

J. Air Quality, Greenhouse Gases and Emissions Reductions

This appendix provides the following detailed information and data tables in support of Chapter 8, *Air Quality and Greenhouse Gas Emissions*:

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J.1 Emissions Inventory Data

J.1.1 2023 and 2024 Aircraft Fleet Mix and LTOs

Table J-1 contains data that were used in **Aviation Environmental Design Tool (AEDT)** Version 3g to represent actual conditions at Logan Airport in 2023 and 2024. These data include aircraft type, engine type, and the number of landing and takeoffs (LTOs).¹ The aircraft are divided into four categories: air carrier (AC), cargo (CA), commuter (CO), and **general aviation (GA)**.

Table J-1 2023 and 2024 Aircraft Fleet Mix Landings and Takeoffs (LTOs)

AEDT Aircraft Type	AEDT Engine Type	2023	2024
Air Carrier			
Embraer ERJ190-LR	CF34-10E6	21,447	17,418
Airbus A321-100 Series	V2533-A5	15,042	13,672
Airbus A220-300	PW1524G	9,593	8,247
Airbus A220-100	PW1519G	7,757	3,721
Airbus A321-100 Series	CFM56-5B3/P	7,462	6,860
Airbus A320-200 Series	V2527-A5	5,369	5,672
Boeing 737-800 Series	CFM56-7B26	5,121	6,041
Airbus A321-NEO	PW1133G-JM	3,882	4,023
Boeing 737-900-ER	CFM56-7B27E	3,779	3,110
Airbus A320-200 Series	V2527-A5	3,615	7,726
Airbus A321-NEO	LEAP-1A35A/33/33B2/32/30	3,317	3,522
Boeing 737-8	LEAP-1B28/28B1/28B2/28B3	3,281	4,727
Boeing 737-9	LEAP-1B28/28B1/28B2/28B3	2,856	3,744
Airbus A321-NEO	PW1133GA-JM	2,528	6,456
Airbus A319-100 Series	V2522-A5	2,214	2,239
Airbus A319-100 Series	CFM56-5B6/P	2,159	2,270
Boeing 737-800 Series	CFM56-7B24E	2,053	2,757
Airbus A320-NEO	PW1127G-JM	2,034	1,497
Boeing 737-800 Series	CFM56-7B27E/F	1,311	1,439
Boeing 737-700 Series	CFM56-7B24	1,227	1,120
Boeing 737-800 Series	CFM56-7B24/3	1,144	1,568
Boeing 737-800 Series	CFM56-7B27E	1,124	1,249
Airbus A330-300 Series	CF6-80E1A4	1,119	1,085
Boeing 737-800 Series	CFM56-7B27	1,024	1,215
Boeing 737-700 Series	CFM56-7B22	1,022	835
Airbus A330-300 Series	Trent 772	962	1,031

¹ One LTO is equal to two operations (i.e., arrival + departure).

Table J-1 2023 and 2024 Aircraft Fleet Mix Landings and Takeoffs (LTOs)

AEDT Aircraft Type	AEDT Engine Type	2023	2024
Boeing 777-300 ER	GE90-115B	772	768
Airbus A350-900 series	Trent XWB-84	747	1,256
Boeing 767-300 ER	PW4060	709	634
Airbus A320-NEO	LEAP-1A26/26E1	600	1,563
Boeing 787-9 Dreamliner	GENx-1B70/P1	546	841
Airbus A330-300 Series	PW4168A	536	594
Boeing 737-800 Series	CFM56-7B26/3	489	587
Airbus A320-200 Series	CFM56-5A3	462	988
Airbus A330-200 Series	CF6-80E1A4	459	556
Embraer ERJ190	CF34-8E5	457	203
Airbus A220-300	PW1521G	454	1,711
Boeing 737-900-ER	CFM56-7B27E/B1	453	259
Boeing 737-8	LEAP-1B25	450	459
Airbus A340-300 Series	CFM56-5C4	388	212
Airbus A320-200 Series	CFM56-5B3/3	380	449
Boeing 777-200 Series	Trent 892	365	361
Airbus A320-200 Series	CFM56-5B4/P	360	200
Airbus A330-900N Series (Neo)	Trent7000-72C	352	497
Boeing 767-300 ER	CF6-80C2B6F	348	406
Boeing 777-200-ER	GE90-85B	346	401
Airbus A330-900N Series (Neo)	Trent7000-72	338	266
Airbus A380-800 Series	Trent 970-84	326	412
Boeing 787-9 Dreamliner	Trent 1000-J2	314	280
Boeing 737-900-ER	CFM56-7B26/3	312	334
Boeing 767-400	CF6-80C2B8F	311	14
Boeing 737-900-ER	CFM56-7B26E	297	258
Boeing 767-300 ER	CF6-80C2B7F	295	262
Airbus A319-100 X/LR	V2524-A5	264	247
Boeing 737-800 Series	CFM56-7B26E	246	278
Airbus A330-900N Series (Neo)	Trent7000-72	228	306
Boeing 737-8	LEAP-1B27	222	222
Airbus A340-600 Series	Trent 556-61	219	277
Airbus A320-NEO	PW1127GA-JM	207	544
Boeing 787-10 Dreamliner	Trent 1000-K2	188	105
Airbus A320-200 Series	V2527E-A5	185	403
Airbus A320-200 Series	CFM56-5-A1	180	334
Boeing 737-900-ER	CFM56-7B27E/F	180	154

Table J-1 2023 and 2024 Aircraft Fleet Mix Landings and Takeoffs (LTOs)

AEDT Aircraft Type	AEDT Engine Type	2023	2024
Boeing 737-700 Series	CFM56-7B24/3	179	149
Airbus A330-200 Series	PW4168A	177	407
Airbus A330-200 Series	Trent 772	175	181
Boeing 787-8 Dreamliner	Trent 1000-D2	173	215
Boeing 737-800 Series	CFM56-7B27E/B1	173	156
Boeing 737-900-ER	CFM56-7B26	170	137
Airbus A350-1000 Series	Trent XWB-97	160	357
Airbus A319-100 Series	CFM56-5A5	151	1,476
Boeing 717-200 Series	BR700-715A1-30	146	8
Airbus A319-100 Series	CFM56-5B6/3	130	133
Airbus A319-100 Series	CFM56-5B3/3	109	98
Airbus A320-200 Series	CFM56-5B4	89	42
Boeing 757-300 Series	RB211-535E4B	84	43
Boeing 737-800 Series	CFM56-7B24	82	116
Airbus A330-300 Series	CF6-80E1A3	76	24
Boeing 777-200-ER	GE90-94B	61	73
Boeing 737-900-ER	CFM56-7B27E/B3	58	27
Airbus A330-200 Series	CF6-80E1A3	48	1
Airbus A330-200 Series	Trent 772	47	42
Airbus A321-200 Series	CFM56-5B3/3	39	35
Airbus A330-200 Series	CF6-80E1A2	35	29
Boeing 787-9 Dreamliner	GE9x-1B74/75/P2	34	102
Airbus A320-200 Series	V2522-D5	30	57
Boeing 737-700 Series	CFM56-7B24E	27	38
Boeing 737-900 Series	CFM56-7B26	19	8
Boeing 737-400 Series	CFM56-3B-2	16	10
Boeing 777-200-ER	GE90-90B	15	34
Boeing 777-200-ER	PW4090	13	4
Airbus A319-100 X/LR	CFM56-5B7/3	13	24
Boeing 767-300 ER	PW4056	12	-
Boeing 717-200 Series	BR700-715C1-30	11	-
Boeing 757-300 Series	RB211-535E4B	9	4
Boeing 737-800 Series	CFM56-7B27/3	9	8
Boeing 737-700 Series	CFM56-7B22/3	9	12
Boeing 777-200-ER	Trent 895	8	34
Boeing 787-9 Dreamliner	Trent 1000-J3	7	1
Airbus A319-100 X/LR	V2527-A5M	6	49

Table J-1 2023 and 2024 Aircraft Fleet Mix Landings and Takeoffs (LTOs)

AEDT Aircraft Type	AEDT Engine Type	2023	2024
Boeing 737-9	LEAP-1B28BBJ1	6	199
Boeing 737-700 Series	CFM56-7B20	6	5
Airbus A340-300 Series	CFM56-5C4/P	5	3
Boeing 787-8 Dreamliner	GEEx-1B70/P2	5	2
Embraer ERJ190	CF34-10E6A1	4	-
Airbus A340-500 Series	Trent 556-61	4	2
Boeing 787-10 Dreamliner	GEEx-1B76/P2	4	17
Boeing 737-700 Series	CFM56-7B26	4	3
Boeing 737-700 Series	CFM56-7B27E	4	3
Boeing 777-200 Series	GE90-90B	3	2
Airbus A320-200 Series	CFM56-5B4/2	3	1
Boeing MD-81	JT8D-219	2	-
Airbus A321-200 Series	V2533-A5	2	-
Boeing 747-400 Series	CF6-80C2B1F	2	1
Airbus A321-100 Series	CFM56-5B1/3	2	4
Airbus A319-NEO	PW1127G-JM	1	1
Boeing 787-8 Dreamliner	GEEx-1B70	1	-
Airbus A318-100 Series	CFM56-5B9/3	1	-
Airbus A220-100	PW1524G	-	8
Boeing 747-8	GEEx-2B67	-	4
Boeing C-17A	PW2041	-	3
Boeing 787-8 Dreamliner	GENX-1B64	-	2
Boeing 777 Freighter	GE90-115B	-	2
Embraer ERJ190	CF34-10E7-B	-	2
Boeing 787-8 Dreamliner	GEEx-1B70/P1	-	1
Airbus A380-800 Series	GP7270	-	1
Airbus A319-100 Series	CFM56-5B7/P	-	1
Boeing 787-8 Dreamliner	GEEx-1B70/75/P2	-	1
Boeing 737-200 Series	JT8D-17AR	-	1
Airbus A330-300 Series	CF6-80E1A2	-	1
Airbus A319-100 Series	CFM56-5B7/3	-	1
Boeing 747-200 Series	CF6-80E1A3	-	1
Boeing 747-SP	RB211-524D4	-	1
Boeing 767-300 ER	CF6-80C2B4	-	1
Total Air Carrier LTOs:		129,088	135,290
Cargo			
Boeing 757-200 Series	RB211-535E4B	2,333	1,297

Table J-1 2023 and 2024 Aircraft Fleet Mix Landings and Takeoffs (LTOs)

AEDT Aircraft Type	AEDT Engine Type	2023	2024
Boeing 767-300 ER Freighter	CF6-80C2B6F	2,177	2,013
Boeing 757-200 Series	PW2037	1,683	1,722
Cessna 208 Caravan	PT6A-114	255	227
Boeing MD-11 Freighter	CF6-80C2D1F	136	93
Airbus A300F4-600 Series	PW4158	130	308
Boeing 767-200 Series Freighter	CF6-80C2B4F	130	98
Boeing 757-200 Series Freighter	RB211-535E4	121	144
Boeing 757-200 Series	RB211-535E4	90	37
Airbus A300F4-600 Series	CF6-80C2A5F	72	13
Boeing 757-200 Series Freighter	PW2040	66	78
Boeing 767-200 Series Freighter	CF6-80A2	63	21
Boeing 767-200 Series Freighter	CF6-80A	62	36
Boeing MD-11 Freighter	PW4460	32	42
Cessna 208 Caravan	TPE331-12B	30	26
Boeing MD-11 Freighter	PW4062	26	22
Boeing 767-200 Series Freighter	JT9D-7R4D, -7R4D1	19	13
Boeing 757-200 Series Freighter	PW2037	18	35
Boeing 767-300BCF	CF6-80C2B6F	10	16
Boeing 767-200 Series Freighter	CF6-80C2B2	10	2
Boeing 767-300BCF	CF6-80C2B6	6	58
Airbus A300F4-600 Series	CF6-80C2A5	6	-
Boeing 767-300BCF	PW4060	4	22
Boeing 737-800BCF	CFM56-7B27E/B1	4	-
Boeing 757-200 Series	PW2040	3	8
Boeing 747-8F	GE9x-2B67	1	-
Boeing 727-200 Series Freighter	JT8D-219	1	-
Boeing 767-300 Series	PW4060	-	31
Boeing 767-200 Series	PW4060	-	3
Boeing 757-200 Series Freighter	RB211-535E4B	-	3
Boeing 747-400 Series Freighter	CF6-80C2B1F	-	1
Boeing 737-300 Series Freighter	CFM56-3C-1	-	1
Boeing 777-200-LR	GE90-115B	-	1
Total Aircraft Cargo LTOs:		7,488	6,368
Commuter			
Embraer ERJ175	CF34-8E5	21,017	24,020
Cessna 402	TIO-540-J2B2	12,402	13,835
Embraer ERJ175-LR	CF34-8E5	5,853	4,055

Table J-1 2023 and 2024 Aircraft Fleet Mix Landings and Takeoffs (LTOs)

AEDT Aircraft Type	AEDT Engine Type	2023	2024
Tecnam P2012 Traveller	TIO-540-J2B2	2,142	3,437
Bombardier de Havilland Dash 8 Q400	PW150A	2,036	2,362
Embraer Phenom 300 (EMB-505)	PW530	1,093	1,035
Embraer ERJ145-LR	AE3007A1	853	1,028
Embraer ERJ170	CF34-8E5	444	937
Embraer ERJ145-LR	AE3007A	410	246
Embraer ERJ170-LR	CF34-8E5	256	473
Embraer ERJ170	CF34-8E5A1	96	199
Bombardier Global 6000	BR700-710A2-20	94	80
Embraer ERJ175	CF34-8E5A1	90	306
Embraer ERJ145-LR	AE3007A1P	87	66
Bombardier CRJ-900	CF34-8C5	26	10
Bombardier (Canadair) CRJ200 ExecLiner	CF34-3A1	21	17
Bombardier CRJ-200	CF34-3B/-3B1	17	21
Bombardier CRJ-705-LR	CF34-8C5	16	62
Embraer ERJ175-LR	CF34-8E5A1	7	6
Bombardier Learjet 36	TFE731-2-2B	3	-
Bombardier CRJ-700	CF34-8C5B1	3	1
Embraer ERJ170-LR	CF34-8E5A1	2	1
DeHavilland DHC-8-200	PW150A	1	-
Embraer ERJ145-LR	AE3007A1E	-	3
Convair CV-640	RDa.7	-	1
DeHavilland DHC-6-100 Twin Otter	PT6A-65R	-	1
Bombardier Challenger 850	CF34-3B/-3B1	-	1
Bombardier de Havilland Dash 8 Q100	PW127-A	-	1
Fairchild SA-227-AC Metro III	PW125B	-	1
Total Commuter Aircraft LTOs:		46,969	52,205
General Aviation (GA)			
Pilatus PC-12	PT6A-67B	1,529	1,630
Cessna 680-A Citation Latitude	PW306B	1,290	1,403
Bombardier Challenger 350	AS907-2-1A (HTF7350)	952	915
Cessna 560 Citation XLS	PW530	725	531
Bombardier Challenger 300	AS907-2-1A (HTF7350)	417	359
Pilatus PC-12	PT6A-67	394	494
Raytheon Super King Air 300	PT6A-67A	377	266
Raytheon Hawker 800	TFE731-2/2A	366	330
Cessna 700 Citation Longitude	AS907-2-1S (HTF7700L)	359	549

Table J-1 2023 and 2024 Aircraft Fleet Mix Landings and Takeoffs (LTOs)

AEDT Aircraft Type	AEDT Engine Type	2023	2024
Gulfstream G650ER	BR700-725A1-12	354	299
Dassault Falcon 2000	PW308C BS 1289	348	250
Bombardier Global Express	BR700-710A2-20	308	273
Embraer Praetor 500	AS907-3-1E-A1 (HTF7500E)	286	255
Cessna CitationJet CJ/CJ1 (Cessna 525)	JT15D-1 series	277	274
Bombardier Challenger 600	CF34-3A1	252	48
Gulfstream G450	TAY 611-8C	248	240
Gulfstream G-5 Gulfstream 5 / G-5SP Gulfstream G500	BR700-710C4-11	244	196
Bombardier Challenger 605	CF34-3B/-3B1	231	74
Raytheon Super King Air 200	PT6A-41	220	159
Gulfstream G280	AS907-2-1G (HTF7250G)	207	174
Bombardier Global 5000	BR700-710A2-20	205	162
Kaman SH-2 Seasprite	T700-GE-401 -401C	200	192
Cessna 750 Citation X	AE3007C1	173	108
Cessna 680 Citation Sovereign	PW306B	168	135
Dassault Falcon 900-LX	TFE731-3	153	123
Bombardier Learjet 60	PW306A	152	128
Sikorsky S-76C	T700-GE-700	142	111
Bombardier Learjet 45	TFE731-2/2A	137	122
Pilatus PC-24	JT15D-5C	135	133
Cirrus SR22 (FAS)	TIO-540-J2B2	128	75
Gulfstream Aerospace Gulfstream G500 (G-7)	PW814GA	124	132
Gulfstream IV-SP	TAY Mk611-8	119	73
Cessna 560 Citation V	JT15D-5, -5A, -5B	106	77
CIRRUS SF-50 Vision	JT15D-1 series	106	-
Cessna 750 Citation X	AE3007C2	105	85
Raytheon Beechjet 400	JT15D-5, -5A, -5B	102	63
Raytheon Beechjet 400	JT15D-5C	101	81
Raytheon Hawker 800	TFE731-3	101	55
Bell 429	TPE331-1	97	79
Falcon 7X	PW307A	91	64
Gulfstream G600	PW815GA	89	90
Cessna S550 Citation S/II	PW610F	89	45
Bombardier Challenger 3500	AS907-2-1A (HTF7350)	88	54
Raytheon Beech Baron 58	TIO-540-J2B2	83	64
Dassault Falcon 50	PW307A	78	68
Bombardier Learjet 31	TFE731-3	72	45

Table J-1 2023 and 2024 Aircraft Fleet Mix Landings and Takeoffs (LTOs)

AEDT Aircraft Type	AEDT Engine Type	2023	2024
Bombardier Global 7500	Passport20-19BB1A	71	98
Cessna 680 Citation Sovereign	PW308C BS 1289	68	85
Embraer Praetor 600	AS907-3-1E-A3 (HTF7500E)	57	71
Gulfstream G200	PW306A	53	48
Honda HA-420 Hondajet	PW610F	51	28
Bombardier Learjet 75	TFE731-3	47	40
Bombardier Learjet 35	TFE731-3	46	51
Daher TBM 900 Series	PT6A-66	41	20
Bombardier Challenger 604	CF34-3B/-3B1	39	109
Gulfstream G150	TFE731-3	39	25
Piper PA-31 Navajo	TIO-540-J2B2	38	36
Cessna CitationJet CJ4 (Cessna 525C)	JT15D-5C	35	49
Piper PA-34 Seneca	TSIO-360C	34	21
Gulfstream G550	BR700-710A1-10	33	31
Raytheon Beech Bonanza 36	TIO-540-J2B2	31	34
Raytheon Beech 99	TPE331-6	27	23
Gulfstream G100	TFE731-2/2A	26	23
Piper PA46 Malibu (FAS)	TIO-540-J2B2	25	20
Gulfstream G-5 Gulfstream 5 / G-5SP Gulfstream G500	BR700-710A1-10	24	28
Bombardier Learjet 45	TFE731-2-2B	24	23
Embraer Phenom 100 (EMB-500)	PW530	22	20
Bombardier Challenger 300	HTF7000 (AS907-1-1A)	22	33
Embraer ERJ135 Legacy Business	AE3007A2	22	17
Raytheon Hawker 4000 Horizon	PW308A	21	13
Cessna 650 Citation III	TFE731-2/2A	20	14
Piper PA-28 Cherokee Series	O-320	20	9
Cessna 414	TIO-540-J2B2	19	22
Dassault Falcon 8X	PW307D	18	13
Eurocopter EC-130	TPE331-3	18	15
Bombardier Learjet 35	TFE731-2-2B	17	18
Bombardier Challenger 601	CF34-3A	17	1
Cessna 560 Citation Ultra	JT15D-5C	17	13
Hawker Beechcraft Corp Nextant Aerospace 400NXT	JT15D-5C	17	19
Raytheon Hawker 1000	PW306A	16	12
SOCATA TBM 850	PT6A-66	16	16
Bombardier Learjet 40	TFE731-2/2A	16	17
Gulfstream G450	TAY Mk611-8	16	4

Table J-1 2023 and 2024 Aircraft Fleet Mix Landings and Takeoffs (LTOs)

AEDT Aircraft Type	AEDT Engine Type	2023	2024
Eurocopter AS 355NP	250B17B	16	7
Piper PA-24 Comanche	TIO-540-J2B2	14	9
Cirrus SR20	IO-360-B	13	16
Piper PA-32 Cherokee Six	TIO-540-J2B2	13	14
Raytheon Beech 99	PT6A-28	13	-
Bombardier Learjet 55	TFE731-3	12	4
Embraer ERJ135 Legacy Business	AE3007A1E	12	16
Cessna 550 Citation Bravo	PW530	11	2
Bell 407 / Rolls-Royce 250-C47B	250B17B	11	13
Aerospatiale SA-350D Astar (AS-350)	TPE331-3	11	15
Dassault Falcon 900-EX	TFE731-3	11	7
Embraer ERJ135 Legacy Business	AE3007A1P	11	5
Raytheon Premier I	JT15D-4 series	10	14
Cessna 182 R (FAS)	IO-360-B	10	12
Piper PA46-TP Meridian	TPE331-10	9	8
Dassault Falcon 100	TFE731-3	9	14
Bell 206B-3	250B17B	9	14
Eurocopter EC-T2 (CPDS)	TPE331-3	7	7
Cessna 182	IO-360-B	7	3
Raytheon King Air 90	PT6A-28	7	-
Cessna 172 Skyhawk	O-320	7	9
Piaggio P.180 Avanti	PT6A-60	7	3
Eclipse 500 / PW610F	PW610F	7	2
Cessna 400 (FAS)	TSIO-360C	7	1
Embraer ERJ140	AE3007A1E	7	1
Raytheon Super King Air 300	PT6A-60A	6	1
Gulfstream G100	TFE731-3	6	11
EADS Socata TBM-700	PT6A-60	5	7
Israel IAI-1124-A Westwind II	TFE731-3	4	1
Bombardier Learjet 70	TFE731-3	4	6
Bell 430	250B17B	4	7
Mooney M20-K	TSIO-360C	4	4
Bell 206L-4T Long Ranger	250B17B	4	5
Cirrus SR22 Turbo (FAS)	TIO-540-J2B2	4	-
Gulfstream III (FAS)	SPEY Mk511	3	1
Robinson R44 Raven / Lycoming O-540-F1B5	TIO-540-J2B2	3	9
Quest Kodiak 100	PT6A-34	3	4

Table J-1 2023 and 2024 Aircraft Fleet Mix Landings and Takeoffs (LTOs)

AEDT Aircraft Type	AEDT Engine Type	2023	2024
Piper PA-31T Cheyenne	PT6A-135A	3	2
Cessna 340	TIO-540-J2B2	3	1
Agusta A-109	250B17B	3	9
Piper PA-42 Cheyenne Series	TPE331-14	3	-
Hughes 500D	250B17B	3	2
Dassault Falcon 50-EX	TFE731-3	3	6
Dassault Falcon 20-G	TFE731-2/2A	3	13
Raytheon Beech 99	PT6A-36	3	-
T-38 Talon	J85-GE-5H (w/AB)	2	-
Hawker HS-125 Series 400	TAY Mk611-8	2	1
Eurocopter EC-155B1	T400-CP-400	2	1
Diamond DA62	IO-360-B	2	2
Diamond DA40	IO-360-B	2	-
Cessna 560 Citation Encore	PW530	2	1
Cessna 441 Conquest II	TPE331-10UK	2	-
Cessna 210 Centurion	TIO-540-J2B2	2	-
Cessna 170 (FAS)	IO-360-B	2	-
Bombardier Learjet 45-XR	TFE731-2-2B	2	-
Vans RV8 (FAS)	IO-360-B	1	-
Schweizer 300C (3)/ Muffler & Resonator	IO-360-B	1	-
Raytheon Beech 55 Baron	TIO-540-J2B2	1	1
Piper PA-27 Aztec	TIO-540-J2B2	1	-
Piper PA-23 Apache/Aztec	TIO-540-J2B2	1	-
Maule MT-7-235	TIO-540-J2B2	1	-
Dornier 328 Jet	PW306B	1	2
Diamond DA20	O-320	1	-
Dassault Falcon 20-F	CF700-2D	1	1
Dassault Falcon 200	TFE731-3	1	18
Cozy (FAS)	IO-360-B	1	-
CESSNA CITATION 510	PW530	1	3
Cessna 501 Citation ISP	PW610F	1	1
Cessna 441 Conquest II	TPE331-10GT	1	-
Cessna 310	TIO-540-J2B2	1	3
Cessna 177 (FAS)	IO-360-B	1	-
Cessna 140 (FAS)	O-200	1	-
Bell 427	TPE331-1	1	-
Antonov 124 Ruslan	JT9D-7Q	1	1

Table J-1 2023 and 2024 Aircraft Fleet Mix Landings and Takeoffs (LTOs)

AEDT Aircraft Type	AEDT Engine Type	2023	2024
American Champion Cibrata (FAS)	O-320	1	-
Aerostar PA-60	TIO-540-J2B2	1	1
Bombardier Challenger 650	CF34-3B/-3B1	-	218
Cirrus Vision SF50 (FAS)	JT15D-1 series	-	65
Bombardier Challenger 601	CF34-3A1	-	16
Cessna 206	TIO-540-J2B2	-	3
Gulfstream V-SP	BR700-710A1-10	-	2
Cessna 150 Series	O-200	-	2
Sikorsky UH-60 Black Hawk	T700-GE-700	-	2
Vans RV-7	IO-360-B	-	2
Rockwell Sabreliner 65	TFE731-3	-	1
Piper PA-22-150 (FAS)	O-320	-	1
Raytheon Beech 1900-C	PT6A-67D	-	1
Raytheon Beechjet 400	JT15D-4 series	-	1
Cessna Aircraft Company 180F	IO-360-B	-	1
Cessna 207 (Turbo) Stationair (FAS)	IO-360-B	-	1
Cessna 404 Titan II	TIO-540-J2B2	-	1
Diamond DA42 Twin Star L360	IO-360-B	-	1
Lancair Evolution (FAS)	TIO-540-J2B2	-	1
Piper PA-30 Twin Comanche	IO-320-D1AD	-	1
Vans RV12 (FAS)	O-320	-	1
Sikorsky S-92	T700-GE-700	-	1
Total GA Aircraft LTOs:		14,027	12,842
Total Fleet LTOs		197,573	206,704

Source: CMT and HMMH, 2025.

Notes:

AEDT Aviation Environmental Design Tool
 LTOs Landings and takeoffs
 AC Air carrier
 CA Cargo
 CO Commuter
 GA General aviation

J.1.2 Ground Service Equipment (GSE)/Auxiliary Power Unit (APU) Time-in-Mode (TIM) Survey

The **Ground Service Equipment (GSE)/Auxiliary Power Unit (APU)** time-in-mode (TIM) data used in the 2023 and 2024 analysis are provided in **Table J-2**. APU operating times for wide-body or large commuter air carriers and small commuter aircraft were assumed to have a TIM of seven minutes per LTO.

GA aircraft in the fleet were not equipped with APUs. Cargo aircraft APU TIM data was based on AEDT defaults (i.e., 26 minutes per LTO).

Table J-2 Ground Service Equipment (GSE)/Auxiliary Power Unit (APU) Time-in-Mode (TIM) Data (minutes) By Aircraft Category

Source	Narrow-Body Air Carriers	Large Commuter Aircraft
Aircraft Tractor	6.37	7.13
Baggage Tractor	27.23	17.43
Belt Loader	26.85	14.88
Cabin Service Truck	2.07	0.53
Catering Truck	11.30	13.28
Hydrant Truck	3.73	2.53
Lavatory Truck	4.82	2.45
Service Truck	0.12	0.57
Water Service Truck	1.65	0.75

Source: GSE TIM survey conducted by CMT with assistance from Massport (security escorts) on June 27-28, 2017.

J.1.3 Example Input/Output Files – MOVES5

Examples of **Motor Vehicle Emission Simulator (MOVES)** Version 5, input and output files are provided in **Table J-3** and **Table J-4**, respectively.

Table J-3 MOVES5 Example Input File

```
<runspec version="MOVES5.0.0">
  <description><![CDATA[EDR Summer TBLCT 2023]]></description>
  <models>
    <model value="ONROAD"/>
  </models>
  <modelscale value="Inv"/>
  <modeldomain value="PROJECT"/>
  <geographicselections>
    <geographicselection type="COUNTY" key="25025" description="Suffolk County, MA (25025)"/>
  </geographicselections>
  <timespan>
    <year key="2023"/>
    <month id="6"/>
    <day id="5"/>
    <beginhour id="24"/>
    <endhour id="24"/>
    <aggregateBy key="Hour"/>
  </timespan>
</runspec>
```

Table J-3 MOVES5 Example Input File

```

</timespan>
<onroadvehicleselections>
  <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="32" sourcetype="Light Commercial Truck"/>
  <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetype="Light Commercial Truck"/>
  <onroadvehicleselection fueltypeid="5" fueltypedesc="Ethanol (E-85)" sourcetypeid="32" sourcetype="Light Commercial Truck"/>
  <onroadvehicleselection fueltypeid="9" fueltypedesc="Electricity" sourcetypeid="32" sourcetype="Light Commercial Truck"/>
  <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="42" sourcetype="Transit Bus"/>
  <onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetype="Transit Bus"/>
  <onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="42" sourcetype="Transit Bus"/>
  <onroadvehicleselection fueltypeid="9" fueltypedesc="Electricity" sourcetypeid="42" sourcetype="Transit Bus"/>
</onroadvehicleselections>
<offroadvehicleselections>
</offroadvehicleselections>
<offroadvehiclesccs>
</offroadvehiclesccs>
<roadtypes>
  <roadtype roadtypeid="1" roadtypename="Off-Network" modelCombination="M1"/>
  <roadtype roadtypeid="2" roadtypename="Rural Restricted Access" modelCombination="M1"/>
  <roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access" modelCombination="M1"/>
  <roadtype roadtypeid="4" roadtypename="Urban Restricted Access" modelCombination="M1"/>
  <roadtype roadtypeid="5" roadtypename="Urban Unrestricted Access" modelCombination="M1"/>
</roadtypes>
<pollutantprocessassociations>
  <pollutantprocessassociation pollutantkey="90" pollutantname="Atmospheric CO2" processkey="1" processname="Running Exhaust"/>
  <pollutantprocessassociation pollutantkey="90" pollutantname="Atmospheric CO2" processkey="2" processname="Start Exhaust"/>
  <pollutantprocessassociation pollutantkey="90" pollutantname="Atmospheric CO2" processkey="90" processname="Extended Idle Exhaust"/>
  <pollutantprocessassociation pollutantkey="90" pollutantname="Atmospheric CO2" processkey="91" processname="Auxiliary Power Exhaust"/>
  <pollutantprocessassociation pollutantkey="98" pollutantname="CO2 Equivalent" processkey="1" processname="Running Exhaust"/>
  <pollutantprocessassociation pollutantkey="98" pollutantname="CO2 Equivalent" processkey="15" processname="Crankcase Running Exhaust"/>
  <pollutantprocessassociation pollutantkey="98" pollutantname="CO2 Equivalent" processkey="2" processname="Start Exhaust"/>
  <pollutantprocessassociation pollutantkey="98" pollutantname="CO2 Equivalent" processkey="16" processname="Crankcase Start Exhaust"/>
  <pollutantprocessassociation pollutantkey="98" pollutantname="CO2 Equivalent" processkey="90" processname="Extended Idle Exhaust"/>
  <pollutantprocessassociation pollutantkey="98" pollutantname="CO2 Equivalent" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
  <pollutantprocessassociation pollutantkey="98" pollutantname="CO2 Equivalent" processkey="91" processname="Auxiliary Power Exhaust"/>
  <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="1" processname="Running Exhaust"/>
  <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="15" processname="Crankcase Running Exhaust"/>
  <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="2" processname="Start Exhaust"/>
  <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="16" processname="Crankcase Start Exhaust"/>
  <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="90" processname="Extended Idle Exhaust"/>
  <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
  <pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="91" processname="Auxiliary Power Exhaust"/>
  <pollutantprocessassociation pollutantkey="118" pollutantname="Composite - NonECPM" processkey="1" processname="Running Exhaust"/>
  <pollutantprocessassociation pollutantkey="118" pollutantname="Composite - NonECPM" processkey="2" processname="Start Exhaust"/>
  <pollutantprocessassociation pollutantkey="118" pollutantname="Composite - NonECPM" processkey="90" processname="Extended Idle Exhaust"/>
  <pollutantprocessassociation pollutantkey="118" pollutantname="Composite - NonECPM" processkey="91" processname="Auxiliary Power Exhaust"/>

```

Table J-3 MOVES5 Example Input File

```

<pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="112" pollutantname="Elemental Carbon" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="119" pollutantname="H2O (aerosol)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="119" pollutantname="H2O (aerosol)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="119" pollutantname="H2O (aerosol)" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="119" pollutantname="H2O (aerosol)" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="5" pollutantname="Methane (CH4)" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="6" pollutantname="Nitrous Oxide (N2O)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="6" pollutantname="Nitrous Oxide (N2O)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="11" processname="Evap Permeation"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="13" processname="Evap Fuel Leaks"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="18" processname="Refueling Displacement Vapor Loss"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="19" processname="Refueling Spillage Loss"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10 - Total" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10 - Total" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10 - Total" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10 - Total" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10 - Total" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10 - Total" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10 - Total" processkey="91" processname="Auxiliary Power Exhaust"/>

```

Table J-3 MOVES5 Example Input File

```

<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="17" processname="Crankcase Extended Idle
Exhaust"/>

<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="106" pollutantname="Primary PM10 - Brakewear Particulate" processkey="9" processname="Brakewear"/>
<pollutantprocessassociation pollutantkey="107" pollutantname="Primary PM10 - Tirewear Particulate" processkey="10" processname="Tirewear"/>
<pollutantprocessassociation pollutantkey="116" pollutantname="Primary PM2.5 - Brakewear Particulate" processkey="9" processname="Brakewear"/>
<pollutantprocessassociation pollutantkey="117" pollutantname="Primary PM2.5 - Tirewear Particulate" processkey="10" processname="Tirewear"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Sulfate Particulate" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Sulfate Particulate" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Sulfate Particulate" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="115" pollutantname="Sulfate Particulate" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="91" pollutantname="Total Energy Consumption" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="91" processname="Auxiliary Power Exhaust"/>
<pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="11" processname="Evap Permeation"/>
<pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="13" processname="Evap Fuel Leaks"/>
<pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="18" processname="Refueling Displacement Vapor
Loss"/>

<pollutantprocessassociation pollutantkey="1" pollutantname="Total Gaseous Hydrocarbons" processkey="19" processname="Refueling Spillage Loss"/>
<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="90" processname="Extended Idle Exhaust"/>

```


Table J-3 MOVES5 Example Input File

```

    <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
    <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="91" processname="Auxiliary Power Exhaust"/>
    <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="11" processname="Evap Permeation"/>
    <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="13" processname="Evap Fuel Leaks"/>
    <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="18" processname="Refueling Displacement Vapor Loss"/>
    <pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="19" processname="Refueling Spillage Loss"/>
  </pollutantprocessassociations>
  <databaseselections>
  </databaseselections>
  <internalcontrolstrategies>
  </internalcontrolstrategies>
  <inputdatabase servername="" databasename="" description=""/>
  <uncertaintyparameters uncertaintymodeenabled="false" numberofrunspersimulation="0" numberofsimulations="0"/>
  <geographicoutputdetail description="LINK"/>
  <outputemissionsbreakdownselection>
    <modelyear selected="true"/>
    <fueltype selected="true"/>
    <fuelsubtype selected="false"/>
    <emissionprocess selected="false"/>
    <onroadoffroad selected="false"/>
    <roadtype selected="true"/>
    <sourceusetype selected="true"/>
    <movesvehicletype selected="false"/>
    <onroadsccl selected="false"/>
    <estimateuncertainty selected="false" numberOfIterations="2" keepSampledData="false" keepIterations="false"/>
    <sector selected="false"/>
    <engtechid selected="false"/>
    <hpclass selected="false"/>
    <regclassid selected="false"/>
  </outputemissionsbreakdownselection>
  <outputdatabase servername="" databasename="suffolk_2023_summer_tblct_revopmode_MY_out_5" description=""/>
  <outputtimestep value="Hour"/>
  <outputvmtdata value="true"/>
  <outputsho value="true"/>
  <outputsh value="true"/>
  <outputshp value="true"/>
  <outputshidling value="true"/>
  <outputstarts value="true"/>
  <outputpopulation value="true"/>
  <scaleinputdatabase servername="localhost" databasename="suffolk_2023_tblct_in_5" description=""/>
  <pmsize value="0"/>
  <outputfactors>
    <timefactors selected="true" units="Hours"/>
  </outputfactors>

```

Table J-3 MOVES5 Example Input File

```

<distancefactors selected="true" units="Miles"/>
<massfactors selected="true" units="Grams" energyunits="Million BTU"/>
</outputfactors>
<savedata>

</savedata>

<donotexecute>

</donotexecute>

<generatordatabase shouldsave="false" servername="" databasename="" description=""/>
<donotperformfinalaggregation selected="false"/>
<lookupableflags scenarioid="" truncateoutput="true" truncateactivity="true" truncatebaserates="true"/>
<skipdomaindatabasevalidation selected="false"/>
</runspec>

```

Source: CMT and Massport, 2025.

Table J-4 MOVES5 Example Output File

```

MOVESRunID;iterationID;yearID;monthID;dayID;hourID;statelD;countyID;zoneID;linkID;pollutantID;processID;sourceTypeID;regClassID;fuelTypeID;modelYearID;roadTypeID;em
issionQuant;activity;emissionRate;units
1;1;2023;7;5;16;25;25025;250250;58;119;0;32;0;5;0;0;0;0;g/mi
1;1;2023;7;5;16;25;25025;250250;58;119;0;32;0;2;0;5;0;0;0;g/mi
1;1;2023;7;5;16;25;25025;250250;58;119;0;32;0;1;0;5;0;0;0;g/mi
1;1;2023;7;5;16;25;25025;250250;57;119;0;32;0;5;0;0;0.004421850200742483;0;g/mi
1;1;2023;7;5;16;25;25025;250250;57;119;0;32;0;2;0;5;0;0.05849060043692589;0;g/mi
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Table J-3 MOVES5 Example Input File

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Table J-3 MOVES5 Example Input File

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Source: CMT and Massport, 2025.

J.1.4 Fuel Storage/Handling and Miscellaneous Sources Throughputs

The “other source” category in the *2023/2024 EDR* includes sources such as fuel storage and handling, boilers, snow melters, emergency generators, heaters, and firefighter training activities. **Table J-5** presents Logan Airport’s fuel storage/handling and stationary sources fuel throughputs by fuel category for the 2023 and 2024 analysis year.

Table J-5 2023 and 2024 Fuel Storage/Handling and Stationary Sources Fuel Throughputs by Fuel Type

Source	Fuel Type	2023	2024	Units
Fuel Storage/ Handling	Jet Fuel	497,877,327	545,232,683	Gallons
	Aviation Gas	510,002	545,924	
	Auto Gas	3,384,009	3,650,827	
	Diesel	949,024	981,572	
Miscellaneous Sources	Natural Gas	360,546,104	397,707,467	Cubic Feet
	ULSD	34,674	54,633	Gallons

J.1.5 Greenhouse Gas (GHG) Inputs and Emission Factors

Table J-6 summarizes the data and information used to prepare the year 2023 and 2024 **Greenhouse Gas (GHG)** emission inventories.

Table J-6 2023 and 2024 GHG Inventory Input Usage Data

Activity		Fuel Type	2023	2024	Units
Aircraft					
Aircraft Taxi		Jet A	23,542,423	23,569,716	Gallons
		AvGas	61,983	68,354	
Engine Startup		Jet A	542,389	504,365	
Aircraft AGL to 3,000 feet		Jet A	25,296,169	26,275,018	
		AvGas	146,697	119,268	
Aircraft Support Equipment					
Ground Service Equipment (GSE)		Diesel	726,795	731,484	Gallons
		Gasoline	708,823	709,337	
Auxiliary Power Units (APU)		Jet A	1,131,531	1,621,300	
Motor Vehicles					
On-airport Vehicles		Composite	51,001,591	58,506,592	VMT
On-airport Parking/Curbsides			2,113,350	2,214,455	hours
Massport Shuttle Bus		CNG	204,679	254,876	GEG
Massport Express Bus		Diesel	458,858	479,517	Gallons
NABI Articulated Buses		Diesel	142,500	165,200	
Massport Fire Rescue		Diesel	8,600	8,899	
Massport Fleet Vehicles	Fueled On-site	Gasoline	167,518	188,902	
		Diesel	43,800	40,709	

Table J-6 2023 and 2024 GHG Inventory Input Usage Data

Activity		Fuel Type	2023	2024	Units
	Fueled Off-site	Gasoline	140,261	123,028	
LSG Skychef		Diesel	35,929	44,288	
Off-airport Vehicles	Public	Composite	152,572,728	181,995,857	VMT
	Airport Employees	Gasoline	3,940,906	4,103,829	
	Tenant Employees	Gasoline	57,779,457	58,332,782	
Other Sources					
Boilers and Space Heaters		ULSD	4,431	8,500	gallons
		Natural Gas	360	397	million ft³
Generators		ULSD	19,234	19,793	Gallons
Snow melters		ULSD	11,009	26,340	
		Natural Gas	0.5	0.7	million ft³
Fire Training Facility		Tekflame	5,649	4,236	Gallons
		AvGas	686	529	
Electrical Consumption	Massport/ Tenant/Common Area		176,645,872	185,154,170	kWh

Sources: Massport and CMT, 2025.

Notes: The analysis accounts for electric vehicles and public transportation usage.

Composite fuels are gasoline and diesel.

AGL above ground level

AvGas Aviation Gasoline

CNG compressed natural gas

ft³ cubic feet

GEG gasoline equivalent gallons;

kWh kilowatt hours

ULSD ultra-low sulfur diesel

Emission factors were obtained from the latest available versions of the **U.S. Environmental Protection Agency's (U.S.EPA's)** MOVES and GHG Emission Factors Hub as well as International Organization for Standardization (ISO). **Table J-7** provides the emission factors for carbon dioxide (CO₂), nitrous oxides (N₂O), and methane(CH₄) that were used to prepare the 2023 and 2024 inventories.

Table J-7 2023 and 2024 GHG Emission Factors

Sources	Year	Fuel	CO ₂	N ₂ O	CH ₄	Units
Aircraft ¹	2023/2024	Jet A	21.5	0.00066	– ⁴	lb/gallon
		AvGas	18.3	0.00024	0.01556	
GSE/APU	2023/2024	Diesel	22.5	0.00256	0.00414	lb/gallon
		Gasoline	19.4	0.00236	0.00227	
		Propane	12.6	0.00011	0.00060	

Table J-7 2023 and 2024 GHG Emission Factors

Sources	Year	Fuel	CO ₂	N ₂ O	CH ₄	Units
Motor Vehicles ²	2023	Composite	378	0.003	0.009	g/mile
		Gasoline	366	0.002	0.008	
			2,830	0.046	0.035	g/hour-vehicle
	2024	Composite	379	0.004	0.008	g/mile
		Gasoline	360	0.002	0.008	
			2,729	0.044	0.037	g/hour-vehicle
Buses	2023/2024	Diesel	22.5	0.00018	0.00090	lb/gallon
		Gasoline	19.4	0.00018	0.00084	
Stationary Sources ¹	2023/2024	Natural Gas	120.0	0.00023	0.00226	lb/1000 ft ³
		ULSD	22.5	0.00018	0.00090	lb/gallon
Fire Training Facility ¹	2023/2024	Tekflame ³	12.6	0.00011	0.00060	lb/gallon
		AvGas	18.3	0.00024	0.01556	lb/gallon
Electrical Consumption ⁵	2023/2024	-	0.575 ⁵	N/A	N/A	lb/kWh

Sources: Massport and CMT, 2025.

Notes:

CNG Compressed natural gas
 ULSD Ultra Low Sulfur Diesel
 CO₂ carbon dioxide
 N₂O nitrous oxides
 CH₄ methane
 G grams
 ft³ cubic feet
 kWh kilowatt hour
 lb pound.

1 U.S. Environmental Protection Agency (U.S.EPA), GHG Emissions Factors Hub (September 2023 and June 2024).

2 U.S.EPA, Motor Vehicle Emission Simulator (MOVES) Version 5.

3 As propane.

4 Contributions of CH₄ emissions from commercial aircraft are reported as zero. Years of scientific measurement campaigns conducted at the exhaust exit plane of commercial aircraft gas turbine engines have repeatedly indicated that CH₄ emissions are consumed over the full emission flight envelope [Reference: Aircraft Emissions of Methane and Nitrous Oxide during the Alternative Aviation Fuel Experiment, Santoni et al., Environ. Sci. Technol., July 2011, Volume 45, pp. 7075-7082]. As a result, U.S.EPA published that: "...methane is no longer considered to be an emission from aircraft gas turbine engines burning Jet A at higher power settings and is, in fact, consumed in net at these higher powers." [Reference: U.S.EPA, Recommended Best Practice for Quantifying Speciated Organic Gas Emissions from Aircraft Equipped with Turbofan, Turbojet, and Turboprop Engines, May 27, 2009 [EPA-420-R-09-901], <http://www.epa.gov/otaq/aviation.html>]. In accordance with the following statements in the 2006 IPCC Guidelines (IPCC 2006), FAA does not calculate CH₄ emissions for either the domestic or international bunker commercial aircraft jet fuel emissions inventories. "Methane (CH₄) may be emitted by gas turbines during idle and by older technology engines, but recent data suggest that little or no CH₄ is emitted by modern engines." "Current scientific understanding does not allow other gases (e.g., N₂O and CH₄) to be included in calculation of cruise emissions." (IPCC 1999).

5 Emission factor (EF) source has been changed from prior years to the ISO CO₂e Composite EF from the eGrid factor.