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OVERVIEW

Heading into 2022, energy experts debated the speed and timing of a return to “normal” energy demand following a tumultuous 2020–2021 as the world responded to the COVID-19 pandemic. As vaccines became widely available in the first half of 2021, optimism grew in the energy economy as demand quickly headed back to pre-pandemic levels. In many cases, energy demand increased faster than supply, causing significant run-ups in prices, as well as supply chain constraints. These problems were compounded when Russia invaded Ukraine causing more disruption to energy supplies. Overall, the higher energy prices and the greater demand spurred increases in local drilling and production of oil and natural gas. In addition, the federal administration maintains an emphasis on a transition to carbon-neutral energy sources, most acutely seen in the electric utility sector with a continued shift away from coal to more renewable sources.

Utah crude oil prices peaked near \$100 per barrel in summer 2022, before dropping back to about \$75 per barrel in the fall, and averaged \$82 per barrel for the year, the highest price since 2013 and more than double the average price in 2020. This rebound in price, coupled with record-high petroleum demand, resulted in a 24% increase in Utah crude oil production to 44 million barrels in 2022, the highest annual production on record. Natural gas prices nearly tripled since 2020 to \$5.90 per thousand cubic feet (Mcf) in 2022 and resulted in an annual natural gas production increase for the first time in nearly 10 years, reaching 265 billion cubic feet (Bcf) in 2022.

Construction of new utility-scale solar facilities continued in 2021 and 2022 with the addition of about 650 megawatts (MW) of capacity, bringing Utah’s total solar capacity to 1.5 gigawatts (GW). Solar dominates Utah’s renewable energy portfolio, providing 65% of total renewable capacity. In the

residential sector, total installed residential photovoltaic (PV) capacity in Utah has increased from just 6 MW in 2013 to about 356 MW in 2021.

Utah coal production dropped to the lowest level in nearly 40 years, just 11 million tons in 2022, despite a significant increase in coal prices. The establishment of a foreign export coal market continues to be a challenge as access to West Coast ports remains in question. Electricity generation in Utah decreased 5% in 2022, despite consumption increasing to a new record high of 33,100 GWh. Electricity prices also increased but continue to be nearly 30% lower than the national average.

Demand for oil and natural gas remained strong in 2022 and will continue to play a major role in Utah’s energy landscape. However, there is a noticeable shift at the federal level to move more quickly to carbon-neutral energy sources. Fortunately, Utah is well positioned to take the lead in this energy transition with major research projects focused on geothermal energy, hydrogen technology, carbon sequestration opportunities, and utility-scale storage, as well as the continued buildout of large-scale PV solar farms, which soon could be coupled with innovative battery storage.

2022 Summary

Petroleum

Production Utah oil production took a major hit in 2020, dropping to 31.0 million barrels, when the COVID-19 pandemic caused major global disruptions to petroleum prices and demand. Production bottomed out at 69,600 barrels per day in May 2020, but then steadily increased and then surpassed pre-pandemic levels in 2021 and 2022, hitting a record high of 131,300 barrels per day in August 2022 (before dropping slightly in September to 121,200 barrels per day). Total crude oil production for 2022 is expected to reach a record high of 44 million barrels, a 24% increase

from 2021 (42% higher than 2020), mostly attributable to the drilling of very successful long-reach (10,000+ feet) horizontal wells in the Uinta Basin. Total crude oil pipeline imports from Colorado, Wyoming, and Canada increased a modest 3.1% to 39 million barrels in 2022 as refineries continued to adjust to post-COVID-19 increases in petroleum product demand. Similarly, refinery receipts—the amount of crude oil delivered to Utah’s five refineries—increased 6.8% to a new record high of 71 million barrels. With the growth in production in 2022, estimated exports of Utah crude oil nearly doubled to 11.8 million barrels, mostly related to more Uinta Basin crude oil leaving the state via trains that are loaded in Price, Utah.

Prices and Value After a volatile year in 2020, oil prices increased steadily in 2021 and the first half of 2022 as petroleum demand returned to pre-pandemic levels. Utah oil prices started the year near \$70 per barrel but steadily increased to about \$100 per barrel by mid-summer, before falling again back to the lower \$70 per barrel range in December. The overall average 2022 crude oil price in Utah is estimated at \$82 per barrel, up 35% from the 2021 price, and up 135% from 2020. The increase in price, coupled with a resultant surge in production, pushed the value of Utah’s produced crude oil up to \$3.6 billion in 2022, a new record high in nominal dollars and more than triple the 2020 value. Following suit, Utah’s average price for regular unleaded motor gasoline and diesel also significantly increased in 2022 to \$4.24 and \$5.01 per gallon, respectively.

Consumption Petroleum product demand plummeted in 2020 as travel restrictions and stay-at-home directives went into effect due to the COVID-19 pandemic, but demand quickly rebounded, surpassing pre-pandemic levels in 2021 and again in 2022. Utah’s refined petroleum product production reached a record high of 81 million barrels in 2022, a 5% increase from 2021. Refined petroleum product imports from Wyoming via the Pioneer pipeline also increased by 3% in 2022, and Utah refineries export an estimated 30 to 35 million barrels of petroleum products per year via pipeline to other states. Utah’s total petroleum product consumption is expected to reach a new record high in 2022 at 64 million

barrels, 4% higher than 2021 and 16% higher than the COVID-19-influenced drop in demand in 2020. Nearly 48% of total petroleum demand was motor gasoline, and diesel represented 28%. Utah imports and exports significant amounts of petroleum products from and to surrounding states, but overall, Utah is a net exporter, only using about 80% of the product refined at Utah-based refineries.

Natural Gas

Production Utah’s natural gas production peaked in 2012 at 491 Bcf but then retreated to 240 Bcf by 2021, due to several years of low prices and a lack of natural gas drilling in Utah. However, production rebounded 10% in 2022 to about 265 Bcf as prices spiked and natural gas-specific drilling resumed for the first time in nearly four years. Natural gas production was also boosted by the significant associated gas produced from new crude oil wells. Dry natural gas production and natural gas sales in 2022 also increased to 255 and 220 Bcf, respectively, and natural gas liquids production increased to 3.8 million barrels.

Prices and Value After averaging only about \$2.50 per Mcf between 2015 and 2020, the wellhead price for natural gas in Utah increased to \$4.11 in 2021 and then again to \$5.90 in 2022. Natural gas prices near \$2.50 per Mcf provided little economic justification for natural gas exploration or development. However, with the dramatic increase in prices over the past year, natural gas-specific drilling has resumed (four rigs were drilling natural gas wells in late 2022). When wellhead prices increase, so do consumer prices; the residential natural gas price increased over 15% in 2022 to \$10.30 per Mcf and the price for industrial uses increased 42% to \$7.70. Higher natural gas and natural gas liquids production, coupled with higher prices, pushed the 2022 natural gas production value to \$1.8 billion, 62% higher than 2021 and nearly triple the value recorded in 2020.

Consumption Natural gas consumption in Utah has been volatile over the past several years mostly due to large swings in the electric utility and residential markets. After reaching a near record high of 261 Bcf in 2021 (only behind the 264 Bcf consumed in 2019), consumption decreased 2% in

2022 to 256 Bcf. Most natural gas in Utah is used for residential purposes (26%) or electricity generation (30%), followed by the commercial (16%) and industrial (15%) sectors. After two years of consuming more natural gas than was produced in the state, Utah returned to being a net exporter of natural gas in 2022.

Coal

Production In 2022, Utah had six active coal mines, the fewest number since mining operations began in Utah nearly 150 years ago. This number was recently reduced to five when the Lila Canyon mine was temporarily idled due to an underground combustion event, and it is currently unclear when the mine will be able to resume production. Overall, coal production is expected to decrease by 12% in 2022 to 11.0 million short tons, well below the 24.5 million tons averaged in the 2000s. Declining Utah coal production started during the 2008 recession, but demand never rebounded like other energy commodities since coal has dropped out of favor as a fuel for electric and industrial needs. Production at the two remaining Wolverine mines, Skyline and Sufco, accounted for 60% (6.6 million tons) of Utah's total coal production. The Emery County Coal Resources Lila Canyon mine produced 2.3 million tons of coal before being idled in September. In mid-2020, COP Coal Development bought the Castle Valley mines, now called Gentry, from Rhino Resources and produced about 500,000 tons in 2021 and 600,000 tons in 2022. The Coal Hollow mine in southern Utah produced about 400,000 tons in 2022 from their surface mine, including new production on their long-sought federal coal leases. Bronco Energy's Emery mine produced about 1.1 million tons of coal in 2022, about the same as in 2021.

Prices and Value The average mine-mouth price for Utah coal dramatically increased to about \$45 per short ton in 2022, a relatively high price in nominal dollars but still well below the inflation-adjusted high of \$118 per ton reached in 1976. The end-use price of coal at Utah electric utilities, which includes transportation costs, also increased to \$47 per ton in 2022. The value of coal produced in Utah totaled \$495 million in 2022, 3% higher than 2021, but well below the inflation-adjusted high of \$1.5 billion recorded in 1982.

Consumption Demand for coal in Utah dropped 17% between 2015 and 2016, then remained steady (about 12.6 million tons) until 2020 when it dropped to about 11 million tons in response to the pandemic-related decline in electricity demand. Demand rebounded in 2021 back to 12.6 million short tons, but decreased again in 2022 to 11.6 million tons, 97% of which was burned at electric utilities. Coal demand in Utah's industrial sector, mostly by cement and lime producers, dropped to about 340,000 tons in 2022, a quarter of peak demand of 1.4 million tons reached in 2005. Utah used to be a significant net exporter of coal to neighboring states, but out-of-state domestic demand dropped from a high of 16 million tons in 2001 to just 1.6 million tons in 2022. Utah's foreign coal exports peaked in the mid-1990s at about 5 million tons, then dropped to near zero in the mid-2000s. Demand from the foreign market has increased over the past decade, totaling an estimated 2.7 million tons in 2022; however, West Coast port access for overseas transport remains a challenge.

Electricity and Renewable Resources

Production Electricity generation in Utah decreased 5% in 2022 to 40,440 gigawatt hours (GWh) after rebounding in 2021 (42,566 GWh) from a nearly 20-year low in 2020 (37,087 GWh). Coal-fired electric generation once dominated Utah's electric portfolio, providing 94% of electric generation back in 2005. In 2022, coal accounted for only 59% of Utah's electric generation. Increases in natural gas generation (26% in 2022) and renewable sources (14% in 2022) have broadened Utah's generation portfolio. The largest change in Utah's electricity sector is the recent exponential increase in utility-scale PV solar capacity. Between mid-2015 and the end of 2016, 855 MW of utility-scale solar capacity came online, more than wind, hydroelectric, geothermal, and biomass combined. Between late 2019 and the end of 2022, an additional 680 MW of solar was installed for a total of 1.5 GW of utility-scale solar capacity. With these new additions, solar contributed just under 10% of Utah's total electric generation in 2022. In contrast, electric generation at Utah's coal-fired power plants has decreased over 37% since 2008.

Prices The overall price of electricity in Utah has remained mostly steady over the past ten years, but with a slight uptick (7%) in 2022. Utah's 2022 average electric rate of 8.9 cents per kilowatt-hour (kWh) for all sectors of the economy is about 30% lower than the national average of 12.5 cents. This lower rate is mostly attributed to Utah's established fleet of coal-fired power plants, which still supply 59% of electricity generation in the state. The residential price of Utah's electricity increased 5% in 2022 to 11.0 cents per kWh, lower than the national average of 15.0 cents per kWh.

Consumption After several years of near-steady demand (from about 2013 to 2019), electricity consumption resumed its upward trend in 2020, setting new record highs for three years in a row, reaching an estimated 33,100 GWh in 2022. These increases took place in the residential (accounting for 34% of total demand) and commercial (38% of total demand) sectors, whereas electricity demand in the industrial sector (27% of total) decreased slightly. Residential electricity consumption per person decreased from an average of 3.22 MWh per capita between 2006 and 2013 to 3.05 MWh between 2014 and 2019. This decrease was most likely related to increased energy efficiency measures as well as the increased use of residential PV solar. However, the COVID-19 pandemic seems to have spurred increased electricity usage in the residential sector (e.g., more work-from-home opportunities, etc.), resulting in an increase in per person electricity usage of 3.21 MWh in 2020, 3.28 MWh in 2021, and 3.32 MWh in 2022. Overall, Utah remains a net exporter of electricity, using only 82% of in-state electric generation.

2023 OUTLOOK

Although the past couple years were dominated by the impact of the COVID-19 pandemic on Utah's energy industry, 2022 returned to a "new normal" with a strong economy, surging energy demand, high energy prices, and the positives and negatives that go along with each. This situation is coupled with the intensifying interest in "the energy transition" with increasing emphasis on renewable and carbon-neutral energy sources, innovations in the hydrogen economy, and the electrification of the transportation system.

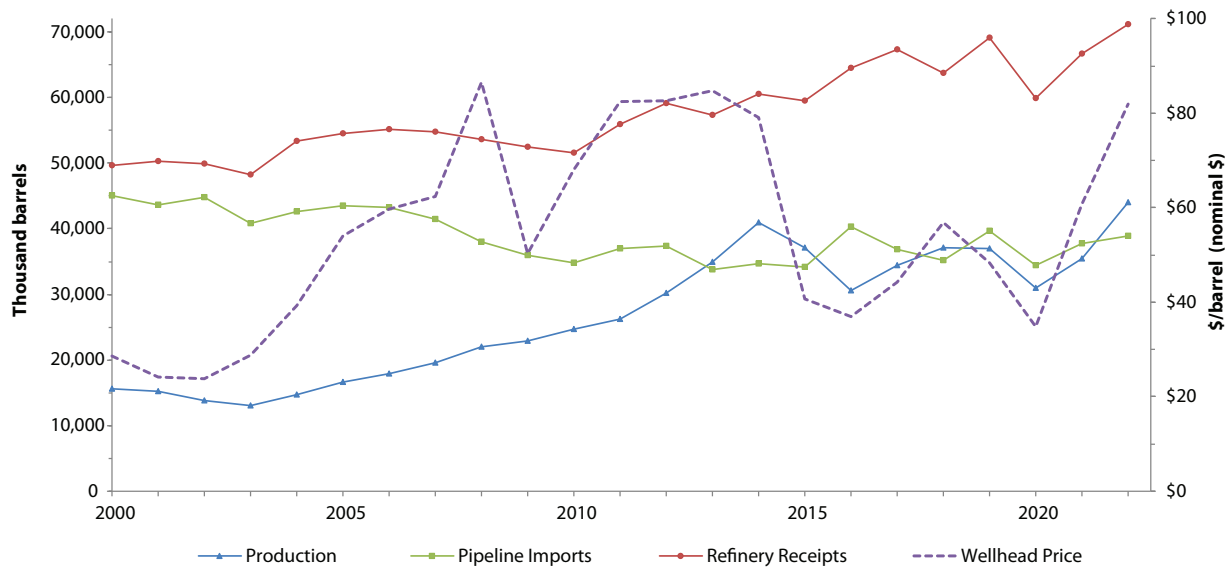
Oil prices in Utah will most likely remain volatile but relatively high in 2023, in the upper-\$70 to low-\$80 per barrel range as demand continues to grow and geopolitical situations influence global prices. Oil prices in this range will continue to support 10 to 12 drill rigs in the Uinta Basin, mostly drilling long-reach horizontal oil wells but with some continued vertical/directional development. However, in the short term, production will be curtailed by transportation constraints, supply-chain issues, labor issues, and gas off-take options. The game-changer for the Uinta Basin would be the construction of the proposed Uinta Basin railway. All approvals from the federal government have been granted and construction can begin after financing has been secured. When built, the proposed railway could open new out-of-state markets for Utah's crude oil, creating potential for significantly higher crude oil production. Exploration/development elsewhere in Utah will likely remain minor compared with drilling in the Uinta Basin, but the increase in crude oil prices has spurred new interest in the Paradox Basin (e.g., Cane Creek play) and the Utah Central Thrust Belt. Demand for petroleum products in Utah is projected to hit record highs in 2022 and is expected to continue this upward trend into 2023 and beyond—any petroleum demand reductions predicted by the electrification of Utah's transportation sector will take years to materialize as electric vehicles still only account for 0.4% (2021 data) of total vehicle registrations.

Several years of sub-\$3 per Mcf natural gas prices caused stagnation in Utah's natural gas production industry, resulting in the lowest production levels since the 1980s. However, in late 2021 and continuing into 2022, the price of natural gas increased to the \$5 to \$8 per Mcf range and is projected to remain high (~\$5 to \$6 per Mcf) for the foreseeable future. These higher prices have facilitated the return of drilling rigs that specifically target natural gas reservoirs, with four rigs drilling gas wells currently (all in the Uinta Basin) and a possibility of two to three more rigs coming online in 2023. This renewed drilling coupled with production of associated gas from increased crude oil drilling will result in higher natural gas production in the coming years.

Coal production in Utah is expected to remain in the 11- to 13-million-ton per year range for the next few years, as in-state demand currently averages 11 to 12 million tons a year, and out-of-state demand continues to be less than 2 million tons per year. This current supply-demand balance will change starting in about 2025 when the coal-fired Intermountain Power Plant converts to natural gas and eventually hydrogen, removing demand for 3 to 4 million tons of coal. Utah coal deliveries to the foreign export market have experienced a modest jump in the past few years and potential remains for access to a strong overseas market which could partially replace falling domestic demand. However, West Coast port facilities are vital for accessing the Asian coal market, but current capacity at existing ports is limited and additional capacity could be a challenge to build.

Utah's electric generation portfolio will continue to evolve as demand for carbon-neutral electricity increases and several new utility-scale solar farms are installed in 2023 and beyond (an additional 600 MW of new capacity is under construction as of late 2022, with many more facilities in the planning stages). This intensified emphasis on carbon-neutral energy sources has spurred research and development into large-scale electric storage facilities (e.g., underground compressed air, pumped hydroelectric facilities, and more traditional utility-scale battery storage), enhanced geothermal systems at the Frontier Observatory for Research in Geothermal Energy (FORGE) site in central Utah as well as traditional geothermal resources, the production of carbon-neutral hydrogen for electricity generation or vehicle fuel, and next generation nuclear energy facilities (e.g., molten salt, etc.). Consumption of electricity has resumed its faster-paced growth as our modern society becomes more reliant on electricity for everyday conveniences. Despite recent changes, Utah's well-established coal-fired power plants (which still provide 59% of Utah's electricity generation), as well as an established fleet of natural-gas plants and nearly 1.5 GW of solar capacity, will assure affordable, reliable electric power for the near future and keep Utah's electricity prices nearly 30% below the national average.

Figure 18.1: Utah's Crude Oil Production, Pipeline Imports, and Refinery Receipts Plotted with Wellhead Price, 2000–2022e



Sources: Utah Geological Survey; Utah Division of Oil, Gas and Mining; U.S. Energy Information Administration, Baker Hughes (rig data)

Table 18.1: Supply, Disposition, Price, and Value of Crude Oil in Utah, 2000–2022e

Year	Supply ¹				Drilling Average # of rigs operating in Utah	Disposition				Price Wellhead \$/barrel	Value Value of Utah Crude Oil (Million \$)
	Utah Crude Production	Colorado Imports	Wyoming Imports	Canadian Imports		Utah Crude Exports ²	Refinery Receipts	Refinery Inputs	Refinery Beginning Stocks		
	Thousand barrels					Thousand barrels					
2000	15,608	7,163	26,367	11,528	15	10,950	49,716	49,999	786	\$28.53	\$445
2001	15,271	7,208	25,100	11,364	21	8,633	50,310	50,143	457	\$24.09	\$368
2002	13,770	7,141	25,455	12,215	13	8,619	49,962	49,987	591	\$23.87	\$329
2003	13,096	6,964	24,152	9,690	14	5,635	48,267	48,284	547	\$28.88	\$378
2004	14,742	7,559	22,911	12,195	22	4,007	53,400	53,180	532	\$39.35	\$580
2005	16,675	8,214	24,372	10,991	28	5,739	54,513	54,544	767	\$53.98	\$900
2006	17,926	9,355	23,256	10,633	40	6,051	55,119	55,192	728	\$59.70	\$1,070
2007	19,534	10,708	22,012	8,769	41	6,258	54,764	54,952	662	\$62.48	\$1,220
2008	22,040	10,259	21,316	6,382	42	6,360	53,637	53,165	473	\$86.58	\$1,908
2009	22,941	7,409	23,000	5,520	18	6,395	52,475	52,479	519	\$50.22	\$1,152
2010	24,666	6,525	24,000	4,278	27	7,832	51,637	51,678	511	\$68.09	\$1,679
2011	26,276	6,997	26,050	3,894	28	7,318	55,900	55,656	473	\$82.53	\$2,169
2012	30,204	7,805	25,118	4,394	37	8,368	59,153	58,961	692	\$82.73	\$2,499
2013	35,002	7,601	23,124	3,111	29	11,493	57,345	56,921	669	\$84.79	\$2,968
2014	40,914	7,662	23,425	3,636	25	15,090	60,548	60,677	798	\$79.04	\$3,234
2015	37,136	7,048	22,211	4,963	7	11,809	59,549	59,568	660	\$40.69	\$1,511
2016	30,528	7,110	27,318	5,873	3	6,348	64,482	64,496	719	\$36.92	\$1,127
2017	34,438	5,763	26,187	4,967	9	4,043	67,311	67,526	826	\$44.24	\$1,524
2018	37,117	5,616	23,819	5,803	7	8,575	63,780	63,805	730	\$56.85	\$2,110
2019	36,933	5,253	26,059	8,308	6	7,487	69,067	69,033	821	\$48.32	\$1,785
2020	31,001	4,820	22,572	7,030	3	5,588	59,835	60,178	978	\$34.91	\$1,082
2021	35,514	4,189	25,010	8,582	8	6,557	66,737	66,881	747	\$60.74	\$2,157
2022e	44,000	4,050	26,400	8,500	12	11,750	71,200	71,400	830	\$82.00	\$3,608

e = estimate

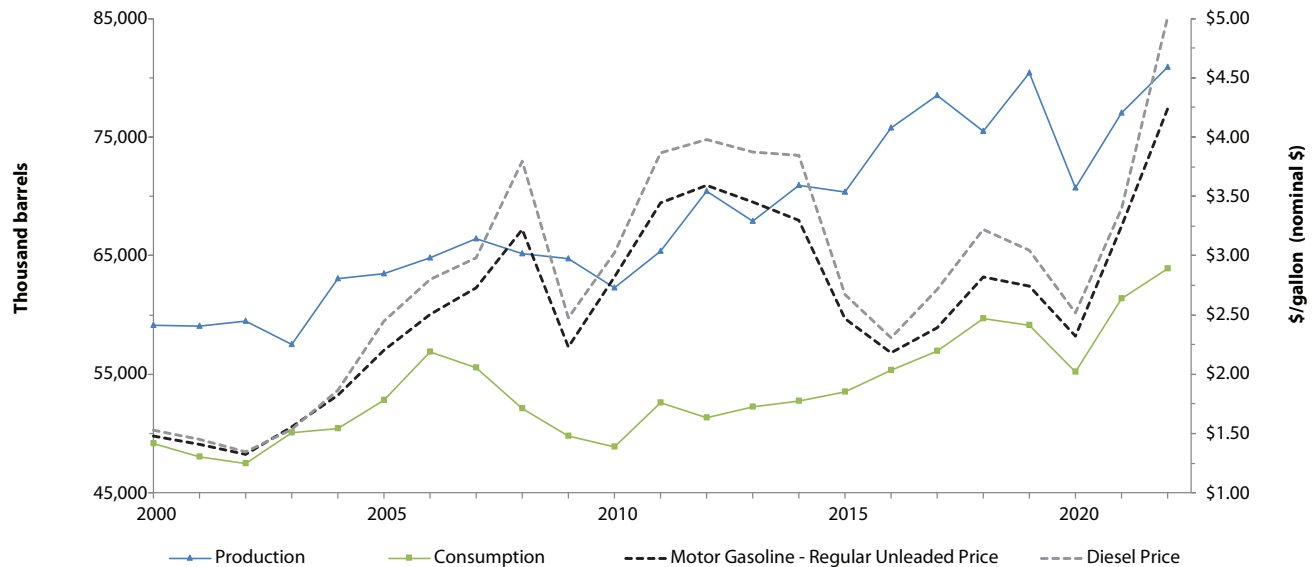
1. Out-of-state imports only include pipeline shipments; minor imports may arrive by truck, and additional minor imports may come from other states.

2. Estimated by subtracting refinery receipts from total supply; all crude oil imports are assumed to be accounted for.

Note: Prices and values are in nominal dollars.

Sources: Utah Geological Survey; Utah Division of Oil, Gas and Mining; U.S. Energy Information Administration, Baker Hughes (rig data)

Figure 18.2: Utah's Petroleum Product Production and Consumption Plotted with Motor Gasoline and Diesel Prices, 2000–2022e



Sources: Utah Geological Survey, U.S. Energy Information Administration, Federal Energy Regulatory Agency

Table 18.2: Supply, Disposition, and Select Prices of Petroleum Products in Utah, 2000–2022e

Year	Supply			Consumption* by Product					Exports	Prices	
	Refined Product Production	Refinery Beginning Stocks	Refined Product Pipeline Imports ^{1,2}	Motor Gasoline	Jet Fuel	Distillate Fuel	All Other	Total	Pipeline Exports to Other States ^{1,3}	Motor Gasoline - Regular Unleaded	Diesel
	Thousand barrels									\$/gallon	
2000	59,125	2,426	14,568	23,895	7,701	10,629	6,954	49,179	22,811	\$1.48	\$1.53
2001	59,094	2,306	15,764	22,993	6,880	11,236	6,904	48,013	23,937	\$1.41	\$1.45
2002	59,514	2,739	16,848	24,158	6,416	11,482	5,394	47,450	24,082	\$1.32	\$1.34
2003	57,511	2,846	16,515	24,325	6,758	12,082	6,917	50,082	22,729	\$1.56	\$1.54
2004	63,071	2,599	18,486	24,744	7,137	12,264	6,289	50,434	24,475	\$1.82	\$1.87
2005	63,487	2,806	20,258	24,677	7,394	13,717	7,015	52,803	24,482	\$2.20	\$2.45
2006	64,806	2,587	18,976	25,312	7,560	17,292	6,699	56,863	23,321	\$2.50	\$2.80
2007	66,443	2,924	15,991	26,054	7,085	15,946	6,465	55,550	22,851	\$2.73	\$2.98
2008	65,178	2,513	14,854	25,051	6,509	14,138	6,415	52,113	21,619	\$3.22	\$3.79
2009	64,752	2,715	13,138	25,324	5,751	12,852	5,854	49,781	21,043	\$2.23	\$2.48
2010	62,310	2,665	12,307	24,761	5,031	12,707	6,367	48,866	21,490	\$2.82	\$3.03
2011	65,369	2,689	11,383	25,568	4,825	15,448	6,772	52,613	23,058	\$3.44	\$3.87
2012	70,456	2,860	13,316	25,228	4,608	14,776	6,694	51,306	26,695	\$3.59	\$3.98
2013	67,892	3,077	15,204	26,085	4,468	15,317	6,366	52,236	26,654	\$3.45	\$3.88
2014	70,931	2,676	13,853	26,469	4,816	15,169	6,272	52,726	27,260	\$3.30	\$3.85
2015	70,385	2,980	16,615	27,776	5,288	14,293	6,167	53,524	28,972	\$2.47	\$2.67
2016	75,780	2,771	16,402	28,535	5,963	14,248	6,575	55,321	30,966	\$2.19	\$2.31
2017	78,473	2,652	15,530	28,769	6,357	15,043	6,762	56,931	32,666	\$2.39	\$2.71
2018	75,506	2,918	15,876	28,725	8,619	15,700	6,671	59,715	31,164	\$2.82	\$3.22
2019	80,371	2,762	16,370	29,667	7,483	15,040	6,958	59,148	33,025	\$2.74	\$3.04
2020*	70,700	3,316	14,700	27,425	5,252	15,714	6,837	55,228	19,589	\$2.32	\$2.52
2021*	77,000	2,620	15,270	29,894	7,369	17,101	7,038	61,402	33,500	\$3.25	\$3.40
2022e	80,900	2,970	15,700	30,600	8,000	18,100	7,200	63,900	na	\$4.24	\$5.01

*Consumption was estimated. e = estimate; na = not available

1. Amounts shipped by truck are unknown.

2. The Pioneer pipeline, originating from Sinclair, Wyoming, is the only pipeline importing petroleum products into Utah.

3. Prior to 2012, only the Chevron Petroleum pipeline exported product to the Northwest (Idaho and Washington); in 2013 this line was sold to Tesoro. Starting in 2012, the UNEV pipeline started shipping product to the Las Vegas area; however, a minor amount of product is offloaded near Cedar City (amount estimated).

Note: Prices are in nominal dollars.

Sources: Utah Geological Survey, U.S. Energy Information Administration, Federal Energy Regulatory Agency

Figure 18.3: Utah's Natural Gas Production and Consumption Plotted with Wellhead and Residential Prices, 2000–2022e



Sources: Utah Geological Survey; Utah Tax Commission; Utah Division of Oil, Gas and Mining; U.S. Energy Information Administration

Table 18.3: Supply, Disposition, Prices, and Value of Natural Gas in Utah, 2000–2022e

Year	Production				Consumption by End Use							Prices					Value of NG and NGL (Million \$)
	Gross Production	Dry Production	Actual Sales	Natural Gas Liquids Production (Thousand bbl)	Residential	Commercial	Vehicle Fuel	Industrial	Electric Utilities	Lease, Plant, & Pipeline	Total	Wellhead	End-Use Residential	End-Use Commercial	End-Use Industrial	Natural Gas Liquids	
2000	281,170	256,490	140,226	5,150	55,626	31,282	848	39,378	10,544	27,344	165,022	\$3.31	\$6.20	\$4.92	\$3.93	\$11.31	\$907
2001	300,966	272,534	219,138	4,641	55,008	30,917	474	33,584	15,141	24,175	159,300	\$3.54	\$8.09	\$6.78	\$5.29	\$12.47	\$1,023
2002	293,030	271,387	250,172	3,542	59,398	33,501	482	26,879	15,439	27,681	163,380	\$1.99	\$6.39	\$5.20	\$3.91	\$8.91	\$572
2003	287,141	264,654	224,327	3,080	54,632	30,994	589	25,200	14,484	28,226	154,125	\$4.12	\$7.33	\$5.95	\$5.04	\$12.18	\$1,128
2004	293,807	274,588	253,855	3,196	60,527	31,156	661	26,674	9,423	27,450	155,891	\$5.22	\$8.12	\$6.75	\$5.90	\$19.66	\$1,496
2005	313,491	298,408	269,062	2,310	58,044	34,447	187	25,370	12,239	29,989	160,276	\$7.40	\$9.71	\$8.23	\$7.33	\$32.31	\$2,283
2006	356,339	345,409	320,163	1,925	60,017	34,051	186	29,076	28,953	35,116	187,399	\$5.69	\$11.02	\$9.61	\$8.02	\$31.40	\$2,026
2007	385,517	373,680	350,285	1,769	60,563	34,447	209	31,578	56,438	36,464	219,699	\$4.14	\$9.44	\$8.03	\$6.35	\$45.16	\$1,627
2008	442,524	430,286	382,960	2,564	65,974	37,612	208	33,112	55,374	31,907	224,187	\$6.82	\$9.00	\$7.74	\$7.21	\$68.15	\$3,109
2009	449,675	435,673	390,475	4,817	65,184	37,024	149	29,845	49,984	32,034	214,220	\$3.38	\$8.95	\$7.57	\$5.62	\$38.87	\$1,660
2010	439,929	422,067	387,593	5,869	66,087	38,461	203	32,079	48,399	33,985	219,214	\$4.25	\$8.22	\$6.83	\$5.57	\$49.98	\$2,087
2011	462,495	442,615	406,323	7,571	70,076	40,444	290	33,633	40,138	37,646	222,227	\$3.92	\$8.44	\$7.05	\$5.50	\$60.99	\$2,197
2012	490,575	474,756	436,090	8,106	59,801	35,363	289	36,350	47,138	44,098	223,039	\$2.82	\$8.70	\$7.00	\$4.69	\$50.49	\$1,748
2013	470,349	455,454	409,704	8,132	70,491	41,398	224	38,009	49,562	47,602	247,286	\$3.68	\$8.55	\$7.13	\$5.22	\$54.03	\$2,115
2014	450,024	435,893	391,536	9,693	62,458	38,156	256	38,330	58,780	43,758	241,738	\$4.35	\$9.48	\$7.71	\$5.87	\$46.13	\$2,343
2015	417,023	401,722	360,018	7,286	58,562	35,772	326	37,189	56,449	44,315	232,613	\$2.60	\$9.72	\$7.97	\$5.93	\$22.84	\$1,213
2016	365,281	352,437	319,056	5,573	63,929	39,066	305	38,568	59,684	38,562	240,114	\$2.24	\$9.12	\$7.43	\$5.52	\$25.51	\$932
2017	315,197	304,266	278,015	4,813	66,700	41,264	354	40,007	40,830	32,679	221,834	\$2.72	\$9.05	\$7.40	\$5.51	\$31.94	\$981
2018	295,826	284,264	249,763	3,817	67,415	42,367	348	39,935	61,161	32,831	244,057	\$2.77	\$9.04	\$7.37	\$5.31	\$46.33	\$964
2019	272,978	262,157	223,142	4,003	75,938	47,336	322	41,348	67,386	31,972	264,302	\$2.51	\$7.82	\$6.35	\$5.00	\$24.07	\$754
2020	242,560	233,239	202,663	2,935	74,191	44,216	273	40,119	67,226	29,824	255,849	\$1.96	\$8.15	\$6.56	\$5.07	\$22.64	\$524
2021	239,936	230,767	197,391	2,785	71,628	43,970	290	39,747	74,395	30,718	260,748	\$4.11	\$8.99	\$7.37	\$5.43	\$56.97	\$1,107
2022e	265,000	255,000	220,000	3,800	67,000	41,000	300	38,500	77,500	32,000	256,300	\$5.90	\$10.30	\$8.60	\$7.70	\$75.00	\$1,790

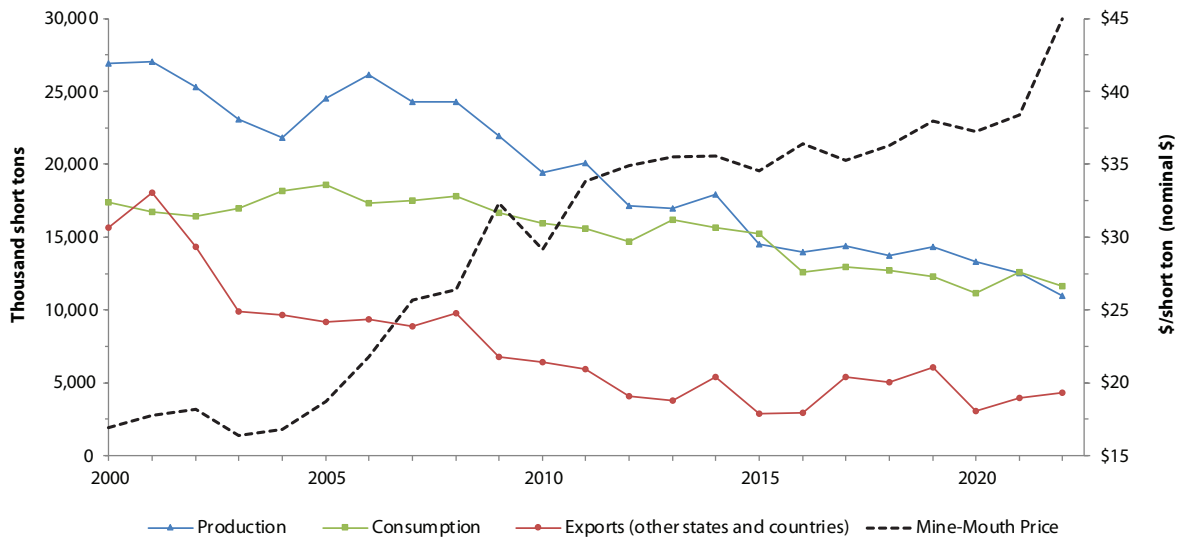
e = estimate

NG = natural gas, NGL = natural gas liquids, bbl = barrels

Note: Prices and values are in nominal dollars.

Sources: Utah Geological Survey; Utah Tax Commission; Utah Division of Oil, Gas and Mining; U.S. Energy Information Administration

Figure 18.4: Utah's Coal Production, Consumption, and Exports Plotted with Mine-mouth Price, 2000–2022e



Sources: Utah Geological Survey, U.S. Energy Information Administration

Table 18.4: Supply, Disposition, Price, and Value of Coal in Utah, 2000–2022e

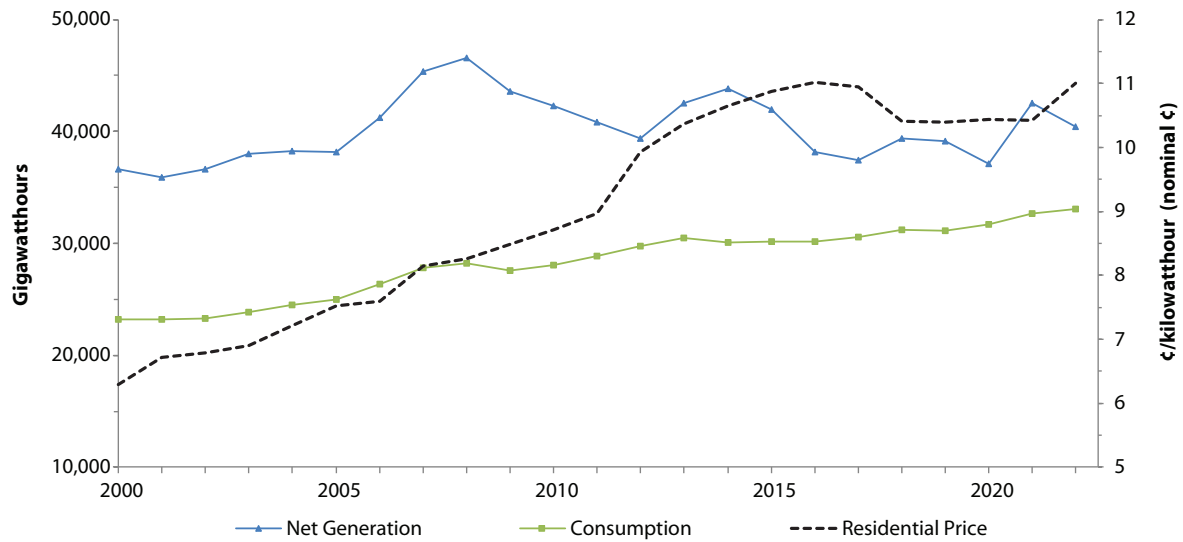
Year	Supply		Distribution	Consumption by End Use					Exports		Prices		Value
	Prod.	Imports	Total Dist. of Utah Coal	Res. & Comm.	Coke Plants	Other Ind.	Electric Utilities	Total	To Other U.S. States	To Canada and/or Overseas	Mine Mouth	End-Use Electric Utilities	Value of Utah Coal (Million \$)
	Thousand short tons										\$/short ton		
2000	26,920	2,535	27,955	59	984	1,166	15,164	17,373	12,553	3,073	\$16.93	\$23.16	\$456
2001	27,024	3,062	26,906	60	547	1,235	14,906	16,748	15,920	2,144	\$17.76	\$25.48	\$480
2002	25,299	2,251	24,392	198	0	592	15,644	16,434	13,170	1,142	\$18.20	\$21.84	\$460
2003	23,069	2,039	23,551	61	0	611	16,302	16,974	9,584	318	\$16.36	\$23.20	\$377
2004	21,818	3,033	23,145	214	0	1,330	16,606	18,150	9,294	346	\$16.82	\$24.95	\$367
2005	24,556	2,776	23,025	45	0	1,431	17,118	18,594	8,835	351	\$18.71	\$24.52	\$459
2006	26,131	1,925	24,520	35	0	680	16,609	17,324	9,279	55	\$21.77	\$27.34	\$569
2007	24,288	1,596	24,451	23	0	911	16,593	17,527	8,877	0	\$25.69	\$30.33	\$624
2008	24,275	2,528	25,426	0	0	873	16,927	17,800	9,219	541	\$26.39	\$30.66	\$641
2009	21,927	4,251	20,487	0	0	718	15,925	16,643	6,643	148	\$32.32	\$33.96	\$709
2010	19,406	1,775	19,220	0	0	717	15,233	15,950	5,807	634	\$29.15	\$37.68	\$566
2011	20,073	2,020	19,039	0	0	598	15,005	15,603	4,841	1,081	\$33.80	\$39.21	\$678
2012	17,155	1,708	16,140	0	0	588	14,084	14,672	3,012	1,080	\$34.92	\$41.84	\$599
2013	16,953	1,864	16,896	0	0	645	15,529	16,174	2,673	1,110	\$35.52	\$44.73	\$602
2014	17,933	1,967	17,829	0	0	614	15,062	15,676	2,543	2,869	\$35.59	\$46.03	\$638
2015	14,513	3,098	14,938	0	0	662	14,580	15,242	2,116	735	\$34.53	\$42.12	\$501
2016	13,978	1,908	14,620	0	0	575	12,001	12,576	1,890	1,049	\$36.40	\$41.36	\$509
2017	14,417	2,314	15,020	0	0	485	12,438	12,923	2,242	3,123	\$35.28	\$41.56	\$509
2018	13,753	1,907	14,084	0	0	378	12,332	12,710	1,907	3,148	\$36.31	\$43.31	\$499
2019	14,347	2,219	15,284	0	0	382	11,891	12,272	2,077	3,964	\$37.95	\$42.79	\$544
2020	13,325	2,334	13,176	0	0	306	10,866	11,173	1,521	1,554	\$37.22	\$44.53	\$496
2021	12,542	1,571	12,953	0	0	335	12,274	12,609	1,656	2,292	\$38.41	\$43.44	\$482
2022e	11,000	2,500	12,300	0	0	340	11,300	11,640	1,600	2,700	\$45.00	\$46.90	\$495

e = estimate

Note: Prices and values are in nominal dollars.

Sources: Utah Geological Survey, U.S. Energy Information Administration

Figure 18.5: Utah's Electricity Net Generation and Consumption Plotted with End-use Residential Price, 2000–2022e



Source: Utah Geological Survey, U.S. Energy Information Administration

Table 18.5: Supply, Disposition, and Price of Electricity in Utah, 2000–2022e

Year	Net Generation by Fuel Type										Consumption by End Use				Residential Consumption Per Capita (MWh/person)	Prices by End Use			
	Coal	Petroleum	Natural Gas	Hydro	Geo-thermal	Wind	Solar	Biomass ¹	Other ²	Total	Residential	Commercial	Industrial	Total		Residential	Commercial	Industrial	All Sectors
	Gigawatthours															¢/kilowatthour			
2000	34,491	58	890	746	186	0	0	9	258	36,639	6,514	8,754	7,917	23,185	2.90	6.3	5.2	3.4	4.8
2001	33,679	58	1,446	508	186	0	0	5	4	35,887	6,693	9,113	7,411	23,217	2.92	6.7	5.6	3.5	5.2
2002	34,488	54	1,380	458	247	0	0	6	5	36,638	6,938	9,309	7,019	23,267	2.98	6.8	5.6	3.8	5.4
2003	35,979	33	1,383	421	198	0	0	5	4	38,024	7,166	9,048	7,646	23,860	3.02	6.9	5.6	3.8	5.4
2004	36,618	33	910	450	195	0	0	4	3	38,212	7,325	9,370	7,816	24,512	3.01	7.2	5.9	4.0	5.7
2005	35,970	41	1,178	784	185	0	0	4	3	38,165	7,567	9,444	7,989	25,000	3.02	7.5	6.1	4.2	5.9
2006	36,856	62	3,389	747	191	0	0	15	5	41,263	8,232	9,778	8,356	26,366	3.20	7.6	6.2	4.2	6.0
2007	37,171	39	7,424	539	164	0	0	31	5	45,373	8,752	10,275	8,759	27,785	3.32	8.2	6.5	4.5	6.4
2008	38,020	44	7,366	668	254	24	0	24	179	46,579	8,786	10,319	9,086	28,192	3.26	8.3	6.7	4.6	6.5
2009	35,526	36	6,444	835	279	160	0	48	215	43,543	8,725	10,268	8,594	27,587	3.16	8.5	7.0	4.8	6.8
2010	34,057	50	6,455	696	277	448	0	56	210	42,249	8,834	10,402	8,808	28,044	3.19	8.7	7.2	4.9	6.9
2011	33,138	54	5,256	1,230	330	573	0	58	197	40,836	8,947	10,579	9,333	28,859	3.17	9.0	7.4	5.1	7.1
2012	30,799	40	6,580	748	335	704	2	60	137	39,403	9,188	10,841	9,694	29,723	3.20	9.9	8.1	5.6	7.8
2013	34,285	26	6,606	505	319	540	2	71	163	42,517	9,402	11,062	10,010	30,474	3.24	10.4	8.3	5.9	8.2
2014	33,377	24	8,376	633	522	660	2	73	118	43,785	8,964	11,114	9,965	30,043	3.04	10.7	8.5	6.1	8.4
2015	31,656	20	8,218	769	430	626	32	85	114	41,949	9,117	11,670	9,405	30,192	3.04	10.9	8.6	6.2	8.5
2016	25,939	32	8,691	760	485	822	1,054	84	267	38,134	9,371	11,622	9,187	30,180	3.06	11.0	8.8	6.3	8.7
2017	26,390	38	5,871	1,294	481	858	2,211	78	191	37,412	9,511	11,795	9,283	30,589	3.05	11.0	8.7	6.1	8.6
2018	25,912	37	8,724	927	446	795	2,224	79	232	39,375	9,715	12,135	9,393	31,242	3.06	10.4	8.2	5.9	8.2
2019	25,241	40	9,369	875	310	819	2,186	71	206	39,117	9,740	11,912	9,491	31,143	3.01	10.4	8.3	6.0	8.2
2020	22,806	40	9,460	817	377	803	2,571	78	137	37,087	10,547	11,444	9,672	31,663	3.21	10.4	8.3	5.9	8.3
2021	26,376	38	10,686	494	420	825	3,479	81	167	42,566	10,950	12,255	9,472	32,678	3.28	10.4	8.1	6.2	8.3
2022e	23,900	30	10,700	540	450	700	3,900	75	145	40,440	11,300	12,700	9,100	33,100	3.32	11.0	8.5	6.7	8.9

e = estimate MWh = megawatthours

1. Includes landfill gas, biogenic municipal solid waste, and other biogenic gases.

2. Includes blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels, as well as nonbiogenic municipal solid waste.

Note: Prices are in nominal dollars.

Sources: Utah Geological Survey, U.S. Energy Information Administration

Andrew Rupke, Utah Geological Survey
Stephanie Mills, Utah Geological Survey

OVERVIEW

The Utah Geological Survey (UGS) projects an estimated gross production value of metallic and industrial mineral commodities of \$4.1 billion in 2022, essentially unchanged from 2021's estimated value of \$4.1 billion (in nominal dollars; \$4.5 billion adjusting for inflation). The U.S. Geological Survey reported that the 2021 value of Utah's nonfuel (metallic and industrial) minerals production ranked seventh nationally, accounting for 4.2% of the total U.S. nonfuel minerals production. The UGS's 2022 production values come primarily from industry production surveys, corporate quarterly reports, and discussions with mining industry professionals.

The 2022 mineral production value estimate of \$4.1 billion includes a metals value of \$2.5 billion (60%) and an industrial minerals value of \$1.7 billion (40%). Utah's metal production includes copper, gold, magnesium, iron, molybdenum, beryllium, and silver in decreasing order of estimated value. Utah also produces a long list of industrial mineral commodities including potash, salt, sand and gravel, crushed stone, portland cement, lime, limestone, lithium, phosphate, gilsonite, gypsum, frac sand, and other mineral products.

The most significant metal producer in the state remains Rio Tinto's Bingham Canyon open-pit mine. Bingham Canyon is the largest producer of copper, gold, and silver in Utah and is the state's only producer of molybdenum and tellurium. Copper production is projected to increase from 2021 to 2022 given the shift of mining at Bingham Canyon to zones of higher-grade copper, though production of gold and silver are expected to decrease moderately and molybdenum production to decrease notably. Rio Tinto announced the beginning of tellurium recovery in May 2022, becoming one of only two producers in the United States, following a \$2.9 million investment in the recovery facility. In September 2022, Rio Tinto

announced a \$55 million investment to start underground mining to supplement open pit production through 2027. This is in addition to a \$108 million investment for a feasibility study of more extensive underground mining announced in July 2021. Current mine life is estimated to reach 2032.

The Lisbon Valley copper mine in San Juan County, the only other copper producer in Utah, re-initiated active mining in 2022 and embarked on an aggressive exploration program to increase the mine's known resources and reserves. Lisbon Valley Mining Company is pursuing permitting for an in-situ mining operation that would allow them to mine deeper parts of the ore body. Mining continued at the Iron Mountain iron mine in Iron County and at the Trixie gold-silver mine in Juab County, both relatively new mining operations that continued to expand production in 2021 and are likely to plateau at current levels in 2022.

Industrial mineral value from 2021 to 2022 is projected to increase modestly. Potash is produced at three facilities in Utah, and potash value increased substantially during 2022 due to the war in Ukraine. Lithium value also increased substantially in 2022, and US Magnesium continues to work towards increasing lithium production at their facility at Great Salt Lake after beginning production in 2020. U.S. Geological Survey data for the first half of 2022 indicate that construction aggregate production in Utah was similar to the first half of 2021. Construction aggregate, consisting of sand and gravel and crushed stone, is one of the more significant mineral commodities in Utah and is an indicator of the growth or decline of the construction sector.

Utah produced six critical minerals in 2022 (beryllium, lithium, magnesium metal, palladium, platinum, and tellurium), and hosts known resources of seven more (aluminum, fluorspar,

indium, gallium, germanium, vanadium, and zinc) based on the U.S. Department of the Interior's (DOI) 2022 critical mineral list. Beryllium is produced from the Spor Mountain mining district by Materion Resources, and this operation accounts for over 65% of global beryllium production. US Magnesium remains the only producer of magnesium metal in the United States, producing from Great Salt Lake brines. Platinum and palladium, along with tellurium, are recovered as byproducts of metal refining at Bingham Canyon. Notable established resources of critical minerals include Blawn Mountain in Beaver County as the largest alunite (aluminum, potash) resource in the country and the West Desert zinc-copper-indium deposit in Juab County as the only known indium resource in the country.

Metal exploration activity held steady in 2022 after a substantial increase in 2021. Notable drilling programs have taken place in Beaver, Iron, Juab, Millard, Piute, Tooele, Utah, and Washington Counties, primarily for copper and gold. Early stage exploration has been active in Box Elder, Emery, Garfield, Grand, and San Juan Counties for uranium and copper. Overall exploration drilling footage in 2022 decreased modestly from 2021 and is expected to remain stable in 2023.

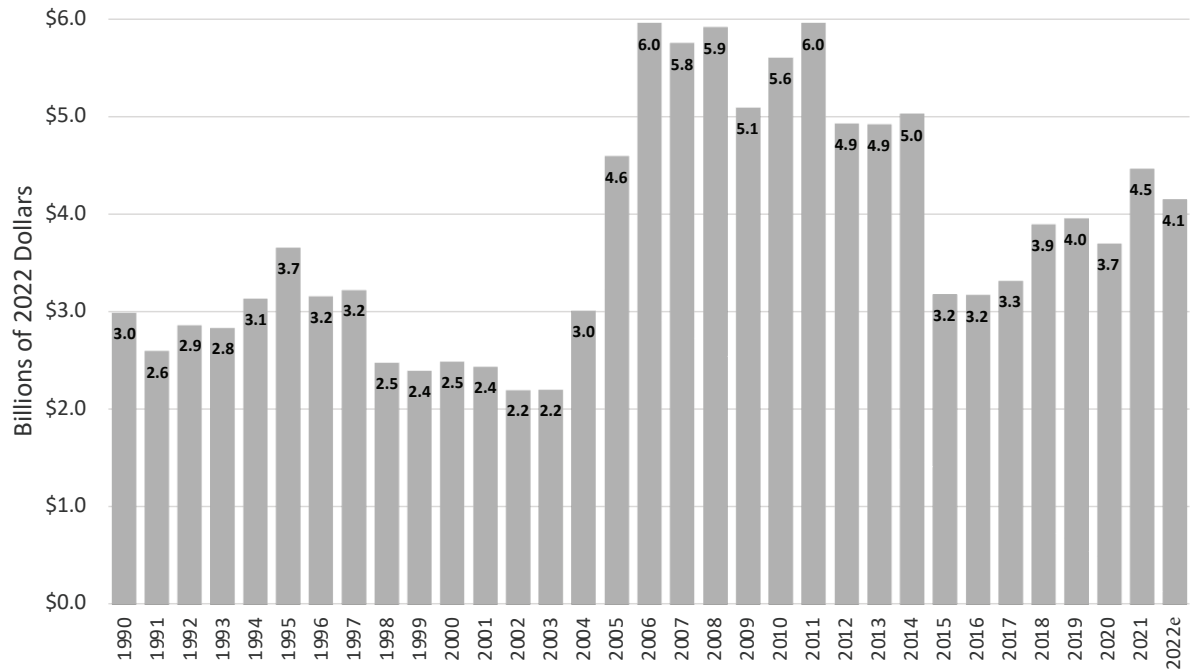
Recent industrial mineral exploration and development in Utah has included fluorspar, lithium, pozzolan, and others. Utah is poised to become the nation's only fluorspar producer as Ares Strategic Mining revives the Lost Sheep mine, Utah's largest historical producer of fluorspar. Due to battery demand, lithium prices continue to rise with renewed exploration interest. Compass Minerals, a potash producer on Great Salt Lake, defined a lithium resource and expressed intent to begin lithium production from the lake by 2025. Anson Resources continues to pursue a potential lithium resource in subsurface brines of the Paradox Basin. Anson has re-entered old oil and gas wells in the basin to test lithium concentration in brines with some success and have expanded

their in-place resource to over 1 million tons of lithium carbonate equivalent. Recently, interest in rock-hosted lithium in the West Desert has also emerged. Pozzolan is a material that has cementitious properties and can be used as an additive to portland cement to extend or enhance the cement. The benefits of pozzolans over conventional cement production can include reductions in manufacturing cost and greenhouse gas emissions. Interest in natural pozzolanic material has increased recently as availability of coal fly ash, a common manufactured pozzolan, has decreased. Multiple companies have been looking for natural pozzolan resources in Utah.

2023 OUTLOOK

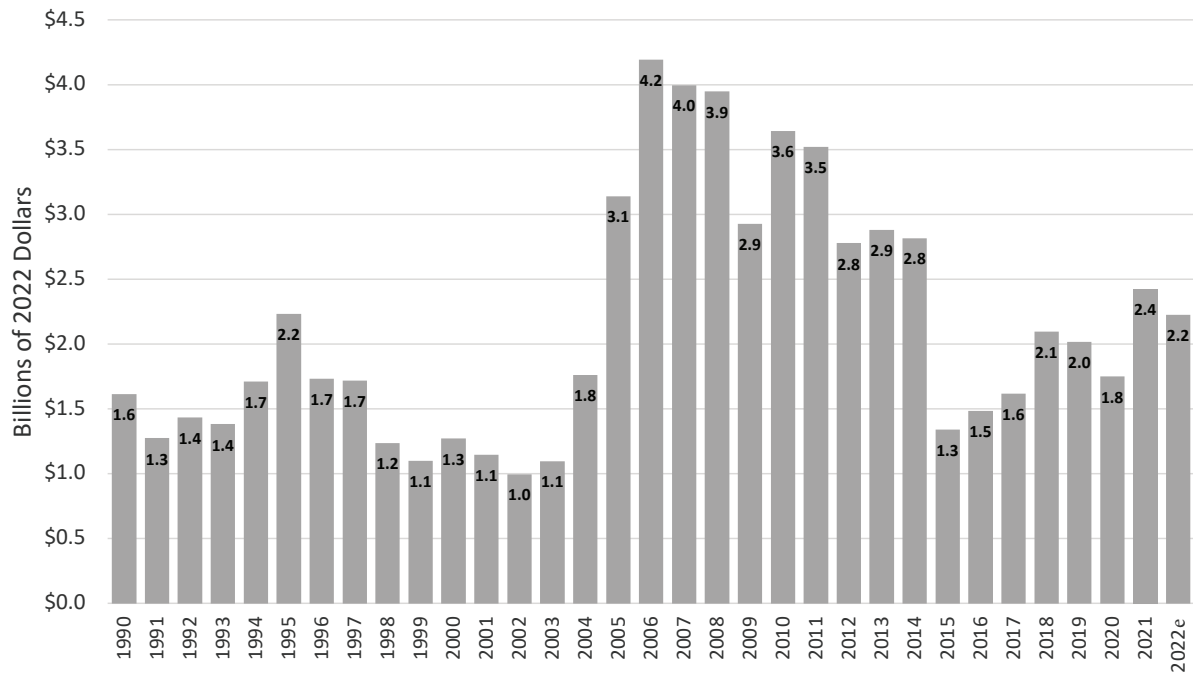
In 2023, Bingham Canyon is expected to increase copper mining rates, hold relatively stable with gold and silver production, and decrease molybdenum production because of pivoting to higher copper zones. Commodity prices dropped notably in the middle of 2022, and it remains unclear where prices might go in 2023 though the long-term outlook for copper remains robust. Consolidation of exploration projects may cause short-term contraction of exploration budgets; however, the need for more resources to support a high tech and increasingly carbon neutral economy is likely to drive strong exploration budgets in the moderate to long term. Given the increase in potash prices during 2022, potash exploration in Utah may be revived after a few years of limited activity. Lithium prices are likely to remain high and exploration and development activity in Utah will likely continue. Major swings in production and commodity prices for other industrial minerals are not expected in 2023. In summary, the UGS estimates that the production value of Utah's metallic and industrial mineral commodities will be similar to or slightly less in 2023 than 2022, mainly due to lower commodity prices.

Figure 21.1: Total Value of Utah's Annual Metallic and Industrial Mineral Production, 1990-2022e



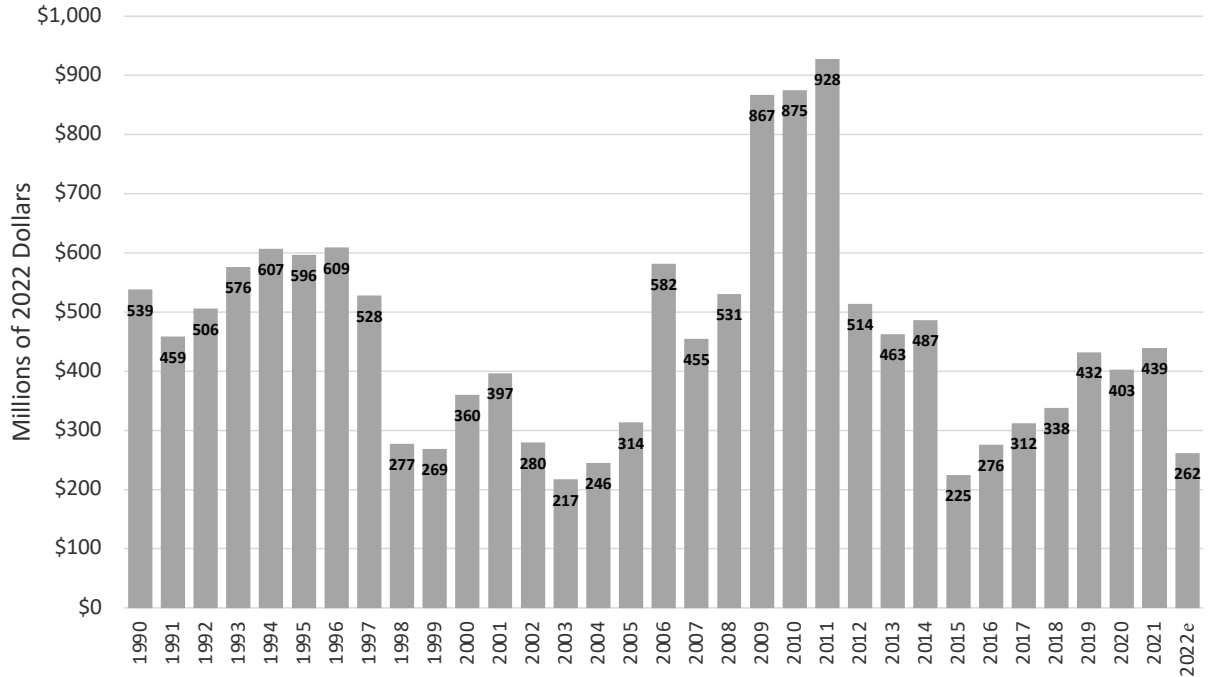
Note: e = estimate
Source: Utah Geological Survey

Figure 21.2: Value of Utah's Annual Base Metal Production, 1990-2022e



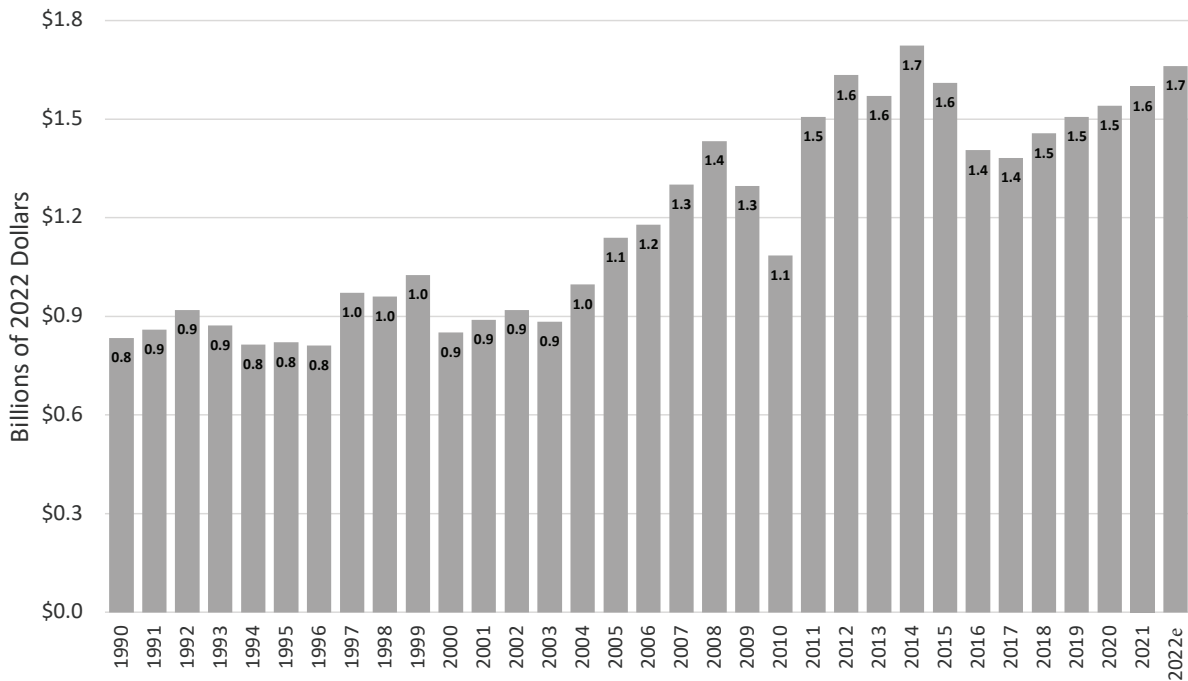
Note: e = estimate
Source: Utah Geological Survey

Figure 21.3: Value of Utah's Annual Precious Metal Production, 1990-2022e



Note: e = estimate
Source: Utah Geological Survey

Figure 21.4: Value of Utah's Annual Industrial Mineral Production, 1990-2022e



Note: e = estimate
Source: Utah Geological Survey