Appendix A
Explanatory Notes

The U.S. Energy Information Administration (EIA) publishes monthly data for the supply and disposition of natural gas in the United States in the *Natural Gas Monthly* (NGM). The information in this appendix is provided to assist users in understanding the monthly data. Table A1 lists the methodologies for deriving the data to be published for the most recent months shown in Tables 1 and 2. The following explanatory notes describe sources for all NGM tables.

Table A1. Methodology for most recent monthly natural gas supply and disposition data of tables 1 and 2

Components	Reporting methodology
Supply and disposition	
Marketed production	Estimated from sample data reported on Form EIA-914
Natural gas plant liquid (NGPL) production	Derived from data reported on Form EIA-816
Dry production	Marketed production minus NGPL production
Withdrawals from storage	Reported on Form EIA-191
Supplemental gaseous fuels	Derived from supply estimates and coal gasification information
Imports	Derived from the Office of Fossil Energy and Carbon Management
Additions to storage	Reported on Form EIA-191
Exports	Derived from the Office of Fossil Energy and Carbon Management
Current-month consumption	Reported on Form EIA-857, Form EIA-923, and other sources below
Consumption by sector	
Lease and plant fuel	Derived from marketed production
Pipeline and distribution use	Derived from deliveries to consumers
Residential	Estimated from sample data reported on Form EIA-857
Commercial	Estimated from sample data reported on Form EIA-857
Industrial	Estimated from sample data reported on Form EIA-857
Electric power	Estimated from sample data reported on Form EIA-923
Vehicle fuel	EIA computations

Note 1. Production

Monthly data

Estimates of gross withdrawals and marketed production for the Lower 48 states are derived from submissions by well operators on the monthly Form EIA-914, *Monthly Crude Oil and Lease Condensate, and Natural Gas Production Report*. For 2022 forward, volumes are available only for those states/areas that were collected

individually on the EIA-914 report (Arkansas, California (including state offshore), Colorado, Federal Offshore Gulf of Mexico, Kansas, Louisiana (including state offshore), Montana, New Mexico, North Dakota, Ohio, Oklahoma, Pennsylvania, Texas (including state offshore), Utah, West Virginia, and Wyoming). The *other states* category comprises states/areas not individually collected on the EIA-914 report (Alabama, Arizona, Federal Offshore Pacific, Florida, Idaho, Illinois, Indiana, Kentucky, Maryland, Michigan, Mississippi, Missouri, Nebraska, Nevada, New York, Oregon, South Dakota, Tennessee, and Virginia). All data for Alaska are obtained directly from the state. The sum of individual states may not equal total U.S. volumes due to independent rounding. (See the EIA-914 Methodology for an explanation of the procedure for estimating state gross withdrawals from reported volumes.)

Marketed production is estimated from gross withdrawals using historical relationships between the two. All monthly data are considered preliminary up to the cover year of the most recent *Natural Gas Annual*.

Annual data

Natural gas production data (gross withdrawals, gas vented and flared, repressuring, nonhydrocarbon gases removed, fuel used on leases, and marketed production) were obtained directly from the state agencies where available, or, in some cases, from EIA-914 estimates, state sponsored public record databases, or commercial data vendors such as Enverus DrillingInfo or IHS Markit. Production data for the Federal Gulf of Mexico region are provided by the U.S. Bureau of Safety and Environmental Enforcement (BSEE). Federal Offshore Pacific production, currently allocated to California, is also collected from BSEE.

Note 2. Natural gas plant liquid (NGPL) production

Monthly data

Monthly NGPL production is reported by gas processing plants on Form EIA-816, *Monthly Natural Gas Liquids Report*. These liquid volumes are converted to natural gas equivalents using factors consistent with industry standards published by the Gas Processors Association, and instructions to respondents to EIA's annual survey of gas processing plants, Form EIA-64A, *Annual Report of the Origin of Natural Gas Liquids Production*. Separate values are used for ethane, propane, isobutane, and normal butane. A value for "natural gasoline," reflecting pentanes and higher, is used. A separate value for isopentane is also used when reporting facilities have the capability to separate out and market isopentane on its own. The value for natural gasoline also includes isopentane - this value is used when estimating the volumetric equivalent of "pentanes plus" produced. These factors all are for "real" rather than "ideal" gas volumes stated at a pressure of 14.73 pounds per square inch absolute (psia) at 60 degrees Fahrenheit on a dry basis.

Annual data

The final NGPL production estimates, published in the NGA, incorporate information received from gas processing plants on Form EIA-64A, *Annual Report of the Origin of Natural Gas Liquids Production*. Monthly NGPL production estimates are recalibrated to equate to this total.

Note 3. Supplemental gaseous fuels

Monthly data

All monthly data are considered preliminary until after the publication of the NGA for the year in which the report month falls. Monthly estimates are based on the annual ratio of supplemental gaseous fuels to the sum of dry gas production, net imports, and net withdrawals from storage. This ratio is applied to the monthly sum of these three elements to compute a monthly supplemental gaseous fuels figure.

Monthly data are revised after publication of the NGA. Final monthly data are estimated based on the revised annual ratio of supplemental gaseous fuels to the sum of dry gas production, net imports, and net withdrawals from storage. This revised ratio is applied to the revised monthly sum of these three supply elements to compute final monthly data.

Annual data

Annual data on supplemental gaseous fuel supply are reported on Form EIA-176, *Annual Report of Natural and Supplemental Gas Supply and Disposition*.

Note 4. Imports and Exports

Monthly and annual data – imports

Monthly import and export data are from Form FE-746R, *Import and Export of Natural Gas*, from the Office of Fossil Energy and Carbon Management, U.S. Department of Energy. Annual data are the aggregate of the monthly data for that year.

Note 5. Natural gas storage

Note that final monthly and annual storage levels, additions, and withdrawal data shown in Table 1 for 2019 through 2022 include both underground and liquefied natural gas (LNG) storage. Beginning in January 2013, U.S. totals include Alaska data. Prior to 2013, totals only included data from the lower 48 states. Beginning in November 2015, new region breakouts of the storage data shown in Tables 12 and 13 were introduced, replacing the Producing, East, and West region breakouts. The states included in each of these five regions are as follows:

East Region: Connecticut, Delaware, District of Columbia, Florida, Georgia, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, and West Virginia.

South Central Region: Alabama, Arkansas, Kansas, Louisiana, Mississippi, Oklahoma, and Texas.

Midwest Region: Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Tennessee, and Wisconsin.

Mountain Region: Arizona, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Utah, and Wyoming.

Pacific Region: California, Oregon, and Washington.

Monthly data

Preliminary and final monthly data on underground storage levels, additions, and withdrawals are from the Form EIA-191, *Monthly Underground Gas Storage Report*. All operators of underground storage fields complete the survey.

Estimates of monthly LNG additions and withdrawals are calculated by applying the proportion of each month's net injections to underground storage during the injection season to annual LNG additions and the proportion of each month's net withdrawals from underground storage during the withdrawal season to annual LNG withdrawals.

There are three principal types of underground storage facilities in operation in the United States today: salt caverns (caverns hollowed out in salt "bed" or "dome" formations), depleted fields (depleted reservoirs in oil and/or gas fields), and aquifer reservoirs (water-only reservoirs conditioned to hold natural gas). A storage facility's daily deliverability or withdrawal capability is the amount of gas that can be withdrawn from it in a 24-hour period. Salt cavern storage facilities generally have high deliverability because all of the working gas in a given facility can be withdrawn in a relatively short period of time. (A typical salt cavern cycle is 10 days to deplete working gas, and 20 days to refill working gas.) By contrast, depleted field and aquifer reservoirs are designed and operated to withdraw all working gas over the course of an entire heating season (about 150 days). Further, while both traditional and salt cavern facilities can be switched from withdrawal to injection operations during the heating season, this is usually more quickly and easily done in salt cavern facilities, reflecting their greater operational flexibility.

Annual data

Final annual data on additions and withdrawals from underground storage facilities are the sum of the monthly data from the EIA-191.

Annual data on LNG additions and withdrawals are from the EIA-176.

Note 6. Consumption

Monthly data

All monthly data are considered preliminary until after publication of the NGA.

Annual data

All annual data are from the NGA. Total consumption is the sum of the components of consumption listed below. Monthly data are revised after publication of the NGA.

Residential, commercial, and industrial consumption

Preliminary estimates of monthly deliveries of natural gas to residential, commercial, and industrial consumers in 50 states are based on data reported on Form EIA-857, *Monthly Report of Natural Gas Purchases and Deliveries*. See Appendix C, "Statistical Considerations," for a detailed explanation of sample selection and estimation procedures. Monthly data for a given year are revised after the publication of the NGA to correct for any sampling errors. Final

monthly data are estimated by allocating annual consumption data from the Form EIA-176 to each month in proportion to monthly volumes reported in Form EIA-857.

Vehicle fuel use

Monthly U.S. total estimates of natural gas (compressed or liquefied) used as vehicle fuel are derived from an annual estimate of vehicle fuel use provided by the Office of Electricity, Renewables, and Uranium Statistics of EIA.

Electric power consumption

Monthly estimates of deliveries of natural gas to electric power producers are derived from data submitted by the sample of electric power producers reporting monthly on Form EIA-923, *Power Plant Operations Report*, which replaced Form EIA-906, *Power Plant Report*, and Form EIA-920, *Combined Heat and Power Plant Report*. The estimates reported in the NGM represent gas delivered to electricity-only plants (utility and independent power producers) and combined heat and power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public. For a discussion of these estimates, see the *Electric Power Monthly*.

Pipeline and distribution use

Preliminary monthly estimates are based on the pipeline fuel consumption as an annual percentage of total consumption from the previous year's Form EIA-176. This percentage is applied to each month's sum of total deliveries plus lease and plant fuel to compute the monthly estimate.

Monthly data are revised after the publication of the NGA. Final monthly data are based on the revised annual ratio of pipeline fuel consumption to total consumption from the Form EIA-176. This ratio is applied to each month's revised sum of total deliveries plus lease and plant fuel to compute final monthly pipeline fuel consumption estimates.

Lease and plant fuel consumption

Preliminary monthly data are estimated based on lease and plant fuel consumption as an annual percentage of marketed production. This percentage is applied to each month's marketed production figure to compute estimated lease and plant fuel consumption.

Monthly data are revised after publication of the NGA. Final monthly plant fuel data are based on a revised annual ratio of plant fuel consumption to marketed production from Form EIA-176. This ratio is applied to each month's revised marketed production figure to compute final monthly plant fuel consumption estimates. Final monthly lease data are collected directly from state agencies' websites where available. For states where these data are not available, lease fuel quantities were estimated by applying an average of the states' historical ratio of lease fuel to gross withdrawals . See the NGA for a complete discussion of this process.

Note 7. Balancing item

The balancing item category represents the difference between the sum of the components of natural gas supply and the sum of the components of natural gas disposition. These differences may be due to data reporting problems or to issues in survey coverage. Preliminary monthly data in the balancing item category are calculated by subtracting dry gas production, withdrawals from storage, supplemental gaseous fuels, and imports from total disposition. The balancing item may reflect problems in any of the surveys comprising natural gas supply or disposition.

Reporting problems include differences due to the net result of conversions of flow data metered at varying temperatures and pressure bases and converted to a standard temperature and pressure base; the effect of variations in company accounting and billing practices; differences between billing cycles and calendar periods; and imbalances resulting from the merger of data reporting systems, which vary in scope, format, definitions, and type of respondents. Survey coverage problems include incomplete survey frames or problems in sampling design.

Annual data are from the NGA. For an explanation of the methodology used in calculating the annual balancing item, see the NGA.

Note 8. Average price of deliveries to consumers

For most states, price data are representative of prices for gas sold and delivered to residential, commercial, and industrial consumers by local distribution companies. Published prices are considered to be total prices paid by end-users per thousand cubic feet of natural gas in the respective sectors, inclusive of all tax, delivery, commodity, demand and other charges. In the states of Georgia, Maryland, New York, Ohio, and Pennsylvania, the residential and commercial sector prices reported in the NGM include data on prices of gas sold to customers in those sectors by energy marketers. These latter data are collected on Form EIA-910, *Monthly Natural Gas Marketer Survey*. In 2008 through 2010, in the states of Florida, Georgia, Maryland, New Jersey, New York, Ohio, Pennsylvania, and Virginia, residential price data were based on total gas deliveries, and, in the states of Florida, Georgia, Maryland, Michigan, New York, Ohio, Pennsylvania, Virginia, and the District of Columbia, commercial price data were based on total gas deliveries. Beginning in 2011, however, residential and commercial price data are based on total gas deliveries in the states of Georgia, New York and Ohio only. Residential and commercial sector prices reported in the NGM include data on prices of gas sold to customers in those states by energy marketers as data quality becomes acceptable. Except for these states, none of the prices reflect average prices of natural gas transported to consumers for the account of third parties. Table 24 indicates the percentage of total deliveries included in residential, commercial, and industrial price estimates.

Prices of natural gas delivered to the electric power sector are derived from data reported on the Form EIA-923, *Power Plant Operations Report*. Prices from these surveys are also published in the *Electric Power Monthly*.

Note 9. NGPL composite spot price and natural gas spot price

Monthly data

The natural gas plant liquids (NGPL) composite price published in the NGM is derived from spot price data at Mont Belvieu, Texas, from Bloomberg. Daily closing spot prices for ethane, propane, butane, isobutane, and natural gasoline (pentanes plus) are each averaged into a monthly series, then weighted according to the portion of a representative natural gas plant liquids barrel that they occupy. Volume weights are updated monthly using the latest available data collected on Form EIA-816, *Monthly Natural Gas Liquids Report*. The NGPL composite price excludes natural gas liquids produced at crude oil refineries.

Bloomberg spot price data for each natural gas liquids (NGL) product are in cents per gallon. EIA converts these prices into dollars per barrel. Using heat conversion factors from Table A1 in the appendix of the *Annual Energy Review*, "Approximate Heat Content of Petroleum Products," the prices are converted to dollars per million British thermal units (MMBtu) for each natural gas liquid.

The NGPL composite spot price is calculated as:

$$P = \sum \left(p_i * \frac{v_i}{V} \right)$$

where:

P = the NGPL composite spot price in dollars per MMBtu,
p_i = the monthly spot price for natural gas liquids product i in dollars per MMBtu,
V = the total volume of natural gas plant liquids produced in the report month,
v_i = the monthly production volume for natural gas plant liquids product i.

The natural gas spot price is the simple average of the daily closing spot prices for natural gas at the Henry Hub in Louisiana. This series is published by Refinitiv, an LSEG business, and republished by EIA with permission.

Annual data

The annual NGPL composite spot price represents the average cost of a representative barrel of NGPL in a given year. This annual figure is calculated as the total cost of all NGPL products sold, as priced at Mont Belvieu, divided by the total volume of all NGPL products produced for the year derived by summing the months of natural gas plant liquids production data collected on Form EIA-816.

The annual natural gas spot price represents the average of daily closing spot prices for dry natural gas at the Henry Hub in Louisiana in a given year.

Note 10. Heating degree-days

Degree-days are relative measurements of outdoor air temperature. Heating degree-days are deviations of the mean daily temperature below 65 degrees Fahrenheit. A weather station recording a mean daily temperature of 40 degrees Fahrenheit would report 25 heating degree-days. There are several degree-day databases maintained by the National Oceanic and Atmospheric Administration. The information published in the NGM, is developed by the National Weather Service Climate Analysis Center, Camp Springs, Maryland.

The data are available weekly with monthly summaries and are based on mean daily temperatures recorded at about 200 major weather stations around the country. The temperature information recorded at these weather stations is used to calculate statewide degree-day averages weighted by gas home customers. The state figures are then aggregated into Census Divisions and into the national average. Table 26 of this report presents the Heating Degree data, and is included in the December through April NGM publications.

Note 11. Heat content

The Form EIA-857 collects volume and cost data on natural gas delivered to residential, commercial, and industrial consumers, as shown in Tables 2 and 25 of the NGM. Data are reported by a sample of natural gas companies that deliver to consumers in the United States. Respondents are instructed to calculate the average heat content (Btu) by summing the total Btu delivered each month (volume delivered directly to consumers) multiplied by average Btu content per unit volume and then dividing by the total volume delivered directly to consumers during that month. The average Btu content for each month should be that used for billing purposes whether billing was on a therm (100,000 Btu) or dekatherm (1,000,000 Btu) basis. The value for heat content is expected to be in the range of 900 to 1200 Btu/cubic foot.