

# Demand data and efficiency indicators in SEA's transport sector

**IEA Demand Side Data and Energy Efficiency Indicators Workshop for Southeast Asia, 10-12 June 2025 (Online)**

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# Transport energy consumption data of SEA economies

# Brunei Darussalam

Transport energy data, 2022, in PJ													
Brunei Darussalam													
		Fuels											
		Motor gasoline	Aviation gasoline	Jet Kerosene	Kerosene	Diesel	Fuel oil	LPG	Natural gas	Biogasoline	Biodiesel	Electricity	Total
Sub-sectors	Total transport sector	11.97		0.14		4.87							16.98
	Domestic air			0.14									0.14
	Road	11.97				4.87							16.84
	Rail												
	Domestic navigation												
	Pipeline												
	Non-specified												
Bunkers	Total bunkers												1.63
	International Aviation												1.63
	International marine												

Source: APEC Energy Database

# Indonesia

Transport energy data, 2022, in PJ													
Indonesia													
		Fuels											
		Motor gasoline	Aviation gasoline	Jet Kerosene	Kerosene	Diesel	Fuel oil	LPG	Natural gas	Biogasoline	Biodiesel	Electricity	Total
Sub-sectors	Total transport sector	1,222.96	0.05	114.64	0.01	855.66	1.68		0.33		337.72	1.24	2,534.29
	Domestic air		0.05	114.64									114.69
	Road	1,222.96				855.66			0.33		337.72		2,416.67
	Rail											1.24	1.24
	Domestic navigation				0.01								0.01
	Pipeline												
	Non-specified						1.68						
Bunkers	Total bunkers												
	International Aviation												
	International marine												

- Not sure if deliveries to international aviation and international marine bunkers are included in domestic air transport and domestic navigation

# Malaysia

Transport energy data, 2022, in PJ													
Malaysia													
		Fuels											
		Motor gasoline	Aviation gasoline	Jet Kerosene	Kerosene	Diesel	Fuel oil	LPG	Natural gas	Biogasoline	Biodiesel	Electricity	Total
Sub-sectors	Total transport sector	578.62		76.16		300.82			1.51		49.95	1.59	1,008.64
	Domestic air			76.16									76.16
	Road	578.62				300.82			1.51		49.95		930.89
	Rail											1.59	1.59
	Domestic navigation												
	Pipeline												
	Non-specified												
Bunkers	Total bunkers												35.42
	International Aviation												
	International marine												35.42

- Not sure if deliveries to international aviation are included in domestic air transport

# The Philippines

Transport energy data, 2022, in PJ

The Philippines

		Fuels											
		Motor gasoline	Aviation gasoline	Jet Kerosene	Kerosene	Diesel	Fuel oil	LPG	Natural gas	Biogasoline	Biodiesel	Electricity	Total
Sub-sectors	Total transport sector	217.23	0.16	14.19		248.52	13.49	0.01		17.00	4.90	0.38	515.90
	Domestic air		0.16	14.19									14.36
	Road	209.99				230.04		0.01		17.00	4.68	0.04	461.76
	Rail					0.08					0.00	0.34	0.42
	Domestic navigation	7.24				18.40	13.49				0.22		39.36
	Pipeline												
	Non-specified												
Bunkers	Total bunkers												55.00
	International Aviation												50.50
	International marine												4.50

Source: APEC Energy Database

# Singapore

Transport energy data, 2022, in PJ													
Singapore													
		Fuels											
		Motor gasoline	Aviation gasoline	Jet Kerosene	Kerosene	Diesel	Fuel oil	LPG	Natural gas	Biogasoline	Biodiesel	Electricity	Total
Sub-sectors	Total transport sector	40.20		0.10		55.58			0.07			10.44	106.38
	Domestic air			0.10									0.10
	Road	40.20				50.34			0.07			0.93	91.53
	Rail											9.51	9.51
	Domestic navigation					5.24							5.24
	Pipeline												
	Non-specified												
Bunkers	Total bunkers												2,237.47
	International Aviation												300.36
	International marine												1,937.11

Source: APEC Energy Database

# Thailand

Transport energy data, 2022, in PJ													
Thailand													
		Fuels											
		Motor gasoline	Aviation gasoline	Jet Kerosene	Kerosene	Diesel	Fuel oil	LPG	Natural gas	Biogasoline	Biodiesel	Electricity	Total
Sub-sectors	Total transport sector	315.45		32.54		643.71	65.96	39.38	45.18	30.26	50.29	0.99	1,223.75
	Domestic air			32.54									32.54
	Road	315.45				631.87		39.38	45.18	30.26	50.29	0.05	1,112.48
	Rail					3.00						0.94	3.94
	Domestic navigation					8.83	65.96						74.80
	Pipeline												
	Non-specified												
Bunkers	Total bunkers												82.74
	International Aviation												82.74
	International marine												

- Deliveries to international marine are included in domestic navigation. Need to revise the data.
- Data are in page 28 of Energy Balance of Thailand publication

# Viet Nam

Transport energy data, 2022, in PJ													
Viet Nam													
		Fuels											
		Motor gasoline	Aviation gasoline	Jet Kerosene	Kerosene	Diesel	Fuel oil	LPG	Natural gas	Biogasoline	Biodiesel	Electricity	Total
Sub-sectors	Total transport sector	299.20		47.31		264.05	13.14		0.53	0.76		1.73	626.72
	Domestic air			47.31									47.31
	Road	299.20				228.35			0.53	0.76		1.64	530.47
	Rail					1.41						0.10	1.50
	Domestic navigation					34.29	13.14						47.43
	Pipeline												
	Non-specified												
Bunkers	Total bunkers												
	International Aviation												
	International marine												

- Deliveries to international marine and aviation may be included in domestic navigation and aviation.

# Transport activity data

# Gross domestic product

## Gross domestic product

PPP @ constant 2021 USD, billion

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AUS	416	380	396	468	615	696	748	855	1,056	929	1,149	1,399	1,548	1,577	1,469	1,352	1,208	1,327	1,430	1,395	1,330	1,559	1,693
BD	6	6	6	7	8	10	11	12	14	11	14	19	19	18	17	13	11	12	14	13	12	14	17
CDA	745	739	761	896	1,027	1,173	1,319	1,469	1,553	1,375	1,617	1,793	1,828	1,847	1,806	1,557	1,528	1,649	1,725	1,744	1,656	2,007	2,161
CHL	78	72	70	76	99	122	154	172	180	172	217	251	267	277	260	242	249	276	296	278	254	316	302
PRC	1,211	1,339	1,471	1,660	1,955	2,286	2,752	3,550	4,594	5,102	6,087	7,552	8,532	9,570	10,476	11,062	11,233	12,310	13,895	14,280	14,688	17,820	17,882
HKC	172	169	166	161	169	182	194	212	219	214	229	249	263	276	291	309	321	341	362	363	345	369	359
INA	165	160	196	235	257	286	365	432	510	540	755	893	918	913	891	861	932	1,016	1,042	1,119	1,059	1,187	1,319
JPN	4,968	4,375	4,183	4,520	4,893	4,831	4,602	4,580	5,107	5,289	5,759	6,233	6,272	5,212	4,897	4,445	5,004	4,931	5,041	5,118	5,056	5,035	4,256
ROK	576	548	627	703	793	935	1,053	1,173	1,047	944	1,144	1,253	1,278	1,371	1,484	1,466	1,500	1,623	1,725	1,651	1,644	1,818	1,674
MAS	94	93	101	110	125	144	163	194	231	202	255	298	314	323	338	301	301	319	359	365	337	374	407
MEX	742	796	811	766	819	918	1,020	1,102	1,162	943	1,105	1,229	1,255	1,327	1,365	1,213	1,112	1,191	1,256	1,305	1,121	1,313	1,463
NZ	53	54	67	88	104	115	112	137	133	121	147	168	176	191	201	178	189	207	212	213	213	254	247
PNG	4	3	3	4	4	5	8	10	12	12	14	18	21	21	23	22	21	23	24	25	24	26	32
PE	52	52	55	59	67	76	89	102	121	121	148	172	193	201	201	190	192	211	223	228	201	226	246
PHL	84	79	84	87	95	107	128	156	182	176	208	234	262	284	297	306	319	328	347	377	362	394	404
RUS	260	307	345	430	591	764	990	1,300	1,661	1,223	1,525	2,046	2,208	2,292	2,059	1,363	1,277	1,574	1,657	1,693	1,493	1,843	2,266
SGP	96	90	93	98	115	128	149	181	194	194	240	279	295	308	315	308	319	343	377	377	349	434	498
CT	259	267	334	382	439	448	469	531	497	488	531	519	511	456	504	546	519	520	534	566	619	668	690
THA	126	120	134	152	173	189	222	263	291	282	341	371	398	420	407	401	413	456	507	544	500	506	496
USA	10,251	10,582	10,929	11,456	12,217	13,039	13,816	14,474	14,770	14,478	15,049	15,600	16,254	16,881	17,608	18,295	18,805	19,612	20,657	21,521	21,323	23,594	25,744
VN	31	33	35	40	45	58	66	77	99	106	147	173	196	214	233	239	257	281	310	334	347	366	410

Source: World Bank World Development Indicators Database. <https://databank.worldbank.org/source/world-development-indicators>

# Population

Population  
Million

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AUS	19.03	19.27	19.50	19.72	19.93	20.18	20.45	20.83	21.25	21.69	22.03	22.34	22.73	23.13	23.48	23.82	24.19	24.59	24.96	25.33	25.65	25.69	26.01
BD	0.33	0.34	0.35	0.35	0.36	0.37	0.37	0.38	0.38	0.39	0.40	0.40	0.41	0.41	0.42	0.42	0.43	0.43	0.43	0.44	0.44	0.45	0.45
CDA	30.69	31.02	31.36	31.64	31.94	32.24	32.57	32.89	33.25	33.63	34.01	34.34	34.71	35.08	35.43	35.70	36.11	36.55	37.07	37.62	38.03	38.24	38.94
CHL	15.35	15.52	15.69	15.86	16.02	16.18	16.33	16.50	16.66	16.83	17.00	17.17	17.34	17.51	17.69	17.87	18.08	18.37	18.70	19.04	19.30	19.49	19.60
PRC	1,262.65	1,271.85	1,280.40	1,288.40	1,296.08	1,303.72	1,311.02	1,317.89	1,324.66	1,331.26	1,337.71	1,345.04	1,354.19	1,363.24	1,371.86	1,379.86	1,387.79	1,396.22	1,402.76	1,407.75	1,411.10	1,412.36	1,412.18
HKC	6.67	6.71	6.74	6.73	6.78	6.81	6.86	6.92	6.96	6.97	7.02	7.07	7.15	7.18	7.23	7.29	7.34	7.39	7.45	7.51	7.48	7.41	7.35
INA	214.07	217.11	220.12	223.08	225.94	228.81	231.80	234.86	237.94	240.98	244.02	247.10	250.22	253.28	256.23	259.09	261.85	264.50	267.07	269.58	271.86	273.75	275.50
JPN	126.84	127.15	127.45	127.72	127.76	127.77	127.85	128.00	128.06	128.05	128.07	127.83	127.63	127.45	127.28	127.14	127.08	126.97	126.81	126.63	126.26	125.68	125.12
ROK	47.01	47.37	47.64	47.89	48.08	48.18	48.44	48.68	49.05	49.31	49.55	49.94	50.20	50.43	50.75	51.01	51.22	51.36	51.59	51.76	51.84	51.77	51.67
MAS	22.95	23.54	24.14	24.74	25.33	25.92	26.51	27.09	27.66	28.22	28.72	29.18	29.66	30.13	30.61	31.07	31.53	31.98	32.40	32.80	33.20	33.57	33.94
MEX	97.87	99.39	100.92	102.43	103.95	105.44	106.89	108.30	109.68	111.05	112.53	114.15	115.76	117.29	118.76	120.15	121.52	122.84	124.01	125.09	126.00	126.71	127.50
NZ	3.86	3.88	3.95	4.03	4.09	4.13	4.18	4.22	4.26	4.30	4.35	4.38	4.41	4.44	4.52	4.61	4.71	4.81	4.90	4.98	5.09	5.11	5.12
PNG	5.51	5.70	5.89	6.09	6.29	6.50	6.71	6.92	7.14	7.36	7.58	7.81	8.03	8.25	8.46	8.68	8.90	9.11	9.33	9.54	9.75	9.95	10.14
PE	26.65	27.01	27.33	27.62	27.89	28.15	28.38	28.60	28.81	29.01	29.23	29.48	29.75	30.04	30.35	30.71	31.13	31.61	32.20	32.82	33.30	33.72	34.05
PHL	77.96	79.63	81.29	82.94	84.61	86.26	87.90	89.56	91.25	92.95	94.64	96.34	98.03	99.70	101.33	103.03	104.88	106.74	108.57	110.38	112.19	113.88	115.56
RUS	146.60	145.98	145.31	144.65	144.07	143.52	143.05	142.81	142.74	142.79	142.85	143.02	143.38	143.81	144.24	144.64	145.02	145.29	145.40	145.45	145.25	144.75	144.24
SGP	4.03	4.14	4.18	4.11	4.17	4.27	4.40	4.59	4.84	4.99	5.08	5.18	5.31	5.40	5.47	5.54	5.61	5.61	5.64	5.70	5.69	5.45	5.64
CT	22.18	22.34	22.46	22.56	22.65	22.73	22.82	22.92	23.00	23.08	23.14	23.19	23.27	23.34	23.40	23.46	23.52	23.56	23.58	23.60	23.58	23.47	23.25
THA	63.07	63.65	64.22	64.78	65.31	65.82	66.32	66.83	67.33	67.81	68.27	68.71	69.16	69.58	69.96	70.29	70.61	70.90	71.13	71.31	71.48	71.60	71.70
USA	282.16	284.97	287.63	290.11	292.81	295.52	298.38	301.23	304.09	306.77	309.33	311.58	313.88	316.06	318.39	320.74	323.07	325.12	326.84	328.33	331.53	332.05	333.27
VN	79.00	79.82	80.64	81.48	82.31	83.14	83.95	84.76	85.60	86.48	87.41	88.35	89.30	90.27	91.24	92.19	93.13	94.03	95.39	96.48	97.58	98.50	99.47

Source: World Bank World Development Indicators Database. <https://databank.worldbank.org/source/world-development-indicators>

# Number of road vehicles (including motorcycles)

Number of road vehicles

Thousand

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AUS	12,288	12,126	12,451	12,786	13,137	13,498	13,896	14,224	14,684	15,004	15,353	15,639	15,980	16,382	16,798	17,142	17,932	18,313	19,089	19,411	19,708	20,149	
BD	181	197	212	218	222	226	235	240	240	238	243	251	257	257									
CDA	17,571	17,783	18,267	18,495	18,665	18,910	19,580	20,071	20,520	20,792	21,201	21,567	21,647	22,334									
CHL	2,006	2,099	2,155	2,212	2,261	2,294	2,342	2,641	3,005	2,904	3,130	3,394	3,689	3,963	4,247	4,422	5,071	4,858	5,150	5,362	5,264	5,716	5,848
PRC	15,701	17,592	20,532	23,829	26,937	31,597	36,974	43,584	50,996	62,806	78,018	93,563	109,331	126,702	145,981	162,745	185,745	209,067	230,173	252,527			
HKC	509	518	518	517	526	533	546	558	568	577	600	623	645	673	692	721	738	758	776	786	794	809	
INA	5,412	5,647	5,983	6,638	7,481	9,062	10,784	12,848	14,001	14,524	15,829	16,762	17,992	19,386	21,233	22,513	24,131	25,197	26,870	27,788			
JPN	72,370	73,067	73,632	74,071	74,881	75,507	75,680	75,469	75,144	75,024	74,997	75,455	75,934	76,539	76,921	77,139	77,491	77,768	77,964	77,991	78,130	78,114	78,295
ROK	12,059	12,914	13,949	14,587	14,934	15,397	15,895	16,428	16,794	17,325	17,941	18,437	18,871	19,401	20,118	20,990	21,803	22,528	23,203	23,634			
MAS	5,242	5,693	5,548	6,732	7,164	7,729	7,858	7,937	8,646	8,900	10,050	10,863	11,004	12,296	12,389	12,614	12,710	14,375	15,368	18,058			
MEX	14,995	17,955	19,065	20,036	21,634	22,707	23,689	24,605	25,540	26,123	30,721	32,303	33,170	34,729	36,259	37,402	39,520	41,756	43,200	44,867			
NZ	2,671	2,744	2,835	2,956	3,074	3,184	3,253	3,319	3,342	3,333	3,354	3,348	3,398	3,480	3,603	3,737	3,891	4,070	4,158	4,262			
PNG	96	96	96	124	125	127	126	128	130	131	131	133	135	138	141	144	148	151	154	158			
PE	1,163	1,209	1,342	1,462	1,507	1,614	1,676	1,766	1,905	2,030	2,130	2,364	2,511	2,546	2,564	2,568	2,569	2,560	2,754	2,943			
PHL	3,701	3,859	4,182	4,286	4,753	5,052	5,323	5,530	5,891	6,220	6,635	7,139	7,463	7,690	7,984	8,707	9,252	10,411	11,595	12,725	11,851	12,067	12,915
RUS	27,189	28,066	29,172	30,706	31,715	33,021	34,787	36,171	40,485	41,514	42,896	45,154	47,837	50,031	51,560	51,846	54,320	55,166	58,424	61,924			
SGP	561	577	535	575	590	616	657	707	749	778	784	796	811	813	808	813	813	821	820	833			
CT	17,856	18,320	18,789	19,412	20,129	20,843	21,307	21,715	22,093	22,389	22,744	23,270	23,401	22,632	22,377	22,504	22,624	22,825	22,996	23,245	23,438	23,755	
THA	6,120	6,438	6,749	7,104	7,264	7,988	8,822	9,700	9,772	10,184	10,700	11,403	12,865	13,922	15,605	15,490	15,606	16,947	17,784	18,597			
USA	221,475	223,446	229,620	231,390	237,243	243,323	247,544	251,180	249,783	248,941	248,200	248,900	251,463	252,680	257,991	264,157	270,283	275,979	281,499	286,884			
VN	6,600	8,796	10,764	11,930	13,995	16,783	19,398	22,600	26,468	29,540	32,699	35,326	37,677	40,411	43,200	46,361	49,640	57,424	61,166	65,554	68,971	71,935	75,434

Source: APEC Energy Database

# Road, passenger-kilometer (pkm)

Passenger-kilometers

Billion

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AUS																							
BD																							
CDA	1,549	1,553	1,597	1,434	1,421	1,478	1,450	1,453	1,574	1,413	1,404	1,404	1,374	1,365	1,327	1,349	1,408	1,529	1,530	1,729	235	542	
CHL																							
PRC	666	721	781	770	875	929	1,013																
HKC																							
INA																							
JPN	951	954	955	954	948	937	918	919	906	899	78	74	76	75	73	71	70	70	70	66	26	30	
ROK																							
MAS																							
MEX																							
NZ																							
PNG																							
PE																							
PHL																							
RUS																							
SGP																							
CT	15	15	16																				
THA																							
USA																							
VN	23	24	26	29	32																		

Source: APEC Energy Database

- A passenger-kilometer (pkm) is a unit of measurement representing the transport of one passenger over a distance of one kilometer. It's a way to quantify the amount of passenger travel within a transport system.
- Question to participants: "Based on your daily commute to work, approximately how many kilometers do you travel each day on average?"
- Edito: 42.8 km/day ~11,000 pkm in one year

## How many pkm?



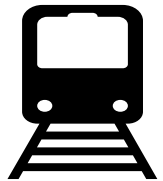
- Bus: 40 passengers, travelled 10 km?



- Motorcycle: 1 passenger, travelled 10 km?



- Car: 4 passengers, travelled 10 km?



- Train: 100 passengers, travelled 10 km?

# Road freight, tonne-kilometer

Road freight, tonne-kilometers

Million

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AUS																							
BD																							
CDA	240,128	233,997	234,707	257,867	274,967	282,512	282,126	285,283	285,564	270,851	292,625	302,484	313,396	327,271	344,069	353,047	372,384	378,802	352,921	365,125	319,206	344,510	
CHL																							
PRC	612,940	633,040	678,250	709,950	784,090	869,320	975,425																
HKC																							
INA																							
JPN	313,118	313,072	312,028	321,862	327,632	334,978	346,534	354,800	346,420	334,667	243,150	231,061	209,956	214,092	210,008	204,316	210,314	210,829	210,467	213,836	213,419	224,095	
ROK																							
MAS																							
MEX																							
NZ																							
PNG																							
PE																							
PHL																							
RUS																							
SGP																							
CT	18,182	17,735	17,731																				
THA																							
USA																							
VN	8	8	9	9	10																		

Source: APEC Energy Database



- A tonne-kilometre (tkm) is a unit of measurement used in freight transport to quantify the amount of goods moved.

# Rail freight, ton-kilometer

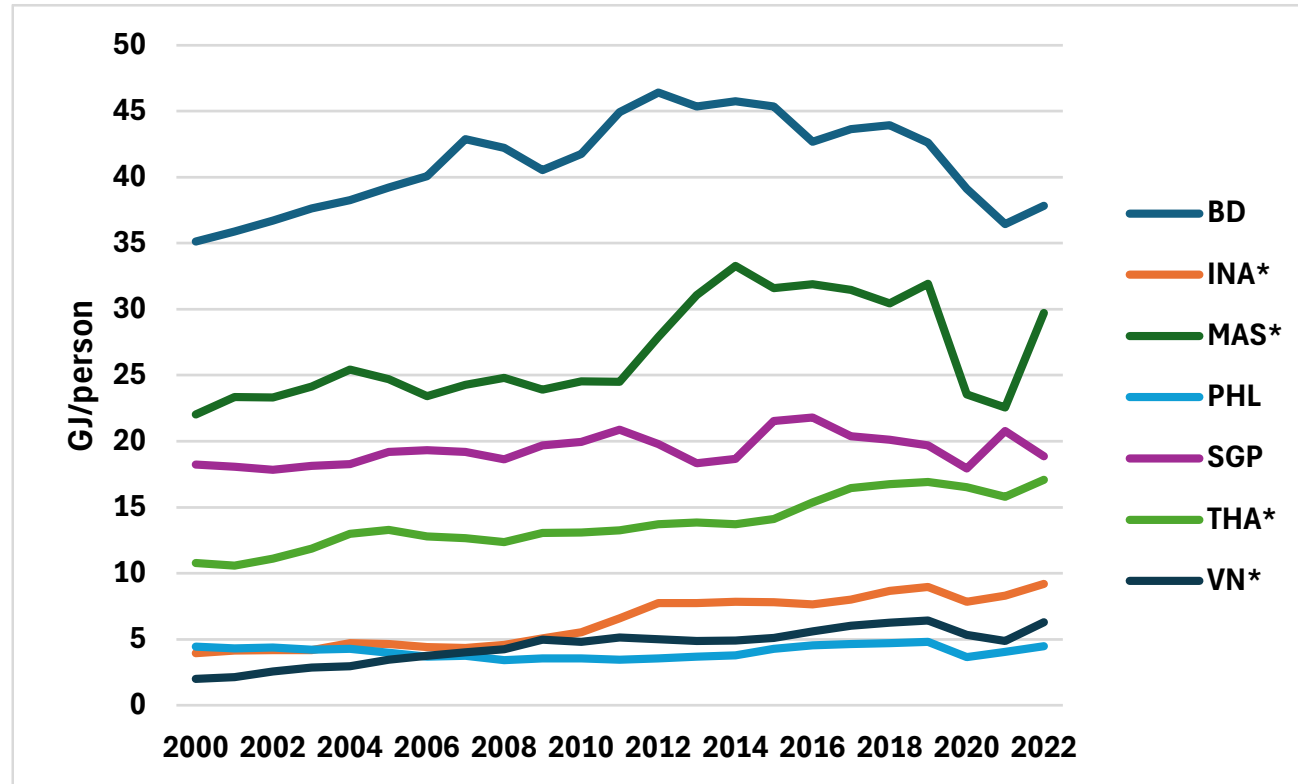
Rail Tonne-kilometer

Million

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AUS	134,200																						
BD																							
CDA	322,511	323,211	317,807	318,263	338,898	352,140	352,477	358,832	340,092	299,829	341,325	352,091	371,074	386,132	415,462	411,813	395,889	423,664	448,319	451,277	420,233	423,865	
CHL	3,141																						
PRC	1,377,050	1,469,410	1,565,840	1,724,670	1,928,880	2,072,600	2,195,441																
HKC																							
INA	4,997																						
JPN	22,136	22,193	22,131	22,794	22,476	22,813	23,192	23,334	22,256	20,562	20,398	19,998	20,471	21,071	21,029	21,519	21,265	21,663	19,369	19,993	18,340	18,042	
ROK																							
MAS	917																						
MEX																							
NZ	4,040																						
PNG																							
PE																							
PHL																							
RUS																							
SGP																							
CT	1	1	1																				
THA	3,384	3,724	3,898	3,976	4,085																		
USA																							
VN	2	2	2	3	3																		

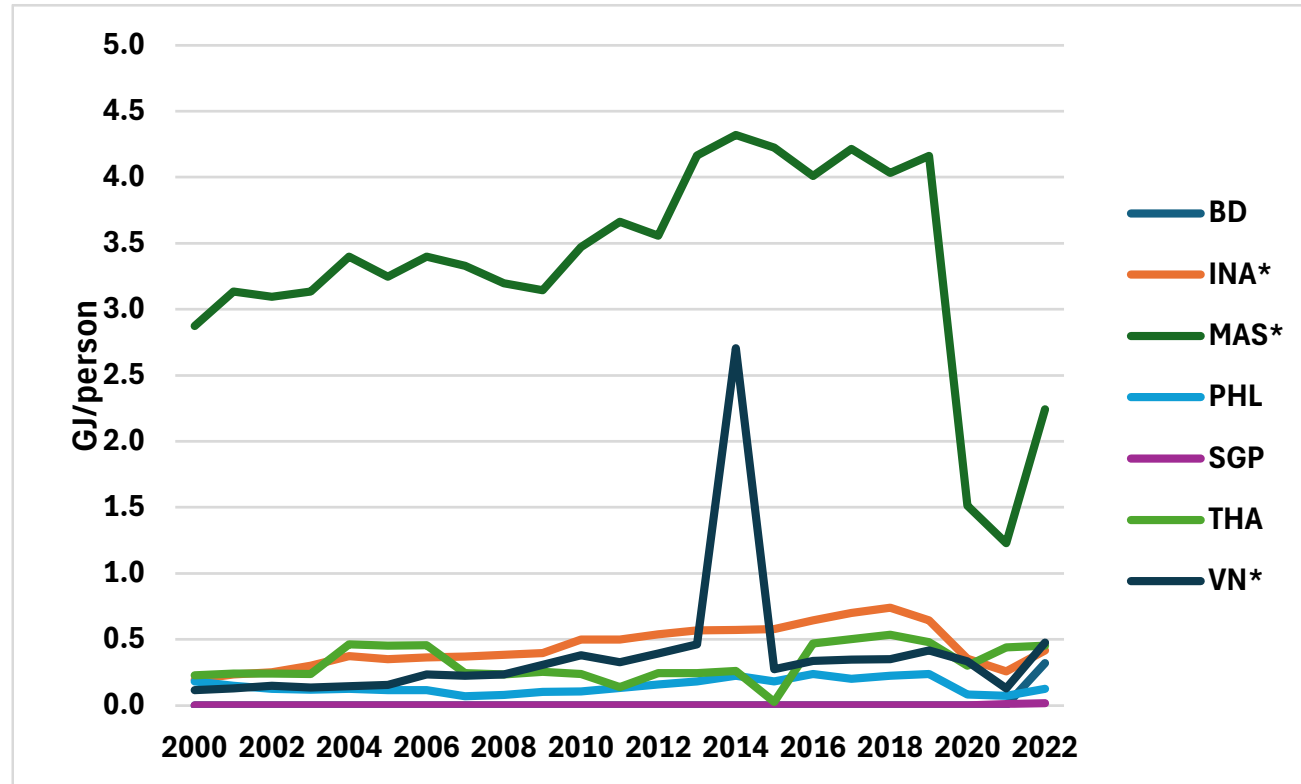
# Energy indicators

# Energy consumption per capita in transportation



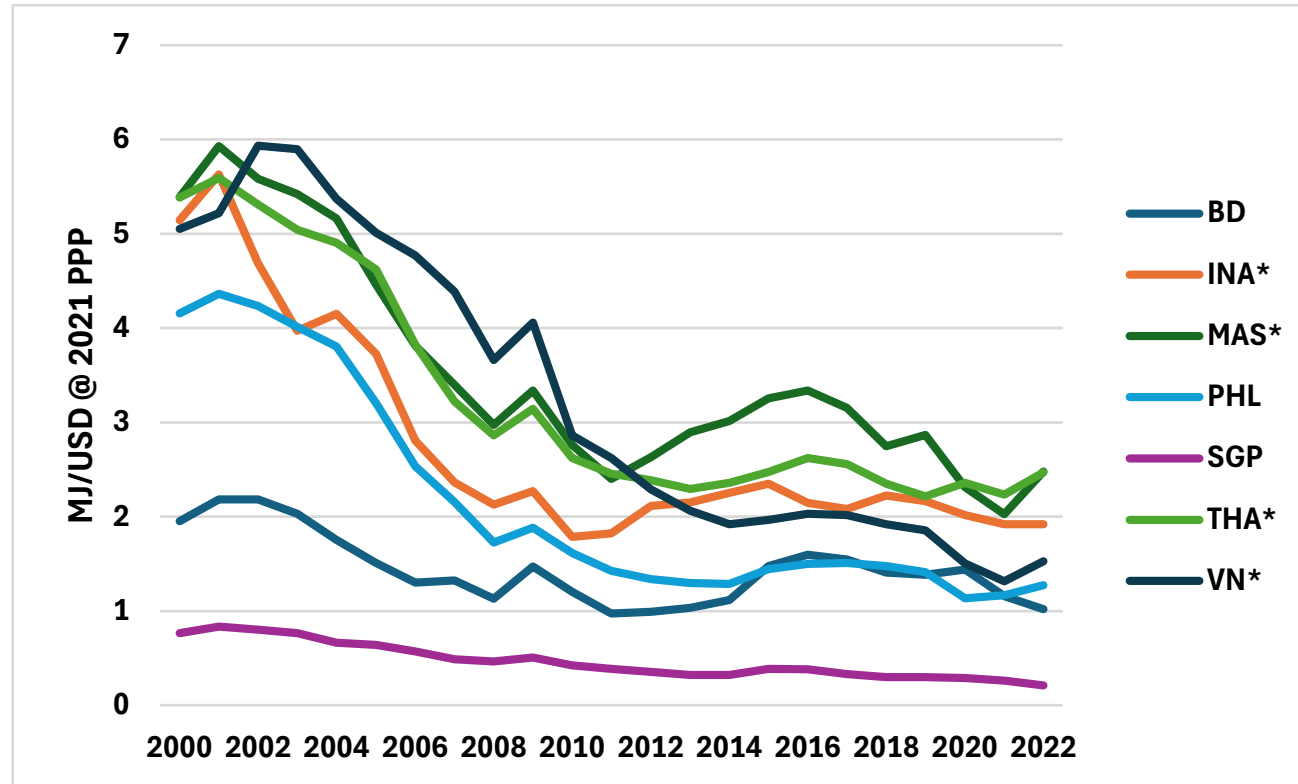
- Transport energy consumption of INA, MAS, and VN could include international aviation and marine bunkers
- THA energy consumption includes international marine bunkers

# Energy consumption per capita in domestic air transportation



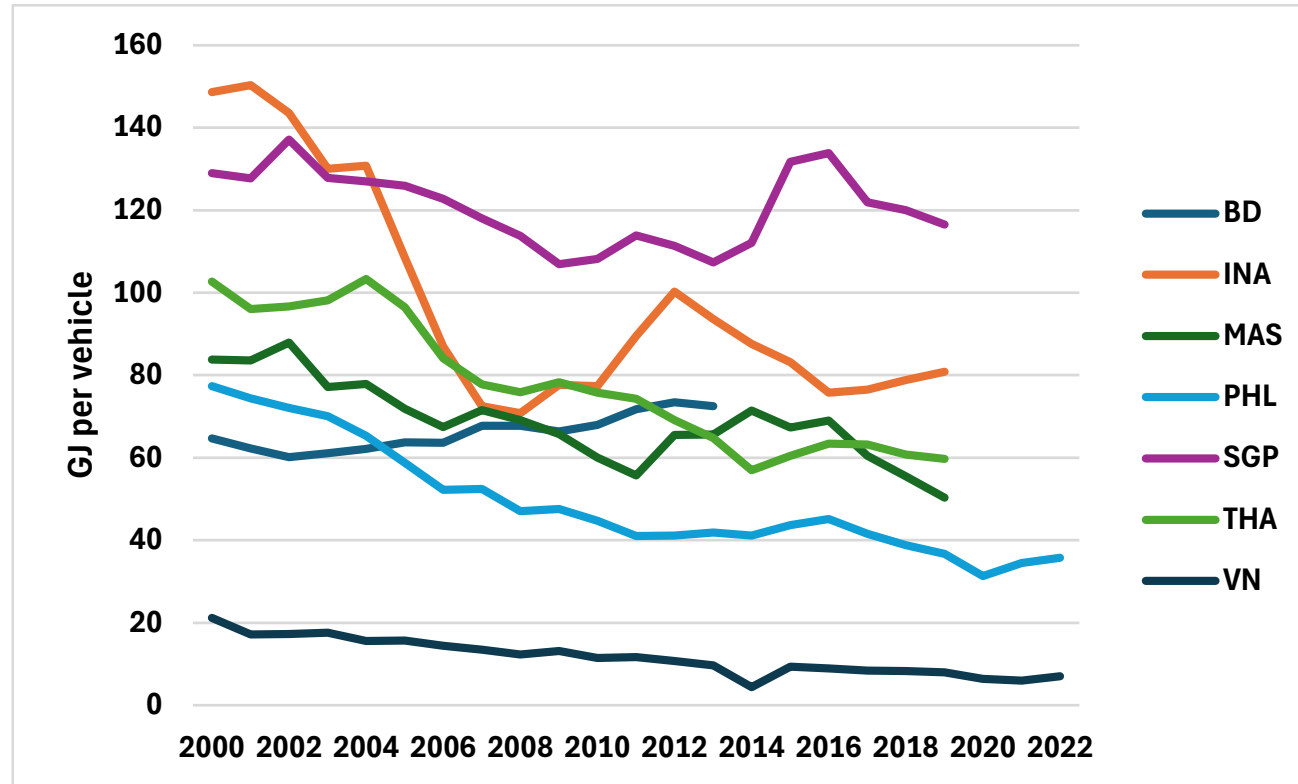
- Transport energy consumption of INA, MAS, and VN could include international aviation bunkers
- There seems to be a data error in VN's 2014 data

# Energy consumption in transportation per GDP



- Transport energy consumption of INA, MAS, and VN could include international aviation and marine bunkers
- THA energy consumption includes international marine bunkers

# Energy consumption per road vehicle



- More than 90% of road vehicles in Viet Nam are motorcycles
- Data error in Viet Nam in 2014

# Conclusion

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- International bunkers (marine and aviation) should be separated from final energy consumption of the transport sector
- Transport energy consumption should be broken down by mode (air, road, rail, water, pipeline, others)
- A lot of data are needed that are not compiled in energy balances; such as:
  - Energy consumption per passenger transport per type of vehicle
  - Energy consumption per freight transport per type of vehicle
- To have good transport energy efficiency indicators, the following **activity** data are needed:
  - Number of vehicles by type (cars, light trucks, buses, trucks, motorcycles)
  - Transport activity data such as passenger-kilometers, freight tonne-kilometers per transport mode and vehicle type

**Thank you for your kind attention.**

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