

Renewable Natural Gas: The Right Solution Right Now

State of the Industry Breakfast

TTP26, The Westin Nashville

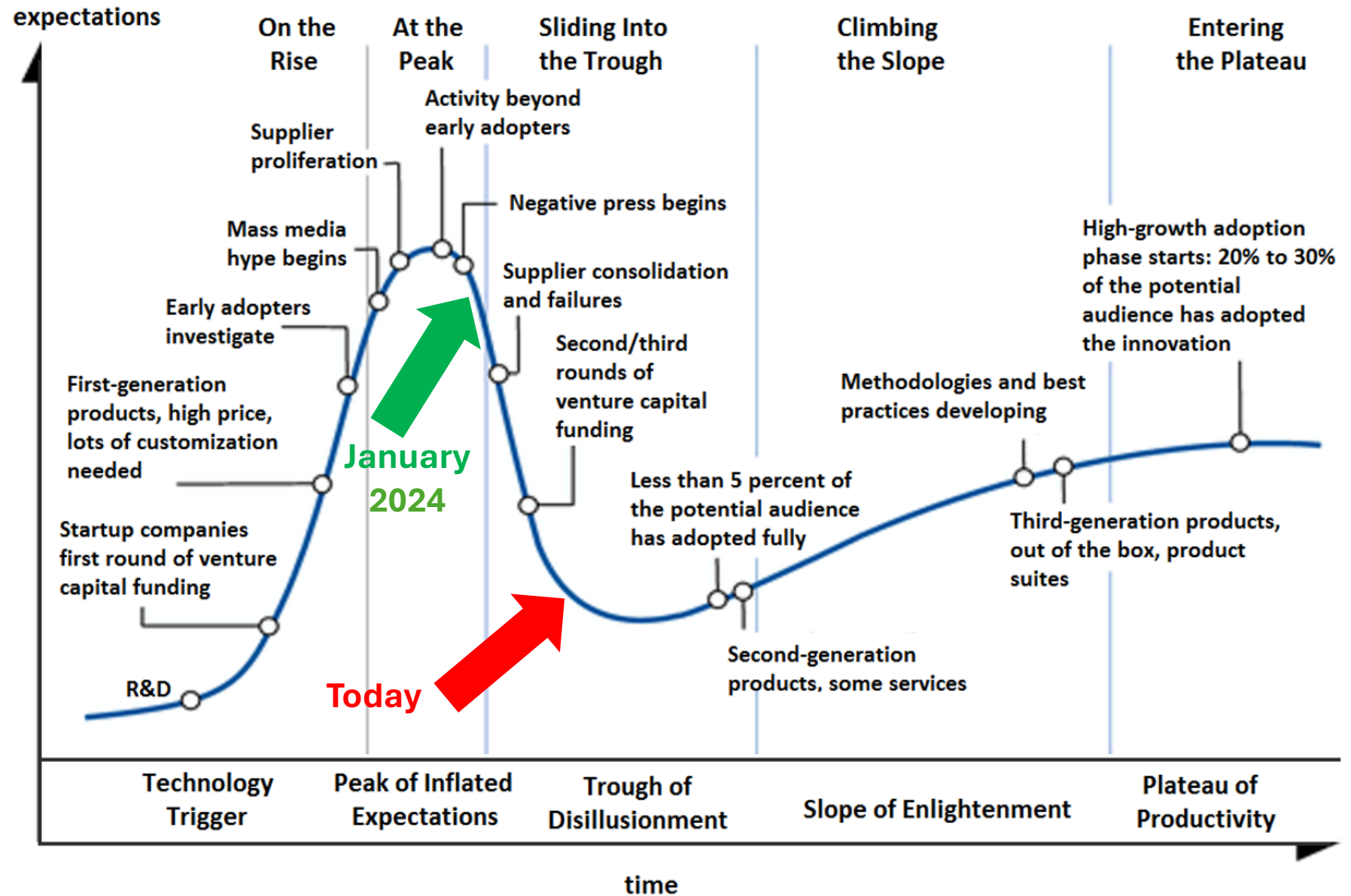
June 8, 2026



Things to Watch

Marty Tufte, Chair

The BEV Journey



Where We Are Today

Jeffrey Clarke, Secretary & General Counsel

A Fuel in Transition

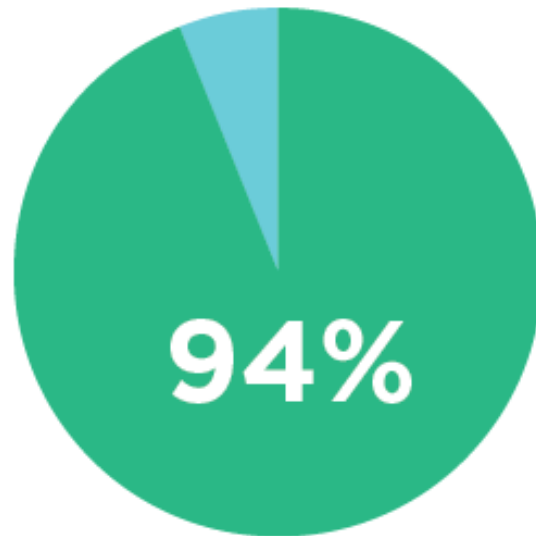
RNG is the Majority NGV Fuel in the U.S.

2025 NGV Fuel Use

806 Million GGE Total

In 2025, **94%** of all on-road fuel used in natural gas vehicles was RNG.

- Conventional Natural Gas
51 Million GGE
- Renewable Natural Gas
755 Million GGE



RNG use as a transportation fuel grew **13% over 2024** volumes, increasing **94%** over the last five years. RNG offset a total of **11.01 million tons** of CO₂e in 2025.

RNG Production Facilities



Note: RNG Coalition (U.S. and Canada Year End 2025)

RNG: Better Than Zero

The only motor fuel with negative carbon intensity



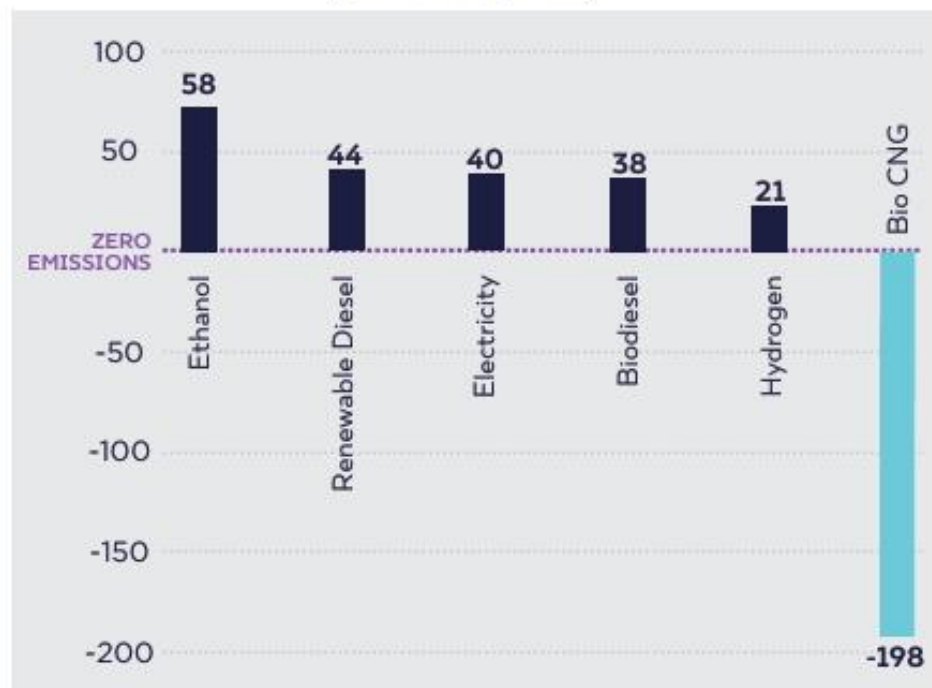
Fuel Up on Fact:

At -198, bio-CNG holds the lowest average carbon intensity of any clean fuel option on California's roadways today and is the only fuel with a negative carbon intensity

Note: Data from CARB LCFS Reporting Tool Quarterly Summaries (calculated weighted average)



**CA LCFS 2025 Renewable Fuels
Average CI Score
(gCO₂e/MJ)**



Note: Baseline conventional diesel carbon intensity = 100.45.
Data from CARB's LCFS Reporting Tool Quarterly Summaries
Bio-LNG not listed above as bio-CNG accounts for more than 95 percent of all RNG used in on-road vehicles

Packing a big punch

While RNG made up just **6%** of all on-road alternative fuels dispensed by volume, it generated **25.3%** of all CO₂e reductions of on-road alternative fuels reported under the California LCFS in 2025.

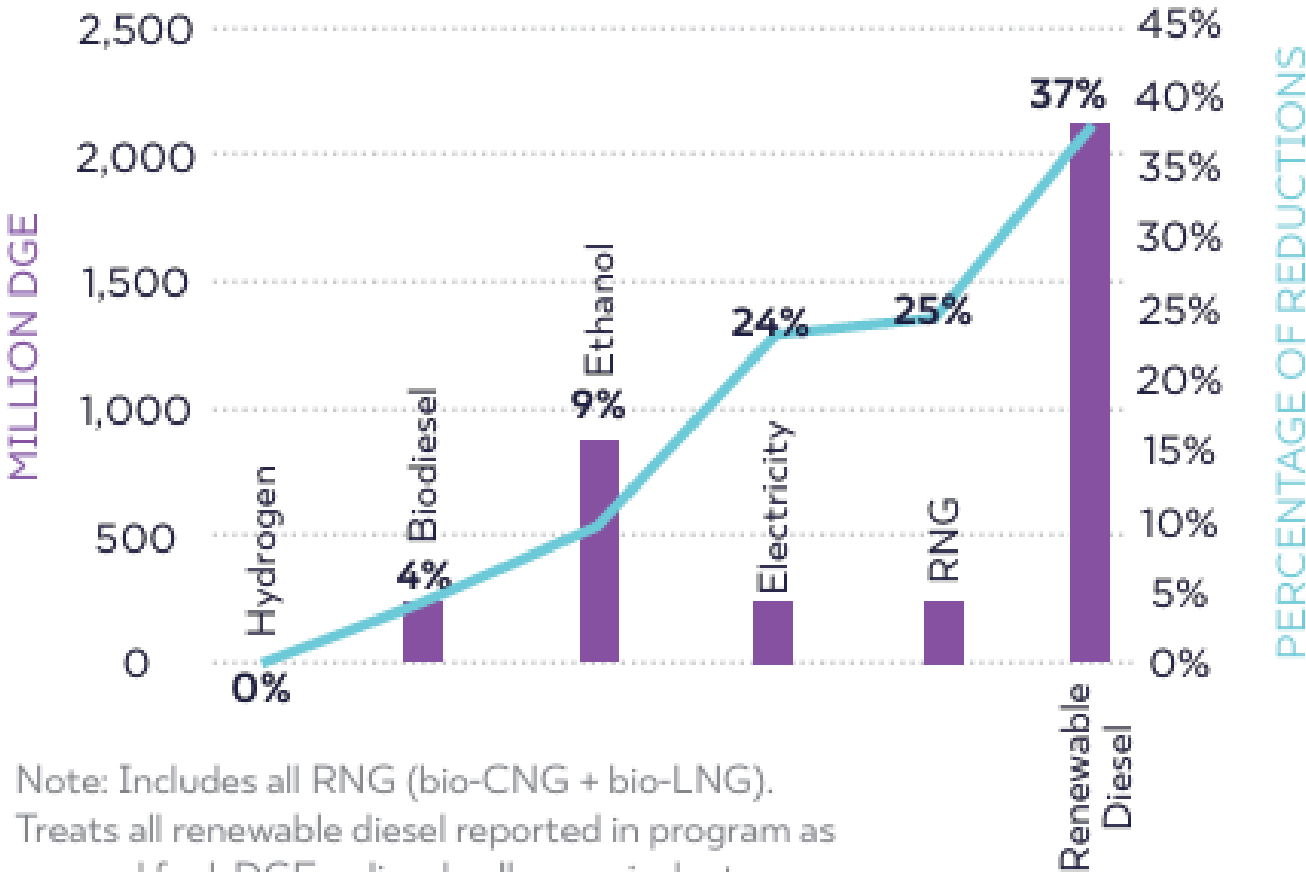
CA LCFS is a success



2025 CA NGV Fuel Use 227.83 million DGE total

In 2025, 98% of all on-road fuel used in natural gas vehicles in California was RNG, driven by the state’s LCFS program

2025 On-Road Alternative Fuels Volumes & Emission Reductions



Note: Includes all RNG (bio-CNG + bio-LNG).
Treats all renewable diesel reported in program as on-road fuel. DGE = diesel gallon equivalent.
Data from CARB LCFS Reporting Tool Quarterly Summaries

Refuse Investment Continues



Approximately 21,000 – 25,000 natural gas refuse and recycling trucks operate across the U.S., and about 60% of new collection trucks on order are powered by CNG.

Transit Investment Continues

Transit CNG Users

ALABAMA

Birmingham-Jefferson County Transit Authority

ARKANSAS

Rock Region Metropolitan Transit Authority

ARIZONA

City of Phoenix Public Transit Department, dba: Valley Metro
Regional Public Transportation Authority, dba: Valley Metro
City of Tucson, dba: Sun Tran
City of Scottsdale, dba: Scottsdale Trolley

CALIFORNIA

Los Angeles County Metropolitan Transportation Authority, dba: Metro
San Diego Metropolitan Transit System
Orange County Transportation Authority
Foothill Transit (West Covina)
Sacramento Regional Transit District, dba: Sacramento RT
City of Los Angeles
Omnitrans (San Bernardino), dba: OMNI
Riverside Transit Agency
City of Fresno, dba: Fresno Area Express
North County Transit District (Oceanside)
City of Santa Monica, dba: Big Blue Bus
Golden Empire Transit District (Bakersfield)
SunLine Transit Agency (Thousand Palms), dba: SunLine
Long Beach Transit
Victor Valley Transit Authority
Gold Coast Transit District (Oxnard)
City of Santa Clarita, dba: Santa Clarita Transit
City of Culver City, dba: Culver City Municipal Bus Lines
Yolo County Transportation District
City of Visalia, dba: Visalia Transit
City of Torrance, dba: Torrance Transit System
Santa Cruz Metropolitan Transit District
City of Montebello, dba: Montebello Bus Lines
City of Glendale
County of Sonoma, dba: Sonoma County Transit
City of Norwalk, dba: Norwalk Transit System
County of Placer
City of Pasadena, dba: Pasadena Transit
Solano County Transit, dba: SolTrans
Kings County Area Public Transit Agency
City of Gardena, dba: GTrans
University of California, Davis, dba: UniTrans
Stanislaus Regional Transit Authority
City of Redondo Beach, dba: Beach Cities Transit
City of Commerce, dba: City of Commerce Transit
Tulare County Regional Transit Agency
Paratransit, Inc. (Sacramento)
City of Riverside
Access Services (El Monte)
City of Turlock, dba: Turlock Transit
Napa Valley Transportation Authority
Anaheim Transportation Network, dba: Anaheim Regional Transportation
Butte County Association of Governments, dba: Butte Regional
Transit/B-Line
City of La Mirada, dba: La Mirada Transit

FLORIDA

County of Miami-Dade
Central Florida Regional Transportation Authority
Jacksonville Transportation Authority
Hillsborough Area Regional Transit Authority
City of Tallahassee, dba: StarMetro

GEORGIA

Metropolitan Atlanta Rapid Transit Authority
City of Albany, dba: Albany Transit System
Cobb County (Marietta), dba: CobbLinc

IDAHO

Valley Regional Transit (Meridian)

ILLINOIS

Pace - Suburban Bus Division (Arlington Heights)
Rock Island County Metropolitan Mass Transit District (Moline)
Springfield Mass Transit District, dba: Sangamon Mass Transit District

INDIANA

Greater Lafayette Public Transportation Corporation, dba: CityBus
South Bend Public Transportation Corporation

KANSAS

Johnson County Kansas (Olathe), dba: Johnson County Transit

KENTUCKY

Lexington Transit Authority, dba: Lextran

LOUISIANA

City of Shreveport, dba: Shreveport Area Transit System
Lafayette City-Parish Consolidated Govt, dba: Lafayette Transit System

MASSACHUSETTS

Massachusetts Bay Transportation Authority (Boston)
MetroWest Regional Transit Authority (Framingham)

MARYLAND

Montgomery County, Maryland (Rockville), dba: Ride On

MAINE

Greater Portland Transit District

MICHIGAN

Interurban Transit Partnership (Grand Rapids), dba: The Rapid
Mass Transportation Authority (Flint)
Blue Water Area Transp. Comm. (Port Huron), dba: Blue Water Area Transit

MINNESOTA

St. Cloud Metropolitan Transit Commission, dba: Metro Bus

MISSOURI

Kansas City Area Transportation Authority

City of Columbia, dba: Go COMO

NORTH CAROLINA

City of Raleigh, dba: GoRaleigh
Cape Fear Public Transportation Authority (Wilmington), dba: Wave Transit
Buncombe County (Asheville), dba: Mountain Mobility

NEBRASKA

Transit Authority of Omaha

City of Lincoln, dba: StarTran

NEVADA

Regional Transportation Commission of Southern Nevada (Las Vegas)
Regional Transportation Commission of Washoe County (Reno)

NEW HAMPSHIRE

City of Nashua, dba: Nashua Transit System

NEW JERSEY

New Jersey Transit Corporation (Newark)

NEW MEXICO

City of Albuquerque, dba: ABQRIDE
City of Santa Fe, dba: Santa Fe Trails

NEW YORK

MTA New York City Transit (Brooklyn)
County of Nassau, dba: Nassau Inter County Express
MTA Bus Company (New York)
Niagara Frontier Transportation Authority (Buffalo), dba: NFTA
Central New York Regional Transportation Authority (Syracuse), dba: CENTRO

OHIO

Central Ohio Transit Authority (Columbus)
The Greater Cleveland Regional Transit Authority
METRO Regional Transit Authority (Akron)
Stark Area Regional Transit Authority (Canton)
Portage Area Regional Transportation Authority (Kent)

OKLAHOMA

Metropolitan Tulsa Transit Authority
Central Oklahoma Transp. & Parking Authority (Oklahoma City), dba: EMBARK

OREGON

Salem Area Mass Transit District, dba: Salem-Keizer Transit or Cherriots
Rogue Valley Transportation District (Medford)
City of Wilsonville, dba: South Metro Area Regional Transit

PENNSYLVANIA

Lehigh and Northampton Transportation Authority (Allentown)
Centre Area Transportation Authority (State College)
Central Pennsylvania Transportation Authority (York)
Erie Metropolitan Transit Authority, dba: the e

Mid Mon Valley Transit Authority (Charleroi)

River Valley Transit Authority (Williamsport)

Luzerne County Transportation Authority (Kingston)

Cambria County Transit Authority (Johnstown), dba: CamTran

Altoona Metro Transit, dba: AMTRAN

County of Lackawanna Transit System (Scranton)

Westmoreland County Transit Authority (Greensburg)

Beaver County Transit Authority (Rochester)

County of Lebanon Transit Authority, dba: Lebanon Transit

Monroe County Transportation Authority (Swiftwater)

County of Fayette (Uniontown), dba: Fayette Area Coordinated Transportation

TEXAS

Dallas Area Rapid Transit

VIA Metropolitan Transit (San Antonio)

Metropolitan Transit Authority of Harris County, Texas (Houston)

Fort Worth Transportation Authority, dba: Trinity Metro

City of El Paso, dba: Sun Metro

Corpus Christi Regional Transportation Authority, dba: The B

Laredo Transit Management, Inc., dba: El Metro

City of Beaumont, dba: Beaumont Municipal Transit System

UTAH

Utah Transit Authority (Salt Lake City)

VIRGINIA

Greater Richmond Transit Company

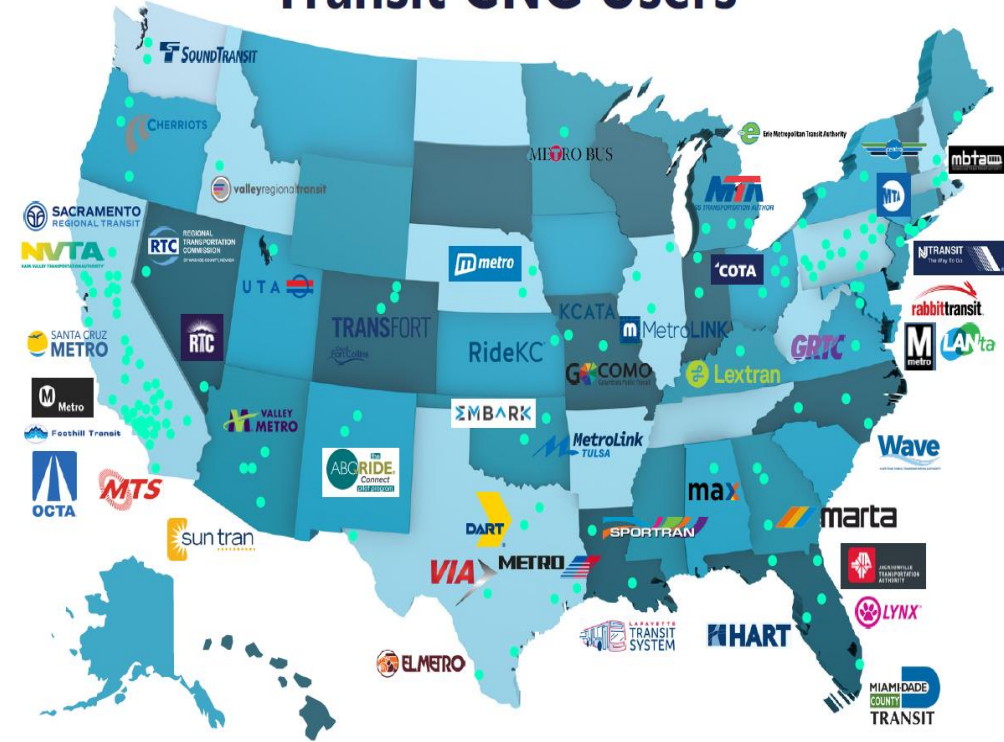
Arlington County, Virginia, dba: Arlington Transit

WASHINGTON

Pierce County Transportation Benefit Area Authority (Lakewood)

Central Puget Sound Regional Transit Authority (Seattle), dba: Sound Transit

Transit CNG Users





X15N™

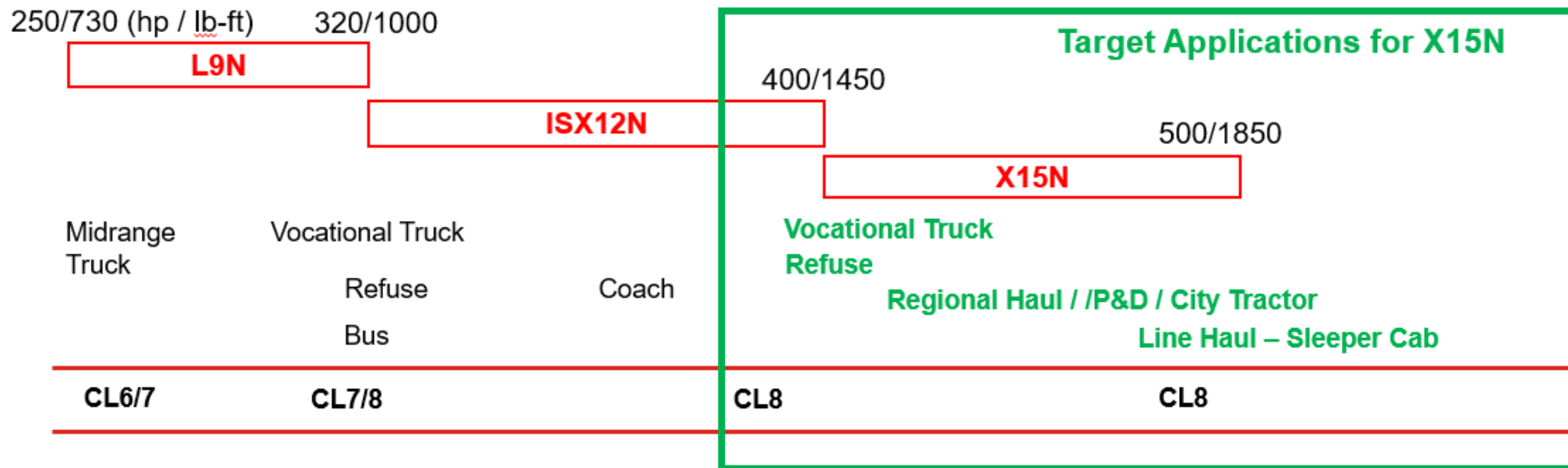
The X15N is an EPA and CARB 2024 compliant solution without using credits.

- 10 years research & development
- 13.4 million miles of on road testing
- NOx levels **75% below** current EPA standard
- Particulate matter (PM) **90% below** current EPA standard
- CO₂ equivalent is **16% below** current EPA standard with fossil natural gas
- Using RNG enables GHG emissions reduction to near or at **sub-zero levels**
 - Up to **97% reduction** in CO₂
 - Up to **80% reduction** in GHGs

11 billion+ miles logged by production engines globally

X15N Application Type

The Natural Gas Power Landscape

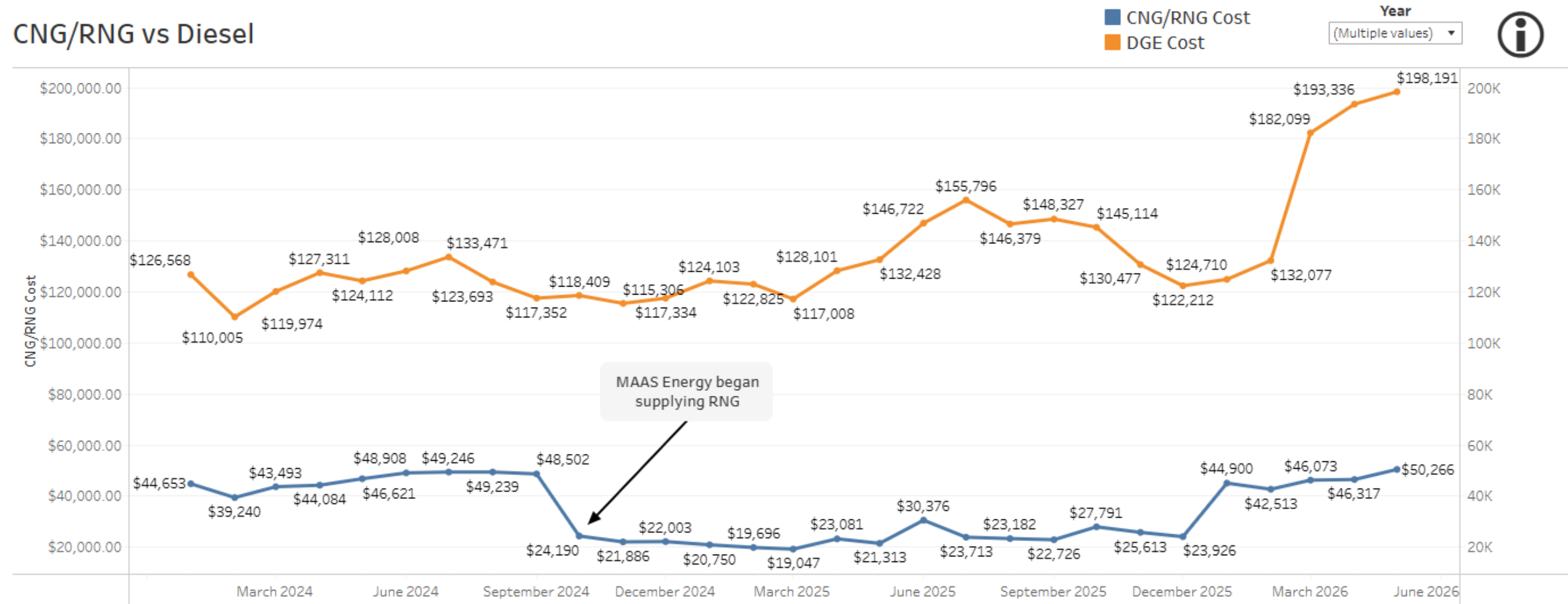


NGV Fuel Consumption Forecast

Year	HD NG Growth	The Transport Projects Estimates				EGE	AEO 2025 Projections	
		NG HD Fuel DGE	NG HD Fuel GGE	All NG Use DGE	All NG GGE		AEO 2025 GGE	AEO 2025 EGE
2023	75,000	462,243,000	512,904,833	685,871,295	761,042,789	1,146,384,879	675,289,529	985,747,312
2024	75,500	466,089,154	517,172,525	707,303,593	784,824,867	1,182,207,434	678,246,403	990,063,581
2025	78,500	493,012,231	547,046,371	734,226,670	814,697,913	1,227,207,434	736,844,901	1,075,602,167
2026	85,622	570,872,950	633,440,625	812,087,389	901,692,167	1,357,346,065	785,914,062	1,147,230,397
2027	99,406	731,689,900	811,883,113	972,904,339	1,079,534,655	1,626,140,110	823,781,710	1,202,507,327
2028	117,785	979,100,592	1,086,410,017	1,220,315,032	1,354,061,559	2,039,669,410	850,521,153	1,241,539,969
2029	138,462	1,279,527,862	1,419,764,115	1,520,742,301	1,687,415,657	2,541,812,131	873,202,389	1,274,648,682
2030	161,436	1,615,299,515	1,792,336,342	1,856,513,955	2,059,987,884	3,103,030,467	887,839,898	1,296,015,644

Note: Projections include 1) first year trucks 0.5 fuel use; 2) adjusted phase in to smooth out curve; and 3) assume that 10% of 15L sales replace existing 12-liter trucks.

CNG/RNG vs. Diesel

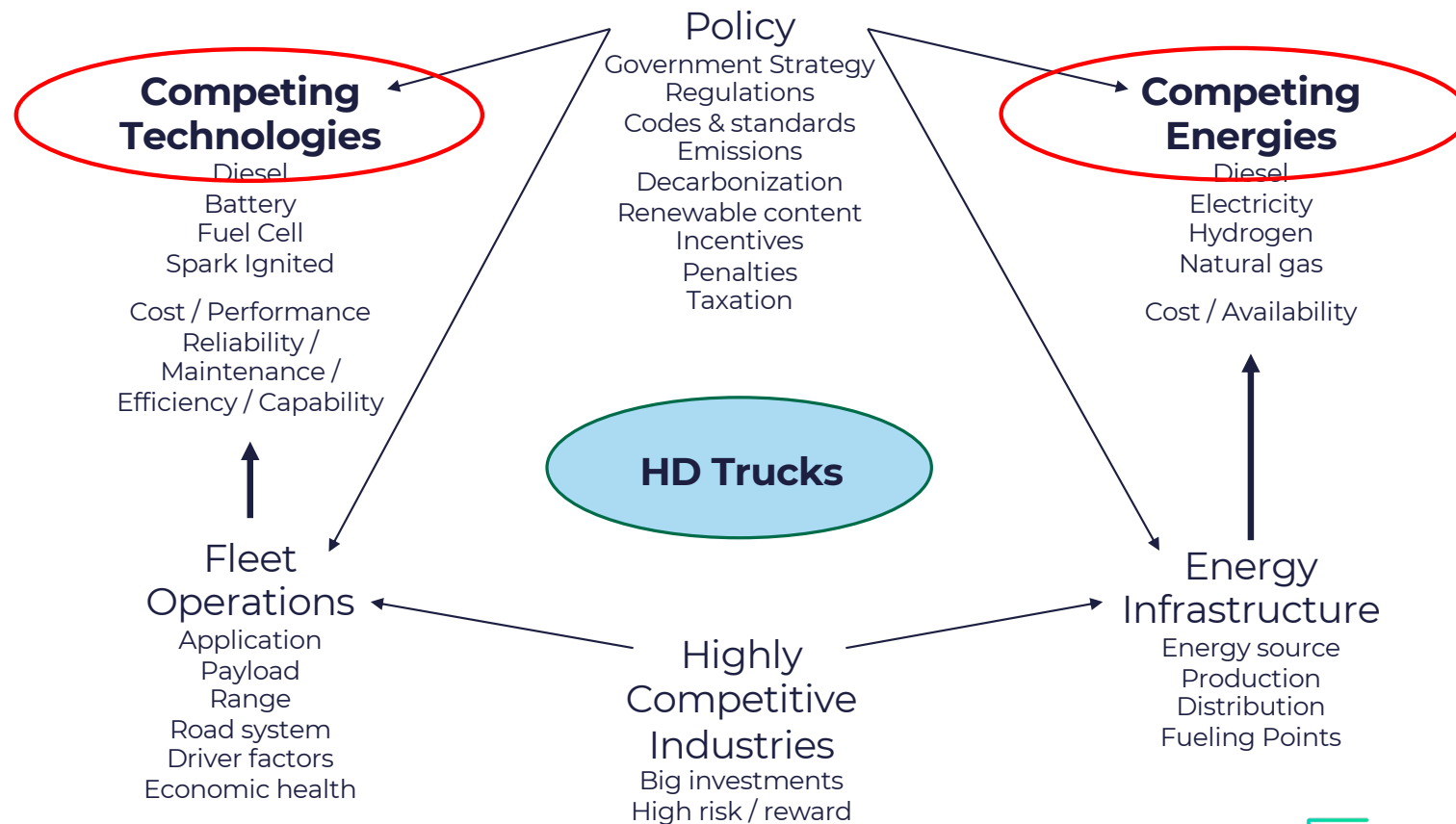


Source: City of Tacoma Solid Waste Services, June 2026

Where We Can Go

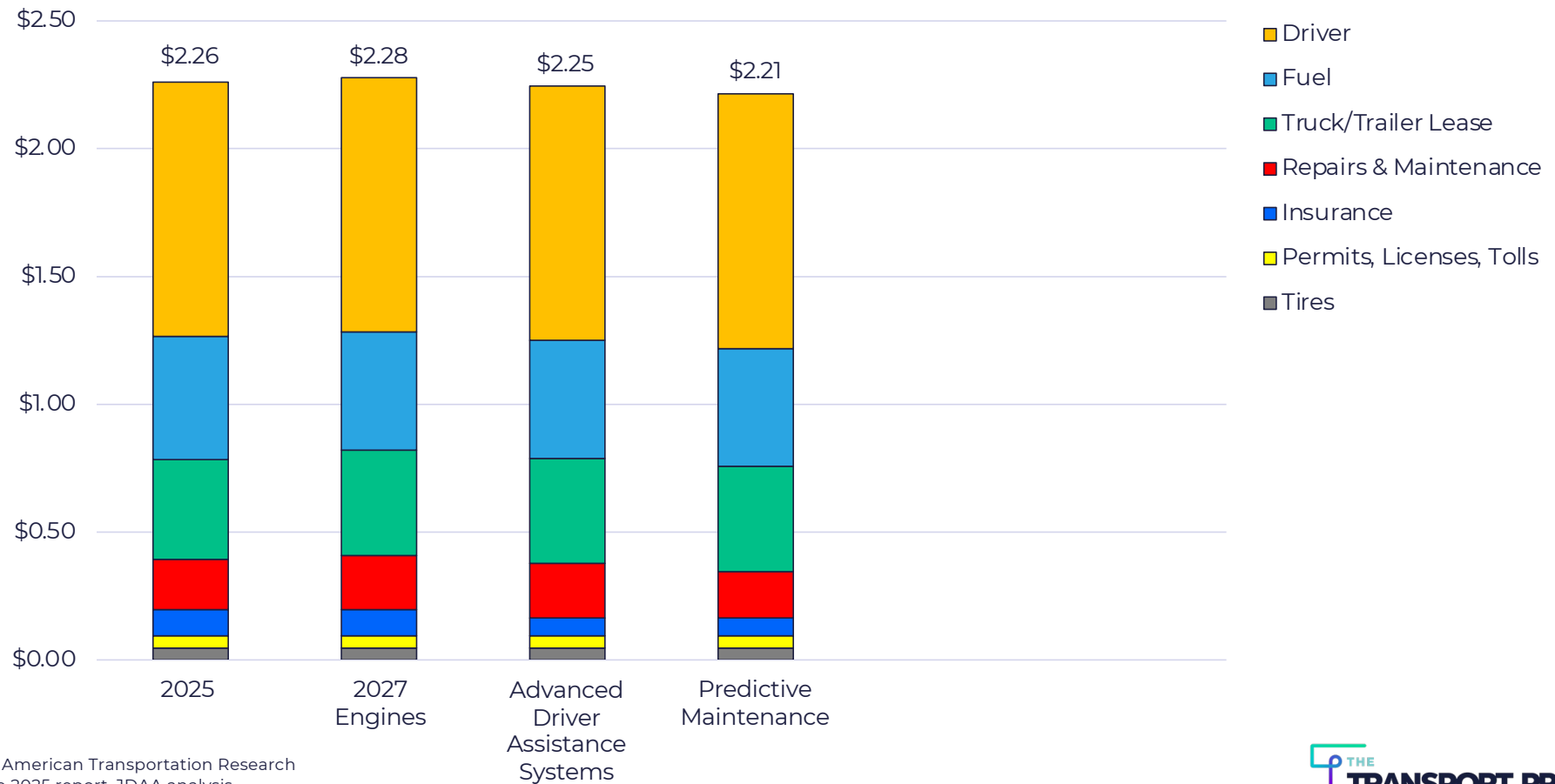
Jim Arthurs, Past Board Chair

Environmental Factors Affecting HD Trucks



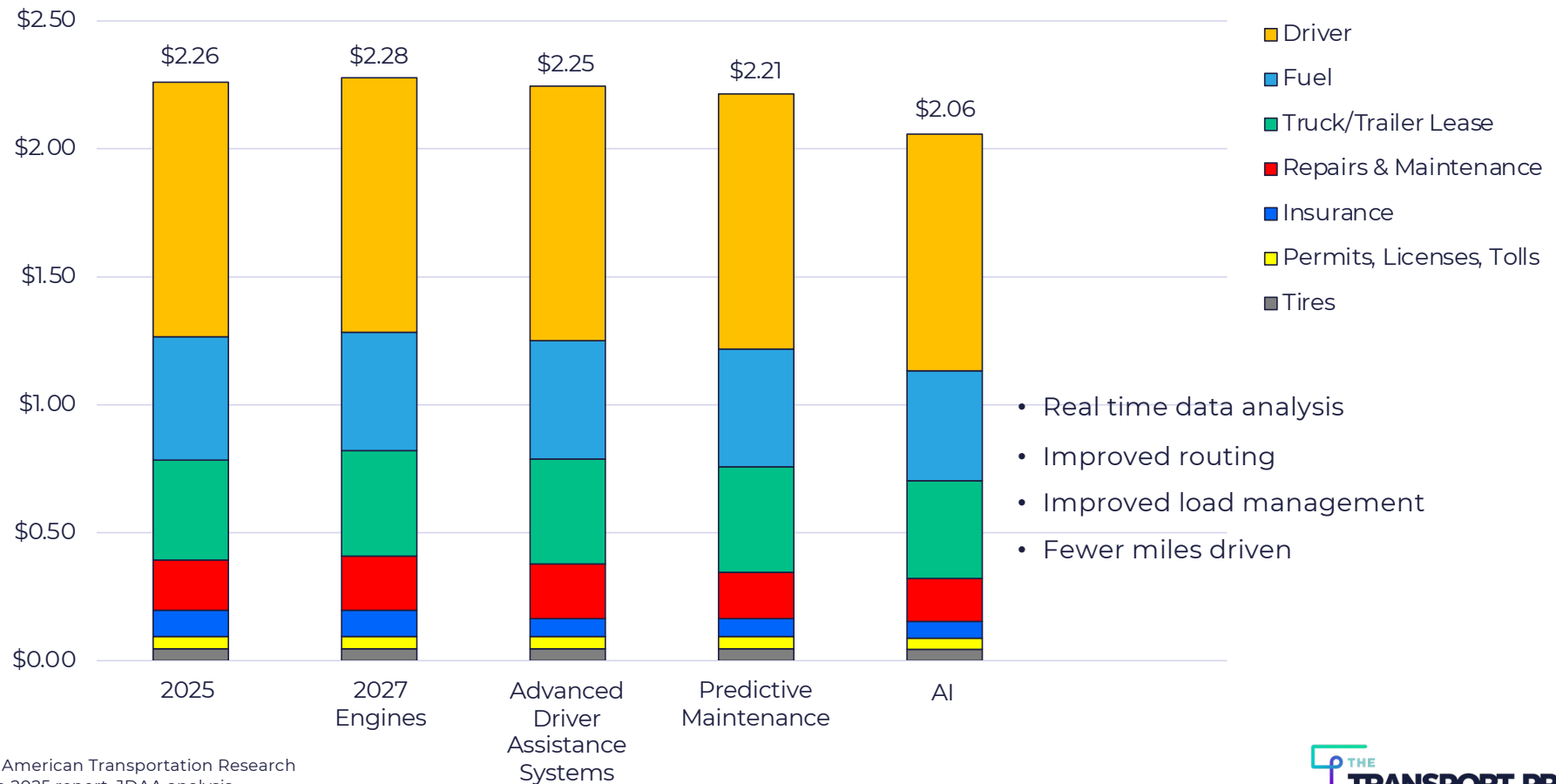
Impact of Technology Advances

Average Cost per Mile to
Operate a Class 8 Truck



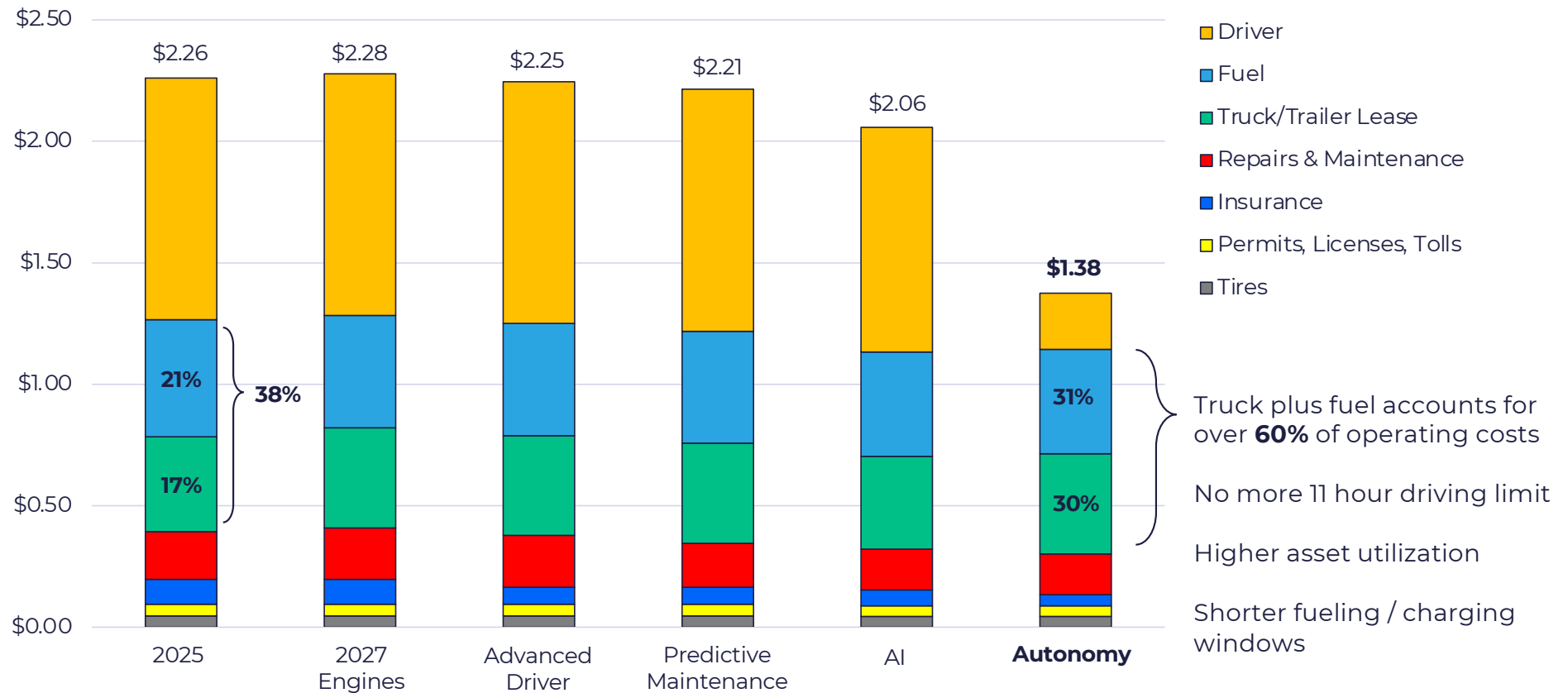
Impact of Technology Advances

Average Cost per Mile to Operate a Class 8 Truck



Impact of Technology Advances

Average Cost per Mile to
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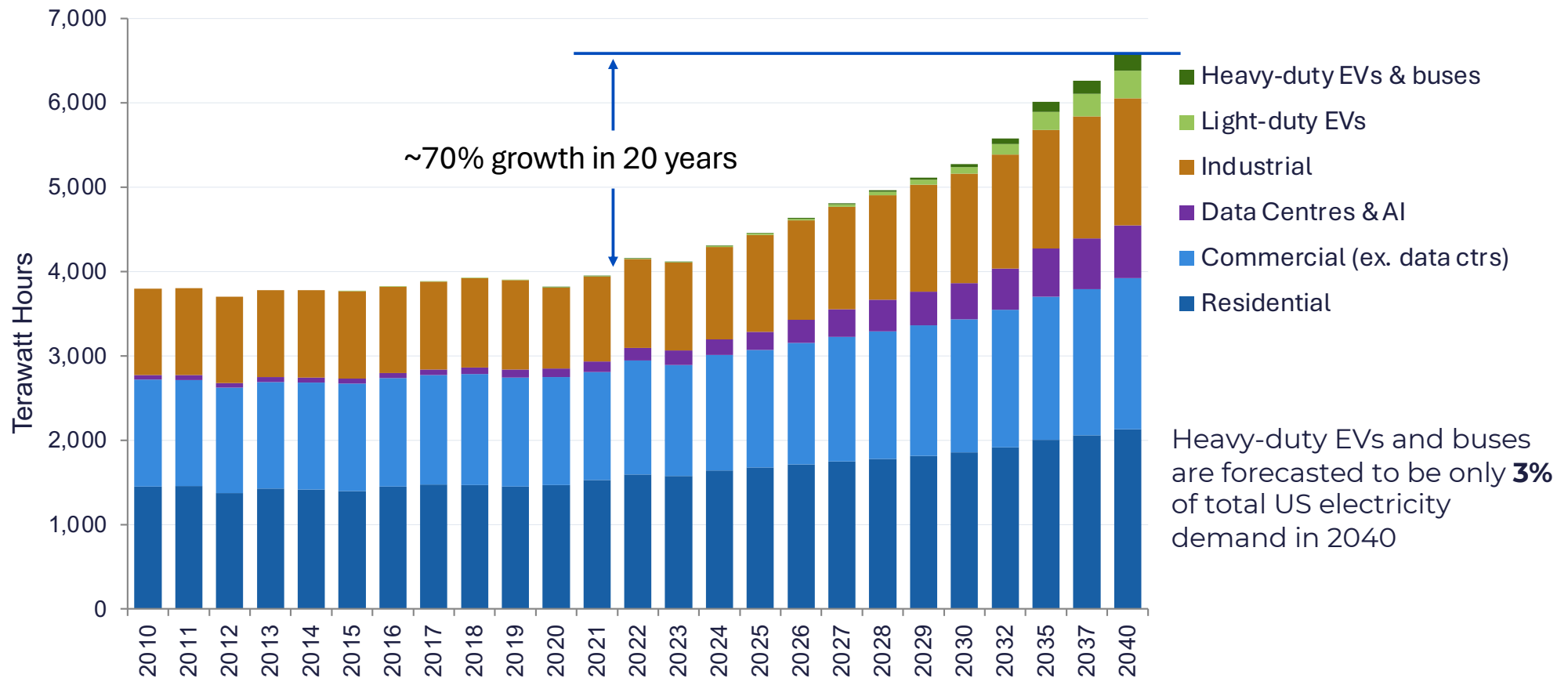
Source: American Transportation Research
Institute 2025 report, JDAA analysis

Electricity outlook



US Electricity Consumption by Sector 2010 to 2040 (TWh)

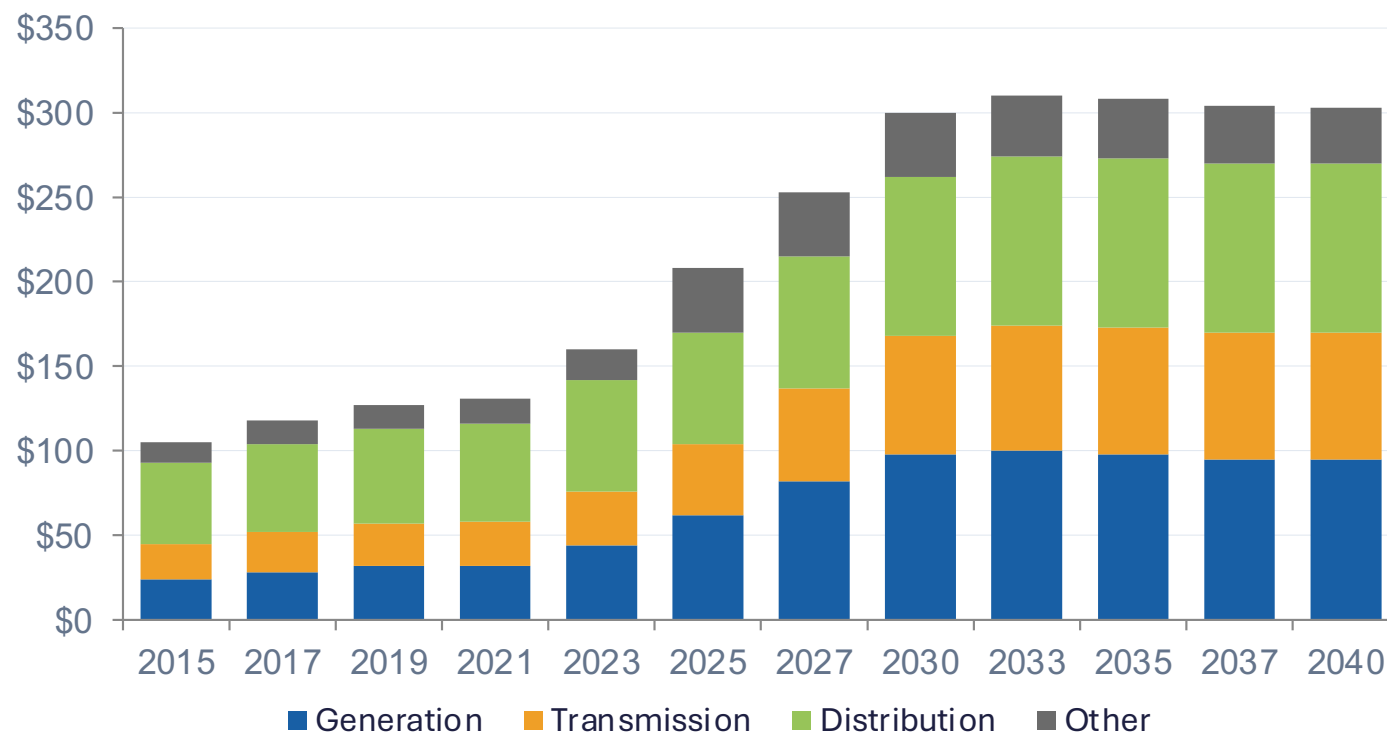
Similar demand
growth globally



Sources: EIA Electric Power Monthly · EIA AEO 2026 · LBNL 2024 Data Center Report · IEA Global EV Outlook 2025 · Pew Research

Annual Investment Ramp for US Electric Utilities

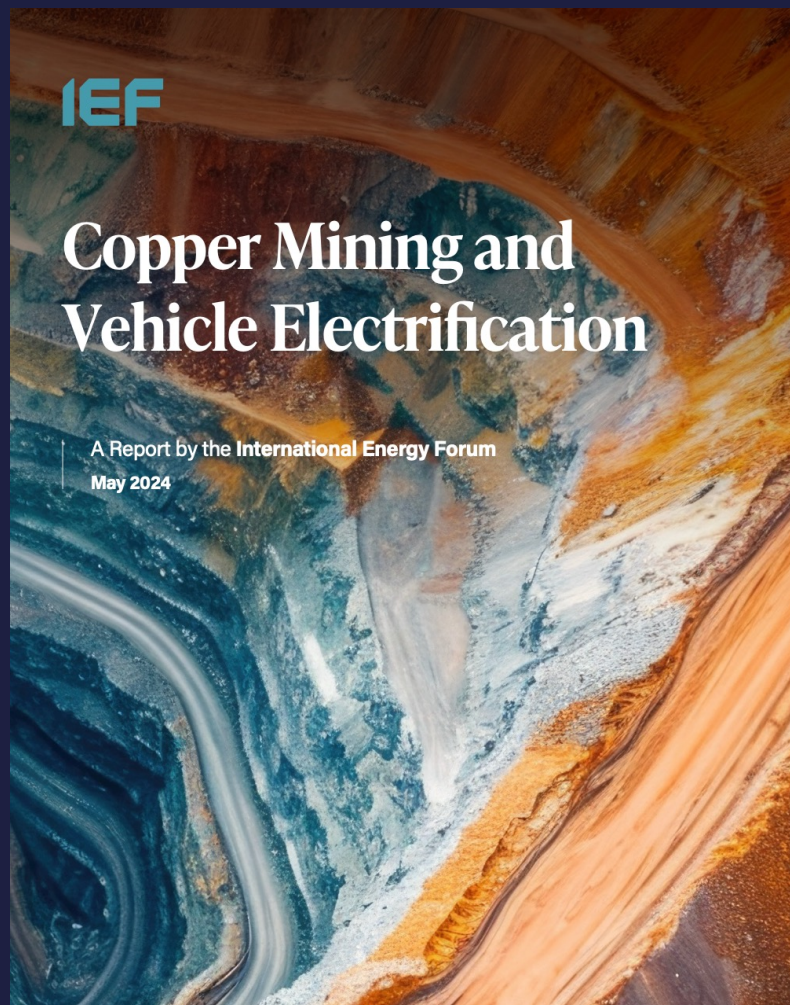
Annual utility capex, \$B



Investment Required: (2025 to 2040)

- Generation	\$1.5 to \$2.7T
- Transmission	\$0.5 to \$0.9T
- Distribution	\$0.7 to \$1.2T
- Total	\$2.7 to \$4.8T

Sources: EEI Industry Capital Expenditures 2025 · Morningstar DBRS · Bloomberg NEF North America Grid Investment · JP Morgan Grid Resilience (2026)



Copper is required throughout the electric vehicle ecosystem, from batteries to vehicles to electricity distribution to chargers.

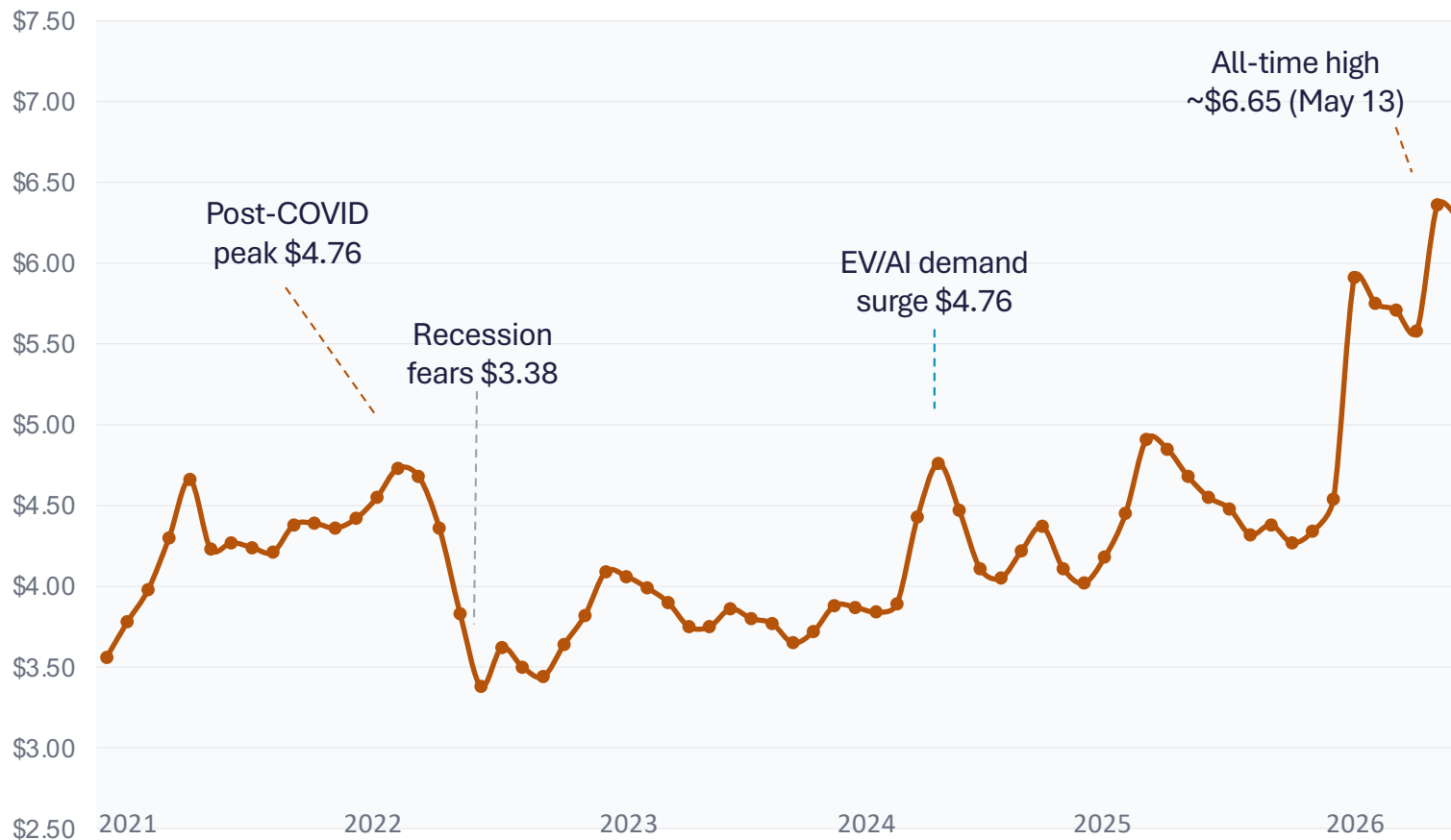
The International Energy Forum released a detailed study of copper mining and vehicle electrification.

	New copper production by 2050 (Mt / year)	New mines required by 2050	New mines per year
Baseline	16.3	35	1.1
Full EV by 2050	91.3	194	6.0

The report raises substantial doubt that this increase in copper production is achievable.

Global Copper Prices

USD per pound · COMEX spot price · Jan 2021 – Jun 2026



▲ +35% YoY

Capacity to supply the demand increase?

How much upward pricing pressure?

Source: COMEX / Trading Economics / Macrotrends · Monthly average closing prices

Critical Risks & Structural Bottlenecks

Transmission crisis

Severity
: Critical

DOE study implies 5,000 miles/yr of new HV lines needed. Only 900 miles built in 2024 — the 3rd slowest year in 15 years. New lines average 10 years to permit and build at \$1–4M/mile.

Transformer shortage

Severity
: High

Large power transformer lead times now run 2–4 years. 70% of the US grid is over 50 years old. Aging fleet increases failure risk and replacement costs simultaneously.

Nuclear cost uncertainty

Severity
: High

Vogtle 3+4 came in at ~\$35B for 2.2 GW (~\$16,000/kW as-built vs. \$7,800 EIA estimate). SMR economics at commercial scale remain unproven.

Renewables intermittency

Severity:
Medium

Solar and wind reaching 33%+ of generation requires massive battery storage expansion. Current interconnection queues are severely backlogged.

Data centre forecast uncertainty

Severity:
High

LBNL range for 2028: 325–580 TWh — a 255 TWh spread. AI efficiency breakthroughs or explosive model demand could shift the outcome dramatically.

Consumer cost impact

Severity:
Medium

Average US residential rates jumped 6.6% YoY as of mid-2025. CMU estimates data centres alone could add 8%+ to bills by 2030, exceeding 25% in high-demand markets.

Electricity Infrastructure Investment to Fully Electrify HD Trucks

Grid + chargers (vehicle powertrain excluded) · 4.0M trucks · deployed over 15–20 years

Grid infrastructure

~\$1.4T

Range: \$0.9T – \$1.9T

Generation, transmission,
substations, distribution

Charging stations

~\$400B

Range: \$305B – \$480B

264K MCS ports @\$890K
474K × 350 kW @\$335K
Average 5.4 trucks per charger

TOTAL electricity capex

~\$1.8T

Range: \$1.2T – \$2.3T

~\$85–115B per year
average over 20-year
deployment period

Per-truck allocation (infrastructure shared across 4M trucks)

\$350K

Grid infrastructure / truck
via utility rates

\$100K

Charger / truck (operator-borne)
depot capex

\$450K

TOTAL infrastructure / truck

Cost of Electricity at a 100-Truck Distribution Center

10

Megawatt charging ports

100 trucks ÷ 10 sharing ratio

10 MW

Peak demand

10 × 1 MW chargers simultaneous

12,600 MWh

Annual energy

100 × 63K mi × 2.0 kWh/mi

Sensitive to time
of charging

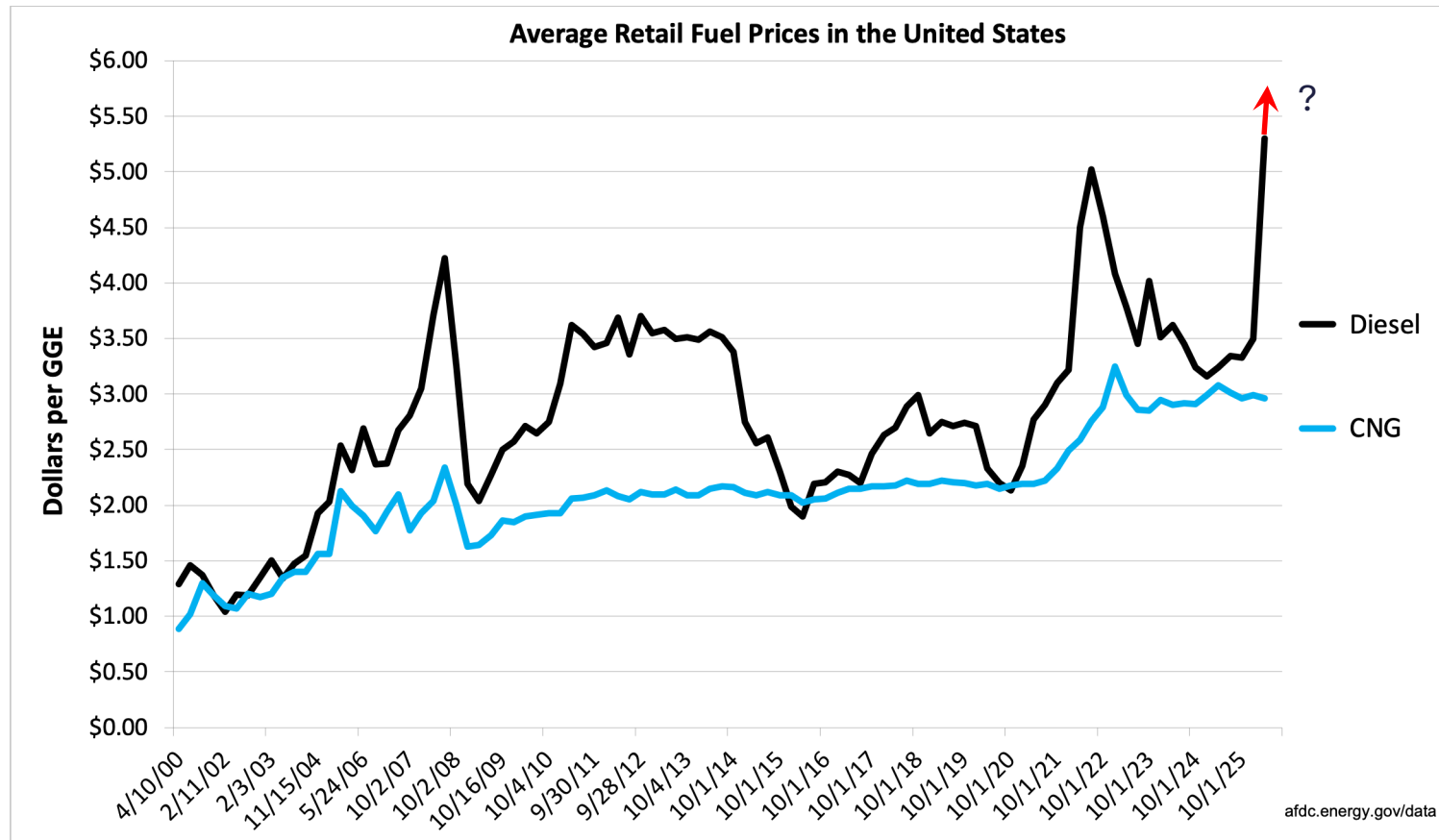
Cost layer	Annual cost	¢/kWh	% of total	
1. Commodity energy (industrial tariff)	\$1,260,000	10¢	24%	Large industrial customers get best commodity rate (~10¢/kWh avg 2025, EIA)
2. T&D delivery charges	\$504,000	4¢	10%	Wires, poles, transformers, metering — 3–6¢/kWh for large industrials
3. Demand charges	\$1,764,000	14¢	33%	10 MW × \$15/kW/month × 12 = \$1.8M/yr. One 15-min peak sets the whole month.
4. Dedicated substation amortisation	\$375,000	3¢	7%	\$15–20M substation over 20 yrs at 5% cost of capital, allocated to this site
5. MCS charger capital recovery	\$620,000	5¢	12%	10 ports × \$671K installed ÷ 10-yr life at 5% WACC, net of grants
6. Charger O&M, networking, insurance	\$250,000	2¢	5%	\$25K/port/yr MCS maintenance + network fees + cyber insurance
7. Grid upgrade pass-through (utility)	\$504,000	4¢	10%	HV line + transformer upgrade cost amortised through tariff over 20 years
Total all-in delivered cost	\$5,277,000/yr	42¢/kWh		Consistent with real-world fleet operator experience of 40¢+ for high-power charging

Sources: EIA Industrial Electricity Rates 2025 · Business Electricity Rates (ElectricChoice May 2026) · NASEO Demand Charges Report · Author calculations

Natural gas outlook



North America Natural Gas vs Diesel Fuel Prices

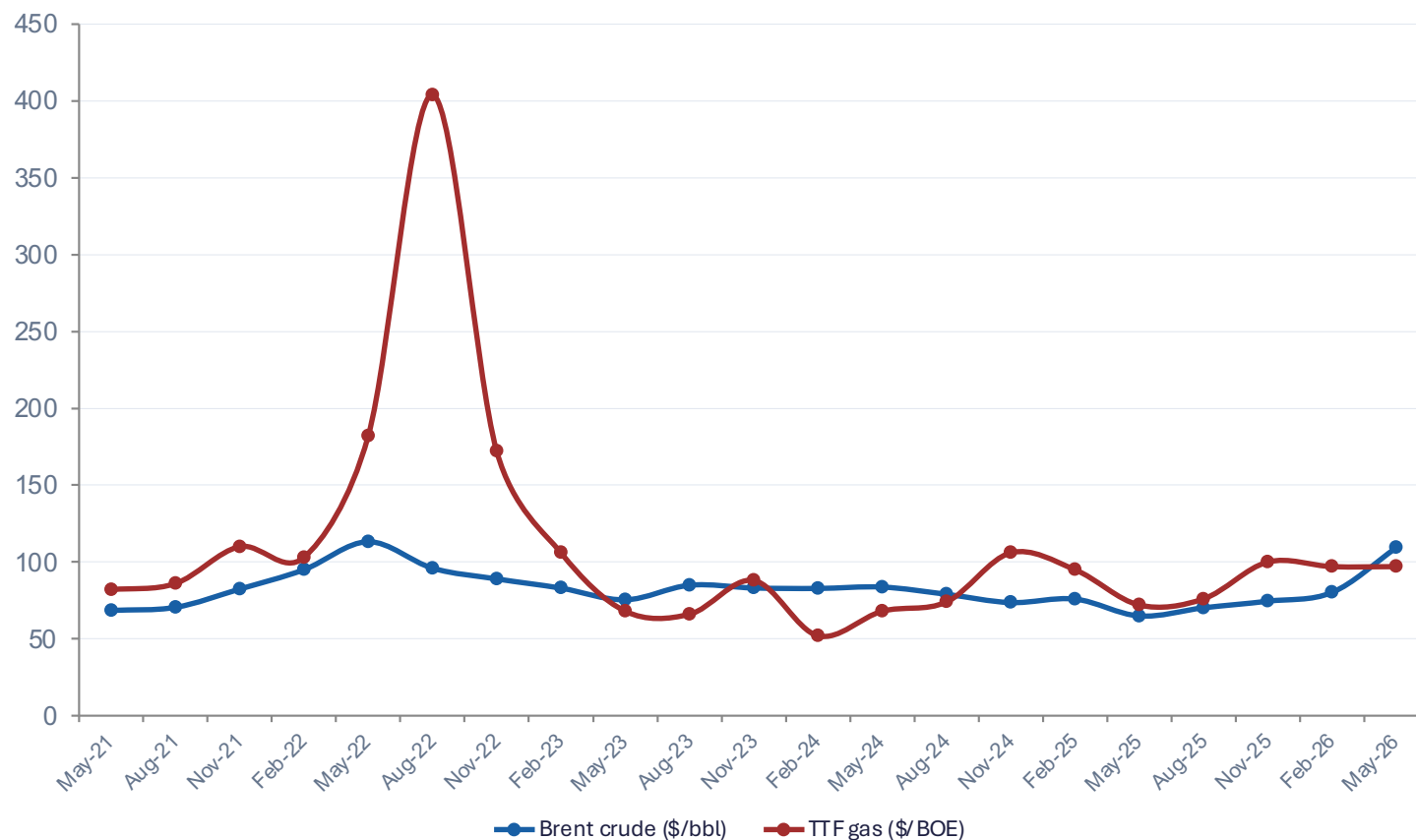


Consistent
stability
versus
persistent
instability

* Source: US DOE Alternative Fuel Datacenter, JDAA analysis

Europe – Brent crude vs TTF gas *\$ per barrel equivalent*

May 2021 – May 2026 · TTF (€/MWh) × 1.7 × EUR/USD



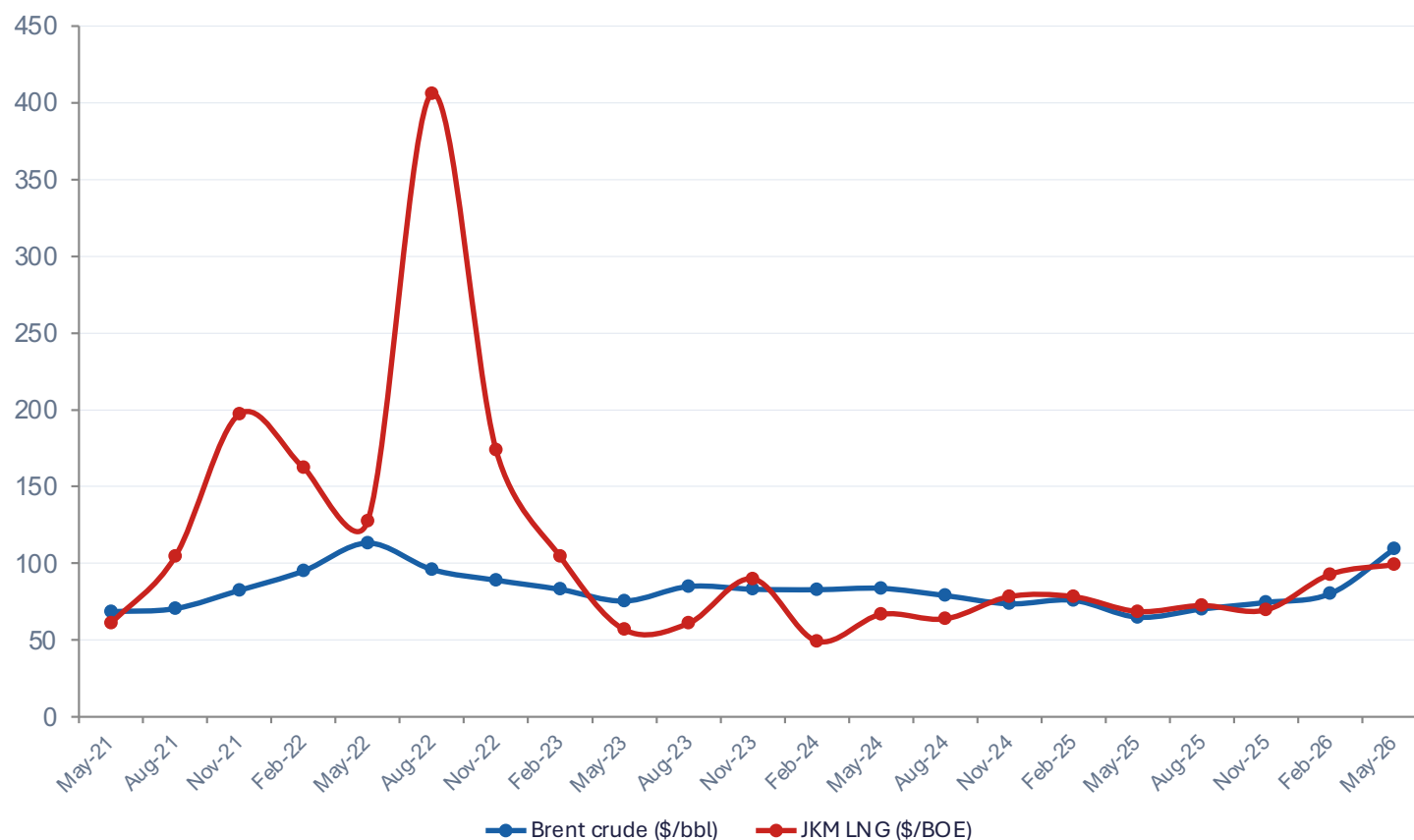
Sources: ICE TTF (Netherlands Title Transfer Facility), EIA Brent. EUR/USD approx. monthly rates applied.

- Natural gas and oil at cost parity, except for Ukraine war shock
- European market driven by **policy**
- EU decarbonization mandates remain in place and will drive demand for LNG and hydrogen trucks
 - 2025 -15% CO₂
 - 2030 -45%
 - 2035 -65%
 - 2040 -90%

China – Brent crude vs JKM Asian LNG

\$ per barrel equivalent

May 2021 – May 2026 · JKM \$/MMBtu × 5.8



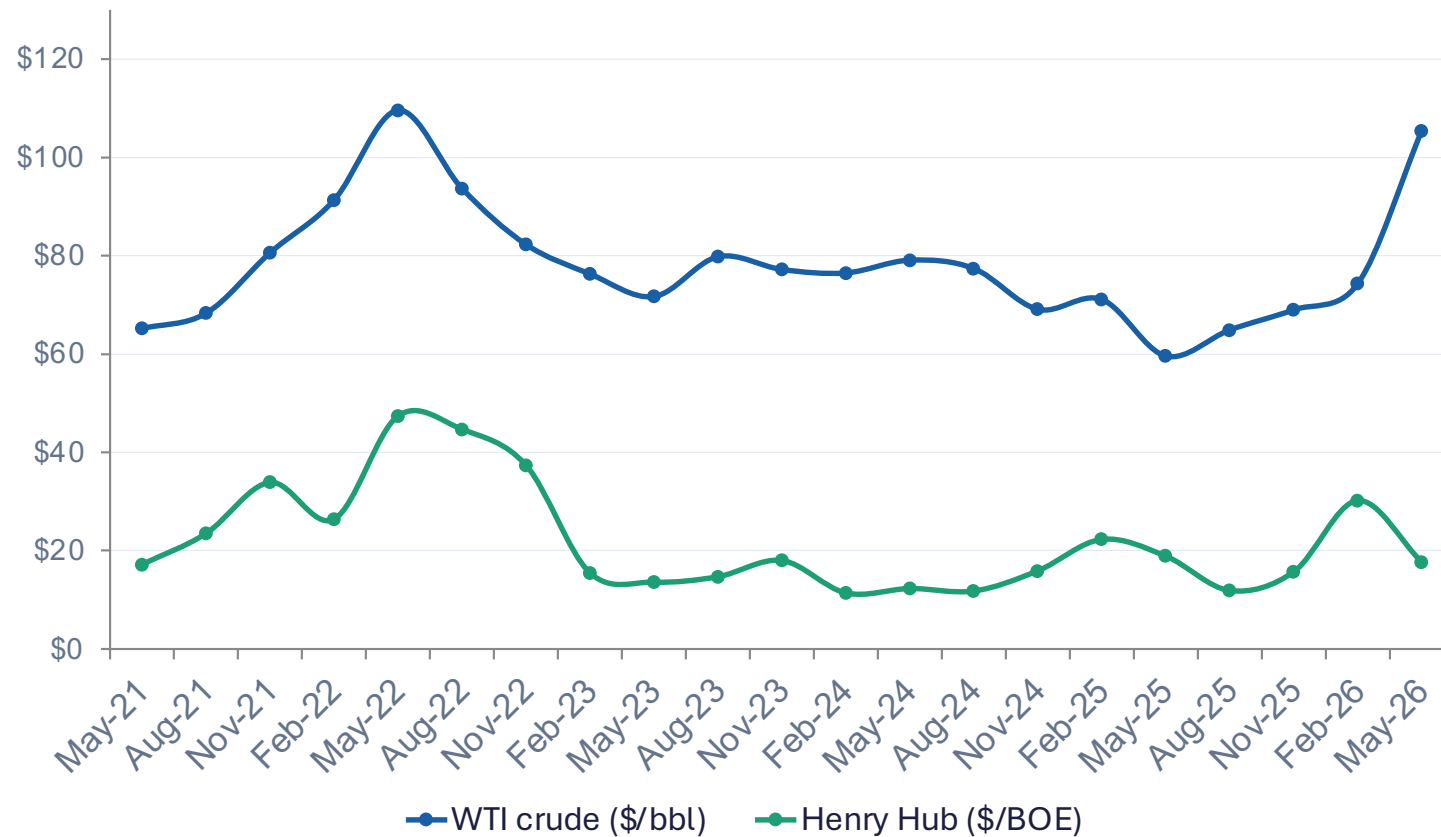
Note: JKM = Japan-Korea Marker (S&P Global Platts) — spot LNG price for delivery to Northeast Asia including China. Sources: Platts, EIA.

- China is also a policy-driven market with high focus on electrification
- Currently importing 40% of natural gas and 73% of oil. Strategic objective to eliminate energy imports
- Massive spending on solar and wind projects. 9X US spending on solar in 2025

US – WTI crude vs Henry Hub gas

\$ per barrel equivalent

May 2021 – May 2026 · Henry Hub × 5.8 MMBtu/barrel

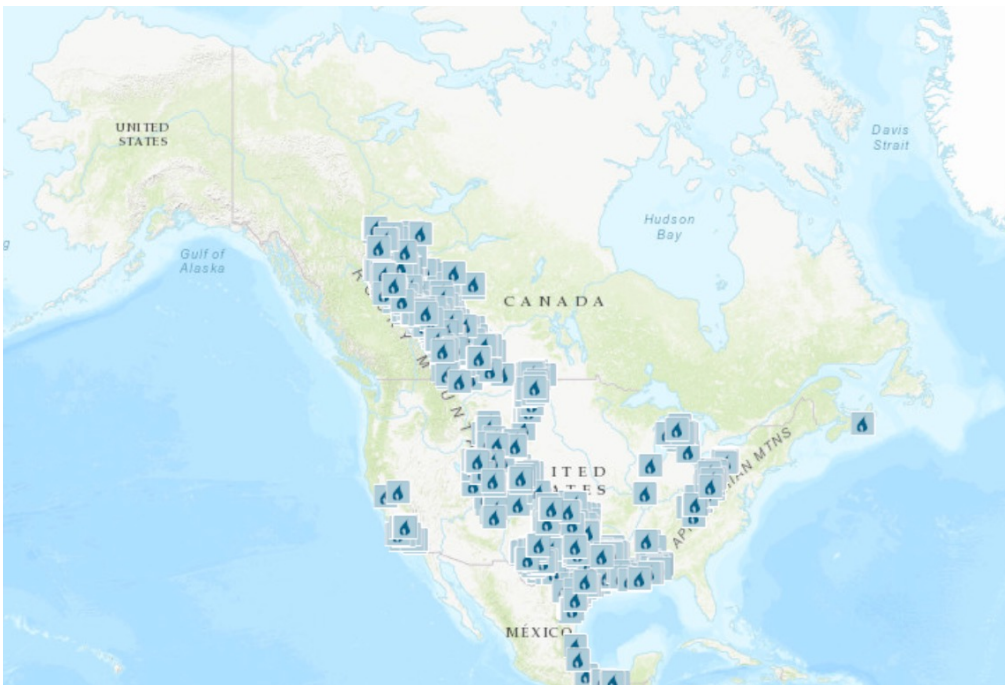


- US market driven by **economics**, not policy (at least for now)
- Long term structural advantage for natural gas due to massive reserves and low-cost transport via pipeline

Note: Henry Hub converted to \$/BOE (×5.8 MMBtu/barrel). Chart uses sampled monthly averages. Sources: EIA, FRED.

Oil prices reflect geopolitical events while natural gas prices are mostly isolated from those events

North America Natural Gas Processing Plants

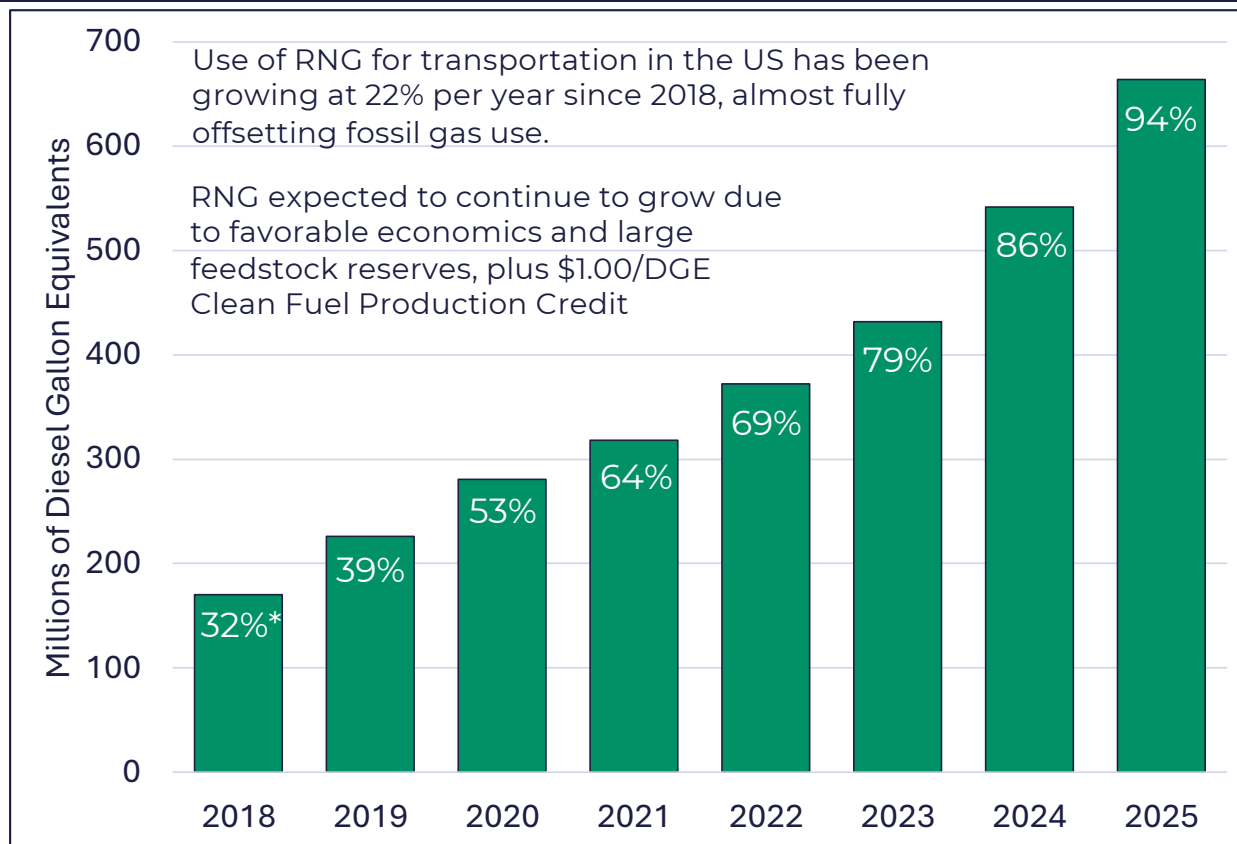


- North America natural gas production is **135 to 140** billion cubic feet per day ("bcf/d")
- This is **30% to 35%** of total global production
- Total LNG export capacity from North America is 15 to 18 bcf/d, or about **12%** of total gas production
- Over **80%** of natural gas production is constrained to the North American market, making it less affected by global events

Natural Gas = stable, available, clean and low cost fuel

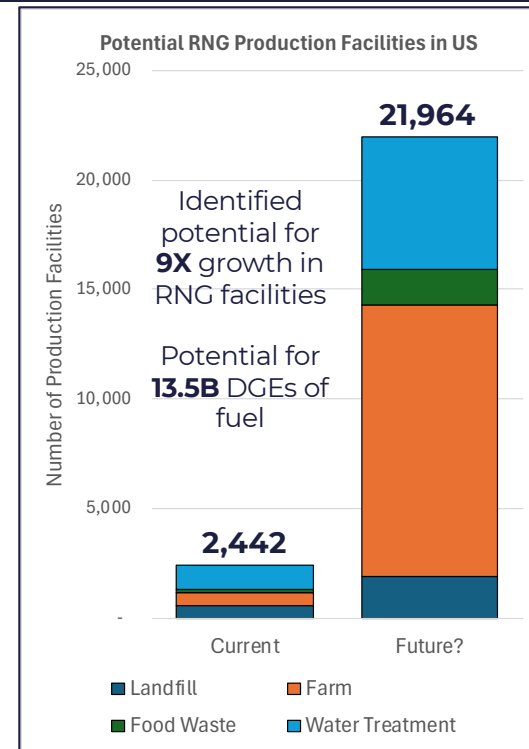
* Source: Natural Resources Canada, ChatGPT

Strong Growth of RNG in US HD Transportation



* Numbers are the percentage of total natural gas used in transportation

Sources: The Transport Project, The America Biogas Council

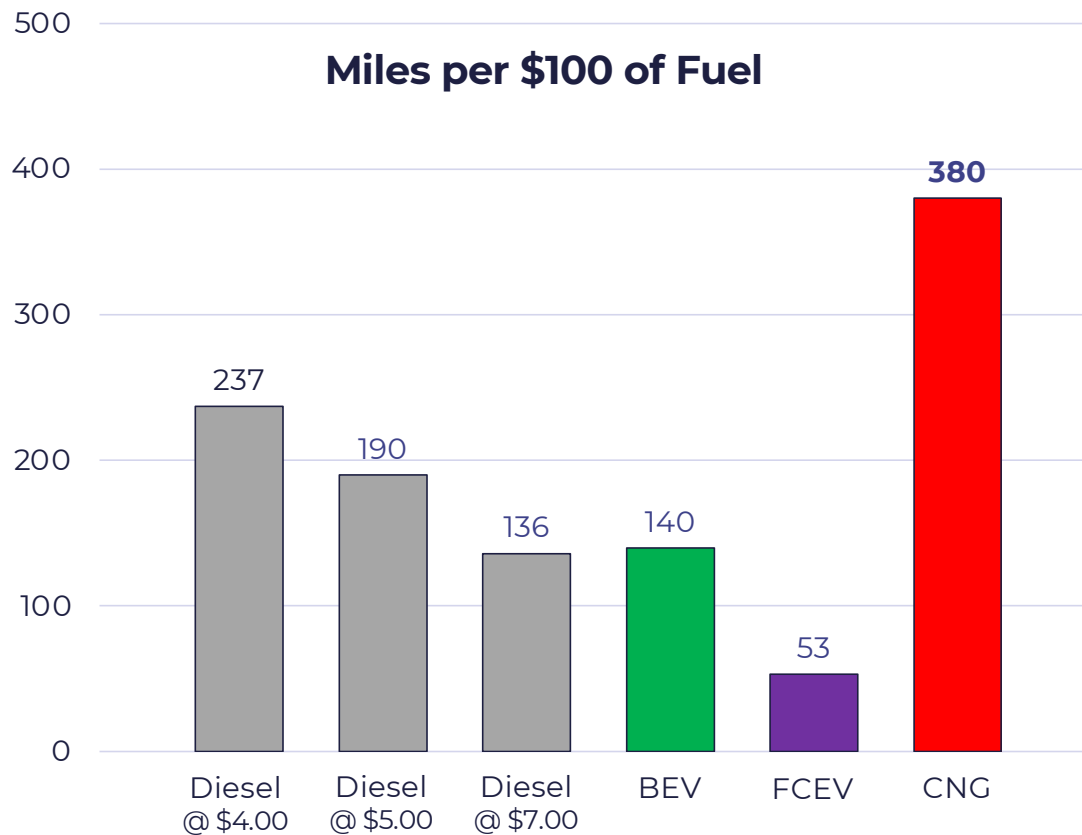


13.5 billion DGEs = **50%** of long + regional haul fleet consumption

Cost Comparison



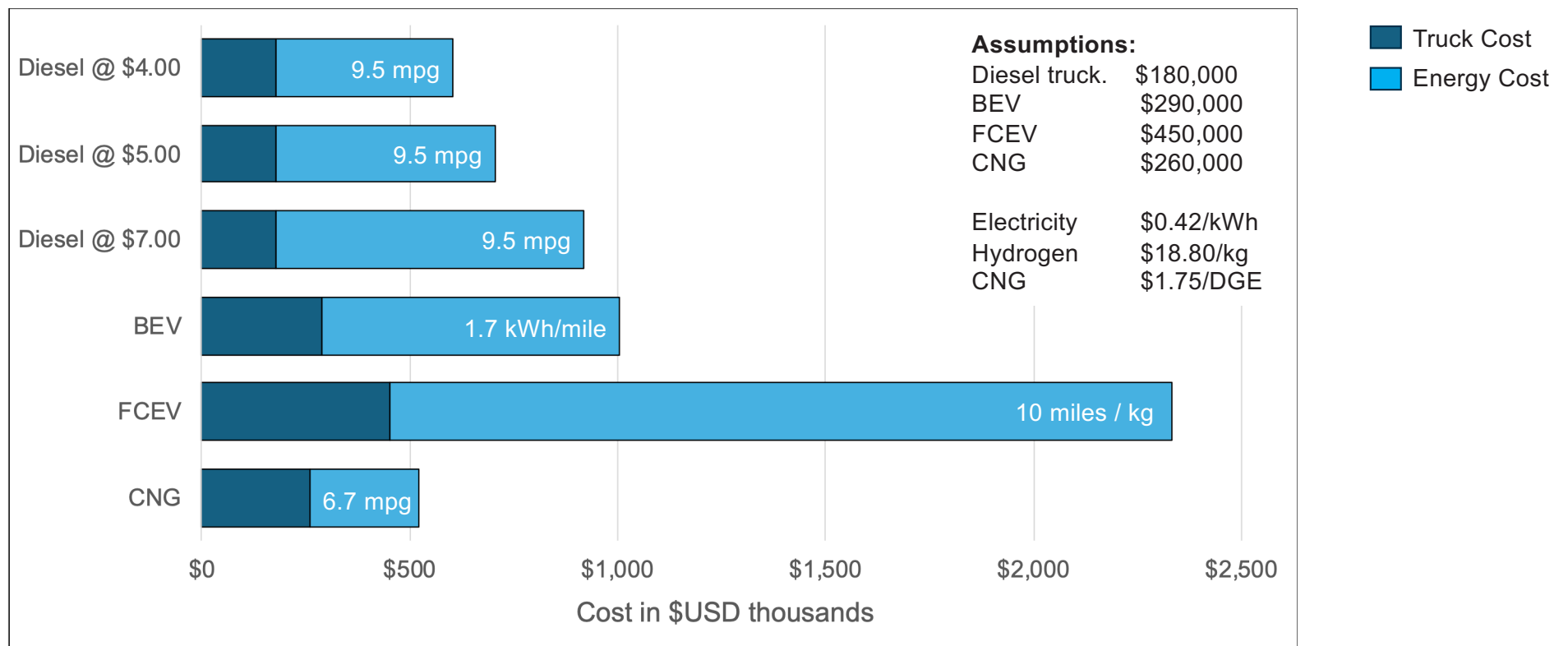
Energy Cost Comparison



	Energy Cost	Consumption	Cost per Mile
Diesel	\$4.00 / gal	9.5 MPG	\$0.42
Diesel	\$5.00 / gal	9.5 MPG	\$0.53
Diesel	\$7.00 / gal	9.5 MPG	\$0.74
BEV	\$0.42 / kWh	1.7 kWh / mile	\$0.71
FCEV	\$18.80 / kg	10 miles / kg	\$1.88
CNG	\$1.75 / DGE	6.7 MPGe	\$0.26

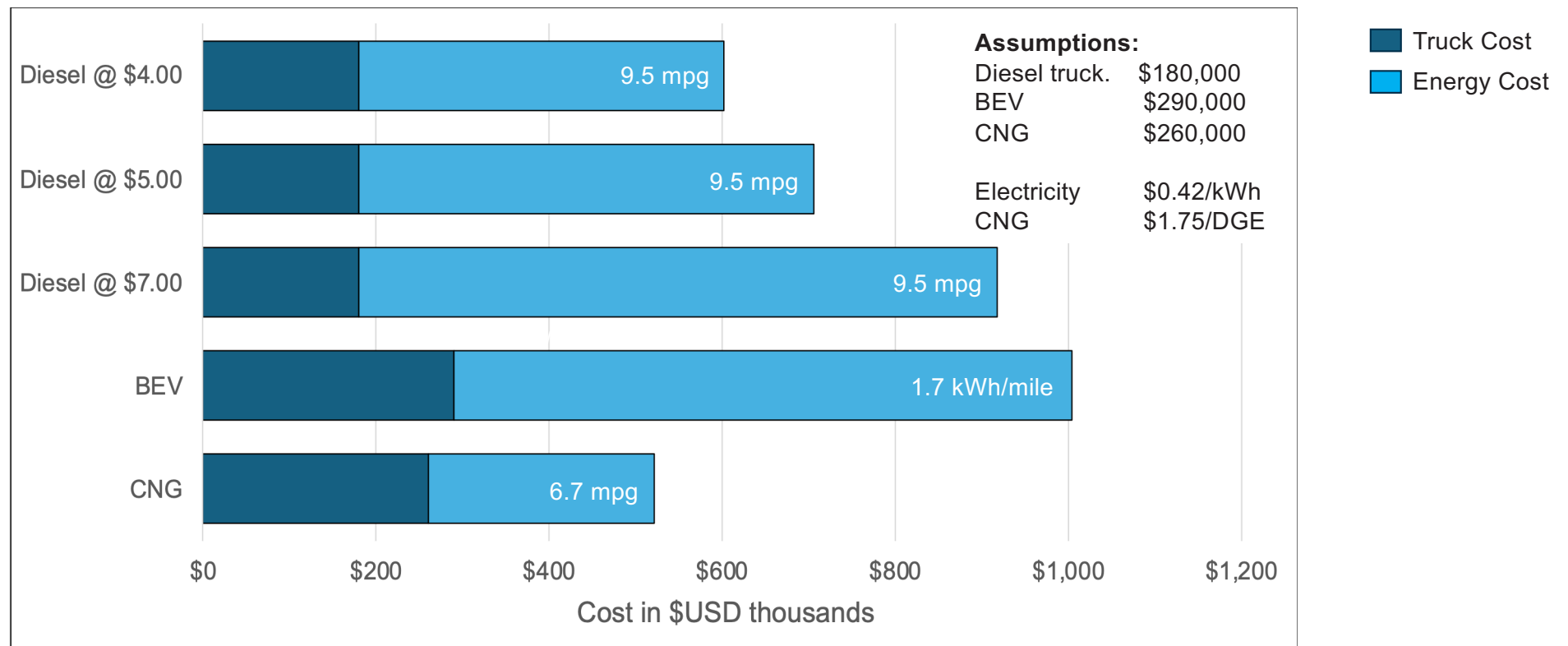
The Bottom Line: Cost

Truck Cost plus Energy Cost for 1 Million Miles - US

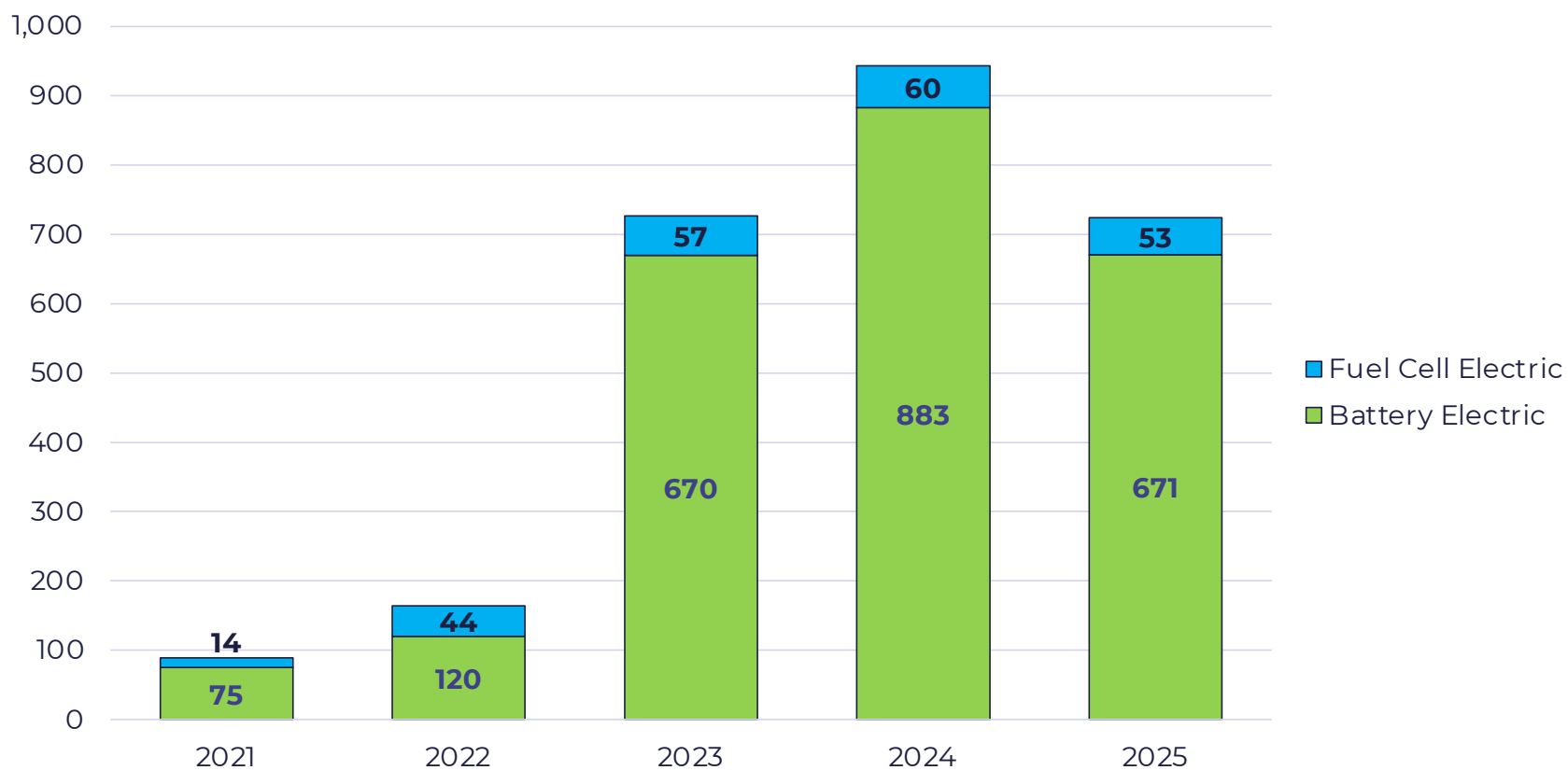


The Bottom Line: Cost

Truck Cost plus Energy Cost for 1 Million Miles - US



US Electric Truck Volumes



* Source: TRC State of Sustainable Fleets

Evolution of HD Natural Gas Engines in North America



2007
WESTPORT
GX HPDI



2010
CUMMINS
WESTPORT
ISL-G



2013
CUMMINS
WESTPORT
ISX12G



2018
CUMMINS
WESTPORT
ISX12N



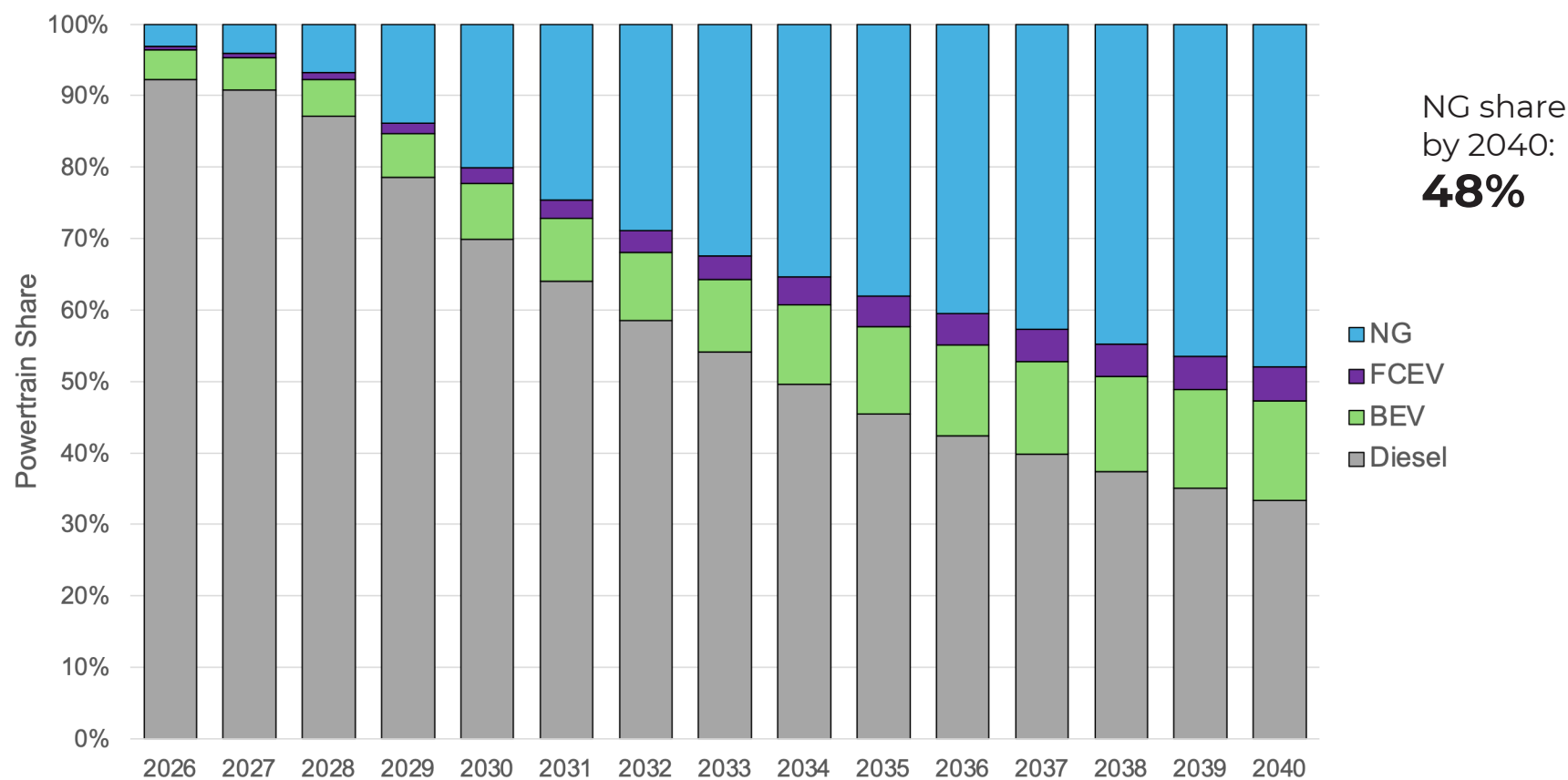
2024
CUMMINS
X15N

	2007 WESTPORT GX HPDI	2010 CUMMINS WESTPORT ISL-G	2013 CUMMINS WESTPORT ISX12G	2018 CUMMINS WESTPORT ISX12N	2024 CUMMINS X15N
Horsepower	●	●	●	●	●
Torque	●	●	●	●	●
Efficiency	●	●	●	●	●
Reliability	●	●	●	●	●
Fuel choice*	●	●	●	●	●

* Choice of CNG or LNG

North America Class 8 Powertrain Share Outlook

AI Version

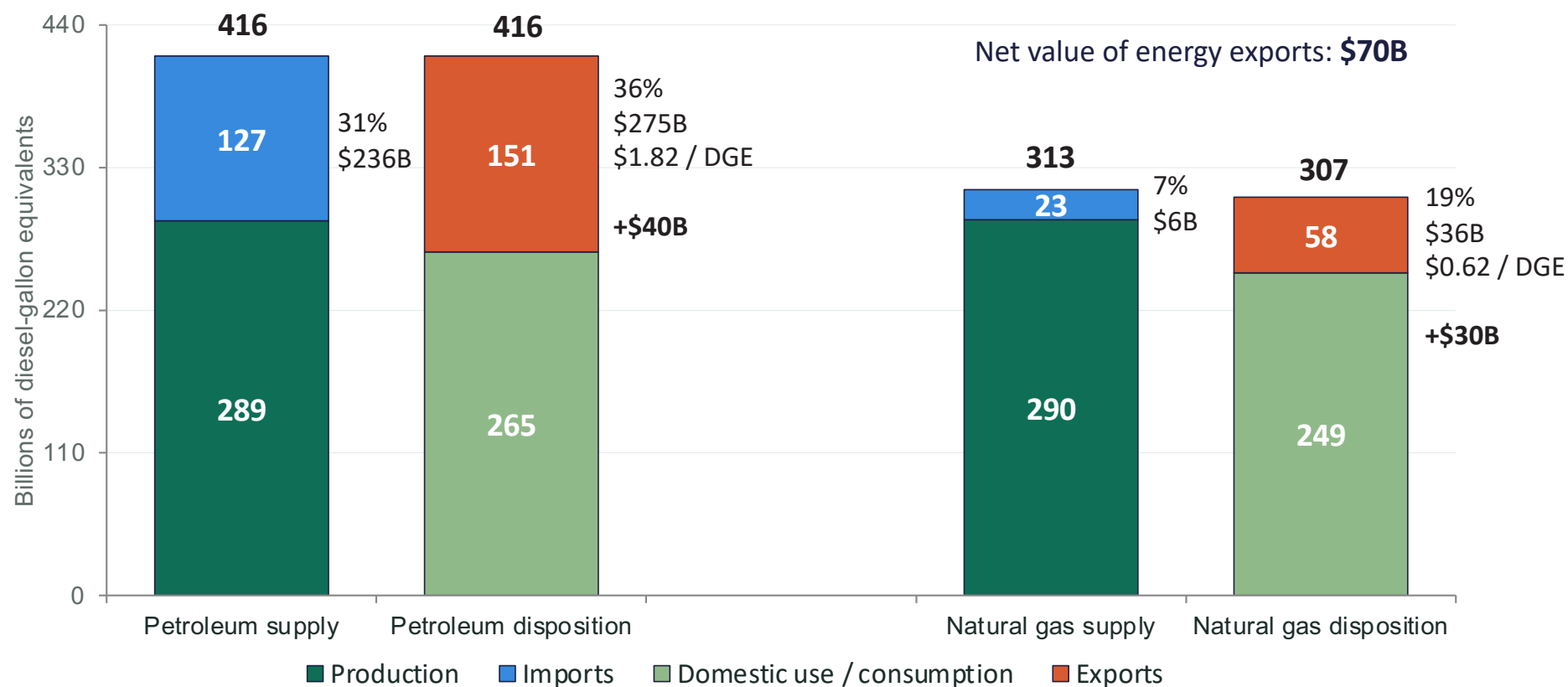


* Source: Powertrain projections by ChatGPT, MS Copilot, Claude AI. Plots are the average of the results each year

A new proposal for energy policy

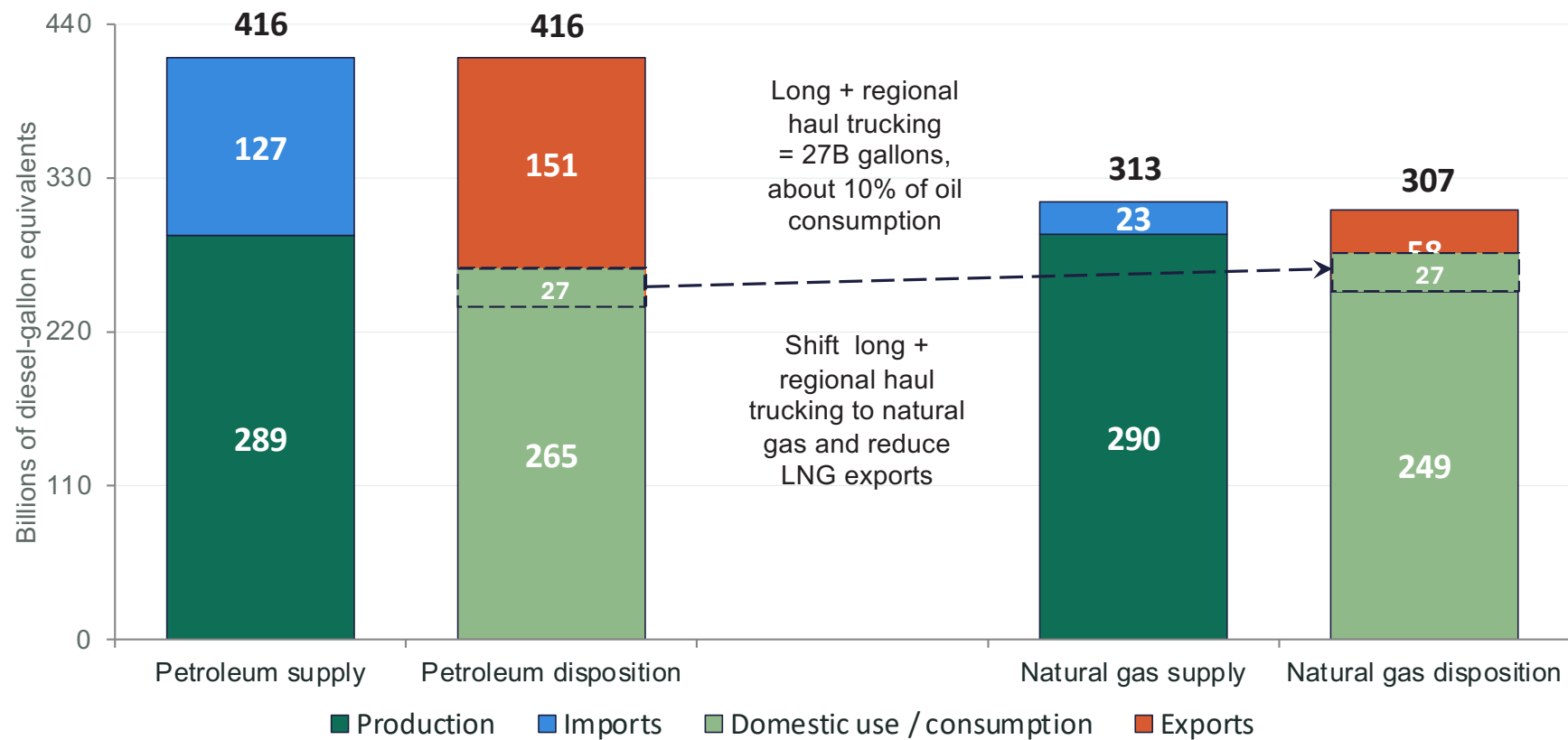


Energy Flows in Diesel Gallon Equivalents 2024



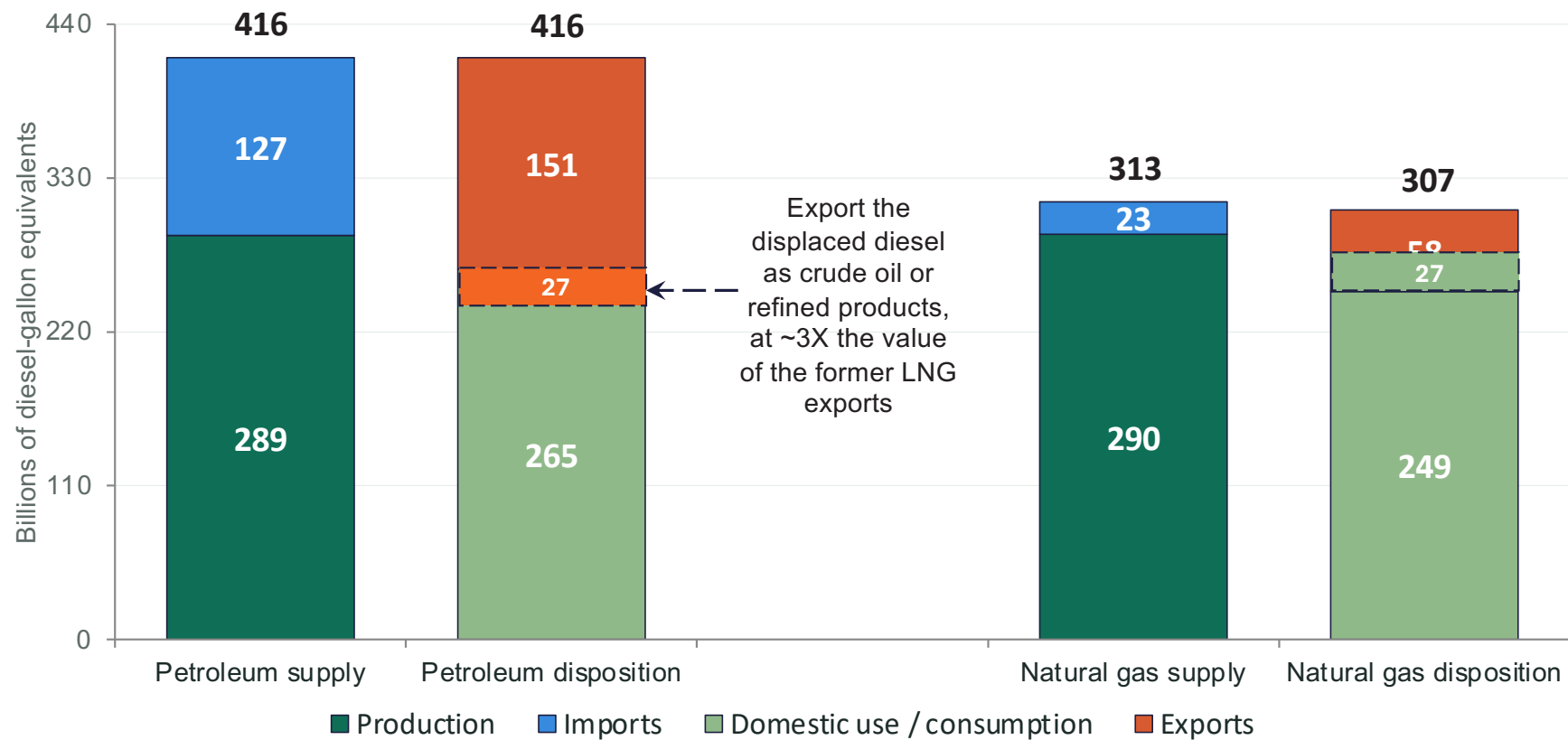
Petroleum = crude oil + natural gas liquids + biofuels + refined products (primary-energy basis). 1 quadrillion BTU $\approx$ 7.3 billion DGE.

Energy Flows in Diesel Gallon Equivalents *Future*



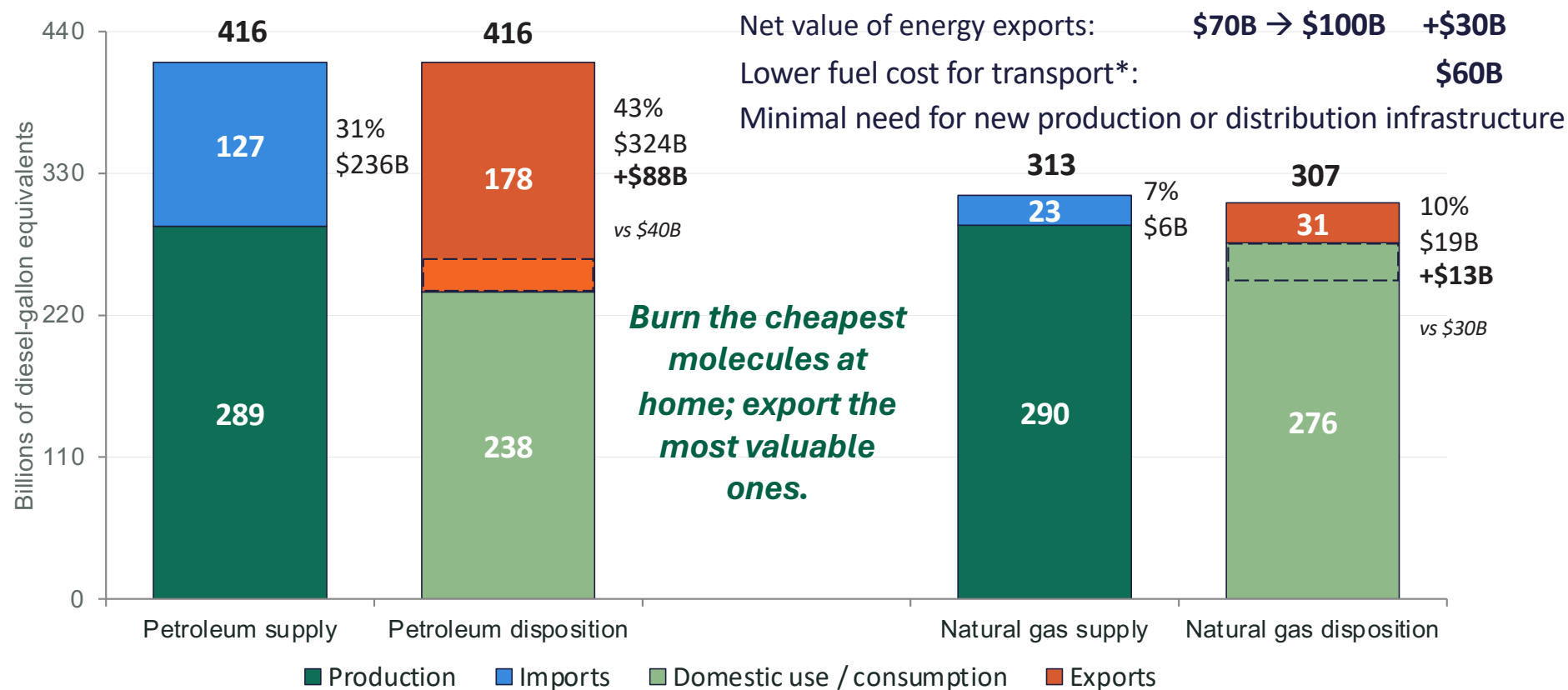
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Energy Flows in Diesel Gallon Equivalents *Future*



Petroleum = crude oil + natural gas liquids + biofuels + refined products (primary-energy basis). 1 quadrillion BTU $\approx$ 7.3 billion DGE.

Energy Flows in Diesel Gallon Equivalents 2024



* CNG at \$1.75/DGE vs diesel at \$4.00/gallon x 27B gallons

Summary

- 1. AI and autonomous trucks will transform the trucking industry**
 - Will increase focus on the truck “technology plus energy” combination
- 2. Electrifying long + regional haul trucks continues to be economically challenged**
 - Battery electric trucks are improving, but the problem is the energy
 - \$1.8 trillion infrastructure investment equals \$450,000 per truck
 - \$0.42/kWh real world cost of megawatt charging equivalent to \$7.00/gal diesel
 - Competing against insatiable demand from other electricity uses
- 3. Shifting long + regional haul trucks to natural gas is in the national interest**
 - Increase energy export revenue by \$30B per year
 - Reduce the cost of domestic truck fuel by \$60B per year
 - Fuel station investment is small: 4,000 CNG stations at \$4M = \$16B = \$5,300/truck*
 - Dramatic CO2 emissions reduction through continuing growth of RNG

* Assumes 3 million long haul and regional haul trucks in service

Summary Conclusions

Mike Zimmerman, Vice Chair