

EMISSION Process Update

presented to
2026 Fall Planning Conference

presented by
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Think  Forward

MOVES Emissions Analysis

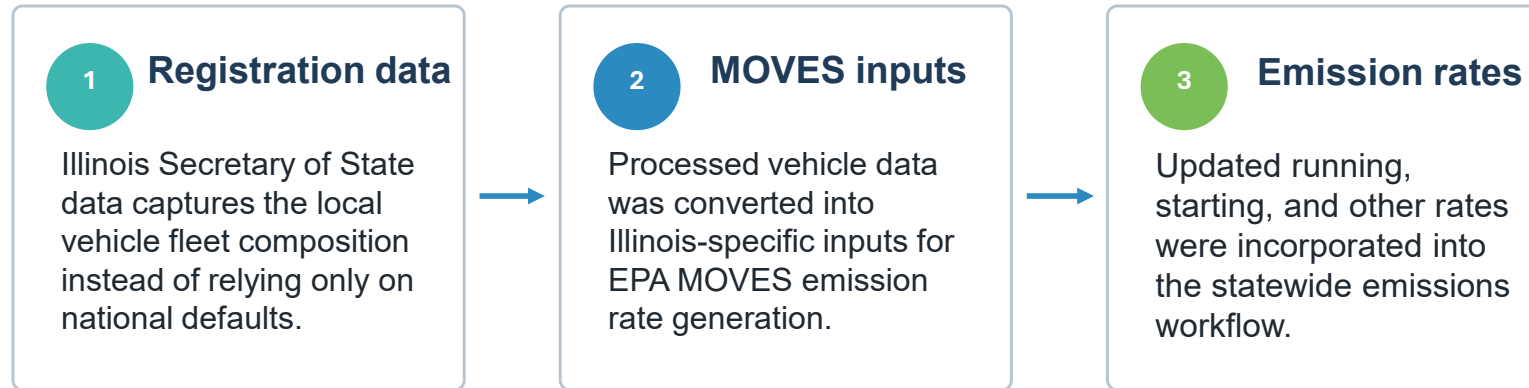
Updating statewide model emission rates with Illinois vehicle registration data

Why this update matters

MOVES can use national defaults, but Illinois-specific inputs better represent the local on-road fleet. Vehicle registration data from the Illinois Secretary of State was processed into MOVES-ready inputs so emission rates reflect the fleet operating in Illinois.

Result

More reliable emissions estimates for air quality analysis, emissions inventories, and project-level screening in the Illinois Data-Driven Decisions Tool.



Application in the Data-Driven Decisions Tool

The updated rates support evaluation of emissions impacts from a statewide program of roadway capacity expansion projects.

MOVES Emission Categories

➤ Time Span:

- » Year: 2025 & 2045
- » Day of Week: Weekday
- » Month: October
- » Hours: 4 Time Periods

➤ Geographic Bounds

- » County

➤ Onroad Vehicles:

- » Passenger Car
- » Passenger Truck
- » Single Long-Haul Truck
- » Single Short-Haul Truck
- » Comb. Long-Haul Truck
- » Comb. Short-Haul Truck

➤ Pollutants and Processes

- » Volatile Organic Compounds (VOC)
- » Carbon Monoxide (CO)
- » Oxides of Nitrogen (NOx)
- » Primary Exhaust Particulate Matter 2.5
- » CO2 Equivalent

➤ Road Type:

- » Off-Network
- » Rural Restricted Access
- » Rural Unrestricted Access
- » Urban Restricted Access
- » Urban Unrestricted Access

MOVES Emission Process Inputs

- **Age, vehicle source type and fuel type distribution:** from Vehicle registration data
- Road Type and Vehicle type VMT: Countywide VMT from ILSTDm
- Vehicle VMT Fractions: Use FHWA's DANA (Database for Air Quality and Noise Analysis) Tool for the month/day/hour distribution
- Meteorology – Generated by IDOT from the “meteostat” package
- Inspection, Fuel, & Speed: Exported from MOVES and Re-Imported

The screenshot displays the 'MOVES4.0.2 - County Data Manager' window. At the top, there are several tabs with green checkmarks: 'Hotelling', 'Idle', 'I/M Programs', 'Retrofit Data', 'Generic', and 'Tools'. Below these, there are more tabs: 'Road Type Distribution', 'Source Type Population', 'Starts', and 'Vehicle Type VMT'. The 'Database' tab is currently selected, showing a 'RunSpec Summary' button and a 'Database' dropdown menu. Below the dropdown, there are fields for 'Server' (set to 'localhost') and 'Database' (set to 'd7_25_in'). To the right of these fields are buttons for 'Refresh', 'Create Database', and 'Clear All Imported Data'. A 'Log:' label is also present at the bottom left of the window.

Vehicle Registration Data Processing

- IDOT requested vehicle registration data from the Secretary of State's office
- VIN records: large txt file, each line for a car, reports vehicle age, model, build and fuel type information. Owner county and zipcode are also available.
- Performed initial QA/QC and used the 2024 data for the base year (2025) MOVES inputs update
- Processed full VIN data at the county level for all the years for: age, fuel, vehicle type distribution for each county within the state

Registration Data Based Tables

➤ SourceType file:

- » yearID — calendar year
- » county
- » sourceTypeID — MOVES vehicle/source type
- » sourceTypePopulation

➤ SourceTypeAgeDistribution file:

- » sourceTypeID — MOVES vehicle/source type
- » yearID — calendar year
- » ageID — vehicle age (0–40)
- » ageFraction — fraction of that source type's fleet at that age

Comparison - SourceType

➤ SourceType file:

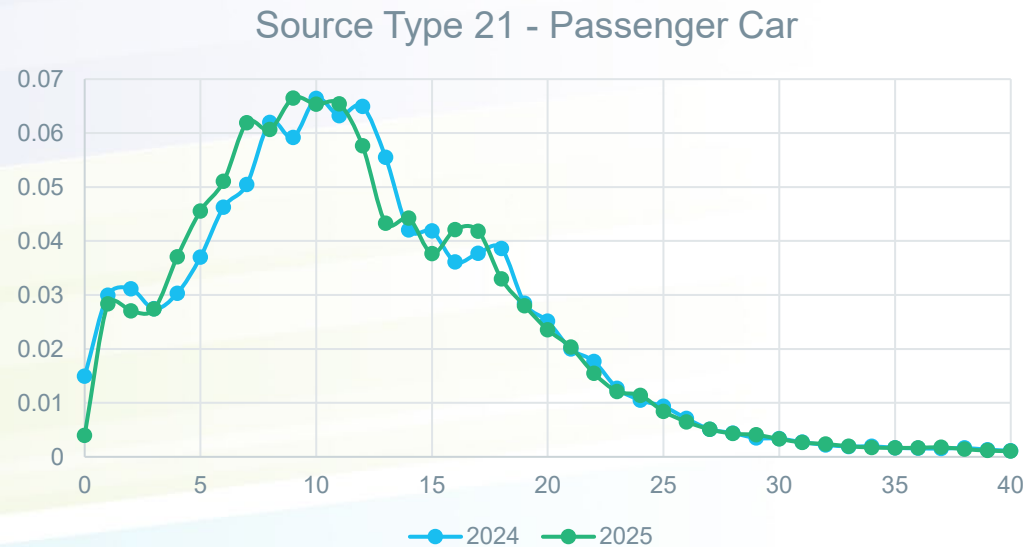
- » yearID — calendar year
- » county
- » sourceTypeID — MOVES vehicle/source type
- » sourceTypePopulation

CMAQ Processed				CS Processed			
yearID	county	sourceTypeID	sourceTypePopulation	yearID	county	sourceTypeID	sourceTypePopulation
2025	CHAMPAIGN	11	3,711	2024	CHAMPAIGN	11	3,572
2025	CHAMPAIGN	21	49,237	2024	CHAMPAIGN	21	45,814
2025	CHAMPAIGN	31	66,866	2024	CHAMPAIGN	31	58,136
2025	CHAMPAIGN	32	20,797	2024	CHAMPAIGN	32	19,102
2025	CHAMPAIGN	41	0	2024	CHAMPAIGN	41	0
2025	CHAMPAIGN	42	288	2024	CHAMPAIGN	42	249
2025	CHAMPAIGN	43	220	2024	CHAMPAIGN	43	198
2025	CHAMPAIGN	51	1	2024	CHAMPAIGN	51	1
2025	CHAMPAIGN	52	3,727	2024	CHAMPAIGN	52	3,123
2025	CHAMPAIGN	53	60	2024	CHAMPAIGN	53	58
2025	CHAMPAIGN	54	116	2024	CHAMPAIGN	54	132
2025	CHAMPAIGN	61	557	2024	CHAMPAIGN	61	521
2025	CHAMPAIGN	62	1,331	2024	CHAMPAIGN	62	1,222

Comparison - SourceTypeAgeDistribution

➤ SourceTypeAgeDistribution file:

- » sourceTypeID — MOVES vehicle/source type
- » yearID — calendar year
- » ageID — vehicle age (0–40)
- » ageFraction — fraction of that source type's fleet at that age



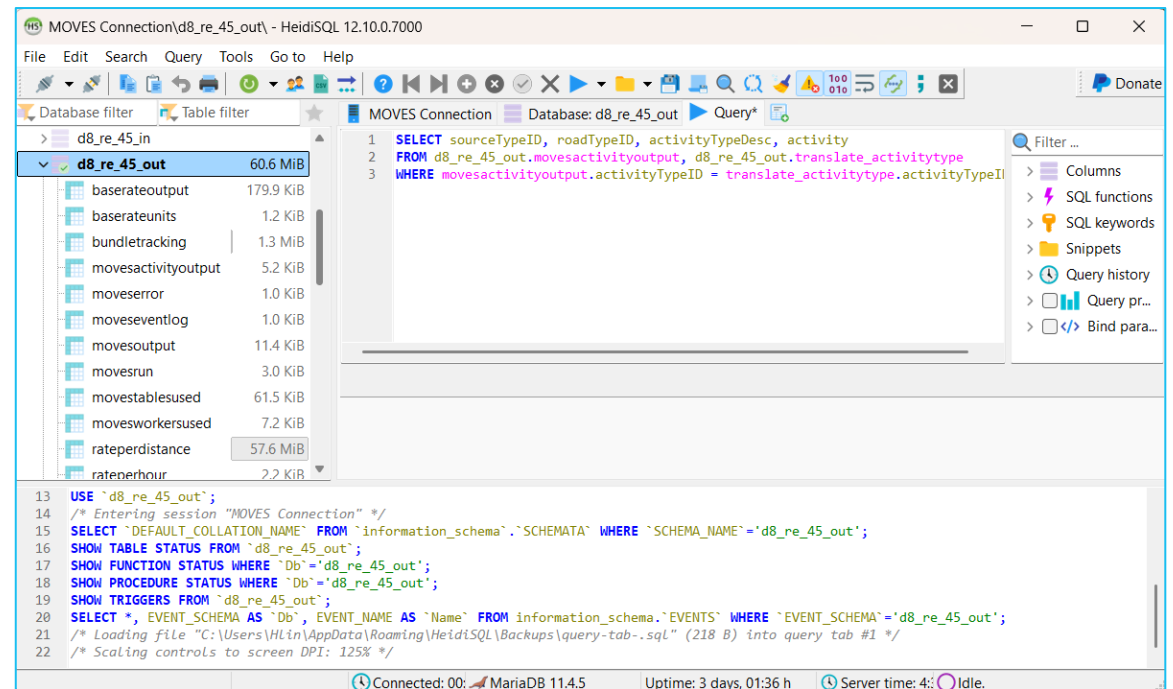
yearID	county	sourceTypeID	ageID	ageFraction
2024	COOK	11	0	0.001825659
2024	COOK	11	1	0.037047965
2024	COOK	11	2	0.06059712
2024	COOK	11	3	0.04766998
2024	COOK	11	4	0.037804046
2024	COOK	11	5	0.037343021
2024	COOK	11	6	0.037988456
2024	COOK	11	7	0.034835045
2024	COOK	11	8	0.039002711
2024	COOK	11	9	0.041768861
2024	COOK	11	10	0.041455364
2024	COOK	11	11	0.03640253
2024	COOK	11	12	0.035517362
2024	COOK	11	13	0.023752005
2024	COOK	11	14	0.019879396
2024	COOK	11	15	0.041916389
2024	COOK	11	16	0.044239954
2024	COOK	11	17	0.050141074
2024	COOK	11	18	0.045973408
2024	COOK	11	19	0.040865252
2024	COOK	11	20	0.033175355
2024	COOK	11	21	0.039408413
2024	COOK	11	22	0.029690007
2024	COOK	11	23	0.025559223
2024	COOK	11	24	0.019363048
2024	COOK	11	25	0.017131687
2024	COOK	11	26	0.011912885

MOVES Model Run Processing

- CMAP and CS rates indicate consistent processing of VIN data
- Repeated process to create updated SourceType, SourceTypeAgeDistribution files for other Counties
- Other input data was generated by IDOT
 - » Road Type & Vehicle Type - ILSTDM County Wide VMT
 - » Vehicle VMT Fractions - FHWA's DANA (Database for Air Quality and Noise Analysis) Tool for the month/day/hour distribution
 - » Meteorology - Generated by IDOT from the "meteostat" package
- Inspection, Fuel, & Speed: Exported from MOVES and Re-Imported

MOVES outputs post-processing in SQL

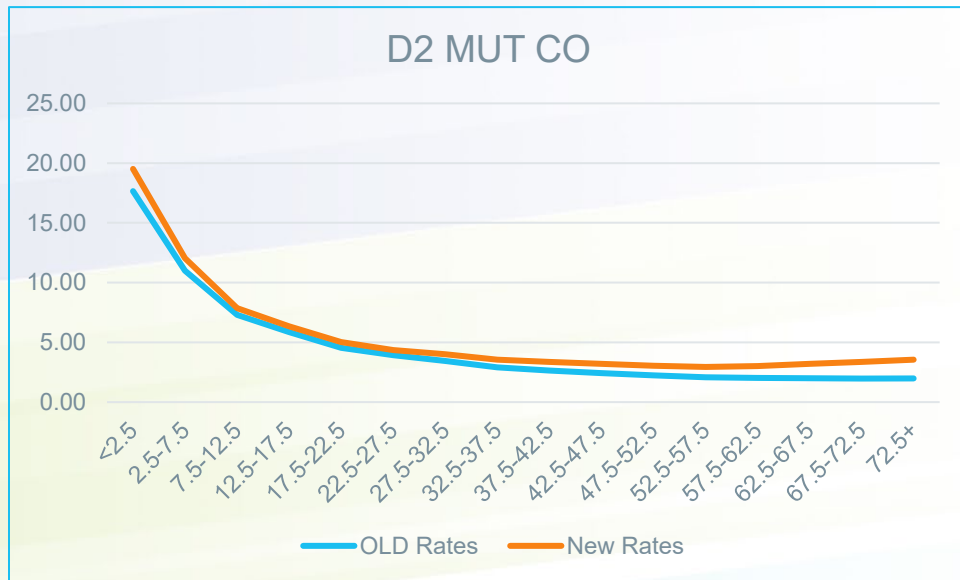
- Post processed the MOVES outputs for ILSTDMD
- ILSTDMD Calculates
 - » Intrazonal Based Emissions – Running Rates
 - » Link Based Emissions - Running Rates
 - » Starts Rates – Starts Rates



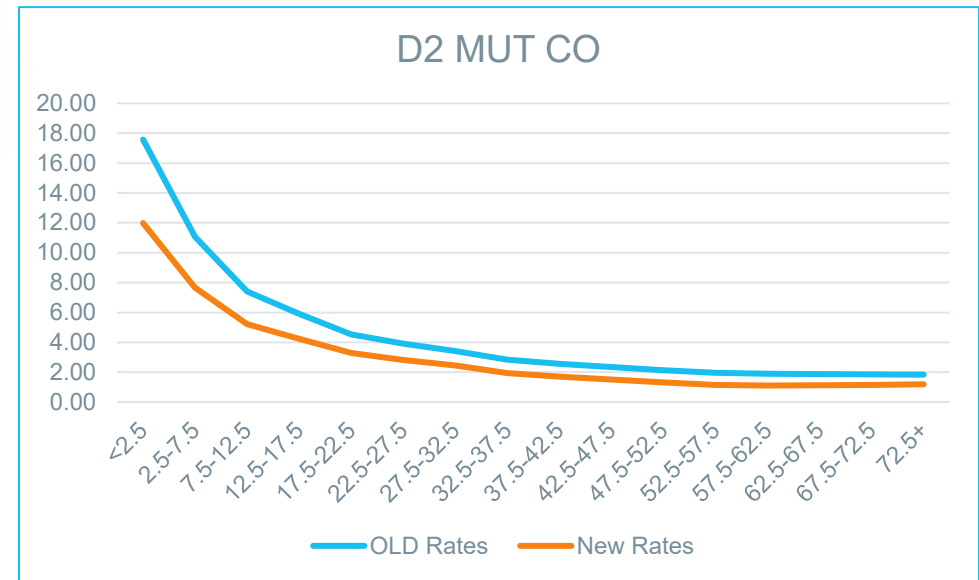
MOVES Running Emission Rates

- Rates were generated for 2025 and 2045
 - » 2 Years, 5 Pollutants, 4 Roadway Types, 3 Vehicle Classes, 4 Times of Day, 16 Speed bins results in 7,680 rates by County

2025 Multi-Unit Trucks CO



2045 Multi-Unit Trucks CO



MOVES Starts Emission Rates

➤ Rates were Generated for 2025 and 2045

» 2 Years, 5 Pollutants, 3 Vehicle Classes, 4 Times of Day = 120 Rates by County

2025

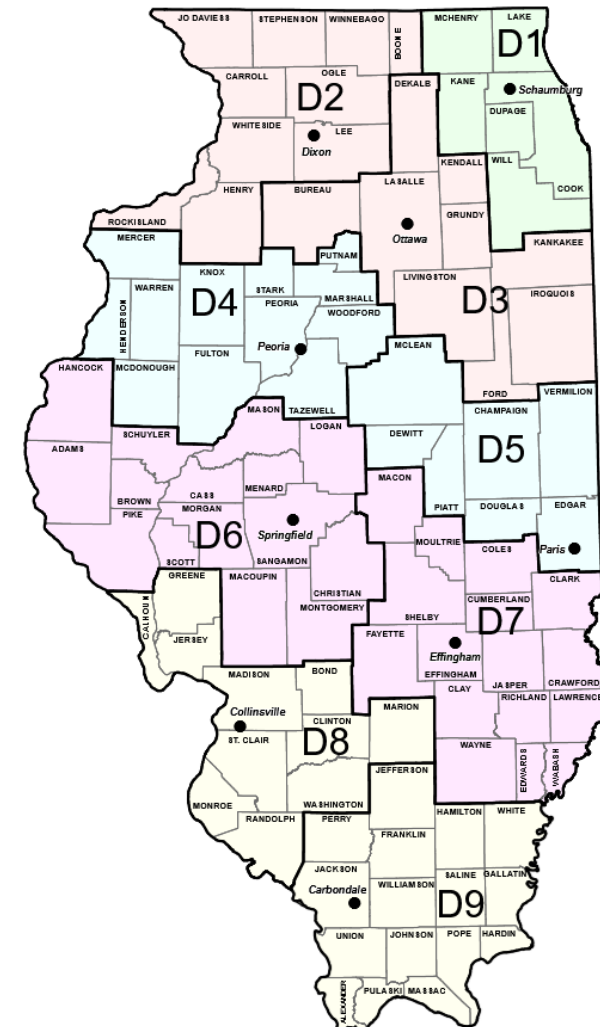
Period		OLD Rates				New Rates			
		AM	MD	PM	OP	AM	MD	PM	OP
Auto	CO	8.26	4.29	4.50	6.93	9.12	6.56	5.59	5.54
Auto	CO2 Equivalent	195.12	97.20	102.57	142.17	201.65	122.98	109.68	112.75
Auto	NOx	0.28	0.22	0.24	0.33	0.49	0.49	0.46	0.44
Auto	PM2.5 Total Exh	0.02	0.01	0.01	0.02	0.03	0.02	0.01	0.02
Auto	VOC	0.60	0.29	0.31	0.53	0.77	0.59	0.44	0.45
SUT	CO	2.63	0.87	0.81	6.07	3.60	1.24	1.25	10.63
SUT	CO2 Equivalent	66.61	20.06	19.55	153.07	67.63	24.13	24.39	186.61
SUT	NOx	0.72	0.22	0.20	1.58	0.67	0.27	0.31	1.82
SUT	PM2.5 Total Exh	0.01	0.00	0.00	0.02	0.01	0.01	0.00	0.02
SUT	VOC	0.39	0.17	0.17	0.65	0.45	0.26	0.18	0.96
MUT	CO	1.23	0.54	0.39	0.38	3.01	2.19	1.96	2.30
MUT	CO2 Equivalent	92.73	42.18	33.50	41.69	137.90	104.61	81.44	96.26
MUT	NOx	1.25	0.52	0.38	0.38	1.71	1.20	1.09	1.23
MUT	PM2.5 Total Exh	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
MUT	VOC	0.34	0.16	0.16	0.29	0.45	0.42	0.23	0.29

2045

Period		OLD Rates				New Rates			
		AM	MD	PM	OP	AM	MD	PM	OP
Auto	CO	5.14	2.43	2.56	4.36	3.54	2.61	1.85	1.93
Auto	CO2 Equivalent	184.30	91.32	96.40	133.89	112.28	69.15	61.71	63.91
Auto	NOx	0.19	0.14	0.15	0.23	0.25	0.25	0.22	0.21
Auto	PM2.5 Total Exh	0.02	0.01	0.01	0.02	0.03	0.02	0.01	0.01
Auto	VOC	0.41	0.17	0.19	0.36	0.39	0.31	0.21	0.22
SUT	CO	1.73	0.54	0.50	4.00	2.32	0.81	0.79	6.72
SUT	CO2 Equivalent	64.81	19.15	18.64	149.50	57.89	20.31	19.44	157.10
SUT	NOx	0.70	0.19	0.18	1.55	0.46	0.20	0.21	1.19
SUT	PM2.5 Total Exh	0.01	0.00	0.00	0.02	0.02	0.01	0.01	0.03
SUT	VOC	0.37	0.16	0.16	0.60	0.39	0.23	0.16	0.86
MUT	CO	1.08	0.44	0.31	0.29	0.94	0.45	0.37	0.43
MUT	CO2 Equivalent	92.51	42.45	33.88	42.05	94.66	56.11	38.19	53.05
MUT	NOx	1.32	0.55	0.40	0.40	0.76	0.41	0.33	0.42
MUT	PM2.5 Total Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MUT	VOC	0.33	0.16	0.16	0.28	0.33	0.31	0.16	0.20

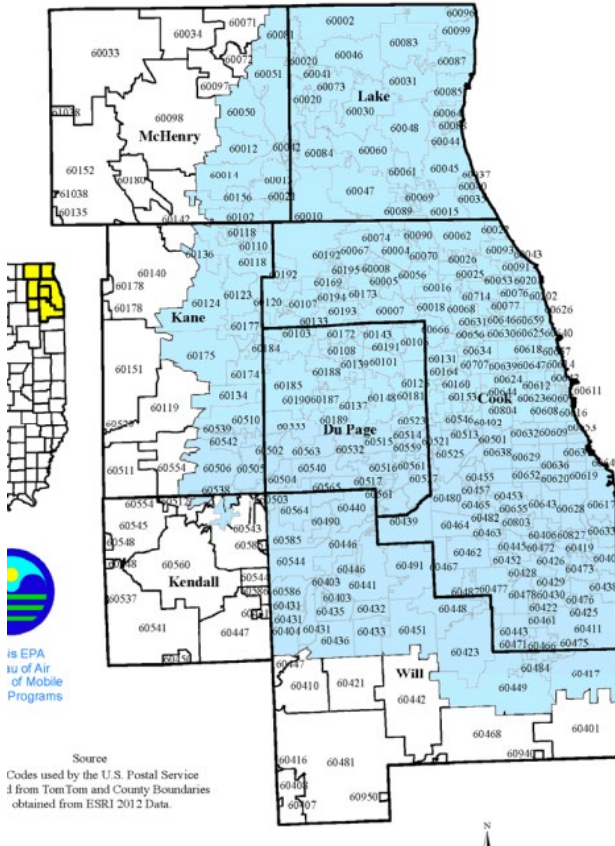
Data Emission Categories - Counties

- D1 – Inspection Area vs. Non-Inspection Area
- D8 – Urban and Rural Rate
 - » St. Claire County – Urban
 - » Jersey County – Rural
- D2-D7 & D9 one county per district
 - » D2: Winnebago, D3: La Salle, D4 Peoria
 - » D5: Champaign, D6: Sangamon,
 - » D7 Fayette, and D9: Williamson



CMAQ Refinement

Chicago Inspection and Maintenance Areas



Original workflow

Traffic activity → aggregate to county → county rate → county emissions

VMT for running emissions
OD trips for start emissions
Intrazonal activity for local road emissions

Limitation of Original workflow

Some CMAQ counties contain both I/M and Non-I/M areas with different emission rates. The original county-level method could not capture different emission rates within the same county.

Enhanced workflow

TAZ was added as an intermediate calculation layer to account for discrepancy of I/M and Non-I/M areas within the same county

Traffic activity → TAZ activity → TAZ-specific rate → TAZ emissions → aggregate to county

VMT for running emissions
OD trips for start emissions
Intrazonal activity for local road emissions

Blue Area - Inspection/Maintenance (I/M)

White Area - Non-I/M

The final output remains county-level, with an additional post-processing improvement for a more direct and user-friendly output format.

Updating the ILSTDM Post-Processor and Reporting Outputs

- The DDD Tool reports the 2045 emissions per mile
- Differences in emissions are estimated for the project county and ranked relative to the other project differences

Project	Description	County	New Lane Miles	TC	Grams Per Day Per Mile					Project Rankings					Weighted Rank	Criteria Score
					CO	CO2E ¹	NO _x	PM _{2.5}	VOC	CO	CO2E	NO _x	PM _{2.5}	VOC		
1	I-39 I-88 to Blackhawk Rd	Ogle, Winnebago	43.71		2,221	646	299	2	48	25	24	27	23	25	26	0.11
4	I-57 I-72 to I-74	Champaign	3.71		2,938	496	139	(6)	38	26	21	25	5	23	24	0.18
23	US 20 W of Randal Rd to Coombs Rd	Kane	4.26	1	(355)	822	132	(12)	(60)	1	25	24	3	1	16	0.46
25	US 34 S of Kirkwood to E of US 34 67 at Monmouth	Warren	12.48		1	1	0	0	(0)	9	4	11	17	10	5	0.86
29	US 67 part of Jerseyville Bypass and existing	Jersey	13.42		58	24	(15)	(4)	(7)	14	10	5	7	6	6	0.82
M1	US 6 I-55 Houbolt Rd	Will	5.14	1	1,364	1,598	(82)	(16)	(8)	24	28	1	1	4	21	0.29
M2	143rd St Will Cook Rd Wolf Rd	Cook, Will	1.98		9,107	2,839	681	(9)	222	29	29	29	4	28	27	0.07
M3	143rd St Wolf Rd Southwest Hwy	Cook, Will	3.99		3,406	883	312	27	225	27	26	28	27	29	28	0.04
M4	D1 IL 176 Herkey Rd to IL 43	Lake	2.74		934	549	117	18	66	22	22	22	26	26	25	0.14
M5	D1 IL 19 Irving Park Rd	DuPage	1.13	1	(15)	349	(42)	82	(23)	7	19	4	29	2	15	0.50
M6	D1 IL 31 Edgewood Dr to Long Meadow Pkwy	Kane, McHenry	2.18	0.5	(39)	596	107	(0)	17	4	23	21	15	21	22	0.25

Example Output used for the DDD project evaluation

➤ Ranked 1-29 by Grams per Mile

MULTIYEAR PROJECT LIST RANKING FOR THE DATA-DRIVEN DECISION TOOL

Project	Description	County	New Lane Miles	TC	Grams Per Day Per Mile					Project Rankings					Weighted Rank	Criteria Score
					CO	CO2E ¹	NOx	PM _{2.5}	VOC	CO	CO2E ¹	NOx	PM _{2.5}	VOC		
1	I-39 I-88 to Blackhawk Rd	Ogle, Winnebago	43.71		2,221	646	299	2	48	25	24	27	23	25	26	0.11
4	I-57 I-72 to I-74	Champaign	3.71		2,938	496	139	(6)	38	26	21	25	5	23	24	0.18
23	US 20 W of Randal Rd to Coombs Rd	Kane	4.26	1	(355)	822	132	(12)	(60)	1	25	24	3	1	16	0.46
25	US 34 S of Kirkwood to E of US 34 67 at Monmouth	Warren	12.48		1	1	0	0	(0)	9	4	11	17	10	5	0.86
29	US 67 part of Jerseyville Bypass and existing	Jersey	13.42		58	24	(15)	(4)	(7)	14	10	5	7	6	6	0.82
M1	US 6 I-55 Houbolt Rd	Will	5.14	1	1,364	1,598	(82)	(16)	(8)	24	28	1	1	4	21	0.29
M2	143rd St Will Cook Rd Wolf Rd	Cook, Will	1.98		9,107	2,839	681	(9)	222	29	29	29	4	28	27	0.07
M3	143rd St Wolf Rd Southwest Hwy	Cook, Will	3.99		3,406	883	312	27	225	27	26	28	27	29	28	0.04
M4	D1 IL 176 Herkey Rd to IL 43	Lake	2.74		934	549	117	18	66	22	22	22	26	26	25	0.14
M5	D1 IL 19 Irving Park Rd	DuPage	1.13	1	(15)	349	(42)	82	(23)	7	19	4	29	2	15	0.50
M6	D1 IL 31 Edgewood Dr to Long Meadow Pkwy	Kane, McHenry	2.18	0.5	(39)	596	107	(0)	17	4	23	21	15	21	22	0.25
M7	D1 IL 31 Long Meadow Pkwy to Alison St	Kane, McHenry	5.09	0.5	3,574	1,439	219	40	209	28	27	26	28	27	29	0.00
M8	D1 IL 47 Burlington Rd to ILL 64	Kane	7.14		44	149	27	15	44	12	15	19	25	24	20	0.32
M9	D1 IL 47 IL 38 to Green Rd	Kane	10.41		57	49	7	(1)	(4)	13	12	15	13	7	10	0.68
M11	D1 IL 47 Plank Rd to Burlington Rd	Kane	9.69		1,305	461	125	(2)	25	23	20	23	9	22	23	0.21
M12	D1 IL 64 Burlington Rd to Randal Rd	Kane	7.04	0.5	(38)	(5)	(3)	(2)	(12)	5	3	9	8	3	2	0.96
M15	D7 I-70 Effingham County	Effingham	14.75		(12)	(12)	(7)	(0)	(1)	8	2	7	16	9	3	0.93
M16	D8 IL 140 from IL 111 to Moreland Rd	Madison	3.20		565	272	(65)	(13)	3	21	18	3	2	12	14	0.54
M17	D9 IL 146 extension	Alexander, Pulaski, Union	32.57		291	147	(11)	(4)	7	17	14	6	6	17	12	0.61
M19	D9 IL 169 Extension	Massac	12.40		383	132	13	1	13	19	13	17	22	19	16	0.46
M20	D1 US 30 US 34 to IL 59	Will, Kendall	17.00		(18)	15	46	6	4	6	8	20	24	14	10	0.68
M22	D9 US 45 Texas City to IL 141	Saline, Gallatin, White	5.98		43	4	0	0	4	11	5	12	20	13	7	0.79
D3.1	Interstate 80 between Seneca and Morris	Grundy	13.10		(48)	10	(6)	(0)	(1)	3	6	8	14	8	4	0.89
D3.2	I-80 between Co Hwy 56 and IL-351	La Salle	6.11		(234)	(165)	(82)	(1)	(7)	2	1	2	12	5	1	1.00
D4	US-24 Banner to Kingston Mines	Peoria, Fulton	8.89		364	154	18	(1)	8	18	16	18	11	18	16	0.46
D8.2	IL-3 Waterloo to Redbud	Monroe	8.41		475	171	10	(1)	14	20	17	16	10	20	19	0.36
D9.1	IL-13/127 Pinckneyville Airport to 0.6 miles N. of Cuddeppa Road	Perry	4.67		35	16	(0)	0	2	10	9	10	19	11	8	0.75
D9.2	IL-13/127 Murphysboro to Vergennes	Jackson	4.56		70	12	6	0	6	15	7	14	21	16	9	0.71
D9.3	I-24 Bridge	Massac	4.58		99	28	3	0	4	16	11	13	18	15	13	0.57

¹ CO2E is measured in thousands.

Multiyear Project List—Emissions Analysis Ranking



I-39 - I-88 TO BLACKHAWK RD.—DISTRICT #2

Project
1

County	Length	Criteria Score	Rank
Ogle, Winnebago	43.7	0.11	26

Change in Grams Per Day Per Mile

CO	CO2E ¹	NOx	PM _{2.5}	VOC
2,221	646	299	2	48

¹ CO2E is measured in thousands.

Emissions Ranking

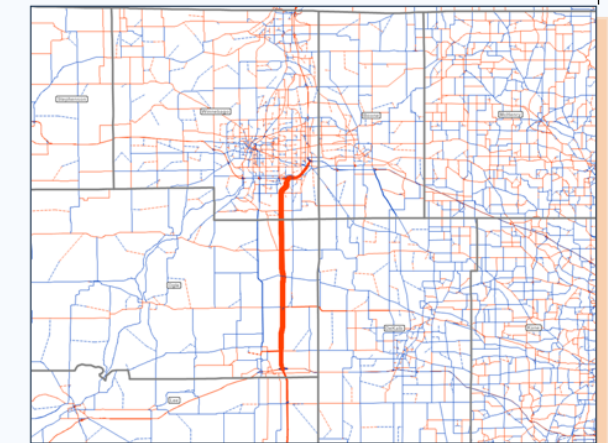
CO	CO2E	NOx	PM _{2.5}	VOC
25	24	27	23	25

Description

This project widens Interstate 39 between Blackhawk Road and Interstate 88 in Ogle and Winnebago Counties. The improvement expands I-39 from two lanes in each direction to three lanes in each direction, adding more than 43 new lane miles to improve traffic flow, capacity, and safety along the corridor.

Findings

The widening of Interstate 39 is expected to increase travel speeds to approximately 70 MPH and attract more than 45,000 new daily vehicle miles traveled (VMT). This substantial increase in VMT is anticipated to generate a corresponding increase in vehicle emissions, resulting in the project ranking less favorably with respect to emission impacts.



	Base	Build	Diff	%Diff
Project Counties VMT				
Auto	14,512,900	14,545,900	33,000	0.2%
Single-Unit	705,900	707,300	1,400	0.2%
Multi-Unit	1,201,200	1,206,200	5,000	0.4%
Total	16,420,000	16,459,400	39,400	0.2%
Project VMT				
Auto	722,800	761,100	38,300	5.3%
Single-Unit	46,400	48,000	1,600	3.4%
Multi-Unit	353,100	358,400	5,300	1.5%
Total	1,122,300	1,167,500	45,200	4.0%
Speed Difference				
Project Counties	40.47	40.48	0.0138	0.03%
Project	67.37	70.24	2.8699	4.26%

Multiyear Project List—Emissions Analysis Ranking

➤ Questions?

MOVES Emission Categories

Years

Select Year: Add

Years: 2025

Remove

Days

☐ Weekend

☒ Weekdays

Select All (Alt+3) Clear All



Onroad Vehicles

Source Use Types:

- Compressed Natural Gas (CNG)
- Light Fuel
- Electricity
- not (E-85)
- Gasoline

Selections:

- Combination Long-haul Truck - Compressed Natural Gas (CNG)
- Combination Long-haul Truck - Diesel Fuel
- Combination Long-haul Truck - Electricity
- Combination Short-haul Truck - Compressed Natural Gas (CNG)
- Combination Short-haul Truck - Diesel Fuel
- Combination Short-haul Truck - Electricity
- Combination Short-haul Truck - Gasoline
- Passenger Car - Diesel Fuel
- Passenger Car - Electricity
- Passenger Car - Ethanol (E-85)
- Passenger Car - Gasoline
- Passenger Truck - Diesel Fuel
- Passenger Truck - Electricity
- Passenger Truck - Ethanol (E-85)
- Passenger Truck - Gasoline
- Single Unit Long-haul Truck - Compressed Natural Gas (CNG)
- Single Unit Long-haul Truck - Diesel Fuel
- Single Unit Long-haul Truck - Electricity
- Single Unit Long-haul Truck - Gasoline
- Single Unit Short-haul Truck - Compressed Natural Gas (CNG)
- Single Unit Short-haul Truck - Diesel Fuel
- Single Unit Short-haul Truck - Electricity
- Single Unit Short-haul Truck - Gasoline

Select All

Road Type

Available Road Types:

Selected Road Types:

Off-Network

Off-Network

File Edit Action Post Processing Tools Settings Help

Description

Description:

Running D7 rep. county (17051) for ILSTDM, 2025

Pollutants and Processes

Selected	Pollutant	Running Exhaust	Crankcase Exhaust	Brakewear	Tirewear	Start Exhaust	Crankcase Start Exhaust	Extended Idle Exhaust	Crankcase Idle Exhaust	Other Hotelling Exhaust	Evap Permeation	Evap Fuel Vapor Venting	Evap Fuel Leaks	Refueling Displacement Vapor Loss	Refueling Spillage
☒	Total Gaseous Hydrocarbons	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Non-Methane Hydrocarbons	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Non-Methane Organic Gases	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Total Organic Gases	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Volatile Organic Compounds	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Methane (CH4)	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Carbon Monoxide (CO)	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Oxides of Nitrogen (NOx)	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Nitrogen Oxide (NO)	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Nitrogen Dioxide (NO2)	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Nitrous Acid (HONO)	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Ammonia (NH3)	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Nitrous Oxide (N2O)	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Primary Exhaust PM2.5 - Total	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Primary Exhaust PM2.5 - Species	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Primary PM2.5 - Brakewear Particulate	☒	☒	☒		☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Primary PM2.5 - Tirewear Particulate	☒	☒	☒		☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Primary Exhaust PM10 - Total	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Primary PM10 - Brakewear Particulate	☒	☒	☒		☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Primary PM10 - Tirewear Particulate	☒	☒	☒		☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Sulfur Dioxide (SO2)	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Total Energy Consumption	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Atmospheric CO2	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	CO2 Equivalent	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Benzene	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Ethanol	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	1,3-Butadiene	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Formaldehyde	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Acetaldehyde	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Acrolein	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	[+] Additional Air Toxics	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	[+] Polycyclic Aromatic Hydrocarbons (PAH)	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	[+] Metals	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	[+] Dioxins and Furans	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	NonHAPTOX Mechanism	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒

Matter 2.5

Outline

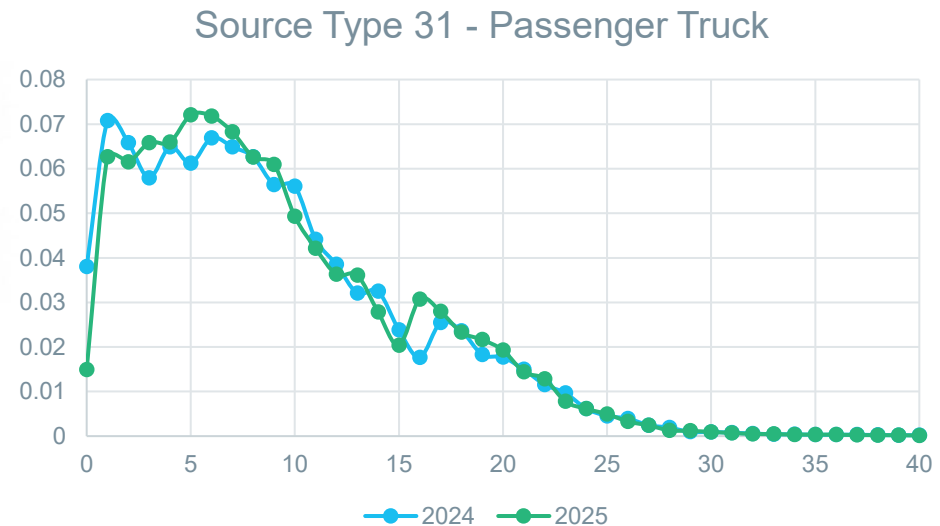
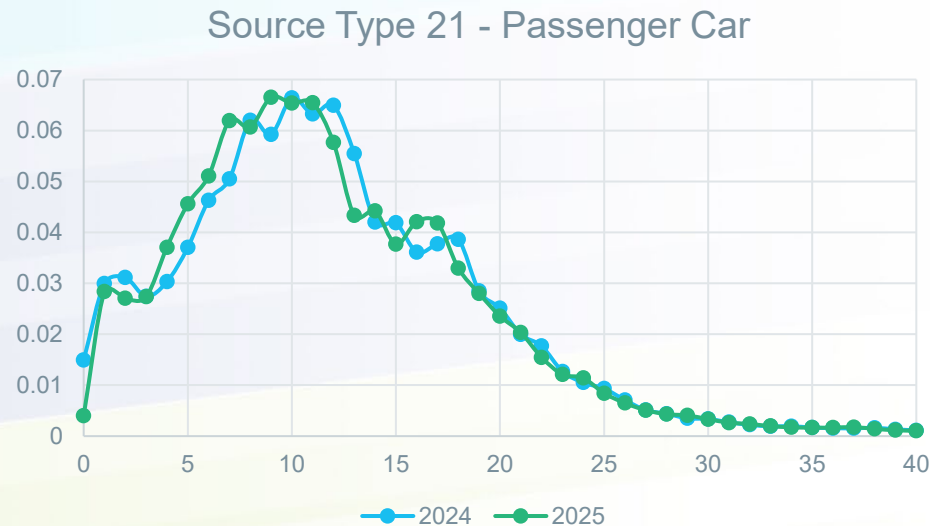
- Background and Reasoning
- MOVES Categories & Inputs
- Vehicle Registration Data
- Comparison to CMAP Data
- MOVES Post Processing
- Emission Rates
- Counties/Districts
- DDD Emissions Analysis

Pollutants and Processes															
Selected	Pollutant	Running Exhaust	Crankcase Running Exhaust	Brakewear	Tirewear	Start Exhaust	Crankcase Start Exhaust	Extended Idle Exhaust	Crankcase Extended Idle Exhaust	Other Hotelling Exhaust	Evap Permeation	Evap Fuel Vapor Venting	Evap Fuel Leaks	Refueling Displacement Vapor Loss	Refueling Spillage Loss
☒	Total Gaseous Hydrocarbons	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Non-Methane Hydrocarbons	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☐	Non-Methane Organic Gases	☐	☐			☐	☐	☐	☐		☐	☐	☐	☐	☐
☐	Total Organic Gases	☐	☐			☐	☐	☐	☐		☐	☐	☐	☐	☐
☒	Volatile Organic Compounds	☒	☒			☒	☒	☒	☒		☒	☒	☒	☒	☒
☒	Methane (CH4)	☒	☒			☒	☒	☒	☒						
☒	Carbon Monoxide (CO)	☒	☒			☒	☒	☒	☒						
☒	Oxides of Nitrogen (NOx)	☒	☒			☒	☒	☒	☒						
☐	Nitrogen Oxide (NO)	☐	☐			☐	☐	☐	☐						
☐	Nitrogen Dioxide (NO2)	☐	☐			☐	☐	☐	☐						
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☒	Primary Exhaust PM2.5 - Total	☒	☒			☒	☒	☒	☒						
☒	[+] Primary Exhaust PM2.5 - Species	☒	☒			☒	☒	☒	☒						
☒	Primary PM2.5 - Brakewear Particulate			☒											
☒	Primary PM2.5 - Tirewear Particulate				☒										
☒	Primary Exhaust PM10 - Total	☒	☒			☒	☒	☒	☒						
☒	Primary PM10 - Brakewear Particulate			☒											
☒	Primary PM10 - Tirewear Particulate				☒										
☐	Sulfur Dioxide (SO2)	☐	☐			☐	☐	☐	☐						
☒	Total Energy Consumption	☒				☒	☒	☒	☒						
☒	Atmospheric CO2	☒				☒	☒	☒	☒						
☒	CO2 Equivalent	☒				☒	☒	☒	☒						
☐	Benzene	☐	☐			☐	☐	☐	☐		☐	☐	☐	☐	☐
☐	Ethanol	☐	☐			☐	☐	☐	☐		☐	☐	☐	☐	☐
☐	1,3-Butadiene	☐	☐			☐	☐	☐	☐						
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☐	[+] Metals	☐	☐			☐	☐	☐	☐		☐	☐	☐	☐	☐
☐	[+] Dioxins and Furans	☐	☐			☐	☐	☐	☐		☐	☐	☐	☐	☐
☐	NonHAPTOG Mechanism	☐	☐			☐	☐	☐	☐		☐	☐	☐	☐	☐

When pollutants are listed in the box at right, MOVES needs to calculate those emissions first, before calculating the pollutants you selected. In this case, click "Select Prerequisites" to proceed.

Data Checking Against CMAP

➤ SOS 2024 compared to CMAP 2025 rates - Autos



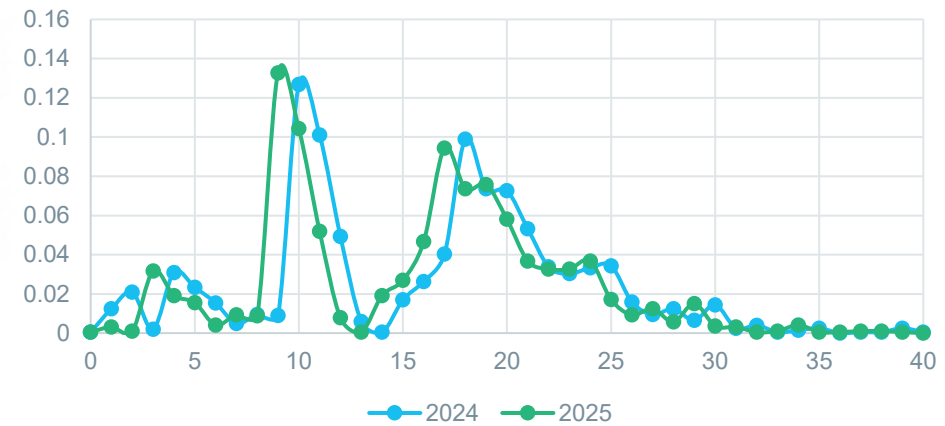
Data Checking Against CMAP

➤ SOS 2024 compared to CMAP 2025 rates – Single-Unit Trucks

Source Type 52 - Single Unit Short-Haul Truck



Source Type 53 - Single Unit Long-Haul Truck



Data Checking Against CMAP

➤ SOS 2024 compared to CMAP 2025 rates – Multi-Unit Trucks

Source Type 61 - Combination Short-Haul Truck



Source Type 62 - Combination Long-Haul Truck

