

Appendix A

Summary of Data Collection Operations and Report Methodology

The 2002 data for the *Natural Gas Annual* are taken primarily from Form EIA-176, “Annual Report of Natural and Supplemental Gas Supply and Disposition” and Form EIA-895, “Monthly Quantity and Value of Natural Gas Report.” Each of these surveys and all other sources of data for this report are discussed separately in the following sections.

Changes in the *Natural Gas Annual 2002*

Introduction of Data from Natural Gas Marketers

For the states of Georgia, Maryland, New York, Ohio and Pennsylvania, natural gas prices in the residential and commercial sectors are comprised of data from Form EIA-176 and the Form EIA-910 “Monthly Natural Gas Marketer Survey”. The EIA-910 collects data on the price and volume of natural gas sold by marketers, or companies that sell but do not deliver gas to residential and commercial customers. Further detail on the use of data from the EIA-910 follows in the section on coverage of consumer prices.

Change in Presentation of Gulf of Mexico Production

The presentation of natural gas production volumes for the Federal Offshore portion of the Gulf of Mexico has been consolidated and is now presented as a separate data series. These changes have been incorporated in this report for report years 2001 and 2002. Because Federal Gulf of Mexico production was previously included in production for the States of Alabama, Louisiana, and Texas, the change in presentation does not affect total U.S. production for prior years.

Cautionary Note: Number of Residential Consumers

EIA expects that there may be some double counting in the number of residential and commercial consumers reported for the years presented in this report, 1998 through 2002.

EIA collects information on the number of residential and commercial consumers through a survey of companies that

deliver gas to consumers (Form EIA-176). The survey asks companies for the number of customers served as sales customers as well as customers to whom they deliver gas purchased from others. Traditionally, residential and commercial customers obtained the gas and all services associated with delivering it from their local distribution company (LDC). The LDC records these customers as sales customers. Customer choice programs allow consumers to select the provider from whom they purchase gas. When customers elect to purchase gas from a provider other than the LDC, the LDC continues to deliver the gas to the household even though it no longer sells the gas. When customers switch to another provider, they become transportation service customers for the LDC. A residential customer who enters a customer choice program during a year may be classified both as a traditional sales customer and, after entering the customer choice program, as a transportation service customer. In addition, some residential and commercial consumers may switch from transportation to sales service, for instance, when a choice pilot program ends. The double reporting affects the number of consumers shown in the *Natural Gas Annual*.

Tables 19-20 assist readers in evaluating the extent and possible effect of double reporting. Tables 19-20 list the number of sales and transportation customers, for residential and commercial consumers, respectively, reported on Form EIA-176 for 2001 and 2002. Appendix A provides a link to the survey Form EIA-176, “Annual Report of Natural and Supplemental Gas Supply and Disposition” on the EIA web site. Numbers of residential customers are reported on this form for both sales (in Section VI, lines 10.1) and transportation (in Section VI, line 11.1). Numbers of commercial customers are reported on this form for both sales (in Section VI, line 10.2) and transportation (in Section VI, line 11.2).

Customer choice programs, also known as retail unbundling programs, were implemented starting in the late 1990s. A description of these programs for States offering customer choice is on the EIA web site at: www.eia.doe.gov/oil_gas/natural_gas/restructure/restructure.html.

Form EIA-176

Survey Design

The original version of Form EIA-176 was approved in 1980 with a mandatory response requirement. Prior to 1980, published data were based on voluntary responses to Bureau of Mines, U.S. Department of the Interior predecessor Forms BOM-6-1340-A and BOM-6-1341-A of the same title.

The Form EIA-176 is a four-page form consisting of seven sections. Section I of the form contains identifying information including the company identification number, the company name and address, the State for which the report is filed, and address correction information. Section II asks for type of operations conducted by the company. The body of the form (Sections III-VII) is a multi-line schedule for reporting all supplies of natural gas and supplemental gaseous fuels and their disposition within the State indicated. Respondents filed completed forms with the EIA in Washington, D.C. Data for the year 2002 were due March 1, 2003.

A copy of the Form EIA-176 and instructions is available at: www.eia.doe.gov/oil_gas/natural_gas/survey_forms/nat_survey_forms.html

Data reported on this form are not considered proprietary.

In January 2003, forms for report year 2002 were mailed to all identified interstate natural gas pipeline companies; intrastate natural gas pipeline companies; investor and municipally owned natural gas distributors; underground natural gas storage operators; synthetic natural gas plant operators; field, well, or processing plant operators that delivered natural gas directly to consumers (including their own industrial facilities) other than for lease or plant use or processing; and field, well, or processing-plant operators that transported gas to, across, or from a State border through field or gathering facilities. Detailed instructions for completing the form were included in each survey package.

Completed forms were returned to the Natural Gas Division, Office of Oil & Gas, where each was checked for errors, corrected as necessary, and processed into computer-generated State and national data summaries.

Response Statistics

Each company and its parent company or subsidiaries were required to file if they met the EIA-176 survey criteria. The original mailing totaled 1,973 questionnaire packages. To the original mailing list, 46 names were added and 34 were deleted as a result of the survey processing. Additions were identified from a special frames update process and by way of comparisons to additional natural gas industry survey mailing lists. Deletions resulted from post office returns and research that identified companies that were out of business, sold, or out of the scope of the survey. After all updates, the 2002 survey universe consisted of 1,985 active respondents.

Following the original mailing, a second request mailing, and nonrespondents follow-up, 1,949 responses were processed and entered into the database. There were 36 nonrespondents.

Summary of Form EIA-176 Data Reporting Requirements

Computer edit programs verify the report year, State code, and arithmetic totals. Further tests were made to ensure that all necessary data elements were present and that the data were reasonable and internally consistent. The computerized edit system produced error listings with messages for each failed edit test. To resolve problems, respondents were contacted by telephone and were required to file amended forms with corrected data.

All natural gas and supplemental gaseous fuels volumes were reported on a physical custody basis in thousand cubic feet, and dollar values were reported to the nearest whole dollar. All volumes were reported at 14.73 pounds per square inch absolute pressure and 60 degrees Fahrenheit. Other minor report standards specified in the instructions booklet assure that the filed data are consistent and can be readily processed.

Comparison of the Form EIA-176 with Other Data Sources

Comparison of the EIA-176 data with data from similar series is another method of ensuring the validity of the data published in this report. When these comparisons on a company-by-company basis showed significant differences, respondents were required to reconcile the data.

Data on imports and exports of natural gas, as collected by the EIA-176 survey, were checked by comparing individual responses with quarterly data reports, "Natural Gas Imports and Exports," filed with the Office of Fossil Energy, U.S. Department of Energy. These quarterly reports are required as a condition of import/export authorizations. Where discrepancies were noted, respondents were required to file corrected reports.

Similarly, data on the underground storage of natural gas were compared with submissions of Form EIA-191, "Underground Gas Storage Report." If significant differences were noted, companies were contacted to reconcile the discrepancies. During 2002, the operators of underground storage facilities filing the Form EIA-191 reported volumes of injections and withdrawals almost identical to the volumes reported on the Form EIA-176.

Data on deliveries to residential, commercial, and industrial consumers were compared with data submitted on Form EIA-857, "Monthly Report of Natural Gas Purchases and Deliveries to Consumers." Where discrepancies were noted, respondents were required to file corrected reports, sometimes for both surveys. Numerous telephone calls were made to clarify any misunderstandings concerning the correct filing of both forms. Typical errors included electric utility volumes combined with industrial volumes, sales for resale volumes reported as industrial consumption, and misinterpretation of general instructions.

Pipeline flows were also compared to pipeline capacity information filed at the Federal Energy Regulatory Commission. Flow volumes in excess of pipeline capacity required research and, in some cases, respondents were required to file corrected reports.

Form EIA-895

Survey Design

Beginning with 1980 data, natural gas production data previously obtained on an informal basis from appropriate State agencies were collected on Form EIA-627. This form was designed by the EIA to collect annual natural gas production data from the appropriate State agencies under a standard data reporting system within the limits imposed by the diversity of data collection systems of the various producing States.

In 1996, the Form was redesigned and assigned a new number. The new Form EIA-895 included both a Monthly and an Annual Schedule for quantity and value of natural gas production. The Annual Schedule is to be filed with the December

Monthly Schedule each year and should include any changes or updates in previously reported monthly data.

In April 2003, forms for report year 2002 were mailed to the appropriate agencies in 32 States. Completed forms were returned to the Natural Gas Division for review, processing, and compilation.

A copy of the Form EIA-895 and instructions is available at: www.eia.doe.gov/oil_gas/natural_gas/survey_forms/nat_survey_forms.html

Response Statistics

Of the 32 natural gas producing States, 31 participated in the EIA-895 voluntary survey by filing the completed form or by responding to telephone contacts. Data for the State of Illinois, which did not respond, were estimated. Data on the quantities of nonhydrocarbon gases removed in 2002 were reported by the appropriate agencies of 9 of the producing States. These States accounted for 36 percent of total 2002 gross withdrawals.

The commercial recovery of methane from coalbeds contributes a significant amount to the production totals in a number of States. Coalbed methane seams production quantities (in million cubic feet) are included in gross withdrawals totals for the following States: Alabama (115,949), Colorado (474,342), New Mexico (497,260) and Wyoming (327,785).

Summary of EIA-895 Data Reporting Requirements

The Form EIA-895 is a three-page form divided into seven sections. Section I requests identifying information including the name and location of the responding State agency and the name and telephone number of a contact person within the agency. Sections II and III collect monthly data on the production of natural gas including gross withdrawals from both gas and oil wells; volumes returned to formation for repressuring, pressure maintenance, and cycling; quantities vented and flared; quantities of nonhydrocarbon gases removed; quantities of fuel used on lease; and marketed production. Sections IV and V of the form request annual data, including the number of producing gas wells, the production of natural gas including gross withdrawals from both gas and oil wells; volumes returned to formation for repressuring, pressure maintenance, and cycling; quantities vented and flared; quantities of nonhydrocarbon gases removed; and quantities of fuel used on leases. Section VI and VII collect information on the marketed production value of marketed production and quantity of marketed production (value based).

Routine Form EIA-895 Edit Checks

Each filing of the Form EIA-895 is manually checked for reasonableness and mathematical accuracy. Volumes are converted, as necessary, to a standard 14.73 pounds per square inch absolute pressure base. Value data are compared to the previous year's data for reasonableness. When data on nonhydrocarbon gases removed, gas vented and flared, and gas used for repressuring are not reported for a State that historically reported one or more of these items, a volume is imputed. The imputation is based on the average ratio of gas volumes in the missing category to total gross withdrawals in States with values reporting gas in that category. This average ratio is applied to the volume of total gross withdrawals reported by the State to calculate the volume for the missing items. State agencies are contacted by telephone in order to correct errors. Amended filings or resubmissions are not a requirement, since participation in the survey is voluntary.

Comparison of the Form EIA-895 with Other Data Sources

Annual production data, as reported on the Form EIA-895, are compared to the sum of monthly data previously reported on the Monthly Schedule. The comparison is made in order to assure the reasonableness of the data reported on the Form EIA-895, Annual Schedule. Any significant differences are resolved by contacting the reporting State.

Other Data Sources

Offshore Production

The EIA developed estimates of the quantity of natural gas production and the number of producing wells for the Federal offshore Gulf of Mexico region from well-level data files provided by the U.S. Minerals Management Service (MMS) for the years of 2001 and 2002. The production data estimation methodology is described on the EIA-website.

Marketed Production

Marketed production of natural gas is taken from responses to Part IV of the Form EIA-895. It is the quantity of natural gas produced that is available for marketing and is reported in Tables 3 and 6. It refers to quantities of gas available after processes related to production are complete. These processes are repressuring, pressure maintenance, cycling, venting and flaring, removing nonhydrocarbon gases, using fuel on the lease.

Average wellhead prices are calculated from volumes and values reported in Part IV of the Form EIA-895. These data are shown as "Reported Wellhead Value" in Table 6. The volumes in this section refer to the actual amounts of natural gas reported to the States as sold.

In many States, the marketed production volumes used in revenue calculations are larger than the reported wellhead value volumes. Differences in these volumes generally result from differences in definition and reporting requirements for separate data systems in the State. For example, while production quantities of Federal, tribal, and State royalty gas are included in marketed production, some State reporting rules exclude these quantities from reported wellhead value volumes.

Natural Gas Processed and Extraction Loss

Extraction loss is the reduction in the volume of natural gas available for disposition resulting from the removal of natural gas liquid constituents at natural gas processing plants. It represents that portion of the "raw" gas stream transferred from the natural gas supply chain to the petroleum and natural gas liquids supply chain. Extraction loss does not include the reduction in volume resulting from the removal of nonhydrocarbon constituents or gas used as fuel, vented, flared, or otherwise disposed of within natural gas processing plants. Extraction loss also results in a reduction in the total heat (Btu) content of the natural gas stream equal to the heat content of the liquids extracted.

The Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production," collects data on the volume of natural gas received for processing, the total quantity of natural gas liquids produced, and the resulting shrinkage (defined as extraction loss in this report) from all natural gas processing- and cycling-plant operators. The quantity of natural gas received and liquids produced are reported by State of origin of the natural gas. Shrinkage volumes are calculated and reported by plant operators based upon the chemical composition of the liquids extracted using standard conversion factors specified in the form instructions. A description of the Form EIA-64A survey is presented in the EIA publication, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, Annual Reports*.

The heat (Btu) content of liquids extracted is not reported on the Form EIA-64A. Therefore, in order to estimate the extraction loss heat content, data reported on the Form EIA-816, "Monthly Natural Gas Liquids Report," were used to determine the individual products contained in the total liquids reported on Form EIA-64A. A description of the Form EIA-816 survey is presented in the EIA publication, *Petroleum Supply Annual 2002*, Volume II.

To estimate the quantities of individual products extracted in each State, data from the Form EIA-64A survey were used to determine the total liquids production, and data from the Form EIA-816 survey were used to estimate the quantities of the individual products contained in those total liquids.

The Form EIA-816 captures information on the quantity of individual components (i.e., ethane, propane, normal butane, isobutane, and pentanes plus) produced or contained in mixes of plant liquids as determined by chemical analysis. The volumetric ratios of the individual components to the total liquids, as calculated from the 12 monthly Form EIA-816 reports for each State, were applied to the annual total liquids production, as reported on the Form EIA-64A, to estimate the quantities of individual components removed at gas-processing plants.

The heat (Btu) content of extracted liquids was estimated by applying conversion factors to the estimated quantities of products extracted in each State. These conversion factors, in million Btu per barrel of liquid produced, were ethane, 3.082; propane, 3.836; normal butane, 4.326; isobutane, 3.974; and pentane plus, 4.620. It should be noted that, at the State level, extraction losses are not necessarily related to State production.

Imports and Exports

Volumes and prices of natural gas imports and exports were reported to the Office of Fossil Energy, U.S. Department of Energy, *Natural Gas Imports and Exports*. These data are nonproprietary and are filed annually by each individual or organization having authorization to import and export natural gas.

Lease and Plant Fuel

Lease and plant fuel represent those quantities of natural gas used in well, field, and/or lease operations (such as gas used in drilling operations, heaters, dehydrators, and field compressors) and as fuel in natural gas processing plants.

Lease fuel data were collected for report year 2002, on the Form EIA-895, "Monthly Quantity and Value of Natural Gas Report." Of the 32 States and the Federal Gulf of Mexico represented on the Form EIA-895, 14 States reported quantities of natural gas used as lease fuel. In the absence of reporting quantities on the Form EIA-895, the Form EIA-176 was used to estimate lease fuel quantities. Although EIA recognizes that lease data collected on the Form EIA-176 do not constitute a census or result from a statistically selected sample, the

data collected in the survey provide the best information available to the EIA for estimating such usage. To estimate lease use during 2002 (Table 15), several simplifying assumptions were made:

- The quantity of gas used for lease fuel was assumed to be a function of gross withdrawals of natural gas from gas and oil wells.
- The average proportion of company-owned on-system production reported as used in lease operations by respondents to the Form EIA-176 was assumed to be typical of the average use by all operators as a proportion of gross withdrawals.
- Average usage was calculated separately for Alaska and for the lower 48 States to reflect the distinctive field operations in Alaska, particularly on the North Slope.

Form EIA-176 respondents reported volumes of company-owned onsystem production equivalent to 1.29 percent of 2002 total gross withdrawals reported on the EIA-895 (1.4 percent of withdrawals in Alaska and 1.28 percent of withdrawals in the lower 48 States). Lease use reported by respondents on the EIA-176 averaged 6.3 percent of their reported production in Alaska and 3.9 percent of their reported production in the lower 48 States. The fuel-use estimates shown in Table 15 were calculated by applying the EIA-176 ratios to the gross withdrawals from the States not reporting lease use on the EIA-895.

Electric Power Generation Data

The data reported for the electric power sector in the *Natural Gas Annual 2002* are derived entirely from data submitted on electricity data collection forms. These include Form EIA-860, "Annual Electric Generator Report", Form EIA-906, "Power Plant Report", and Form FERC-423, "Monthly Report of Cost and Quality of Fuels for Electric Plants". The *Natural Gas Annual 2002* reports natural gas prices for electric utilities only.

The electric power sector includes electricity-only and combined heat and power plants whose primary business is to sell electricity, or electricity and heat, to the public. The change from "electric utilities" to "electric power" effected in *Natural Gas Annual, 2001*, was made in order to maintain consistency among EIA publications.

Natural Gas Consumed as a Vehicle Fuel

Volumes of natural gas consumed as vehicle fuel published in the *Natural Gas Annual 2002* were estimated by the Coal, Nuclear, and Renewable Fuels Division of EIA based on Form EIA-886, "Annual Survey of Alternative Fueled Vehicle Suppliers and Users." Vehicle fuel prices continue to be calculated from data obtained from the EIA-176.

Coverage of Consumer Prices

Coverage for prices varies by consumer sector as discussed below. All average prices are computed by dividing the reported revenue by its associated sales volume. Prices for deliveries of natural gas to residential, commercial and industrial consumers are calculated from reports to Form EIA-176, "Annual Report of Natural and Supplemental Gas Supply and Disposition" for all States and sectors except for Georgia, Maryland, New York, Ohio and Pennsylvania.

With the unbundling of services in the natural gas industry, pipeline and local distribution companies provide transportation service for end-user customers to whom they do not sell the gas. In this report, those volumes are described as deliveries of gas for the account of others. When companies that deliver gas are the sellers of that gas, they are able to report the associated revenue to the Energy Information Administration. Those volumes are described as onsystem sales. When the firm that physically delivers gas to the end user acts as a transportation agent, it does not know the sales price of the gas.

Respondents, therefore, do not report a revenue amount associated with deliveries for the account of others in their submissions of the Form EIA-176. In the States of Georgia, Maryland, New York, Ohio and Pennsylvania, natural gas marketers who sell gas transported to residential and commercial customers by local distribution companies report the revenues from the sale of this gas to EIA on Form EIA-910, "Monthly Natural Gas Marketer Survey." In these States, prices in the residential and commercial sectors are calculated by combining data from the Form EIA-176 and Form EIA-910.

City gate prices are calculated from reports to the Form EIA-857, "Monthly Report of Natural Gas Purchases and Deliveries to Consumers." Both the EIA-176 and EIA-857 are completed by companies that deliver natural gas to end-use consumers while the EIA-910 is completed by marketers or companies that sell but do not deliver natural gas to end-use consumers.

City Gate: City gate prices represent the total cost paid by gas distribution companies for gas received at the point where the gas is physically transferred from a pipeline company or transmission system. This price is intended to reflect all charges for the acquisition, storage, and transportation of gas as well as other charges associated with the LDCs obtaining the gas for sale to consumers.

Prices for gas delivered to the city gate represent all of the volumes of gas delivered. Since these prices are reported on a monthly form, the annual average city gate price is calculated by summing the monthly revenues reported and dividing that figure by the sum of the monthly reported volumes.

Residential: Prices in this publication for the residential sector cover nearly all of the volumes of gas delivered.

Commercial and Industrial: Prices for the commercial and industrial sectors are often associated with relatively small volumes of the total gas delivered. This occurs because they are reported by those that deliver gas and not by either the gas resellers or by the consumers. The delivery agent provides transportation service only and does not know the commodity cost of the gas it transports.

Natural gas prices reported for commercial and industrial consumers represent only those purchases from local distribution companies except for the States of Georgia, Maryland, New York, Ohio and Pennsylvania where commercial prices include data from natural gas marketers who sell gas transported to end-use commercial customers by local distribution companies. With the above exception, natural gas prices for commercial and industrial customers exclude volumes transported, but not sold, by the local distribution company or pipeline company.

Electric Utilities: Prices for natural gas are also reported to the EIA on the Form FERC-423, "Monthly Report of Cost and Quality of Fuels for Electric Plants," a consumer survey form. Electric utility prices in this report are taken from this form. The respondents are all large regulated electric utilities that report consumption and prices of fuels and represent most of the volumes delivered to electric utilities. These prices are also published in the EIA report, *Cost and Quality of Fuels for Electric Utility Plants*. Prices to electric utilities, because they are derived from a survey of the utilities themselves, represent most of the volumes consumed by this sector.

Vehicle Fuel: For the *Natural Gas Annual 2002*, natural gas consumption for vehicle fuel estimates were prepared by the Coal, Nuclear, and Renewable Fuels Division of EIA based on the Form EIA-886, "Annual Survey of Alternative Fueled Vehicle Suppliers and Users." Vehicle fuel prices continue to be calculated from data obtained from the Form EIA-176. Most of the natural gas delivered for vehicle fuel represents deliveries to refueling stations that are used primarily or exclusively by fleet vehicles. Thus, the prices are often those associated with the operation of fleet vehicles and may be based on internal transfer prices for companies primarily in the natural gas business. Because two different sources are used, with a different reporting population, coverage varies and leads to instances in which volumes, but no price data are available.

Natural Gas Balancing Item

The natural gas balancing item represents the difference between the sum of the components of natural gas supply and the sum of the components of natural gas disposition. It is calculated for each State as the result of a comparison between total reported supply and total reported disposition (Table 2). In the formula used, total reported supply is the sum of marketed production, net interstate movements, net movements across U.S. borders, and supplemental gaseous fuels supplies. Total reported disposition is the sum of extraction loss, net storage changes (net additions to storage), and consumption. When this calculation results in a negative quantity for the balancing item it represents an excess of reported supply in relation to reported disposition, and positive quantities indicate the opposite situation.

The differences between supply and demand represent quantities lost, the net result of gas company conversions of flow data metered at varying temperature and pressure conditions to a standard temperature and pressure base, metering inaccuracies, the effect of variations in company accounting and billing practices, differences between billing cycle and calendar-period time frames, and imbalances resulting from EIA's merger of data reporting systems, which vary in scope, format, definitions, and type of respondents. The balancing items in individual States may also reflect the underreporting on Form EIA-176 of gas transported across State borders for the account of others by some interstate pipelines.