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Annual retail propane sales report

U.S. odorized propane sales by state and end-use sector

Reporting year: 2022

Conducted by

Frost & Sullivan

on behalf of the

Propane Education & Research Council

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Executive summary

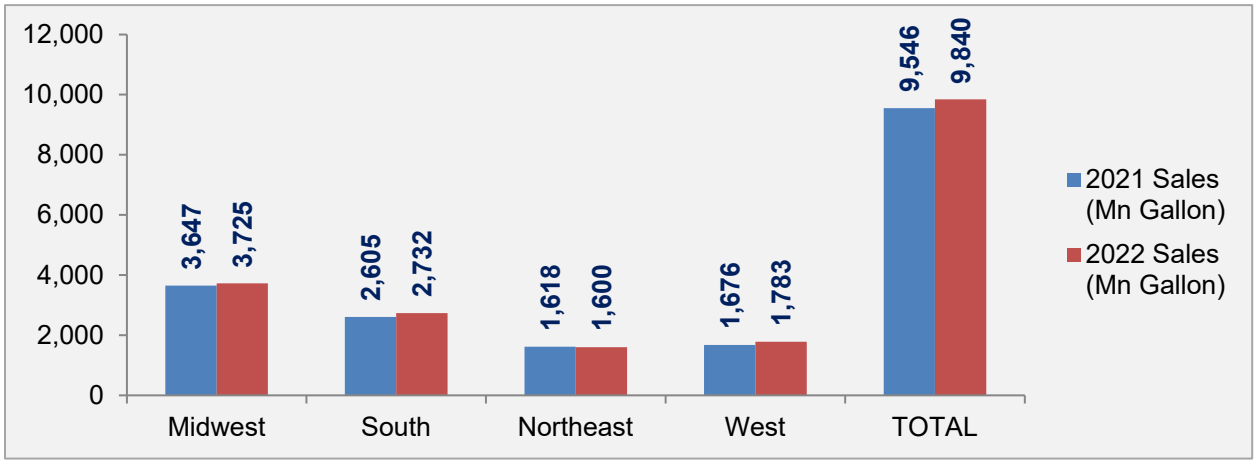
2022 U.S. retail propane sales

In 2022, U.S. retail odorized propane sales totaled 9.84 billion gallons, a 3.1% year-over-year increase from the 9.54 billion gallons sold in 2021. Primary energy consumption in the United States was 100.4 quadrillion British Thermal Units (BTUs) in 2022, a 3% increase from 2021. Higher sales in the residential segment and increased industrial activities post pandemic have played a major role in the overall growth in propane sales during 2022. Total sales for 2022 were 9.8% above the ten-year average of 8.96 billion gallons of odorized propane volumes per year.[1]

While propane sales increased across the South, West, and Midwest regions, the Northeast[2] region experienced a drop of 1.1% in propane sales in 2022. Focus on electrification, adoption of new technologies such as heat pumps, and decrease in average propane sales in the New England region are some of the key reasons for the decline in propane sales in the region in 2022.

As per the 2022 regional electricity outlook report, the electrification of heating and transportation end uses is estimated to more than double the capacity of the New England electricity grid over the next two decades. Electricity usage in Maine is expected to grow at 2.6% annually through 2031, while the growth could be 1% annually for Vermont, Rhode Island, New Hampshire, and Massachusetts. The New England Independent System Operator (ISO) anticipates powering 1.1 million air-source heat pumps by 2031, and more than 1.5 million electric vehicles, potentially accounting for more than 3,000 MW of demand.[3] Carrier, the leading heat pump supplier in North America, mentioned in its Annual Report that more than 30% of its 2021 residential heating sales in North America consisted of heat pumps and the share of heat pumps is likely to increase further going forward.[4]

Exhibit 1: 2022 U.S. retail propane sales by region



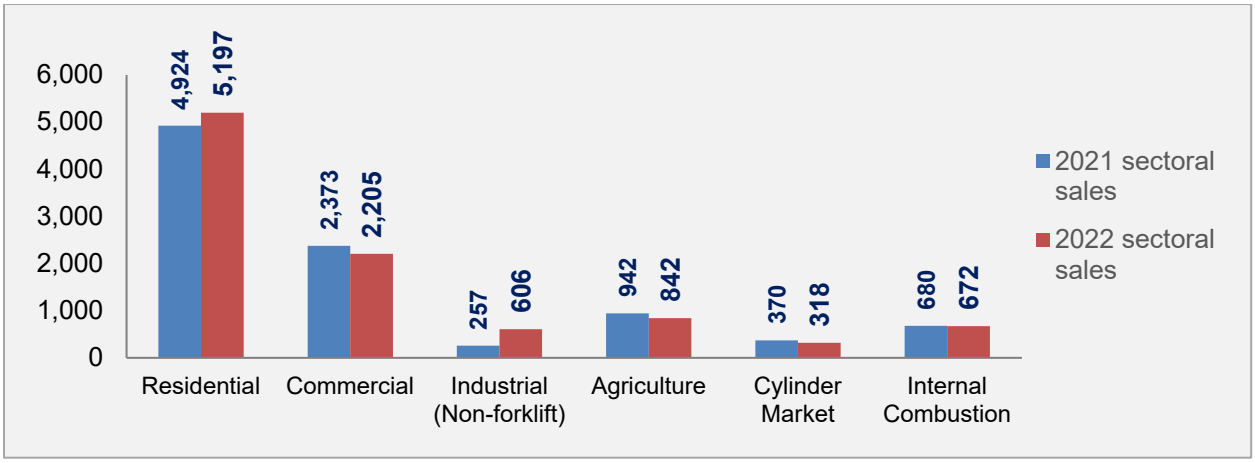
[1] *Odorized propane volumes are estimated based on PERC Assessment Collections.*
[2] *State listing by regions*
[3] *https://www.utilitydive.com/news/new-england-grid-capacity-iso-report-electrification/626725/*
[4] *https://ir.carrier.com/static-files/14ff9ec1-9df4-474e-8cff-feb247cbf456*

The residential sector accounted for 53% of propane sales in 2022 and experienced 6% growth compared to 2021. Propane sales in the residential sector increased by 273 million gallons in 2022, from 4.92 billion gallons in 2021 to 5.20 billion gallons in 2022. The industrial sector has the largest gain with 136% growth in propane sales in 2022 – volume-wise, propane sales in the industrial sector increased from 257 million gallons in 2021 to 606 million gallons in 2022. Two key factors contributed to this increase:

a. A few retailers have reclassified some of their commercial accounts to industrial accounts.
b. Some of the states such as California, have reported higher propane sales in industrial applications.

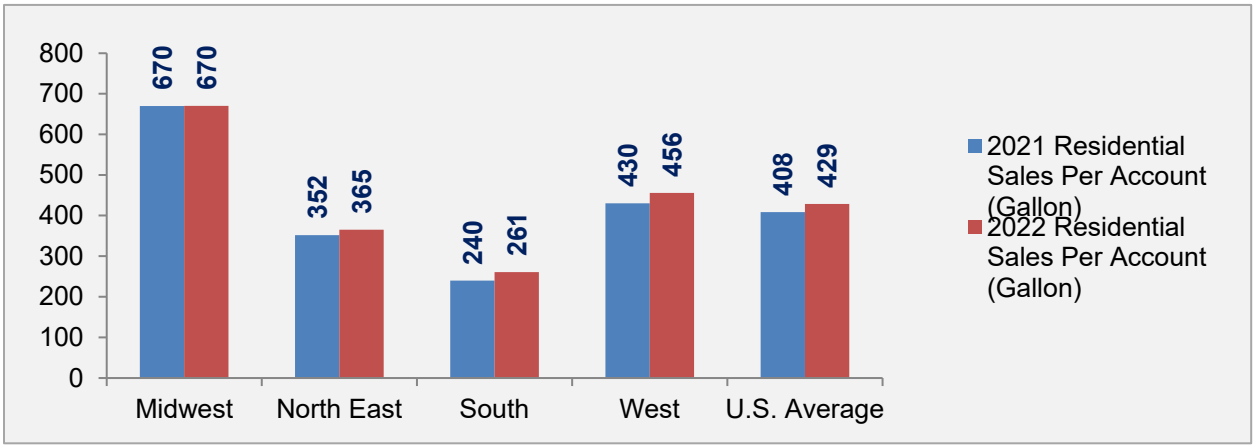
On the other hand, Commercial and Agriculture are the two most impacted sectors with a decline of 168 and 100 million gallons of propane sales respectively in 2022. The cylinder market also experienced a decline of 52 million gallons in 2022.

Exhibit 2: Break Up of U.S. 2021 vs 2022 Propane Sales Volume by End-use Sectors



In line with the increase in residential sales, the number of residential retail propane accounts also increased by 0.6%, from 12.05 million in 2021 to 12.12 million in 2022. Residential propane sales per account increased by 4.9% in 2022, from 408 gallons to 429 gallons. The increase was more prominent in the West and in the South regions – 5.9% and 8.6% respectively.

Exhibit 3: Change in residential sales per account from 2021 to 2022



North America's annual temperature in 2022 was 0.91°C (1.64°F) above the 1910-2000 average and tied with 2011 and 2019 as the 15th-warmest year on record. Data from the NOAA state climate report indicates that the average temperature in the contiguous United States reached 53.37 degrees Fahrenheit (11.87 degrees Celsius) in 2022. This was approximately 1.35 degrees Fahrenheit higher than the 20th century average. However, 2022 was a comparatively cooler year than 2021 with U.S. average heating degree days (HDD) increased by 7.8%, from 3,934 in 2021 to 4,240 in 2022 (source: EIA). Regionally, HDDs increased by 14% in the Midwest, 11% in the South, and 6% in both the West and the Northeast regions.

From a natural disaster perspective, 2022 had the third-highest number of billion-dollar events after 2020 and 2021. The U.S. underwent 18 separate billion-dollar weather and climate events in 2022. These weather events are year-round occurrences that seriously impact propane supplies to end customers. However, these events also boost propane sales for running generators for critical applications, laundry facilities, and preparing food for the displaced residents. These extreme events also played a role in the increase in retail propane sales in 2022.

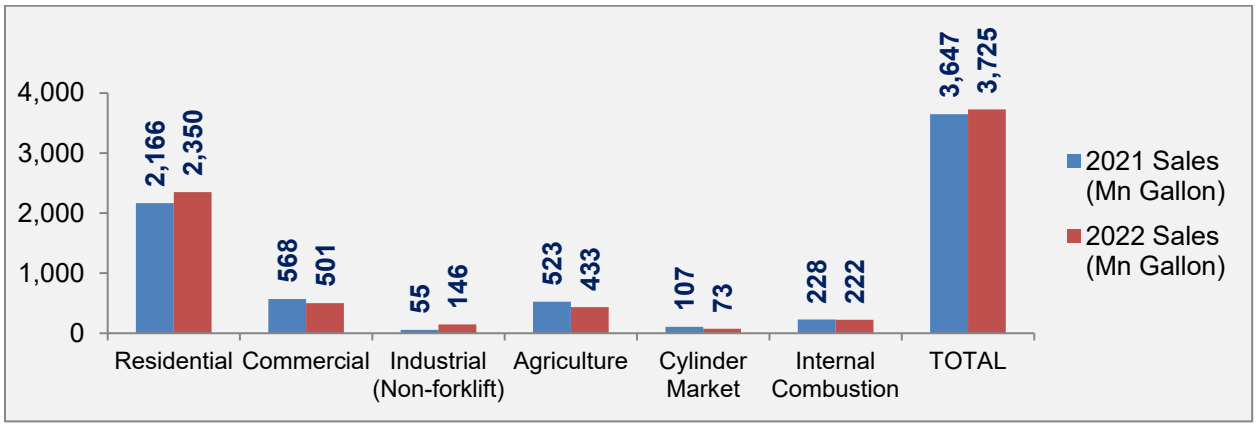
2022 U.S. retail propane sales by region

Midwest:

The Midwest region accounted for 37.9% of total U.S. propane sales in 2022, a decline from the 38.2% share of U.S. propane sales in 2021. Total propane sales in the region increased from 3.64 billion gallons in 2021 to 3.72 billion gallons in 2022.

- Residential sales totaled 2.35 billion gallons in 2022, up from 2.16 billion gallons in 2021. The residential contribution in Midwest propane sales increased from 59.4% to 63.1%.
- Annual HDDs in the Midwest increased by 14%, leading to an increase in propane demand for space heating.
- Agriculture sales totaled 433 million gallons, representing 11.6% of total propane sales in the Midwest. This represented a decline of 90 million gallons from 2021, primarily due to a decrease in grain drying demand due to the early maturity of the U.S. corn crop.

Exhibit 4: Propane Sales by Sector, Midwest

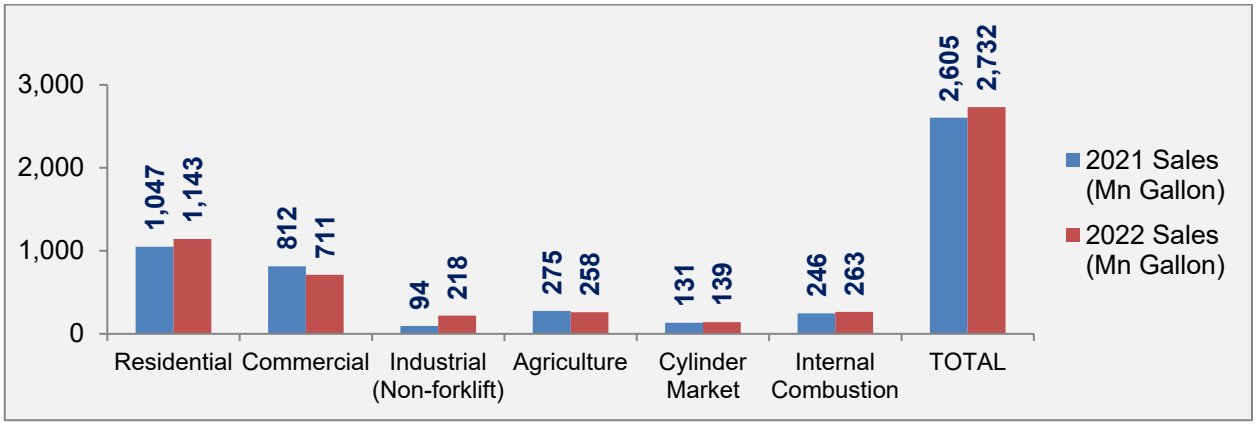


South:

The South region accounted for 27.8% of total U.S. propane sales in 2022, up from 27.3% share in 2021. Total propane sales in the region increased modestly, from 2.61 billion gallons in 2021 to 2.73 billion gallons in 2022.

- Residential propane sales increased by 9.2 on a year-on-year basis to reach a volume of 1,143 million gallons in 2022 compared to 1,047 million gallons in 2021.
- Industrial sales increase by more than two times to 218 million gallons in 2022 due to heightened industrial activities in the region.
- Commercial and Agriculture sectors experienced a decline of 101 million gallons and 17 million gallons respectively in 2022.

Exhibit 5: Propane Sales by Sector, South

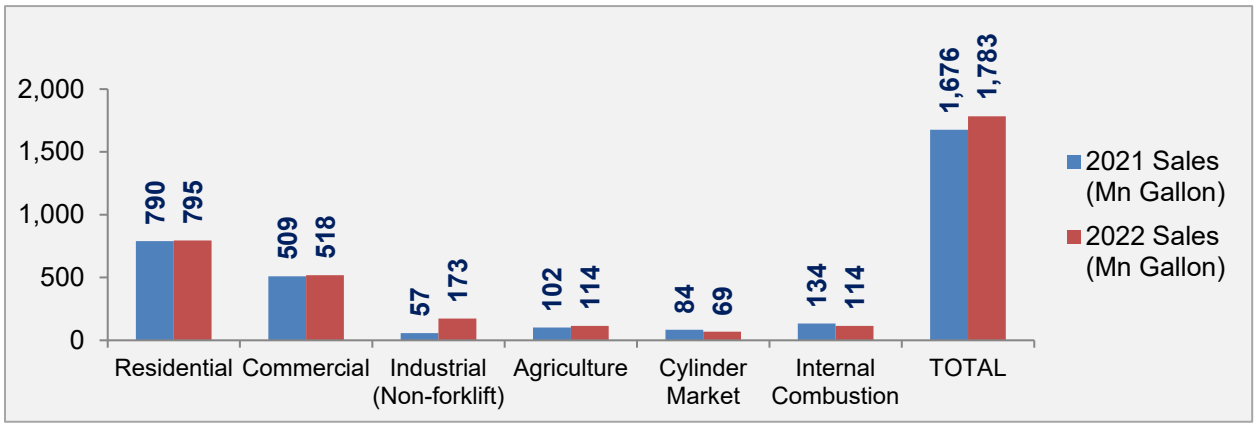


West:

West region accounted for 18.1% of U.S. propane sales in 2022, an increase of 0.5% in the market share. Propane sales in the region increased by 6.4%, from 1.68 billion gallons in 2021 to 1.78 billion gallons in 2022.

- Residential and Commercial sales increased marginally by 5 million gallons and 9 million gallons respectively in 2022.
- Industrial propane sales increased by almost 3 times to 173 million gallons in 2022 from 57 million gallons in 2021. Usage of propane has significantly increased for industrial heating in the region.
- Cylinder and Internal Combustion sector sales declined by 15 million gallons and 20 million gallons respectively – as per the leading retailers in the region, both the sectors are exploring usage of alternate fuels / electrification.

Exhibit 6: Propane Sales by Sector, West

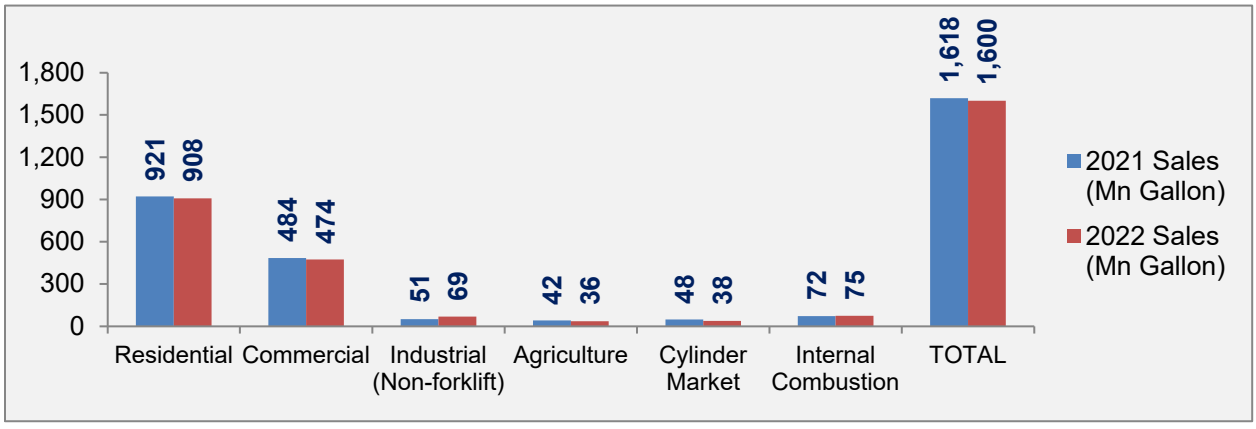


Northeast:

The Northeast region accounted for 16.3% of total U.S. propane sales in 2022 – the regions market share declined by 0.6% in 2022. Propane sales in the region were 1.6 billion gallons in 2022, a decrease of 18 million gallons over 2021.

- Propane sales in both Residential and Commercial sectors declined by 13 and 10 million gallons respectively in 2022.
- The decline in this region was primarily impacted by increased prices for propane, energy conservation measures and adoption of technologies such as heat pumps.
- Sales in Agriculture and Cylinder sectors have also experienced declines of 6 and 10 million gallons respectively.
- Industrial and Internal Combustion (IC) sales have increased marginally in 2022.

Exhibit 7: Propane Sales by Sector, Northeast



Top-ranked states by retail propane sales

In 2022, the top 10 states by total retail sales accounted for 46.5% of total U.S. propane sales, while the remaining 40 states and the District of Columbia totaled the remaining 53.5% of sales.

Exhibit 8: Top 10 states by total 2022 retail propane sales (millions of gallons)

State	Rank	2022 Propane Sales (Mn Gallon)	Share	Residential Sales Per Account (Gallon)	Commercial Sales Per Account (Gallon)
California	1	539	5.5%	334	2,447
Michigan	2	531	5.4%	645	2,287
Minnesota	3	501	5.1%	696	2,878
Texas	4	493	5.0%	289	2,175
Wisconsin	5	452	4.6%	597	2,230
Iowa	6	449	4.6%	881	2,568
New York	7	428	4.3%	391	1,714
Illinois	8	408	4.1%	902	3,366
Ohio	9	390	4.0%	481	2,273
North Carolina	10	382	3.9%	241	1,638
Other States		5,267	53.5%	379	1,824
Total U.S.		**9,840**		**429**	**1,947**

- **California** retained its lead position as the top-ranked state in total propane sales with 539 million gallons in sales in 2022. It was also the top-ranked state in commercial sales, with 154 million gallons for 2022. California ranked second in the industrial sector, material handling sector and internal combustion with total sales of 36 million gallons, 51 million gallons, and 58 million gallons respectively. California ranked third in the cylinder sales with total sales of 28 million gallons.
- **Michigan** was the second-ranked state by total sales in 2022, with 531 million gallons. Michigan was the top-ranked state for the residential market with 356 million gallons and ranked third in material handling and internal combustion with total sales of 41 million gallons and 46 million gallons respectively.
- **Minnesota** was the third-ranked state by total sales in 2022 with 501 million gallons and was the third-ranked state for the residential sector with 320 million gallons. Minnesota ranked second in Agriculture sales with total propane sales of 76 million gallons.
- **Texas** was the fourth-ranked state by total sales in 2022 and was ranked second in the commercial sector with 135 million gallons. Texas ranked first position in industrial sales with total sales of 60 million gallons.
- **Wisconsin** retained its market position to become the fifth-ranked state by total sales in 2022. Sales in 2022 were 452 million gallons. The state ranked second in the residential sector with 325 million gallons.

2022 U.S. retail propane sales by end-use sectors

The table below shows total U.S. propane retail sales, and the corresponding number of retail accounts and the average gallons sold per account. In 2022, the survey indicated about 12.13 million total residential accounts and about 2.49 million propane accounts in the other sectors.

Exhibit 9: Summary information of total U.S. 2022 retail propane sales by end-use sectors

Category	Residential	Commercial	Industrial (Non-forklift)	Agriculture	Cylinder Market	Internal Combustion	Total Sales
Propane Sold (Mn Gallons)	5,197	2,205	606	842	318	672	9,840
Total Accounts	12,126,215	1,132,665	262,507	315,526	491,760	291,868	14,620,541
Gallons Per Account	429	1,947	2,309	2,669	647	2,302	673
Sector share of total sales	53%	22%	6%	9%	3%	7%	100%

- The **residential** sector accounted for 53% of total sales, or 5.197 billion gallons. The sector averaged sales of 429 gallons per account.
- The **commercial** sector accounted for 22% of total sales, or 2.205 billion gallons. The sector averaged sales of 1,947 gallons per account.
- The **industrial (non-forklift)** sector accounted for 6% of total sales, or 606 million gallons. The sector averaged sales of 2,309 gallons per account.
- The **agriculture** sector accounted for 9% of total sales, or 842 million gallons. The sector averaged sales of 2,669 gallons per account.
- The **cylinder markets** sector accounted for 3% of total sales, or 318 million gallons. The sector averaged sales of 647 gallons per account.
- The **internal combustion** sector accounted for 7% of total sales, or 672 million gallons. The sector averaged sales of 2,302 gallons per account.

2022 U.S. retail propane sales

National retail propane sales

Exhibit 10: 2022 total U.S. retail propane accounts by sector

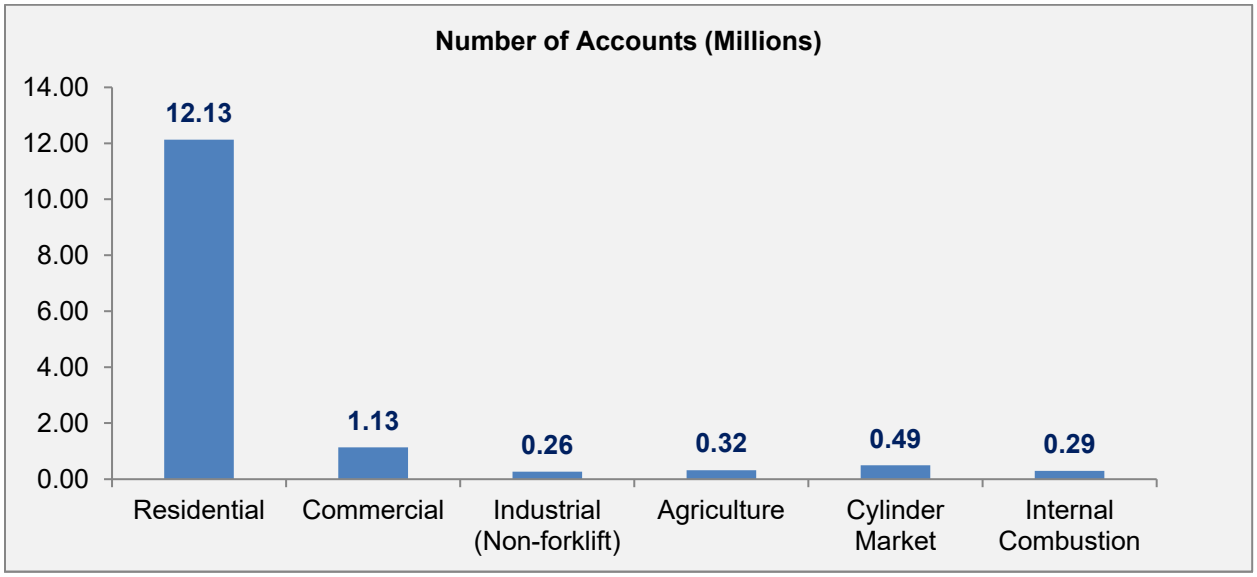


Exhibit 11: 2022 average U.S. retail propane gallon sales per account

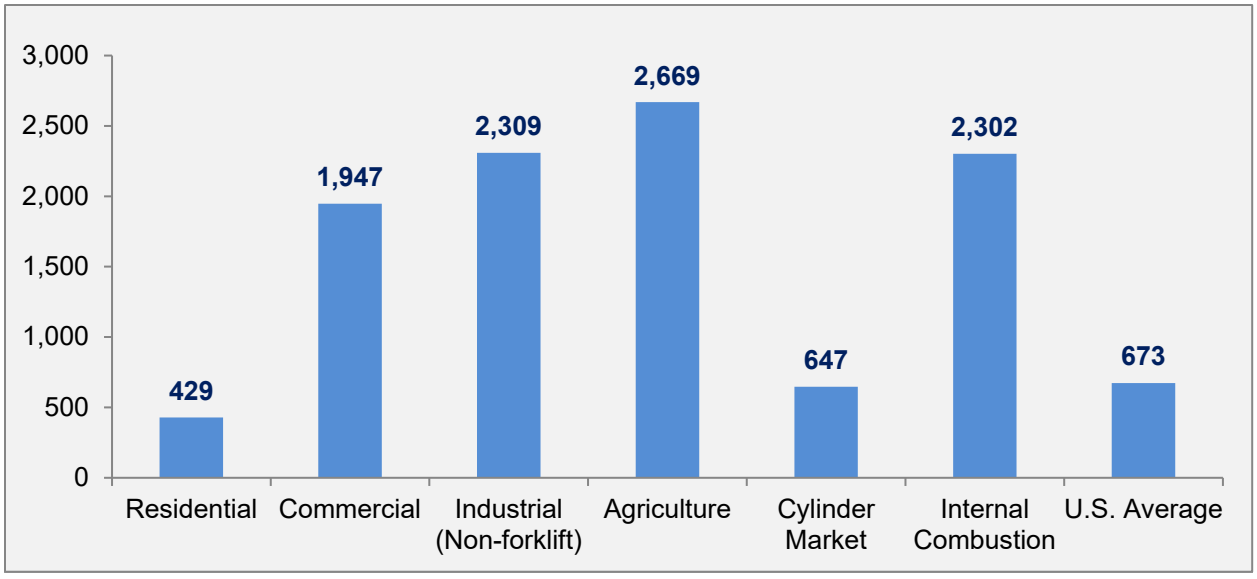


Exhibit 12: 2022 U.S. retail propane sales by census division and sector (millions of gallons)

Census Division	Residential	Commercial	Industrial (Non-forklift)	Agriculture	Cylinder Market	Internal Combustion	Total
East North Central	1,277	298	80	162	40	168	**2,025**
East South Central	260	112	24	64	13	43	**516**
Middle Atlantic	482	215	58	34	28	61	**878**
Mountain	469	223	84	27	30	37	**870**
New England	426	259	11	2	10	14	**722**
Pacific	328	295	89	86	39	77	**914**
South Atlantic	574	410	115	154	64	126	**1,443**
West North Central	1,073	203	67	272	32	52	**1,699**
West South Central	308	190	78	41	62	94	**773**
U.S. TOTAL	**5,197**	**2,205**	**606**	**842**	**318**	**672**	**9,840**

Exhibit 13: 2022 U.S. retail propane sales by PADD and sector (millions of gallons)

PADD	Residential	Commercial	Industrial (Non-forklift)	Agriculture	Cylinder Market	Internal Combustion	Total
PADD1	1,483	884	184	190	101	201	**3,043**
PADD2	2,595	588	168	460	86	260	**4,157**
PADD3	374	236	90	79	66	100	**945**
PADD4	350	145	47	21	17	20	**600**
PADD5	395	352	117	92	48	91	**1,095**
U.S. TOTAL	**5,197**	**2,205**	**606**	**842**	**318**	**672**	**9,840**

Exhibit 14: Share of 2022 total U.S. retail propane sales by sector

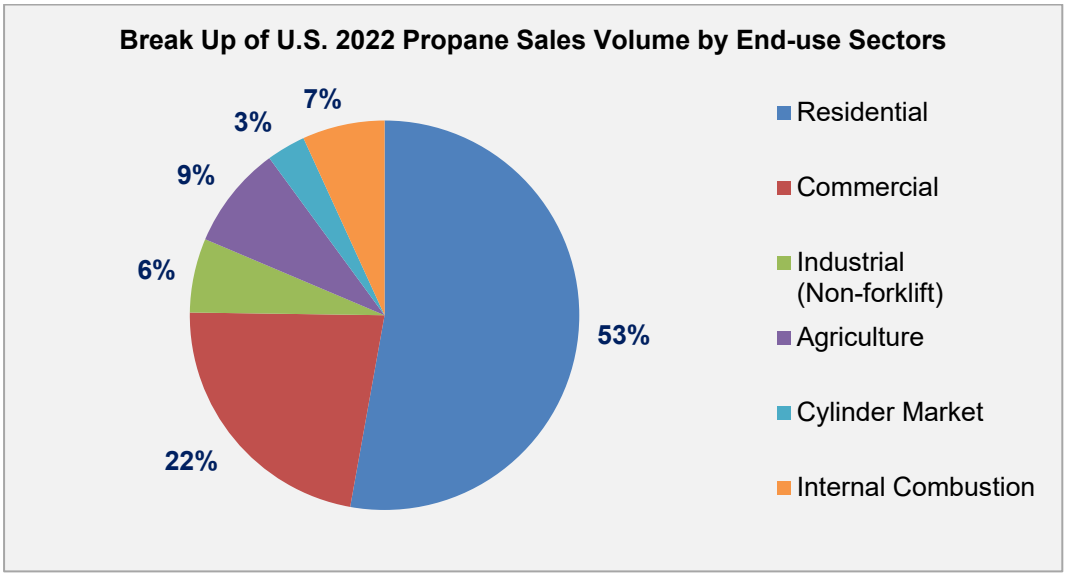


Exhibit 15: Share of 2022 total U.S. retail propane sales by census division

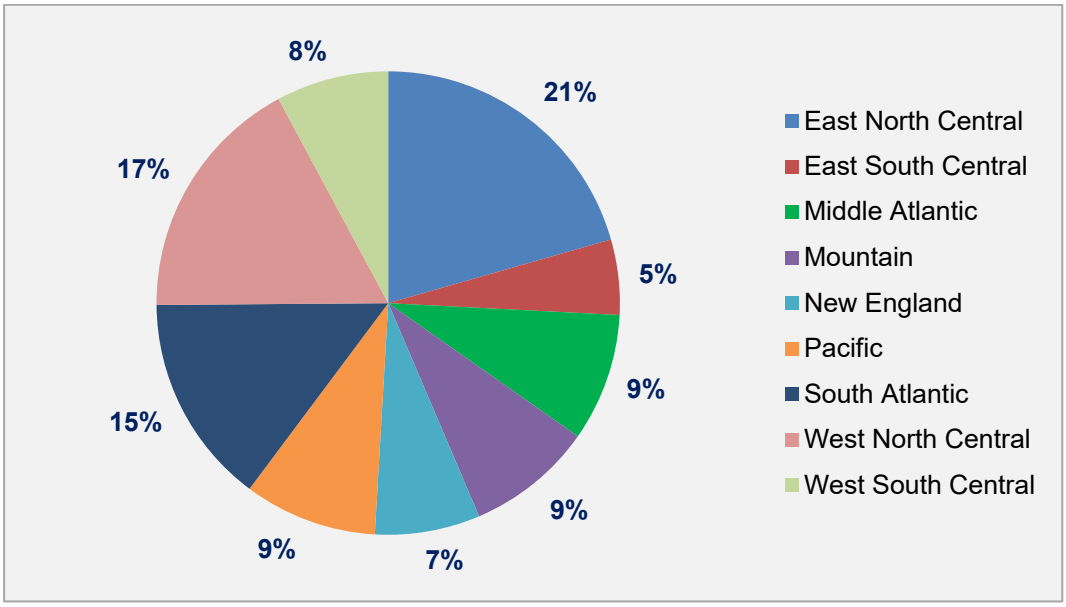
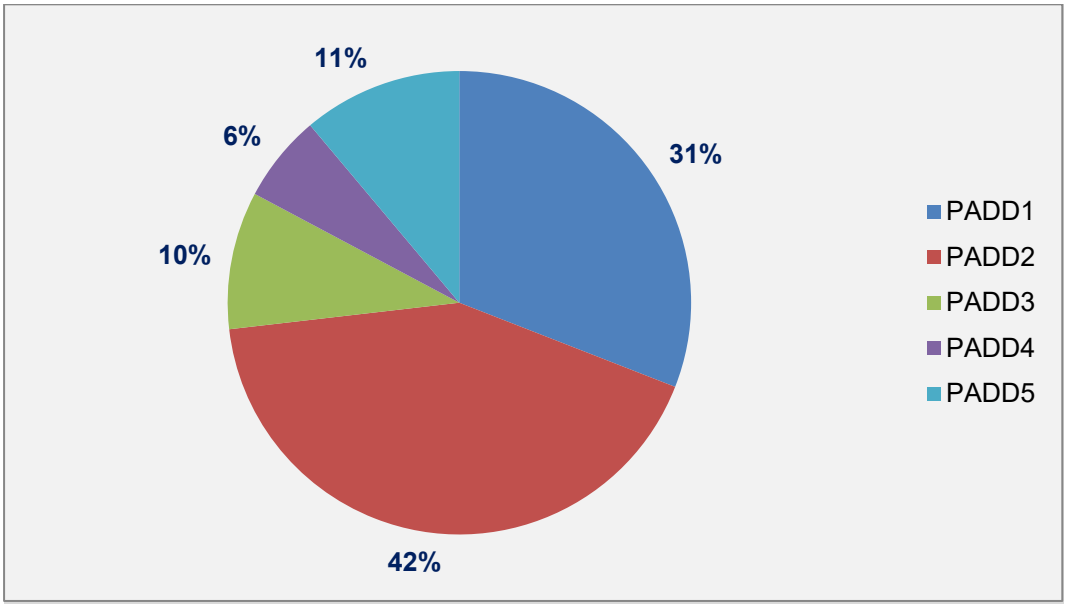


Exhibit 16: Share of 2022 total U.S. retail propane sales by PADD



State rankings by retail propane sales metrics

Exhibit 17: Top 10 States: 2022 residential and commercial propane sales

State	2022 Residential & Commercial Propane Sales (Mn Gallons)	Share
Michigan	433	5.9%
Minnesota	391	5.3%
Wisconsin	385	5.2%
California	366	4.9%
New York	365	4.9%
Iowa	311	4.2%
Illinois	307	4.2%
Texas	298	4.0%
Pennsylvania	283	3.8%
Ohio	280	3.8%
Other States	3,982	53.8%
U.S. TOTAL	**7,401**	

Exhibit 18: 2022 state rankings: retail propane sales (millions of gallons)

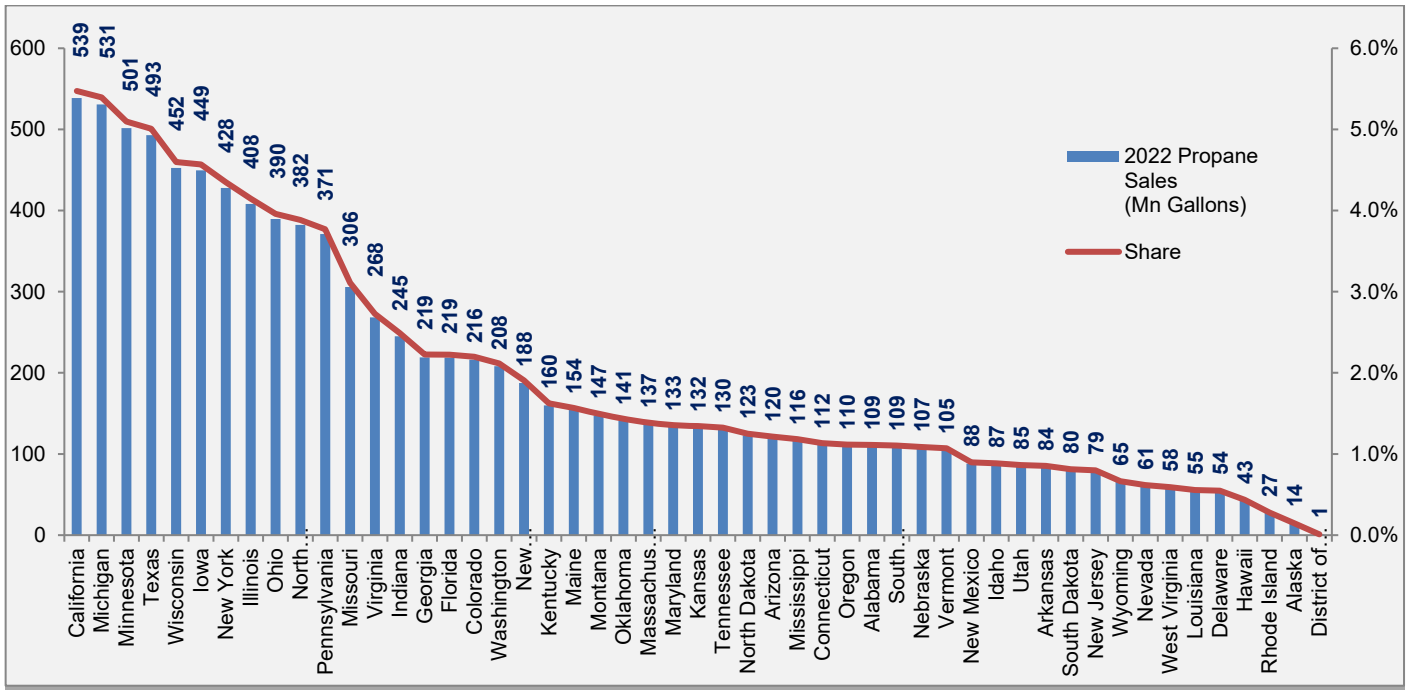


Exhibit 19: Total retail propane sales by states; alphabetical

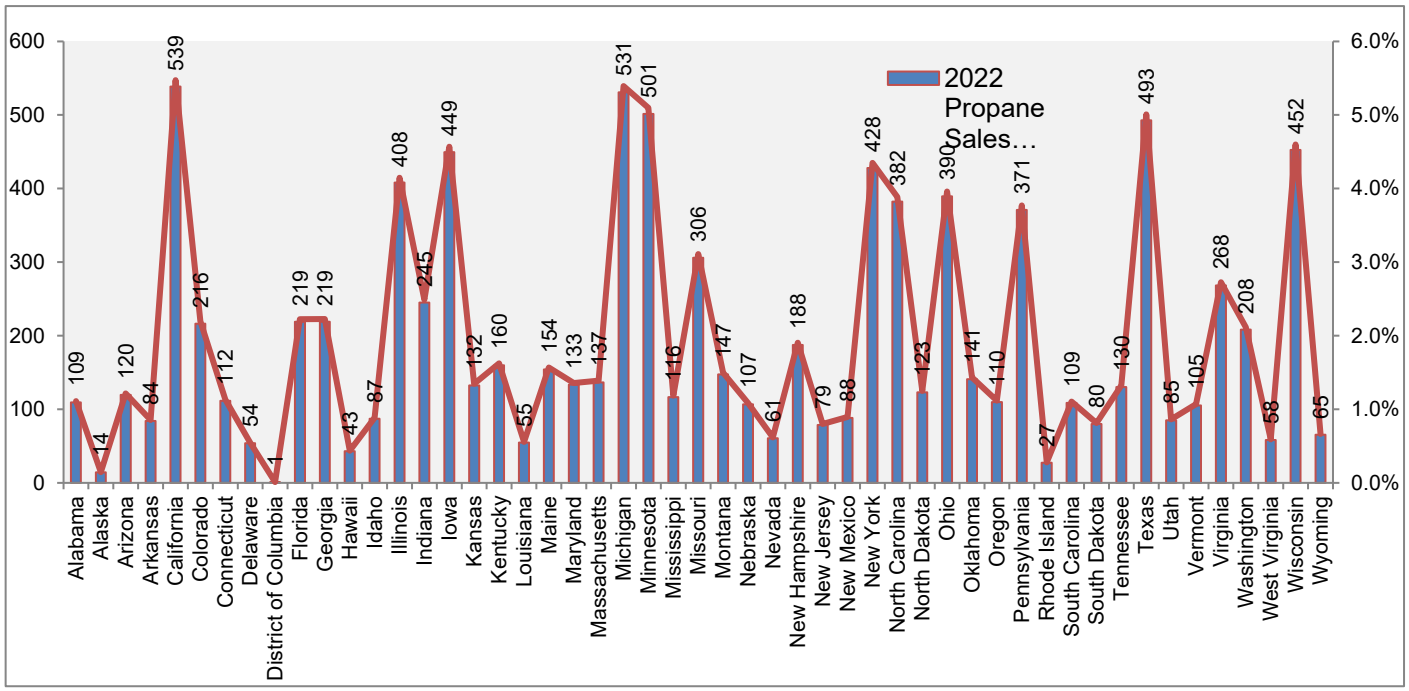


Exhibit 20: 2022 state rankings: retail propane gallons per account by state

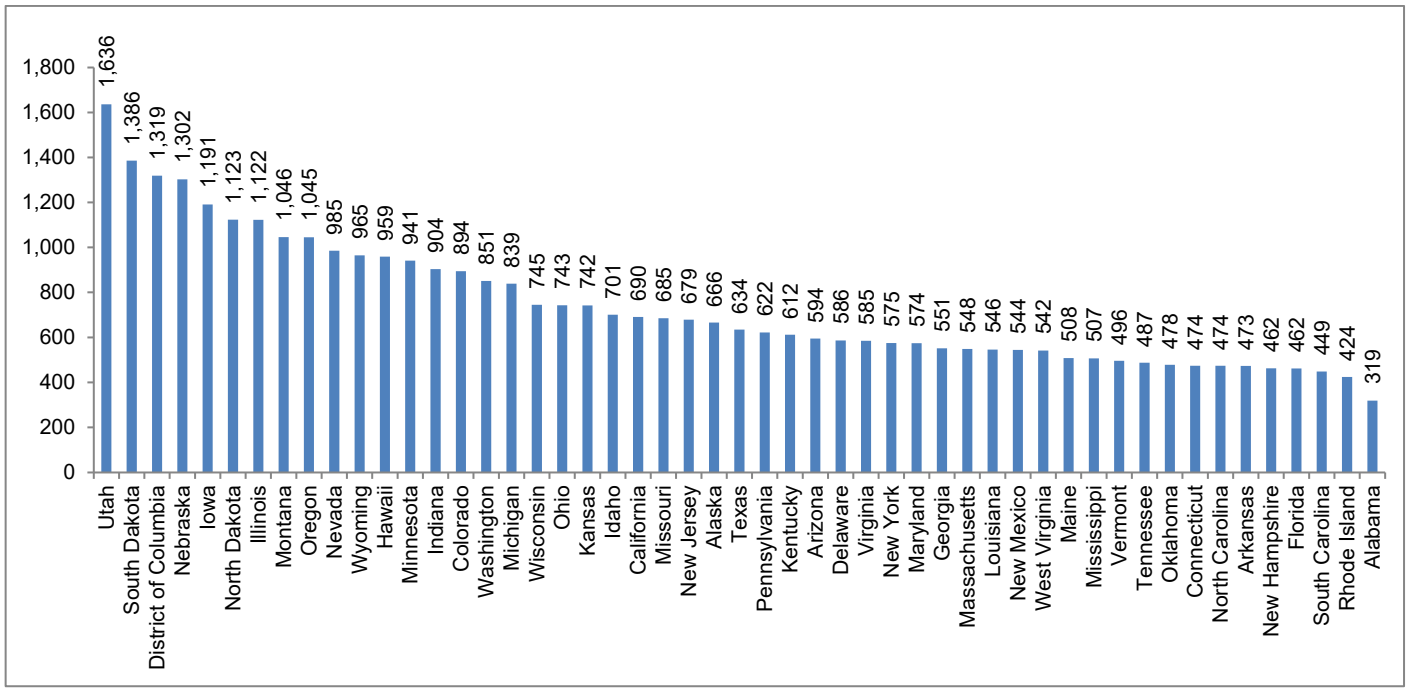


Exhibit 21: 2022 U.S. retail propane gallons per residential account by state

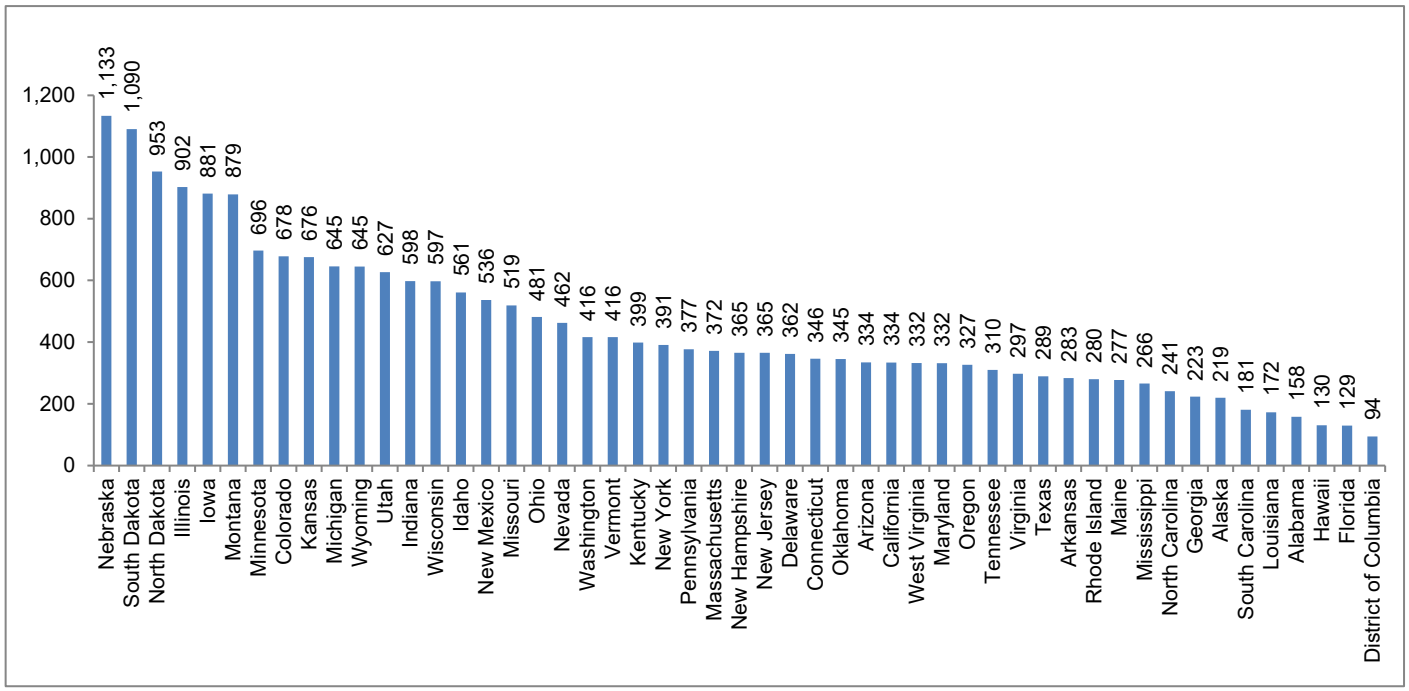
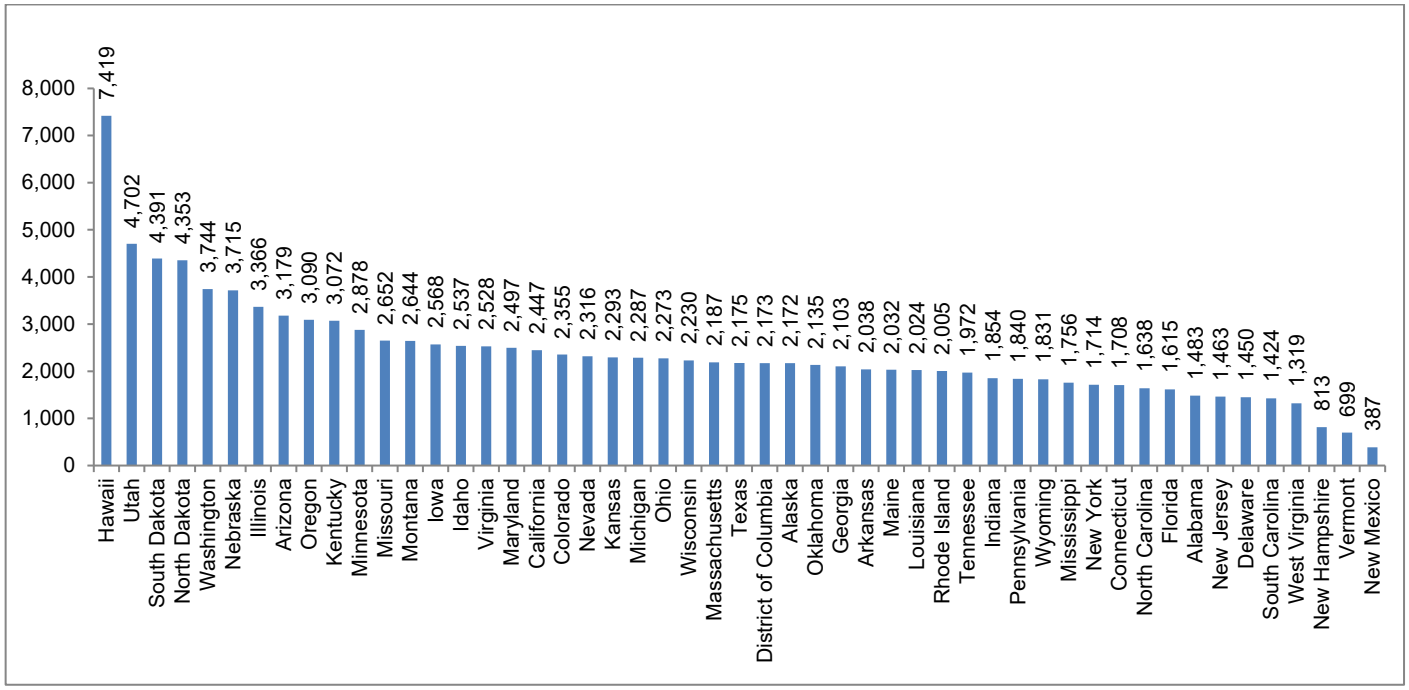


Exhibit 22: 2022 U.S. retail propane gallons per commercial account by state



Detailed state level information

Exhibit 23: 2022 U.S. retail propane sales summary by state and sector (millions of gallons)

State	Residential	Commercial	Industrial (Non-forklift)	Agriculture	Cylinder Market	Internal Combustion	Total Sales
Alabama	47	26	7	17	3	9	**109**
Alaska	4	9	1	0	1	0	**15**
Arizona	46	36	17	4	7	10	**120**
Arkansas	45	13	5	11	3	7	**84**
California	212	154	36	51	28	58	**539**
Colorado	122	49	17	6	10	12	**216**
Connecticut	73	30	2	1	1	5	**112**
Delaware	30	9	4	6	1	4	**54**
District of Columbia	0	0	0	0	0	1	**1**
Florida	47	88	31	6	19	28	**219**
Georgia	75	55	15	28	7	39	**219**
Hawaii	5	35	1	0	1	1	**43**
Idaho	64	16	1	3	1	2	**87**
Illinois	264	44	11	45	9	35	**408**
Indiana	125	44	16	30	7	23	**245**
Iowa	283	28	5	116	7	10	**449**
Kansas	88	17	6	5	8	8	**132**
Kentucky	90	32	7	17	3	11	**160**
Louisiana	14	15	5	8	5	8	**55**
Maine	72	76	3	0	1	2	**154**
Maryland	69	36	10	8	4	6	**133**
Massachusetts	83	42	2	1	4	5	**137**
Michigan	356	77	20	20	12	46	**531**
Minnesota	320	71	17	76	5	12	**501**
Mississippi	54	26	4	24	3	5	**116**
Missouri	208	46	16	12	7	17	**306**
Montana	107	29	2	7	2	0	**147**
Nebraska	61	15	3	22	3	3	**107**
Nevada	21	21	11	1	3	4	**61**
New Hampshire	117	65	3	0	2	1	**188**
New Jersey	34	16	5	2	6	16	**79**
New Mexico	51	21	9	1	3	3	**88**
New York	254	111	29	8	10	16	**428**
North Carolina	168	91	21	62	15	25	**382**
North Dakota	67	18	18	17	2	1	**123**
Ohio	208	72	20	37	9	44	**390**
Oklahoma	86	27	7	4	6	11	**141**
Oregon	24	44	21	10	3	8	**110**
Pennsylvania	194	89	24	25	11	28	**371**
Rhode Island	16	7	1	0	1	2	**27**
South Carolina	37	32	9	8	9	14	**109**
South Dakota	47	7	1	23	0	2	**80**
Tennessee	69	28	7	5	4	17	**130**
Texas	163	135	61	18	48	68	**493**
Utah	21	38	14	4	3	5	**85**
Vermont	64	38	1	1	1	0	**105**
Virginia	119	86	21	27	8	7	**268**
Washington	83	53	30	26	6	10	**208**
West Virginia	30	13	3	8	2	2	**58**
Wisconsin	325	61	13	30	3	20	**452**
Wyoming	35	14	13	1	1	1	**65**
U.S. TOTAL	**5,197**	**2,205**	**606**	**842**	**318**	**672**	**9,840**

Exhibit 24: 2022 U.S. retail propane accounts by state and sector (number of accounts)

State	Residential	Commercial	Industrial (Non-forklift)	Agriculture	Cylinder Market	Internal Combustion	Total Accounts
Alabama	299,631	17,289	2,103	7,066	13,013	3,827	**342,929**
Alaska	16,030	3,942	441	16	599	479	**21,507**
Arizona	136,424	11,302	40,181	3,995	4,259	4,907	**201,068**
Arkansas	160,432	6,229	2,379	2,946	3,128	2,601	**177,715**
California	633,409	62,963	13,573	38,154	14,897	17,086	**780,082**
Colorado	179,487	20,946	6,152	5,538	23,103	6,788	**242,014**
Connecticut	211,428	17,575	545	328	3,776	1,583	**235,235**
Delaware	82,206	6,527	509	1,384	942	421	**91,989**
District of Columbia	49	62	89	3	538	83	**824**
Florida	363,594	54,316	19,754	2,218	16,938	17,086	**473,906**
Georgia	337,675	26,009	5,462	4,822	12,328	10,984	**397,280**
Hawaii	39,254	4,731	407	6	137	246	**44,781**
Idaho	114,787	6,220	648	877	988	783	**124,303**
Illinois	291,266	13,195	8,875	18,694	11,516	20,021	**363,567**
Indiana	209,096	23,499	6,922	14,052	10,136	7,395	**271,100**
Iowa	320,640	10,929	2,404	27,935	10,786	4,683	**377,377**
Kansas	129,872	7,490	11,132	2,827	24,202	2,886	**178,409**
Kentucky	226,649	10,494	3,261	6,922	9,626	4,485	**261,437**
Louisiana	80,562	7,503	1,939	1,737	4,308	4,164	**100,213**
Maine	261,330	37,564	660	509	2,148	1,373	**303,584**
Maryland	208,052	14,593	2,383	2,644	3,099	1,660	**232,431**
Massachusetts	222,424	19,110	1,020	339	3,507	2,723	**249,123**
Michigan	552,328	33,598	9,978	7,869	12,782	16,340	**632,895**
Minnesota	459,951	24,502	6,056	25,292	11,214	5,885	**532,900**
Mississippi	201,866	14,885	1,564	4,278	4,956	2,338	**229,887**
Missouri	400,130	17,472	6,992	2,973	12,329	6,726	**446,622**
Montana	122,341	10,814	1,026	2,398	3,773	562	**140,914**
Nebraska	53,848	4,156	1,414	10,175	10,771	1,644	**82,008**
Nevada	46,363	9,005	1,180	314	2,429	2,264	**61,555**
New Hampshire	320,366	79,552	795	434	1,017	3,467	**405,631**
New Jersey	92,529	10,919	3,062	525	1,818	6,926	**115,779**
New Mexico	94,668	54,682	2,227	549	8,922	1,046	**162,094**
New York	650,650	64,971	5,586	3,748	10,207	9,388	**744,550**
North Carolina	698,822	55,784	6,803	13,873	22,155	8,821	**806,258**
North Dakota	70,374	4,231	8,332	5,190	20,480	824	**109,431**
Ohio	431,138	31,899	9,960	16,804	15,227	19,286	**524,314**
Oklahoma	248,017	12,519	5,159	10,861	11,330	6,883	**294,769**
Oregon	74,617	14,283	6,001	4,587	2,402	3,251	**105,141**
Pennsylvania	516,108	48,133	6,290	7,221	10,706	8,488	**596,946**
Rhode Island	58,974	3,732	488	53	532	715	**64,494**
South Carolina	202,742	22,214	2,029	1,231	9,974	4,008	**242,198**
South Dakota	43,180	1,577	336	6,492	5,361	720	**57,666**
Tennessee	222,858	14,028	3,326	4,610	7,551	14,936	**267,309**
Texas	563,857	62,227	15,758	4,674	101,409	28,761	**776,686**
Utah	34,147	8,040	2,683	661	3,798	2,559	**51,888**
Vermont	154,640	54,700	634	997	907	189	**212,067**
Virginia	399,239	33,860	4,566	7,802	8,341	4,797	**458,605**
Washington	200,285	14,234	8,742	14,349	2,906	4,121	**244,637**
West Virginia	89,654	9,483	1,377	1,460	3,822	1,586	**107,382**
Wisconsin	543,505	27,219	7,611	12,395	8,285	8,308	**607,323**
Wyoming	54,721	7,458	1,693	699	2,382	765	**67,718**
U.S. TOTAL	**12,126,215**	**1,132,665**	**262,507**	**315,526**	**491,760**	**291,868**	**14,620,541**

Exhibit 25: 2022 U.S. retail propane sales per account by state and sector (gallons per account)

State	Residential	Commercial	Industrial (Non-forklift)	Agriculture	Cylinder Market	Internal Combustion	Retail Sales Per Account
Alabama	157	1,504	3,329	2,406	231	2,352	**318**
Alaska	250	2,283	2,268	0	1,669	0	**697**
Arizona	337	3,185	423	1,001	1,644	2,038	**597**
Arkansas	280	2,087	2,102	3,734	959	2,691	**473**
California	335	2,446	2,652	1,337	1,880	3,395	**691**
Colorado	680	2,339	2,763	1,083	433	1,768	**893**
Connecticut	345	1,707	3,670	3,049	265	3,159	**476**
Delaware	365	1,379	7,859	4,335	1,062	9,501	**587**
District of Columbia	0	0	0	0	0	12,048	**1,214**
Florida	129	1,620	1,569	2,705	1,122	1,639	**462**
Georgia	222	2,115	2,746	5,807	568	3,551	**551**
Hawaii	127	7,398	2,457	0	7,299	4,065	**960**
Idaho	558	2,572	1,543	3,421	1,012	2,554	**700**
Illinois	906	3,335	1,239	2,407	782	1,748	**1,122**
Indiana	598	1,872	2,311	2,135	691	3,110	**904**
Iowa	883	2,562	2,080	4,152	649	2,135	**1,190**
Kansas	678	2,270	539	1,769	331	2,772	**740**
Kentucky	397	3,049	2,147	2,456	312	2,453	**612**
Louisiana	174	1,999	2,579	4,606	1,161	1,921	**549**
Maine	276	2,023	4,545	0	466	1,457	**507**
Maryland	332	2,467	4,196	3,026	1,291	3,614	**572**
Massachusetts	373	2,198	1,961	2,950	1,141	1,836	**550**
Michigan	645	2,292	2,004	2,542	939	2,815	**839**
Minnesota	696	2,898	2,807	3,005	446	2,039	**940**
Mississippi	268	1,747	2,558	5,610	605	2,139	**505**
Missouri	520	2,633	2,288	4,036	568	2,528	**685**
Montana	875	2,682	1,949	2,919	530	0	**1,043**
Nebraska	1,133	3,609	2,122	2,162	279	1,825	**1,305**
Nevada	453	2,332	9,322	3,185	1,235	1,767	**991**
New Hampshire	365	817	3,774	0	1,967	288	**463**
New Jersey	367	1,465	1,633	3,810	3,300	2,310	**682**
New Mexico	539	384	4,041	1,821	336	2,868	**543**
New York	390	1,708	5,192	2,134	980	1,704	**575**
North Carolina	240	1,631	3,087	4,469	677	2,834	**474**
North Dakota	952	4,254	2,160	3,276	98	1,214	**1,124**
Ohio	482	2,257	2,008	2,202	591	2,281	**744**
Oklahoma	347	2,157	1,357	368	530	1,598	**478**
Oregon	322	3,081	3,499	2,180	1,249	2,461	**1,046**
Pennsylvania	376	1,849	3,816	3,462	1,027	3,299	**621**
Rhode Island	271	1,876	2,049	0	1,880	2,797	**419**
South Carolina	182	1,441	4,436	6,499	902	3,493	**450**
South Dakota	1,088	4,439	2,976	3,543	0	2,778	**1,387**
Tennessee	310	1,996	2,105	1,085	530	1,138	**486**
Texas	289	2,169	3,871	3,851	473	2,364	**635**
Utah	615	4,726	5,218	6,051	790	1,954	**1,638**
Vermont	414	695	1,577	1,003	1,103	0	**495**
Virginia	298	2,540	4,599	3,461	959	1,459	**584**
Washington	414	3,723	3,432	1,812	2,065	2,427	**850**
West Virginia	335	1,371	2,179	5,479	523	1,261	**540**
Wisconsin	598	2,241	1,708	2,420	362	2,407	**744**
Wyoming	640	1,877	7,679	1,431	420	1,307	**960**
U.S. Total	**429**	**1,947**	**2,309**	**2,669**	**647**	**2,302**	**673**

Exhibit 26: 2018-2022 U.S. retail propane sales summary by state (millions of gallons)

State	2018	2019	2020	2021	2022
Alabama	105	112	111	112	109
Alaska	14	15	14	15	15
Arizona	102	118	109	115	120
Arkansas	91	97	89	88	84
California	521	556	519	546	539
Colorado	187	215	193	196	216
Connecticut	133	132	126	128	112
Delaware	53	53	47	50	54
District of Columbia	0	0	0	1	1
Florida	217	213	216	225	219
Georgia	218	210	207	205	219
Hawaii	35	40	37	46	43
Idaho	67	81	78	77	87
Illinois	386	505	486	492	408
Indiana	233	259	245	232	245
Iowa	465	544	467	409	449
Kansas	123	141	130	123	132
Kentucky	105	141	108	117	160
Louisiana	50	52	57	56	55
Maine	167	166	149	154	154
Maryland	127	139	132	136	133
Massachusetts	139	154	143	141	137
Michigan	567	587	535	522	531
Minnesota	498	559	512	484	501
Mississippi	110	115	106	116	116
Missouri	289	309	283	276	306
Montana	105	129	119	116	147
Nebraska	106	124	113	108	107
Nevada	48	53	50	54	61
New Hampshire	186	182	165	165	188
New Jersey	83	81	78	83	79
New Mexico	81	78	75	81	88
New York	418	432	417	437	428
North Carolina	393	364	372	375	382
North Dakota	121	164	131	123	123
Ohio	313	353	332	346	390
Oklahoma	138	148	141	141	141
Oregon	92	98	87	98	110
Pennsylvania	380	402	357	373	371
Rhode Island	32	29	27	28	27
South Carolina	106	96	99	107	109
South Dakota	83	98	80	81	80
Tennessee	119	127	123	123	130
Texas	386	449	432	443	493
Utah	56	63	59	64	85
Vermont	119	113	107	109	105
Virginia	251	245	243	258	268
Washington	194	202	188	207	208
West Virginia	39	53	52	52	58
Wisconsin	404	488	435	452	452
Wyoming	58	65	59	60	65
U.S. TOTAL	**9,313**	**10,149**	**9,440**	**9,546**	**9,840**

Exhibit 27: Annual heating degree days[5] (HDDs) by state: 2018 to 2022

State	2018	2019	2020	2021	2022	Five Year Average (2018 to 2022)	Percent Change from 2021 to 2022	Percent Change from Five Year Average to 2022
Alabama	2,510	2,222	2,129	2,255	**2,581**	2,339	14.5%	10.3%
Alaska	9,632	8,998	10,781	10,977	**10,035**	10,085	-8.6%	-0.5%
Arizona	1,907	2,000	2,079	1,985	**2,304**	2,055	16.1%	12.1%
Arkansas	3,571	3,345	3,130	3,106	**3,469**	3,324	11.7%	4.4%
California	2,165	2,535	2,374	2,567	**2,521**	2,432	-1.8%	3.6%
Colorado	6,640	7,142	6,607	6,533	**7,133**	6,811	9.2%	4.7%
Connecticut	5,865	5,913	5,315	5,312	**5,546**	5,590	4.4%	-0.8%
Delaware	4,537	4,212	3,862	4,121	**4,615**	4,269	12.0%	8.1%
District of Columbia	3,842	3,571	3,317	3,435	**3,736**	3,580	8.8%	4.4%
Florida	498	413	425	413	**506**	451	22.5%	12.2%
Georgia	2,644	2,346	2,366	2,371	**2,630**	2,471	10.9%	6.4%
Hawaii	1	0	2	13	**0**	3	-100.0%	-100.0%
Idaho	6,650	6,927	6,612	6,575	**7,531**	6,859	14.5%	9.8%
Illinois	6,244	6,321	5,749	5,590	**6,233**	6,027	11.5%	3.4%
Indiana	5,786	5,690	5,325	5,209	**5,704**	5,543	9.5%	2.9%
Iowa	7,303	7,440	6,720	6,327	**7,235**	7,005	14.4%	3.3%
Kansas	5,235	5,326	4,810	4,579	**5,218**	5,034	14.0%	3.7%
Kentucky	4,414	4,095	4,001	4,092	**4,472**	4,215	9.3%	6.1%
Louisiana	1,697	1,617	1,393	1,543	**1,880**	1,626	21.8%	15.6%
Maine	7,972	8,113	7,266	7,082	**7,315**	7,550	3.3%	-3.1%
Maryland	4,626	4,347	4,114	4,109	**4,539**	4,347	10.5%	4.4%
Massachusetts	6,125	6,231	5,626	5,591	**5,837**	5,882	4.4%	-0.8%
Michigan	6,750	6,836	6,336	6,109	**6,787**	6,564	11.1%	3.4%
Minnesota	8,852	9,026	8,164	7,781	**9,086**	8,582	16.8%	5.9%
Mississippi	2,387	2,231	2,014	2,111	**2,374**	2,223	12.5%	6.8%
Missouri	5,333	5,247	4,874	4,651	**5,288**	5,079	13.7%	4.1%
Montana	8,261	8,650	7,865	7,847	**8,507**	8,226	8.4%	3.4%
Nebraska	6,837	6,787	6,039	5,690	**6,452**	6,361	13.4%	1.4%
Nevada	3,196	3,531	3,682	3,620	**3,844**	3,575	6.2%	7.5%
New Hampshire	7,287	7,463	6,737	6,529	**6,902**	6,984	5.7%	-1.2%
New Jersey	5,332	5,163	4,713	4,760	**5,123**	5,018	7.6%	2.1%
New Mexico	4,462	4,502	4,362	4,294	**4,853**	4,495	13.0%	8.0%
New York	5,789	5,827	5,240	5,605	**5,942**	5,681	6.0%	4.6%
North Carolina	3,454	3,165	3,005	3,050	**3,267**	3,188	7.1%	2.5%
North Dakota	9,706	10,074	8,799	8,207	**9,610**	9,279	17.1%	3.6%
Ohio	5,673	5,478	5,230	5,119	**5,662**	5,432	10.6%	4.2%
Oklahoma	3,891	3,806	3,574	3,412	**3,863**	3,709	13.2%	4.1%
Oregon	5,267	5,439	5,155	5,351	**5,527**	5,348	3.3%	3.4%
Pennsylvania	5,788	5,541	5,174	5,162	**5,723**	5,478	10.9%	4.5%
Rhode Island	5,822	5,881	5,258	5,233	**5,488**	5,536	4.9%	-0.9%
South Carolina	2,700	2,420	2,361	2,398	**2,506**	2,477	4.5%	1.2%
South Dakota	8,171	8,312	7,270	6,888	**7,882**	7,705	14.4%	2.3%
Tennessee	3,977	3,648	3,618	3,549	**3,878**	3,734	9.3%	3.9%
Texas	1,961	1,880	1,533	1,610	**2,031**	1,803	26.1%	12.6%
Utah	6,288	6,782	6,279	6,542	**7,191**	6,616	9.9%	8.7%
Vermont	7,955	8,138	7,454	7,142	**7,452**	7,628	4.3%	-2.3%
Virginia	4,262	3,929	3,724	3,879	**4,238**	4,006	9.3%	5.8%
Washington	5,413	5,536	5,338	5,752	**6,055**	5,619	5.3%	7.8%
West Virginia	5,073	4,679	4,683	4,755	**5,122**	4,862	7.7%	5.3%
Wisconsin	7,673	7,951	7,180	6,781	**7,676**	7,452	13.2%	3.0%
Wyoming	7,886	8,508	7,787	7,703	**8,352**	8,047	8.4%	3.8%

[5] *A heating degree day (HDD) is the difference between 65 degrees Fahrenheit and the daily mean temperature at that location. It is primarily a measure used to estimate heating requirements.*

Renewable propane sales

In 2022, Propane marketers reported retail sales of nearly 50 million gallons of renewable propane and renewable propane blends, resulting in a CO_2 equivalent emissions reduction of between 15,537[6] and 24,276[7] metric tons over conventional propane.

Non-odorized propane sales information

Propane can be used in a variety of manners within the petrochemical and refining sectors. The below table shows 2022 non-odorized propane sales in the U.S. for the petrochemical sector only. Within the petrochemical sector, propane is used as a feedstock in steam cracking facilities and Propane Dehydrogenation (PDH) facilities. In 2022, sales to the petrochemical sector totaled 4.16 billion gallons of propane, roughly 42.3% of total U.S. retail propane sales for the year.

In 2022, total propane sales to ethylene plants in Texas, Louisiana, and Iowa were 2.961 billion gallons. Sales in 2021 were 0.39 billion gallons or 13.1% higher than in 2022. Ethylene production using propane was 5.6 billion pounds in 2022, 0.76 billion pounds or 11.9% lower than in 2021.

In recent years, there have been several new PDH facilities built in the U.S. to take advantage of the growing U.S. propane supply. These facilities use propane to create propylene, a primary product used in plastics manufacturing. In 2022, total propane sales to PDH Plants was 1.201 billion gallons. Sales to PDH plants in 2022 were 185.4 million gallons more than in 2021.

In 2022, total propane sales to chemical feedstock markets were 4.162 billion gallons and were 203.9 million gallons or less than in 2021.

Finally, based on spot propane prices in Mont Belvieu in 2022, ethylene production costs based on propane were 10 cents per pound higher than ethane and butane.

The combination of the increase in ethylene production from "ethane only" crackers and propane's cost disadvantages versus ethane and normal butane were the primary factors that resulted in the drop in propane sales into US chemicals feedstock markets.

Exhibit 28: 2022 U.S. Chemical sector non-odorized sales volumes (millions of gallons)

Year	Ethylene Feedstock	PDH Feedstock	Total Chemical Sales
Texas	2,294	1,201	3,495
Louisiana	635	0	635
Iowa	32	0	32
U.S. Total	**2,961**	**1,201**	**4,162**

Source: Petral Consulting

[6] *CO2 emissions calculated based on a carbon intensity of 43.5 gCO2eq/MJ*
[7] *CO2 emissions calculated based on a carbon intensity of 20.5 gCO2eq/MJ*

Review of annual retail propane sales report methodology

End-use sector definitions

Residential sector:

Residential propane sales include odorized propane delivered to and used by residential consumers at their place of residence for fixed applications. Uses include space heating, water heating, cooking, spa/pool use, and other household uses. Residential sector sales include delivery and replacement of 100-pound cylinders attached at fixed locations. Residential sales do not include household use of propane from 20-pound (or similar) cylinders used for portable appliances and applications.

Commercial sector:

Commercial sector propane sales include odorized propane delivered to and used by commercial entities, such as schools, hospitals, retail outlets, office buildings, and other types of non-industrial outlets. Commercial sales do not include propane-used forklifts or engine use. Commercial sales do include propane used in on-site standby or backup electric generation at the facility.

Industrial (non-forklift) sector:

Industrial (non-forklift) sector propane sales include odorized propane delivered to and used by industrial or manufacturing facilities for process heating, large-scale combined heat and power systems, distributed generation, or as a fuel for furnaces. Propane used by industrial customers in forklifts or other internal combustion engines is reported as Internal Combustion and is not included in the industrial (non-forklift) sector.

Agricultural sector:

Agricultural sector propane sales include odorized propane delivered to and used by agricultural entities that are primarily engaged in growing crops, raising animals, or other agricultural products. Agricultural sector sales include propane used for grain drying, agricultural harvesting activities, weed control, radiant heating systems, crop irrigation engines, and other related agricultural applications. Propane used by agricultural customers in other internal combustion engine applications is reported in the Internal Combustion category.

Cylinder markets:

The cylinder market is defined as propane that is delivered in a 20-pound (or similar) cylinder. The definition of propane cylinder markets does not include wholesale or bulk propane sales to other propane retailers, fixed 100-pound (or similar) cylinders attached at fixed residential locations, or cylinders used by forklifts, commercial mowers, or other internal combustion engines. Information on cylinder market sales volumes was reported by participating companies using the following two sub-categories:

Consumer bottle refill & exchange: Residential or individual use bottle exchange programs. This includes bottle-filling programs at grocery stores, gas stations, campgrounds, and other individual-use sites.

Rental yards / RV refill stations / other: Direct sales to large direct consumer cylinder program managers. This does not include propane sales for use in public autogas fueling infrastructure to companies such as Pilot, Menards, and U-Haul, which should be reported in the autogas section.

These two sub-categories have been added together for the total cylinder market sales.

Internal combustion:

The internal combustion sector includes odorized propane sales for use in internal combustion engines (other than agricultural irrigation engines). Information on internal combustion sales volumes was reported by participating companies for the following three sub-categories:

Propane autogas: All other odorized propane use by internal combustion engines for on-road vehicles.

Material handling: Only includes odorized propane use by forklifts at commercial and industrial sites, as well as airport and port equipment. This can either be consumed in cylinders or directly.

Non-road: Only includes propane used by commercial mowers, outdoor power equipment, golf equipment, ATVs, or other non-road vehicles. This can either be consumed in cylinders or can be supplied directly.

These three sub-categories have been added together for the total internal combustion sales.

Classification of the State by Region, Census Division, and PADD

State	Region	Census Divison	PADD Classification
Alabama	South	East South Central	PADD3
Alaska	West	Pacific	PADD5
Arizona	West	Mountain	PADD5
Arkansas	South	West South Central	PADD3
California	West	Pacific	PADD5
Colorado	West	Mountain	PADD4
Connecticut	Northeast	New England	PADD1
Delaware	South	South Atlantic	PADD1
District of Columbia	South	South Atlantic	PADD1
Florida	South	South Atlantic	PADD1
Georgia	South	South Atlantic	PADD1
Hawaii	West	Pacific	PADD5
Idaho	West	Mountain	PADD4
Illinois	Midwest	East North Central	PADD2
Indiana	Midwest	East North Central	PADD2
Iowa	Midwest	West North Central	PADD2
Kansas	Midwest	West North Central	PADD2
Kentucky	South	East South Central	PADD2
Louisiana	South	West South Central	PADD3
Maine	Northeast	New England	PADD1
Maryland	South	South Atlantic	PADD1
Massachusetts	Northeast	New England	PADD1
Michigan	Midwest	East North Central	PADD2
Minnesota	Midwest	West North Central	PADD2
Mississippi	South	East South Central	PADD3
Missouri	Midwest	West North Central	PADD2
Montana	West	Mountain	PADD4
Nebraska	Midwest	West North Central	PADD2
Nevada	West	Mountain	PADD5
New Hampshire	Northeast	New England	PADD1
New Jersey	Northeast	Middle Atlantic	PADD1
New Mexico	West	Mountain	PADD3
New York	Northeast	Middle Atlantic	PADD1
North Carolina	South	South Atlantic	PADD1
North Dakota	Midwest	West North Central	PADD2
Ohio	Midwest	East North Central	PADD2
Oklahoma	South	West South Central	PADD2
Oregon	West	Pacific	PADD5
Pennsylvania	Northeast	Middle Atlantic	PADD1
Rhode Island	Northeast	New England	PADD1
South Carolina	South	South Atlantic	PADD1
South Dakota	Midwest	West North Central	PADD2
Tennessee	South	East South Central	PADD2
Texas	South	West South Central	PADD3
Utah	West	Mountain	PADD4
Vermont	Northeast	New England	PADD1
Virginia	South	South Atlantic	PADD1
Washington	West	Pacific	PADD5
West Virginia	South	South Atlantic	PADD1
Wisconsin	Midwest	East North Central	PADD2
Wyoming	West	Mountain	PADD4

Outreach and data collection

Data sources

The primary source of information used in the creation of 2022 retail propane sales report has been provided directly by the participating propane retail companies and PERC. All sales and customer account information provided by participants is reflective of the calendar year 2022 totals.

Additional data sources have also been used during the research in order to ensure the highest degree of accuracy in reporting. These additional data sources include, but are not limited to the following:

- Energy Information Agency (EIA)
- Industry trade press and publications
- National Oceanic and Atmospheric Administration
- Information reported by the states
- NASA GISS

Research methodology

Survey coverage

Propane Education & Research Council (PERC) conducted a web-based survey of U.S. propane retailers between April and June 2023. Out of a universe of 3,014 U.S. retailers, 1,095 retailers undertook the survey. These retailers reported a total of 7.153 billion gallons or 73% of the assessed propane sales for 2022, demonstrating that most of the large and multi-state retailers participated in the survey. With a gap of 2.687 billion gallons between the assessment total and the sales reported through a web survey, Frost & Sullivan adopted four extrapolation methodologies to determine sales by states and sectors.

Data quality

To ensure the quality of the data, Frost and Sullivan crosschecked the reported data through multiple dimensions – 2022 vs 2021 reported data for the leading 50 retailers, gallons per state and gallons per account comparison for different category retailers, etc. While the reported data was consistent in most of the cases, there were a few cases where there were some inconsistencies and retailers made some reporting errors in the survey form. Those retailers were contacted to validate the reported data before proceeding with the analysis. As for the number of propane accounts, there were a significant number of respondents that chose not to report this information. On follow-up, to obtain this information supplemental reporting was not provided in most cases.

The following are the four methodologies used for extrapolating the survey findings and determining the 2022 U.S. propane retail sales estimates:

1. Methodology 1: through historical propane sales shares of the states
2. Methodology 2: establishing the correlation between state GDP and propane sales
3. Methodology 3: retailer universe estimation and extrapolation of the survey data
4. Methodology 4: establishing the correlation between state HDD and propane sales

Explanation of the propane sales estimation and extrapolation methodologies:

A. Methodology 1: through historical propane sales shares of the states

As a starting point, Frost and Sullivan documented and studied the past propane sales data for all 50 states and the District of Columbia between 2018 and 2021. Throughout that time, the share of the top 25 states had remained range bound – 78.4% in 2018, 78.5% in 2019, 78.7% in 2020 and 78.1% in 2021. This further showed the maturity of the U.S. propane market and its consistency in propane sales over the years. This also served as a validation point for 2022.

For estimating the propane sales through the Methodology 1, a mix of quantitative and qualitative factors have been considered:

- Factor 1 (Quantitative): Average propane sales reported per retailer (60% weightage)
- Factor 2 (Quantitative): Average increase/decrease in historical share in propane sales (10% weightage)
- Factor 3 (Qualitative): Impact of weather and regulations on propane sales in the state (20% weightage)
- Factor 4 (Qualitative): Inputs from the retailers regarding the propane sales trend in the state/region (10% weightage)

Frost & Sullivan utilized these factors to derive propane sales in each state in 2022. The total sales is then rationalized to 9.840 billion gallons to derive the propane sales in all 50 states and the District of Columbia.

B. Methodology 2: establishing the correlation between state GDP and propane sales

The second methodology was based on a 'Top Down' approach. In this methodology, Frost & Sullivan sought to identify specific macro variables which could be strongly correlated with propane sales in the states. After much deliberation, GDP was ultimately selected. GDP was the best parameter to establish this correlation, as propane is used across all sectors of the economy – residential, commercial, agriculture, and industrial.

An analysis of GDP and propane sales data between 2017 and 2021 showed a strong correlation (coefficient of correlation of 0.77) between U.S. GDP and national-level propane sales. Hence, 2022 U.S. national and state-level GDP data was considered to estimate 2022 propane sales for all U.S. states. Though an effective forecasting methodology, this method predicted 2022 overall U.S. propane sales at 11.149 billion gallons – a gap of approximately 1.30 billion from the actual data. However, to compare the output from all four methodologies, propane sales numbers for each state

were rationalized and decreased in the same ratio to achieve an overall sales total of 9.840 billion gallons.

C. Methodology 3: Retailer universe estimation and extrapolation of the survey data

The third methodology was based on a 'Bottoms Up' approach. First, Frost & Sullivan split the retailers who participated in the survey into six categories, then derived state propane sales norms for each category, and finally used extrapolation to arrive at 2022 state propane sales. Using the geographic spread as the categorization parameter, retailers were split into the following six categories:

a. Retailers present only in one states
b. Retailers present in 2 to 5 states
c. Retailers present in 6 to 10 states
d. Retailers present in 11 to 15 states
e. Retailers present in 16 to 30 states
f. Retailers present in more than 30 states

In this methodology, if a retailer is present across 10 states, the retailer was considered as 10 retailers (i.e., each state entity was considered as one retailer). This new definition of retailers created a total of 4,063 state entities present in the U.S., of which 1,871 (1,095 retailers) were survey participants. Out of these 1,871 state entities, 42% entities belonged to the first category, 37% were in the second category, 4% were in the third category, 3% were in the fourth category, 4% were in the fourth category, and the remaining 10% were in the last category.

Once the above was established, state cumulative gallon sales for each category were computed and then used to derive averages/norms for state propane sales for each category. Ideally, the same norm would then be used for extrapolation to the universe. However, in this specific case, the following observations were made:

- 1,871 retailers who had participated in the survey accounted for 74% of sales, while the remaining 2,192 retailers accounted for only 26% sales
- Retailers who had not participated in the survey were relatively smaller retailers; their average propane sales were approximately one-third of reporting retailers.

Hence, it was necessary to conduct a rationalization of the propane sales norm for extrapolation. To derive the overall propane sales number of 9.840 billion gallons, extrapolation norms for each category were reduced by the following percentages:

- Category 1: 50% of the propane sales norm
- Category 2: 60% of the propane sales norm
- Category 3: 70% of the propane sales norm
- Category 4: 80% of the propane sales norm
- Category 5: 90% of the propane sales norm
- Category 5: 100% of the propane sales norm

D. Methodology 4: establishing a correlation between state HDD and propane sales

The fourth methodology was based on a 'Top Down' approach. In this methodology, Frost & Sullivan tried to identify a specific macro variable that could be strongly correlated with propane sales in the states. After much discussion, HDD was shortlisted for analysis as propane is primarily used for space heating and grain drying applications, and thus HDD bears a strong correlation with propane sales.

An analysis of HDD and propane sales data between 2017 and 2021 showed a moderate degree of correlation (coefficient of correlation of 0.56) between U.S. HDD and national-level propane sales. Hence, 2022 U.S. national and state-level HDD data was considered to estimate 2022 propane sales for all U.S. states. This method estimated 2022 overall U.S. propane sales at 9.813 billion gallons – approximately 27 million gallons lower than the actual data. However, to compare the output from all four methodologies, propane sales numbers for each state were rationalized and increased in the same ratio to achieve an overall sales total of 9.840 billion gallons.

Rationalization among methodologies and finalization of propane sales and account number estimates by states and sectors

A. State propane sales finalization

As a first step, the pros and cons of the four methodologies were deliberated at length.

Methodology	Pros	Cons
Methodology 1	• This method considered multiple qualitative and quantitative factors. • Easy to understand the sales trend over a period of time and establish a rationale for the same. • Linked the rationale with last year's events to predict an increase/ decrease in sales	• It is difficult to accurately measure the severity of various climate change events and regulations on propane sales in each state.
Methodology 2	• The method is widely used to forecast sales • Strong correlation between national GDP and national propane sales	• Propane sales had an extremely limited bearing on national GDP and hence difficult to predict propane sales through the movement of GDP • Much weaker correlation when it came to state propane sales • The model on the state level predicted sales of 11.149 billion gallons – almost more than one billion higher than assessment gallons

Methodology 3	• This method fully utilized the data collected through the survey • Since most of the large retailers had participated in the survey, this method provided visibility to a significant portion of a state's propane sales.	• Accuracy of the number of actual retailers was an area of concern. • Change in the number of retailers in a state resulted in significant changes in a state's propane sales estimates • Iterative method had been used to decide the reduction factors. Multiple combinations were possible, and each combination showed different propane sales estimates for the states; however, the differences were not significant.
Methodology 4	• HDD is an important parameter that indicates changes in temperature which in turn indicates an increase/decrease in space heating requirements • Moderate correlation between HDD and national propane sales	• Difficult to explain the reasons for the poor coefficient of correlations for certain states • The model estimated sales of 9.813 billion gallons – almost 27 million lesser than the assessed gallons

After weighing all four methodologies, Methodology 1 and Methodology 4, were the better choices, as they both used a significant amount of propane market insights. While Methodology 1 was built upon historical trends and dynamics of other proxy parameters such as heating degree days, natural calamities, etc., Methodology 4 used heating degree days which is widely used to predict propane sales in the region. Methodology 2 on the other hand was a 'Top-down' approach and barely incorporated propane market insights and/or survey data. Further, Methodology 2 predicted 1.2 billion gallons higher sales than actual assessment collections. Methodology 3, although built on actual inputs from the retailers, limitations in data correctness and assumptions across multiple factors such as universe of retailers, categorization of the retailers, reduction factors, etc. made the methodology not so suitable to be considered as the best model. Ultimately, Methodology 1 was chosen as the base method for this exercise, and the gap between Methodology 1 and the other methodologies was calculated.

Result	Rationalization Formula	No. of states
≤5% gap between Met.1 and the other three methodologies	Average of all four methodologies	4
≤5% gap between Met.1 and any two of the three methodologies	Average of the three methodologies	25
≤5% gap between Met.1 and any one of the three methodologies	Average of two methodologies	16

>5% gap between Met.1 and the other three methodologies	Met. 1	6

By applying the above formula, a total of 9.852 billion gallons of propane sales was established for 2022, only 12 million gallons more than the assessment gallons. Accordingly, state level estimates were then reduced in the same ratio to arrive at the state and national-level propane sales estimates for 2022. Where applicable, propane sales estimates were then verified with the sales figures provided by the states themselves.

B. Sector Propane sales finalization for each state

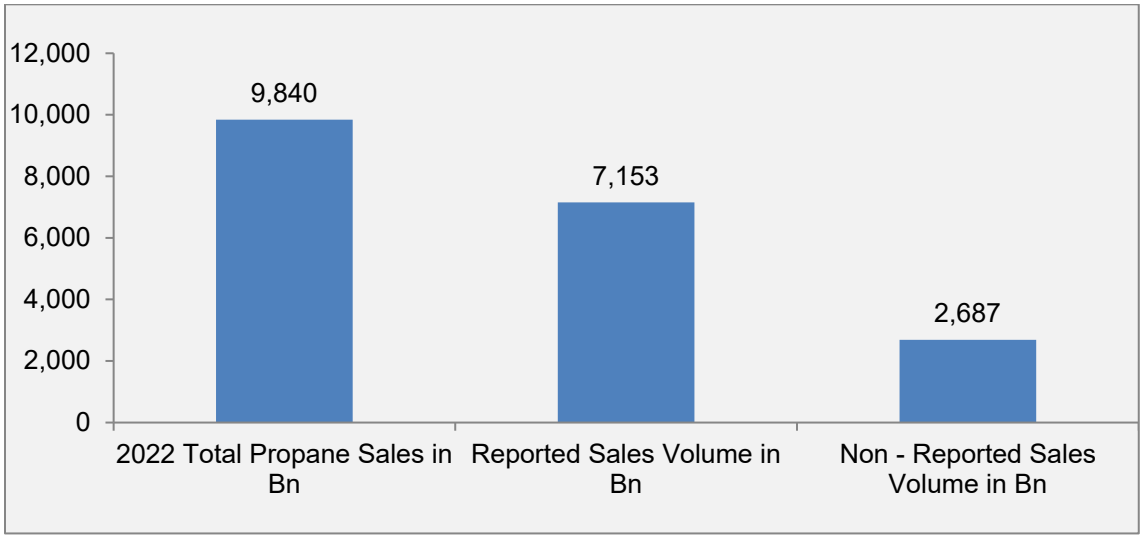
Once the state-level propane sales estimates were finalized, 2022 survey data was used to derive the sector splits and subsequently, sector propane sales. As approximately three-fourths of the propane sales volume was covered through the survey, reported data represented a true and fair assessment of sector-level propane consumption for each state.

C. Market sector account number finalization for each state

Average propane sales per account were calculated for each state and sector, and retailers who did not report their accounts during the survey were not considered for this calculation. Average propane sales norms were then used to divide the state and sector-level propane sales to derive the market sector account numbers for each state.

Differences in sales volume reporting and assessment totals

For the 2022 retail propane sales report, the total U.S. sales volume was 9,840 million gallons of propane. The companies that participated in the study reported 7,153 million gallons in 2022, an increase from 7,069 million gallons of propane sales reported in 2021. Both 2022 and 2021 reported Gallons were around 74% of the overall final Gallons. Frost & Sullivan attributed the remaining volume of 2,687 million gallons to the companies that did not report sales volumes.



2022 retail propane sales report

The annual retail propane sales report is a joint initiative between the Propane Education & Research Council (PERC) and Frost & Sullivan. The 2022 retail propane sales report has been used to determine the odorized propane sales to end-use sectors for the calendar year 2022. This report is the only source of state-level end-use sector sales information for odorized propane.

Reason for the retail propane sales report

Information for state level and end-use odorized propane sales is required by PERC to fulfil specific requirements of the 1996 Propane Education and Research Act (PERA). Under PERA, 20% of assessment collections are eligible for rebate back to the states. The allocation of the rebate between the states is determined by the percentage of the total odorized propane sales in each state. PERA also places limits on the share of total PERC investment in the on-road market to no more than the share of the total propane market used for motor vehicle combustion and sets a minimum of 5% of total assessments that must be allocated to the agricultural sector. This report is the only available source of retail propane sales by state and end-use sector.

The allocation of odorized propane sales between the states has a significant impact on the PERC allocation of expenditures. Each state's allocation of rebate funds is based on the latest retail sales data for residential, commercial, industrial, and internal combustion engine fuel, agricultural uses, and sales to retail dispensers that are compiled using the responses to this report. As a result, the reporting of sales volumes from propane retailers is a critical component of the PERC budgeting process.

Confidentiality guidelines for participant responses

PERC and Frost & Sullivan understand that the U.S. retail propane market is a highly competitive market. All company and contact information that is collected as part of this annual report will be held under Frost & Sullivan’s confidential information data handling guidelines.

Proprietary or confidential information provided by respondents and developed by Frost & Sullivan as part of the 2022 retail propane sales report has been clearly labelled and identified as ‘confidential information and stored in a manner consistent with Frost & Sullivan’s standard practices. Confidential information shall not be disclosed by Frost & Sullivan to third parties or used for anything other than the stated purpose of completing the annual retail propane sales report.

State-level total and end-use sector sales information has been published only where sales and account information were provided by three or more participant respondents. For state-level end-use sector information without three or more respondents, sector and state information has not been provided.

Data Ownership

The annual retail propane sales report was prepared for PERC by Frost & Sullivan. As the contractor of this report, Frost & Sullivan will keep all proprietary company information shared by PERC during the data collection process in accordance with the company's confidentiality guidelines. PERC retains all ownership rights to this publication and its underlying data.

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