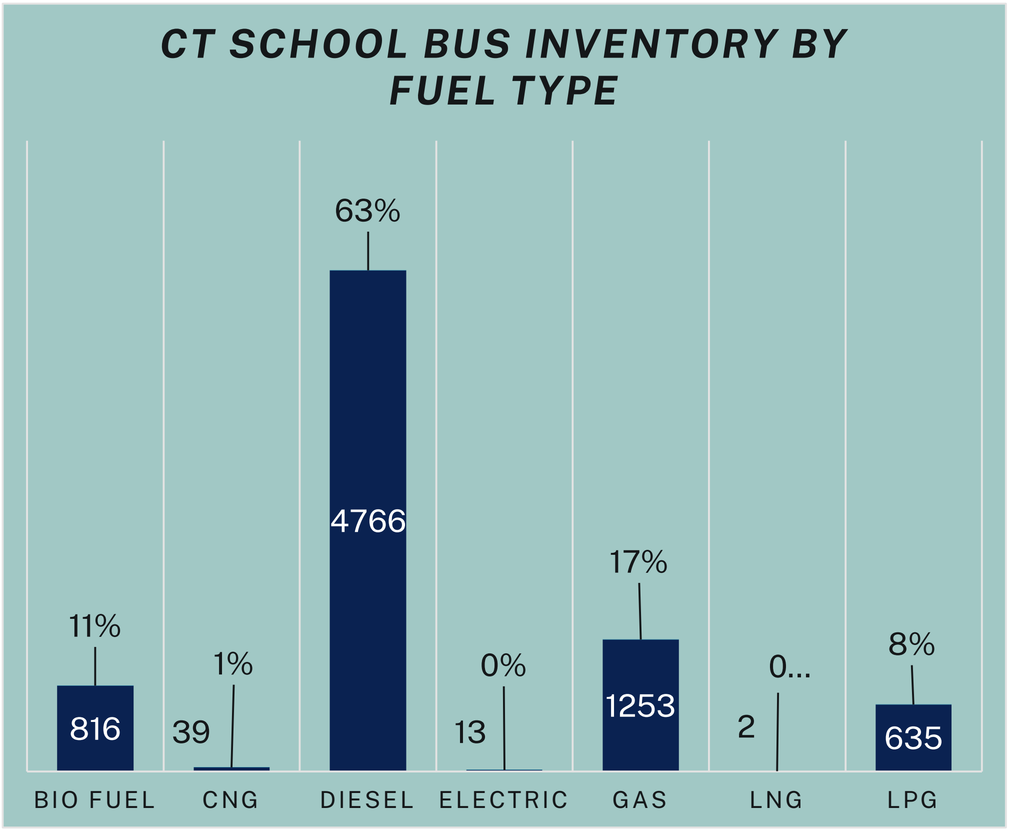
Connecticut Conference of Municipalities	Brian O’Connor
Connecticut Association of School Business Officials	Sherri DiNello
Connecticut Council of Small Towns	Betsy Gara
Connecticut Association of Public School Superintendents	Tom Giard & Frances Rabinowitz
Connecticut Association of Boards of Education	Sheila McKay & Patrice McCarthy (invited)
Alternative Fuels Coalition of Connecticut	Michael Morrisey
CT Utilities	Eversource: Sean Tully, Nikhon Schuler, & Kevin Boughan UI: Brian Morris & Rick Rosa
Capital Region Education Council	Nakisha Strickland & Mason Thrall
Propane Industry	Joel Stutheit (PERC) & Todd Mouw (propane school bus manufacturer)

CHARGE OF THE WORKGROUP

- DEEP must establish a working group to evaluate the increased use of alternative fuels and technologies in school buses
- The fuels to be assessed include, but are not limited to:
  - **Biodiesel**
  - **Propane**
  - **Electricity**
- Report due February 1, 2027
- See: P.A. 26-63, Sec. 36

Connecticut 's School Bus Inventory

SCHOOL BUS INVENTORY IN CONNECTICUT



Current CT school bus inventory by fuel type:

- Diesel 4,766 - 63% of inventory
- Gasoline 1,253 - mostly Class 1
- BioFuel 816 – not clear what biofuels are used
- Propane - 635
- CNG - 39
- Electric - 13 (but 228 in the pipeline)
- Natural Gas - 2

Total Fleet 7,524

933 buses are Class 1-3
6,591 are Class 4-8.

Electric School Bus (ESB) Pipeline: An additional 228 ESBs through a combination of VW and EPA's CSB program and CT CSB Supplemental grant program. DEEP CT Clean School Bus Website

Breakdown of Fuel Type & Model Year

Row Labels	Bio Fuel	CNG	Diesel	Electric	Gasoline	LNG	LPG	Grand Total
2004			1		1			2
2005			1					1
2006			6		1			7
2007			2		1			3
2008			8					8
2009			11		2			13
2010	3		21					24
2011	3		44		1			48
2012	10		108		2			120
2013	20		96		6			122
2014	76	1	251				51	379
2015	56		379		5			440
2016	76		349		26			451
2017	108		390		58		162	718
2018	122	24	147		22		158	473
2019	204	14	548		85		69	920
2020	90		442		51		75	658
2021	33		350	1	72		10	466
2022	15		218		197		6	436
2023			339	10	220		27	596
2024			389	2	304	1	64	760
2025			267		143		7	417
2026			399		55	1	6	461
2027					1			1
Grand Total	816	39	4766	13	1253	2	635	7524
Percentage of Total	10.85%	0.52%	63.34%	0.17%	16.65%	.03%	8.44%	100.00%

CURRENT SCHOOL BUS INVENTORY IN CONNECTICUT

Propane Buses by Town

Town	LPG vehicles
Waterbury	146
Ansonia	13
Danbury	124
Durham	20
East Hartford	12
Harwinton	1
Litchfield	4
New Britain	13
New Canaan	42
New Haven	6
New Milford	45
Newtown	46
North Branford	7
Norwalk	3
Unknown	48
Scotland	3
Seymour	37
Shelton	11
Simsbury	14
Stamford	5
Torrington	35

World Resource Institute Alternative Fuel School Bus Emissions Data

Alternative Fuel School Bus Emissions: What the Data Says

World Resources Institute

Connecticut School Bus Alternative Fuel's Working Group

Electric School Bus INITIATIVE

Brian Zepka, Alice Kwak

August 19, 2026

Electric School Bus Initiative Mission Statement

- In collaboration with partners and communities, **WRI's Electric School Bus Initiative** aims to build unstoppable momentum toward an equitable transition of the entire U.S. school bus fleet to electric, bringing health, climate and economic benefits to children and families across the country and normalizing electric mobility for an entire generation.

Systems change across multiple stakeholders

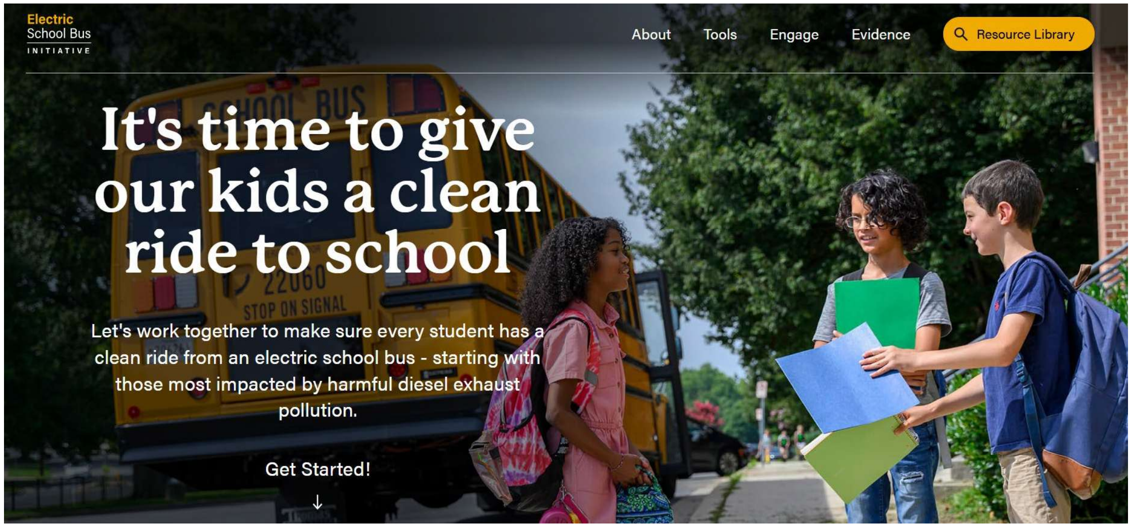
Our theory of change:
By partnering with school districts, manufacturers, utilities, policymakers, regulators and communities, we can increase knowledge and support for an equitable electric school bus transition.

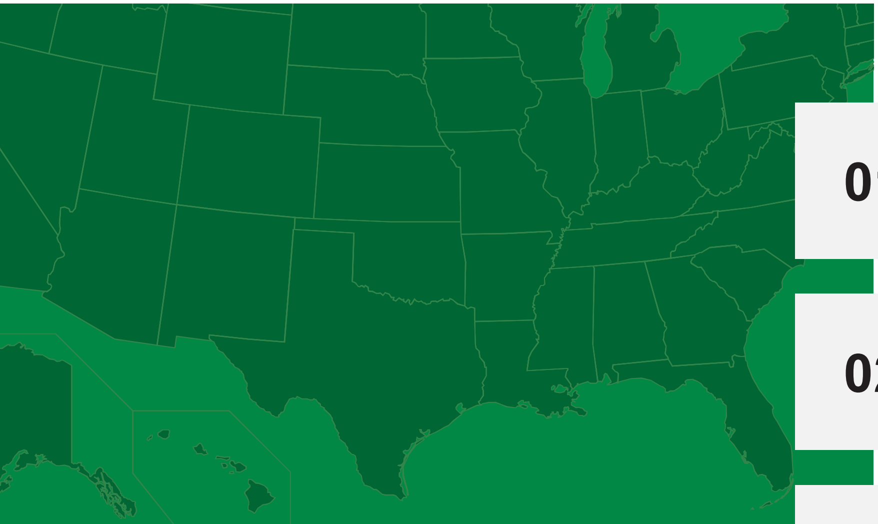
Key 2026 work:
Aggregated purchasing, lowering costs and creating new revenue streams, and supporting accelerated ESB demand

ESB Initiative website

Electricschoolbusinitiative.org:

- One-stop-shop for tools, resources and information
- For school districts, manufacturers, electric utilities, policymakers, community members and more
- Free resources from across the electric school bus movement





Agenda

01 Methods

02 Tailpipe emissions

03 Well-to-wheel emissions

04 Greenhouse gas emissions

05 Implications

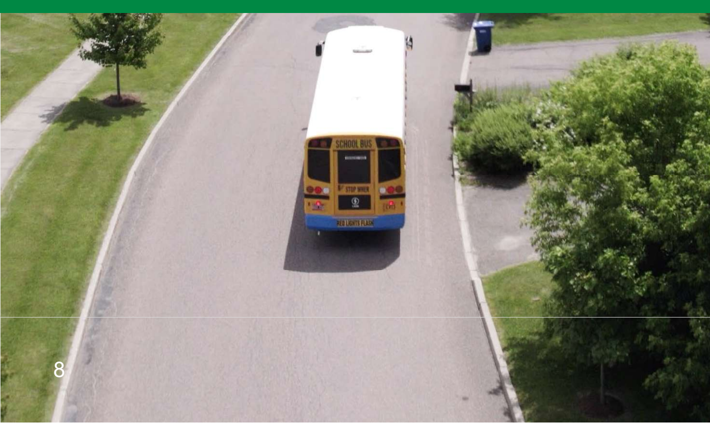
Methods

- Analysis conducted using the U.S. Department of Energy's AFLEET Tool developed by Argonne National Laboratory
- AFLEET estimates:
  - Tailpipe emissions
  - Well-to-wheel emissions
  - Greenhouse gas emissions
  - Fuel use and total cost of ownership
- The tool combines emissions data from:
  - Argonne's GREET lifecycle model
  - EPA's MOVES emissions model
- AFLEET is widely used to compare environmental impacts across vehicle technologies

Methods

- Electricity emissions were projected using a 15-year national grid mix representing the expected lifetime of a school bus
- National average tailpipe emission factors were used for all alternative fuels (diesel fuel as baseline)
- AFLEET uses a static electricity model and does not account for:
  - Charging during low-emission periods
  - Future grid decarbonization
    - the emissions associated with operating an electric school bus could decline further as the electric grid becomes cleaner over the lifetime of a bus.
  - Time-of-use electricity emissions

Tailpipe emissions



- Tailpipe emissions come directly from the bus when it's running, and are breathed in by people riding or standing near the bus
  - Tailpipe emissions occur where children ride, board, and exit buses
- Eliminating tailpipe emissions provides direct health benefits to students and surrounding communities

Tailpipe emissions

- Electric school buses are the only technology with zero tailpipe emissions
- Every combustion-powered alternative fuel bus continues to emit pollutants
- Renewable diesel shares identical tailpipe emissions with diesel in AFLEET because the engines operate similarly

Lifetime (15 years) national average school bus tailpipe emissions

Reference **Emissions by Pollutant** Low High

	PM2.5 (lbs)	PM10 (lbs)	NOx (lbs)	VOC (lbs)	CO (lbs)	SOx (lbs)
Diesel	4.8	5.2	594.9	18.4	386.8	5
Battery Electric	0	0	0	0	0	0
Biodiesel 20% (from soy)/ 80% conventional diesel (B20)	4.8	5.2	594.9	18.4	386.8	4
Biodiesel 100% (B100)	4.8	5.2	594.9	18.4	386.8	0
Renewable Diesel 20% (from soy)/ 80% conventional diesel (RD20)	4.8	5.2	594.9	18.4	386.8	4
Renewable diesel 100% (from soy, RD100)	4.8	5.2	594.9	18.4	386.8	0
Propane (LPG)	4.8	5.6	53.8	136.1	8,908.7	0
Ethanol-gasoline blend (E85)	4.8	5.5	134.5	136.1	8,908.7	1.2
Hydrogen (H2) [Not manufactured]	0	0	0	0	0	0
Compressed natural gas (CNG) [Not manufactured]	4.8	5.2	29.8	18.4	9,244.8	2.9
Liquefied natural gas (LNG) [Not manufactured]	4.8	5.2	29.8	18.4	9,244.8	0

Electric School Bus INITIATIVE WORLD RESOURCES INSTITUTE

Well-to-wheel emissions

- Well-to-wheel analysis includes:
  - Fuel production
  - Transportation
  - Electricity generation
  - Vehicle operation
- Lifecycle analysis provides a more complete picture of environmental impacts

Well-to-wheel emissions

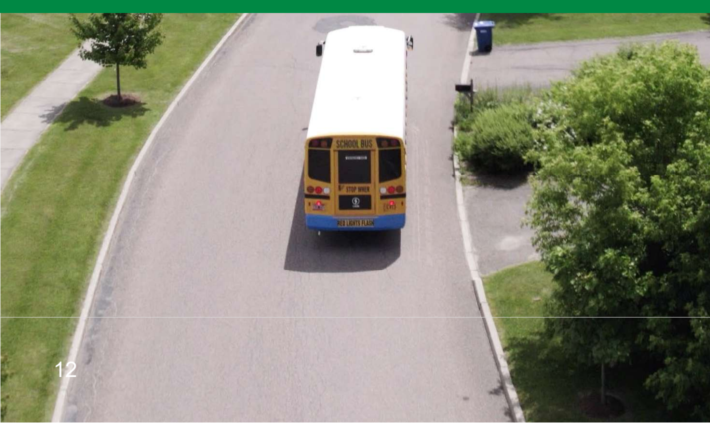
- Electric school buses produce the lowest lifecycle emissions of:
  - Nitrogen oxides (NOx)
  - Carbon monoxide (CO)
  - Volatile organic compounds (VOCs)
- PM emissions are similar to diesel
- Alternative fuels increase lifecycle emissions for one or more pollutants compared to diesel

Lifetime (15 years) school bus well to wheels emissions

Reference **Emissions by Pollutant** Low High

	PM2.5 (lbs)	PM10 (lbs)	NOx (lbs)	VOC (lbs)	CO (lbs)	SOx (lbs)
Diesel	24.7	49.4	763.5	105.7	499.8	47.8
Battery Electric	24.8	57.7	183.1	29.4	110.7	145.3
Biodiesel 20% (from soy)/ 80% conventional diesel (B20)	25.1	49.9	768.3	130.2	506.8	51.5
Biodiesel 100% (B100)	26.8	51.9	787.3	228.1	535	66.1
Renewable Diesel 20% (from soy)/ 80% conventional diesel (RD20)	25.5	50.5	776.9	132.4	513.3	54.5
Renewable diesel 100% (from soy, RD100)	28.8	54.6	830.4	239.4	567.5	81.1
Propane (LPG)	23.8	42.9	349.4	274.1	9,116.2	226.7
Ethanol-gasoline blend (E85)	72.3	185.5	1,037.8	1,098.9	9,339.4	240.7
Hydrogen (H2) [Not manufactured]	22	48	244.5	68.6	206.4	88.6
Compressed natural gas (CNG) [Not manufactured]	20.6	45.1	524.7	146.8	9,659.9	142.7
Liquefied natural gas (LNG) [Not manufactured]	23.1	46.5	330.9	111.6	9,494.5	136.9

Greenhouse Gas emissions



- School buses also produce greenhouse gas emissions
  - These include carbon dioxide and methane, which contribute to climate change
  - These emissions come from burning fuel and producing energy
  - The United States has nearly half a million school buses, so their fuel choices can have a large impact on climate pollution
  - Reducing greenhouse gas emissions is important because climate change affects extreme weather, air quality, and public health
    - These impacts affect the safety and well-being of students and communities

Greenhouse Gas emissions

- Electric school buses emit the lowest greenhouse gas emissions over their full lifecycle
- Propane school buses emit the highest greenhouse gas emissions over their full lifecycle
- Renewable diesel, biodiesel and E85 fuels can lower greenhouse gas emissions compared with conventional diesel
  - Land use not accounted in AFLEET models

Lifetime (15 years) school bus greenhouse gas emissions

Reference | **Emissions by Pollutant** Low — High

	GHGs (short tons)
Diesel	442.4
Battery Electric	125.3
Biodiesel 20% (from soy)/ 80% conventional diesel (B20)	383.5
Biodiesel 100% (B100)	147.8
Renewable Diesel 20% (from soy)/ 80% conventional diesel (RD20)	389.3
Renewable diesel 100% (from soy, RD100)	176.6
Propane (LPG)	457.1
Ethanol-gasoline blend (E85)	336.9
Hydrogen (H2) [Not manufactured]	212
Compressed natural gas (CNG) [Not manufactured]	418.7
Liquefied natural gas (LNG) [Not manufactured]	436.6

Data implications

- Electric school buses produce zero tailpipe emissions
  - Switching from diesel-burning buses to propane, CNG, or E85 buses could expose children to higher levels of some tailpipe pollutants
  - Using biodiesel or renewable diesel could leave children exposed to similar levels of most tailpipe pollutants as conventional diesel buses
- Even after accounting for emissions from electricity generation, electric school buses would provide the greatest reduction of GHG emissions of any fuel technology evaluated
- Propane buses are estimated to produce higher greenhouse gas emissions than conventional diesel buses

Thank You

Questions?

electricschoolbusinitiative.org

brianzepka@wri.org, alice.kwak@wri.org

Connecticut Green Bank
School Bus Electrification Incentives

ESB Funding Update

Awarded Funding

A total of $55.4 MM federal and $13.6 MM state grant funds have been awarded across various programs to support over 200 ESB deployments in Connecticut. Projects vary significantly in terms of their stage of planning, construction, ESB deployment, etc.

School District	# of Buses
CTECS	50
Branford	46
Bridgeport	25
Hartford	25
West Hartford	22
Fairfield	10
Ridgefield	7
Middletown	6
Ansonia	6
New Britain	4
East Hartford	2
Griswold	2
ACES	1

Looking Ahead: EPA Clean School Bus Program

- Remaining Funding = $2.2 billion
- Zero-emission funding minimum = 50%
- Rumored next round timeframe = October 2026
- Rumored structure
  - Competitive grant (not lottery-style)
  - Lower per bus awards than in past rounds
  - Long application window (3-4 months)
  - Potential for multi-year awards and phased deployments
- Considerations for CT
  - Market promotion and application assistance
  - Alignment with state grant programs

Investment Structuring

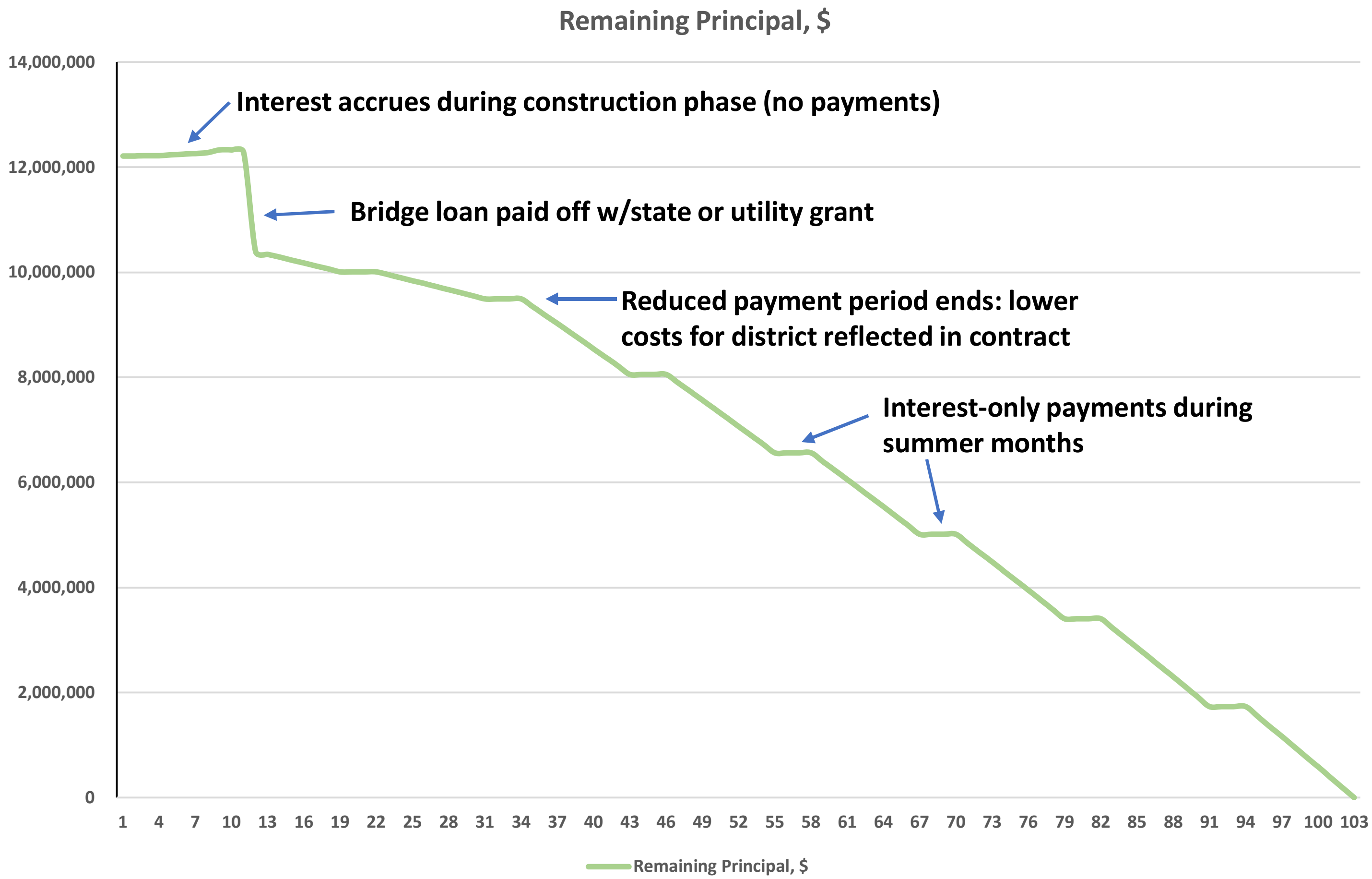
Hardware
- Buses
- Charging Stations
- Make-ready Infrastructure

Bridge Loans
- ESB Down Payment
- State Grant Awards
- Utility Incentives

Borrower, Structuring
- School Bus Operator – contract term
- School District – asset lifetime

Electric School Buses	Charging Equipment	Electric System Upgrades
Up to 12 years*	Up to 10 years*	Up to 20 years

Payment Sculpting Example



PURA Docket No. 21-09-17

Full Docket Title: PURA Investigation Into Medium and Heavy-duty Electric Vehicle Charging

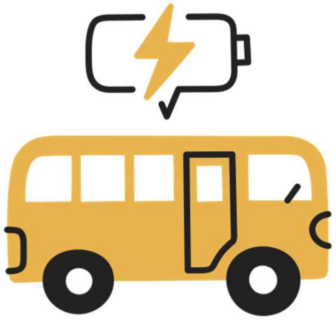
Final Decision Link

Priority Vehicles

1. School Buses and Transit Buses
2. Last Mile Delivery Fleets (beverage trucks, delivery vans and trucks, etc.)

Decision Focus Areas

1. "Make-ready" Infrastructure + Charging Station Incentives
2. Rate Structures for MHD EVs
3. Fleet Advisory Services → Green Bank Selected. Accelerator Webpage



Program Administrator

- CALSTART

fleet electrification accelerator

CONNECTICUT GREEN BANK

Fleet Electrification Planning

Vehicle and Charger Recommendations

One-to-one electric school bus and charger recommendations based current operations

District-Specific Road Map

A school district-specific Fleet Electrification Road Map that can be used in federal and state funding applications, including total cost of ownership analysis for each vehicle

On-Site Assessment

Evaluating capacity for chargers and infrastructure upgrades needed

Procurement Timeline

Short-and long-term plans for infrastructure upgrades, bus, and EVSE procurement

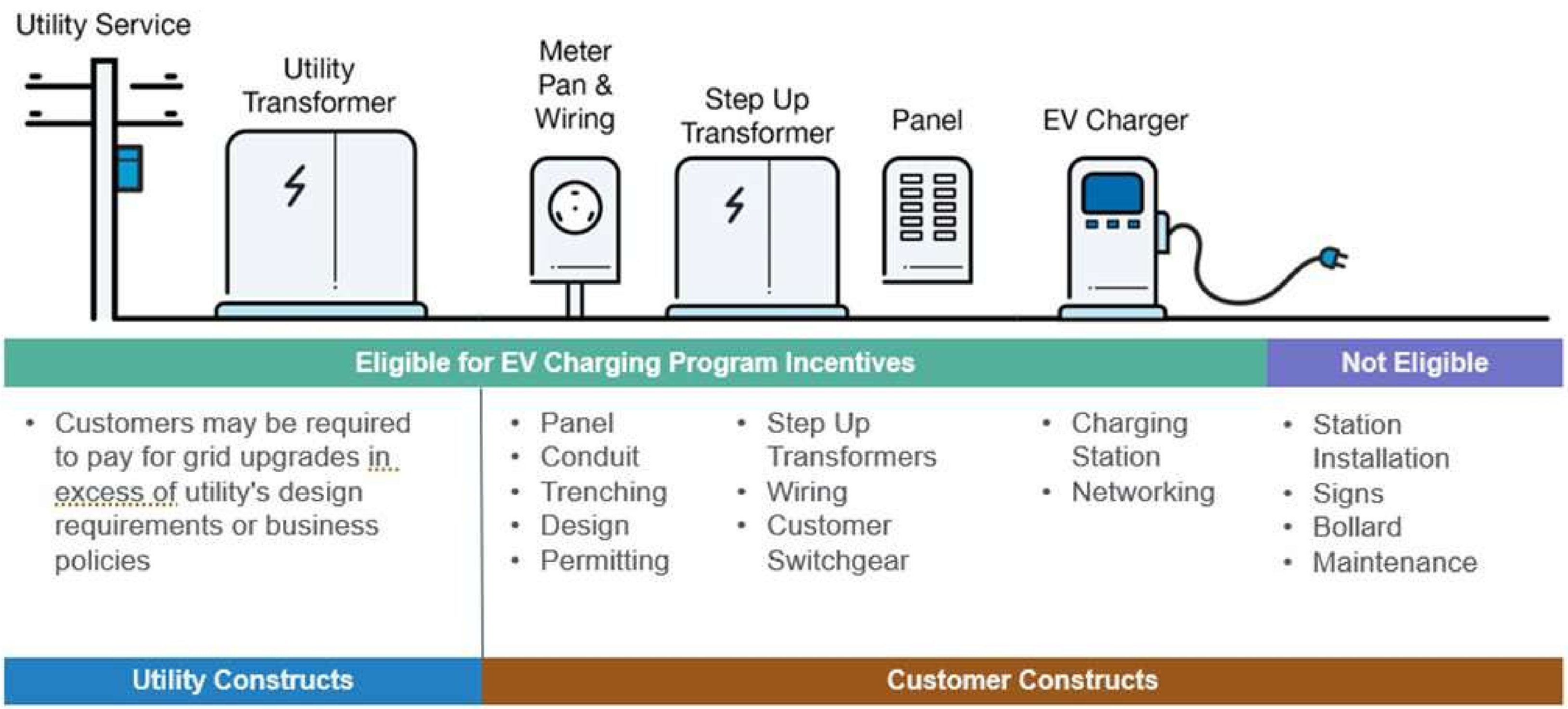
Funding and Incentives

Detailed descriptions and application instructions for available funding and incentive opportunities

Electric School Bus Basics

Everything you need to know to transition to electric school buses in easy-to-understand language

Make-ready Infrastructure



Infrastructure Incentive Structure

Pilot Structure and Availability

- Up to four demonstration project sites
  - 2 in Eversource service territory
  - 2 in UI service territory
- Projects must be in "disadvantaged" communities

Make-ready Infrastructure:

- $1300/kW for up to 3 MW of capacity per site
  - Ex: Ten, 30 kW chargers = 300 kW of capacity x $1300 = up to $390,000
- Eligible uses include both customer and utility-side costs

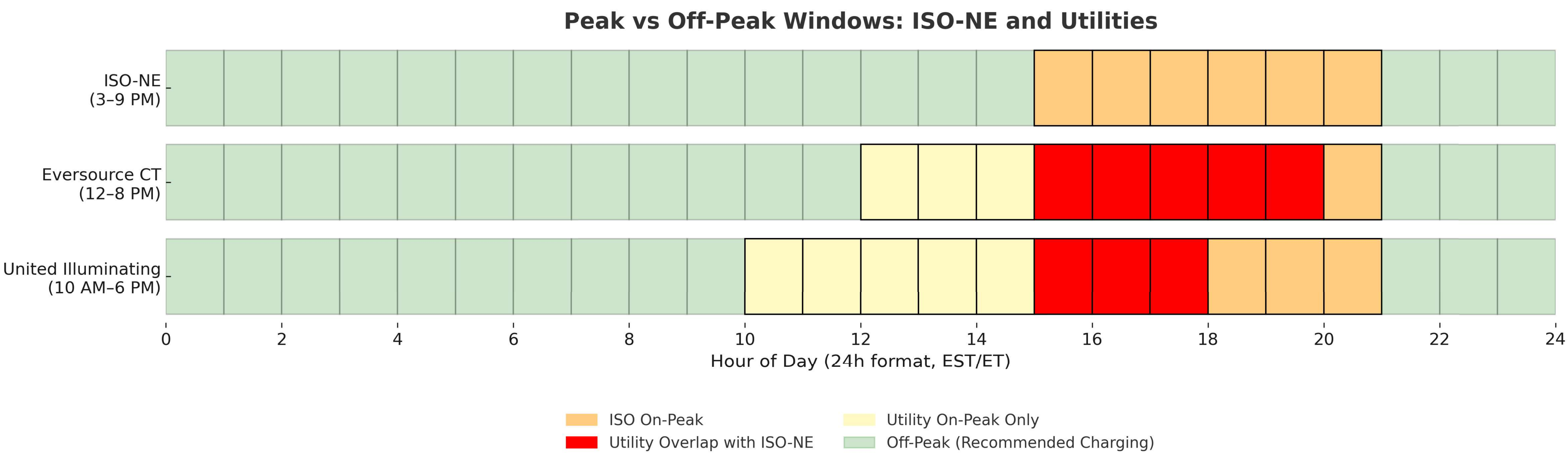
EV Charging Stations:

- Up to 50% of charging station hardware costs, up to $400,000 per site

Electrification Plan Requirement

- Must demonstrate an electrification plan (either via Accelerator or independent)

Time-of-Use Planning



Projected ESB Charging Costs

Load Factor Tier, #	3	*On-peak Charging Percentage*									
Output, Avg. $/kWh	**$0.2556**	*10%*	*20%*	*30%*	*40%*	*50%*	*60%*	*70%*	*80%*	*90%*	*100%*
	100%	0.312	0.320	0.329	0.337	0.346	0.354	0.363	0.371	0.380	0.388
	90%	0.299	0.307	0.316	0.324	0.333	0.341	0.350	0.358	0.367	0.375
	80%	0.286	0.294	0.303	0.311	0.320	0.328	0.337	0.345	0.354	0.362
	70%	0.273	0.281	0.290	0.298	0.307	0.315	0.324	0.332	0.341	0.349
% of Demand Capacity	*60%*	0.260	0.269	0.277	0.286	0.294	0.303	0.311	0.320	0.328	0.337
Used	*50%*	0.247	0.256	0.264	0.273	0.281	0.290	0.298	0.307	0.315	0.324
	40%	0.234	0.243	0.251	0.260	0.268	0.277	0.285	0.294	0.302	0.311
	30%	0.221	0.230	0.238	0.247	0.255	0.264	0.272	0.281	0.289	0.298
	20%	0.208	0.217	0.225	0.234	0.242	0.251	0.259	0.268	0.276	0.285
	10%	0.195	0.204	0.212	0.221	0.229	0.238	0.246	0.255	0.263	0.272

Market Development Takeaways

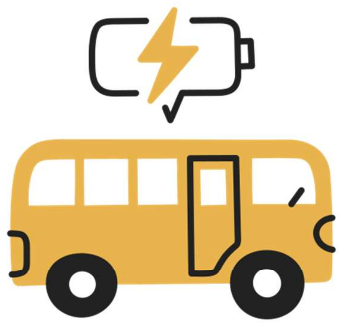
CONNECTICUT GREEN BANK

State Policy: Electric School Buses
- Planning and deployment requirements are now organized around Distressed Municipality school districts (37 in total), not "environmental justice communities"
- Green Bank Accelerator = **FREE** planning program for school districts and school bus operators

Grant Funding
- EPA – funds will become available soon for both electric and alternative fuel technologies
- CT DEEP – a more flexible grant program is under development

Green Bank Financing
- "Concessionary financing" goes beyond a low interest rate → flexible, long-term structuring to make projects happen

PURA Programs and Dockets
- Docket No. 26-01-07: Medium and Heavy-duty Electric Vehicle Charging Program
    - Fixed Costs: Infrastructure incentive funding opportunities are expanding
    - Marginal Costs: Tailored charging rates for medium and heavy-duty EVs are now available
- Docket No. 26-08-05: Energy Storage Solutions Program
    - Vehicle-to-Grid (V2G) Charging: likely to launch for commercial fleets in Summer 2027
    - The Zum-Branford buses are projected to earn upwards of $75k per bus over ten years



Clean Fuels Alliance
Biodiesel 101

Clean Fuels
ALLIANCE AMERICA

Biodiesel 101
CT-DEEP Schoolbus Alt. Fuels Workgroup

Floyd Vergara, Esq., P.E.
Senior Policy Advisor
August 19, 2026

What is Biodiesel?

Clean Fuels ALLIANCE AMERICA

Biodiesel Defined

- Biodiesel – A fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100, and meeting the requirements of ASTM D6751
- FAME – fatty acid methyl ester
- A renewable biofuel used as a substitute for diesel in compression ignition engines and heating oil appliances
- Blend level "BXX" – 5% biodiesel (B5), 20% (B20), 100% (B100)

B20 Drop-In Replacement for Diesel

	Low Sulfur Diesel	Biodiesel
Chemical Structure [1]	C_8 to C_{25}	Methyl esters of C_{12} to C_{22} fatty acids
Fuel Material (feedstocks)	Crude Oil	Fats and oils from sources such as soybeans, waste cooking oil, animal fats, and rapeseed
Energy Comparison [2]	1 gallon of diesel has 113% of the energy in 1 GGE due to the higher energy density of diesel fuel.	1 gallon of B100 has 93% of the energy in 1 DGE, and 1 gallon of B20 has 99% of the energy in 1 DGE due to a lower energy density in biodiesel.
Physical State	Liquid	Liquid
Cetane Number	40–55 (d)	45–65 (d)
Maintenance Issues		Lubricity is improved over that of conventional low sulfur diesel fuel. For more maintenance information, see the Biodiesel Handling and Use Guidelines—Sixth Edition. (d)
Energy Security Impacts	Manufactured using oil. Transportation accounts for approximately 30% of total U.S. energy needs and 70% of petroleum consumption. (l)	Biodiesel is domestically produced, renewable, and reduces petroleum use 95% throughout its lifecycle. (m)

Source: U.S. Dept. of Energy, Alt. Fuels Data Center, Fuel Properties Comparison

First Advanced Biofuel Designation by USEPA

- Advanced biofuel can be produced from qualifying renewable biomass (except corn starch) and must meet a 50% GHG reduction
- Biodiesel reduces GHG emissions by 57% - 86%, avg. 74%

Sources: US Dept. of Energy, Overview of Renewable Fuels Standard (RFS) Program, CARB LCFS Pathway Certified Carbon Intensities

Clean Fuels
ALLIANCE AMERICA

How is Biodiesel Made and From What?

Biomass-based Diesel: Diverse, Energy-dense Fuels

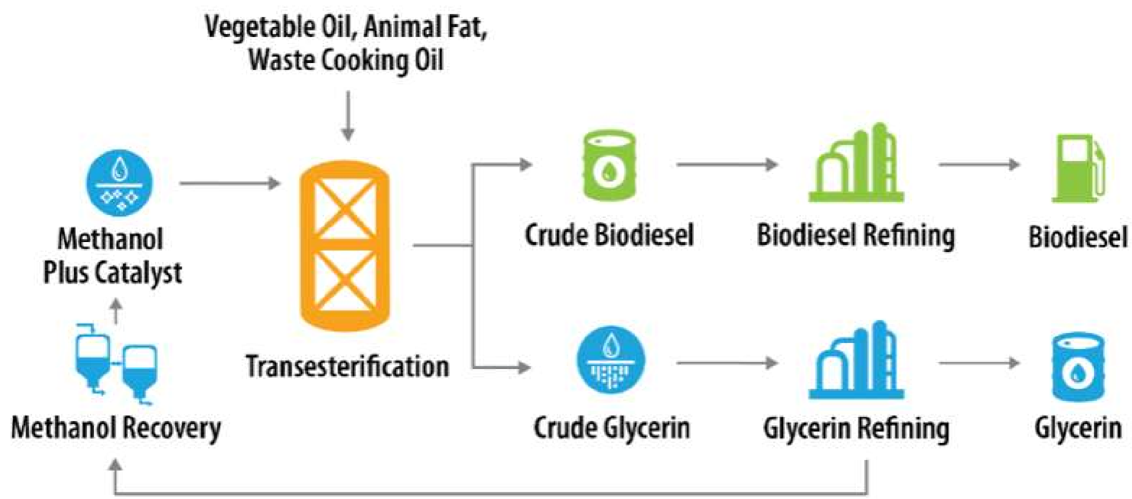


Figure 1. Basic transesterification process

Biodiesel, renewable diesel, and sustainable aviation fuels are produced from agricultural by-products, wastes and residues such as:

- Soybean, canola and other plant oils
- Inedible corn oil
- Rendered animal fats
- Winter oilseed cover crops
- Used cooking oil
- Other biomasses

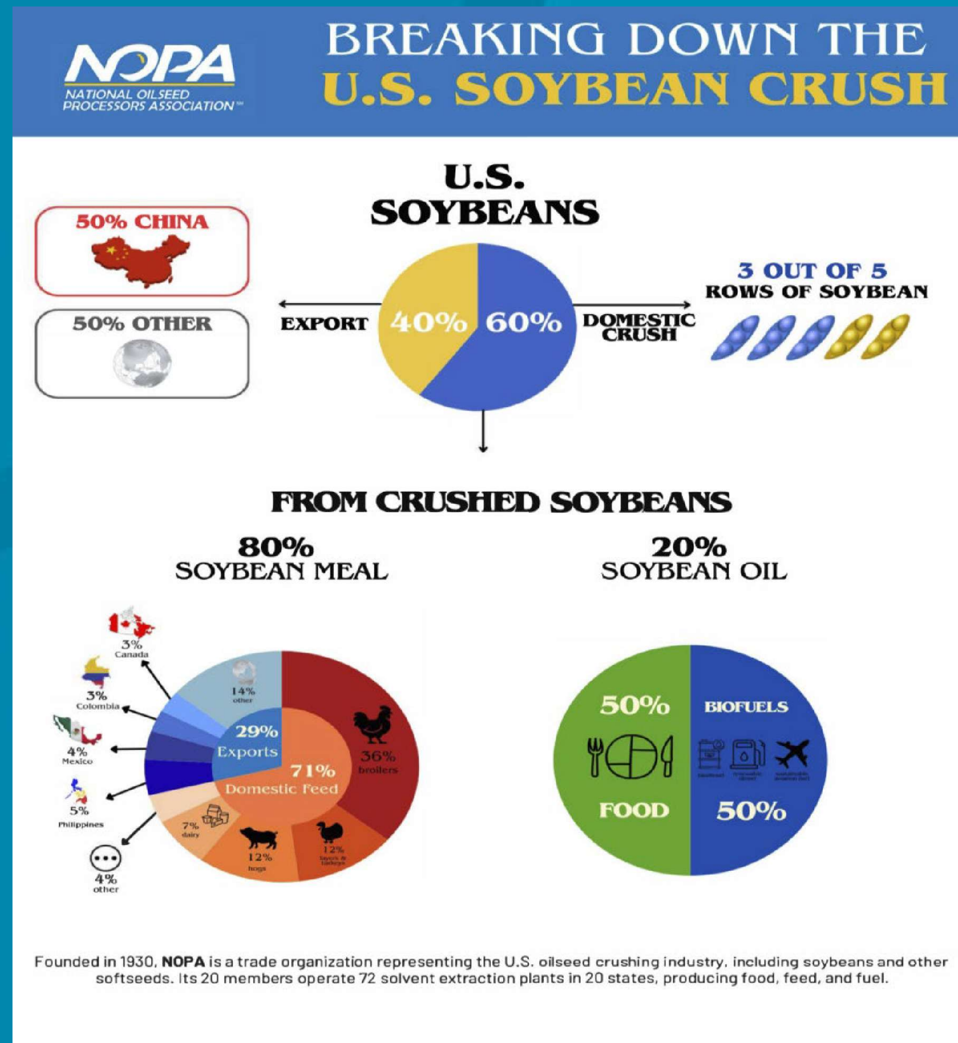
Image Source: McCormick, R., K. Moriarity, "Biodiesel Handling and Use Guide, Sixth Edition" National Renewable Energy Laboratory (NREL), at 3.

Clean Fuels
ALLIANCE AMERICA

Soybeans at a Glance

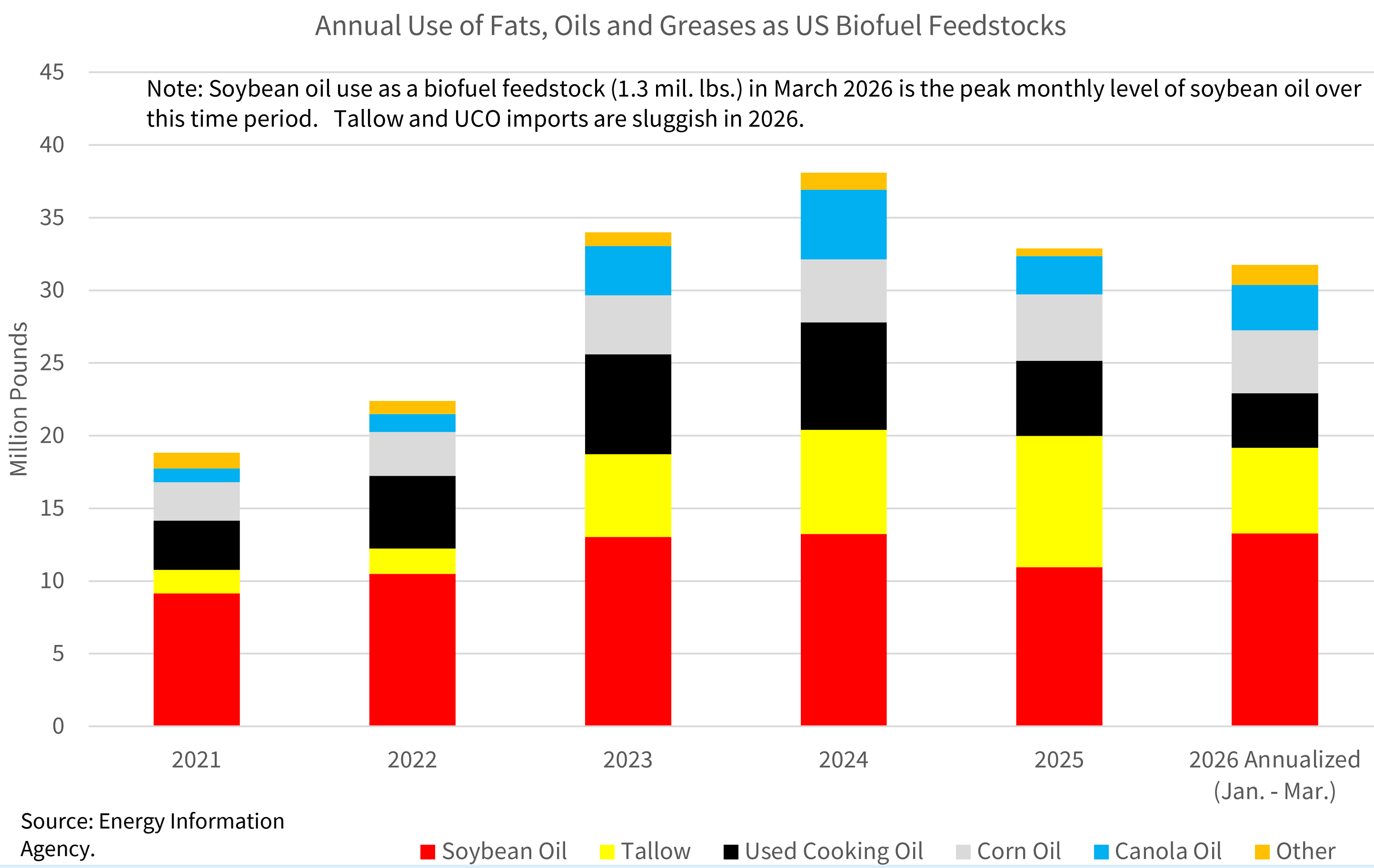
- Each bean = 80% protein, 20% oil
- Protein goes to animal feed and human consumption
- Half of that 20% oil goes to food uses, half to biofuel
- Value from biofuel production helps lower protein costs, making meat, dairy, other animal products more affordable

Source: National Oilseed Processing Association



USDA U.S. DEPARTMENT OF AGRICULTURE

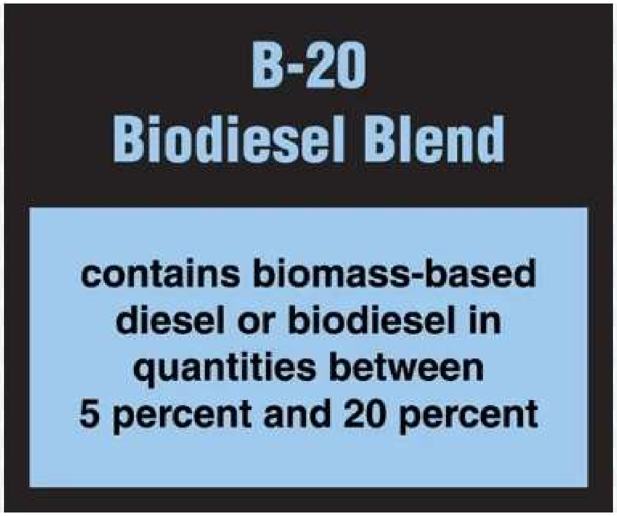
Trends in Fats/Oils/Greases Feedstock Use

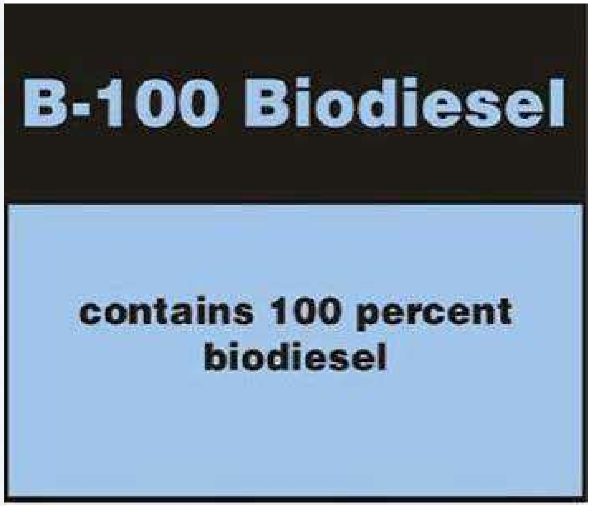


Source: Energy Information Agency.

Infrastructure & Handling

Storage and Dispensing





Underground Storage Tanks (CT)

- ≤ B20 – compliance with federal UST guidelines
- > B20 – Compatibility documentation (DEEP UST reqmts)

Pump Labeling

- FTC pump labeling requirements for blends greater than B5 (16 CFR 306)

Handling and Use in Cold Weather

Cold Compatibility

- All diesel fuel – incl. petroleum and biodiesel – must be managed to ensure proper cold weather performance (cloud point, pour point)
- When properly managed, blends of ULSD and biodiesel of any feedstock can be used successfully in winter
- Management includes field proven additives, proactive tank management, use appropriate BD blend

Fleet Use

- B20 widely used year round
- Various fleets in IL, IN, NY, elsewhere use B20 or higher in winter
- Iowa Snow Removal fleets use B100 in winter using Optimus Vector B100 system

Sources: USDOE, Alt. Fuels Data Center; NREL Biodiesel Handling and Use Guide, Sept. 2023

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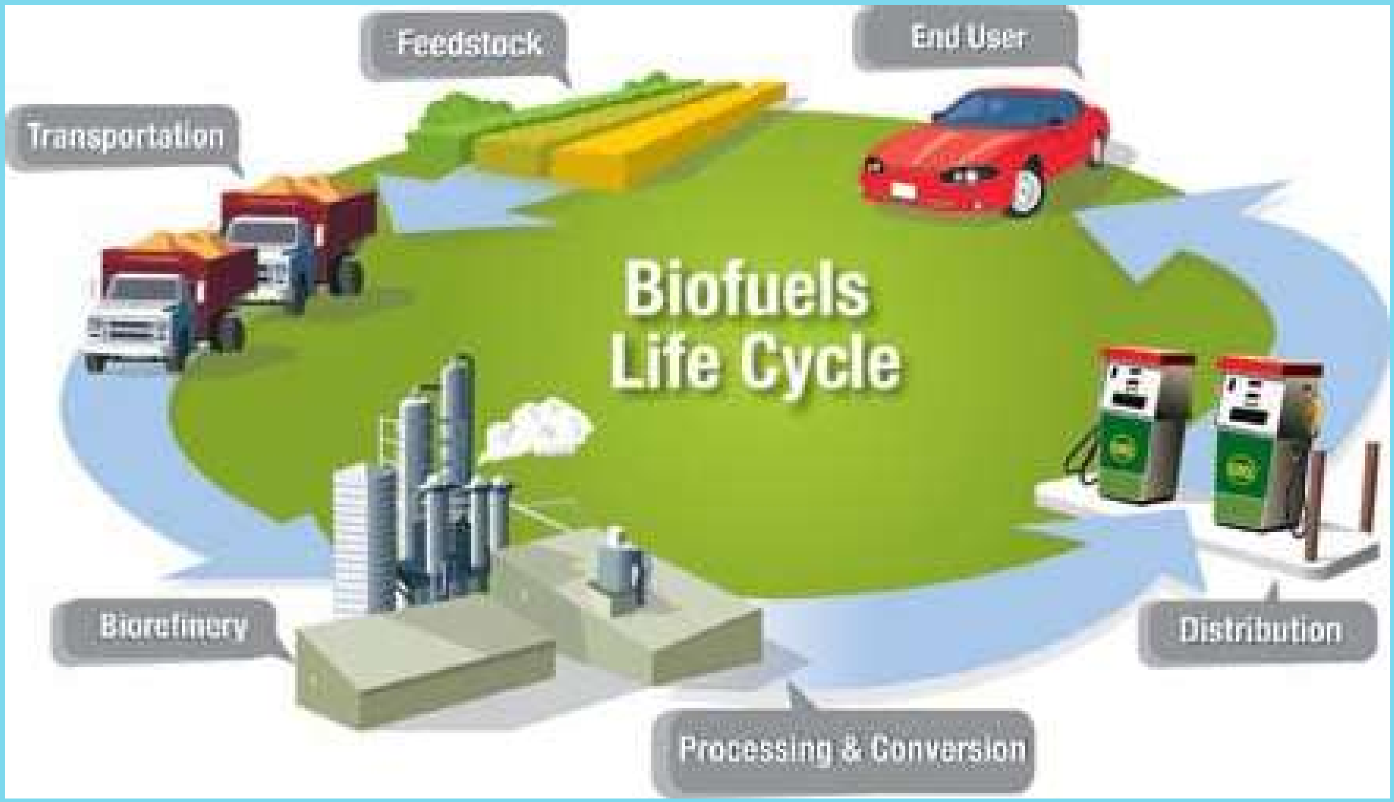
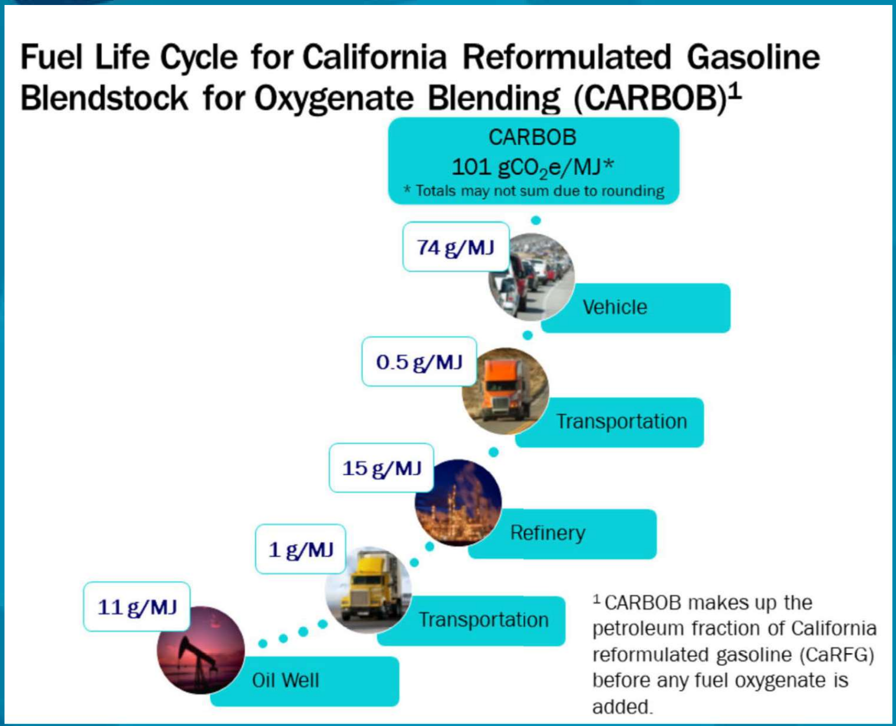
Emissions and Environmental Impacts

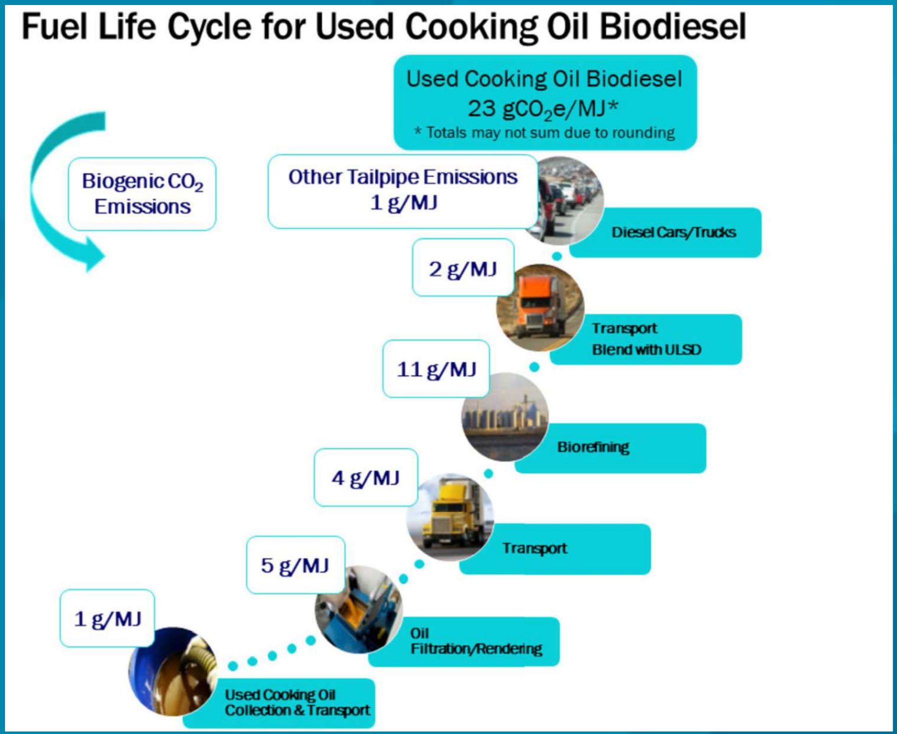
Carbon Reductions Based on Full Fuel Lifecycle



Source: US Dept. of Energy

Recycling Biogenic CO2 Offsets Tailpipe CO2





Source: Adapted from "LCFS Basics," California Air Resources Board
Assumes fossil diesel baseline CI 100 g CO2/MJ

Representative 45ZCF-GREET CI Scores (kgCO2e/MMBTU) – USMCA feedstocks only

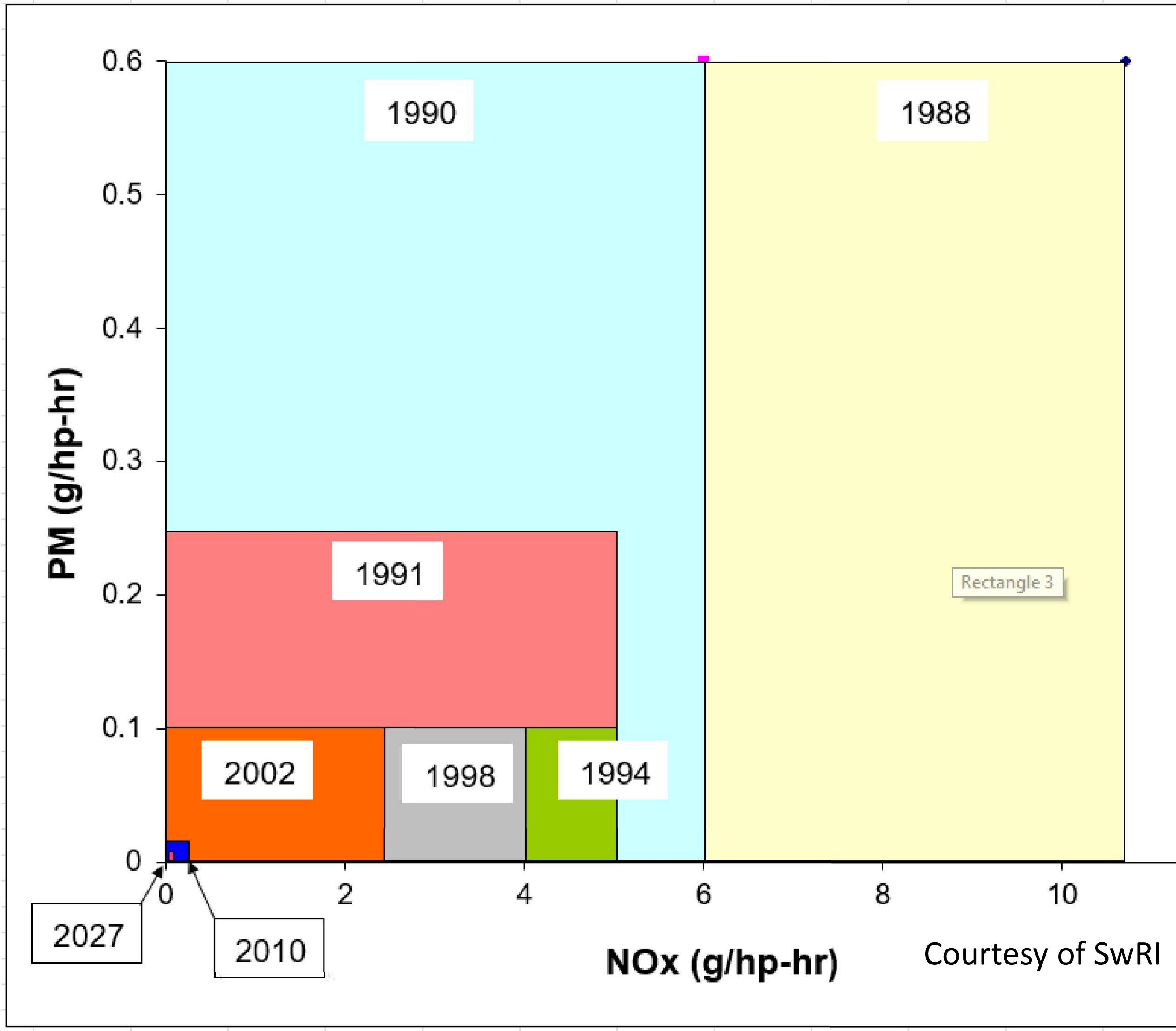
Fuel\Feedstock	Soybean	Canola	DCO	US UCO	CAN/MEX UCO	Tallow	Winter Camelina	Winter Carinata	Winter Pennycress
Biodiesel	20.2	33.6	10.4	19.1	20.6	19.7	37.9	29.0	28.8
Renewable Diesel	24.7	36.4	12.5	17.5	19.0	18.1	41.8	32.4	32.2
Sustainable Aviation Fuel	26.5	38.1	14.2	17.5	19.0	18.1	43.5	34.1	34.0

Source: Veronica Bradley, Clean Fuels

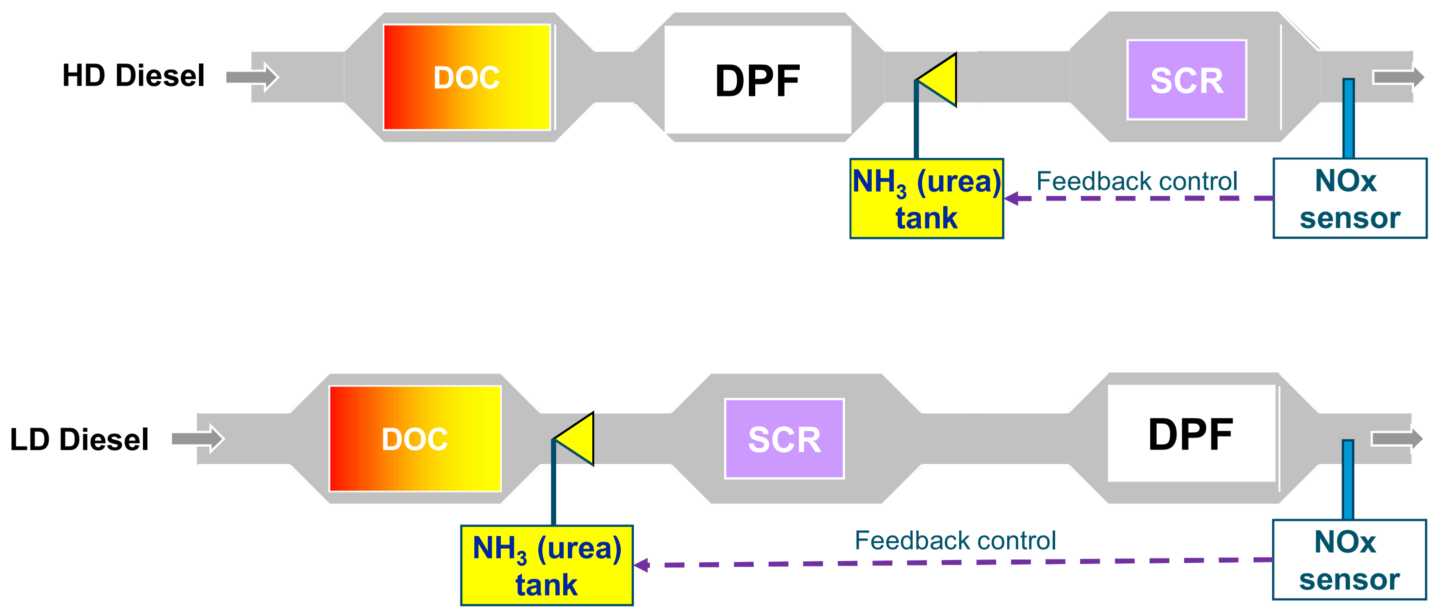
2027 NEAR-ZERO TAILPIPE LIMITS

- 2027 – reduces NOx and PM by 82% and 50%, resp., relative to 2010 and 98% relative to pre-2010
- Advanced aftertreatment (ULEDE) achieves near-zero emissions and is fuel-agnostic

Source: Engine Technology Forum, Aug. 2026; Southwest Research Institute



CONVENTIONAL 2010 ARCHITECTURES FOR HD AND LD DIESEL



DOC=Diesel oxidation catalyst

DPF=Diesel particulate filter

SCR = Selective Catalytic Reduction

Courtesy of the Manufacturer of Emissions Controls Association (MECA)

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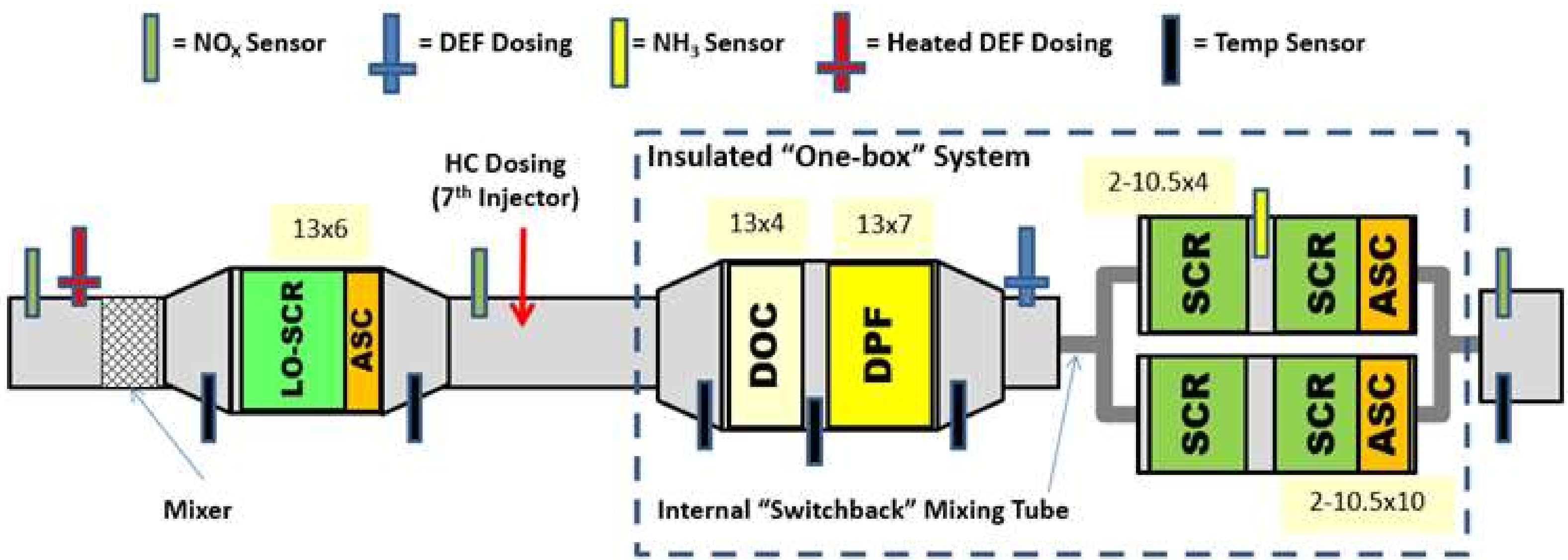
WHAT 2027 AFTER TREATMENT WILL LOOK LIKE

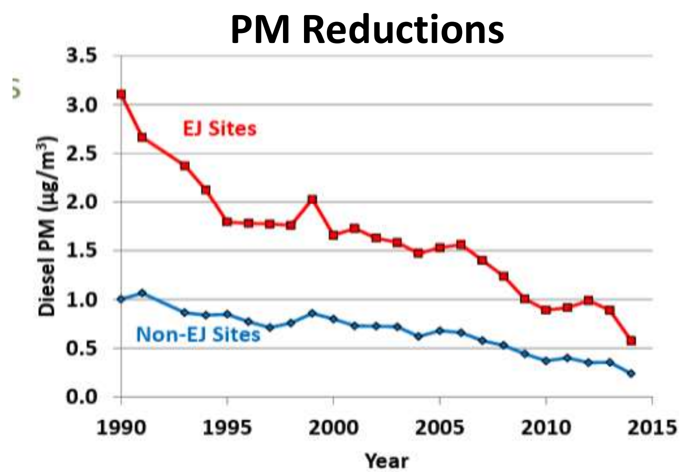


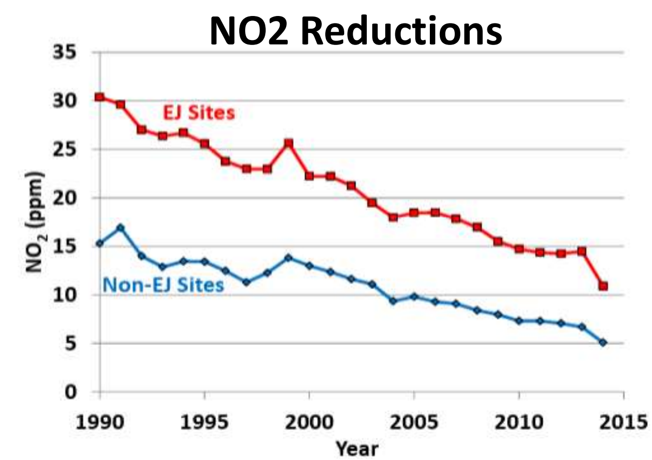
Courtesy of SwRI

Accelerated Fleet Turnover + Cleaner Fuels = Better EJ Outcomes

<u>California Experience</u>:

- 2000 – Diesel Risk Reduction Plan adopted
- 2004 - ULSD (15 ppm S, 10% aromatics)
- 2007 – New Technology Diesel Engines
- 2011 – LCFS implemented, BMBD use increases
- Both diesel PM and NO2 decreased dramatically from accelerated turnover to new engines coupled with cleaner fuels, in EJ and non-EJ communities

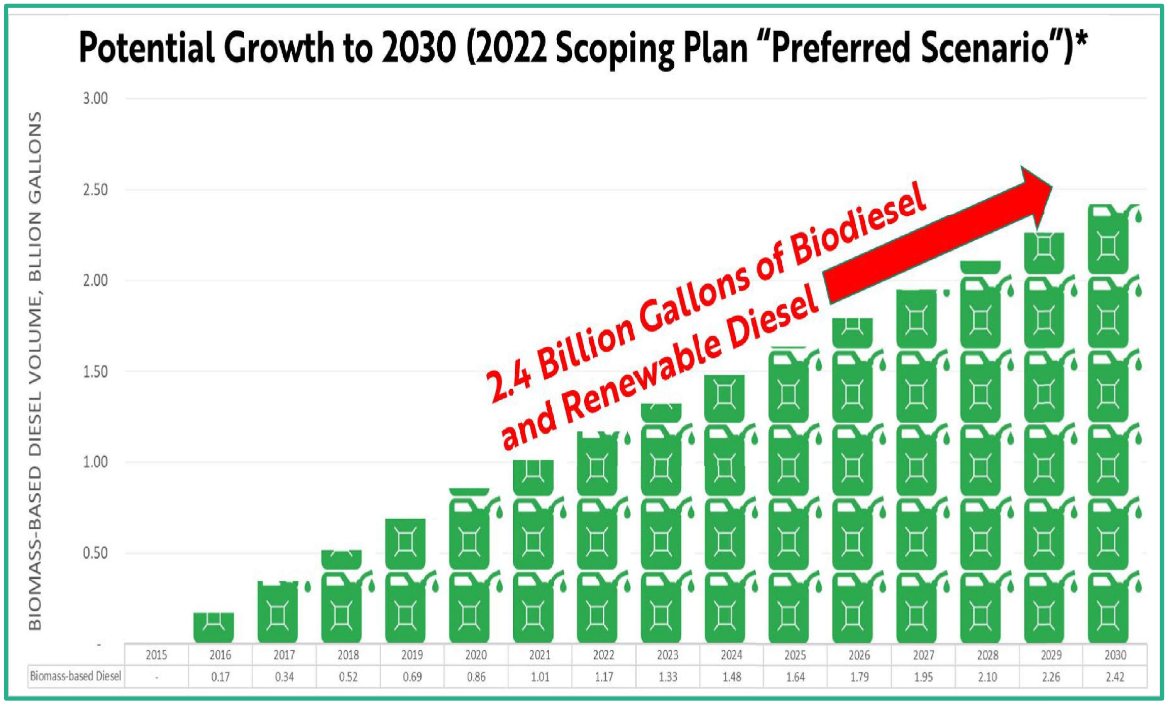




Source: Adapted from CARB, "[Air Quality Progress in California Communities]," June 2016, at 9-10

Continued Key Role for Biomass-based Diesels

California Experience:
- BMBD from 14 Mgal (2011) to over 2.4 Bgal (2025)
- Biomass-based diesel now >70% of diesel fuel pool
- 2022 Scoping Plan projects continued key role for BMBD through 2030+
- 2025 volumes already at 2030 level in “Preferred Scenario”
- State has not reported any adverse environmental impacts due to increased BMBD use



Source: CARB Q1 2026 LCFS Quarterly Data Summary Spreadsheet, 2022 Scoping Plan, Alternative 3 Modeling

Affordability

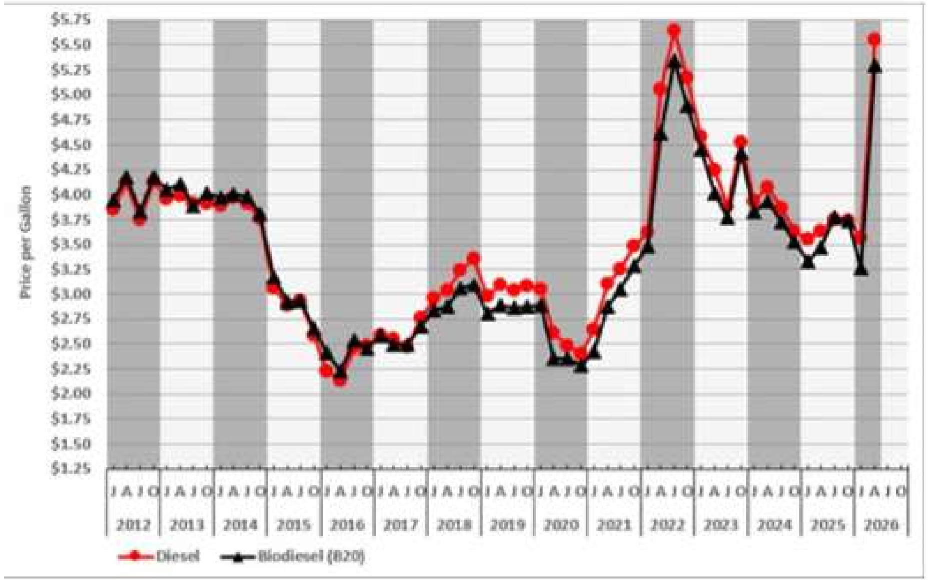
Biodiesel (B20) Cost-Competitive with Diesel in Most Regions

TABLE 11
Biodiesel (B20) and Diesel
Average Retail Prices by Region

Region	B20 Prices ($/gal)	Diesel Prices ($/gal)	Price Difference*
New England	$3.75	$5.55	-$1.80
Central Atlantic	$4.30	$5.66	-$1.36
Lower Atlantic	$4.48	$5.63	-$1.15
Midwest	$5.11	$5.07	$0.04
Gulf Coast	$5.19	$5.40	-$0.21
Rocky Mountain	---	$4.91	---
West Coast	$6.14	$7.16	-$1.02
NATIONAL AVERAGE	**$5.30**	**$5.55**	**-$0.24**

* Price differences that are negative numbers represent average B20 prices that are lower than diesel prices, or

Historical Biodiesel (B20) Prices Versus Diesel



Source: USDOE Clean Cities Alternative Fuel Price Report, April 2026, at 20-21.

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Biodiesel (B20) Cost-Competitive with Other Fuels in New England PADD

Regional Fuel Prices

Chart Data

Average fuel prices as of April 2026

Fuel	New England Region per unit sold	New England Region per GGE	National Average per unit sold	National Average per GGE
Biodiesel (B20)	$3.75/gallon	$3.41/GGE	$5.30/gallon	$4.82/GGE
Biodiesel (B99–B100)	$4.82/gallon	$4.77/GGE	$5.28/gallon	$5.23/GGE
Natural Gas (CNG)	$4.03/GGE	$4.03/GGE	$3.08/GGE	$3.08/GGE
Propane	$3.43/gallon	$4.73/GGE	$3.59/gallon	$4.95/GGE
Gasoline	$3.94/gallon	$3.94/GGE	$4.09/gallon	$4.09/GGE
Diesel	$5.55/gallon	$5.00/GGE	$5.55/gallon	$5.00/GGE

Source: Average prices per gasoline gallon equivalent (GGE) for the New England PADD from the Alternative Fuel Price Report

Source: USDOE Alternative Fuels Data Center, Connecticut Transportation Data for Alternative Fuels and Vehicles, visited Aug. 18, 2026

Conclusions

- Accelerated turnover to cleanest engines (NTDE/ULEDE) + cleanest fuels (e.g., biodiesel blends) fastest way to reduce GHGs, PM, NOx, etc., from heavy duty transport to near-zero levels
- California experience shows such a strategy provides greatest benefits for EJ and non-EJ communities in foreseeable future
- B20 is a common diesel drop-in substitute with no significant market entry barriers
- B20 cost-competitive with petrodiesel in New England and most other regions (Apr 2026)

THANKS

Floyd Vergara
Vergara.Law@gmail.com

Questions?

Next Steps

TIMELINE AND MEETING SCHEDULE

Event/ Deliverable	Date	Revised Topics (tentative)
Kickoff Meeting	July 29	Introduction and Scope
Second Meeting	August 19	Fleet Inventory, Technical and Emissions Analysis
Third Meeting	September 16	Technical and Emissions Analysis (Fuel Availability & Supply)
Fourth Meeting	October 15	Case Studies
Fifth Meeting	November 18	Economics, Procurement, Barriers, Pathways to Adoption
Sixth Meeting	December 16	Draft Recommendations
DEEP Staff Draft Report	By December 2026	
Draft Final Report	By Jan 1, 2027	For Workgroup Review
Final Meeting	January 13, 2027	Report Review
Final Report Due by February 1, 2027		