

Energy Tidbits

Maersk Pause Red Sea Transit Post Houthis Missile/Boat Attack,
US Navy Saves & Sinks 3 Houthis Small Boats Killing Crews

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Table 1. Summary of natural gas supply and disposition in the United States, 2018-2023

billion cubic feet

Year and month	Gross withdrawals	Marketed production	NGPL production ^a	Dry gas production ^b	Supplemental gaseous fuels ^c	Net imports	Net storage withdrawals ^d	Balancing item ^e	Consumption ^f
2018 total	37,326	33,009	2,235	30,774	69	-719	314	-300	30,139
2019 total	40,780	36,447	2,548	33,899	61	-1,916	-503	-408	31,132
2020 total	40,730	36,521	2,710	33,811	63	-2,734	-180	-357	30,603
2021									
January	3,504	3,106	234	2,872	5	-279	719	18	3,335
February	2,939	2,597	195	2,402	5	-152	795	46	3,096
March	3,510	3,136	236	2,900	6	-357	64	27	2,640
April	3,428	3,059	230	2,829	5	-356	-180	-27	2,272
May	3,525	3,158	238	2,921	6	-373	-423	-13	2,116
June	3,390	3,045	229	2,816	5	-331	-254	6	2,242
July	3,509	3,177	239	2,938	6	-338	-175	-12	2,418
August	3,535	3,186	240	2,946	6	-343	-164	-9	2,436
September	3,441	3,104	233	2,871	5	-315	-398	-25	2,138
October	3,613	3,258	245	3,013	6	-317	-368	-75	2,259
November	3,564	3,189	240	2,949	6	-315	137	-92	2,685
December	3,720	3,323	250	3,073	6	-368	330	-33	3,008
Total	41,677	37,338	2,809	34,529	66	-3,845	83	-188	30,646
2022									
January	3,628	3,235	252	2,983	6	-315	1,013	-95	3,593
February	3,266	2,914	227	2,687	5	-288	673	-17	3,059
March	3,663	3,282	256	3,026	6	-380	171	-43	2,781
April	3,568	3,199	250	2,950	6	-342	-220	-33	2,360
May	3,695	3,332	260	3,072	6	-386	-412	-39	2,241
June	3,565	3,232	252	2,980	6	-325	-332	-13	2,317
July	3,736	3,375	263	3,112	6	-303	-187	-46	2,583
August	3,730	3,392	265	3,128	6	-322	-213	-39	2,559
September	3,669	3,330	260	3,071	6	-293	-446	-50	2,288
October	3,814	3,438	268	3,170	6	-315	-432	-66	2,364
November	3,712	3,327	259	3,067	6	-308	78	-77	2,767
December	3,755	3,370	263	3,107	6	-304	588	-21	3,376
Total	43,802	39,428	3,075	36,353	73	-3,880	281	-539	32,288
2023									
January	£3,820	£3,429	270	£3,159	7	-333	455	14	3,302
February	£3,456	£3,103	247	£2,856	6	-331	399	18	2,947
March	£3,858	£3,475	£286	£3,189	6	-401	224	£-8	£3,010
April	£3,729	£3,362	£283	£3,079	5	-400	-268	5	2,421
May	£3,869	£3,500	289	£3,210	6	-422	-452	-26	2,316
June	£3,720	£3,375	£278	£3,098	4	-376	-343	£-27	£2,357
July	£3,827	£3,495	290	£3,205	6	-378	-134	-33	£2,666
August	£3,850	£3,534	£294	£3,240	5	-388	-133	-50	£2,674
September	£3,764	£3,429	£291	£3,138	3	-396	-323	£-54	2,368
October	£3,914	£3,542	302	£3,240	3	-420	-320	-62	2,441
2023 10-month	£37,807	£34,243	2,830	£31,414	53	-3,846	-895	-224	26,501
2022 10-month	36,335	32,731	2,553	30,178	61	-3,268	-385	-441	26,145
2021 10-month	34,393	30,826	2,319	28,507	55	-3,162	-384	-63	24,953

^a We derive monthly natural gas plant liquid (NGPL) production, gaseous equivalent, from sample data reported by gas processing plants on Form EIA-816, *Monthly Natural Gas Liquids Report*, and Form EIA-64A, *Annual Report of the Origin of Natural Gas Liquids Production*.

^b Equal to marketed production minus NGPL production.

^c We only collect supplemental gaseous fuels data on an annual basis except for the Dakota Gasification Co. coal gasification facility, which provides data each month. We calculate the ratio of annual supplemental fuels (excluding Dakota Gasification Co.) to the sum of dry gas production, net imports, and net withdrawals from storage. We apply this ratio to the monthly sum of these three elements. We add the Dakota Gasification Co. monthly value to the result to produce the monthly supplemental fuels estimate.

^d Monthly and annual data for 2018 through 2022 include underground storage and liquefied natural gas storage. Data for January 2023 forward include underground storage only. Appendix A, Explanatory Note 5, contains a discussion of computation procedures.

^e Represents quantities lost and imbalances in data due to differences among data sources. Net imports and balancing item excludes net intransit deliveries. These net intransit deliveries were (in billion cubic feet): 91 for 2022; 184 for 2021; 207 for 2020; -8 for 2019; and -12 for 2018. Appendix A, Explanatory Note 7, contains a full discussion of balancing item calculations.

^f Consists of pipeline fuel use, lease and plant fuel use, vehicle fuel, and deliveries to consuming sectors as shown in Table 2.

^R Revised data.

^{RE} Revised estimated data.

^E Estimated data.

Source: 2018-2022: U.S. Energy Information Administration (EIA), *Natural Gas Annual 2022*. January 2023 through current month: Form EIA-914, *Monthly Crude Oil and Lease Condensate, and Natural Gas Production Report*; Form EIA-857, *Monthly Report of Natural Gas Purchases and Deliveries to Consumers*; Form EIA-191, *Monthly Underground Gas Storage Report*; EIA computations and estimates; and Office of Fossil Energy and Carbon Management, *Natural Gas Imports and Exports*. Table 7 includes detailed source notes for Marketed Production. Appendix A, Notes 3 and 4, includes discussion of computation and estimation procedures and revision policies.

Note: Data for 2018 through 2022 are final. All other data are preliminary unless otherwise indicated. Geographic coverage is the 50 states and the District of Columbia. Totals may not equal sum of components because of independent rounding.

Table 2. Natural gas consumption in the United States, 2018-2023

billion cubic feet, or as indicated

Year and month	Lease and plant fuel ^a	Pipeline and distribution use ^b	Delivered to consumers						Total consumption	Heating value ^c (Btu per cubic foot)
			Residential	Commercial	Industrial	Electric power	Vehicle fuel	Total		
2018 total	1,694	877	4,998	3,514	8,417	10,589	50	27,568	30,139	1,036
2019 total	1,823	1,018	5,019	3,515	8,417	11,288	53	28,291	31,132	1,038
2020 total	1,851	1,020	4,674	3,163	8,213	11,632	49	27,731	30,603	1,037
2021										
January	154	125	895	496	796	864	5	3,056	3,335	1,038
February	129	117	876	496	690	785	4	2,850	3,096	1,041
March	155	98	574	357	709	742	5	2,387	2,640	1,038
April	152	83	342	247	682	761	4	2,037	2,272	1,036
May	157	77	218	182	664	814	5	1,883	2,116	1,035
June	151	82	130	143	644	1,087	4	2,009	2,242	1,034
July	157	89	113	143	673	1,238	5	2,171	2,418	1,035
August	158	90	106	141	674	1,262	5	2,189	2,436	1,034
September	154	78	119	150	645	989	4	1,906	2,138	1,035
October	162	82	193	195	684	939	5	2,015	2,259	1,035
November	158	99	482	337	736	868	4	2,428	2,685	1,037
December	165	112	669	401	778	879	5	2,732	3,008	1,038
Total	1,851	1,131	4,717	3,289	8,375	11,229	54	27,663	30,646	1,037
2022										
January	154	137	958	551	826	961	6	3,302	3,593	1,038
February	139	116	791	464	729	815	5	2,804	3,059	1,038
March	157	105	588	385	761	779	6	2,519	2,781	1,036
April	153	88	384	276	706	748	5	2,120	2,360	1,035
May	159	83	201	183	684	925	6	1,999	2,241	1,034
June	154	86	124	146	655	1,146	5	2,076	2,317	1,033
July	161	97	110	144	665	1,400	6	2,325	2,583	1,033
August	162	96	103	141	677	1,375	6	2,302	2,559	1,035
September	159	85	114	150	653	1,122	5	2,044	2,288	1,036
October	164	88	242	223	692	950	6	2,112	2,364	1,036
November	159	104	513	353	729	903	5	2,504	2,767	1,036
December	161	128	835	492	761	993	6	3,087	3,376	1,041
Total	1,883	1,212	4,964	3,509	8,537	12,118	65	29,193	32,288	1,036
2023										
January	£164	£124	799	475	771	964	£5	3,014	3,302	1,039
February	£148	£111	683	423	708	870	£4	2,689	2,947	1,038
March	£166	£113	633	408	756	930	£5	£2,731	£3,010	1,036
April	£161	£91	338	253	706	869	£4	2,170	2,421	1,035
May	£167	£87	197	183	681	997	£5	2,062	2,316	1,034
June	£161	£88	£129	149	652	1,173	£4	2,107	£2,357	1,034
July	£167	£100	111	143	669	1,471	£5	£2,399	£2,666	1,035
August	£169	£100	104	145	689	1,462	£5	£2,405	£2,674	1,035
September	£164	£89	113	£146	665	1,187	£4	2,116	2,368	1,034
October	£169	£92	228	224	707	1,016	£5	2,180	2,441	1,035
2023 10-month YTD	£1,635	£995	3,334	2,549	7,004	10,939	£44	23,871	26,501	1,036
2022 10-month YTD	1,563	980	3,616	2,664	7,047	10,222	54	23,602	26,145	1,036
2021 10-month YTD	1,528	920	3,565	2,551	6,861	9,481	45	22,504	24,953	1,039

^a We only collect plant fuel data and lease fuel data annually. We estimate monthly lease and plant fuel use from monthly marketed production by assuming that the preceding annual percentage remains constant for the next 12 months.

^b We base published pipeline and distribution use data on reports collected on an annual basis. We estimate monthly pipeline and distribution use data from monthly total consumption (excluding pipeline and distribution use) by assuming that the preceding annual percentage remains constant for the next 12 months. Pipeline and distribution use volumes include line loss, defined as known volumes of natural gas that were the result of leaks, damage, accidents, migration, and/or blow downs, as well as fuel used in liquefaction and regasification.

^c Heating value is the average number of British thermal units per cubic foot of natural gas as reported on EIA-857 and EIA-176. Appendix A, Explanatory Note 11, contains further information.

^R Revised data.

^{RE} Revised estimated data.

^E Estimated data.

Source: 2018-2022: U.S. Energy Information Administration (EIA): Form EIA-857, *Monthly Report of Natural Gas Purchases and Deliveries to Consumers*; state and federal agencies; EIA estimates based on historical data; and *Natural Gas Annual 2022*. January 2023 through current month: Form EIA-914, *Monthly Crude Oil and Lease Condensate, and Natural Gas Production Report*; Form EIA-857; Form EIA-923, *Power Plant Operations Report*. Appendix A, Explanatory Note 6, contains an explanation of computation procedures and revision policy.

Note: Data for 2018 through 2022 are final. All other data are preliminary unless otherwise indicated. Geographic coverage is the 50 states and the District of Columbia. Totals may not equal sum of components because of independent rounding. Appendix A, Explanatory Note 6, contains a definition of sectors.

Table 5. U.S. natural gas exports, 2021-2023

volumes in million cubic feet; prices in dollars per thousand cubic feet

	2023	2022	2021	2023				
	10-month YTD	10-month YTD	10-month YTD	October	September	August	July	June
Exports								
Volume (million cubic feet)								
Pipeline								
Canada	824,783	770,733	743,419	66,936	76,619	68,390	76,567	75,320
Mexico	1,887,413	1,759,003	1,822,052	199,930	202,402	213,050	208,625	204,115
Total pipeline exports	2,712,196	2,529,736	2,565,471	266,866	279,021	281,440	285,193	279,435
LNG								
Exports								
By vessel								
Antigua and Barbuda	37	19	3	7	7	5	4	3
Argentina	76,921	66,939	81,371	0	0	0	11,162	22,663
Bahamas	432	412	416	34	51	47	47	45
Bangladesh	17,650	12,663	37,734	0	0	7,095	0	3,624
Barbados	0	92	236	0	0	0	0	0
Belgium	75,969	76,971	5,584	20,775	17,209	3,363	0	6,953
Brazil	31,324	71,998	272,753	3,720	6,561	3,287	0	8,628
Chile	31,217	30,131	115,987	0	0	3,065	7,144	4,011
China	137,357	72,359	386,026	18,013	10,222	14,252	38,997	20,261
Colombia	23,008	5,703	2,247	6,689	10,322	3,149	0	0
Croatia	42,394	65,961	23,600	0	10,542	3,023	10,121	0
Dominican Republic	61,938	44,179	44,345	8,826	6,734	10,055	6,076	7,443
Egypt	0	0	0	0	0	0	0	0
El Salvador	1	0	0	0	0	0	1	0
Finland	35,681	0	0	2,921	7,057	6,630	3,666	1,622
France	389,785	482,433	126,868	53,559	28,705	34,332	20,589	45,569
Germany	166,936	0	0	17,901	17,228	16,860	17,245	15,769
Greece	31,139	65,740	26,774	0	1,968	4,700	0	2,924
Haiti	92	106	125	8	10	9	8	6
India	139,822	98,241	178,208	13,698	24,452	13,713	20,494	14,488
Indonesia	3,157	2,817	1,594	0	489	766	1,097	0
Israel	0	0	8,906	0	0	0	0	0
Italy	155,600	105,837	34,210	6,850	22,094	21,519	13,923	13,959
Jamaica	8,447	1,232	24,448	1,831	4,038	3	1,443	3
Japan	250,722	164,288	296,703	24,357	36,686	27,825	40,356	28,031
Jordan	3,282	0	0	0	0	0	3,282	0
Kuwait	38,464	57,018	34,476	3,279	6,636	3,289	7,081	10,670
Lithuania	45,491	70,223	30,919	3,555	7,154	7,005	3,375	3,629
Malaysia	0	0	0	0	0	0	0	0
Malta	2,592	2,345	5,427	0	0	0	0	0
Mexico	10,001	3,292	15,200	1,776	0	0	1,954	0
Netherlands	503,750	317,792	142,156	49,701	39,745	57,445	53,296	45,866
Nicaragua	0	0	1	0	0	0	0	0
Pakistan	0	3,074	43,328	0	0	0	0	0
Panama	15,707	9,676	8,436	0	3,196	0	3,295	0
Philippines	3,378	0	0	3,378	0	0	0	0
Poland	114,273	110,066	42,093	14,213	14,121	10,550	3,635	18,046
Portugal	67,008	55,826	50,855	7,125	6,437	6,660	9,845	3,194
Singapore	20,042	22,980	17,190	0	6,649	3,384	0	10,009
South Korea	214,452	253,963	384,495	28,224	24,112	34,932	16,462	17,044
Spain	236,293	366,365	159,662	49,792	9,933	20,023	34,106	12,274
Taiwan	94,316	93,943	83,911	6,686	13,201	14,117	13,090	6,848
Thailand	48,077	25,988	14,548	7,538	0	14,793	7,463	4,242
Turkiye	83,382	142,657	103,098	4,507	3,531	0	0	0
United Arab Emirates	0	0	0	0	0	0	0	0
United Kingdom	353,453	318,437	104,082	25,414	7,464	7,133	0	0
By truck								
Canada	70	68	100	0	16	8	8	17
Mexico	558	1,238	942	27	35	19	25	34
Re-exports								
By vessel								
Argentina	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0
Japan	0	0	0	0	0	0	0	0
South Korea	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0
Total LNG exports	3,534,218	3,223,075	2,909,058	384,403	346,604	353,059	349,292	327,872
CNG								
Canada	1	2	211	0	0	0	0	0
Total CNG exports	1	2	211	0	0	0	0	0
Total exports	6,246,415	5,752,813	5,474,740	651,269	625,625	634,499	634,485	607,307

See footnotes at end of table.

Table 5. U.S. natural gas exports, 2021-2023

volumes in million cubic feet; prices in dollars per thousand cubic feet – continued

	2023					2022		
	May	April	March	February	January	Total	December	November
Exports								
Volume (million cubic feet)								
Pipeline								
Canada	77,984	75,674	106,178	95,691	105,422	959,630	98,718	90,179
Mexico	193,623	169,179	177,653	152,807	166,028	2,078,627	158,638	160,986
Total pipeline exports	271,608	244,853	283,832	248,498	271,450	3,038,257	257,355	251,165
LNG								
Exports								
By vessel								
Antigua and Barbuda	3	3	2	2	4	22	1	2
Argentina	26,930	11,536	2,343	2,287	0	66,939	0	0
Bahamas	45	43	53	27	42	489	42	35
Bangladesh	3,561	0	0	0	3,369	12,663	0	0
Barbados	0	0	0	0	0	93	0	1
Belgium	3,809	4,844	8,053	7,322	3,640	80,245	3,274	0
Brazil	4,196	3,598	1,334	0	0	71,998	0	0
Chile	6,419	0	7,271	0	3,307	30,131	0	0
China	6,593	3,426	5,132	2,565	17,896	96,659	6,992	17,308
Colombia	2,847	0	0	0	0	5,703	0	0
Croatia	2,932	3,163	3,694	6,006	2,913	77,286	6,204	5,122
Dominican Republic	7,871	6,901	876	3,514	3,643	50,824	6,644	0
Egypt	0	0	0	0	0	0	0	0
El Salvador	0	0	0	0	0	0	0	0
Finland	6,935	0	6,850	0	0	329	329	0
France	51,658	53,211	28,581	39,457	34,124	571,399	38,311	50,655
Germany	16,002	18,546	24,841	8,229	14,314	7,113	7,112	1
Greece	4,498	3,905	3,156	6,781	3,207	69,031	2,869	421
Haiti	12	11	8	11	8	115	9	0
India	7,140	14,585	10,230	14,064	6,956	122,518	14,139	10,138
Indonesia	0	0	0	0	805	6,579	3,256	505
Israel	0	0	0	0	0	0	0	0
Italy	18,542	17,378	13,699	17,555	10,082	116,034	6,992	3,205
Jamaica	289	31	540	161	107	1,516	147	137
Japan	27,923	13,687	20,102	14,058	17,696	209,220	20,535	24,396
Jordan	0	0	0	0	0	0	0	0
Kuwait	3,802	3,707	0	0	0	57,018	0	0
Lithuania	7,048	3,412	3,599	0	6,713	77,212	3,281	3,708
Malaysia	0	0	0	0	0	0	0	0
Malta	0	0	0	0	2,592	5,273	0	2,928
Mexico	0	0	3,051	0	3,219	3,832	539	0
Netherlands	60,691	60,234	61,017	39,301	36,453	378,329	39,893	20,645
Nicaragua	0	0	0	0	0	0	0	0
Pakistan	0	0	0	0	0	3,074	0	0
Panama	3,289	0	3,209	0	2,718	13,759	249	3,833
Philippines	0	0	0	0	0	0	0	0
Poland	17,422	7,165	7,236	10,347	11,538	127,404	13,885	3,453
Portugal	10,424	4,237	6,133	6,138	6,816	69,583	10,025	3,732
Singapore	0	0	0	0	0	22,980	0	0
South Korea	10,958	24,734	10,807	22,672	24,507	292,732	24,700	14,069
Spain	12,266	13,680	38,096	32,138	13,987	426,657	33,847	26,445
Taiwan	10,262	9,774	10,311	6,557	3,471	106,738	9,203	3,592
Thailand	0	4,225	4,249	1,829	3,738	25,988	0	0
Turkiye	0	13,908	11,866	13,444	36,126	192,067	17,979	31,430
United Arab Emirates	0	0	0	0	0	0	0	0
United Kingdom	32,374	75,836	70,499	71,702	63,032	464,462	69,332	76,693
By truck								
Canada	7	7	7	0	0	76	8	0
Mexico	26	58	96	106	133	1,552	160	153
Re-exports								
By vessel								
Argentina	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0
Japan	0	0	0	0	0	0	0	0
South Korea	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0
Total LNG exports	366,774	375,843	366,941	326,275	337,155	3,865,643	339,960	302,608
CNG								
Canada	0	0	*	*	*	2	0	*
Total CNG exports	0	0	*	*	*	2	0	*
Total exports	638,382	620,697	650,773	574,773	608,605	6,903,902	597,316	553,774

See footnotes at end of table.

Table 5. U.S. natural gas exports, 2021-2023

volumes in million cubic feet; prices in dollars per thousand cubic feet – continued

								2022
	October	September	August	July	June	May	April	March
Exports								
Volume (million cubic feet)								
Pipeline								
Canada	72,738	61,926	75,220	69,774	70,105	79,214	80,475	105,074
Mexico	171,766	169,159	182,596	189,652	182,995	186,003	176,447	169,885
Total pipeline exports	244,505	231,086	257,816	259,426	253,100	265,217	256,922	274,958
LNG								
Exports								
By vessel								
Antigua and Barbuda	2	3	2	2	3	2	3	2
Argentina	0	0	2,202	9,448	25,246	20,111	9,933	0
Bahamas	40	43	53	45	47	42	34	43
Bangladesh	0	0	0	0	0	3,346	0	3,421
Barbados	0	0	0	0	0	0	0	34
Belgium	7,190	9,165	3,589	0	7,023	3,441	7,341	17,743
Brazil	3,439	0	10,542	5,192	3,857	15,303	3,448	2,236
Chile	0	3,365	0	6,917	0	9,943	3,530	3,214
China	22,598	10,275	10,272	784	7,329	0	10,217	7,527
Colombia	3,699	0	606	0	912	0	0	0
Croatia	2,922	9,073	7,824	4,600	7,925	8,543	6,763	3,358
Dominican Republic	3,469	3,196	3,357	6,532	5,838	4,964	3,645	6,530
Egypt	0	0	0	0	0	0	0	0
El Salvador	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0
France	41,959	57,943	33,885	53,443	37,564	47,150	56,343	64,415
Germany	0	0	0	0	0	0	0	0
Greece	4,424	0	10,763	12,922	9,633	12,650	1,336	4,116
Haiti	0	8	11	8	13	9	11	10
India	7,005	10,528	10,265	13,902	10,653	7,152	14,223	10,438
Indonesia	625	509	967	0	0	0	0	0
Israel	0	0	0	0	0	0	0	0
Italy	0	8,355	15,462	9,914	7,137	21,696	15,519	7,088
Jamaica	144	240	110	121	48	144	135	92
Japan	10,684	7,005	20,156	18,189	21,561	24,024	13,231	17,697
Jordan	0	0	0	0	0	0	0	0
Kuwait	3,299	7,038	6,415	5,382	8,105	14,204	7,298	0
Lithuania	7,072	3,541	7,579	7,947	6,729	11,237	13,770	5,700
Malaysia	0	0	0	0	0	0	0	0
Malta	0	0	0	0	0	0	0	0
Mexico	0	0	0	0	3,292	0	0	0
Netherlands	39,703	30,924	50,020	32,637	34,420	28,902	28,395	24,922
Nicaragua	0	0	0	0	0	0	0	0
Pakistan	0	0	0	0	0	0	3,074	0
Panama	0	0	0	0	623	1,192	1,536	0
Philippines	0	0	0	0	0	0	0	0
Poland	7,095	16,917	6,885	17,780	14,282	18,224	13,882	3,831
Portugal	7,005	5,806	3,202	6,412	5,582	3,888	6,632	10,728
Singapore	6,628	0	0	6,275	3,352	0	0	6,725
South Korea	38,844	19,736	36,033	34,342	25,054	17,538	13,813	19,289
Spain	26,369	21,263	26,140	34,396	29,639	40,337	40,259	59,224
Taiwan	9,041	9,753	8,901	9,353	6,892	15,975	9,541	12,161
Thailand	0	3,673	3,607	0	6,920	3,419	0	0
Turkiye	10,333	5,458	0	0	7,542	7,281	6,637	16,629
United Arab Emirates	0	0	0	0	0	0	0	0
United Kingdom	46,040	51,467	21,263	3,797	3,326	10,608	39,775	56,799
By truck								
Canada	19	0	0	0	8	8	15	0
Mexico	175	94	103	76	105	115	122	144
Re-exports								
By vessel								
Argentina	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0
Japan	0	0	0	0	0	0	0	0
South Korea	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0
Total LNG exports	309,823	295,379	300,215	300,415	300,659	351,448	330,463	364,116
CNG								
Canada	1	*	*	1	*	0	0	*
Total CNG exports	1	*	*	1	*	0	0	*
Total exports	554,328	526,465	558,031	559,842	553,760	616,665	587,385	639,074

See footnotes at end of table.

Table 5. U.S. natural gas exports, 2021-2023

volumes in million cubic feet; prices in dollars per thousand cubic feet – continued

	2022							2021
	February	January	Total	December	November	October	September	August
Exports								
Volume (million cubic feet)								
Pipeline								
Canada	74,630	81,577	937,124	108,568	85,136	62,464	72,023	71,586
Mexico	155,032	175,467	2,154,457	166,956	165,449	184,472	178,746	193,710
Total pipeline exports	229,662	257,045	3,091,580	275,524	250,585	246,936	250,769	265,296
LNG								
Exports								
By vessel								
Antigua and Barbuda	0	2	8	3	2	0	3	0
Argentina	0	0	83,449	2,077	0	0	1,950	14,363
Bahamas	31	34	486	36	34	36	43	56
Bangladesh	5,896	0	37,734	0	0	0	3,276	7,085
Barbados	31	28	297	34	27	25	33	27
Belgium	7,691	13,786	5,584	0	0	0	0	0
Brazil	10,660	17,322	307,714	24,246	10,715	40,769	38,282	34,204
Chile	0	3,162	121,881	2,938	2,956	6,364	7,929	16,262
China	3,357	0	453,304	17,050	50,228	42,202	48,584	51,662
Colombia	0	486	2,247	0	0	0	436	919
Croatia	5,870	9,084	36,133	3,117	9,416	0	0	2,980
Dominican Republic	0	6,647	53,095	5,969	2,780	5,619	0	5,901
Egypt	0	0	0	0	0	0	0	0
El Salvador	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0
France	39,646	50,084	170,780	33,892	10,021	9,333	6,578	7,111
Germany	0	0	0	0	0	0	0	0
Greece	8,094	1,802	39,708	5,305	7,629	1,515	799	3,607
Haiti	16	20	137	4	8	17	10	24
India	7,210	6,866	196,218	3,203	14,807	10,548	23,941	20,592
Indonesia	717	0	3,269	1,218	456	477	1,118	0
Israel	0	0	8,906	0	0	0	2,855	0
Italy	13,629	7,037	34,210	0	0	0	0	3,401
Jamaica	111	86	25,276	113	715	1,858	2,931	2,907
Japan	10,214	21,527	354,948	24,297	33,947	37,666	10,290	19,979
Jordan	0	0	0	0	0	0	0	0
Kuwait	5,277	0	34,476	0	0	6,193	10,333	3,298
Lithuania	3,131	3,518	30,919	0	0	0	3,282	1,677
Malaysia	0	0	0	0	0	0	0	0
Malta	2,345	0	5,427	0	0	0	2,498	0
Mexico	0	0	15,200	0	0	1,088	0	0
Netherlands	31,591	16,279	174,339	23,354	8,829	17,157	10,424	7,347
Nicaragua	0	0	1	0	0	0	0	0
Pakistan	0	0	45,818	0	2,490	3,138	9,642	3,319
Panama	3,069	3,255	8,436	0	0	911	0	1,390
Philippines	0	0	0	0	0	0	0	0
Poland	7,475	3,695	56,320	7,159	7,068	3,270	0	0
Portugal	3,703	2,868	65,865	9,630	5,380	10,459	3,696	6,382
Singapore	0	0	20,918	0	3,728	0	0	0
South Korea	27,489	21,824	453,483	38,201	30,787	33,836	31,375	50,101
Spain	39,359	49,379	215,062	32,579	22,821	35,638	31,274	23,068
Taiwan	6,115	6,211	99,350	12,034	3,404	7,123	5,789	6,728
Thailand	4,880	3,490	14,548	0	0	0	0	3,707
Turkiye	43,697	45,081	188,849	38,420	47,330	19,385	24,176	0
United Arab Emirates	0	0	0	0	0	0	0	0
United Kingdom	25,301	60,060	195,046	60,315	30,648	3,302	3,099	0
By truck								
Canada	4	13	128	20	8	8	19	18
Mexico	157	148	1,250	148	160	182	150	147
Re-exports								
By vessel								
Argentina	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0
Japan	0	0	0	0	0	0	0	0
South Korea	0	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0
Total LNG exports	316,766	353,791	3,560,818	345,363	306,397	298,119	284,813	298,262
CNG								
Canada	0	0	211	0	0	0	0	14
Total CNG exports	0	0	211	0	0	0	0	14
Total exports	546,428	610,836	6,652,609	620,886	556,982	545,055	535,583	563,572

See footnotes at end of table.

Table 5. U.S. natural gas exports, 2021-2023

volumes in million cubic feet; prices in dollars per thousand cubic feet – continued

							2021
	July	June	May	April	March	February	January
Exports							
Volume (million cubic feet)							
Pipeline							
Canada	68,264	69,528	70,561	74,567	91,301	78,198	84,927
Mexico	197,623	198,242	192,549	182,918	183,051	137,381	173,360
Total pipeline exports	265,887	267,770	263,110	257,485	274,352	215,579	258,287
LNG							
Exports							
By vessel							
Antigua and Barbuda	0	0	0	0	0	0	0
Argentina	22,798	19,312	16,226	4,485	2,238	0	0
Bahamas	46	48	45	46	39	29	28
Bangladesh	0	3,493	6,948	10,219	3,566	0	3,148
Barbados	31	22	19	30	14	19	17
Belgium	0	0	2,100	0	3,484	0	0
Brazil	39,637	32,293	19,726	11,615	21,977	13,118	21,132
Chile	19,913	0	17,598	10,293	21,320	6,524	9,784
China	42,222	42,319	37,731	50,474	28,476	3,415	38,940
Colombia	0	0	0	892	0	0	0
Croatia	3,299	2,923	3,364	3,666	7,367	0	0
Dominican Republic	1,806	4,670	5,283	2,905	5,577	5,689	6,895
Egypt	0	0	0	0	0	0	0
El Salvador	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0
France	0	3,683	11,926	36,120	33,678	14,851	3,587
Germany	0	0	0	0	0	0	0
Greece	6,651	0	6,796	0	6,805	0	600
Haiti	8	18	12	3	10	11	12
India	13,090	16,503	28,259	13,752	17,381	13,776	20,367
Indonesia	0	0	0	0	0	0	0
Israel	0	0	0	3,225	2,826	0	0
Italy	6,826	3,425	2,923	6,896	10,739	0	0
Jamaica	0	2,927	2,925	2,370	2,458	2,365	3,708
Japan	24,895	39,783	25,058	28,756	27,673	18,271	64,331
Jordan	0	0	0	0	0	0	0
Kuwait	0	7,126	0	3,705	3,821	0	0
Lithuania	6,469	3,285	3,049	3,078	3,228	6,851	0
Malaysia	0	0	0	0	0	0	0
Malta	0	0	0	2,928	0	0	0
Mexico	758	0	0	0	0	13,354	0
Netherlands	10,597	3,030	26,611	17,060	24,204	22,777	2,949
Nicaragua	1	0	0	0	0	0	0
Pakistan	13,428	3,376	0	3,323	3,421	0	3,682
Panama	0	0	2,341	0	3,279	0	516
Philippines	0	0	0	0	0	0	0
Poland	6,619	10,635	3,581	7,382	3,507	7,099	0
Portugal	3,296	5,538	10,765	7,358	0	3,360	0
Singapore	3,449	0	3,089	3,660	3,303	0	3,688
South Korea	39,314	55,918	46,033	21,683	32,203	18,094	55,936
Spain	8,630	7,833	5,234	22,974	13,900	3,733	7,377
Taiwan	20,653	3,097	10,157	6,594	13,450	0	10,319
Thailand	0	0	3,453	7,388	0	0	0
Turkiye	5,591	0	3,017	0	3,619	20,652	26,659
United Arab Emirates	0	0	0	0	0	0	0
United Kingdom	0	0	10,586	13,877	17,440	34,343	21,436
By truck							
Canada	16	7	18	15	0	0	0
Mexico	97	105	48	48	19	63	83
Re-exports							
By vessel							
Argentina	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0
Japan	0	0	0	0	0	0	0
South Korea	0	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0
Total LNG exports	300,143	271,368	314,922	306,818	321,023	208,394	305,196
CNG							
Canada	16	27	25	29	36	32	32
Total CNG exports	16	27	25	29	36	32	32
Total exports	566,046	539,165	578,056	564,333	595,411	424,004	563,515

See footnotes at end of table.

Table 7. Marketed production of natural gas in selected states and the Federal Gulf of Mexico, 2018-2023

million cubic feet

Year and month	Alaska	Arkansas	California	Colorado	Kansas	Louisiana	Montana	New Mexico	North Dakota	Ohio
2018 total	341,315	589,985	202,617	1,847,402	201,391	2,832,404	43,530	1,493,082	706,552	2,403,382
2019 total	329,361	524,757	196,823	1,986,916	183,087	3,212,318	43,534	1,769,086	850,826	2,651,631
2020 total	339,337	481,205	155,979	1,996,740	163,362	3,205,574	38,191	1,965,533	887,445	2,389,629
2021										
January	31,667	39,288	11,467	160,766	12,900	277,421	3,292	173,924	83,195	193,017
February	28,365	30,185	10,352	143,192	10,142	223,272	2,860	144,784	70,130	174,338
March	31,483	42,468	11,434	157,254	13,251	283,012	3,300	180,642	83,245	193,017
April	29,514	37,756	11,121	156,092	12,830	273,644	3,078	178,897	82,920	185,344
May	29,005	38,563	12,342	163,746	13,073	283,573	3,329	187,958	85,321	191,522
June	27,715	36,921	11,209	155,104	12,711	276,148	2,975	184,699	82,521	185,344
July	26,280	38,047	12,141	161,273	13,227	299,944	3,321	195,871	79,978	189,619
August	27,864	37,755	11,512	159,501	13,227	292,795	3,343	199,330	84,253	189,619
September	28,534	36,527	11,202	154,695	12,770	290,609	3,286	194,265	85,061	183,502
October	30,458	37,648	11,298	162,706	13,227	307,739	3,462	200,454	87,534	199,954
November	30,735	36,102	10,925	156,654	12,711	310,407	3,297	195,247	87,017	193,503
December	33,039	37,023	11,031	159,277	12,918	325,203	3,176	201,095	87,918	199,954
Total	354,660	448,283	136,034	1,890,260	152,986	3,443,767	38,719	2,237,165	999,094	2,278,731
2022										
January	32,865	36,087	11,347	155,786	12,478	318,772	3,119	199,405	81,490	190,930
February	30,014	32,336	9,814	141,557	11,122	290,031	2,977	184,452	75,867	172,453
March	32,473	36,319	11,603	159,101	12,465	319,562	3,370	218,272	88,106	190,930
April	30,910	35,043	11,384	153,816	12,347	324,537	3,175	216,047	68,665	181,993
May	31,677	35,781	11,593	154,313	12,826	348,337	3,170	222,902	81,340	188,060
June	28,644	34,299	11,296	149,081	12,302	336,152	3,208	215,334	86,437	181,993
July	29,654	35,096	11,734	153,856	12,659	348,334	3,367	228,003	90,288	193,328
August	29,380	35,394	12,177	155,140	12,814	351,777	3,544	229,728	89,688	193,328
September	29,288	34,211	11,260	151,515	11,854	348,817	3,491	231,482	90,550	187,092
October	31,122	35,112	11,520	156,992	13,008	365,742	3,560	250,312	93,103	190,335
November	30,934	33,568	11,095	151,304	12,206	357,021	3,266	239,821	85,482	184,195
December	36,181	32,951	11,396	150,558	11,764	355,708	2,461	251,472	76,605	190,335
Total	373,141	416,196	136,220	1,833,019	147,846	4,064,791	38,709	2,687,231	1,007,621	2,244,971
2023										
January	33,391	€34,788	€11,055	€151,849	€11,783	€363,863	€3,538	€254,905	€83,384	€198,189
February	30,726	€31,085	€10,042	€135,238	€10,528	€352,464	€3,233	€233,411	€80,766	€174,917
March	32,676	€34,429	€10,900	€150,138	€11,441	€370,158	€3,565	€268,590	€88,736	€199,571
April	31,313	€32,911	€10,652	€146,856	€11,228	€363,538	€3,475	€259,515	€88,066	€187,566
May	31,288	€33,689	€11,243	€152,690	€11,555	€379,548	€3,577	€263,626	€92,326	€191,104
June	28,991	€32,280	€10,795	€149,138	€10,817	€345,747	€3,469	€252,650	€92,129	€179,766
July	28,478	€33,094	€11,217	€155,584	€10,985	€363,583	€3,551	€264,909	€96,906	€189,040
August	26,756	RE32,973	€11,217	RE157,964	RE11,293	RE365,347	RE3,654	RE270,933	RE97,655	RE195,216
September	28,784	RE31,891	RE10,806	RE152,187	RE10,892	RE352,163	RE3,548	RE264,459	RE98,167	RE188,576
October	31,535	€32,621	€10,897	€157,736	€11,288	€362,168	€3,603	€270,987	€100,305	€186,956
2023 10-month	303,937	€329,760	€108,825	€1,509,380	€111,809	€3,618,579	€35,214	€2,603,984	€918,440	€1,890,900
2022 10-month	306,026	349,677	113,728	1,531,157	123,875	3,352,063	32,981	2,195,938	845,535	1,870,442
2021 10-month	290,886	375,158	114,078	1,574,329	127,357	2,808,157	32,246	1,840,823	824,159	1,885,274

See footnotes at end of table.

Table 7. Marketed production of natural gas in selected states and the Federal Gulf of Mexico, 2018-2023

million cubic feet – continued

Year and month	Oklahoma	Pennsylvania	Texas	Utah	West		Other states	Federal Gulf of Mexico	U.S. total
					Virginia	Wyoming			
2018 total	2,875,787	6,264,832	8,041,010	295,826	1,771,698	1,637,517	485,675	974,863	33,008,867
2019 total	3,036,052	6,896,792	9,378,489	271,808	2,155,214	1,488,854	456,024	1,015,343	36,446,918
2020 total	2,673,207	7,168,902	9,813,035	241,965	2,567,990	1,206,122	435,117	791,491	36,520,826
2021									
January	216,559	652,283	799,384	19,392	226,357	97,700	35,166	71,804	3,105,581
February	162,358	585,293	610,705	18,126	198,404	89,387	31,295	64,043	2,597,230
March	217,547	649,393	828,055	20,404	217,550	95,201	34,611	74,201	3,136,068
April	211,950	620,194	823,807	19,783	215,237	92,348	34,385	69,762	3,058,663
May	218,136	635,492	847,314	20,313	226,230	94,307	35,810	72,051	3,158,085
June	209,019	616,203	817,582	19,522	220,743	90,244	29,181	67,424	3,045,264
July	219,906	638,130	860,680	20,601	221,714	93,624	30,406	71,746	3,176,507
August	218,176	646,670	862,398	20,347	234,964	89,735	33,021	61,409	3,185,920
September	216,136	627,305	858,752	19,928	224,034	92,092	30,825	34,553	3,104,078
October	222,128	651,674	886,988	20,460	231,720	93,092	37,901	60,037	3,258,481
November	220,076	646,383	856,488	20,004	221,495	90,106	32,243	65,566	3,188,958
December	223,437	678,051	897,003	20,541	236,698	91,580	37,047	68,035	3,323,025
Total	2,555,430	7,647,068	9,949,156	239,422	2,675,145	1,109,416	401,892	780,632	37,337,860
2022									
January	216,347	657,613	878,743	20,719	234,795	89,680	30,986	64,105	3,235,266
February	196,621	577,251	795,295	18,516	209,707	78,589	31,234	56,642	2,914,480
March	225,203	634,328	903,364	21,502	239,344	87,991	34,249	64,273	3,282,454
April	226,464	614,569	880,176	21,243	235,580	86,485	31,383	65,402	3,199,218
May	235,497	638,527	918,979	22,306	247,179	85,606	32,053	61,895	3,332,041
June	231,202	616,619	881,753	21,786	240,568	85,970	31,592	64,090	3,232,326
July	239,209	644,039	920,414	22,646	251,625	89,886	34,763	66,176	3,375,077
August	238,619	635,404	937,041	23,549	255,603	87,801	33,420	67,976	3,392,383
September	238,112	618,364	925,985	21,849	245,734	83,339	32,595	64,875	3,330,414
October	245,755	637,050	941,968	22,103	251,647	88,939	33,226	66,250	3,437,743
November	234,562	613,000	910,587	21,297	255,298	85,621	32,901	64,414	3,326,572
December	236,429	624,415	934,211	22,675	253,533	82,730	32,644	64,307	3,370,376
Total	2,764,019	7,511,179	10,828,515	260,192	2,920,613	1,032,634	391,046	770,406	39,428,350
2023									
January	€241,437	€646,645	€935,962	€22,310	€256,931	€79,538	€31,536	€67,666	€3,428,769
February	€217,813	€572,742	€842,907	€18,969	€231,585	€69,492	€27,372	€59,490	€3,102,781
March	€240,498	€642,354	€961,177	€22,752	€266,638	€78,520	€27,921	€64,871	€3,474,934
April	€232,276	€619,656	€932,661	€22,593	€256,029	€75,109	€30,110	€58,454	€3,362,007
May	€237,558	€648,124	€982,394	€24,031	€268,279	€81,880	€30,706	€56,290	€3,499,909
June	€233,220	€627,912	€949,437	€24,338	€266,083	€80,375	€31,225	€57,076	€3,375,450
July	€238,429	€643,265	€985,195	€24,165	€279,996	€70,816	€32,548	€63,043	€3,494,802
August	RE236,507	RE648,577	RE996,400	RE25,154	RE282,678	RE79,142	€32,273	RE59,986	RE3,533,722
September	RE234,532	RE616,777	RE969,819	RE24,587	RE268,934	RE78,772	RE31,376	RE62,801	RE3,429,071
October	€240,412	€640,985	€1,003,056	€25,737	€284,290	€84,924	€32,097	€62,442	€3,542,040
2023 10-month YTD	€2,352,680	€6,307,038	€9,559,008	€234,636	€2,661,442	€778,568	€307,163	€612,120	€34,243,485
2022 10-month YTD	2,293,028	6,273,764	8,983,718	216,220	2,411,782	864,284	325,501	641,685	32,731,402
2021 10-month YTD	2,111,917	6,322,635	8,195,665	198,876	2,216,952	927,730	332,601	647,031	30,825,877

RE Revised estimated data.

E Estimated data.

Source: 2018-2022: U.S. Energy Information Administration (EIA), *Natural Gas Annual 2022*, Bureau of Safety and Environmental Enforcement (BSEE), IHS Markit, and Enverus. January 2023 through current month: Form EIA-914, *Monthly Crude Oil and Lease Condensate, and Natural Gas Production Report*; and EIA computations.

Note: For 2023 forward, we estimate state monthly marketed production from gross withdrawals using historical relationships between the two. We collect data for Arkansas, California, Colorado, Kansas, Louisiana, Montana, New Mexico, North Dakota, Ohio, Oklahoma, Pennsylvania, Texas, Utah, West Virginia, Wyoming, and federal offshore Gulf of Mexico individually on the EIA-914 report. The "other states" category comprises states/areas not individually collected on the EIA-914 report (Alabama, Arizona, Federal Offshore Pacific, Florida, Idaho, Illinois, Indiana, Kentucky, Maryland, Michigan, Mississippi, Missouri, Nebraska, Nevada, New York, Oregon, South Dakota, Tennessee, and Virginia). Before 2023, Federal Offshore Pacific is included in California. We obtain all data for Alaska directly from the state. Monthly preliminary state-level data for all states not collected individually on the EIA-914 report are available after the final annual reports for these series are collected and processed. Final annual data are generally available in the third quarter of the following year. The sum of individual states may not equal total U.S. volumes because of independent rounding.



U.S. DEPARTMENT OF
ENERGY

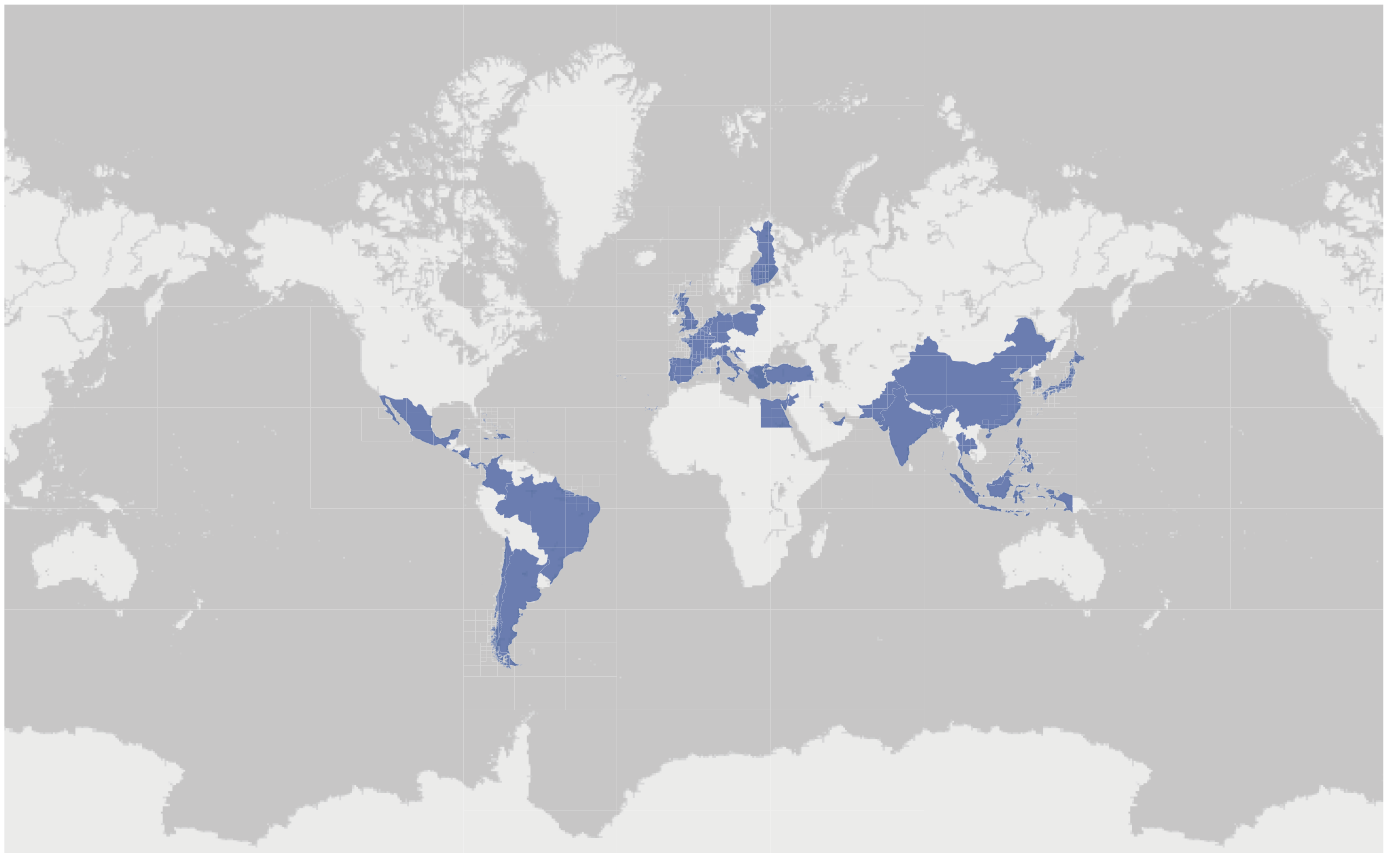
Fossil Energy and
Carbon Management

OFFICE OF RESOURCE SUSTAINABILITY

Office of Regulation, Analysis, and Engagement
Division of Natural Gas Regulation

U.S. Natural Gas Imports and Exports Monthly October 2023

Data are current as of the publication date. Any revisions to reported data will be published in the next scheduled monthly report.



U.S. LNG Historical Countries of Destination

To be placed on the U.S. Natural Gas Imports & Exports Monthly email distribution list, please add your contact information [here](#).

All other inquiries, please send an email to ngreports@hq.doe.gov.

For electronic version: <https://www.energy.gov/fecm/listings/natural-gas-imports-exports-monthly-reports>

Executive Summary

October 2023

Summary

In October 2023, the United States exported 651.3 Bcf and imported 247.7 Bcf of natural gas, which resulted in 403.6 Bcf of net exports.

U.S. LNG Exports

The United States exported 384.4 Bcf (59.0% of total U.S. natural gas exports) of natural gas in the form of liquefied natural gas (LNG) to 28 countries.

- Europe (259.7 Bcf, 67.6%), Asia (101.8 Bcf, 26.5%), Latin America/ Caribbean (22.9 Bcf, 6.0%)
- 10.9% increase from September 2023
- 24.1% increase from October 2022
- 88.2% of total LNG exports went to non-Free Trade Agreement countries (nFTA), while the remaining 11.8% went to Free Trade Agreement countries (FTA).

U.S. LNG exports to the top five countries of destination accounted for 54.7% of total U.S. LNG exports.

- France (53.6 Bcf, 13.9%), Spain (49.8 Bcf, 13.0%), Netherlands (49.7 Bcf, 12.9%), United Kingdom (28.8 Bcf, 7.5%), and South Korea (28.2 Bcf, 7.3%).

U.S. Imports and Exports by Pipeline and Truck with Mexico

The United States exported 200.0 Bcf of natural gas to Mexico and imported less than 0.1 Bcf of natural gas from Mexico, which resulted in 199.9 Bcf of net exports.

- 1.2% decrease from September 2023
- 16.3% increase from October 2022

U.S. Imports and Exports by Pipeline and Truck with Canada

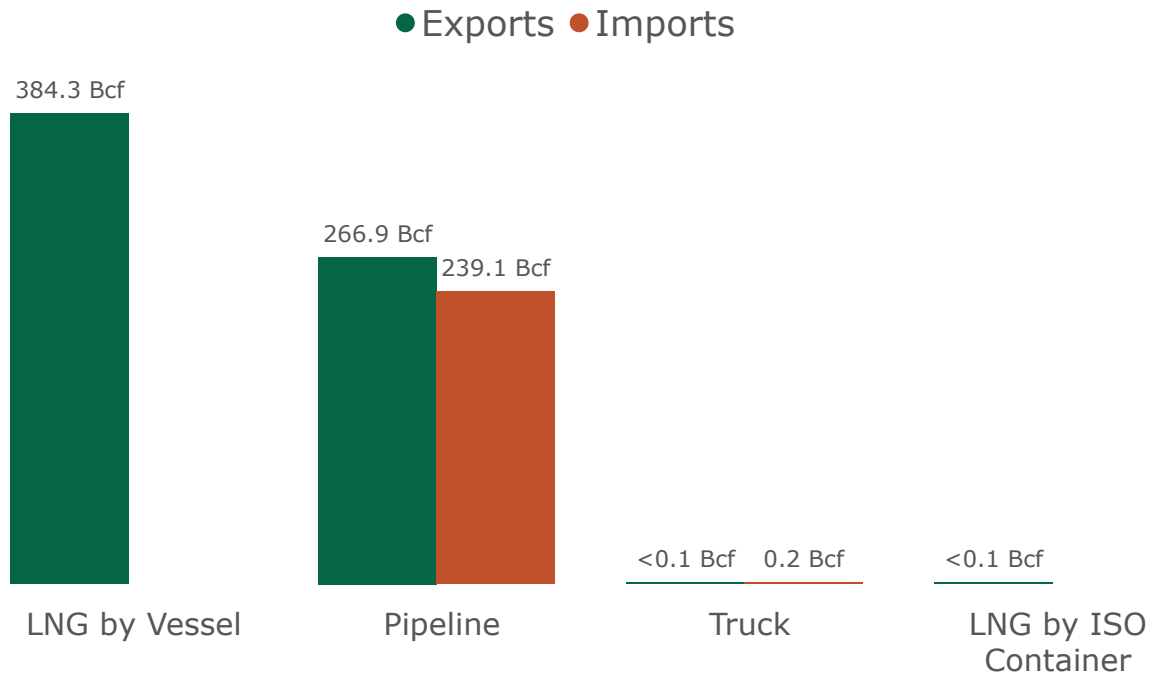
The United States exported 66.9 Bcf of natural gas to Canada and imported 239.3 Bcf of natural gas from Canada, which resulted in 172.3 Bcf of net imports.

- 12.7% increase from September 2023
- 8.0% increase from October 2022

U.S. Natural Gas Imports & Exports

Monthly Summary

U.S. Natural Gas Imports & Exports by Mode of Transport (October 2023)



1a. Monthly Summary: U.S. Natural Gas Imports & Exports by Mode of Transport

Volume (Bcf)	Monthly			Percentage Change	
	Oct 2023	Sep 2023	Oct 2022	Oct 2023 vs. Sep 2023	Oct 2023 vs. Oct 2022
Exports					
LNG by Vessel	384.3	346.5	309.4	11%	24%
Pipeline	266.9	279.0	244.5	-4%	9%
Truck	<0.1	<0.1	0.2	-47%	-86%
LNG by ISO Container	<0.1	<0.1	0.2	-30%	-73%
Total	651.3	625.6	554.3	4%	17%
Imports					
LNG by Vessel	0	0	0	-	-
Pipeline	239.1	237.5	247.9	<1%	-4%
Truck	0.2	0.2	0.2	23%	1%
LNG by ISO Container	0	0	0	-	-
Total	239.3	237.7	248.2	<1%	-4%
Net Exports	412.0	388.0	306.2	6%	35%

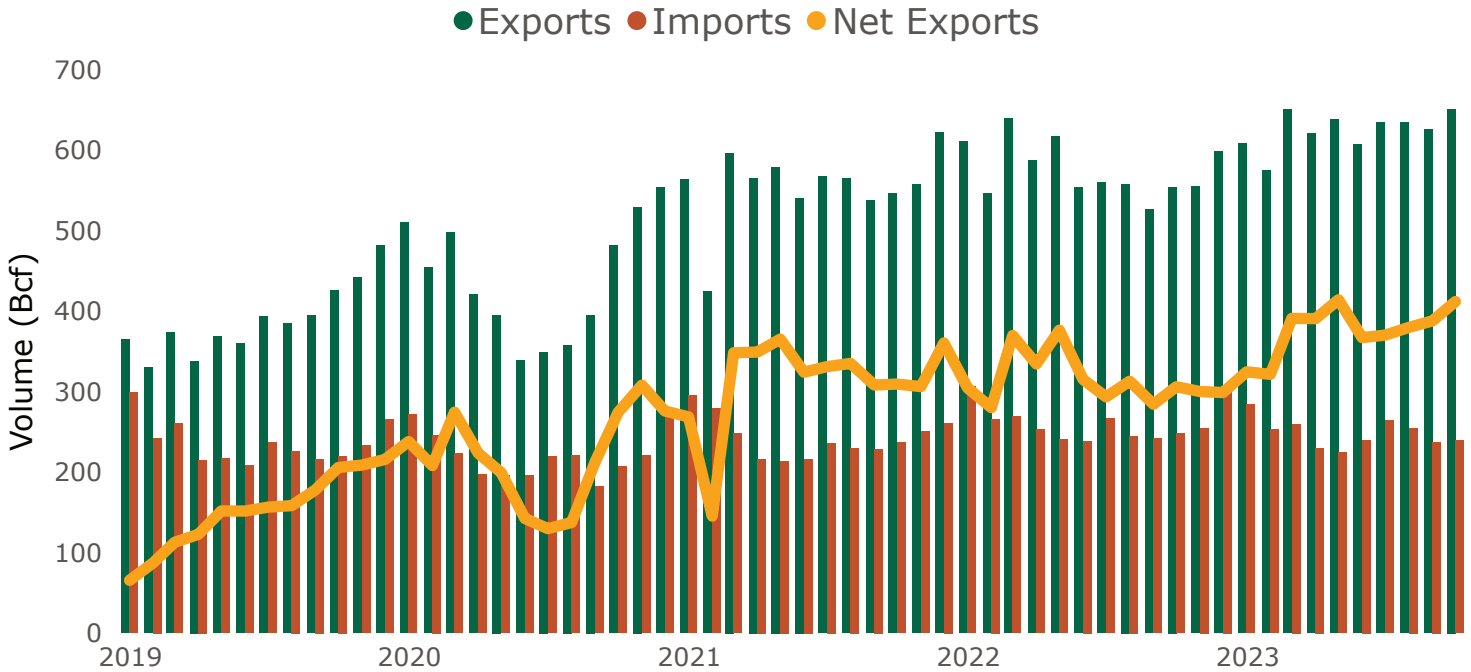
Notes

- Natural gas imports & exports by truck included compressed natural gas (CNG) and liquefied natural gas (LNG).
- Does not include LNG Re-Exports or Puerto Rico LNG Imports or Exports. See Table 6 for LNG Re-Exports and Table 8 for Puerto Rico LNG Imports and Exports.
- Totals may not equal sum of components because of independent rounding.
- not applicable(-).

U.S. Natural Gas Imports & Exports

Year-to-Date and Annual Summary

U.S. Natural Gas Imports & Exports



1b. Year-to-Date and Annual Summary: U.S. Natural Gas Imports & Exports by Mode of Transport

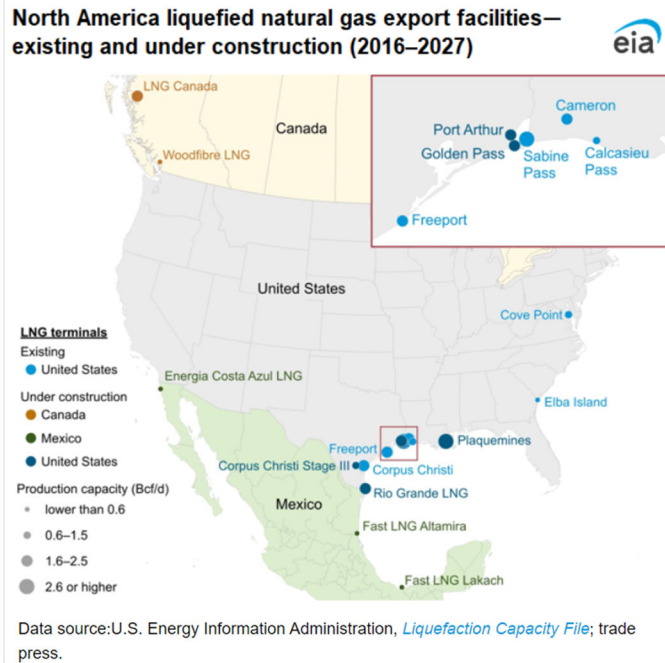
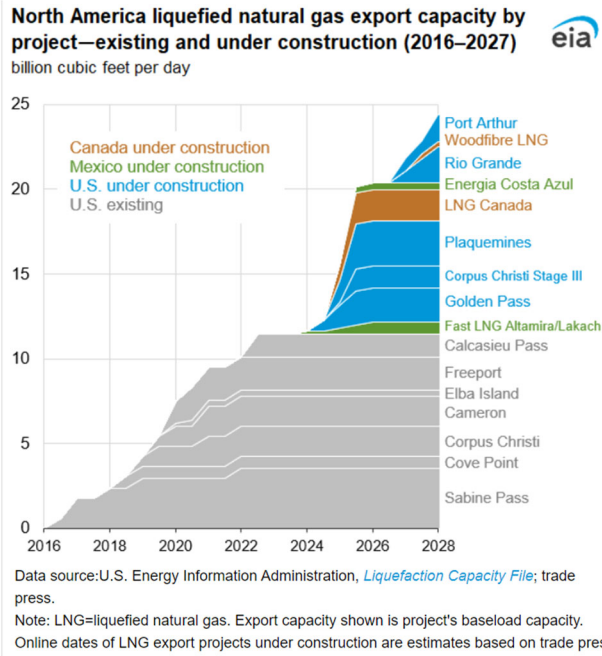
Volume (Bcf)	Year-to-Date (Jan-Oct)			Annual		
Mode of Transport	YTD 2023	YTD 2022	% Change	2022	2021	% Change
Exports						
LNG by Vessel	3,532.6	3,220.0	10%	3,861.9	3,558.3	9%
Pipeline	2,712.2	2,529.7	7%	3,040.8	3,103.3	-2%
Truck	0.6	1.3	-52%	1.6	1.6	3%
LNG by ISO Container	1.0	1.7	-43%	2.1	1.1	83%
Total	6,246.4	5,752.8	9%	6,906.4	6,664.4	4%
Imports						
LNG by Vessel	10.5	19.5	-46%	23.5	21.4	10%
Pipeline	2,474.5	2,553.9	-3%	3,104.0	2,890.5	7%
Truck	2.1	1.7	23%	2.1	0.5	296%
LNG by ISO Container	0	0	-	0	0	-
Total	2,487.1	2,575.1	-3%	3,129.6	2,912.4	7%
Net Exports	3,759.3	3,177.7	18%	3,776.8	3,752.0	<1%

Notes

- Does not include LNG Re-Exports or Puerto Rico LNG Imports or Exports. See Table 6 for LNG Re-Exports and Table 8 for Puerto Rico LNG Imports and Exports.
- Totals may not equal sum of components because of independent rounding.
- not applicable(-).

Natural Gas Weekly Update

for week ending October 25, 2023 | Release date: October 26, 2023 | Next release: November 2, 2023 | [Previous weeks](#)



LNG exports from North America are set to expand with new projects

Over the next five years, we expect North America's liquefied natural gas (LNG) export capacity to expand by 12.9 billion cubic feet per day (Bcf/d) as Mexico and Canada place into service their first LNG export terminals and the United States adds to its 11.4 Bcf/d of existing LNG capacity. **By the end of 2027, we estimate LNG export capacity will grow by 1.1 Bcf/d in Mexico, 2.1 Bcf/d in Canada, and 9.7 Bcf/d in the United States from a total of ten new projects across the three countries.**

Mexico. Three projects with a combined LNG export capacity of 1.1 Bcf/d are currently under construction—Fast LNG Altamira offshore and onshore, Fast LNG Lakach on the east coast, and Energia Costa Azul on the west coast.

- Fast LNG Altamira consists of three units, each with a capacity to liquefy up to 0.18 Bcf/d. The first unit will be located offshore and the other two units will be installed onshore at the Altamira LNG regasification terminal. These units will be supplied by natural gas from the United States delivered via the [Sur de Texas-Tuxpan pipeline](#). The first LNG exports from the offshore unit are expected in December 2023, and LNG exports from the onshore units are expected in 2025.
- The Fast LNG Lakach unit (capacity 0.18 Bcf/d) will be installed offshore of Veracruz, Mexico, at the nearby Lakach natural gas field. First LNG exports are expected in 2026.
- The [Energia Costa Azul LNG export terminal](#) is located at the site of the existing LNG regasification terminal in Baja California, western Mexico. The LNG export capacity will be 0.4 Bcf/d for Phase 1 (under construction) and 1.6 Bcf/d for Phase 2 (proposed). The export terminal will be supplied with [natural gas from the Permian Basin](#) in the United States.

Developers have proposed other LNG export projects for Mexico's west coast, including Saguario Energia LNG, Salina Cruz FLNG, and Vista Pacifico LNG, which have a combined capacity over 2.7 Bcf/d. These projects will use relatively low-cost natural gas imported from the United States for LNG exports to Asian markets. However, none of these proposed projects has reached a final investment decision yet.

Canada. Two LNG export projects with a combined capacity of 2.1 Bcf/d are under construction in British Columbia on Canada's west coast. [LNG Canada](#) (with an export capacity of 1.8 Bcf/d) is scheduled to begin service in 2025, and [Woodfibre LNG](#) (0.3 Bcf/d) is scheduled to begin service in 2027. Both export terminals will be supplied with natural gas from western Canada. In addition, [the Canada Energy Regulator \(CER\) has authorized an additional 18 LNG export projects](#) with a combined capacity of 29 Bcf/d.

United States. [Five LNG export projects are currently under construction](#) with a combined 9.7 Bcf/d of LNG export capacity—Golden Pass, Plaquemines, Corpus Christi Stage III, Rio Grande, and Port Arthur. LNG exports from Golden Pass LNG and Plaquemines LNG are [expected to start](#) in 2024.

Russian Petroleum Exports Decline as Diesel, Naphtha Flows Ease 2023-12-28 05:00:00.2 GMT

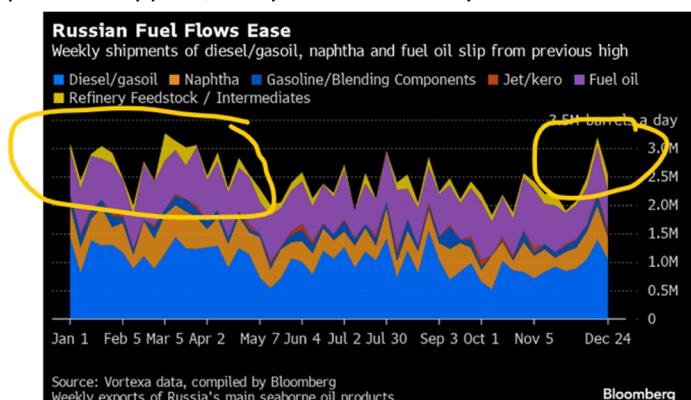
By Prejula Prem

(Bloomberg) -- Russia's oil-product exports dropped on a weekly basis, led by a slump in shipments of diesel, naphtha and fuel oil.

The more volatile weekly flows for the period though Dec. 24 slipped to 2.5 million barrels a day, according to data compiled by Bloomberg from analytics firm Vortexa Ltd. That was about 666,000 barrels down from the revised figure for the period to Dec. 17.

However, the four-week average climbed to the highest in more than seven months amid a ramp-up in oil processing at Russian refineries. Oil-product flows from the nation reached 2.6 million barrels a day in the four weeks to Dec. 24, up by 157,000 barrels a day from the previous week.

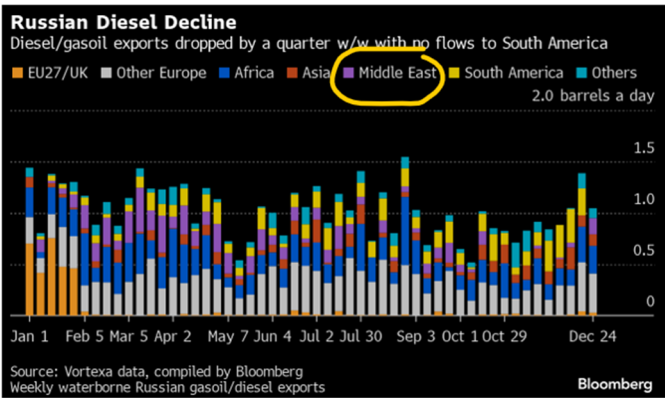
The oil market is closely monitoring Russian exports to assess its production levels since Moscow stopped releasing official output data. In the previous OPEC+ meeting, Russia agreed to deepen its export cuts next quarter by 300,000 barrels a day for crude oil and by 200,000 barrels a day of its oil-product supplies, compared to the May-June 2023 baseline.



Here's a breakdown of shipments from Russian ports for the week through Dec. 24:

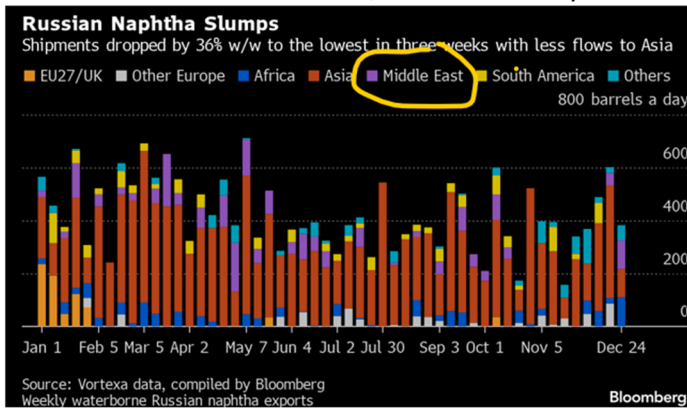
Diesel and gasoil exports slumped by a quarter on a weekly basis to just above 1 million barrels a day, the lowest in three weeks. No shipments were observed to South America, while cargoes heading to the Middle East jumped to a 13-week high.

There still remains some restrictions on Russian winter-grade diesel exports as outflows are allowed only if the fuel is delivered to ports by pipeline and refiners need to keep at least 50% of their output at home.



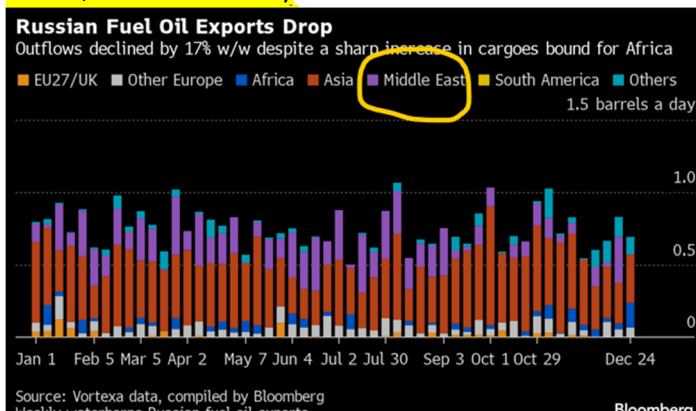
Naphtha shipments dropped by 36% on a weekly basis to 382,000 barrels a day, the lowest in three weeks. Volumes to Asia have declined, while flows to Africa and the Middle East have increased.

Gasoline and blending component exports plunged to the lowest since mid-October to 23,000 barrels a day.



Meanwhile, jet fuel shipments more than doubled on a weekly basis to 106,000 barrels a day.

Fuel oil flows dropped by 17% on a weekly basis to about 692,000 barrels a day, even as cargoes bound for Africa jumped. Shipments of refinery feedstocks like vacuum gasoil gained 73% to 281,000 barrels a day.



Cargo volumes and destinations are likely to be revised if more port data or vessel information becomes available. To contact the reporter on this story: Prejula Prem in London at pprem1@bloomberg.net
 To contact the editors responsible for this story: Alaric Nightingale at anightingal1@bloomberg.net
 Andrew Reiersen

India Seeks More Middle East Crude as Attacks Delay Cargoes (1)

2023-12-27 11:35:14.368 GMT

By Rakesh Sharma and Ruchi Bhatia

(Bloomberg) -- Refiners in India, the world's third-largest crude oil importer, are seeking to boost supplies from the Middle East and other nearby nations as recent attacks on ships in the Red Sea raise the risk of longer shipping time and higher costs, according to people familiar with the matter.

Shippers turned cautious about entering the Red Sea in recent weeks due to multiple attacks by Yemen's Iran-backed Houthi rebels. That prompted massive diversions, with many ships taking a longer route around the Cape of Good Hope, adding as much as three weeks to the voyage. Vessels carrying cargoes from the producers in the Mediterranean and North Sea are among those affected, as they travel the Suez Canal and Red Sea en route to Asia.

Shipping companies are asking Indian firms to bear the risk premiums for deliveries via the usual route, said the people, who asked not to be identified because of the sensitivity of the issue. The refiners are not willing to bear the additional liability and are scouting for alternative suppliers, they said. Indian refiners are concerned their margins may come under pressure due to a sharp rise in insurance and freight costs. However, they also need to keep pace with domestic demand, which is rising because of the South Asian nation's rapid economic growth.

State-owned Bharat Petroleum Corp Ltd. has already arranged crude oil from other sources, a company official said, but didn't provide more details.

The government is advising merchants to take longer routes and diversify energy imports, with greater emphasis on buying from the Persian Gulf and Central Asia, officials from India's trade ministry said on condition of anonymity. Talks are also underway with countries such as Saudi Arabia and the United Arab Emirates to strengthen maritime security cooperation in the Red Sea region, they said.

A spokesperson from the ministry didn't immediately respond to an email seeking comment.

The flow of Russian oil from the Black Sea region may be affected and rerouted, leading to a higher premium for crude from the Middle East, said Madhavi Arora, lead economist at Emkay Global Financial Services Ltd. India's refined fuel product exports to the EU too could be impacted, she said.

Although, Indian refiners are concerned about supplies, there hasn't been any impact on refinery run rates so far, the people said. India's Prime Minister Narendra Modi discussed the situation in the Middle East, including the Red Sea attacks, with Saudi Arabia's Crown Prince Mohammed bin Salman on Tuesday.

To contact the reporters on this story: Rakesh Sharma in New Delhi at rsharma511@bloomberg.net;

Ruchi Bhatia in New Delhi at rbhatia91@bloomberg.net

To contact the editors responsible for this story: Serene Cheong at scheong20@bloomberg.net

Atul Prakash, Muneeza Naqvi



Defence Minister confirms combat readiness to deal with all possible options & hypotheses

Defence Minister confirms combat readiness to deal with all possible options & hypotheses

[25/December/2023]

SANA'A December [25. 2023](#) (Saba) - The Minister of Defense of the caretaker government, Major General Muhammad Nasser Al-Atfi, affirmed the Yemeni position in the Red Sea, the Gulf of Aden, Bab al-Mandab and the Arabian Sea, and that it is highly prepared and on full combat readiness to deal with all options and possible hypotheses .

This came in a speech he delivered on Monday before participants in the analytical conference for commanders, staffs and officers of the naval forces and coastal defense for the training, combat and operational year 2023 AD, as well as the missions carried out in the Red Sea, the Arabian Sea and Bab al-Mandab, and the readiness and full combat preparedness for the procedures and strategic options of the leader of the revolution in supporting Gaza.

Major General Al-Atafi said: "Our strategic deterrent weapons and their ranges reach far beyond what the enemies expect, and there are no red lines in front of us. All possibilities are open, all the time distance is absolute, and our fighting spirit is long. Death and fighting are directions we have experienced and are prepared for because they are a path that leads to eternal eternity in Paradise if it does not lead us to the truth and to "Justice."

He added, "We are not advocates of war, and we realize the importance and vitality of the international shipping route in the Red Sea, Bab al-Mandab, the Gulf of Aden, and the Arabian Sea. We are keen on the safety of international navigation and respect for international conventions. This is not disputed. All the ships of the world will be safe and will be protected, except for the ships identified by the Yemeni Armed Forces through its official spokesman.

The caretaker Minister of Defense explained that Yemen was robbed of its natural right and geopolitical position for many years and multiple decades. He said, "Recently, Yemen has begun to put the dots on the letters and claim, with full merit, its right to geostrategic views of the Bab al-Mandab Strait, the Gulf of Aden, the southern Red Sea, and the Arabian Sea."

He added, "As long as the whole world realizes this, it must respect Yemeni sovereignty and recognize the freedom and independence of Yemeni sovereign decision-making in its seas and ports." He stressed that the Yemeni people, despite all the challenges that have befallen them over the past nine years of aggressive war, siege, and conspiracies, have chosen to be a strong supporter of the truth. And with the truth, and to help the oppressed in besieged Gaza against the Zionist arrogance that has committed killing, destruction, sabotage, corruption on earth, and has brutalized the valiant children, women, and elders of Gaza.

He continued, "Sana'a was reading the stormy events and the brutal aggression against our people in Gaza and realized that Zionism and the Zionists did not want it to be a regional or international issue, but rather confined it to that geographical area and sought to portray its people as terrorists while defending itself. Therefore, from the first moment, Sana'a entered into a confrontation with the Zionist entity confirms that the issue is global."

He added, "This is how the Palestinian issue was made globally circulated, and there are people being subjected to injustice and murder. The trick of concealment is no longer valid. Rather, the Palestinian issue has become the talk of the world, and it has become necessary to establish an independent state over the entire Palestinian geography, with Holy Al-Quds as its capital."

Al-Atifi minister said, "You know that the American imperialist colonial Zionism is mobilizing today, through its satanic multinational alliances and its mercenary henchmen, more defeatist naval legions under the name of protecting international navigation, but the main goal is to force Yemen and its people to retreat from their positions of support for the Palestinian people."

He reiterated that nothing will be achieved from such American practices, regardless of the sacrifices. He added, "We assure Washington, Tel Aviv, London, and those with them, their agents in the region, and those in their orbit that today's Yemen is different from yesterday's Yemen, and all the actions and positions you have seen are a prelude and preliminary steps." Because we provide you with the painful future as long as you persist in your hostile attitudes against our brothers and people in the besieged and abused Gaza. "

He continued, "Be certain that we will transform the geography of the seas, from the Red Sea, the Gulf of Aden, the Arabian Sea, and Bab al-Mandab, into the curse of geography that will descend upon your heads like lightning bolts."

He went on to say, "You must realize that either peace and security will prevail for all, or the curses of geography and the curses of unjust positions will fall on the heads of the arrogant. It is important that you reach certainty that the management of crises, chaos, and wars that you were managing and igniting their fires has been controlled by new rules of engagement and a fair Yemeni equation entitled either that justice and peace prevail for all, or that volcanoes of war and confrontations erupt, so know which path you choose and which positions you take."

Al-Atifi minister also affirmed, "America, Britain, France, and those in their orbit only see the world from the perspective of brutal imperialism and from the perspective of global arrogance. Therefore, we find them rushing to create aggressive alliances against Yemen under maritime names, and the more the revolutionary leadership, represented by the leader of the nation, Mr. Abdul-Malik Badr al-Din al-Houthi, believes in he advised them and explained the Yemeni position to them, making them arrogant and looking for aggressive tentacles and flimsy excuses for the purpose of dominating the region."

E.M



The Associated Press

Houthis show no sign of ending 'reckless' Red Sea attacks as trade traffic picks up, commander says

Story by By REBECCA SANTANA, Associated Press • 7h

CHRISTIANSTED, U.S. Virgin Islands (AP) — [Yemen's Houthi rebels](#) show no signs of ending their "reckless" [attacks on commercial ships in the Red Sea](#), the [top commander of U.S. naval forces in the Middle East](#) said Saturday, even as [more nations](#) join the [international maritime mission](#) to protect vessels in the vital waterway and trade traffic begins to pick up.

Since Operation Prosperity Guardian was announced just over 10 days ago, 1,200 merchant ships have traveled through the Red Sea region, and none has been hit by drone or missile strikes, Vice Adm. Brad Cooper said in an Associated Press interview. He said additional countries are expected to sign on. Denmark was the latest, announcing Friday it plans to send a frigate to the mission that Defense Secretary Lloyd Austin announced during a visit to Bahrain, where the Navy's 5th Fleet is based, saying that "this is an international challenge that demands collective action."

The [Iran-backed Houthis](#) say their attacks are aimed at Israel-linked ships in an effort to stop the [Israeli offensive in Gaza](#).

The narrow Bab el-Mandeb Strait connects the Gulf of Aden to the Red Sea and then the Suez Canal. The crucial trade route links markets in Asia and Europe. [The seriousness of the attacks, several of which have damaged vessels, led multiple shipping companies to order their vessels to hold in place and not enter the strait until the security situation improved.](#) Some major shippers were sending their ships around Africa and the Cape of Good Hope, adding time and costs to the journeys.

Currently there are five warships from the United States, France, and the United Kingdom patrolling the waters of the southern Red Sea and the western Gulf of Aden, said Cooper, who heads the 5th Fleet. Since the operation started, the ships have shot down a total of 17 drones and four anti-ship ballistic missiles, he said.

Just two days ago, the USS Mason, a Navy destroyer, down a drone and anti-ship ballistic missile that were fired by the Houthis, according to U.S. Central Command. The U.S. said the 22nd attack on international shipping by the Houthis since Oct. 19 caused no damage to any of the 18 ships in the area or any reported injuries.

"I expect in the coming weeks we're going to get additional countries," Cooper said, noting Denmark's recent announcement.

The U.S. has said that more than 20 nations are participating, but a number of those nations have not acknowledged it publicly.

Cooper said the coalition is in direct communication with commercial ships to provide guidance on "maneuvering and the best practices to avoid being attacked," and working closely with the shipping industry to coordinate security.

An international task force had been set up in April 2022 to improve maritime security in the region. But Cooper said Operation Prosperity Guardian has more ships and a persistent presence to assist vessels.

Since the operation started, the Houthis have stepped up their use of anti-ship ballistic missiles, Cooper said. "We are cleareyed that the Houthi reckless attacks will likely continue," he said.

The Houthis seized Yemen's capital, Sanaa, in 2014, launching a grinding war against a Saudi-led coalition that sought to restore the government. The militants have sporadically targeted ships in the region, but the attacks increased since the start of the [Israel-Hamas war](#).

The Houthi threatened to attack any vessel they believe is either going to or coming from Israel. That has escalated to apparently any vessel, with [container ships and oil tankers](#) flagged to countries such as Norway and Liberia being attacked or [drawing missile fire](#).

The shipping company Maersk had announced earlier that it had decided to re-route its ships that have been paused for days outside the strait and Red Sea, and send them around Africa instead. [Maersk announced Dec. 25](#) that it was going to resume sending ships through the strait, citing the operation. Cooper said another shipping company had also resumed using the route.

"Commerce is definitely flowing," Cooper said.

Associated Press writer Lolita C. Baldor in Washington contributed to this report.

Yemen says will turn Red Sea into 'graveyard' after US announces maritime coalition

Tuesday, 19 December 2023 7:12 AM [Last Update: Tuesday, 19 December 2023 8:13 AM]



Yemeni Defense Minister Major General Mohammad al-Atifi speaks at a ceremony in Sana'a, Yemen. (File photo by Yemen Press Agency)

Yemen's defense minister has denounced the formation of a US-led maritime task force in the Red Sea to protect the passage of merchant vessels bound for the Israeli-occupied territories, cautioning the Western alliance that any assault on Yemeni soil will have dire consequences.

"We are in possession of munitions and military gear that can sink your warships, submarines and aircraft carriers," Major General Mohammad al-Atifi said on Monday.

"The Yemeni Armed Forces will turn the Red Sea into a graveyard of the US-led coalition if the alliance decides to take any action against Yemen," he said.

Earlier on Monday, Pentagon chief Lloyd Austin announced the formation of the coalition – including Bahrain, Canada, France, Italy, the Netherlands, Norway, Seychelles, Spain and the UK – to patrol the Red Sea in response to Yemeni strikes on ships bound for the Israeli-occupied territories, which came in retaliation for the Tel Aviv regime's war on the Gaza Strip.

Ansarullah vows to confront US-led coalition

Meanwhile, Yemen's Ansarullah resistance movement has pledged to confront the US-led coalition, stressing that Washington will experience both military and prestige defeats if it attacks Yemen.

"The Yemeni Armed Forces have painful options, which they will employ in response to any act of aggression against their homeland. We only target ships that are either Israeli-owned or heading towards Israeli ports," said Mohammed al-Bukhaiti, a member of Ansarullah's political bureau.

Bukhaiti stressed that Yemen stands fairly committed to safe navigation at sea, adding, "We are only acting against the interests of the Zionist regime. We will confront any coalition that Washington establishes in the Red Sea."

The senior Yemeni official noted that negotiations are underway through intermediaries with a number of countries, including the United States, to persuade Yemeni forces to stop their retaliatory operations.

BP halts oil, gas shipments through Red Sea

Furthermore, the British oil and gas giant has halted all shipments of energy through the Red Sea after an increase in attacks on Israel-bound ships by the Yemeni Armed Forces in Yemen, including two further strikes on Monday.

BP said it had paused shipping in the region indefinitely, citing a "deteriorating security situation" amid tensions in the aftermath of the ongoing Israeli war on Gaza.

The Yemenis have declared their open support for Palestine's struggle against the Israeli occupation since the regime launched a devastating war on Gaza on October 7.

The relentless Israeli strikes against Gaza have killed at least 19,453 people, most of them women and children, in Gaza. Another 52,286 individuals have been wounded as well.

Reports revealed that Israeli shipping companies have already decided to reroute their vessels in fear of attacks by Yemeni forces.

The Yemeni forces have also launched missile and drone attacks on targets in the Israeli-occupied territories of Palestine after the occupying regime's aggression on Gaza.

Revolution Leader



Revolution leader warns of America's efforts to militarize Red Sea & confirms that Yemen will respond to any targeting of it

Revolution leader warns of America's efforts to militarize Red Sea & confirms that Yemen will respond to any targeting of it

[20/December/2023]

SANA'A December 20, 2023 (Saba) - The Leader of the Revolution, Mr. Abdul Malik Badr al-Din al-Houthi, warned of America's efforts to militarize the Red Sea and threaten international navigation, stressing the responsibility of all countries located on the shores of the Red Sea to move against the aggressive and intrusive American position because of its harm to international navigation.

In his speech on Wednesday regarding the latest developments in Palestine, the Leader of the Revolution called on the countries bordering the Red Sea to take a clear stance against the American position that violates the rights of these countries and threatens their security and stability.

He advised all countries that the American seeks to implicate them not to implicate themselves, and not to sacrifice their interests and lose the security of their navigation in the service of the Zionists. Pointing out that whoever moves with the American and implicates himself in protecting Israeli ships is providing an exclusive service to Israel and harming international navigation.

He said, "The recent American move will not completely deter us from our firm, principled, and moral position that we declared from the beginning alongside the Palestinian people." Pointing out that the American move is not new, as it has moved battleships, aircraft carriers, and all its capabilities from the beginning, but it is now seeking to implicate others.

The Leader of the Revolution stressed that the Yemeni people will not stand idly by if the Americans have a tendency to escalate further and commit foolishness by targeting the country or launching a war against it, and that any "American targeting of Yemen will be met with targeting of American battleships, interests, and navigation with missiles, drones, and military operations."

He said: "We are not among those who stand idly by while the enemy targets them. We are a people who reject injustice, rely on God, and do not fear direct American threats and aggression."

The leader of the revolution asked the Arab countries to "leave Yemen in direct war with the Israeli and American enemies. If they want to dance, let them dance, but not participate militarily or financially with them." He said: "If the Arabs want to be an audience that applauds the Americans, let them applaud, and if they want to dance to let them dance with the remains of the victims, but do not join the Americans in their war against us."

He added, "As long as the American wants to enter into a direct war with us, he should know that we are not among those who fear him, and that he is facing an entire people and not a specific group. If he wants to prevent the Yemeni position towards Palestine, then he is in trouble with all the Yemeni people."

He continued: "If the American sends his soldiers to Yemen, he should know that he will face something harsher than what he faced and suffered in Afghanistan and Vietnam. He should also not imagine that he can strike here or there and then send mediations to calm the situation."

Mr. Abdulmalik Badr al-Din al-Houthi stressed that the Americans must know that the Zionists of America are seeking to involve it in what is not in its interest but rather in the service of Israel. He pointed out that what the American is doing at sea is a loss for him, as he launches a missile worth two million dollars to confront a drone worth no more than two thousand dollars.

He stated that the Yemeni people have the strength to confront and confront the enemy and remain steadfast in the face of attacks, as the Yemenis have steadfasted for nine years in the face of aggression.

Yemen's position is correct and principled

The leader of the revolution explained that the Yemeni people took action and took the correct position at all levels and announced the provision of all possible forms of support to the Palestinian people. He said, "Our dear people moved out of faith, moral and religious responsibility to declare war on the Zionist enemy, and move their missile force and drones to target the enemy, and they also moved

at the level of the Red Sea, the Gulf of Aden, and the Arabian Sea to prevent the movement of Israeli ships and ships linked to Israel that are trying to deliver supplies to the Israelis."

He added, "We have submitted a request to the countries that geographically separate us from occupied Palestine to open land crossings through which hundreds of thousands of our people can move to Palestine. Our people also continue to provide financial donations to the Palestinian people despite the very difficult living conditions because we are essentially a besieged people and are still in a state of war."

He continued, "At the level of the political position, our position was supportive, and our media front moved mainly to support the Palestinian people and their mujahideen. As for the level of marches, our people come out every Friday in millions filling the squares, and the masses roar with their voices and their declared and clear positions, chanting the chant of innocence and the cry in the face of the arrogant people with this bold and clear slogan, this is a position that rises to the level of responsibility."

He pointed out that the popular movement in Yemen may be unparalleled at the level of the Arab and Islamic world and even the rest of the world, as it is a position that enjoys great consensus among the people, even more than national issues, as the Yemeni people's consensus regarding the aggression against it was not the same as it is regarding the Palestinian issue and supporting the Palestinian people and the mujahideen in Gaza.

The leader of the revolution stated that the issue is not a movement related to a specific group of the Yemeni people, but rather an official and popular movement that expresses the will of the people even in the occupied governorates controlled by the aggression coalition, and this expresses the position, conscience and values of the Yemeni people that are consistent with their principles, affiliation, freedom and faith identity. If some positions of some mercenaries are deviant, they do not reflect the people and their will.

He stated that the Yemeni people clearly expressed in Al-Sabeen Square, through the two million public attendance, expressing this position and the high ceiling for this position. He said: "What the Yemeni people hope and demand is greater than what we are currently doing, but we are doing what we can and seeking to do what is greater and more severe against the Zionist enemy."

Efforts to develop Yemen's military capabilities

The Leader of the Revolution revealed the current efforts and endeavors to develop Yemen's military capabilities in light of what some forces in the region are doing to confront the strikes directed at the Israeli enemy.

He said: "Sometimes four countries, including Arab countries and military forces, in addition to the enemy entity, try to prevent our drones and missiles from reaching their targets."

He expressed his regret over some Arab countries enlisting with the Zionist enemy and using their military capabilities to protect it from Yemeni missiles instead of moving to protect the Palestinian people. He added, "We seek to develop our capabilities to overcome any obstacles and achieve their goals so that this rises to the level of responsibility and meets the desire and will of the Yemeni people and their clear position against the Zionist enemy in its criminal aggression against the Palestinian people in Gaza. We did not target any other country, and we have been patient with the objection operations carried out by some Arab countries and did not target them."

He continued, "Our goal and our approach is to support the Palestinian people, the residents of Gaza, and its mujahideen, and this is a right and legitimate position," indicating that "the Americans, the British, and those with them come to our region and our seas and support the Zionist enemy in its crimes, and then they denounce the actions of others in the humanitarian position."

The leader of the revolution stressed that the unjust and criminal position is the American-British position, as the situation reached the point that some American officials submitted their resignation after feeling ashamed of what America is doing... indicating that the demonstrations took place in America, France and Britain to denounce the official approach there, as this approach is what contradicts People's interests and values.

He pointed out that the position of the Yemeni people is the honorable position and the correct position that is consistent with the faith and humanitarian responsibility of our people. He said, "Shame on America, Britain, France, Italy and all countries for standing with the Zionist enemy in its killing of children and women and its very heinous crimes."

He added, "We are not ashamed of our position, but rather we seek to reach it to the maximum extent possible without embarrassment or hesitation, and we see it as a position worthy of sacrifices, whatever they may be." He stressed that the position of the Yemeni people in the Arabian Sea, the Gulf of Aden, and the Red Sea is to prevent the movement of Israeli ships or those associated with it, it is an effective and influential position.

He mentioned that some ignorant and vile people were mocking the position of the Yemeni people at sea, until the Zionist enemy became angry about it and shouted about its impact on their economy. The Americans and the arms of the Zionist lobby were shouting about the position of the Yemeni people in preventing Israeli ships from crossing the Red and Arabian seas... stressing that the field It is open to the movement of commercial ships in the Red and Arab seas, the Gulf of Aden and Bab al-Mandab, and the movement of

ships has continued in the hundreds.

The leader of the revolution pointed out that Yemen's move does not target international ships and does not harm international navigation. **The target is exclusively Israeli ships or those linked to Israel.** He said, "We target ships that are either owned by the Israelis, or they own part of them, or go to the ports of occupied Palestine, bringing supplies to the Zionist enemy."

He added, "Our effective and influential position was prompted by the Israeli enemy and asked its partners in the crimes of genocide to move in the Red Sea to prevent this move... Pointing out that the American was moving from the beginning in the sea and sought to protect the passing Israeli ships and his battleships were moving to protect them, but what he was seeking was **Now he implicates others with him in this matter, indicating that the American move is not a move to protect international navigation in Bab al-Mandab. The greatest danger is the American move that seeks to militarize the Red Sea.**

The Zionist enemy continues to commit the most heinous crimes

The Leader of the Revolution indicated that, for 75 days, the Zionist-Jewish-Israeli enemy continues its brutal, criminal, barbaric aggression against the Palestinian people in the Gaza Strip, committing the most heinous and shameful crimes, which are the crimes of genocide and the mass killing of children, women, adults and children, as thousands of the Palestinian people were killed.

He pointed out that the Zionist enemy targets the Palestinian people with all means of extermination, killing by all brutal means, starvation, siege, and denying them food and medicine, to the point that it made hospitals declared main targets for its ground and field operations as if they were military bases, in an unprecedented behavior.

He stated that countries that are at war usually declare strategic and military bases as their targets, while the Israeli enemy brazenly declares hospitals as the target of its military operation and kills and destroys. When it reaches the hospital, it targets the wounded, the sick, medical personnel, and nurses, and targets civilians with all criminality and brutality, then presents this as a military achievement and brags about it.

Mr. Abdul-Malik Badr al-Din al-Houthi stated that the Zionist enemy is targeting, with bombs, missiles, artillery, and tanks, homes, markets, and displaced persons' gatherings, until the outcome of its brutal crimes every 24 hours has become hundreds of martyrs, most of whom are children and women... indicating that the Israeli enemy continues in its brutality, and when it fails in a field battle, it resorts to indiscriminate bombing of civilians in Gaza.

He pointed out that the state of starvation in Gaza had reached the level of recording deaths from hunger, and the complete prevention of access to medicines. The Zionist targeting included even infants and premature infants in hospital care departments, with a criminal tendency that expresses the reality of the Jewish Zionists, what they are like in their beliefs and behavior, and the hatred and extreme hostility they carry and are devoid of all human feeling.

Unlimited American support for the Zionist enemy

The Leader of the Revolution confirmed that the Americans are partners in this aggression that began 74 days ago against Gaza, as the Americans participated directly from the first moment and sent their military experts and advisors to directly manage the military operations and be the ones who plan and supervise the implementation and the ones who follow up on the implementation of these crimes and attacks.

He stated that the American provided the Zionist enemy with thousands of destructive bombs that target civilians and residential neighborhoods, as well as internationally prohibited weapons, including white phosphorus bombs, and provided it with material support in the amount of billions of dollars to finance these military operations and sent drones and reconnaissance aircraft to contribute at the level of direct information and provided all forms of support and cooperation.

He stated that, in addition to all forms of military and financial support, the Americans provided political support to the enemy entity and protection in the regional environment of Palestine, **and they threatened all countries in the region against any cooperation with the Palestinian people in order to create sufficient conditions** for the Zionist enemy to commit whatever crimes it wanted without objection or obstruction from anyone.

He said, "Even at the level of humanitarian support and the introduction of food and medicine to the Palestinian people in the Gaza Strip, nothing is allowed to enter except after American and Israeli approval, and it must be in a very limited manner that does not satisfy the livelihood of the people of Gaza. The Americans also threatened the countries of the region not to intervene to stop the Israeli aggression on Gaza."

He continued: "When we see the tragic scenes of thousands of children and women killed by American bombs and the state of extreme hunger, we must remember the American contribution to all of this, and that America is another arm of global Jewish Zionism, to which the American president boasted of his affiliation and that he is moving according to that premise."

The leader of the revolution pointed out that those who move in America to support Israel in what it is doing to the Palestinian people are the American Zionists. The Zionist-Jewish lobby moves America even in ways that go beyond its interests, harms it in the world,

and presents it in a hideous, criminal form, while it supports injustice and tyranny that is added to its criminal and terrible record.

He pointed out that the American has transformed its bases in the region to be a support for the Zionist enemy, all of its weapons stores, and every resolution under the title of a ceasefire in the United Nations that the American objects to and insists on the continuation of killing and crimes in Gaza... indicating that the American who presented himself under the title of being a sponsor of peace in the Middle East, he objects to any ceasefire decision in Gaza and insists on killing civilians in Palestine.

He stated that the American prevents any movement to protect civilians in Palestine, and obstructs any efforts to provide the Palestinian people with the food and medicine they need.

He stated that the British movement, which had the lead in establishing the Zionist entity from the beginning, is constantly moving today in support of the Zionist enemy. He said, "We also see in supporting the Zionists the movement of some European countries, including France, Italy, and Germany, each of which has a dark history and a hideous criminal record."

He stated that the regimes and governments that support the enemy entity have a black criminal record, and are known for their moral and ethical bankruptcy, and they are the ones that have expunged morals and values from their political dictionary... indicating that when the Zionist lobby moves Western regimes, they make them deny even liberal values, it moves as if its crazy, without any human values and as a product of jungle policies.

The leader of the revolution pointed out that the responsibility is great on the Islamic world, especially in the Arab region, which is the heart of the Islamic world, and the responsibility is on all Muslims, even those in Western countries, considering Palestine a part of them at the level of geography and people, to take serious action to support the Palestinian people and prevent this injustice as a religious, moral and humanitarian responsibility based on their affiliation to Islam and its principles, values and morals.

He explained that some Arab countries severed their relations with countries from the West because they said a word in describing their behavior or insulted a king or prince... indicating that countries that act harshly against any Arab or Muslim country, we see in a state of complete apathy towards the nation's major issues, such as the oppression of the Palestinian people. .

He said, "These countries have reached the point where they are preoccupied with dancing, singing, dog competitions, and very trivial things, ignoring the major massacres in Palestine." He stressed that it is a great responsibility for all Muslims to have a voice and take serious positions in the same way that they support any cause they interact and are passionate about seriously, and to provide financial support and even military support.

He said, "Sometimes ugly voices appear in Arab countries to blame the Palestinian people and their mujahideen and insult any position that supports them. The Arab countries were not satisfied with shirking responsibility in supporting the Palestinian people, but rather began to gloat over them and their mujahideen, insult them, and distort any support for them."

He added, "We do not expect any positive role from America and European countries for the benefit of the Palestinian people, as they are always in a position of injustice, tyranny, arrogance, and plundering peoples."

The leader of the revolution pointed out that the position at the general level, including the Riyadh summit, was a weak position, just statements containing a demand and everything ends after the statement... indicating that the axis of resistance stands at the level of military, media and popular support and going out in marches, while in some Arab countries it was even prohibited demonstrations.

He stressed that the axis of resistance stands at the level of military, media and popular support and going out in marches, while in some Arab countries even demonstrations were banned.

He asked, "Is there a scholarly movement by those who were issuing fatwas on the necessity of jihad if the issue was strife in Syria or targeting the Yemeni or Iraqi people and others? Where is the scholarly voice that issued fatwas that jihad was necessary in support of the Palestinian people? What justifies their silence, ignoring, and even blaming the Palestinian people and their mujahideen?"

The leader of the revolution stressed that the more the Yemeni people were at war, the stronger they became, and the more the enemies attacked them, the more they developed their military capabilities to confront them. He said, "The enemy does not hope that it is possible for our people to submit. Our position is firm, but we advise others to beware of getting involved with the American and to leave him to get himself involved."

He addressed the European countries by saying, "There is no danger to your ships that do not go to the enemy entity, but when you get involved with the Americans, you are risking your interests in every sense of the word."

He expressed the hope that the Islamic world, in light of the continued American and Israeli tyranny over Gaza, would review their calculations and adopt stronger positions than they are...praising the Malaysian position that banned one of the Zionist companies

from its ports and prevented it from practicing any activity in its ports.

Gaza's steadfastness expresses a will of faith. The leader of the revolution pointed out that the steadfastness of the brothers in Gaza is a great steadfastness that expresses a will of faith and of mujahideen who depend on God, trust in Him, believe in their cause, and possess morals that qualify them for steadfastness and dedication. He said, "The mujahideen in Gaza are abusing the Zionist enemy and killing its soldiers, perhaps this issue does not receive the media coverage it deserves, but it is an honorable matter that represents hope for victory."

He added, "We say to the Palestinian people and to the proud Mujahideen brothers in Gaza. You are not alone. God is with you and He is the best of helpers. Our Yemeni people are with you in everything they can."

He addressed the people and the Palestinian resistance: "The American position, nor the threat from the American or anyone else will deter us from our stand beside you. All the free people of our nation are at your side. The axis of resistance is present in important and active roles. Hezbollah is on a raging front in northern Palestine at your side."

He stated that all the peoples of the world who have some human conscience left cheer for the Palestinian people and their oppression... and he said, "Have faith in the victory of God Almighty, and no matter how far the enemy persists in its crimes, your steadfastness and jihad are a reason for divine victory, along with your oppression and suffering, which are in the eyes of God."

Mr. Commander confirmed that the American seeks to protect the Israeli ships because he wants crimes to continue in Gaza. Otherwise, the correct solution is to stop the aggression and the siege on Gaza. Whatever the American position in supporting the Zionist enemy, he will lose if the Israeli loses. Therefore, no matter the extent of the suffering, the oppressed will gain victory.

He reiterated that the position of the Yemeni people continues, and it is the correct position that all countries of the world must adopt, which is to demand an end to the aggression against Gaza. He explained that the American move in the Red Sea is an illegal move, but rather aggression, crime, bullying, and brutal behavior that seeks to serve the Israelis.

He urged the Yemeni people to continue all activities and be prepared for all eventualities. He said, "Our dear people adopted their position diligently and honestly, not a tactical position. The enemy must know what we mean by a position of faith and positions based on faith, and our people will not hesitate or back down from their position as a result of threats, intimidation, and pressure."

The leader of the revolution concluded his speech by emphasizing that, "No matter what the Americans do against our people, we rely on God and confront the Americans. We prefer a direct war with the Americans and the Zionist enemy."

E.M

Maersk to send almost all ships via Suez, schedule shows

By [Louise Rasmussen](#)

December 28, 2023 4:07 AM MST Updated 3 days ago

COPENHAGEN, Dec 28 (Reuters) - Denmark's Maersk ([MAERSKb.CO](#)) will sail almost all container vessels travelling between Asia and Europe through the Suez Canal from now on while diverting only a handful around Africa, a Reuters breakdown of the group's schedule showed on Thursday.

Major shipping companies, including container giants Maersk and Hapag-Lloyd ([HLAG.DE](#)), stopped using Red Sea routes and the Suez Canal earlier this month after Yemen's Houthi militant group began targeting vessels, disrupting global trade.

Instead, they rerouted ships around Africa via the Cape of Good Hope to avoid attacks, charging customers extra fees and adding days or weeks to the time it takes to transport goods from Asia to Europe and to the east coast of North America.

But Maersk on Dec. 24 [said](#) it was preparing a return to the Red Sea, citing the deployment of a U.S.-led military operation to protect vessels, and on Wednesday released [schedules](#) showing ships were headed for Suez in the coming weeks.

A detailed breakdown showed that while Maersk had diverted 26 of its own ships around the Cape of Good Hope in the last 10 days or so, only five more were scheduled to start the same journey.

By contrast, more than 50 Maersk vessels are set to go via Suez in coming weeks, the company's schedule showed.

Vessels re-routing

Attacks by Yemen's Houthi militants on ships in the Red Sea are disrupting maritime trade through the Suez Canal, with some vessels re-routing to a much longer East-West route via the southern tip of Africa.



Around the southern tip of Africa
Around 11,800 Nautical miles
in a 36-day trip

Sources: LSEG; Planet Labs; Maps4News; Shoei Kisen Kaisha
Reuters Staff • Dec. 19, 2023 | REUTERS

Attacks by Yemen's Houthi militants on ships in the Red Sea are disrupting maritime trade through the Suez Canal, with some vessels re-routing to a much longer East-West route via the southern tip of Africa.

But Maersk said alliance partner Mediterranean Shipping Company (MSC) continued to divert all MSC vessels via the Cape of Good Hope for the time being, regardless of date or point of departure and the direction they were sailing in.

MSC did not immediately respond to a request for comment.

Hapag Lloyd on Wednesday said it still considered the situation [too dangerous](#) to pass through the Suez Canal, adding that it planned to review the situation on Friday,

The Suez Canal is used by roughly one-third of global container ship cargo, and re-directing ships around the southern tip of Africa is [expected to cost](#) up to \$1 million extra in fuel for every round trip between Asia and Northern Europe.

Among a handful of other third-party vessels in Maersk's alliance that were set to sail in the coming weeks, two would be diverted around Africa while the rest would travel via Suez, the schedule showed.

All schedules remain subject to change based on specific contingency plans that may be formed over the coming days, Maersk has said.

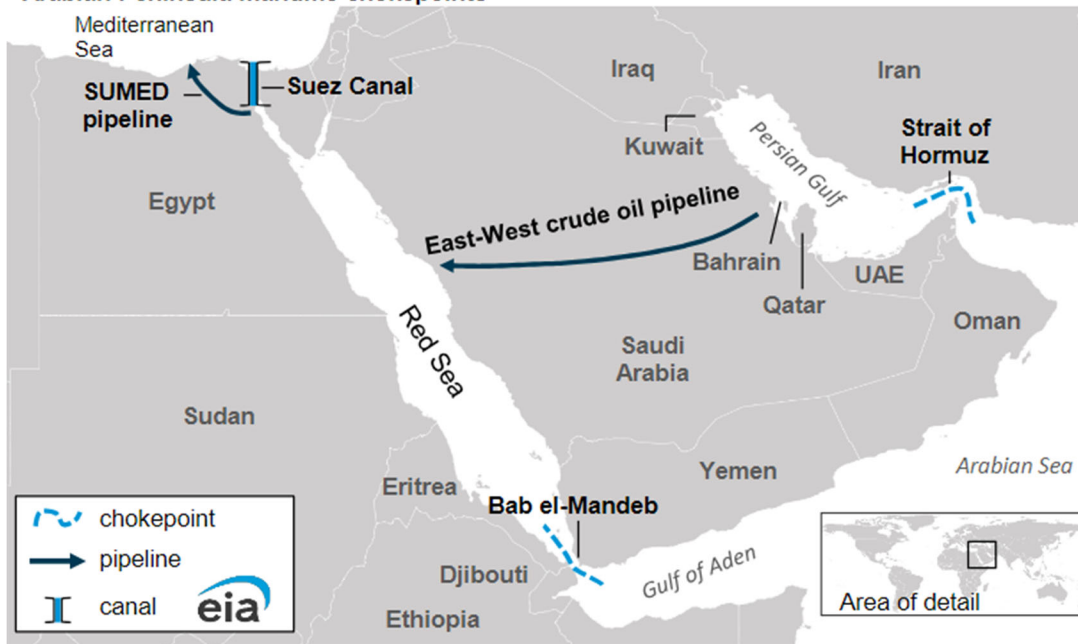
The company did not immediately respond to a request for comment.

Reporting by Louise Rasmussen, editing by Terje Solsvik and Christina Fincher

DECEMBER 4, 2023

Red Sea chokepoints are critical for international oil and natural gas flows

Arabian Peninsula maritime chokepoints



Data source: U.S. Energy Information Administration

The Suez Canal, the SUMED pipeline, and the Bab el-Mandeb Strait are strategic routes for Persian Gulf oil and natural gas shipments to Europe and North America. Total oil shipments via these routes accounted for about 12% of total seaborne-traded oil in the first half of 2023, and liquefied natural gas (LNG) shipments accounted for about 8% of worldwide LNG trade.

The Suez Canal and SUMED pipeline are located in Egypt and connect the Red Sea with the Mediterranean Sea. The SUMED pipeline transports crude oil north through Egypt and has a capacity of 2.5 million barrels per day. The Bab el-Mandeb Strait is between the Horn of Africa and the Middle East, connecting the Red Sea to the Gulf of Aden and Arabian Sea. Most exports of petroleum and natural gas from the Persian Gulf to Europe and North America pass through multiple [chokepoints](#), including the Suez Canal or the SUMED pipeline and both the Bab el-Mandeb and the [Strait of Hormuz](#).

Volume of crude oil, condensate, and petroleum products transported through the Suez Canal, SUMED pipeline, and Bab el-Mandeb Strait (2018–1H23)

million barrels per day



	2018	2019	2020	2021	2022	1H23
Total oil flows through Suez Canal and SUMED pipeline	6.4	6.2	5.3	5.1	7.2	9.2
crude oil and condensate	3.4	3.1	2.6	2.2	3.6	4.9
petroleum products	3.0	3.1	2.6	2.9	3.6	4.3
LNG flows through Suez Canal (billion cubic feet per day)	3.3	4.1	3.7	4.5	4.5	4.1
Total oil flows through Bab el-Mandeb Strait	6.1	5.9	5.0	4.9	7.1	8.8
crude oil and condensate	3.0	2.7	2.2	1.9	3.3	4.5
petroleum products	3.1	3.2	2.8	3.1	3.8	4.4
LNG flows through Bab el-Mandeb Strait (billion cubic feet per day)	3.1	3.9	3.7	4.5	4.5	4.1

Data source: U.S. Energy Information Administration analysis based on Vortexa tanker tracking

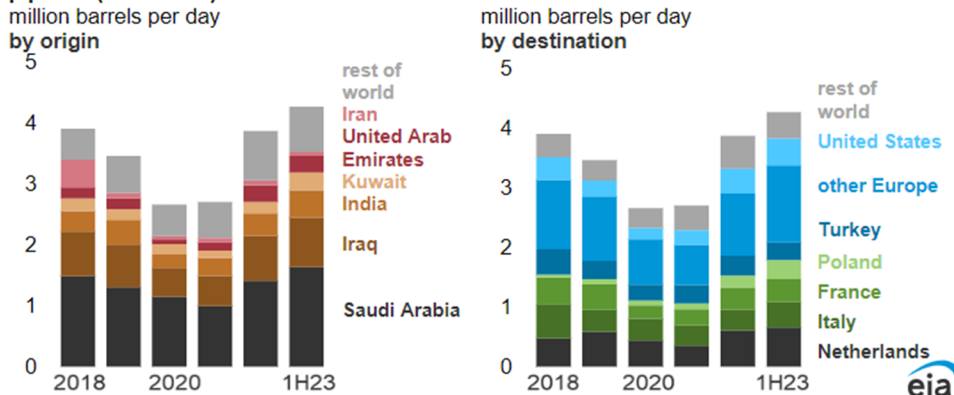
Note: 1 LNG=liquefied natural gas 1H23=first half of 2023

Oil shipments

Northbound oil flows toward Europe via the Suez Canal and SUMED pipeline fell between 2018 and 2020. Renewed U.S. sanctions on

Iran reduced all exports from Iran, including those through the Suez Canal. In addition, less crude oil and oil products from Middle East producers moved through the Suez Canal because Europe imported less oil from the Middle East and more from the United States. The COVID-19 pandemic further reduced flows through the Suez Canal because of slowing global oil demand. In the first half of 2023, northbound crude oil flowing through the Suez Canal and SUMED pipeline had increased by more than 60% from 2020, as demand in Europe and the United States rose from pandemic-induced lows. Also, Western sanctions on Russia's oil beginning in early 2022 shifted global trade patterns, leading Europe to import more oil from the Middle East via the Suez Canal and SUMED pipeline and less from Russia.

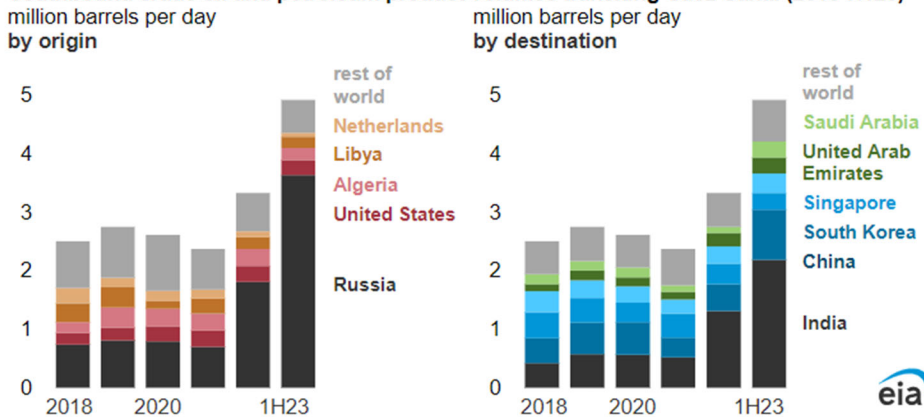
Northbound crude oil and petroleum product volumes transiting Suez Canal and SUMED pipeline (2018-H123)



Data source: U.S. Energy Information Administration analysis based on Vortexa tanker tracking
 Note: 1H23=first half of 2023.

Southbound shipments through the Suez Canal rose significantly between 2021 and 2023, largely because of Western sanctions on Russia's oil exports. Oil exports from Russia accounted for 74% of Suez southbound oil traffic in the first half of 2023, up from 30% in 2021. Most of those export volumes were destined for India and China, which imported mostly crude oil from Russia. The Middle East, primarily [Saudi Arabia](#) and the [United Arab Emirates](#), increased imports of refined oil products from Russia in 2022 and the first half of 2023 in order to generate electric power or to store or re-export.

Southbound crude oil and petroleum product volumes transiting Suez Canal (2018-H123)

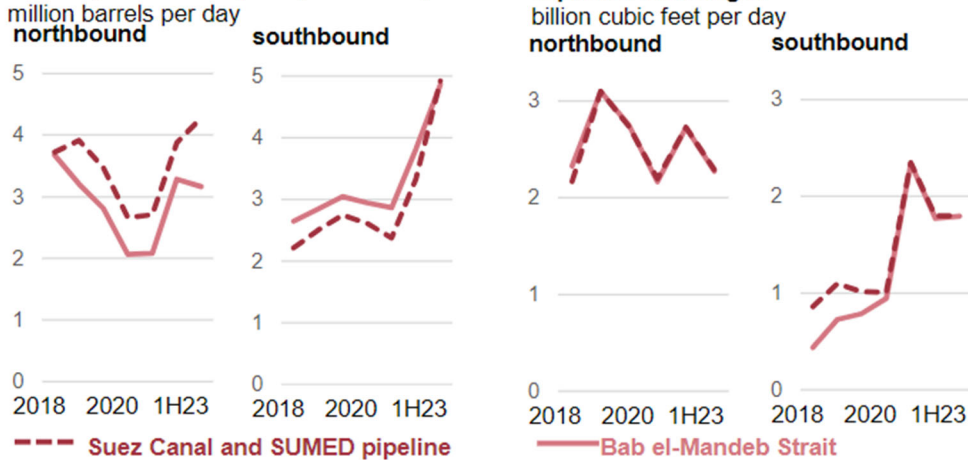


Data source: U.S. Energy Information Administration analysis based on Vortexa tanker tracking

LNG shipments

LNG flows through the Suez Canal in both directions rose to a combined peak in 2021 and 2022 of 4.5 billion cubic feet per day (Bcf/d) before total flows declined in the first half of 2023 to 4.1 Bcf/d. Southbound LNG flows more than doubled from 2020 to 2021, mainly driven by [growing exports from the United States](#) and Egypt heading to Asia. In 2022 and the first half of 2023, southbound LNG volumes via the Suez Canal declined as U.S. and Egyptian LNG exports both favored European destinations over Asian markets, supplanting some of the natural gas exports that Russia historically sent to Europe. Most of the variation in northbound volumes reflects changes in Qatar's exports to Europe (via the Suez Canal) compared with Asia. Qatar also sent more LNG to Europe in 2022 to replace some volumes from Russia, increasing northbound flows.

**Flows through the Suez Canal, SUMED pipeline, and the Bab el-Mandeb Strait
crude oil, condensate, and petroleum products liquefied natural gas**



Data source: U.S. Energy Information Administration analysis based on Vortexa tanker tracking
 Note: 1H23=first half of 2023.

Data source: U.S. Energy Information

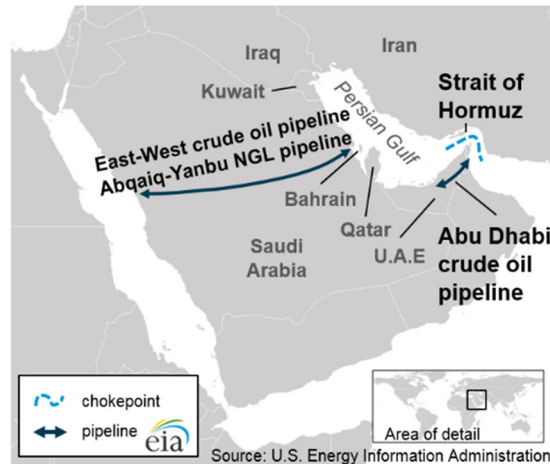
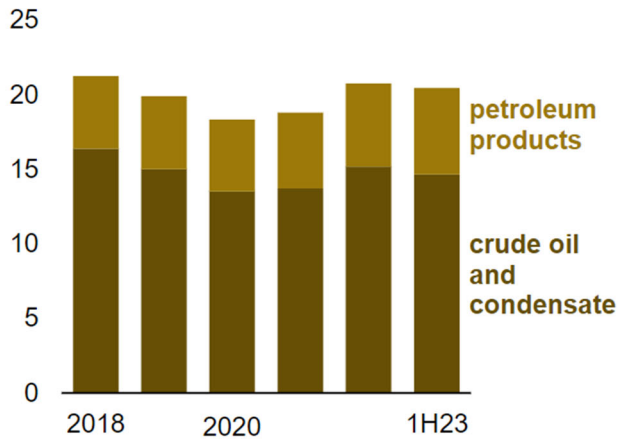
Although oil flow trends through the Bab al-Mandeb Strait are similar to those of the Suez Canal, more oil exits the Red Sea (northbound via the Suez Canal and southbound via the Bab el-Mandeb Strait) than enters the Red Sea through these chokepoints. Saudi Arabia transports some crude oil from the Persian Gulf via pipeline to the Red Sea for export mostly to Europe. LNG flows through the Bab el-Mandeb Strait have matched those in the Suez Canal over the last few years because the few LNG import terminals in the Red Sea have been used less.

Principal contributors: Candace Dunn, Justine Barden

NOVEMBER 21, 2023

The Strait of Hormuz is the world's most important oil transit chokepoint

Annual volumes of crude oil, condensate and petroleum products transported through the Strait of Hormuz (2018–1H23)
million barrels per day



Data source: U.S. Energy Information Administration analysis based on Vortexa tanker tracking and FACTS Global Energy
Note: 1H23=first half of 2023

The Strait of Hormuz, located between Oman and Iran, connects the Persian Gulf with the Gulf of Oman and the Arabian Sea. The Strait of Hormuz is the world's most important oil chokepoint because large volumes of oil flow through the strait. In 2022, its oil flow averaged 21 million barrels per day (b/d), or the equivalent of about 21% of global petroleum liquids consumption. In the first half of 2023, total oil flows through the Strait of Hormuz remained relatively flat compared with 2022 because increased flows of oil products partially offset declines in crude oil and condensate.

Chokepoints are narrow channels along widely used global sea routes that are critical to global energy security. The inability of oil to transit a major chokepoint, even temporarily, can create substantial supply delays and raise shipping costs, increasing world energy prices. Although most chokepoints can be circumvented by using other routes, which often add significantly to transit time, some chokepoints have no practical alternatives.

Between 2020 and 2022, volumes of crude oil, condensate, and petroleum products transiting the Strait of Hormuz rose by 2.4 million b/d as oil demand recovered after the economic downturn from the COVID-19 pandemic. In the first half of 2023, shipments of crude oil and condensates dropped because OPEC+ members implemented crude oil production cuts starting in November 2022. Flows through the Strait of Hormuz in 2022 and the first half of 2023 made up more than one-quarter of total global seaborne traded oil. In addition, around one-fifth of global liquefied natural gas trade also transited the Strait of Hormuz in 2022.

Volume of crude oil, condensate, and petroleum products transported through the Strait of Hormuz (2018–1H23)
million barrels per day

	2018	2019	2020	2021	2022	1H23
Total oil flows through Strait of Hormuz	21.3	19.9	18.3	18.8	20.8	20.5
Crude oil and condensate	16.4	15.0	13.5	13.7	15.2	14.7
Petroleum products	4.9	4.9	4.8	5.1	5.6	5.8
World maritime oil trade	77.4	77.1	71.9	73.2	75.2	76.3
World total petroleum and other liquids consumption	100.1	100.9	91.6	97.1	99.6	100.3
LNG flows through Strait of Hormuz (billion cubic feet per day)	10.3	10.6	10.4	10.6	10.9	10.8

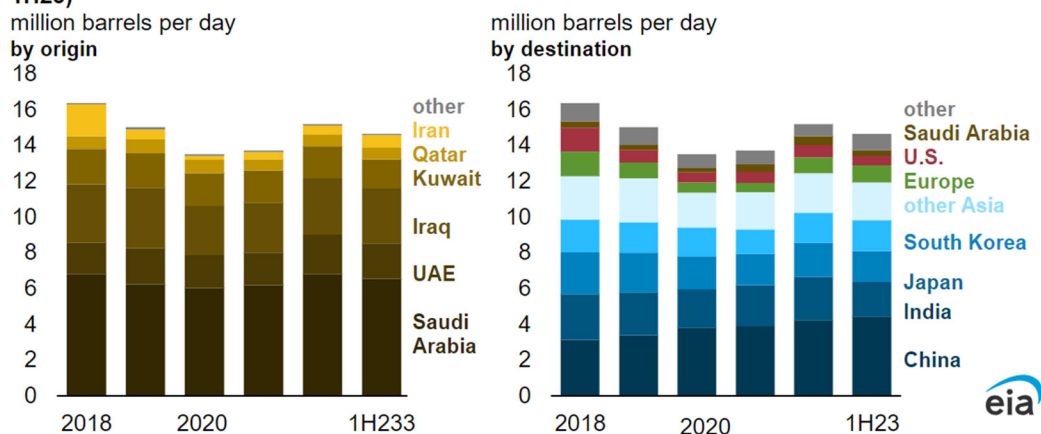
Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, and U.S. Energy Information Administration analysis based on Vortexa tanker tracking and FACTS Global Energy
 Note: World maritime oil trade excludes intra-country volumes except those volumes that transit the Strait of Hormuz.
 LNG=liquefied natural gas. 1H23=first half of 2023.

Only Saudi Arabia and the United Arab Emirates (UAE) have operating pipelines that can circumvent the Strait of Hormuz. Saudi Aramco operates the 5-million-b/d East-West crude oil pipeline and temporarily expanded the pipeline’s capacity to 7 million b/d in 2019 when it converted some natural gas liquids pipelines to accept crude oil. The UAE links its onshore oil fields to the Fujairah export terminal on the Gulf of Oman with a 1.5 million b/d pipeline.

Iran inaugurated the Goreh-Jask pipeline and the Jask export terminal on the Gulf of Oman with a single export cargo in July 2021. The pipeline’s capacity was 0.3 million b/d at that time, although Iran has not used the pipeline since then. We estimate that around 3.5 million b/d of effective unused capacity from these pipelines could be available to bypass the strait in the event of a supply disruption. Based on tanker tracking data published by Vortexa, Saudi Arabia moves more crude oil and condensate through the Strait of Hormuz than any other country, most of which is exported to other countries. Around 0.5 million b/d transited the strait in 2022 from Saudi ports in the Persian Gulf to Saudi ports in the Red Sea.

We estimate that 82% of the crude oil and condensate that moved through the Strait of Hormuz went to Asian markets in 2022. China, India, Japan, and South Korea were the top destinations for crude oil moving through the Strait of Hormuz to Asia, accounting for 67% of all Hormuz crude oil and condensate flows in 2022 and the first half of 2023.

Annual volumes (crude oil and condensate) transported through the Strait of Hormuz (2018–1H23)



Data source: U.S. Energy Information Administration analysis based on Vortexa tanker tracking data
 Note: 1H23=first half of 2023.

In 2022, the United States imported about 0.7 million b/d of crude oil and condensate from Persian Gulf countries through the Strait of Hormuz, accounting for about 11% of U.S. crude oil and condensate imports and 3% of U.S. petroleum liquids consumption. U.S. crude oil imports from countries in the Persian Gulf have fallen by half since 2018 as domestic production has increased.

Principal contributors: Candace Dunn, Justine Barden

Iraqi government condemns the US attack, considers a violation of sovereignty



- Yesterday, 11:56

+A -A

Baghdad-INA

The Iraqi government condemned on Tuesday, the US attack on Iraqi military sites.

“The Iraqi government, through its security forces, constitutional institutions, and legal authorities, asserts its steadfast response to attacks on foreign diplomatic mission headquarters and sites hosting military advisors from friendly nations. Such attacks, we previously labeled as hostile acts, infringe upon Iraq’s sovereignty and are deemed unacceptable under any circumstances or justification,” stated the Media Office of the Prime Minister in a statement, received by The Iraqi News Agency-INA.

The statement added, “At the same time, the Iraqi government condemns what transpired early this morning, Tuesday, December 26, 2023, during which Iraqi military sites were targeted by the American side justifying the act as a response. This resulted in the martyrdom of one service member and the injury of 18 others, including civilians. This constitutes a clear hostile act. It runs counter to the pursuit of enduring mutual interests in establishing security and stability, and it opposes the declared intention of the American side to enhance relations with Iraq”.

“We emphasize that this action undermines the bilateral relations between the two nations and will further complicate the efforts to achieve mutual understandings through collaborative dialogue aimed at concluding the presence of the international coalition. Above all, it constitutes an unacceptable violation of Iraqi sovereignty,” the statement continued.

Our security forces have succeeded in establishing security and stability throughout our country, and achieved victory over the terrorist ISIS gangs, which no longer pose a threat to Iraqi national security. Hence, safeguarding the gains of this victory stands at the heart of our security and strategic priorities, and we will not allow any entity to undermine what has been accomplished and solidified through invaluable sacrifices.

China's manufacturing PMI drops to 49 in Dec; policies expected to boost demand

By Global Times Published: Dec 31, 2023 12:49 PM

China's manufacturing activity remains in contraction territory in December, official data showed on Sunday, reflecting challenges posed by insufficient demand. Analysts believe that as more policies are implemented to boost demand, the situation is expected to improve.

China's manufacturing Purchasing Managers' Index (PMI) stood at 49 in December, down from 49.4 in November, data from National Bureau of Statistics (NBS) showed on Sunday.

A reading below 50 indicates a contraction, while one above 50 indicates expansion.

The slight drop of manufacturing PMI was affected by factors such as the off-season production for several categories of basic raw material industries, indicating a slight decline in the level of economic activity, according to Zhao Qinghe, an NBS official.

Non-manufacturing PMI stood at 50.4 in December, up 0.2 percentage points from November, indicating accelerated expansion, NBS data showed.

From the perspective of market expectations, service industry enterprises remain optimistic about the continued recovery and development of the industry in the near future, according to Zhao.

In breakdown of sub-indexes, the production index came in at 50.2, down 0.5 percentage points compared with the previous month. Manufacturing companies have sustained an expansion in production for seven consecutive months.

The new order index stood at 48.7 in October, a decrease of 0.7 percentage points from the previous month.

The fluctuation in manufacturing PMI data is in line with expectations, but it also highlights the challenge of insufficient demand in the current economic climate, which is clearly impacting the entire industry chain, said Tian Yun, a veteran economist based in Beijing.

Chinese economic policymakers have already recognized the challenges, and with the introduction of policies to expand domestic demand, the stabilization and recovery of domestic demand should improve month by month, Tian said.

The National Development and Reform Commission (NDRC), China's top economic planner, recently stated that it aims to leverage the advantages of a super-large-scale market to boost domestic demand. It vowed to coordinate efforts to expand domestic demand and deepen supply-side structural reforms.

"We should coordinate the expansion of domestic demand and the deepening of supply-side structural reforms, and integrate the two organically," Li Chao, an NDRC spokesperson, said at a press briefing for the key macroeconomic policy priorities in 2024 on December 19.

Respiratory diseases show declining trend, with COVID-19 at lowest level of 2023: China CDC

By Global Times Published: Dec 24, 2023 08:55 PM



Parents take their children to the pediatric emergency and laboratory area of Xinhua Hospital in the Yangpu district in Shanghai on December 11, 2023. Photo: from VCG.

China's respiratory diseases cases, which recently have been showing a declining trend, have mainly been caused by influenza viruses, while COVID-19 cases have reached their lowest level since the beginning of 2023, the Chinese Center for Disease Control and Prevention (China CDC) announced on Sunday.

The overall number of diagnosis and treatment of respiratory diseases in the outpatient clinic and emergency departments of medical institutions nationwide continues to show a fluctuating downward trend as numbers on Friday had dropped by about 30 percent compared to the peak period, Mi Feng, a spokesperson with the National Health Commission (NHC), said on Sunday at a press conference.

According to NHC, from November 26 to Sunday, the daily diagnosis and treatment volume of respiratory diseases at grassroots level medical institutions was between 1 million to 1.37 million, accounting for about 40 percent of the total number of respiratory diseases at all medical institutions nationwide.

Mi vowed to further trace the trends of respiratory diseases and changes in pathogens and virus mutations at home and abroad to strengthen situational analysis and monitoring.

China CDC also said the period of December 11 to 17 showed that acute respiratory diseases have also been dropping and that this trend is likely to continue next week, adding that influenza viruses still hold a dominant position among pathogens.

While influenza activity has slightly decreased but still remains high, infections of mycoplasma pneumoniae, adenovirus, and respiratory syncytial virus rose and fell. COVID-19 activity is at its lowest level this year, according to China CDC.

China CDC recommended that the public, especially vulnerable groups such as the elderly, pregnant women, children and people with underlying disease, to wear masks while taking subways, buses, trains and planes as traveling will increase at the end of the year.

As wearing masks for a long period of time can hinder the normal functioning of the immune system and weaken people's ability to resist diseases, experts do not particularly advocated masks be required for an extended period of time unless there is a major viral outbreak or when going to crowded places, said China's top respiratory disease expert Zhong Nanshan on Friday.

China in early December released a guideline on wearing masks to prevent respiratory illness while reducing their impact on people's daily life. The document gave scenarios to the public when they should and should not wear masks.

2023年11月訪港旅客統計 Monthly Report - Visitor Arrival Statistics : Nov 2023

1. 訪港旅客人次撮要 (按居住國家/地區計) Total Visitor Arrivals by Country / Region of Residence

居住國家 / 地區	Country / Region of Residence	2022年11月	2023年11月	增長率	2022年1至11月	2023年1至11月	增長率
		Nov 2022	Nov 2023		Jan - Nov 2022	Jan - Nov 2023	
		人次 No.	人次 No.	% Growth	人次 No.	人次 No.	% Growth
合計	TOTAL	113,763	3,288,915	+ 2,791.0	443,986	30,069,674	+ 6,672.7
內地	Mainland	58,694	2,427,471	+ 4,035.8	307,886	23,815,818	+ 7,635.3
非內地	Non-Mainland	55,069	861,444	+ 1,464.3	136,100	6,253,856	+ 4,495.0
短途地區市場 (不包括內地)	Short Haul Markets (Exclude Mainland)	25,343	565,338	+ 2,130.7	63,711	4,229,649	+ 6,538.8
澳門特區	Macau SAR	1,121	92,635	+ 8,163.6	5,939	1,085,230	+ 18,172.9
短途地區市場 (不包括內地以及 澳門特區)	Short Haul Markets (Exclude Mainland & Macau SAR)	24,222	472,703	+ 1,851.5	57,772	3,144,419	+ 5,342.8
台灣	Taiwan	5,691	79,090	+ 1,289.7	14,300	694,936	+ 4,759.7
日本	Japan	2,107	52,154	+ 2,375.3	4,223	302,367	+ 7,060.0
南韓	South Korea	2,180	62,256	+ 2,755.8	5,080	328,942	+ 6,375.2
印尼	Indonesia	1,629	26,858	+ 1,548.7	3,536	209,938	+ 5,837.2
馬來西亞	Malaysia	2,010	38,025	+ 1,791.8	4,783	207,547	+ 4,239.3
菲律賓	Philippines	3,982	102,172	+ 2,465.8	10,417	648,355	+ 6,124.0
新加坡	Singapore	3,626	56,200	+ 1,449.9	7,659	326,363	+ 4,161.2
泰國	Thailand	2,413	49,274	+ 1,942.0	6,520	379,987	+ 5,728.0
其他	Others	584	6,674	+ 1,042.8	1,254	45,984	+ 3,567.0
長途地區市場	Long Haul Markets	24,832	246,906	+ 894.3	61,360	1,711,038	+ 2,688.5
美國	USA	6,075	77,937	+ 1,182.9	16,421	523,194	+ 3,086.1
加拿大	Canada	2,570	29,331	+ 1,041.3	6,294	184,414	+ 2,830.0
英國	United Kingdom	3,613	26,835	+ 642.7	8,266	191,826	+ 2,220.7
法國	France	1,310	12,010	+ 816.8	3,015	77,117	+ 2,457.8
德國	Germany	1,229	11,884	+ 867.0	2,859	95,373	+ 3,235.9
澳洲	Australia	3,239	29,654	+ 815.5	6,813	201,326	+ 2,855.0
其他	Others	6,796	59,255	+ 771.9	17,692	437,788	+ 2,374.5
新市場	New Markets	4,894	49,200	+ 905.3	11,029	313,169	+ 2,739.5
印度	India	3,236	30,704	+ 848.8	7,086	177,310	+ 2,402.3
海灣合作地區國	GCC Markets	135	1,645	+ 1,118.5	280	13,978	+ 4,892.1
俄羅斯	Russia	556	6,907	+ 1,142.3	1,658	47,748	+ 2,779.9
荷蘭	Netherlands	853	6,189	+ 625.6	1,790	44,157	+ 2,366.9
越南	Vietnam	114	3,755	+ 3,193.9	215	29,976	+ 13,842.3

資料來源：入境事務處 Source : Immigration Department

海灣合作地區國家包括巴林、科威特、阿曼、卡塔爾、沙地阿拉伯以及阿聯酋

GCC Markets including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia & United Arab Emirates

2. 過夜旅客人次 (按居住國家 / 地區計) Overnight Visitor Arrivals by Country / Region of Residence

居住國家 / 地區	Country / Region of Residence	2022年11月	2023年11月	增長率	2022年1至11月	2023年1至11月	增長率
		Nov 2022	Nov 2023		Jan - Nov 2022	Jan - Nov 2023	
		人次 No.	人次 No.	% Growth	人次 No.	人次 No.	% Growth
合計	TOTAL	107,699	1,663,968	+ 1,445.0	421,906	15,187,995	+ 3,499.9
內地	Mainland	55,933	1,056,081	+ 1,788.1	295,752	11,115,548	+ 3,658.4
非內地	Non-Mainland	51,766	607,887	+ 1,074.3	126,154	4,072,447	+ 3,128.2
短途地區市場 (不包括內地)	Short Haul Markets (Exclude Mainland)	23,806	395,709	+ 1,562.2	57,450	2,653,164	+ 4,518.2
澳門特區	Macau SAR	887	20,385	+ 2,198.2	4,136	289,127	+ 6,890.5
短途地區市場 (不包括內地以及 澳門特區)	Short Haul Markets (Exclude Mainland & Macau SAR)	22,919	375,324	+ 1,537.6	53,314	2,364,037	+ 4,334.2
台灣	Taiwan	5,031	46,554	+ 825.3	12,158	366,831	+ 2,917.2
日本	Japan	2,055	38,578	+ 1,777.3	4,114	206,726	+ 4,924.9
南韓	South Korea	2,102	51,860	+ 2,367.2	4,901	257,322	+ 5,150.4
印尼	Indonesia	1,577	21,005	+ 1,232.0	3,438	165,558	+ 4,715.5
馬來西亞	Malaysia	1,978	31,537	+ 1,494.4	4,711	165,720	+ 3,417.7
菲律賓	Philippines	3,657	90,884	+ 2,385.2	8,765	559,273	+ 6,280.8
新加坡	Singapore	3,598	46,907	+ 1,203.7	7,590	269,884	+ 3,455.8
泰國	Thailand	2,350	43,178	+ 1,737.4	6,406	339,770	+ 5,203.9
其他	Others	571	4,821	+ 744.3	1,231	32,953	+ 2,576.9
長途地區市場	Long Haul Markets	23,313	177,577	+ 661.7	58,066	1,192,086	+ 1,953.0
美國	USA	5,795	54,213	+ 835.5	15,791	352,299	+ 2,131.0
加拿大	Canada	2,369	20,881	+ 781.4	5,953	125,686	+ 2,011.3
英國	United Kingdom	3,471	21,485	+ 519.0	8,006	151,409	+ 1,791.2
法國	France	1,247	8,878	+ 611.9	2,885	55,716	+ 1,831.2
德國	Germany	1,114	8,508	+ 663.7	2,650	67,570	+ 2,449.8
澳洲	Australia	3,020	22,739	+ 652.9	6,360	148,883	+ 2,240.9
其他	Others	6,297	40,873	+ 549.1	16,421	290,523	+ 1,669.2
新市場	New Markets	4,647	34,601	+ 644.6	10,638	227,197	+ 2,035.7
印度	India	3,085	19,926	+ 545.9	6,868	117,913	+ 1,616.8
海灣合作地區國:	GCC Markets	133	1,275	+ 858.6	275	11,252	+ 3,991.6
俄羅斯	Russia	536	5,345	+ 897.2	1,585	37,507	+ 2,266.4
荷蘭	Netherlands	779	4,618	+ 492.8	1,696	33,029	+ 1,847.5
越南	Vietnam	114	3,437	+ 2,914.9	214	27,496	+ 12,748.6

資料來源：入境事務處 Source : Immigration Department

海灣合作地區國家包括巴林、科威特、阿曼、卡塔爾、沙地阿拉伯以及阿聯酋

GCC Markets including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia & United Arab Emirates

3. 不過夜旅客人次 (按居住國家 / 地區計) Sameday Visitor Arrivals by Country / Region of Residence

居住國家 / 地區	Country / Region of Residence	2022年11月	2023年11月	增長率	2022年1至11月	2023年1至11月	增長率
		Nov 2022	Nov 2023		Jan - Nov 2022	Jan - Nov 2023	
		人次 No.	人次 No.	% Growth	人次 No.	人次 No.	% Growth
合計	TOTAL	6,064	1,624,947	+ 26,696.6	22,080	14,881,679	+ 67,298.9
內地	Mainland	2,761	1,371,390	+ 49,570.0	12,134	12,700,270	+ 104,566.8
非內地	Non-Mainland	3,303	253,557	+ 7,576.6	9,946	2,181,409	+ 21,832.5
短途地區市場 (不包括內地)	Short Haul Markets (Exclude Mainland)	1,537	169,629	+ 10,936.4	6,261	1,576,485	+ 25,079.4
澳門特區	Macau SAR	234	72,250	+ 30,776.1	1,803	796,103	+ 44,054.4
短途地區市場 (不包括內地以及 澳門特區)	Short Haul Markets (Exclude Mainland & Macau SAR)	1,303	97,379	+ 7,373.4	4,458	780,382	+ 17,405.2
台灣	Taiwan	660	32,536	+ 4,829.7	2,142	328,105	+ 15,217.7
日本	Japan	52	13,576	+ 26,007.7	109	95,641	+ 87,644.0
南韓	South Korea	78	10,396	+ 13,228.2	179	71,620	+ 39,911.2
印尼	Indonesia	52	5,853	+ 11,155.8	98	44,380	+ 45,185.7
馬來西亞	Malaysia	32	6,488	+ 20,175.0	72	41,827	+ 57,993.1
菲律賓	Philippines	325	11,288	+ 3,373.2	1,652	89,082	+ 5,292.4
新加坡	Singapore	28	9,293	+ 33,089.3	69	56,479	+ 81,753.6
泰國	Thailand	63	6,096	+ 9,576.2	114	40,217	+ 35,178.1
其他	Others	13	1,853	+ 14,153.8	23	13,031	+ 56,556.5
長途地區市場	Long Haul Markets	1,519	69,329	+ 4,464.1	3,294	518,952	+ 15,654.5
美國	USA	280	23,724	+ 8,372.9	630	170,895	+ 27,026.2
加拿大	Canada	201	8,450	+ 4,104.0	341	58,728	+ 17,122.3
英國	United Kingdom	142	5,350	+ 3,667.6	260	40,417	+ 15,445.0
法國	France	63	3,132	+ 4,871.4	130	21,401	+ 16,362.3
德國	Germany	115	3,376	+ 2,835.7	209	27,803	+ 13,202.9
澳洲	Australia	219	6,915	+ 3,057.5	453	52,443	+ 11,476.8
其他	Others	499	18,382	+ 3,583.8	1,271	147,265	+ 11,486.5
新市場	New Markets	247	14,599	+ 5,810.5	391	85,972	+ 21,887.7
印度	India	151	10,778	+ 7,037.7	218	59,397	+ 27,146.3
海灣合作地區國:	GCC Markets	2	370	+ 18,400.0	5	2,726	+ 54,420.0
俄羅斯	Russia	20	1,562	+ 7,710.0	73	10,241	+ 13,928.8
荷蘭	Netherlands	74	1,571	+ 2,023.0	94	11,128	+ 11,738.3
越南	Vietnam	-	318	-	1	2,480	+ 247,900.0

資料來源: 入境事務處 Source: Immigration Department

海灣合作地區國家包括巴林、科威特、阿曼、卡塔爾、沙地阿拉伯以及阿聯酋

GCC Markets including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia & United Arab Emirates

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* Figures less than 0.1%

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Peak Gasoline Demand Turns Out to Be a Mirage: Javier Blas
2023-12-28 05:00:15.326 GMT

By Javier Blas

(Bloomberg Opinion) -- After fueling the 20th century automobile culture that reshaped cities and defined modern travel, gasoline was supposed to begin its long goodbye this year. It didn't.

Sure, Tesla Inc. and its rivals sold more electric vehicles in 2023 than ever before, reducing fossil fuel demand. In the moneyed suburbs of London, New York and Beijing, EV cars are a common sight. From that narrow perspective, it looks like the world has already started "transitioning away from fossil fuels," as agreed at the recent COP28 climate talks. But it's a mirage.

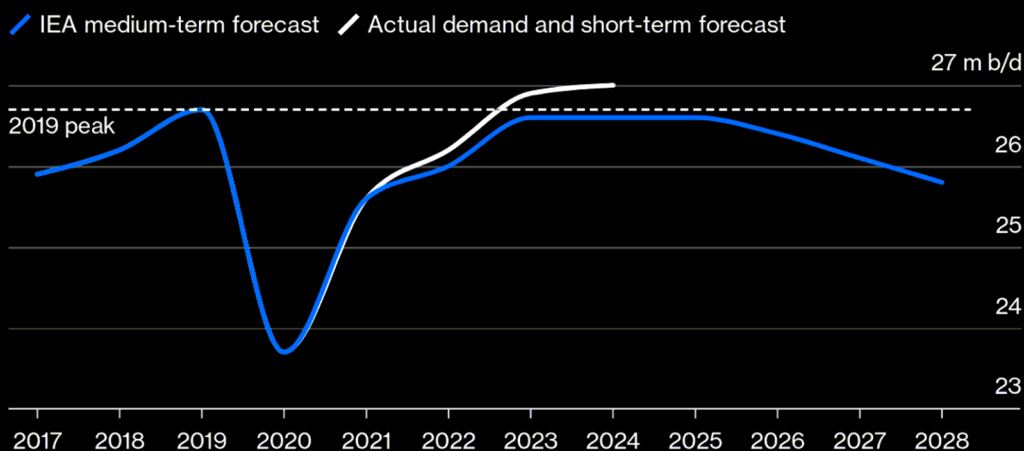
Even as EV sales increased, the global oil industry sold more gasoline than ever this year, surpassing the previous 2019 peak that the International Energy Agency had expected would remain an unassailable all-time high. Outside wealthy neighborhoods, the internal combustion engine still reigns supreme; in middle- and working-class areas, the energy transition remains a distant prospect.

From the 1950s onward, when Henry Ford's dream of a car in every middle-class American driveway became a reality, gas stations sprung up next to drive-in restaurants and strip malls, transforming the US landscape and economies across the globe. The gasoline used to power automobiles accounts for roughly one-in-four barrels of petroleum-refined products consumed worldwide.

As the climate crisis garners increased attention, the fuel is destined to play an outsized role in the energy transition — an early indicator of whether the shift away from fossil fuels is happening, and at what speed. The theory was that as EV cars became more popular, gasoline demand would be "disproportionally" impacted, the IEA predicted in its most recent five-year oil outlook, released in June. "This means that the fuel is likely to exhibit the earliest and most pronounced peak in demand" of all fractions of the oil barrel, it added. While consumption would recover this year, it wouldn't reach pre-pandemic levels; the outlook was for a gentle, but constant, downward trend. In the middle of the year, the IEA predicted that gasoline usage would "never return to 2019 levels," when demand reached 26.7 million barrels a day. Instead, consumption rose to about 26.9 million barrels a day this year, according to the latest IEA figures. And 2024 is poised for another, even if small, increase, to just above 27 million barrels a day. As things stand, the peak in gasoline demand has been delayed by five years, to 2024 from 2019. And I won't be surprised if, once more data are available and forecasts are updated, the peak is pushed forward even further.

Gasoline Recovery

Global demand for gasoline surpassed this year the record high set in 2019 before the onset of the pandemic, defying expectations of a long-term decline



Source: IEA and Bloomberg

Bloomberg Opinion

The surge past the 2019 peak is particularly significant because it came against three notable headwinds: gasoline prices have been high, particularly in local currencies outside the US dollar world; work-from-home remains far more prevalent than before the pandemic; and Chinese economic growth has slowed.

The trend of higher-for-longer demand has three important lessons for understanding the energy transition. First, the stylized forecasts showing sustained demand declines rarely survive the passage of time – not just years later, but often as soon as a few months after publication. Second, announcements of peak demand generate lots of headlines, but when consumption surges past those peaks, the public rarely hears about it, providing a misleading picture of the pace of the transition. Third, the shift away from fossil fuels will take longer than many had expected.

It's not all bad. The world is embracing EV cars and, over time, their market share will continue to increase, particularly in China, North America and Western Europe – boosted by generous subsidies in many nations. Even if gasoline demand continues to increase, the pace of growth is slowing. We may not have reached the peak, but probably there isn't much growth ahead, either.

Still, gasoline demand benefits from a strong force: the world is becoming richer. In 2023, there were about 1.1 billion passenger cars in use, up from about 850 million a decade earlier. Even if a growing percentage of those cars is battery-powered, the absolute number of gasoline-fueled cars has increased. It's a trend that will take decades, rather than years, to reverse.

Until then, gasoline remains king — whatever the forecasts say.

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Since the IEA released its 5-year oil outlook in June, it had revised its 2019 gasoline demand estimate from 26.7 million barrels a day to 26.8 million barrels a day.

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Executive summary

Electric car sales break new records with momentum expected to continue through 2023

Electric car markets are seeing exponential growth as sales exceeded 10 million in 2022. A total of 14% of all new cars sold were electric in 2022, up from around 9% in 2021 and less than 5% in 2020. Three markets dominated global sales. China was the frontrunner once again, accounting for around 60% of global electric car sales. More than half of the electric cars on roads worldwide are now in China and the country has already exceeded its 2025 target for new energy vehicle sales. In Europe, the second largest market, electric car sales increased by over 15% in 2022, meaning that more than one in every five cars sold was electric. Electric car sales in the United States – the third largest market – increased 55% in 2022, reaching a sales share of 8%.

Electric car sales are expected to continue strongly through 2023. Over 2.3 million electric cars were sold in the first quarter, about 25% more than in the same period last year. We currently expect to see 14 million in sales by the end of 2023, representing a 35% year-on-year increase with new purchases accelerating in the second half of this year. As a result, electric cars could account for 18% of total car sales across the full calendar year. National policies and incentives will help bolster sales, while a return to the exceptionally high oil prices seen last year could further motivate prospective buyers.

There are promising signs for emerging electric vehicle (EV) markets, albeit from a small base. Electric car sales are generally low outside the major markets, but 2022 was a growth year in India, Thailand and Indonesia. Collectively, sales of electric cars in these countries more than tripled compared to 2021, reaching 80 000. For Thailand, the share of electric cars in total sales came in at slightly over 3% in 2022, while both India and Indonesia averaged around 1.5% last year. In India, EV and component manufacturing is ramping up, supported by the government's USD 3.2 billion incentive programme that has attracted investments totalling USD 8.3 billion. Thailand and Indonesia are also strengthening their policy support schemes, potentially providing valuable experience for other emerging market economies seeking to foster EV adoption.

Landmark EV policies are driving the outlook for EVs closer to climate ambitions

Market trends and policy efforts in major car markets are supporting a bright outlook for EV sales. Under the IEA Stated Policies Scenario (STEPS), the global outlook for the share of electric car sales based on existing policies and firm objectives has increased to 35% in 2030, up from less than 25% in the previous outlook. In the projections, China retains its position as the largest market for electric cars with 40% of total sales by 2030 in the STEPS. The United States doubles its market share to 20% by the end of the decade as recent policy announcements drive demand, while Europe maintains its current 25% share.

Projected demand for electric cars in major car markets will have profound implications on energy markets and climate goals in the current policy environment. Based on existing policies, oil demand from road transport is projected to peak around 2025 in the STEPS, with the amount of oil displaced by electric vehicles exceeding 5 million barrels per day in 2030. In the STEPS, emissions of around 700 Mt CO₂-equivalents are avoided by the use of electric cars in 2030.

The European Union and the United States have passed legislation to match their electrification ambitions. The European Union adopted new CO₂ standards for cars and vans that are aligned with the 2030 goals set out in the Fit for 55 package. In the United States, the Inflation Reduction Act (IRA), combined with adoption of California's Advanced Clean Cars II rule by a number of states, could deliver a 50% market share for electric cars in 2030, in line with the national target. The implementation of the recently proposed emissions standards from the US Environmental Protection Agency is set to further increase this share.

Battery manufacturing continues to expand, encouraged by the outlook for EVs. As of March 2023, announcements on battery manufacturing capacity delivered by 2030 are more than sufficient to meet the demand implied by government pledges and would even be able to cover the demand for electric vehicles in the Net Zero Emissions by 2050 Scenario. It is therefore well possible that higher shares of sales are achievable for electric cars than those anticipated on the basis of current government policy and national targets.

As spending and competition increase, a growing number of more affordable models come to market

Global spending on electric cars exceeded USD 425 billion in 2022, up 50% relative to 2021. Only 10% of the spending can be attributed to government support, the remainder was from consumers. Investors have also maintained confidence in EVs, with the stocks of EV-related companies consistently

outperforming traditional carmakers since 2019. Venture capital investments in start-up firms developing EV and battery technologies have also boomed, reaching nearly USD 2.1 billion in 2022, up 30% relative to 2021, with investments increasing in batteries and critical minerals.

SUVs and large cars dominate available electric car options in 2022. They account for 60% of available BEV options in China and Europe and an even greater share in the United States, similar to the trend towards SUVs seen in internal combustion engine (ICE) car markets. In 2022, ICE SUVs [emitted](#) over 1 Gt CO₂, far greater than the 80 Mt net emissions reductions from the electric vehicle fleet that year. Battery electric SUVs often have batteries that are two- to three-times larger than small cars, requiring more critical minerals. However, last year electric SUVs resulted in the displacement of over 150 000 barrels of oil consumption per day and avoided the associated tailpipe emissions that would have been generated through burning the fuel in combustion engines.

The electric car market is increasingly competitive. A growing number of new entrants, primarily from China but also from other emerging markets, are offering more affordable models. Major incumbent carmakers are increasing ambition as well, especially in Europe, and 2022-2023 saw another series of important EV announcements: fully electric fleets, cheaper cars, greater investment, and vertical integration with battery-making and critical minerals.

Consumers can choose from an increasing number of options for electric cars. The number of available electric car models reached 500 in 2022, more than double the options available in 2018. However, outside of China, there is a need for original equipment manufacturers (OEMs) to offer affordable, competitively priced options in order to enable mass adoption of EVs. Today's level of available electric car models is still significantly lower than the number of ICE options on the market, but the number of ICE models available has been steadily decreasing since its peak in the mid-2010s.

Focus expands to electrification of more vehicle segments as electric cars surge ahead

Electrification of road transport goes beyond cars. Two or three-wheelers are the most electrified market segment today; in emerging markets and developing economies, they outnumber cars. Over half of India's three-wheeler registrations in 2022 were electric, demonstrating their growing popularity due to government incentives and lower lifecycle costs compared with conventional models, especially in the context of higher fuel prices. In many developing economies, two/three-wheelers offer an affordable way to get access to mobility, meaning their electrification is important to support sustainable development.

The commercial vehicle stock is also seeing increasing electrification. Electric light commercial vehicle (LCV) sales worldwide increased by more than 90% in 2022 to more than 310 000 vehicles, even as overall LCV sales declined by nearly 15%. In 2022, nearly 66 000 electric buses and 60 000 medium- and heavy-duty trucks were sold worldwide, representing about 4.5% of all bus sales and 1.2% of truck sales. Where governments have committed to reduce emissions from public transport, such as in dense urban areas, electric bus sales reached even higher shares; in Finland, for example, electric bus sales accounted for over 65% in 2022.

Ambition with respect to electrifying heavy-duty vehicles is growing. In 2022, around 220 electric heavy-duty vehicle models entered the market, bringing the total to over 800 models offered by well over 100 OEMs. A total of 27 governments have [pledged to achieve 100% ZEV bus and truck sales by 2040](#) and both the United States and European Union have also proposed stronger emissions standards for heavy-duty vehicles.

EV supply chains and batteries gain greater prominence in policy-making

The increase in demand for electric vehicles is driving demand for batteries and related critical minerals. Automotive lithium-ion (Li-ion) battery demand increased by about 65% to 550 GWh in 2022, from about 330 GWh in 2021, primarily as a result of growth in electric passenger car sales. In 2022, about 60% of lithium, 30% of cobalt and 10% of nickel demand was for EV batteries. Only five years prior, these shares were around 15%, 10% and 2%, respectively. Reducing the need for critical materials will be important for supply chain sustainability, resilience and security, especially given recent price developments for battery material.

New alternatives to conventional lithium-ion are on the rise. The share of lithium-iron-phosphate (LFP) chemistries reached its highest point ever, driven primarily by China: around 95% of the LFP batteries for electric LDVs went into vehicles produced in China. Supply chains for (lithium-free) sodium-ion batteries are also being established, with over 100 GWh of manufacturing capacity either currently operating or announced, almost all in China.

The EV supply chain is expanding, but manufacturing remains highly concentrated in certain regions, with China being the main player in battery and EV component trade. In 2022, 35% of exported electric cars came from China, compared with 25% in 2021. Europe is China's largest trade partner for both electric cars and their batteries. In 2022, the share of electric cars manufactured in China and sold in the European market increased to 16%, up from about 11% in 2021.

EV supply chains are increasingly at the forefront of EV-related policy-making to build resilience through diversification. The Net Zero Industry Act, proposed by the European Union in March 2023, aims for nearly 90% of the European Union’s annual battery demand to be met by EU battery manufacturers, with a manufacturing capacity of at least 550 GWh in 2030. Similarly, India aims to boost domestic manufacturing of electric vehicles and batteries through Production Linked Incentive (PLI) schemes. In the United States, the Inflation Reduction Act emphasises the strengthening of domestic supply chains for EVs, EV batteries and battery minerals, laid out in the criteria to qualify for clean vehicle tax credits. As a result, between August 2022 and March 2023, major EV and battery makers announced cumulative post-IRA investments of at least USD 52 billion in North American EV supply chains – of which 50% is for battery manufacturing, and about 20% each for battery components and EV manufacturing.

Trends and developments in EV markets

Electric light-duty vehicles

Electric car sales continue to increase, led by China

Electric car sales¹ saw another record year in 2022, despite supply chain disruptions, macro-economic and geopolitical uncertainty, and high commodity and energy prices. The growth in electric car sales took place in the context of globally contracting car markets: total car sales in 2022 dipped by 3% relative to 2021. Electric car sales – including battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) – exceeded 10 million last year, up 55% relative to 2021.² This figure – 10 million EV sales worldwide – exceeds the total number of cars sold across the entire European Union (about 9.5 million vehicles) and is nearly half of the total number of cars sold in China in 2022. In the course of just five years, from 2017 to 2022, EV sales jumped from around 1 million to more than 10 million. It previously took five years from 2012 to 2017 for EV sales to grow from 100 000 to 1 million, underscoring the exponential nature of EV sales growth. The share of electric cars in total car sales jumped from 9% in 2021 to 14% in 2022, more than 10 times their share in 2017.

Over 26 million electric cars were on the road in 2022, up 60% relative to 2021 and more than 5 times the stock in 2018

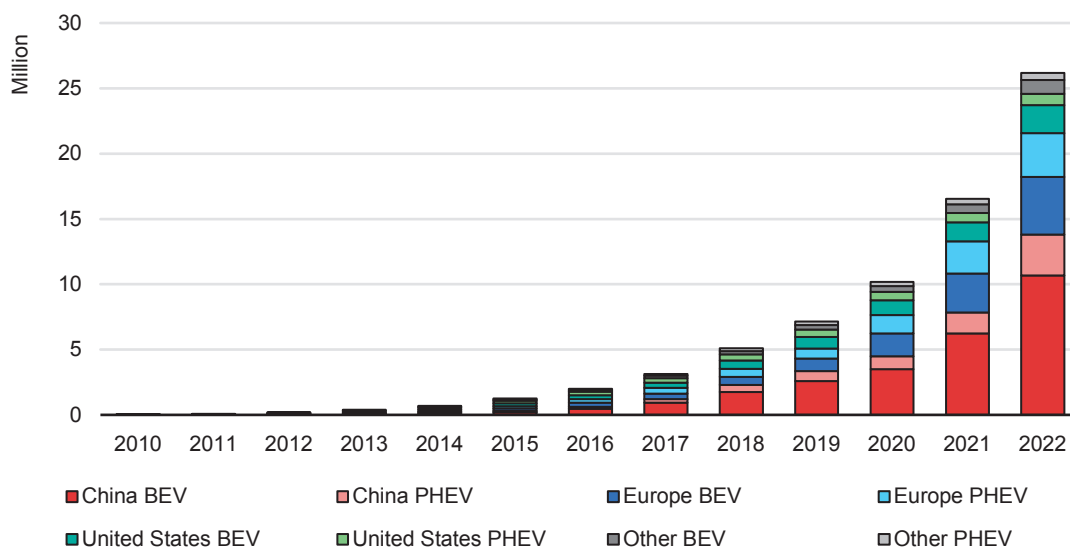
Increasing sales pushed the total number of electric cars on the world's roads to 26 million, up 60% relative to 2021, with BEVs accounting for over 70% of total annual growth, as in previous years. As a result, about 70% of the global stock of electric cars in 2022 were BEVs. The increase in sales from 2021 to 2022 was just as high as from 2020 to 2021 in absolute terms – up 3.5 million – but relative growth was lower (sales doubled from 2020 to 2021). The exceptional boom in 2021 may be explained by EV markets catching up in the wake of the coronavirus

¹ The term sales, as used in this report, represents an estimate of the number of new vehicles hitting the roads. Where possible, data on new vehicle registrations is used. In some cases, however, only data on retail sales (such as sales from a dealership) are available. See Box 1.2 for further details. The term car is used to represent passenger light-duty vehicles and includes cars of different sizes, sports utility-vehicles and light trucks.

² Unless otherwise specified, the term electric vehicle is used to refer to both battery electric and plug-in hybrid electric vehicles but does not include fuel cell electric vehicles. For a brief description of the trends related to fuel cell electric vehicles, see Box 1.3.

(Covid-19) pandemic. Seen in comparison to recent years, the annual growth rate for electric car sales in 2022 was similar to the average rate over 2015-2018, and the annual growth rate for the global stock of electric cars in 2022 was similar to that of 2021 and over the 2015-2018 period, showing a robust recovery of EV market expansion to pre-pandemic pace.

Figure 1.1 Global electric car stock in selected regions, 2010-2022



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; PHEV = plug-in hybrid electric vehicle. Electric car stock in this figure refers to passenger light-duty vehicles. In “Europe”, European Union countries, Norway, and the United Kingdom account for over 95% of the EV stock in 2022; the total also includes Iceland, Israel, Switzerland and Türkiye. Main markets in “Other” include Australia, Brazil, Canada, Chile, Mexico, India, Indonesia, Japan, Malaysia, New Zealand, South Africa, Korea and Thailand.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: IEA analysis based on country submissions, ACEA, EAFO, EV Volumes and Marklines.

Over 26 million electric cars were on the road in 2022, up 60% relative to 2021 and more than five times the stock in 2018.

Half of the world’s electric cars are in China

The increase in electric car sales varied across regions and powertrains, but remains dominated by the People’s Republic of China (hereafter “China”). In 2022, BEV sales in China increased by 60% relative to 2021 to reach 4.4 million, and PHEV sales nearly tripled to 1.5 million. The faster growth in PHEV sales relative to BEVs warrants further examination in the coming years, as PHEV sales still remain lower overall and could be catching up on the post-Covid-19 boom only now; BEV sales in China tripled from 2020 to 2021 after moderate growth over 2018-2020. Electric car sales increased even while total car sales dipped by 3% in 2022 relative to 2021.

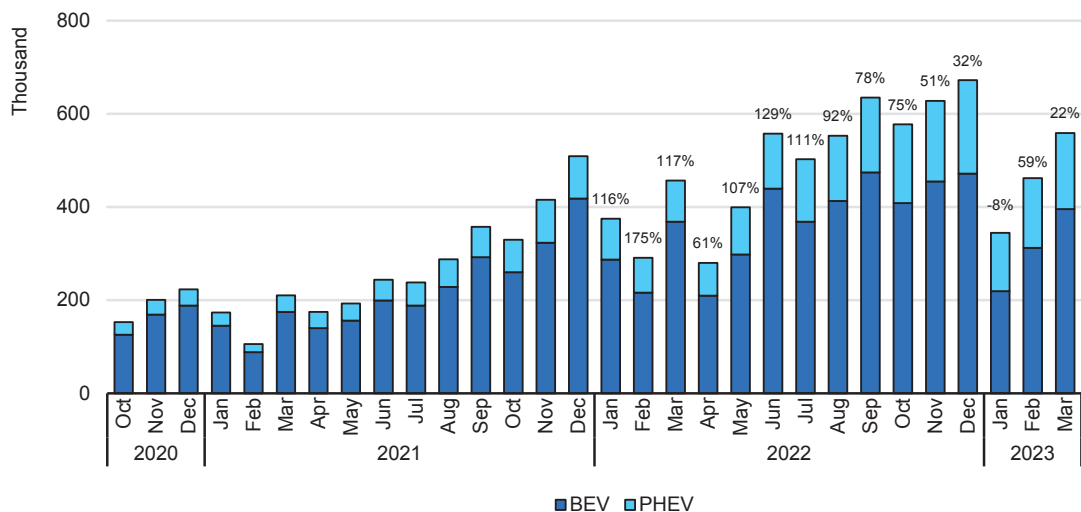
China accounted for nearly 60% of all new electric car registrations globally. For the first time in 2022, China accounted for more than 50% of all the electric cars on the world's roads, a total of 13.8 million. This strong growth results from more than a decade of sustained policy support for early adopters, including an [extension of purchase incentives](#) initially planned for phase-out in 2020 to the end of 2022 due to Covid-19, in addition to non-financial support such as rapid roll-out of charging infrastructure and stringent registration policies for non-electric cars.

In 2022, the share of electric cars in total domestic car sales reached 29% in China, up from 16% in 2021 and under 6% between 2018 and 2020. China has therefore [achieved](#) its 2025 national target of a 20% sales share for so-called new energy vehicles (NEVs)³ well in advance. All indicators point to further growth: although the national NEV sales target is yet to be updated by China's Ministry of Industry and Information Technology (MIIT), which is responsible for the automotive industry, the objective of greater road transport electrification is re-affirmed in multiple strategy documents. China aims to reach a [50%](#) sales share by 2030 in so-called "key air pollution control regions", and [40% across the country](#) by 2030 to support the national action plan for carbon peaking. If recent market trends continue, China's 2030 targets may also be reached ahead of time. Provincial governments are also supporting adoption of NEVs, with 18 provinces to date having set NEV targets.

Support at the regional level in China has also helped to advance some of the world's largest EV makers. Shenzhen-based BYD has supplied most of the city's electric buses and taxis, and its leading position is also reflected in Shenzhen's ambition of reaching a [60%](#) NEV sales share by 2025. Guangzhou, which has a 50% NEV sales share by 2025 target, [facilitated](#) the expansion of Xpeng Motors to become one of the national EV frontrunners.

³ NEVs (China) include BEVs, PHEVs and fuel cell electric vehicles.

Figure 1.2 Monthly new electric car registrations in China, 2020-2023



IEA. CC BY 4.0.

Note: BEV = battery electric vehicle; PHEV = plug-in hybrid electric vehicle. Percentage labels in 2022-2023 refer to year-on-year growth rates relative to the same month in the previous year.
Source: IEA analysis based on EV Volumes.

Electric car sales in China have been steadily increasing since 2020, but future trends will warrant further examination given that purchase incentives ended in 2022.

Whether China’s electric car sales share will remain significantly above the 20% target in 2023 remains uncertain, as sales may have been especially high in anticipation of incentives being phased out at the end of 2022. Sales in January 2023 [plunged](#), and while this is in part due to the timing of the Chinese New Year, they were nearly 10% lower than sales in January 2022. However, electric car sales caught up in February and March 2023, standing nearly 60% above sales in February 2022 and more than 25% above sales in March 2022, thereby bringing sales in the first quarter of 2023 more than 20% higher than in the first quarter of 2022.

Growth remained steady in Europe despite disruptions

In Europe,⁴ electric car sales increased by more than 15% in 2022 relative to 2021 to reach 2.7 million. Sales grew more quickly in previous years: annual growth stood at more than 65% in 2021 and averaged 40% over 2017-2019. In 2022, BEV sales rose by 30% relative to 2021 (compared to 65% growth in 2021 relative to 2020) while PHEV sales dipped by around 3%. Europe accounted for 10% of global growth in new electric car sales. Despite slower growth in 2022, electric car

⁴ Europe includes European Union countries, Iceland, Israel, Norway, Switzerland, Türkiye, and the United Kingdom.

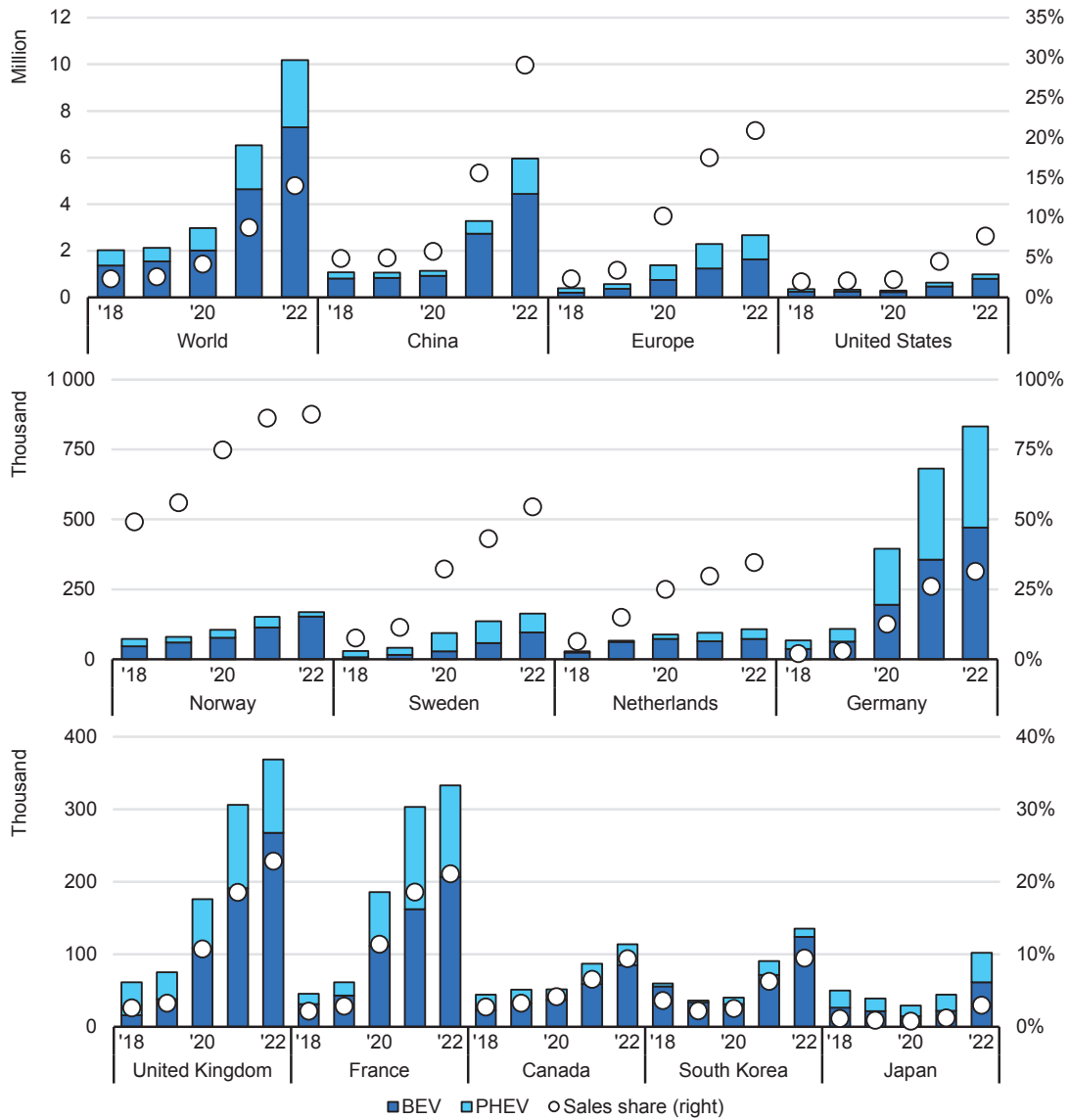
sales are still increasing in Europe in the context of continued contraction in car markets: total car sales in Europe dipped by 3% in 2022 relative to 2021.

The slowdown seen in Europe relative to previous years was, in part, a reflection of the exceptional growth in electric car sales that took place in 2020 and 2021 in the European Union, as manufacturers quickly adjusted corporate strategy to comply with the CO₂ emission [standards](#) passed in 2019. These standards covered the 2020-2024 period, with EU-wide emission targets becoming stricter only from 2025 and 2030 onwards.

High energy prices in 2022 had a mixed impact on the competitiveness of EVs relative to internal combustion engine (ICE) cars. Gasoline and diesel prices for ICE cars spiked, but residential electricity tariffs (with relevance for charging) also increased in some cases. Higher electricity and gas prices also increased manufacturing costs for both ICE and EV cars, with some carmakers arguing that high energy prices could [restrict](#) future investment for new battery manufacturing capacity.

Europe remained the world's second largest market for electric cars after China in 2022, accounting for 25% of all electric car sales and 30% of the global stock. The sales share of electric cars reached 21%, up from 18% in 2021, 10% in 2020 and under 3% prior to 2019. European countries continued to rank highly for the sales share of electric cars, led by Norway at 88%, Sweden at 54%, the Netherlands at 35%, Germany at 31%, the United Kingdom at 23% and France at 21% in 2022. In volume terms, Germany is the biggest market in Europe with sales of 830 000 in 2022, followed by the United Kingdom with 370 000 and France with 330 000. Sales also exceeded 80 000 in Spain. The share of electric cars in total car sales has increased tenfold in Germany since before the Covid-19 pandemic, which can in part be explained by increasing support post-pandemic, such as purchase incentives through the [Umweltbonus](#), and a frontloading of sales in 2022 in [expectation](#) of subsidies being further reduced from 2023 onwards. However, in Italy, electric car sales decreased from 140 000 in 2021 to 115 000 in 2022, and they also decreased or stagnated in Austria, Denmark and Finland.

Figure 1.3 Electric car registrations and sales share in selected countries and regions, 2018-2022



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; PHEV = plug-in hybrid electric vehicle. Passenger light-duty vehicles only. Major markets at the top. Other countries (middle, bottom) ordered by the share of electric car sales in total car sales. Y-axes do not have the same scale to improve readability.

Source: IEA analysis based on country submissions, ACEA, EAFO, EV Volumes and Marklines.

Electric car sales exceeded 10 million in 2022, up 55% relative to 2021. Sales in China increased by 80% and accounted for 60% of global growth. Growth in Europe remained high (up 15%) and accelerated in the United States (up 55%).

Sales are expected to continue increasing in Europe, especially following [recent policy](#) developments under the 'Fit for 55' package. New rules set stricter CO₂ emission standards for 2030-2034 and target a 100% reduction in CO₂ emissions for new cars and vans from 2035 relative to 2021 levels. In the nearer term, an

incentive mechanism operating between 2025 and 2029 will reward manufacturers that achieve a 25% car sales share of zero- and low-emission cars (17% for vans). In the first two months of 2023, battery electric car sales were already [up](#) by over 30% year-on-year, while overall car sales increased by just over 10% year-on-year.

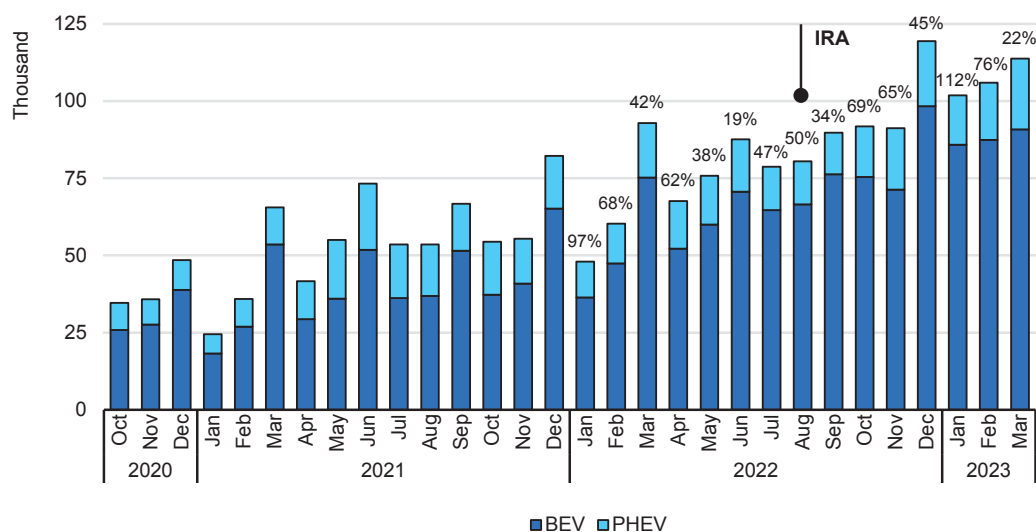
The United States confirms return to growth

In the United States, electric car sales increased 55% in 2022 relative to 2021, led by BEVs. Sales of BEVs increased by 70%, reaching nearly 800 000 and confirming a second consecutive year of strong growth after the 2019-2020 dip. Sales of PHEVs also grew, albeit by only 15%. The increase in electric car sales was particularly high in the United States, considering that total car sales dropped by 8% in 2022 relative to 2021, a much sharper decrease than the global average (minus 3%). Overall, the United States accounted for 10% of the global growth in sales. The total stock of electric cars reached 3 million, up 40% relative to 2021 and accounting for 10% of the global total. The share of electric cars in total car sales reached nearly 8%, up from just above 5% in 2021 and around 2% between 2018 and 2020.

A number of factors are helping to increase sales in the United States. A greater number of available models, beyond those offered by Tesla, the historic leader, helped to close the [supply](#) gap. Given that major companies like Tesla and General Motors had already reached their subsidy cap under US support in previous years,⁵ new models from other companies being available means that more consumers can benefit from purchase incentives, which can be as high as USD 7 500. Awareness is increasing as government and companies lean towards electrification: in 2022, a quarter of Americans expect that their next car will be electric, [according](#) to the American Automobile Association. Although charging infrastructure and driving range have improved over the years, they remain major [concerns](#) for US drivers given the typically long travel distances and lower popularity and limited availability of alternatives such as rail. However, in 2021 the Bipartisan Infrastructure Law strengthened support for EV charging, allocating USD 5 billion in total funding over the 2022-2026 period through the National Electric Vehicle Infrastructure Formula Program, as well as USD 2.5 billion in competitive grants over the same period through the Charging and Fueling Infrastructure Discretionary Grant Program.

⁵ Manufacturer caps were [still in place](#) for sales taking place in 2022, with models by carmakers having sold over 200 000 EVs losing eligibility for the purchase incentive, even if they were manufactured in North America following [requirements](#) under the IRA. Caps were removed starting from 2023.

Figure 1.4 Monthly new electric car registrations in the United States, 2020-2023



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; PHEV = plug-in hybrid electric vehicle; “IRA” refers to the Inflation Reduction Act. Percentage labels in 2022-2023 refer to year-on-year growth rates relative to the same month in the previous year. Source: IEA analysis based on EV Volumes.

Monthly sales of electric cars have been steadily increasing in the United States, with further growth expected in 2023 as a result of strengthened policy support.

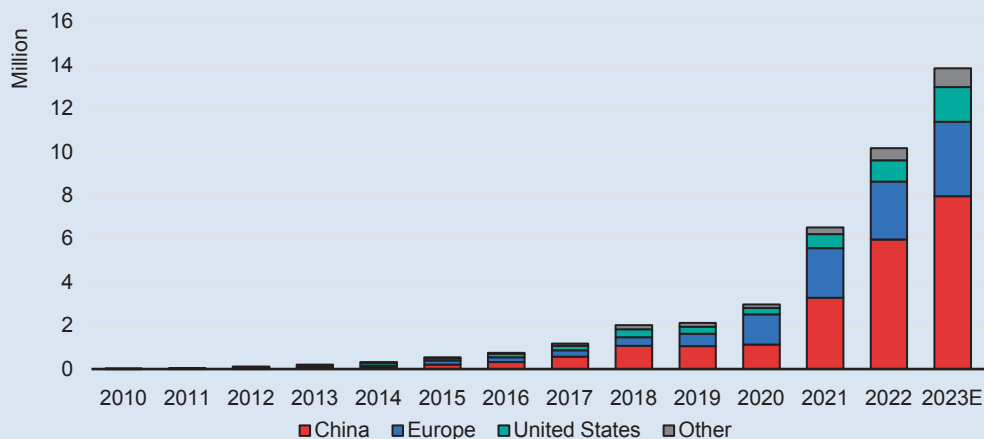
The acceleration in sales growth could continue in 2023 and beyond thanks to recent new [policy](#) support (see [Prospects for electric vehicle deployment](#)). The Inflation Reduction Act (IRA) has triggered a [rush by global electromobility companies](#) to expand US manufacturing operations. Between August 2022 and March 2023, major EV and battery makers announced cumulative post-IRA investments of [USD 52 billion](#) in North American EV supply chains, of which 50% is for battery manufacturing, and about 20% each for battery components and EV manufacturing. Overall, company announcements including tentative commitments for US investments for future battery and EV production add up to around [USD 75-108 billion](#). As an example, Tesla plans to [relocate](#) its Berlin-based lithium-ion battery gigafactory to Texas, where it will work in [partnership](#) with China’s CATL, and to manufacture next-generation EVs [in Mexico](#). Ford also announced a [deal with CATL](#) for a battery plant in Michigan, and [plans](#) to increase electric car manufacturing sixfold by the end of 2023 relative to 2022, at 600 000 vehicles per year, scaling up to 2 million by 2026. BMW is seeking to [expand](#) EV manufacturing at its plant in South Carolina following the IRA. Volkswagen chose Canada for its [first battery plant outside Europe](#), which will begin operations in 2027, and is also investing USD 2 billion in its plant in South Carolina. While these investments can be expected to lead to high growth in the years to come, the impact may only fully be seen from 2024 onwards as plants come online.

In the immediate term, the IRA has [constrained](#) eligibility requirements for purchase incentives, as vehicles need to be produced in North America in order to qualify for a subsidy. However, electric car sales have remained strong since August 2022 (Figure 1.4), and the first months of 2023 have been no exception: In the first quarter of 2023, electric car sales increased 60% compared to the same period in 2022, potentially boosted by the January 2023 removal of the subsidy caps for manufacturers, which means models by market leaders can now benefit from purchase incentives. In the longer-term, the list of models eligible for subsidies is expected to expand.

Box 1.1 The 2023 outlook for electric cars is bright

Early indications from first quarter sales of 2023 point to an upbeat market, supported by cost declines as well as strengthened policy support in key markets such as the United States. Globally, our current estimate is therefore for nearly 14 million electric cars to be sold in 2023, building on the more than 2.3 million already sold in the first quarter of the year. This represents a 35% increase in electric car sales in 2023 compared to 2022 and would bring the global electric sales share to around 18%, up from 14% in 2022.

Electric car sales, 2010-2023



IEA. CC BY 4.0.

Note: 2023 sales ("2023E") are estimated based on market trends through the first quarter of 2023.
 Source: IEA analysis based on EV Volumes.

Electric car sales in the first three months of 2023 have shown strong signs of growth compared to the same period in 2022. In the United States, more than 320 000 electric cars were sold in the first quarter of 2023, 60% more than over the same period in 2022. Our current expectation is for this growth to be sustained throughout the year, with electric car sales reaching over 1.5 million in 2023, bringing the electric car sales share in the United States up to around 12% in 2023.

In China, electric car sales were off to a rough start in 2023, with January sales being 8% lower than in January 2022. The latest available data suggests a quick recovery: over the entire first quarter of 2023, electric car sales in China were more than 20% higher than in the first quarter of 2022, with more than 1.3 million electric cars being registered. For the remainder of 2023, we expect the generally favourable cost structure of electric cars to outweigh the effects of the phase-out of the NEV subsidy. As a result, our current expectation is for electric car sales in China to be more than 30% higher than in 2022 and reach around 8 million by the end of 2023, reaching a sales share of over 35% (from 29% in 2022).

Based on recent trends and tightening CO₂ targets not going into effect until 2025, the growth of electric car sales in Europe is expected to be the lowest of the three largest markets. In the first quarter of 2023, electric car sales in Europe increased by around 10% compared to the same period in 2022. For the full year, we currently expect electric car sales to increase by over 25%, with one-in-four cars sold in Europe being electric.

Outside of the major EV markets, electric car sales are expected to reach around 900 000 in 2023 – 50% higher than in 2022. Electric car sales in India in the first quarter of 2023 are already double what they were in the same period in 2022. In India and across all regions outside the three major EV markets, electric car sales are expected to represent 2-3% of car sales in 2023, a relatively small yet growing share.

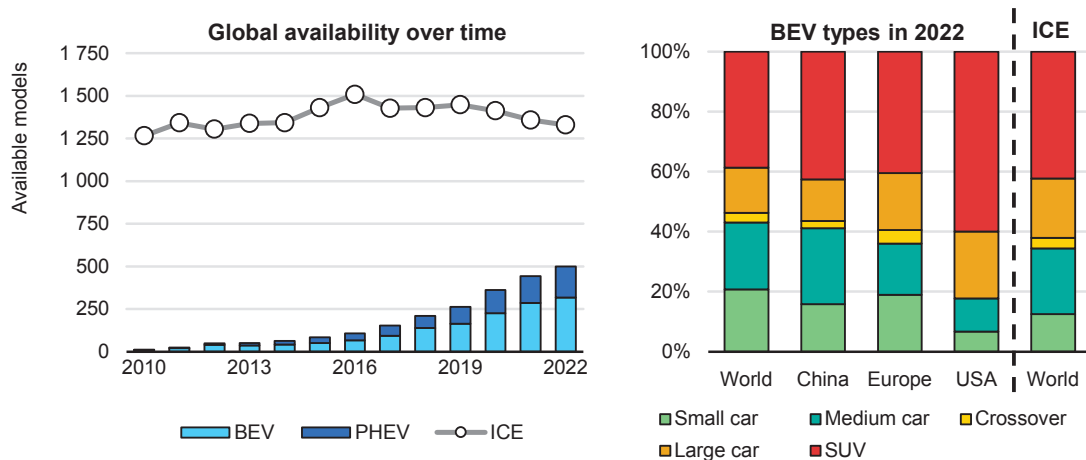
There are, of course, downside risks to the 2023 outlook: a sluggish global economy and the phase-out of subsidies for NEVs in China could reduce 2023 growth in global electric car sales. On the upside, new markets may open up more quickly than anticipated, as persistent high oil prices make the case for EVs stronger in an increasing number of settings. And new policy developments, such as the April 2023 proposal from the US Environmental Protection Agency (EPA) to strengthen GHG emissions standards for cars, may send signals that boost sales even before going into effect.

The number of electric car models rises, especially for large cars and SUVs, at the same time as it decreases for conventional cars

The race to electrification is increasing the number of electric car models available on the market. In 2022, the number of available options reached 500, up from below 450 in 2021 and more than doubling relative to 2018-2019. As in previous years, China has the broadest portfolio with nearly 300 available models, double the number available in 2018-2019, prior to the Covid-19 pandemic. This remains nearly twice as many as in Norway, the Netherlands, Germany, Sweden, France and the United Kingdom, which all have around 150 models available, more than

three times as many as before the pandemic. In the United States, there were fewer than 100 models available in 2022, but twice as many as before the pandemic; and 30 or fewer were available in Canada, Japan and Korea.

Figure 1.5 Car model availability by powertrain, 2010-2022 (left), and breakdown of available cars by powertrain and segment in 2022 (right)



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; PHEV = plug-in hybrid vehicle; ICE = internal combustion engine; SUV = sports utility vehicle; USA = United States. Analysis based on models for which there was at least one new registration in a given year; a model on sale but never sold is not counted, and as such actual model availability may be underestimated. In the chart on the right-hand side, distribution is based on the number of available models, not sales-weighted. Small cars include A and B segments. Medium cars include C and D segments. Crossovers are a type of sports utility vehicle (SUV) built on a passenger car platform. Large cars include E and F segments and multi-purpose vehicles.

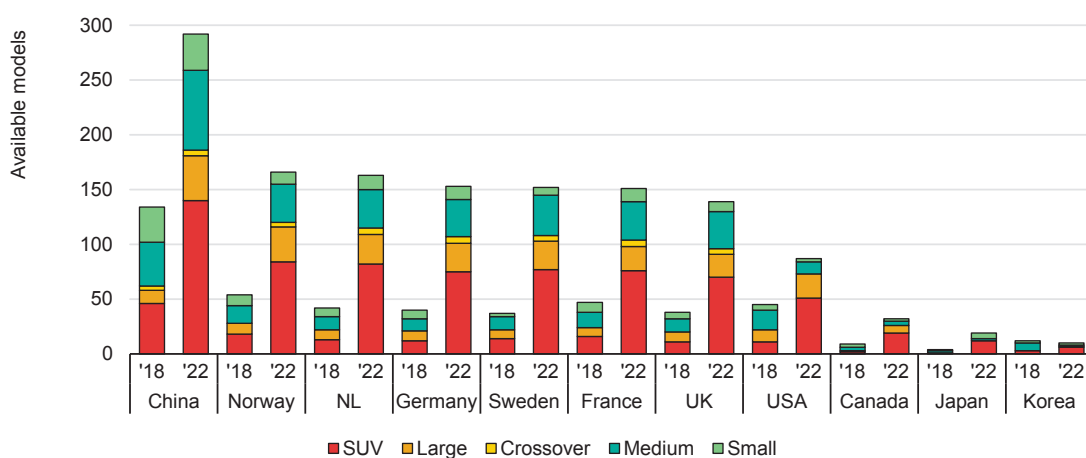
Source: IEA analysis based on Marklines.

The number of available electric car models reached 500 in 2022 but remains far below the number of ICE options. Large cars and SUVs still account for over half of available BEVs.

The 2022 trend reflects the increasing maturity of EV markets and demonstrates that carmakers are responding to increasing consumer demand for electric cars. However, the number of electric car models available remains much lower than that of conventional ICE cars, which has remained above 1 250 since 2010 and peaked at 1 500 in the middle of the past decade. In recent years, the number of ICE models sold has been steadily [decreasing](#), at a compound annual growth rate of minus 2% over the 2016-2022 period, reaching about 1 300 models in 2022. This dip varies across major car markets and is most pronounced in China, where the number of available ICE options was 8% lower in 2022 than in 2016, versus 3-4% lower in the United States and Europe over the same period. This could result from contracting car markets and a progressive shift towards EVs among major carmakers. Looking forward, the total number of ICE models available could remain stable, while the number of [new models](#) shrinks, if carmakers focus on electrification and keep selling existing ICE options rather than increasing budgets to develop new models.

In contrast to ICE models, EV model availability has been growing quickly, at a compound annual growth rate of 30% over the 2016-2022 period. Such growth is to be expected in a nascent market with a large number of new entrants bringing innovative products to the market, and as incumbents diversify their portfolios. Growth has been slightly lower in recent years: the annual growth rate stood at around 25% in 2021 and 15% in 2022. In the future, the number of models can be expected to continue to increase quickly, as major carmakers expand their EV portfolios and new entrants strengthen their positions, particularly in emerging markets and developing economies (EMDEs). The historic number of ICE models available on the market suggests that the current number of EV options could double, at least, before stabilising.

Figure 1.6 Electric car model availability in selected countries by size, 2018-2022



IEA. CC BY 4.0.

Notes: NL = the Netherlands; UK = United Kingdom; USA = United States; SUV = sports utility vehicle. Includes battery electric vehicles and plug-in hybrid electric vehicles. Countries are ordered by the number of available models in 2022. Analysis based on models for which there was at least one new registration in a given year; a model on sale but never sold is not counted, and as such actual model availability may be underestimated.

Source: IEA analysis based on Marklines.

In 2022, 7 countries had around 150 EV models or more available for sale, up from 50 in 2018. The number of large models is increasing more quickly than that of small models.

SUVs and large car models dominate both EV and ICE markets

A major concern for global car markets – both EV and ICE – is the overwhelming dominance of SUVs and large models among available options. Carmakers are able to generate higher revenues from such models, given higher profit margins, which can cover some of the investments made in developing electric options. In certain cases, such as in the United States, larger vehicles can also benefit from less stringent fuel economy standards, hence creating an incentive for carmakers to slightly increase the vehicle size of a car for it to qualify as a light truck.

However, large models are more expensive, which poses significant affordability issues across the board, and all the more so in EMDEs. Large models also have

implications for sustainability and supply chains, being equipped with larger batteries that require more critical minerals. In 2022, the sales-weighted average battery size of small battery electric cars ranged from 25 kWh in China to 35 kWh across France, Germany and the United Kingdom, and about 60 kWh in the United States. In comparison, the average for battery electric SUVs was around 70-75 kWh in these countries, and within the 75-90 kWh range for large car models.

[Transitioning](#) from ICE to electric is a priority for achieving net zero emissions targets, regardless of vehicle size, but mitigating the impacts of higher battery sizes will also be important. In France, Germany and the United Kingdom in 2022, the sales-weighted average weight of a battery electric SUV was 1.5 times higher than the average small battery electric car, requiring greater amounts of steel, aluminium and plastic; the battery in the SUV was twice as large, requiring about 75% more critical minerals. The CO₂ emissions associated with materials processing, manufacturing and assembly can be estimated at more than 70% higher as a result.

At the same time, in 2022, electric SUVs resulted in the displacement of over 150 000 barrels per day of oil consumption and avoided the associated tailpipe emissions that would have been generated through burning the fuel in combustion engines. Although electric SUVs represented roughly 35% of all electric passenger light-duty vehicles (PLDVs) in 2022, their share of oil displacement was even higher (about 40%), as SUVs tend to be driven more than smaller cars. Of course, smaller vehicles generally require less energy to operate and less materials to build, but electric SUVs certainly remain favourable to ICE vehicles.

In 2022, ICE SUVs [emitted](#) more than 1 Gt CO₂, far greater than the 80 Mt net emissions reductions from the electric vehicle fleet that year. While total car sales decreased by 0.5% in 2022, SUV sales increased by 3% relative to 2021, accounting for about 45% of total car sales, with noticeable growth in the United States, India and Europe. Of the 1 300 available options for ICE cars in 2022, more than 40% were SUVs, compared to fewer than 35% for small and medium cars. The total number of available ICE options went down from 2016 to 2022, but the drop was only for small and medium cars (down 35%) while large cars and SUVs increased (up 10%).

Similar trends are observed in EV markets. Around 16% of all SUVs sold were electric in 2022, which is above the overall market share of EVs and demonstrates consumer preferences for SUVs regardless of whether they are an ICE vehicle or EV. Nearly 40% of all BEV models available in 2022 were SUVs, which is equivalent to the shares of small and medium car options combined. Other large models accounted for more than 15%. Just 3 years before, in 2019, small and medium models accounted for 60% of all available models, and SUVs just 30%.

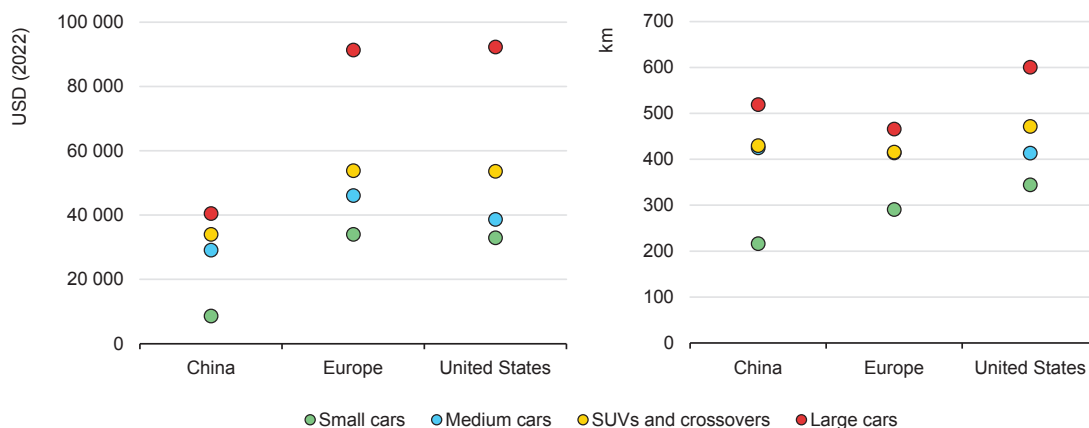
In China and Europe, SUVs and large models accounted for 60% of available BEV options in 2022, on par with the world average. As a comparison, ICE SUVs and large models accounted for about 70% of available ICE options in these regions,

suggesting that electric cars currently remain somewhat smaller than their ICE equivalents. Announcements by some major European carmakers indicate that there could be a greater focus on smaller, more popular models in the years to come. For example, [Volkswagen](#) has announced the launch of a compact model for the European market under EUR 25 000 by 2025 and under EUR 20 000 by 2026-2027, as a means to appeal to a broader consumer base. In the United States, over 80% of available BEV options in 2022 were SUVs or large car models, which is greater than the share of ICE SUVs or large models at 70%. Looking ahead, more electric SUVs are to be expected in the United States, should recent policy announcements on [expansion](#) of IRA incentives to more SUVs be implemented. Following the IRA, the US Treasury has been [revising](#) vehicle classifications, and in 2023 changed the eligibility criteria for clean vehicle credits relevant to smaller SUVs, which are now eligible if priced under USD 80 000, up from the previous limit of USD 55 000.

Electric cars remain much cheaper in China

The growth in electric car sales in China has been underpinned by sustained policy support, but also cheaper retail prices. In 2022, the sales-weighted average price of a small BEV in China was below USD 10 000. This is significantly less than the prices of small BEVs found in Europe and the United States, where the sales-weighted average price exceeded USD 30 000 in the same year.

Figure 1.7 Sales-weighted average retail price (left) and driving range (right) of BEV passenger cars in selected countries, by size, in 2022



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; SUV = sports utility vehicle. 'Europe' is based on data only from France, Germany and the United Kingdom. Retail prices collected in 2022-2023, before subsidy.

Source: IEA analysis based on EV Volumes.

In 2022, BEV passenger cars remained much cheaper in China, which explains in part higher adoption rates there.

In China, the best-selling electric cars in 2022 were the Wuling Mini BEV, a small model priced at under USD 6 500, and BYD's Dolphin, another small model, below USD 16 000. Together, these two models accounted for nearly 15% of Chinese BEV passenger car sales, illustrating the appetite for smaller models. To compare, the best-selling small BEVs across France, Germany and the United Kingdom – Fiat's 500, Peugeot's e-208 and Renault's Zoe – were all priced above USD 35 000. Few small BEVs were sold in the United States, limited mainly to Chevrolet's Bolt and the Mini Cooper BEV, which are priced around USD 30 000. Tesla's Y Model was the best-selling BEV passenger car in both the selected European countries (priced at more than USD 65 000) and the United States (more than USD 50 000).⁶

Chinese carmakers have focused on developing smaller and more affordable models in advance of their international peers, cutting down costs following years of tough competition domestically. Hundreds of small EV manufacturers have entered the market since the 2000s, benefitting from a variety of public support schemes, including subsidies and incentives for both consumers and manufacturers. The majority of these firms went bankrupt due to competition as subsidies were gradually phased out, and the market has since consolidated around a dozen frontrunners, which have succeeded in developing small and cheap electric cars for the Chinese market. Vertical integration of battery and EV supply chains from mineral processing to battery and EV manufacturing, as well as cheaper labour, manufacturing and access to finance across the board, have also contributed to developing cheaper models.

Meanwhile, carmakers in Europe and the United States – both early developers such as Tesla and incumbent major manufacturers – have mostly focused on larger or more luxurious models to date, hence offering few options affordable for mass-market consumers. However, the small options available in these countries typically offer greater performance than those in China, such as longer driving range. In 2022, the sales-weighted average range of small BEVs sold in the United States was nearly 350 km, while in France, Germany and the United Kingdom it was just under 300 km, compared to under 220 km in China. For other segments, the differences are less significant. The broader availability of public charging points in China may, in part, explain why consumers there have been more willing to opt for lower driving ranges than their European or American counterparts.

In 2022, Tesla heavily reduced the price of its models on two occasions as competition increased, and many carmakers have also announced cheaper options in the coming years. While these announcements warrant further examination, this trend could indicate that the price gap between small electric cars and incumbent ICE options could progressively close during this decade.

⁶ However, Tesla has decreased car prices several times since the publication of the IRA in the United States, in part to boost sales as competition gets tougher (see [section on corporate strategy and finance](#)).

Actual vehicle range depends on the loaded vehicle weight, duty cycle, aerodynamics and drivetrain efficiency, as well as environmental factors such as temperature. In addition, as no harmonised test procedure currently exists to measure electric range for medium- and heavy-duty vehicles in any of the major markets where deployment of electric trucks has begun, manufacturers can determine their own methods to declare the electric range of the commercially available and announced models. However, any standardised test procedure would need to consider complicated issues of non-motive energy consumption (e.g. heating ventilation and air conditioning in buses, cooling in refrigerated trucks), as well as the potential for buses and trucks to be used in vehicle-to-grid applications (as [has been demonstrated](#), for instance, with [electric school buses](#) in the United States). In light of such considerations, a first regulatory step could be to mandate that electric medium- and heavy-duty vehicle makers measure and disclose the usable battery energy according to a yet-to-be-developed standardised measurement procedure.

Charging infrastructure

Public charging points are increasingly necessary to enable wider EV uptake

While most of the charging demand is currently met by home charging, publicly accessible chargers are increasingly needed in order to provide the same level of convenience and accessibility as for refuelling conventional vehicles. In dense urban areas, in particular, where access to home charging is more limited, public charging infrastructure is a key enabler for EV adoption. At the end of 2022, there were 2.7 million public charging points worldwide, more than 900 000 of which were installed in 2022, about a 55% increase on 2021 stock, and comparable to the pre-pandemic growth rate of 50% between 2015 and 2019.

Slow chargers

Globally, more than 600 000 public slow charging points¹¹ were installed in 2022, 360 000 of which were in China, bringing the stock of slow chargers in the country to more than 1 million. At the end of 2022, China was home to more than half of the global stock of public slow chargers.

Europe ranks second, with 460 000 total slow chargers in 2022, a 50% increase from the previous year. The Netherlands leads in Europe with 117 000, followed by around 74 000 in France and 64 000 in Germany. The stock of slow chargers

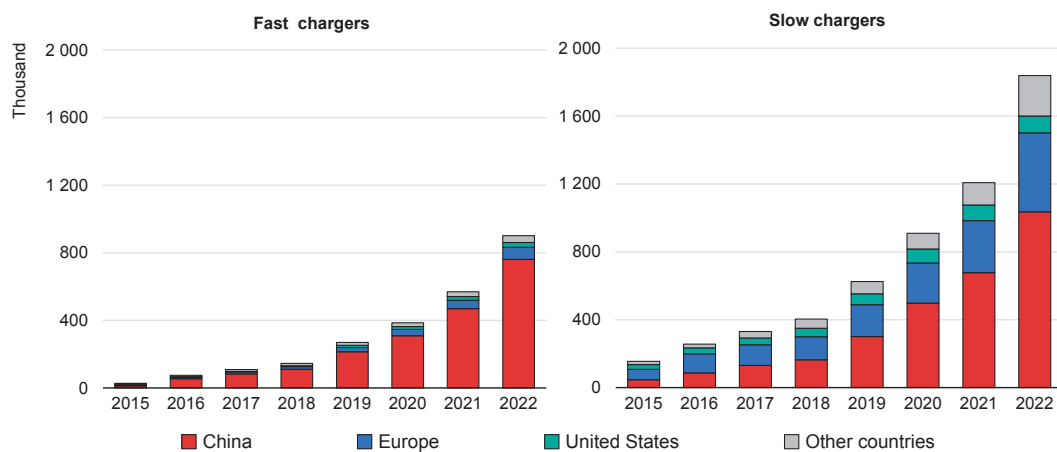
¹¹ Slow chargers have power ratings less than or equal to 22 kW. Fast chargers are those with a power rating of more than 22 kW and up to 350 kW. "Charging points" and "chargers" are used interchangeably and refer to the individual charging sockets, reflecting the number of EVs that can charge at the same time. "Charging stations" may have multiple charging points.

in the United States increased by 9% in 2022, the lowest growth rate among major markets. In Korea, slow charging stock has doubled year-on-year, reaching 184 000 charging points.

Fast chargers

Publicly accessible fast chargers, especially those located along motorways, enable longer journeys and can address range anxiety, a barrier to EV adoption. Like slow chargers, public fast chargers also provide charging solutions to consumers who do not have reliable access to private charging, thereby encouraging EV adoption across wider swaths of the population. The number of fast chargers increased by 330 000 globally in 2022, though again the majority (almost 90%) of the growth came from China. The deployment of fast charging compensates for the lack of access to home chargers in densely populated cities and supports China’s goals for rapid EV deployment. China accounts for total of 760 000 fast chargers, but more than [70%](#) of the total public fast charging pile stock is situated in just ten provinces.

Figure 1.13 Installed publicly accessible light-duty vehicle charging points by power rating and region, 2015-2022



IEA. CC BY 4.0.

Note: Values shown represent number of charging points.
 Source: IEA analysis based on country submissions.

Installed publicly accessible charging points have increased by around 55%, with accelerated deployment led by China and Europe.

In Europe the overall fast charger stock numbered over 70 000 by the end of 2022, an increase of around 55% compared to 2021. The countries with the largest fast charger stock are Germany (over 12 000), France (9 700) and Norway (9 000). There is a clear ambition across the European Union to further develop the public charging infrastructure, as indicated by provisional agreement on the proposed

Alternative Fuels Infrastructure Regulation (AFIR), which will set electric charging coverage requirements across the trans-European network-transport (TEN-T).¹² An [agreement](#) between the European Investment Bank and the European Commission will make over EUR 1.5 billion available by the end of 2023 for alternative fuels infrastructure, including electric fast charging.

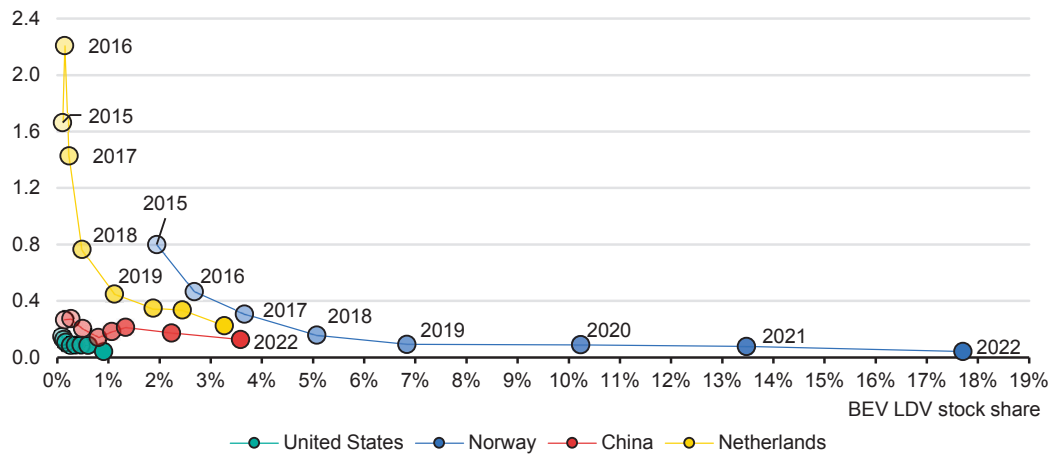
The United States installed 6 300 fast chargers in 2022, about three-quarters of which were Tesla Superchargers. The total stock of fast chargers reached 28 000 at the end of 2022. Deployment is expected to accelerate in the coming years following government approval of the [National Electric Vehicle Infrastructure Formula Program](#) (NEVI). All US states, Washington DC, and Puerto Rico are participating in the programme, and have already been allocated USD 885 million in funding for 2023 to support the build-out of chargers across 122 000 km of highway (see [Policy support for EV charging infrastructure](#)). The US Federal Highway Administration has announced new national standards for federally funded EV chargers to ensure consistency, reliability, accessibility and compatibility. [As a result](#) of the new standards, Tesla has announced it will open a portion of its US Supercharger (where Superchargers represent 60% of the total stock of fast chargers in the United States) and Destination Charger network to non-Tesla EVs.

Ratio of electric LDVs per public charger

Deployment of public charging infrastructure in anticipation of growth in EV sales is critical for widespread EV adoption. In Norway, for example, there were around 1.3 battery electric LDVs per public charging point in 2011, which supported further adoption. At the end of 2022, with over 17% of LDVs being BEVs, there were 25 BEVs per public charging point in Norway. In general, as the stock share of battery electric LDVs increases, the charging point per BEV ratio decreases. Growth in EV sales can only be sustained if charging demand is met by accessible and affordable infrastructure, either through private charging in homes or at work, or publicly accessible charging stations.

¹² Previously a directive, the proposed AFIR, once formally approved, would become a binding legislative act, stipulating, among other things, a maximum distance between chargers installed along the TEN-T, the primary and secondary roads within the European Union.

Figure 1.14 Public charging points per battery electric light-duty vehicle ratio in selected countries against battery electric light-duty vehicle stock share, 2015-2022



IEA. CC BY 4.0.

Notes: BEV = battery electric vehicle; LDV = light-duty vehicle. Charging points include only publicly available chargers, both fast and slow. Shading grows darker each year.

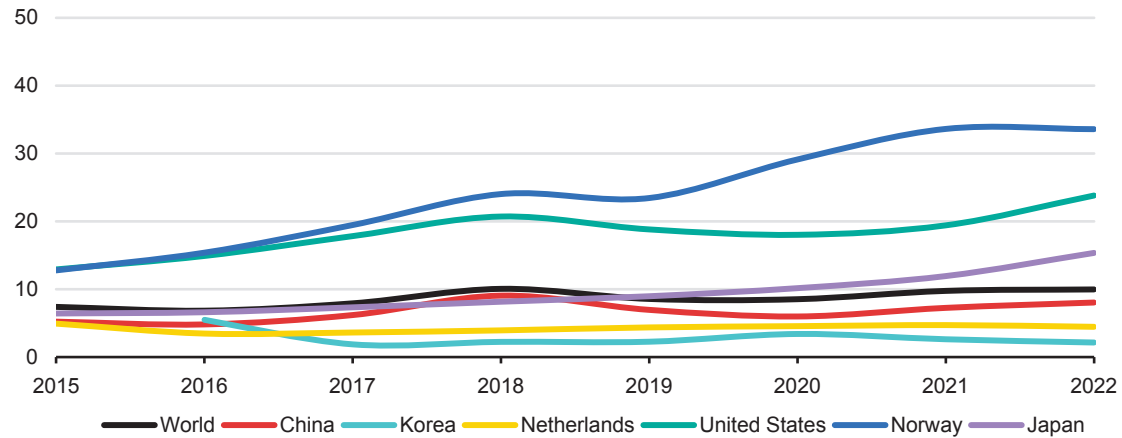
Source: IEA analysis based on country submissions.

In many advanced markets, as the stock share of battery electric LDVs increased, the charging point per BEV ratio has decreased.

While PHEVs are less reliant on public charging infrastructure than BEVs, policy-making relating to the sufficient availability of charging points should incorporate (and encourage) public PHEV charging. If the total number of electric LDVs per charging point is considered, the global average in 2022 was about ten EVs per charger. Countries such as China, Korea and the Netherlands have maintained fewer than ten EVs per charger throughout past years. In countries that rely heavily on public charging, the number of publicly accessible chargers has been expanding at a speed that largely matches EV deployment.

However, in some markets characterised by widespread availability of home charging (due to a high share of single-family homes with the opportunity to install a charger) the number of EVs per public charging point can be even higher. For example, in the United States, the ratio of EVs per charger is 24, and in Norway is more than 30. As the market penetration of EVs increases, public charging becomes increasingly important, even in these countries, to [support](#) EV adoption among drivers who do not have access to private home or workplace charging options. However, the optimal ratio of EVs per charger will differ based on local conditions and driver needs.

Figure 1.15 Electric light-duty vehicle per public charging point, 2010-2022



IEA. CC BY 4.0.

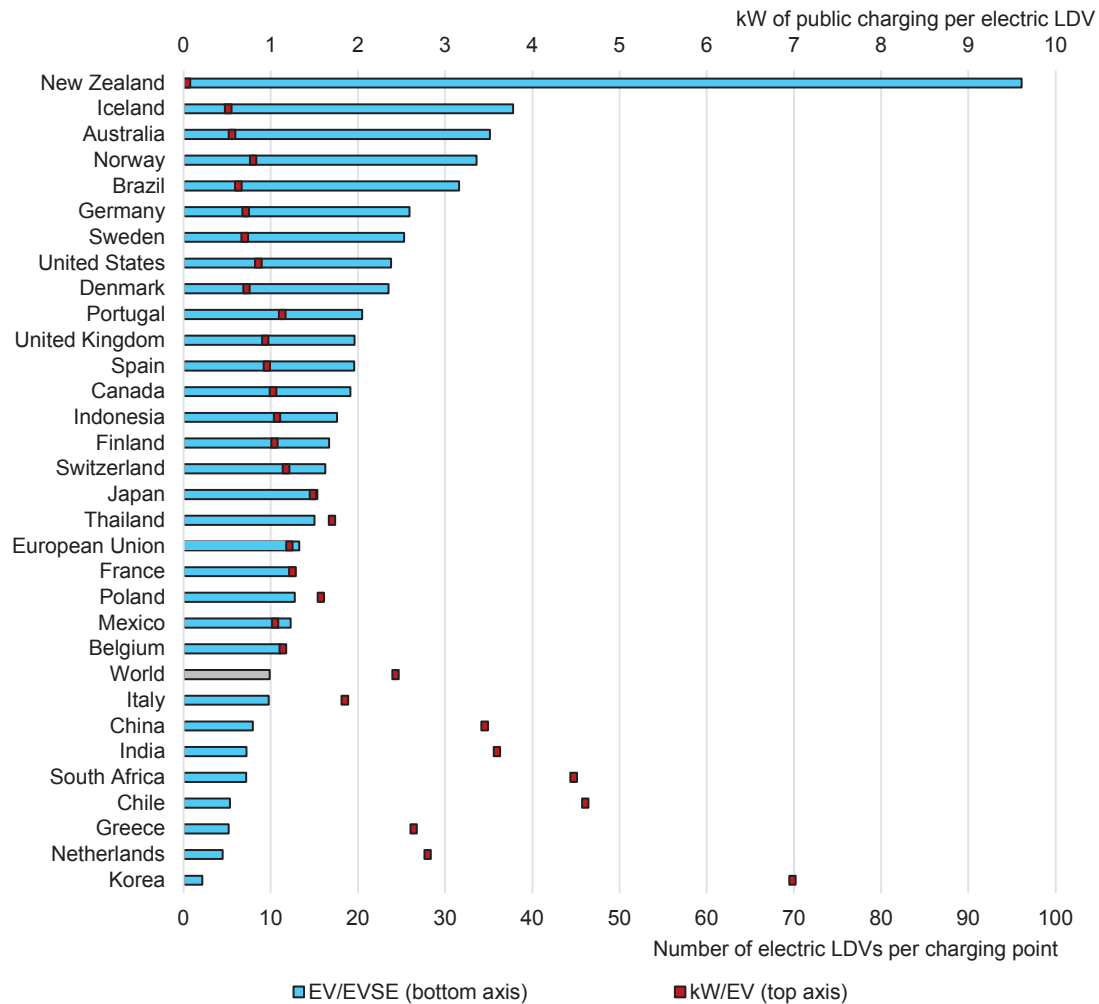
Note: Charging points include only publicly available chargers, both fast and slow.
 Source: IEA analysis based on country submissions.

Countries show different speeds in public charging deployment as the number of EVs on the road increases.

Perhaps more important than the number of public chargers available is the total public charging power capacity per EV, given that fast chargers can serve more EVs than slow chargers. During the early stages of EV adoption, it makes sense for available charging power per EV to be high, assuming that charger utilisation will be relatively low until the market matures and the utilisation of infrastructure becomes more efficient. In line with this, the European Union’s [provisional agreement](#) on the AFIR includes requirements for the total power capacity to be provided based on the size of the registered fleet.

Globally, the average public charging power capacity per electric LDV is around 2.4 kW per EV. In the European Union, the ratio is lower, with an average around 1.2 kW per EV. Korea has the highest ratio at 7 kW per EV, even with most public chargers (90%) being slow chargers.

Figure 1.16 Number of electric light-duty vehicles per public charging point and kW per electric light-duty vehicle, 2022



IEA. CC BY 4.0.

Notes: EV = electric vehicle; EVSE = electric vehicle supply equipment; LDV = light-duty vehicle. Kilowatts per EV are estimated assuming 11 kW for slow and 50 kW for fast chargers. Official national metrics might differ from these values as they can rely on more granular data.

Source: IEA analysis based on country submissions.

The number of electric light-duty vehicles per public EV charging point varies dramatically between countries, ranging from about 2 vehicles per charging point in Korea to almost 100 in New Zealand.

Charging needs for heavy-duty vehicles

In the regions where electric trucks are becoming commercially available, battery electric trucks can compete on a TCO basis with conventional diesel trucks for a growing range of operations, not only urban and regional, but also in the [heavy-duty](#) tractor-trailer regional and long-haul segments. Three parameters that determine the time at which [TCO parity](#) is reached are tolls; fuel and operations

costs (e.g. the difference between diesel and electricity prices faced by truck operators, and reduced maintenance costs); and CAPEX subsidies to reduce the gap in the upfront vehicle purchase price. Since electric trucks can provide the same operations with lower lifetime costs (including if a discounted rate is applied), the [time horizon](#) in which vehicle owners expect to recuperate upfront costs is a key factor in determining whether to purchase an electric or conventional truck.

The economics for electric trucks in long-distance applications can be substantially improved if charging costs can be reduced by maximising “off-shift” (e.g. night-time or other longer periods of downtime) slow charging, securing bulk purchase contracts with grid operators for “mid-shift” (e.g. during breaks), fast (up to 350 kW), or ultra-fast (>350 kW) charging, and exploring smart charging and vehicle-to-grid opportunities for extra income.

Electric trucks and buses will rely on off-shift charging for the majority of their energy. This will be largely achieved at private or semi-private charging depots or at public stations on highways, and often overnight. Depots to service growing demand for heavy-duty electrification will need to be developed, and in many cases may require distribution and transmission grid upgrades. Depending on vehicle range requirements, depot charging will be sufficient to cover most operations in urban bus as well as urban and regional truck operations.

The [major constraint](#) to rapid commercial adoption of electric trucks in [regional and long-haul operations](#) is the [availability of “mid-shift” fast charging](#). Although the majority of energy requirements for these operations could come from “off-shift” charging, fast and ultra-fast charging will be needed to extend range such that operations currently covered by diesel can be performed by battery electric trucks with little to no additional dwell time (i.e. waiting). Regulations that mandate rest periods can also provide a time window for mid-shift charging if fast or ultra-fast charging options are available en route: the European Union requires 45 minutes of break after every 4.5 hours of driving; the United States mandates 30 minutes after 8 hours.

Most commercially available direct current (DC) fast charging stations currently enable power levels ranging from 250-350 kW. The European Union’s Alternative Fuels Infrastructure Regulation (AFIR) aims to enable mid-shift charging across the EU’s core TEN-T network, which covers 88% of total long-haul freight activity, and along other key freight corridors. The [provisional agreement](#) reached by the European Council and Parliament includes a gradual process of infrastructure deployment for electric heavy-duty vehicles starting in 2025. Recent studies of power requirements for regional and long-haul truck operations in the [United States](#) and [Europe](#) find that charging power higher than 350 kW, and as high as 1 MW, may be required to fully recharge electric trucks during a 30- to 45-minute break.

Recognising the need to scale up fast or ultra-fast charging as a prerequisite for making both regional and, in particular, long-haul operations technically and economically viable, in 2022 Traton, Volvo, and Daimler established an independent joint venture, [Milence](#). With EUR 500 million in collective investments from the three heavy-duty manufacturing groups, the initiative aims to deploy more than 1 700 fast (300 to 350 kW) and ultra-fast (1 MW) charging points across Europe.

Multiple charging standards are currently in use, and technical specifications for ultra-fast charging are under development. Ensuring maximum possible convergence of charging standards and interoperability for heavy-duty EVs will be needed to avoid the cost, inefficiency, and challenges for vehicle importers and international operators that would be created by manufacturers following divergent paths.

In China, co-developers China Electricity Council and CHAdeMO's "ultra ChaoJI" are developing a charging standard for heavy-duty electric vehicles for up to several megawatts. In Europe and the United States, specifications for the CharIN Megawatt Charging System (MCS), with a potential maximum power of [4.5 MW](#), are under development by the International Organization for Standardization (ISO) and other organisations. The final MCS specifications, which will be needed for commercial roll-out, are expected for 2024. After the first megawatt charging site offered by Daimler Trucks and Portland General Electric (PGE) in 2021, at least [twelve high-power charging projects](#) are planned or underway in the United States and Europe, including charging of an electric Scania truck in Oslo, Norway, at a speed of [over 1 MW](#), [Germany's HoLa project](#), and the Netherlands Living Lab Heavy-Duty and [Green Transport Delta](#) Charging Stations, as well as investments and projects in Austria, Sweden, Spain and the United Kingdom.

Commercialisation of chargers with rated power of 1 MW will require significant investment, as stations with such high-power needs will incur significant costs in both installation and grid upgrades. Revising public electric utility business models and power sector regulations, co-ordinating planning across stakeholders and smart charging can all help to [manage grid impacts](#). Direct support through pilot projects and financial incentives can also accelerate demonstration and adoption in the early stages. A recent study outlines some [key design considerations](#) for developing MCS rated charging stations:

- Planning charging stations at highway depot locations near transmission lines and substations can be an optimal solution for minimising costs and increasing charger utilisation.
- "Right-sizing" connections with direct connections to transmission lines at an early stage, thereby anticipating the energy needs of a system in which high shares of freight activity have been electrified, rather than upgrading distribution grids on an

ad-hoc and short-term basis, will be critical to reduce costs. This will require structured and co-ordinated planning between grid operators and charging infrastructure developers across sectors.

- Since transmission system interconnections and grid upgrades can take 4-8 years, siting and construction of high-priority charging stations will need to begin as soon as possible.

[Alternative solutions](#) include installing stationary storage and integrating local renewable capacity, combined with smart charging, which [can help reduce](#) both infrastructure costs related to grid connection and electricity procurement costs (e.g. by enabling truck operators to minimise cost by arbitraging price variability throughout the day, taking advantage of vehicle-to-grid opportunities, etc.).

Other options to provide power to electric heavy-duty vehicles (HDVs) are [battery swapping](#) and electric road systems. Electric road systems can transfer power to a truck either via inductive coils¹³ in a road, or through conductive connections between the vehicle and road, or via catenary (overhead) lines. Catenary and other dynamic charging options may hold promise for [reducing the uncertainty](#) of system-level costs in the transition to zero-emission regional and long-haul trucks, [competing](#) favourably in terms of total capital and operating costs. They can also help to reduce battery capacity needs. [Battery demand](#) can be further reduced, and utilisation further improved, if electric road systems are designed to be compatible not only with trucks but also electric cars. However, such approaches would require inductive or in-road designs that come with greater hurdles in terms of technology development and design, and are more capital intensive. At the same time, electric road systems pose significant challenges resembling those of the rail sector, including a greater need for standardisation of paths and vehicles (as illustrated with trams and trolley buses), compatibility across borders for long-haul trips, and appropriate infrastructure ownership models. They provide less flexibility for truck owners in terms of routes and vehicle types, and have high development costs overall, all affecting their competitiveness relative to regular charging stations. Given these challenges, such systems would most effectively be deployed first on heavily used freight corridors, which would entail close co-ordination across various public and private stakeholders. Demonstrations on public roads to date in [Germany](#) and [Sweden](#) have relied on champions from both [private](#) and public entities. Calls for electric road system pilots are also being considered in the China, India, the [United Kingdom](#) and the United States.

¹³ Inductive solutions are further from commercialisation and face challenges to deliver sufficient power at highway speeds.

in 2022, and the company has set a target of 4 000 battery swap stations globally by 2025. The company [claims](#) their swap stations can perform over 300 swaps per day, charging up to 13 batteries concurrently at a power of 20-80 kW.

NIO also announced plans to [build battery swap stations in Europe](#) as their battery swapping-enabled car models became available in European markets towards the end of 2022. The first NIO battery swap station in Sweden was opened in [November 2022](#), and by the end of 2022, ten NIO battery swap stations had been opened across Norway, Germany, Sweden and the Netherlands. In contrast to NIO, whose swapping stations service NIO cars, the Chinese battery swapping station operator Aulton's stations support [30 models from 16 different vehicle companies](#).

Battery swapping could also be a particularly attractive option for LDV taxi fleets, whose operations are more sensitive to recharging times than personal cars. US start-up Ample currently operates [12 battery swapping stations](#) in the San Francisco Bay area, mainly serving Uber rideshare vehicles.

Batteries

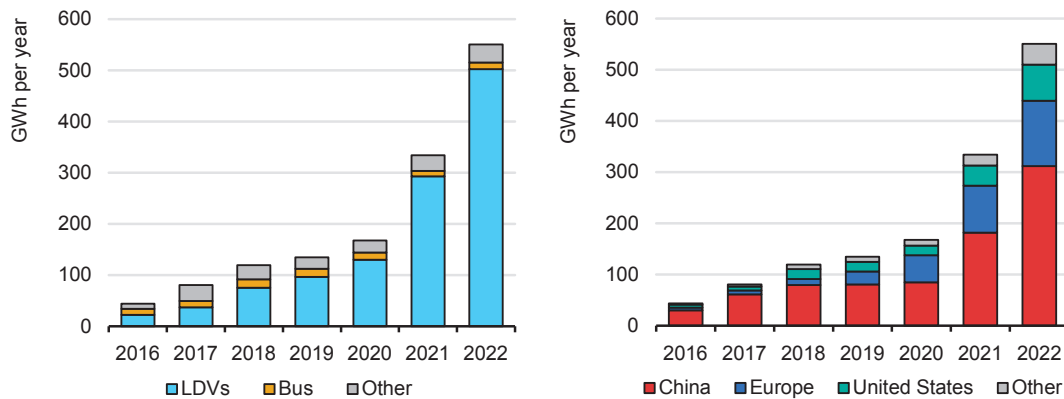
Battery demand for EVs continues to rise

Automotive lithium-ion (Li-ion) battery demand increased by about 65% to 550 GWh in 2022, from about 330 GWh in 2021, primarily as a result of growth in electric passenger car sales, with new registrations increasing by 55% in 2022 relative to 2021.

In China, battery demand for vehicles grew over 70%, while electric car sales increased by 80% in 2022 relative to 2021, with growth in battery demand slightly tempered by an increasing share of PHEVs. Battery demand for vehicles in the United States grew by around 80%, despite electric car sales only increasing by around 55% in 2022. While the average battery size for battery electric cars in the United States only grew by about 7% in 2022, the average battery electric car battery size remains about 40% higher than the global average, due in part to the higher share of SUVs in US electric car sales relative to other major markets,¹⁴ as well as manufacturers' strategies to offer longer all-electric driving ranges. Global sales of BEV and PHEV cars are outpacing sales of hybrid electric vehicles (HEVs), and as BEV and PHEV battery sizes are larger, battery demand further increases as a result.

¹⁴ For more information on the climate impact of SUVs, refer to the IEA's [27 February 2023 commentary](#) on the subject.

Figure 1.17 Battery demand by mode and region, 2016-2022



IEA. CC BY 4.0.

Notes: LDVs = light-duty vehicles, including cars and vans; In the left chart, “Other” includes medium- and heavy-duty trucks and two/three-wheelers. Battery demand refers to automotive lithium-ion batteries. This analysis does not include conventional hybrid vehicles.

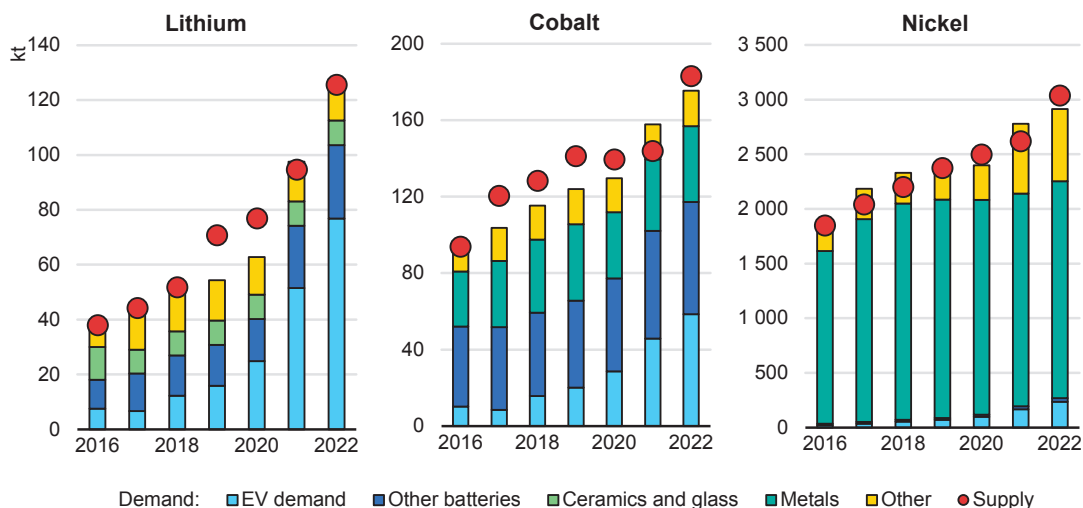
Source: IEA analysis based on EV Volumes.

Global battery demand increased by 65% in 2022, mainly as a result of electric car sales in China.

The increase in battery demand drives the demand for critical materials. In 2022, lithium demand exceeded supply (as in 2021) despite the 180% increase in production since 2017. In 2022, about 60% of lithium, 30% of cobalt and 10% of nickel demand was for EV batteries. Just five years earlier, in 2017, these shares were around 15%, 10% and 2%, respectively. As has already been seen for lithium, mining and processing of these critical minerals will need to increase rapidly to support the energy transition, not only for EVs but more broadly to keep up with the pace of demand for clean energy technologies.¹⁵ Reducing the need for critical materials will also be important for supply chain sustainability, resilience and security. Accelerating innovation can help, such as through advanced battery technologies requiring smaller quantities of critical minerals, as well as measures to support uptake of vehicle models with optimised battery size and the development of battery recycling.

¹⁵ For more information on the future of supply and demand of critical minerals, refer to the [Energy Technology Perspective 2023](#) report.

Figure 1.18 Overall supply and demand of battery metals by sector, 2016-2022



IEA. CC BY 4.0.

Note: EV = electric vehicle. The metals category includes alloying applications. Supply refers to refinery output and not mining output.

Source: IEA analysis based on [Mineral Commodity Summary 2022](#) by USGS, lithium and cobalt global supply-demand balance (January 2023) and nickel global supply-demand balance (January 2023) from S&P Global and World Metal Statistics Yearbook by the World Bureau of Metal Statistics.

In 2022, supply of nickel and cobalt exceeded demand, while lithium demand outpaced supply by a small margin.

Battery chemistries are diversifying

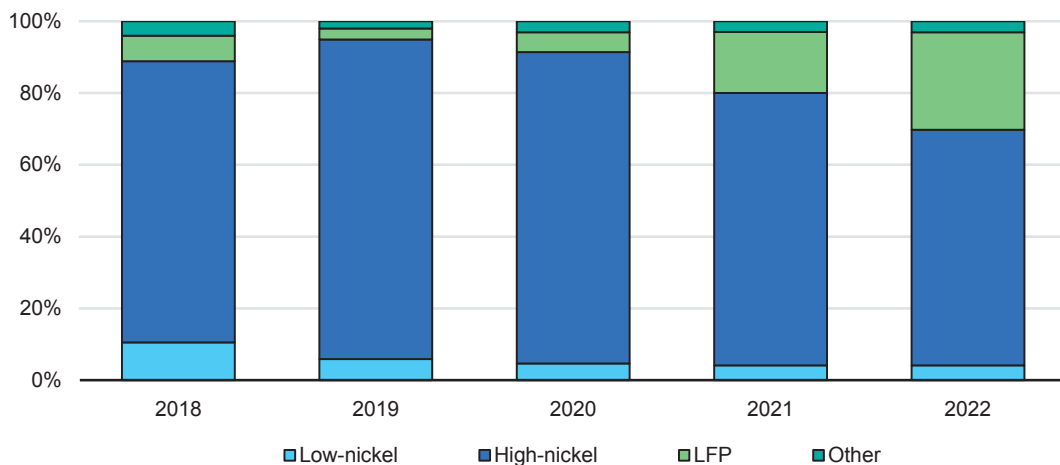
New alternatives to conventional lithium-ion are on the rise

In 2022, lithium nickel manganese cobalt oxide (NMC) remained the dominant battery chemistry with a market share of 60%, followed by lithium iron phosphate (LFP) with a share of just under 30%, and nickel cobalt aluminium oxide (NCA) with a share of about 8%.

Lithium iron phosphate (LFP) cathode chemistries have reached their highest share in the past decade (Figure 1.19). This trend is driven mainly by the preferences of Chinese OEMs. Around 95% of the LFP batteries for electric LDVs went into vehicles produced in China, and BYD alone represents 50% of demand. Tesla accounted for 15%, and the share of LFP batteries used by Tesla increased from 20% in 2021 to 30% in 2022. Around 85% of the cars with LFP batteries manufactured by Tesla were manufactured in China, with the remainder being manufactured in the United States with cells imported from China. In total, only around 3% of electric cars with LFP batteries were manufactured in the United States in 2022.

LFP batteries contrast with other chemistries in their use of iron and phosphorus rather than the nickel, manganese and cobalt found in NCA and NMC batteries. The downside of LFP is that the energy density tends to be lower than that of NMC. LFP batteries also contain phosphorus, which is used in food production. If all batteries today were LFP, they would account for nearly 1% of current agricultural phosphorus use by mass, suggesting that conflicting demands for phosphorus may arise in the future as battery demand increases.

Figure 1.19 Electric light-duty vehicle battery capacity by chemistry, 2018-2022



IEA. CC BY 4.0.

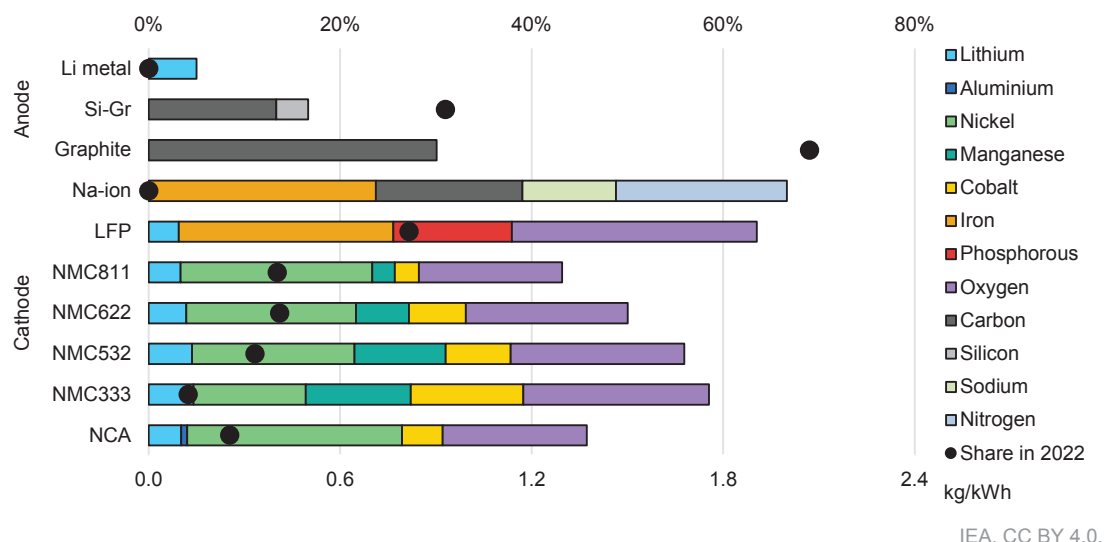
Notes: LFP = Lithium iron phosphate. Low-nickel includes: NMC333. High-nickel includes: NMC532, NMC622, NMC721, NMC811, NCA and NMCA. Cathode sales share is based on battery capacity.

Source: IEA analysis based on EV Volumes.

The share of lithium iron phosphate reached its highest ever point, accounting for almost 30% of new electric LDV battery capacity in 2022.

With regards to anodes, a number of chemistry changes have the potential to improve energy density (watt-hour per kilogram, or Wh/kg). For example, silicon can be used to replace all or some of the graphite in the anode in order to make it lighter and thus increase the energy density. Silicon-doped graphite already entered the market a few years ago, and now around 30% of anodes contain silicon. Another option is innovative lithium metal anodes, which could yield even greater energy density when they become commercially available (Figure 1.20).

Figure 1.20 Material content in different anode and cathodes



Notes: Li metal = Lithium metal anode; Si-Gr = Silicon-graphite anode; Graphite = Pure graphite anode; Na-ion = Sodium-ion; LFP = Lithium iron phosphate; NMC = Lithium nickel manganese cobalt oxide; NCA = Lithium nickel cobalt aluminium oxide. Materials composing the battery casing and the electrolyte are excluded. Chemistry shares are based on demand. The share of NCA battery includes every NCA type and Si-Gr includes every degree of silicon-graphite mix. Carbon covers the graphite composing anodes. The Na-ion cathode shown is the Prussian white.

Source: IEA analysis based on *Lithium-Ion Batteries: State of the Industry 2022* by BNEF, *BatPaC v4* by Argonne Laboratory and *Sodium-ion batteries: disrupt and conquer?* by Wood Mackenzie.

Lithium iron phosphate cathodes do not rely on nickel, manganese or cobalt, which has contributed to their increased market share.

In recent years, alternatives to Li-ion batteries have been emerging, notably sodium-ion (Na-ion). This battery chemistry has the dual advantage of relying on lower cost materials than Li-ion, leading to cheaper batteries, and of completely avoiding the need for critical minerals. It is currently the only viable chemistry that does not contain lithium. The Na-ion battery developed by China’s CATL is estimated to cost 30% [less](#) than an LFP battery. Conversely, Na-ion batteries do not have the same energy density as their Li-ion counterpart (respectively [75](#) to [160](#) Wh/kg compared to 120 to 260 Wh/kg). This could make Na-ion relevant for urban vehicles with lower range, or for stationary storage, but could be more challenging to deploy in locations where consumers prioritise maximum range autonomy, or where charging is less accessible. There are nearly 30 Na-ion battery manufacturing plants currently operating, planned or under construction, for a combined capacity of over [100 GWh](#), almost all in China. For comparison, the current manufacturing capacity of Li-ion batteries is around 1 500 GWh.

Multiple carmakers have already announced Na-ion electric cars, such as the [Seagull by BYD](#), which has an announced range of 300 km and is sold for USD 11 600 (with possible discounts bringing the price down to USD 9 500), and the Sehol EX10, produced by the VW-JAC joint venture, with a 250 km range.

While these first models are likely to be slightly more expensive than the cheapest small BEV models in China – such as the Wuling Mini BEV, [sold](#) for as little as USD 5 000 to 6 500 – they are still cheaper than equivalent options with similar driving range. To compare, the Wuling Mini BEV's range stands at 170 km, but BYD's Dolphin BEV, the second best-selling small BEV in China in 2022, with a similar range to the announced Na-ion cars, can [cost](#) more than USD 15 000. BYD plans to progressively integrate Na-ion batteries into all its models below USD 29 000 as battery production ramps up. These announcements suggest that electric vehicles powered by Na-ion will be available for sale and driven for the first time in 2023-2024, hence bringing the technology to a readiness level (TRL¹⁶) of 8-9, between first-of-a-kind commercial and commercial operation in the relevant environment. In 2022, it was [assessed](#) at TRL 6 (full prototype at scale) in the IEA [Clean Technology Guide](#), compared to only TRL 3-4 (small prototypes) in the assessment from 2021, highlighting quick technological progress.

Critical mineral prices can have an impact on chemistry choice

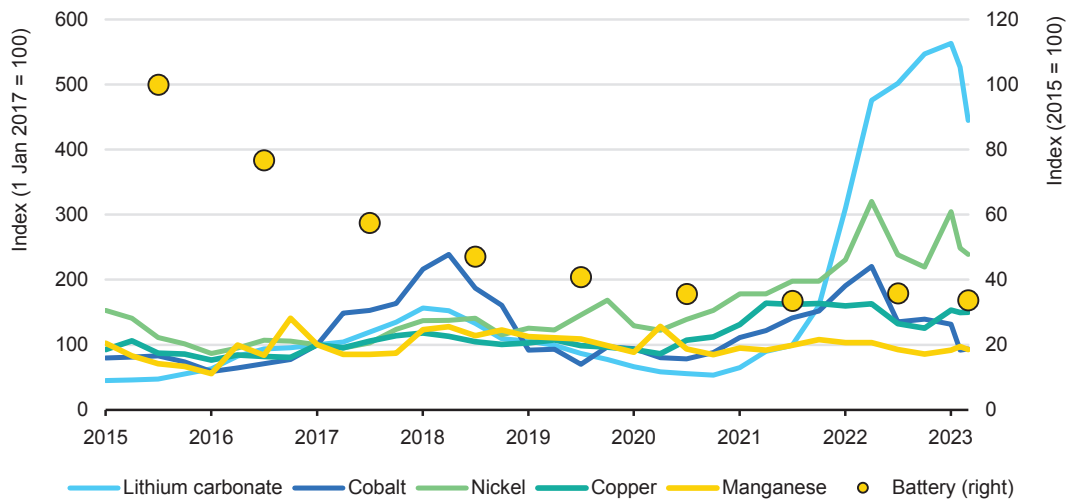
The variability in price and availability of critical minerals can also explain some of the developments in battery chemistry from the last few years (Figure 1.21). NMC chemistries using an equal ratio of nickel, manganese, and cobalt (NMC333 or NMC111) were popular until 2015. Since then, cobalt price increases and concerns affecting public acceptance of cobalt mining have contributed to a shift towards lower-cobalt ratios, such as NMC622, and then NMC811, which are nevertheless more difficult to manufacture. In 2022, the price of nickel increased, reaching a peak twice as high as the 2015-2020 average. This created incentives to use chemistries that are less reliant on nickel, such as LFP, despite their lower energy density.

Lithium carbonate prices have also been steadily increasing over the past two years. In 2021, prices multiplied four- to five-fold, and continued to rise throughout 2022, nearly doubling between 1 January 2022 and 1 January 2023. At the beginning of 2023, lithium prices stood six times above their average over the 2015-2020 period. In contrast to nickel and lithium, manganese prices have been relatively stable. One reason for the increase in prices for lithium, nickel and cobalt was the insufficient supply compared to demand in 2021 (Figure 1.18). Although nickel and cobalt supply surpassed demand in 2022, this was not the case for lithium, causing its price to rise more strongly over the year. Between January and March 2023, lithium prices dropped 20%, returning to their late 2022 level. The combination of an expected 40% [increase](#) in supply and slower growth in demand, especially for EVs in China, has contributed to this trend. This drop – if sustained – could translate into lower battery prices.

¹⁶ Technology Readiness Level (TRL) provides a snapshot of the maturity of a given technology. It has 11 steps ranging from initial idea at step 1 to proof of stability reached at step 11. For more information, refer to the [IEA Clean Technology Guide](#).

Beyond those materials, global commodity prices have surged in the last few years, as a [result](#) of supply disruptions in the wake of the Covid-19 pandemic, rising demand as the global economy started to recover, and Russia's invasion of Ukraine in February 2022, among other factors.

Figure 1.21 Price of selected battery materials and lithium-ion batteries, 2015-2023



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Notes: Data until March 2023. Lithium-ion battery prices (including the pack and cell) represent the global volume-weighted average across all sectors. Nickel prices are based on the London Metal Exchange, used here as a proxy for global pricing, although most nickel trade takes place through direct contracts between producers and consumers. The 2023 battery price value is based on cost estimates for NMC 622.

Source: IEA analysis based on material price data by S&P, 2022 Lithium-Ion Battery Price Survey by BNEF and Battery Costs Drop as Lithium Prices in China Fall by BNEF.

From 2021 to the end of 2022, the price of critical materials such as lithium, cobalt and nickel increased dramatically, putting pressure on historical Li-ion battery price decreases.

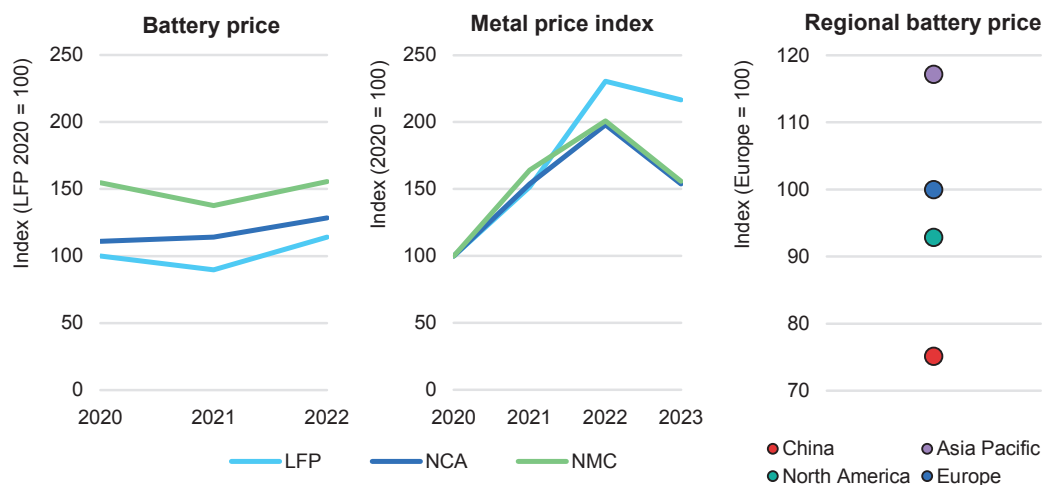
In 2022, the estimated average battery price [stood](#) at about USD 150 per kWh, with the cost of pack manufacturing accounting for about 20% of total battery cost, compared to more than 30% a decade earlier. Pack production costs have continued to decrease over time, down 5% in 2022 compared to the previous year. In contrast, cell production costs increased in 2022 relative to 2021, returning to 2019 levels. This can be explained in part by the increasing prices of materials, which account for a significant portion of cell price, and of electricity, which affects manufacturing costs, whereas efficiency gains in pack manufacturing help decrease costs. Bloomberg New Energy Finance (BNEF) sees pack manufacturing costs dropping further, by about 20% by 2025, whereas cell production costs decrease by only 10% relative to their historic low in 2021. This warrants further analysis based on future trends in material prices.

The effect of increased battery material prices differed across various battery chemistries in 2022, with the strongest increase being observed for LFP batteries

(over 25%), while NMC batteries experienced an increase of less than 15% (Figure 1.21). Since LFP batteries contain neither nickel nor cobalt, which are relatively expensive compared to iron and phosphorus, the price of lithium plays a relatively larger role in determining the final cost. Given that the price of lithium increased at a higher rate than the price of nickel and cobalt, the price of LFP batteries increased more than the price of NMC batteries. Nonetheless, LFP batteries remain less expensive than NCA and NMC per unit of energy capacity.

The price of batteries also varies across different regions, with China having the lowest prices on average, and the rest of the Asia Pacific region having the highest (Figure 1.21). This price discrepancy is influenced by the fact that around 65% of battery cells and almost 80% of cathodes are manufactured in China.

Figure 1.22 Price index for selected battery chemistries, regions and metal price, 2020-2023



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Note: LFP = Lithium iron phosphate; NMC = Lithium nickel manganese cobalt oxide; NCA = Lithium nickel cobalt aluminium oxide. The metal price index is based on the price evolution of four commodities (lithium carbonate, cobalt, nickel and copper) weighted by their use in each battery chemistry. For this metal price index, NMC uses the NMC622 chemistry. The 2023 value of the metal price index covers only the first 3 months of the year. Asia Pacific excludes China. Regional battery (pack) price refers to 2022.

Source: IEA analysis based on material price data by S&P, 2022 Lithium-Ion Battery Price Survey by BNEF, [BatPaC v4](#) by Argonne Laboratory and Lithium-Ion Batteries: State of the Industry 2022 by BNEF.

Despite a higher relative increase in price compared to other battery chemistries, LFP batteries remain the lowest price per kWh.

Prospects for electric vehicle deployment

Several pathways to electrify road transport in the period to 2030 are explored in this section. First, deployment of electric vehicles (EVs) is projected by region and road segment for the Stated Policies and Announced Pledges scenarios, and globally by segment for the Net Zero Emissions by 2050 Scenario. These projections are then compared to announcements by original equipment manufacturers (OEMs). Then the corresponding battery demand is projected, followed by roll-out requirements for charging infrastructure. Finally, the impacts of EV deployment are assessed, including increased electricity demand, oil displacement, implications for tax revenues, and net well-to-wheels GHG emissions.

Outlook for electric mobility

Scenarios

A scenario-based approach is used to explore road transport electrification and its impact, based on the latest market data, policy drivers and technology perspectives. Two IEA scenarios – the Stated Policies and Announced Pledges scenarios – inform the outlooks, which are examined in relation to the Net Zero Emissions by 2050 Scenario at the global level.¹ These scenarios are based on announced policies, ambitions and market trends through the first quarter of 2023.

The purpose of the scenarios is to assess plausible futures for global EV markets and the implications they could have. The scenarios do not make predictions about the future. Rather, they aim to provide insights to inform decision-making by governments, companies and stakeholders about the future of EVs.

These scenario projections incorporate GDP and population assumptions from the [International Monetary Fund](#) (2022) and [United Nations](#) (2022), respectively.

Stated Policies Scenario

The [Stated Policies Scenario](#) (STEPS) reflects existing policies and measures, as well as firm policy ambitions and objectives that have been legislated by

¹ The projections in the Stated Policies and Announced Pledges scenarios are based on historical trends through the end of 2022 as well as stated policies and ambitions as of the end of March 2023. The Net Zero Emissions by 2050 Scenario is consistent with the [World Energy Outlook 2022](#) publication.

governments around the world. It includes current EV-related policies, regulations and investments, as well as market trends based on the expected impacts of technology developments, announced deployments and plans from industry stakeholders. The STEPS aims to hold up a mirror to the plans of policy makers and illustrate their consequences.

Announced Pledges Scenario

The [Announced Pledges Scenario](#) (APS) assumes that all announced ambitions and targets made by governments around the world are met in full and on time. With regards to electromobility, it includes all recent major announcements of electrification targets and longer-term net zero emissions and other pledges, regardless of whether these have been anchored in legislation or in updated Nationally Determined Contributions (NDCs). For example, the APS assumes that countries that have signed on to the Conference of the Parties (COP 26) declaration on accelerating the transition to [100% zero emissions cars and vans](#) will achieve this goal, even if there are not yet policies or regulations in place to support it. In countries that have not yet made a net zero emissions pledge or set electrification targets, the APS considers the same policy framework as the STEPS. Non-policy assumptions for the APS, including population and economic growth, are the same as in the STEPS.

The difference between the APS and the STEPS represents the “implementation gap” that exists between the policy frameworks and measures required to achieve country ambitions and targets, and the policies and measures that have been legislated.

Net Zero Emissions by 2050 Scenario

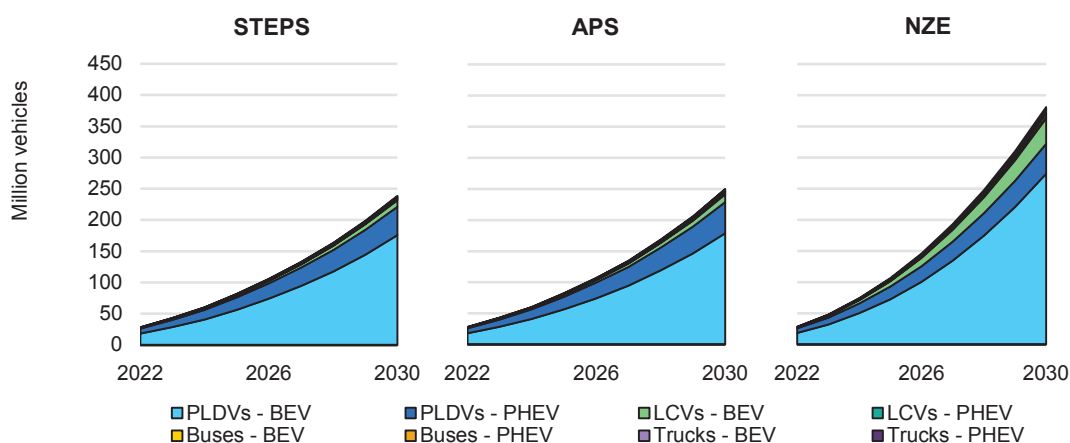
The [Net Zero Emissions by 2050 Scenario](#) (NZE Scenario) is a normative scenario that sets out a narrow but achievable pathway for the global energy sector to achieve net zero CO₂ emissions by 2050. The scenario is compatible with limiting the global temperature rise to 1.5°C with no or limited temperature overshoot, in line with reductions assessed by the Intergovernmental Panel on Climate Change in its [Special Report on Global Warming of 1.5°C](#). There are many possible paths to achieve net zero CO₂ emissions globally by 2050 and many uncertainties that could affect them. The NZE Scenario is therefore a path and not *the* path to net zero emissions.

The difference between the NZE Scenario and the APS highlights the “ambition gap” that needs to be closed to achieve the goals under the 2015 Paris Agreement.

Electric vehicle fleet to grow by a factor of eight or more by 2030

The total fleet of EVs (excluding two/three-wheelers) grows from almost 30 million in 2022 to about 240 million in 2030 in the Stated Policies Scenario (STEPS), achieving an average annual growth rate of about 30%. In this scenario, EVs account for over 10% of the road vehicle fleet by 2030. Total EV sales reach over 20 million in 2025 and over 40 million in 2030, representing over 20% and 30% of all vehicle sales, respectively.

Figure 3.1. Electric vehicle stock by mode and scenario, 2022-2030



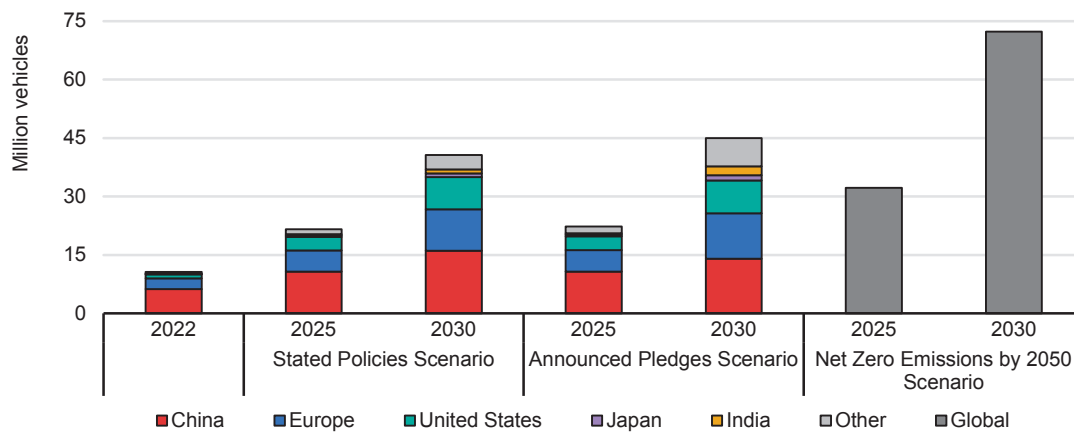
IEA. CC BY 4.0.

Notes: STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario; NZE = Net Zero Emissions by 2050 Scenario; BEV = battery electric vehicle; PHEV = plug-in hybrid electric; PLDV = passenger light-duty vehicle; LCV = light commercial vehicle.

EV deployment commensurate with government pledges is only 5% above what stated policies would imply by 2030.

In the Announced Pledged Scenario (APS), based on announced government targets and pledges that go beyond existing policies, the global EV fleet reaches almost 250 million in 2030, around 5% higher than in the STEPS. The average annual growth rate in the APS is nearly 35%, with the result that one in seven vehicles on the road is an EV in 2030. Total EV sales reach 45 million in 2030, representing over 35% of all vehicle sales.

Figure 3.2. Electric vehicle sales by region, 2022-2030

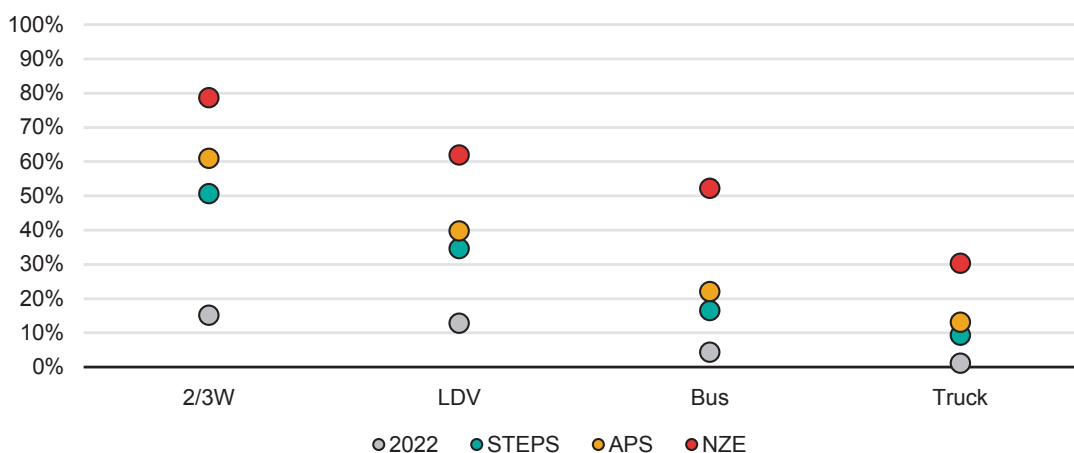


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Global EV sales increase around fourfold from 2022 to 2030 under both stated policies and announced ambitions.

The global EV sales share in 2030 in the STEPS is about half that in the NZE Scenario, in which the fleet of EVs grows more rapidly, at an average annual rate of around 40%, reaching 380 million EVs on the road in 2030. Electric vehicle sales reach over 30 million in 2025 and over 70 million in 2030, a total of approximately 30% and 60% of all vehicle sales, respectively.

Figure 3.3. Electric vehicle sales shares by mode and scenario, 2030



IEA. CC BY 4.0.

Notes: 2/3W = two/three-wheeler; LDV = light-duty vehicle; STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario; NZE = Net Zero Emissions by 2050 Scenario.

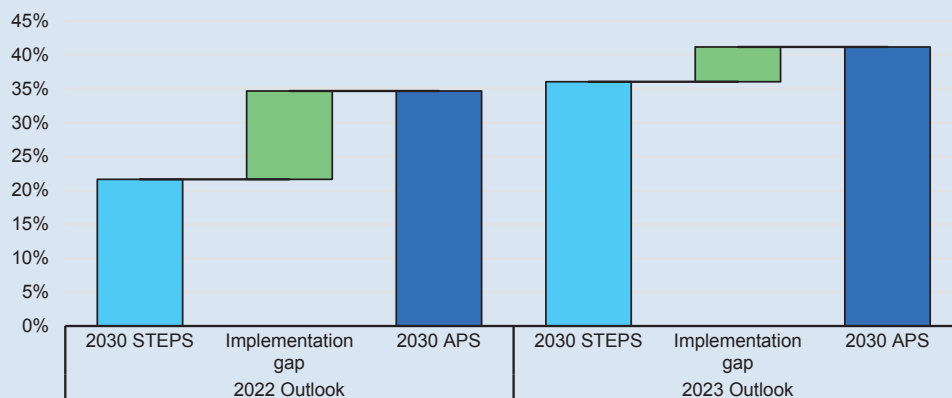
Existing policies are projected to yield market shares almost in line with country pledges across all modes of transport.

Box 3.1 Closing the implementation gap: how EV policy is catching up with targets

Targets and ambitions for clean energy technology deployment are generally more easily formulated than they are achieved, but in the case of EVs, the momentum is clearly on the side of achievement. Strong market uptake in 2022, combined with major policy announcements over the past year, have led to a significant upward revision of EV deployment to 2030 in the STEPS presented in this edition of the Global EV Outlook compared to the [2022 edition](#). The projected sales shares of EVs based on stated policies and market trends are now coming close to country stated ambitions for EVs, meaning that the policy implementation gap – the difference between country deployment ambitions and the policies currently in place – in the 2023 Outlook is much smaller than in the 2022 edition.

This is most notable for light-duty vehicles, where recent policies such as the US Inflation Reduction Act (IRA) and new EU CO₂ standards for cars and vans have resulted in a significantly higher EV sales share in 2030 in the STEPS. In this year’s Outlook, under announced ambitions, the electric car sales share exceeds 40% in 2030 compared to 35% under stated policies: this gap has more than halved in the past year. For trucks and buses, the EV sales share in 2030 in the STEPS also increased faster than ambition. As a result, the gap between ambition and legislated policies for HDVs is half of what it was in the 2022 Outlook.

Electric car sales share implementation gap, 2030



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Realising the potential of EVs to support government climate (as well as energy security) ambitions is thus almost in reach under current policy frameworks. In particular, the gap between policy and ambition has closed in three of the largest EV markets: the European Union, the United States and China. At the global level, oil displacement by EVs reaches 1.8 million barrels per day in 2025 (over 5 mb/d in 2030) under stated policies. As a result, global demand for oil-based road transport fuels will peak by 2025.

The momentum seen over the past year in terms of increasing EV sales and new supportive policies being introduced, along with funding designated for the necessary infrastructure (for example, the USD 5 billion allocated in the US IIJA to support EV charger installation), have also led industry players to invest more in EV supply chains. Notably, planned EV battery manufacturing expansions are set to increase capacity more than fourfold, reaching 6.8 TWh/year of production capacity in 2030, 65% higher than is needed to enable the level of EV deployment in the APS. Taken together, this suggests that even higher EV deployment than is implied by the APS is achievable by 2030 if policy efforts are sustained and critical potential bottlenecks (such as around recharging infrastructure and mining) are addressed early on.

Light-duty vehicles

Light-duty vehicles (LDVs), including passenger light-duty vehicles (PLDVs) and light commercial vehicles (LCVs), continue to make up the majority of electric vehicles (excluding two/three-wheelers). This is a result of strong policy support, including light-duty vehicle fuel economy or CO₂ standards, the availability of EV models, and the size of the LDV market. In the STEPS, electric LDV sales are projected to reach over 20 million in 2025, doubling the number of sales in 2022, and to quadruple to 40 million in 2030. The sales share of electric LDVs thus increases from 13% in 2022 to over 20% in 2025 and around 35% in 2030. The stock of electric LDVs reaches about 230 million in 2030, meaning that about one in every seven LDVs on the road is electric.

In the APS, the fleet of electric LDVs reaches over 240 million in 2030, a 15% stock share. Of these, 230 million are electric PLDVs, with only 6% being LCVs. Sales of electric LDVs reach almost 45 million in 2030 in the APS, representing a sales share of 40%. These results reflect government electrification ambitions and net zero pledges, including the [2021 COP 26 declaration target](#) to achieve 100% zero-emission LDV sales by 2040, and by 2035 in leading markets, which 40 national governments have committed to.

In the NZE Scenario, the sales share of electric LDVs reaches 30% in 2025, four years earlier than in the STEPS. In 2030, the sales share is over 60%, about 80% higher than in the STEPS and 55% higher than in the APS.

Buses

Governments have made significant progress in electrifying public bus fleets. In 2022, there were more than 800 000 electric buses on the road, representing over 3% of all buses. As such, buses are the most electrified road segment, excluding two/three-wheelers. In the STEPS, the electric bus fleet reaches 1.4 million in 2025 and 2.7 million in 2030, at which point around one in ten buses will be electric. In the near term, electrification is expected to progress most rapidly within the publicly owned urban bus fleet, which is covered by government procurement

regulations and, in some cases, government funding. For example, Canada is aiming to put 5 000 electric public and school buses on the road by the end of 2025 via the CAD 2.75 billion [Zero Emission Transit Fund](#).

In the APS, the electric bus fleet exceeds 3 million in 2030, reaching a stock share of over 10%. In 2030, about a quarter of buses sold are electric, which is about 35% higher than the sales share in the STEPS. In part, this increase is due to the [proposed EU heavy-duty vehicle CO₂ standards](#), which would require 100% zero-emission city bus sales from 2030. In the NZE Scenario, the electrification of buses is even more rapid, with one in two buses sold in 2030 being electric.

Medium- and heavy-duty trucks

Medium- and heavy-duty trucks are more difficult to electrify than other road segments, due in part to the size, weight and cost of the batteries needed to fully electrify this segment. However, progress is being made: around 320 000 electric trucks were on the road in 2022. By 2030, the fleet of electric trucks reaches almost 3.5 million in the STEPS, over 3% of the total truck fleet.

In the APS, the stock of electric trucks exceeds 4 million in 2030, a stock share of 4%. Electric truck sales increase from a negligible share today to over 9% in the STEPS in 2030 and 13% in the APS. The increased sales in the APS are driven in particular by the [Global Memorandum of Understanding \(MoU\) on Zero-Emission Medium- and Heavy-Duty Vehicles](#), through which 27 countries have now pledged to reach 30% zero-emission medium- and heavy-duty vehicle² sales by 2030 and 100% by 2040. In addition, the European Union has proposed HDV CO₂ standards that would require a 45% reduction in emissions in 2030 compared to 2019 levels.

In the NZE Scenario, electric trucks reach 30% of sales in 2030, which is aligned with the Global MoU on Zero-Emission Medium- and Heavy-Duty vehicles. However, this sales share is still two-and-a-half times that in the APS, and over three times that in the STEPS.

Two/three-wheelers

Two/three-wheelers are currently the most electrified road transport segment. Given the vehicles' light weight and limited daily driving distance, battery electrification is relatively easy and makes economic sense on a total cost of ownership basis in many regions. In 2022, the electric two/three-wheeler fleet totalled over 50 million, reaching a stock share of around 7%.

In the STEPS, the fleet of electric two/three-wheelers reaches 220 million in 2030, or a quarter of the total two/three-wheeler fleet. In the APS, the stock grows to 280 million, and almost 30% of all two/three-wheelers are electric. The electric sales share in 2030 reaches 50% in the STEPS and 60% in the APS. In the NZE Scenario, the electric two/three-wheeler sales share reaches almost 80% in 2030.

²Includes buses.

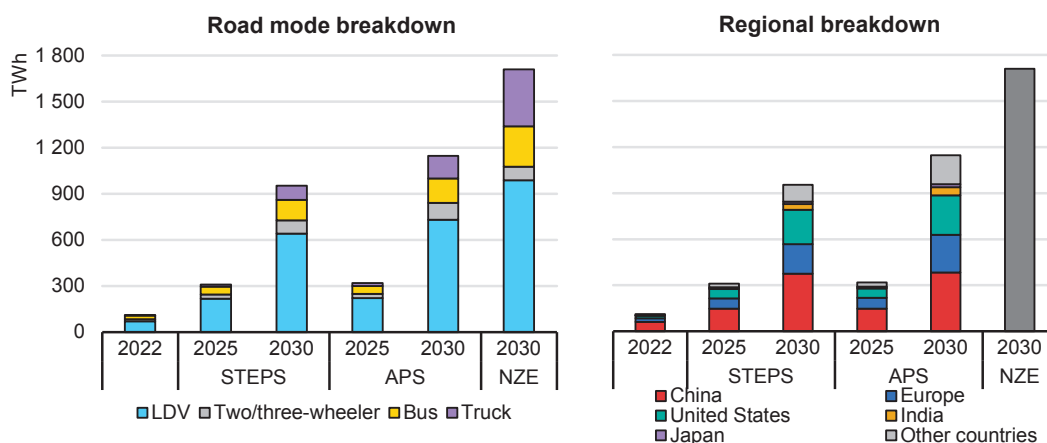
To power the growing stock of electric trucks, the number of depot chargers increases from around 300 000 today to 3.5 million in 2030 in the STEPS and 4.2 million in the APS. The installed capacity of truck depot chargers is about 310 GW in the STEPS and 380 GW in the APS in 2030. As with buses, the number of depot chargers needed in 2030 is far greater than the number of opportunity chargers. In the STEPS, the number of opportunity truck chargers is about 13 500 (6.5 GW installed capacity), increasing to 25 000 (13 GW installed capacity) in the APS in 2030.

Impact on energy demand and emissions

Electricity demand

The global EV fleet consumed about 110 TWh of electricity in 2022, which equates roughly to the current total electricity demand in the Netherlands. Almost a quarter of the total EV electricity consumption was for electric cars in China, and a fifth for electric buses in the same country. Electricity demand for EVs accounts for less than half a percent of current total final electricity consumption worldwide, and still less than one percent of China's final electricity consumption.

Figure 3.12. Electricity demand by mode and region, 2022-2030



IEA. CC BY 4.0.

Notes: STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario; NZE = Net Zero Emissions by 2050 Scenario; LDV = light-duty vehicle; RoW = rest of the world. The analysis is carried out for each region in the transport model within the IEA's Global Energy and Climate Model (GEC-Model) separately and then aggregated for global results. For the Net Zero Emissions by 2050 Scenario, only global values are reported. Regional data can be interactively explored via the [Global EV Data Explorer](#).

Electricity demand for EVs accounts for only a minor share of global electricity consumption in 2030 in the Announced Pledges Scenario.

Electricity demand for EVs is projected to reach over 950 TWh in the STEPS and about 1 150 TWh in the APS in 2030. Notably, electricity demand in the APS is

about 20% higher than in the STEPS, despite the stock of EVs only being about 15% higher. This is in part due to higher rates of electrification in many high-average vehicle mileage markets such as the United States, but also to greater electrification in the truck and bus segments, which contribute incrementally to vehicle stock, but have a high electricity demand per vehicle. In addition, it is assumed that in countries with net zero pledges, a larger share of energy consumption in PHEVs is provided by electricity (as opposed to gasoline or diesel). This is particularly relevant for cars and vans, which account for about two-thirds of demand in both scenarios.

By 2030, electricity demand for EVs accounts for less than 4% of global final electricity consumption in both scenarios. As shown in the [World Energy Outlook 2022](#), in 2030 the share of electricity for EVs is relatively small compared to demand for industrial applications, appliances or cooling and heating.

Table 3.1 Share of electricity consumption from electric vehicles relative to final electricity demand by region and scenario, 2022 and 2030

Country/region	2022	Stated Policies Scenario 2030	Announced Pledges Scenario 2030
China	0.8%	3.8%	4.0%
Europe	0.7%	4.7%	5.7%
United States	0.4%	5.4%	6.3%
Japan	0.1%	1.7%	2.2%
India	0.1%	1.7%	2.5%
Global	0.5%	3.2%	3.8%

Note: Non-road electricity consumption from the [World Energy Outlook 2022](#).

China remains the largest consumer of electricity for EVs in 2030, although its share of global EV electricity demand decreases significantly from about 55% in 2022 to less than 40% in the STEPS, and around 30% in the APS. This reflects wider adoption of electromobility across other countries in the period to 2030.

The size of the EV fleet becomes an important factor for power systems in both scenarios, with implications for peak power demand, transmission and distribution capacity. Careful planning of electricity infrastructure, peak load management, and smart charging will be critical. Reducing dependence on fast charging will allow for optimal planning and resiliency of power systems, mitigating peak power demand. More than 80% of the electricity demand for electric LDVs in 2030 in both scenarios is via slow chargers (private and public).

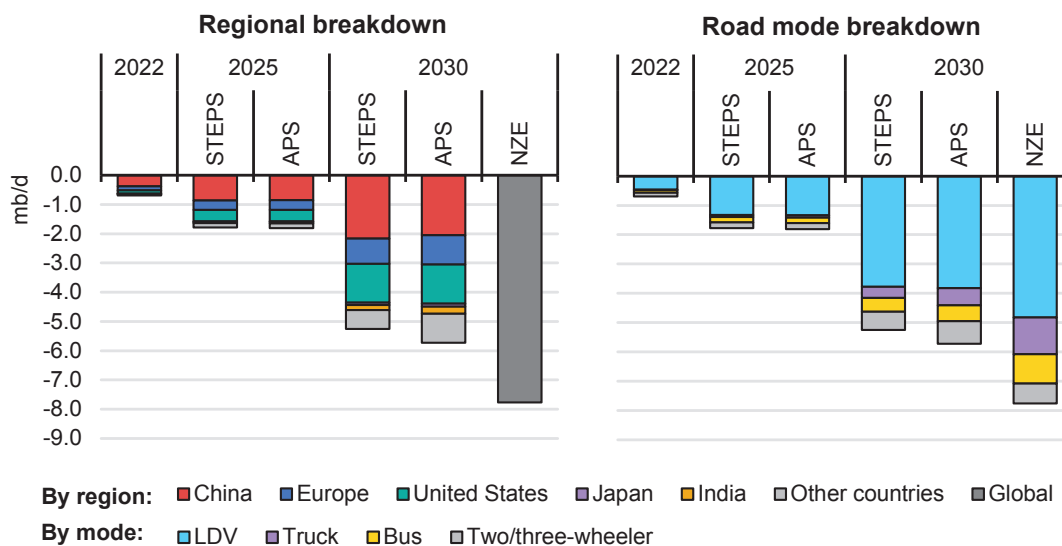
To help policy makers prioritise charging strategies according to the size of their EV fleet and their power system configuration, the IEA has developed a [guiding framework](#) and [online tool](#) for EV grid integration.

Oil displacement

The growing EV stock will reduce oil use, which today accounts for over 90% of total final consumption in the transport sector. Globally, the projected EV fleet in 2030 displaces more than 5 million barrels per day (mb/d) of diesel and gasoline in the STEPS and almost 6 mb/d in the APS, up from about 0.7 mb/d in 2022. For reference, Australia consumed around 1 mb/d of oil products across all sectors in 2021.

However, recent price volatility for critical minerals that are important inputs to battery manufacturing, and market tension affecting supply chains, are a stark reminder that in the transition to electromobility, energy security considerations evolve and require regular reconsideration.

Figure 3.13. Oil displacement by region and mode, 2022-2030



IEA. CC BY 4.0.

Notes: STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario; NZE = Net Zero Emissions by 2050 Scenario; LDV = light-duty vehicle. Oil displacement based on internal combustion engine (ICE) vehicle fuel consumption to cover the same mileage as the EV fleet.

Oil displacement increases from 0.7 mb/d in 2022 to nearly 6 mb/d in 2030 if pledges supporting electromobility in road transport around the world are fulfilled.

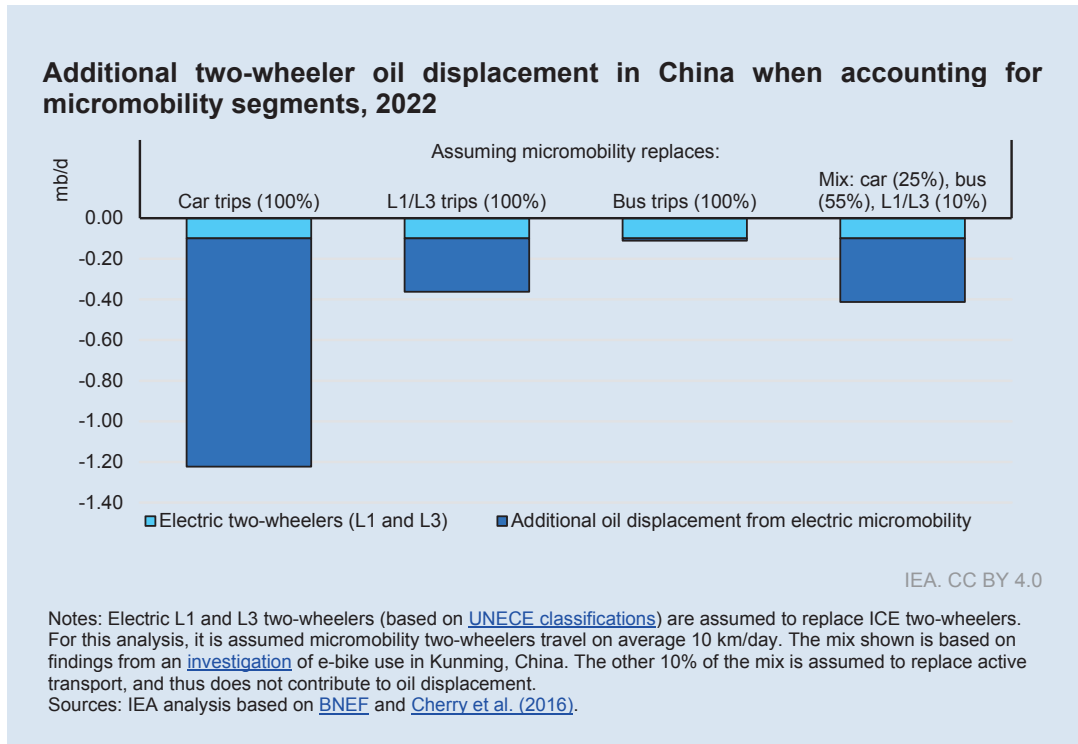
Box 3.2 How much oil really gets displaced by electric vehicles?

Oil displacement through the use of EVs can be estimated by assuming that the distance (total kilometres) travelled by EVs by segment each year would have otherwise been travelled by ICE vehicles or hybrid electric vehicles (HEVs) (based on the stock shares of each). In the case of PHEVs, only the distance covered by electricity gets included. The stock average fuel consumption of gasoline and diesel vehicles determines the total liquid fuel displacement, where the biofuel portion is taken out of the estimate based on regional blending rates. As a result, it can be estimated that in 2022, the stock of EVs displaced 700 000 barrels of oil per day.

This method of estimation assumes that EVs replace ICE or hybrid vehicles of the same segment, as opposed to some other means of transport, i.e. an electric car replaces an ICE car. The accuracy of this assumption is uncertain, in particular with respect to two-wheelers. In IEA analysis, only two-wheelers that fit the United Nations Economic Commission for Europe (UNECE) classification of L1 or L3 are considered. This definition excludes micromobility options such as electric-assisted bicycles and low-speed electric scooters, leading to a significantly lower stock (around 80% lower) than when including micromobility segments.

Whether or not electric micromobility avoids oil use is uncertain, as it might displace manual bicycles or walking rather than ICE two-wheelers. At the same time, there is evidence that in some cases micromobility [displaces personal car or taxi trips](#). The estimate of the amount of oil use that is avoided by two-wheeled micromobility therefore strongly depends on the assumptions about the mode that is being displaced.

The case of China, which represents over 95% of the global stock of two-wheeled electric micromobility, is a good example. Assuming that all two-wheeled micromobility in China replaces conventional ICE two-wheelers would increase oil displacement by 260 kb/d (or 160%). If instead electric micromobility was assumed to replace only bus trips, then the total oil displacement from two-wheelers in China would increase by just 10 kb/d (10%). However, if it was assumed that they displaced car trips, then oil use avoided by two-wheelers in China would be more than 1 mb/d higher. Including oil displacement from the two-wheeled electric micromobility segment in China alone can therefore increase the estimated 2022 global oil displacement from all electric vehicles anywhere from 1% to 160%. But there is significant uncertainty as to whether any oil is displaced at all.



Tax revenues

Taxes on petroleum-based road fuels can be a significant source of income for governments,⁷ and are often used to support investments in transport infrastructure, such as roads and bridges. Given the levels of oil displacement discussed above, the transition to EVs will reduce these tax revenues. Additional tax revenue from electricity will not be sufficient to fully compensate for this reduction, both because taxes on electricity tend to be lower on an energy basis and because EVs are more efficient and thus use less energy than ICE vehicles.

In 2022, the transition to electric vehicle stock displaced around USD 11 billion in gasoline and diesel tax revenues globally. At the same time, the use of EVs generated around USD 2 billion in electricity tax revenue, meaning there was a net loss of around USD 9 billion. Although China has the greatest stock of EVs, the greatest impact on tax revenues was seen in Europe, a trend which is expected to continue into the future. This is because Europe has some of the highest taxes on gasoline and diesel; for example, the gasoline tax rate in Germany is almost ten times the rate in China.

As the number of EVs increases globally, government fuel tax revenues are expected to decline, with global net tax losses increasing by around two-and-a-

⁷ While the share of total government revenue from fuel taxes may be small, for example it has recently been [less than 3%](#) in the United Kingdom, in many cases it represents a large share of the budget allocations for transportation infrastructure.

By Aya Wagatsuma

(Bloomberg) -- One of the world's biggest share market rallies this year in Japan may be extended if foreign investors become even more bullish in 2024.

The Topix index and the Nikkei 225 Stock Average both touched 33-year highs and rose more than 20% so far for 2023, beating most equity benchmarks in the rest of Asia. Gauges that track Japanese automakers and electronics companies surged at least 33% as the yen depreciated against all major currencies. That was fueled by signs that the Bank of Japan isn't in a hurry to alter its ultra-loose monetary policy.

Even with the yen's rally since early November, Japanese stocks may stay solid given that the currency remains relatively cheap and corporate earnings have become less susceptible to foreign exchange fluctuations. Overseas investors have also cheered Japan's push to increase companies' shareholder value. "Investors outside of Asia, such as those in the US, Europe, and the Middle East, are also interested in Japanese equities," said Masashi Akutsu, chief equity strategist at BofA Securities in Tokyo. "If they are really convinced that Japan will improve, they will raise their rating, and then funds will come in line with the fundamentals."



Foreign investors were net sellers for only three months this year as of November, according to data calculated by the Tokyo Stock Exchange.

Other sector winners included trading companies that climbed after billionaire Warren Buffett increased his stake in the sector's largest firms. Among the Topix's 33 sub-indices, pharmaceutical companies were the only group to decline this year after a series of clinical trials faced setbacks.

Here's a list of some notable sectors:

Semiconductors

Shares of Screen Holdings Co. have surged 172% this year, making it one of the Nikkei 225's best performing stocks, while Advantest Corp. and Renesas Electronics Corp. both more than doubled. Semiconductor-equipment suppliers have been in focus as Taiwan Semiconductor Manufacturing Co. considers building a third plant in Japan, which is pushing to use extra budgeting to support chip infrastructure. Analysts have also pointed out that semiconductor-equipment suppliers are seeing signs of a recovery.

Japan Chip Stocks Rise to Record on Signs Demand Is Recovering

Automakers

The automobile sector made the list of top performers as the yen depreciated in November to a one-year low of 151.91 per dollar, helping exporters post record earnings. The Topix subindex for car companies is set for a year-to-date gain of 36%. Toyota Motor Corp. is on course for its best year since 2013 with a gain of 40%.

Trading Companies

The five trading firms that Buffett favored earlier this year — Mitsubishi Corp., Mitsui & Co., Sumitomo Corp., Marubeni Corp. and Itochu Corp. — are all up at least 35% since a report in April said he raised holdings in the sector. Investors are watching for what he buys next after Berkshire Hathaway Inc. sold yen bonds in November. The Topix's Wholesale Trade index, which includes those companies, has climbed more than 37% this year.

Berkshire Sells Yen Debt Amid Talk It's Eying More Japan Stocks

Pharmaceuticals

A slew of bearish signals emerged from the pharmaceutical sector, the year's only Topix's sub-index loser. Those included a more-than 50% slump in Sumitomo Pharma Co. that made it the biggest decliner in the Nikkei 225. In July, the drugmaker and Otsuka Pharmaceutical Co. said their schizophrenia treatment Ulotrant didn't meet the primary endpoint in phase 3 Developing Innovative Approaches for Mental Disorders 1 and 2 clinical studies. Eisai Co. also lost 20% this year after a Keytruda trial to treat a type of cancer in the uterus didn't meet the dual primary endpoints of overall survival and progression-free survival.

"Going ahead, I think investors need to be very picky for Japan health-care sector," said Tina Banerjee, a health-care

analyst who publishes her insights on the Smartkarma platform, based in Mumbai. “Companies with promising late-stage pipeline should be the winners.”

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NEWS RELEASE

Mastercard SpendingPulse: U.S. Retail Sales Grew +3.1%* This Holiday Season

12/26/2023

PURCHASE, N.Y.--(BUSINESS WIRE)-- According to preliminary insights from **Mastercard SpendingPulse™**, U.S. retail sales excluding automotive **increased +3.1% year-over-year this holiday season**, running from November 1 through December 24. Mastercard SpendingPulse measures in-store and online retail sales across all forms of payment and **is not adjusted for inflation.**

“This holiday season, the consumer showed up, spending in a deliberate manner,” said Michelle Meyer, Chief Economist, Mastercard Economics Institute. “The economic backdrop remains favorable with healthy job creation and easing inflation pressures, empowering consumers to seek the goods and experiences they value most.”

Key retail trends this holiday season included:

- **Shopping Extravanzas In-Store & Online:** Online retail sales increased +6.3% YOY while in-store sales were up a more modest +2.2% YOY. Spending online is increasing at a faster pace than in-store, therefore taking a growing slice of the retail pie, but shopping in-store still makes up a considerably larger portion of total retail spending.
- **Winter Wardrobe Wonderland:** Apparel was one of the top categories for shoppers this season as consumers shopped for new outfits and upcoming holiday festivities. The sector was up +2.4% YOY.
- **Season’s Eatings:** Culinary celebrations continued as family and friends gathered in restaurants to ring in the holidays. **The Restaurant sector was up +7.8% YOY, while Grocery was up +2.1% for the season.**

“Retailers started promotions early this season, giving consumers time to hunt for the best deals and promotions,” said Steve Sadove, senior advisor for Mastercard and former CEO and Chairman of Saks Incorporated. “Ultimately it

was about getting the most bang for your buck as consumers spent on a variety of goods and services, resurfacing spending trends from before the pandemic.”

*Excluding automotive

Mastercard SpendingPulse™ U.S. Holiday Retail Sales November 1 – December 24, 2023 vs. 2022	
	2023 vs. 2022
Total retail (ex. auto)	+3.1%
E-commerce sales	+6.3%
In-store	+2.2%
Apparel	+2.4%
Electronics	-0.4%
Grocery	+2.1%
Jewelry	-2.0%
Restaurants	+7.8%
Source: Mastercard SpendingPulse, which measures in-store and online retail sales across all forms of payment and is not adjusted for inflation	

About Mastercard SpendingPulse

Mastercard SpendingPulse reports on national retail sales across all payment types in select markets around the world. The findings are based on aggregate sales activity in the Mastercard payments network, coupled with survey-based estimates for certain other payment forms, such as cash and check.

Mastercard SpendingPulse defines “U.S. retail sales” as sales at retailers and food services merchants of all sizes. Sales activity within the services sector (for example, travel services such as airlines and lodging) are not included in the total retail sales figure. SpendingPulse insights are not indicative of Mastercard company performance; insights and forecast are subject to change.

About Mastercard (NYSE: MA)

Mastercard is a global technology company in the payments industry. Our mission is to connect and power an inclusive, digital economy that benefits everyone, everywhere by making transactions safe, simple, smart and accessible. Using secure data and networks, partnerships and passion, our innovations and solutions help individuals, financial institutions, governments and businesses realize their greatest potential. With connections across more than 210 countries and territories, we are building a sustainable world that unlocks priceless possibilities for all. www.mastercard.com

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Source: Mastercard Investor Relations

The 10 Most Intriguing Science Breakthroughs of 2023: F.D. Flam
2023-12-30 13:00:18.354 GMT

By F.D. Flam

(Bloomberg Opinion) -- Every year, scientists make amazing new discoveries — findings that often don't get the attention they deserve. War, tragedy and political controversies understandably dominate social media and the front pages, but not all the news is bad. As 2023 draws to a close, let's look back on some of the astounding breakthroughs we've seen in the last 12 months.

New drugs help us lose weight — and understand why we gain it

The most talked-about science story in 2023 was the expanding use of the diet drugs called GLP-1 receptor agonists, most popularly known as Ozempic. Marketed as Wegovy when prescribed for weight loss, this drug and a slew of others have already helped thousands lose weight. In 2023, several studies also showed GLP-1s reduced the risk of heart attacks and strokes in obese people.

But the drugs also shed light on the roots of obesity. Conventional wisdom holds that obese people lack willpower and therefore eat too much — or exercise too little. That's wrong, but this pervasive misconception has clouded scientific thinking for years.

Scientific evidence is pointing to obesity as a hormonal malfunction, as I wrote in December 2022. The malfunction can stem from a diet too high in sugar and refined starch, according to a recent study by endocrinologist David Ludwig of Harvard.

Once controversial, the hormonal view is harder to deny now, since the new drugs work by mimicking the hormone GLP-1 (glucagon-like peptide).

Climate tipping points become clearer while there's still time to act

Climate tipping points were also a big topic in 2023. These tipping points represent not just sudden changes, but the onset of reinforcing feedback loops. In the past, naturally occurring vicious cycles have turned our planet into "snowball Earth" or ushered in hot periods so extreme that more than 90% of all species went extinct.

Scientists warned many times this year of a looming feedback loop caused by humans. Researchers estimate that warming of just 1.5 C above pre-industrial levels could set off several global tipping points, including permafrost melt, burning of the Amazon rain forest and collapse of the Greenland and West Antarctic ice sheets.

Two 2023 studies also showed the slowing of a circulatory current in the Southern Ocean. These currents act like the planet's beating heart, with cold polar waters drawing carbon, oxygen and heat downward and driving currents that connect all the planet's oceans.

The slowing of that heartbeat might seem depressing, but

there's a glimmer of good news here: We're still on the right side of all these potential tipping points, and the warnings have come while there's still time to do something about it.

Physicists repeat a nuclear fusion feat

Over the summer, scientists said that they had liberated more energy from a peppercorn-sized capsule than they had beamed in with a set of lasers — a repeat of a feat they had first announced at the very end of 2022. As I wrote last summer, fusion is clean, the fuel is inexhaustible and cheap, and there's no risk of a meltdown. The fact that humanity has finally captured the power source of the stars surely will go down in history.

The dark side is that these achievements used a facility whose primary purpose is the testing of weapons designed to kill millions of people. The clean energy hopes are secondary. The National Ignition Facility, located at Lawrence Livermore National Laboratory, is so embedded in the nuclear weapons industry that some physicists say we'd be better off investing in projects aimed exclusively at providing clean energy. A nuclear war would cause vastly more catastrophic climate change than we're going to get from fossil fuel.

But the Livermore feat has given us a better understanding of the physics of fusion, and a surge in funding for fusion energy. Today, there are at least 30 startups working on nuclear fusion using billions of dollars in private money and government grants. Some would call them all long shots, but the need for clean energy calls for placing as many bets as possible.

Early arrival of humans in the Americas demands a rethink of history

Sometime in the prehistoric past, two adults and a child left a trail of footprints in the mud near what's now White Sands, New Mexico. A new analysis of quartz grains and pollen show they took this walk between 21,000 to 23,000 years ago — thousands of years before humans were thought to have reached the Americas.

For years, the textbook story held that people first came to the Americas between 16,000 and 14,000 years ago, crossing a land bridge between Siberia and Alaska. The oldest established artifacts, from the Clovis site in New Mexico, date back 13,500 years. Over recent years, claims of earlier artifacts have been raised though nothing has been quite as carefully dated and undisputedly human as those footprints.

The new dates would mean people were already living in New Mexico during the peak of the last ice age. Figuring out how they arrived will require some new thinking. Researchers from Oxford have proposed that they got here by boat. If the footprint dates hold up, this or some other dramatically different story will become the new common knowledge.

A new telescope helps us see the universe when it was young

Astronomers estimate that our universe is about 13.7 billion years old, and because distant objects appear as they

did long ago, astronomers have been able to see back to about the first billion years.

But that long-hidden first billion years was important. That's when the stars and galaxies were lighting up and assembling themselves. In 2023 the James Webb Space Telescope started sending images from that formative time.

The JWST has shown us fragments of primitive galaxies, but to astrophysicist David Spergel, president of the Simons Foundation, the most interesting find from this era is the oldest supermassive black hole. It resides in a galaxy called UHZ1, which appears as it did 13.2 billion years ago — 470 million years after the Big Bang.

This black hole is comparable in mass to the whole rest of the galaxy combined, said Spergel. That's surprising, since the black hole in the center of our galaxy constitutes just half a percent of the galaxy's mass. The finding could help astronomers understand how supermassive black holes formed and their role in shaping the rest of the universe.

Giant gravitational waves rock the universe

In the spring of 2023, scientists from five distant parts of the globe announced the discovery of massive vibrations in space and time. The feat involved more than 20 years of precision observations of pulsars — burnt-out stars which emit beams of radio waves at a precise rhythm as they spin hundreds or even thousands of times a second.

Tiny deviations in the timing of those pulses revealed this long-sought background of gravitational waves. The scientists say the waves are being stirred up by supermassive black holes spiraling toward each other or perhaps more exotic phenomena — defects in the fabric of space known as cosmic strings.

Einstein first predicted gravitational waves would ripple space, but proof of their existence wasn't announced until 2016.

The 2023 discovery was of much longer waves cresting and falling over periods of years. Finding them took a combined effort from scientists in the US, Europe, China and Australia. Such collaboration is becoming more common as scientists take on ever more ambitious projects — ones too costly for individual countries to pull off alone.

A cure for sickle cell disease

For decades, medical research neglected sickle cell disease, though it caused severe pain and early death for thousands of people, mostly of African descent. But 2023 brought two new treatments that rely on extremely sophisticated gene alterations, including the very first FDA-approved treatment using the gene editing technique known as Crispr.

Sickle cell disease is caused by a genetic variant that produces abnormal hemoglobin — a protein in red blood cells. The cells become misshapen and can clog or inflame blood vessels. Patients could be cured with a bone marrow transplant, but only about 25% of people with sickle cell can find a matched donor. Both new therapies use different ways to alter the DNA in bone

marrow cells restoring the ability to make normal hemoglobin. These aren't practical solutions yet for most of the world, let alone most of the 40,000 people in the US with severe symptoms — one therapy, known as Casgevy, costs more than \$2 million, and the other, known as Lyfgenia, \$3.1 million. (Despite the cost, one major insurer has already agreed to cover Lyfgenia.) But it's a step in the right direction for a disease that's gotten too little attention.

Reading the minds of the severely paralyzed

In May, scientists announced they'd learned to decode people's thoughts from brain scans, with an AI system as interpreter. The findings, which I described in this column, could restore the ability to communicate in people who are so profoundly paralyzed they can't speak or write.

This so-called locked-in syndrome happens for various reasons — especially strokes or neurological diseases. When the condition is temporary, people sometimes describe a harrowing ordeal — one man remembers being frozen in place while his wife and a doctor debated whether to remove life support and let him die.

In the new system, published in Nature Neuroscience, the researchers had volunteers lie in a brain scanner while listening to podcasts. The AI system analyzed connections between the brain scan patterns and the words. Eventually the AI could turn brain patterns into words. When the subject heard, "I don't have my driver's license yet," the system read the brain to say, "She hasn't even started learning how to drive." The translation was imperfect but still eerily accurate. For those who find themselves trapped in frozen bodies, this could be a powerful tool restoring the ability to communicate.

ChatGPT learns to play doctor

In years of reporting, I've talked to doctors around the world about mind-boggling technological advances, but rarely have I heard so much astonishment and wonder in their voices as when they talked this year about the feats of ChatGPT-4. Though an earlier version of ChatGPT debuted in late 2022, it was really in 2023 that we started to get a sense of what large language models could do.

ChatGPT can diagnose complex medical issues, ask for tests and work-ups, and even get a perfect score on most medical licensing exams. But there's something alien about its reasoning. It won't necessarily ace a test unless it's told specifically to do so, said Andrew Beam, an assistant professor of biomedical informatics at Harvard. It performs better if you tell it to imitate the smartest person in the world.

There are risks to trusting AI too much in diagnosis or recommending treatments, but there's also vast potential to help doctors become smarter, faster and better at what they do.

Intelligent life is found on Earth

A new study released in November toppled the myth that only humans can imagine the past and future, while animals live in the moment. Rats, it turns out can imagine and plan ahead. As I wrote in this column, the newest findings may explain observations of city rats bringing slices of pizza into subway cars where they can eat away from other hungry rats.

The last 10 years have brought a paradigm shift in how humanity sees other animals, with a wealth of findings showing that many kinds of creatures can think, reason and solve problems in a way once believed to be unique to humans. That now includes farm animals. One study showed pigs are empathetic enough to free trapped companions. Cows were potty trained — a finding that showed they have a body awareness also thought to be beyond them. Goats understand what it means when humans point at things.

Humans dream of finding intelligent life in the cosmos, but our experiences here on Earth show we're not that good at recognizing it when it's right in front of us.

Let's hope 2024 brings another year of breakthroughs — including the discovery of some truths that have been hiding right under our noses.

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- * Wanted: A Covid Booster That Actually Works
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Dan Tsubouchi @Energy_Tidbits · 2h



Chinese stalled recovery & consumer staying on sidelines.

Official manufacturing PMI down for 3rd mth to 49.0 in Dec vs 49.4 in Nov, lowest in 6 mths.

state media says 3 times, need to boost/expand domestic demand!

#OOTT

<https://www.globaltimes.cn/page/202312/1304548.shtml>

China's manufacturing PMI drops to 49 in Dec; policies expected to boost demand

By Global Times Updated Dec 31, 2023 12:49 PM

China's manufacturing activity remains in contraction territory in December, official data showed on Sunday, reflecting challenges posed by insufficient demand. Analysts believe that as more policies are implemented to boost demand, the situation is expected to improve.

China's manufacturing Purchasing Managers' Index (PMI) stood at 49 in December, down from 49.4 in November, data from National Bureau of Statistics (NBS) showed on Sunday.

A reading below 50 indicates a contraction, while one above 50 indicates expansion.

The slight drop of manufacturing PMI was affected by factors such as the off-season production for several categories of basic raw material industries, indicating a slight decline in the level of economic activity, according to Zhao Qinghe, an NBS official.

Non-manufacturing PMI stood at 50.4 in December, up 0.2 percentage points from November, indicating accelerated expansion, NBS data showed.

From the perspective of market expectations, service industry enterprises remain optimistic about the continued recovery and development of the industry in the near future, according to Zhao.

In breakdown of sub-indices, the production index came in at 50.2, down 0.5 percentage points compared with the previous month. Manufacturing companies have sustained an expansion in production for seven consecutive months.

The new order index stood at 48.7 in October, a decrease of 0.7 percentage points from the previous month.

The fluctuation in manufacturing PMI data is in line with expectations, but it also highlights the challenge of insufficient demand in the current economic climate, which is clearly impacting the entire industry chain, said Tian Yun, a veteran economist based in Beijing.

Chinese economic policymakers have already recognized the challenges, and with the introduction of policies to expand domestic demand, the stabilization and recovery of domestic demand should improve month by month, Tian said.

The National Development and Reform Commission (NDRC), China's top economic planner, recently stated that it aims to leverage the advantages of a super-large-scale market to boost domestic demand. It vowed to coordinate efforts to expand domestic demand and deepen supply-side structural reforms.

"We should coordinate the expansion of domestic demand and the deepening of supply-side structural reforms, and integrate the two organically," Li Chao, an NDRC spokesperson, said at a press briefing for the key macroeconomic policy priorities in 2024 on December 19.

Global Times



4



1.1K



Dan Tsubouchi @Energy_Tidbits · 3h



OOPS!

Missing from CENTCOM report.

@AFP reports Maersk ship was 1st hit by missile before attempted boarding by Houthis.

@AFP also reports Maersk has paused Suez transit for 48 hrs.

#OOTT ...

Show more

Dan Tsubouchi @Energy_Tidbits · 3h

Breaking!

Houthis response to Maersk resuming shipments via Suez.

Tried to board container ship, but US Navy to the rescue, "returned fir...

Show more



2



1.4K



SAF Dan Tsubouchi @EnergyTidbits · 3h Breaking!

Houthi's response to Maersk resuming shipments via Suez.

Tried to board container ship, but US Navy to the rescue, "returned fire in self-defense, sinking 3 of the 4 small boats, & killing the crews".

Won't be surprised if Houthis increase drone attacks.

#OOT

U.S. Central Command @CENTCOM · 6h
Iranian-backed Houthi small boats attack merchant vessel and U.S. Navy helicopters in Southern Red Sea

On Dec. 31 at 6:30am (Sanaa time) the container ship MAERSK HANGZHOU issued a second distress call in less than 24 hours ...
[Show more](#)



3 3 3.5K

SAF Dan Tsubouchi @EnergyTidbits · 14h 12/25. Houthis warned US only "seen prelude & preliminary steps" in Red Sea.

Today, US says Yemen's Houthis show no signs of ending their "reckless" attacks on commercial ships in the Red Sea reports @ruskygal

What did US expect?

#OOT
apnews.com/article/red-se...

SAF Dan Tsubouchi @EnergyTidbits · Dec 25
 #Houthis warn only "seen prelude & preliminary steps".

Weapons have greater range.

"no red lines in front of us" ...
[Show more](#)



The article discusses Houthi missile strikes on coastal roadways in dual waves. It mentions that the strikes occurred on December 25, 2023, and that the Houthi forces claimed to have destroyed several vehicles and infrastructure. The article also notes that the strikes were part of a broader campaign of attacks on commercial shipping in the Red Sea.

1 4 15 3.4K

SAF

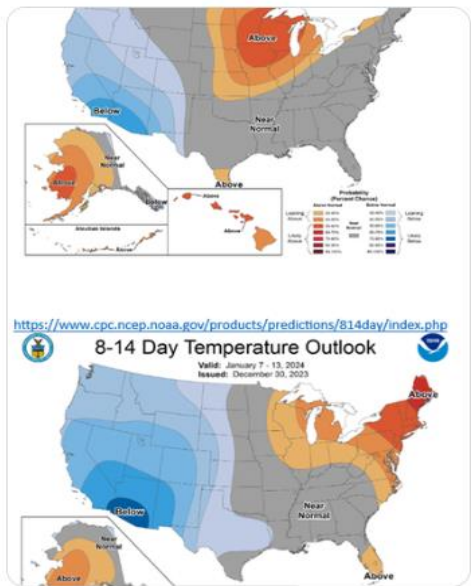
Dan Tsubouchi  @Energy_Tidbits · 15h

...

Best near-term @NOAA temp outlook in a long time.

But may not drive up HH #NatGas prices because key gas heating areas, Great Lakes & NE US, are expected warmer than normal.

And need a cold sustained Jan after a warm Nov/Dec start to winter.
#OOTT



↻ 3

♥ 9

📊 1.8K





Dan Tsubouchi @Energy_Tidbits · 37m

Floating #Oil storage 12/29 is 72.98 mmb, -17.13 WoW vs revised up 12/22 of 90.11 mmb.

12/22 revised +6.43 BUT all other weeks revised down by average -1.5 mmb.

Last 7-wk average 80.32 mmb, so want to watch coming into seasonally low demand in Q1.

Thx @Vortexa @business. #OOTT



2 8 490



Dan Tsubouchi @Energy_Tidbits · 19h

#JetFuel

Still a long way to go for visitors to Hong Kong to get back to pre-Covid. China 48% down, ROW 37% down.

Visitors from China lag ROW makes sense as Chinese consumer still being cautious until better clarity on economic recovery.

#OOTT

Show more

In Thousands	Total	ROW excl China	China	China % of Total
Nov-23	3,289	862	2,427	73.8%
Nov-22	114	55	59	51.8%
Nov-21	10	3	7	68.4%
Nov-20	6	2	4	60.0%
Nov-19	2,646	719	1,927	72.8%
Nov-18	5,995	1,364	4,631	77.2%
Nov 23 % of Nov 18	54.9%	63.2%	52.4%	

Source: Hong Kong Tourism Board, Bloomberg
Prepared by SAF Group

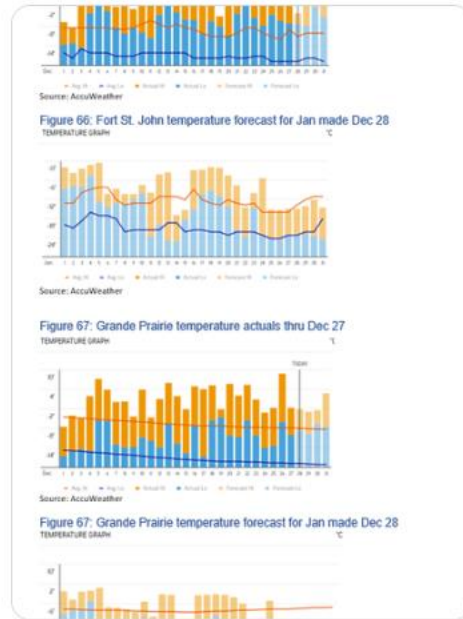
2 1.5K

SAF Dan Tsubouchi @Energy_Tidbits · Dec 28
 Increasing risk for early & abrupt end to Cdn winter #Oil #NatGas drilling season.

Warm temps in key drilling areas for Dec & now forecast for Jan.

Warm temps means no deep freeze in ground so risk to abrupt road bans & rig moves.

Big pad drilling will help mitigate #OOTT



2 3 11 4.3K

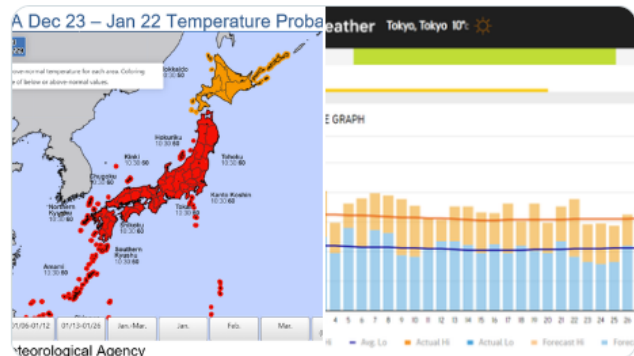
SAF Dan Tsubouchi @Energy_Tidbits · Dec 28
 Negative to #LNG prices.

JMA forecasts warmer than normal Jan across Japan.

ie. @accuweather fcast for Tokyo shows daily highs & lows above normal for next 3 wks

once get past Jan, winter cold fears in Japan for LNG are mostly gone.

#NatGas #OOTT ...
[Show more](#)



1 2 6 3.1K

Dan Tsubouchi @Energy_Tidbits · Dec 28
EVs vs ICE 101.

EVs sales are big, but EVs tend to be 2nd car ie, driven less miles & don't displace ICE mileage on per car basis.

Disconnect is 04/26/23 thread ie. IEA assumes every new EV displaces miles driven by an ICE

Gasoline demand will be stronger for longer
#OOTT

Dan Tsubouchi @Energy_Tidbits · Nov 7
Gasoline demand stronger for longer vs EV fcasts. EVs aren't displacing ICE mileage on per car basis.
@GWmedia. BEV driven 4,500 fewer miles/yr vs ICE. EVs 7,165 vs ICE 11,642. EV SUV 10,587 vs ICE SUV 12,945. ...
[Show more](#)

3 8 36 14K


Dan Tsubouchi @Energy_Tidbits · Dec 28
What will Houthis do?

Maersk updated schedule shows almost all container ships Asia/EU will go thru Suez Canal from now on. Thx @terjesolsvik

See 12/25 tweet, Houthis warned only "seen prelude & preliminary steps" "no red lines in front of us"

#OOTT
[reuters.com/world/middle-e...](https://www.reuters.com/world/middle-e...)

Dan Tsubouchi @Energy_Tidbits · Dec 25
#Houthis warn only "seen prelude & preliminary steps".
Weapons have greater range.
"no red lines in front of us" ...
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The screenshot shows a Reuters article from December 25, 2023. The headline is "Defense Minister outlines combat readiness to deal with all possible options & hypotheses". The article discusses the Ministry of Defense's (MoD) readiness for various scenarios, including the use of nuclear weapons. Key quotes include: "Weapons have greater range," "no red lines in front of us," and "We are not interested in war, and we intend the cooperation and stability of the international shipping route in the Red Sea, Bab el-Mandeb, the Gulf of Aden, and the Arabian Sea." The article also mentions that the MoD is preparing for all possible options and hypotheses, including the use of nuclear weapons, and that it is ready to deal with any threat.

1 3 5 3.7K



Dan Tsubouchi @EnergyTidbits · Dec 27

Here's why most aren't too worried about EU #NatGas storage for the winter.

@GIEBrussels data for Dec 26 shows #NatGas storage in good shape across EU.

#OOT



1 5 3.9K



Dan Tsubouchi @EnergyTidbits · Dec 27

Italy #PetroleumProducts consumption YTD Nov 30 is basically flat YoY.

Note below SAF Group table uses metric tons to barrels conversion by specific product and not one overall generic petroleum products conversion.

Thx @GiosalzanoWire #OOT

Italy Petroleum Products Consumption for Nov 2023							
Tonnes to barrel, multiply by		Nov 23	Nov 22	YoY %	Jan-Nov 23	Jan-Nov 22	YoY %
000/metric tons							
Gasoline		654	675	-3.11%	7,514	7,205	4.29%
Jet-Fuel		342	288	18.75%	4,151	3,422	21.30%
Total Gasol		2,217	2,287	-3.06%	23,888	24,371	-1.98%
Auto Diesel		1,934	2,044	-5.38%	21,426	21,802	-1.72%
Heating Diesel		81	62	30.65%	499	568	-12.15%
Fuel For Electricity Genration		1	88	-98.86%	328	515	-36.31%
Total Consumption		4,790	4,875	-1.74%	52,781	53,466	-1.28%
000/bpd							
Gasoline	8.350x	182	188	-3.11%	187	180	4.29%
Jet-Fuel	7.880x	90	76	18.75%	98	80	21.30%
Total Gasol	7.460x	551	569	-3.06%	592	543	-1.98%
Auto Diesel	7.460x	481	508	-5.38%	477	486	-1.72%
Heating Diesel	7.460x	20	15	30.65%	11	13	-12.15%
Fuel For Electricity Genration	6.350x	0	19	-98.86%	6	10	-36.31%
Total Consumption		1,324	1,375	-3.65%	1,311	1,311	0.05%

2 4 2.2K

Can Russia cut deal with Houthis to get their #Oil tankers free from attacks?

If not, set to lose market share.

India is #3 largest oil importer, refiners are seeking to boost supplies from Middle East & other nearby nations reports @jourmorakesh @29_ruchibhatia #OOTT

by Rakesh Sharma and Ruchi Bhatia

(Bloomberg) -- Refiners in India, the world's third-largest crude oil importer, are seeking to boost supplies from the Middle East and other nearby nations as recent attacks on ships in the Red Sea raise the risk of longer shipping time and higher costs, according to people familiar with the matter.

Shippers turned cautious about entering the Red Sea in recent weeks due to multiple attacks by Yemen's Iran-backed Houthi rebels. That prompted massive diversions, with many ships taking a longer route around the Cape of Good Hope, adding as much as three weeks to the voyage. Vessels carrying cargoes from the producers in the Mediterranean and North Sea are among those affected, as they travel the Suez Canal and Red Sea en route to Asia.

Shipping companies are asking Indian firms to bear the risk premiums for deliveries via the usual route, said the people who asked not to be identified because of the sensitivity of the issue. The refiners are not willing to bear the additional liability and are scouting for alternative suppliers, they said. Indian refiners are concerned their margins may come under pressure due to a sharp rise in insurance and freight costs. However, they also need to keep pace with domestic demand, which is rising because of the South Asian nation's rapid economic growth.

State-owned Bharat Petroleum Corp Ltd. has already arranged crude oil from other sources, a company official said, but didn't provide more details.

The government is advising merchants to take longer routes and diversify energy imports, with greater emphasis on buying from the Persian Gulf and Central Asia, officials from India's trade ministry said on condition of anonymity. Talks are also underway with countries such as Saudi Arabia and the United Arab Emirates to strengthen maritime security cooperation in the Red Sea region, they said.

A spokesperson from the ministry didn't immediately respond to an email seeking comment.

The flow of Russian oil from the Black Sea region may be affected and rerouted, leading to a higher premium for crude from the Middle East, said Madhavi Arora, lead economist at Emkay Global Financial Services Ltd. India's refined fuel product exports to the EU too could be impacted, she said.

Although, Indian refiners are concerned about supplies, there hasn't been any impact on refinery run rates so far, the people said. India's Prime Minister Narendra Modi discussed the situation in the Middle East, including the Red Sea attacks, with Saudi Arabia's Crown Prince Mohammed bin Salman on Tuesday.

To contact the reporters on this story: Rakesh Sharma in New Delhi at rsharma511@bloomberg.net;

Ruchi Bhatia in New Delhi at rbhatia1@bloomberg.net.



2



2



7



3.1K



SAF

Dan Tsubouchi  @Energy_Tidbits · Dec 27
Iraq #Oil geopolitical risk.

...

Will Iraq eventually forgive or will this turn out to be a pivot point?

Iraq govt statement. "US attack on military sites.... justifying it as a response.. constitutes a clear hostile act.....unacceptable violation of Iraqi sovereignty."

#OTT

<https://ina.is/enq/30578-iraqi-government-condemns-the-us-attack-on-iraqi-military-sites-considers-a-violation-of-sovereignty.html>

Iraqi government condemns the US attack, considers a violation of sovereignty



• Yesterday, 11:56

 Baghdad-INA

The Iraqi government condemned on Tuesday, the US attack on Iraqi military sites.

"The Iraqi government, through its security forces, constitutional institutions, and legal authorities, asserts its steadfast response to attacks on foreign diplomatic mission headquarters and sites hosting military advisors from friendly nations. Such attacks, we previously labeled as hostile acts, infringe upon Iraq's sovereignty and are deemed unacceptable under any circumstances or justification," stated the Media Office of the Prime Minister in a statement, received by The Iraqi News Agency-INA.

The statement added, "At the same time, the Iraqi government condemns what transpired early this morning, Tuesday, December 26, 2023, during which Iraqi military sites were targeted by the American side justifying the act as a response. This resulted in the martyrdom of one service member and the injury of 18 others, including civilians. This constitutes a clear hostile act. It runs counter to the pursuit of enduring mutual interests in establishing security and stability, and it opposes the declared intention of the American side to enhance relations with Iraq."

"We emphasize that this action undermines the bilateral relations between the two nations and will further complicate the efforts to achieve mutual understandings through collaborative dialogue aimed at concluding the presence of the international coalition. Above all, it constitutes an unacceptable violation of Iraqi sovereignty," the statement continued.

Our security forces have succeeded in establishing security and stability throughout our country, and achieved victory over the terrorist ISIS gangs, which no longer pose a threat to Iraqi national security. Hence, safeguarding the gains of this victory stands at the heart of our security and strategic priorities, and we will not allow any entity to undermine what has been accomplished and solidified through invaluable sacrifices.

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❤ 17

👁 6.8K

🔖 ⬆



Dan Tsubouchi @Energy_Tidbits · Dec 26 ·

Houthi's target US navy & commercial ship.

@CENTCOM: Navy shot down 12 drones, 3 anti-ship ballistic missiles & 2 attack cruise missiles.

Houthi's say targeted container ship

See 📌 12/15 Houthi's warn only "seen prelude & preliminary steps" so far.

#OOTT ...
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<https://twitter.com/CENTCOM/status/12804888452134720>

U.S. Central Command @CENTCOM


U.S. assets, to include the USS LABOON (DDG 58) and F/A-18 Super Hornets from the Eisenhower Carrier Strike Group, shot down twelve one-way attack drones, three anti-ship ballistic missiles, and two land attack cruise missiles in the Southern Red Sea that were fired by the Houthis over a 10 hour period which began at approximately 6:30 a.m. (Sanaa time) on December 26. There was no damage to ships in the area or reported injuries.



1:36 PM · Dec 26, 2023 · 1.5M Views

<https://www.aljazeera.com/news/2023/12/26/houthi>

United Forces announce targeting of commercial ship & military targets of Zionist entity
26/December/2023



SALEHA, December 26, 2023 (Saba) - The Yemeni Armed Forces announced the targeting of a commercial ship and military targets in the Horn of Houthi area and other areas in occupied Palestine, a victory for the oppression of the Palestinian people, who until this moment have been subjected to killing, bombardment, siege, and starvation.

The Yemeni Armed Forces expressed in a statement issued on Tuesday that the naval forces carried out an operation to target a commercial ship, MSC UNITEO, "with appropriate naval missiles, after the ship's crew rejected, for the third time, the calls of the naval forces, as well as repeated warning messages."


It indicated that the Yemeni Armed Forces' Air Force also carried out a military operation with a number of drones on military targets in the Horn of Houthi area and other areas in occupied Palestine.

The Yemeni Armed Forces reaffirmed their continued support of the Palestinian people within their religious, moral and humanitarian duty, as well as the continuation of their operations in the Red and Arab Seas against Israeli ships or those heading to the ports of occupied Palestine until the entry of the food and medicine that the Gaza Strip needs.

It affirmed what was stated in its previous statements regarding preventing the passage of all Israeli ships or those heading to the ports of occupied Palestine, while being fully open on the continuation of maritime traffic to all destinations except the Israeli entity.

E.H

Dan Tsubouchi @Energy_Tidbits · Dec 25



#Houthi's warn only "seen prelude & preliminary steps".

Weapons have greater range.

...
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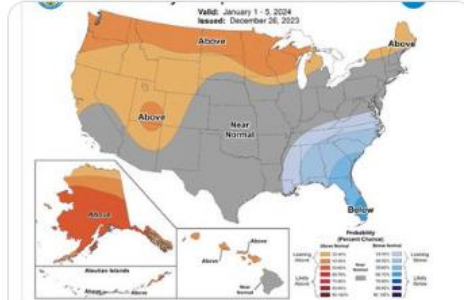
SAF

Dan Tsubouchi @Energy_Tidbits · Dec 26

...

#NatGas investors likely to stay on sidelines. Today's @NOAA temperature outlook covering Jan 1-9 doesn't see any sustained, broad return to colder than normal temps as hoped from 12/23 temp outlook.

And need a cold sustained Jan after a warm Nov/Dec start to winter. #OOTT



<https://www.cpc.ncep.noaa.gov/products/predictions/814day/index.php>



SAF Dan Tsubouchi @Energy_Tidbits · Dec 23



Finally, a near-term @NOAA temp outlook showing normal to colder than normal temps are moving into eastern half of US in Jan.

Today's NOAA temp outlook is for Dec 29-Jan 6. ... [Show more](#)



4

10

3.9K



SAF Dan Tsubouchi @Energy_Tidbits · Dec 26
#Mastercard Spending Pulse for holiday season.

NOT adjusted for inflation!

US retails sales +3.1% YoY, split online +6.3% YoY vs in-store +2.2% YoY

Restaurants +7.8% YoY, vs Grocery +2.1% YoY.

Don't know where you live, but these YoY seem less than price increases!

Category	YoY Change	Holiday Season Change
Online	+6.3%	+6.3%
In-store	+2.2%	+2.2%
Total	+3.1%	+3.1%
Restaurants	+7.8%	+7.8%
Grocery	+2.1%	+2.1%

8 16 2.6K

SAF Dan Tsubouchi @Energy_Tidbits · Dec 25 ·
#WarrenBuffettEffect

Japan stocks outperform in 2023 led by 5 trading firms Buffett favored earlier this yr — Mitsubishi, Mitsui., Sumitomo, Marubeni & Itochu are up >35% reports @aya_wagatsuma

See 05//18/23 Buffett 04/11 with @BeckyQuick interview.

[bloomberg.com/news/articles/...](https://www.bloomberg.com/news/articles/...)



SAF Dan Tsubouchi @Energy_Tidbits · May 18
The #WarrenBuffett effect is still working.
@business "foreigners loving Japanese stocks. positive flows into equities for 7th straight week"
...
[Show more](#)

2 7 3.5K

SAF

Dan Tsubouchi @Energy_Tidbits · Dec 24

...

Over/Under?


China state media reports National Health Commission says there are 2.5 to 3.4 million respiratory diseases at all medical institutions nationwide in China.

Don't recall seeing disclosure of number of millions before.

#OOTT

<https://www.globaltimes.cn/page/2023/12/330521.shtml>

Respiratory diseases show declining trend, with COVID-19 at lowest level of 2023: China CDC
By Global Times Published: Dec 24, 2023 08:55 PM



Parents take their children to the pediatric emergency and laboratory area of Xinhua Hospital in the Yangpu district in Shanghai on December 11, 2023. Photo from VCG.

China's respiratory diseases cases, which recently have been showing a declining trend, have mainly been caused by influenza viruses, while COVID-19 cases have reached their lowest level since the beginning of 2023, the Chinese Center for Disease Control and Prevention (China CDC) announced on Sunday.

The overall number of diagnosis and treatment of respiratory diseases in the outpatient clinic and emergency departments of medical institutions nationwide continues to show a fluctuating downward trend as numbers on Friday had dropped by about 30 percent compared to the peak period, Mi Feng, a spokesperson with the National Health Commission (NHC), said on Sunday at a press conference.

According to NHC, from November 26 to Sunday, the daily diagnosis and treatment volume of respiratory diseases at grassroots level medical institutions was between 1 million to 1.37 million, accounting for about 40 percent of the total number of respiratory diseases at all medical institutions nationwide.

Mi vowed to further trace the trends of respiratory diseases and changes in pathogens and virus mutations at home and abroad to strengthen situational analysis and monitoring.

China CDC also said the period of December 11 to 17 showed that acute respiratory diseases have also been dropping and that this trend is likely to continue next week, adding that influenza viruses still hold a dominant position among pathogens.

While influenza activity has slightly decreased but still remains high, infections of mycoplasma pneumoniae, adenovirus, and respiratory syncytial virus rose and fell. COVID-19 activity is at its lowest level this year, according to China CDC.

China CDC recommended that the public, especially vulnerable groups such as the elderly, pregnant women, children and people with underlying disease, to wear masks while taking subways, buses, trains and planes as traveling will increase at the end of the year.

As wearing masks for a long period of time can hinder the normal functioning of the immune system and weaken people's ability to resist diseases, experts do not particularly advocated masks be required for an extended period of time unless there is a major viral outbreak or when going to crowded places, said China's top respiratory disease expert Zhong Nanshan on Friday.

China in early December released a guideline on wearing masks to prevent respiratory illness while reducing their impact on people's daily life. The document gave scenarios to the public when they should and should not wear masks.

1

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3.1K

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