

## II. Description of the Problem

### AN OVERVIEW OF NATURAL GAS CURTAILMENTS

In 1970, the supply of natural gas for the interstate market, began to be curtailed.<sup>4</sup> These curtailments have subsequently increased to where the current projections for the year April 1975 to March 1976 total 2.9 trillion cubic feet (Tcf), or 19.4 percent of firm interstate natural gas requirements.<sup>1</sup> For the heating season, November 1975 to March 1976, the curtailments total 1.3 Tcf or 18 percent of the firm requirements. The situation will continue to deteriorate as estimates for the following year (1976-77) project still greater supply deficiencies. The curtailment levels are shown in Table 1 for the years 1971-72 through 1975 -76. S

Table 1  
Total Curtailment Volumes  
Interstate Pipelines<sup>5</sup>

<u>Year</u> <u>(April 1 to March 31)</u>	<u>Curtailment</u> <u>(Trillion</u> <u>cubic feet)</u>
1971-72 .....	0.48
1972-73 .....	0.82
1973-74 .....	1.19
1974-75 .....	2.01
1975-76 (Projected) ..	2.92

The increase in curtailment volumes since 1971-72 for interstate pipelines reporting to the Federal Power Commission.

As straightforward as the above figures appear, the situation they reflect is complex and care must be exercised in their interpretation. The curtailment volumes which are reported in Federal Power Commission Form 16 data and are shown in Table 1, are derived by relating the actual gas supplied that year by each of the

interstate pipelines to the pipelines' firm requirements. The latter are contractual obligations determined from an historical base period, typically 1968 to 1973, adjusted for changing loads. The firm requirements are not determined from the actual demand for the coming year. Therefore, it is possible that the curtailment volumes could misrepresent the actual shortfall.

A portion (up to 20%) of a pipelines' firm requirements which are sold to the gas utilities, are resold by these gas utilities as interruptible gas. Interruptible gas is sold with the understanding that the buyer could be cut off at anytime by the gas supplier. During those periods for which gas delivery is halted, the consumer must have his own supply of alternate fuel (usually oil) to continue operation. The advantage of such contracts in most cases is lower priced natural gas. When it was plentiful, these consumers usually needed to use alternate fuels only during short periods of unusually cold weather and were able to keep sufficient alternate fuel capability on hand. The increase in curtailments, however, has changed this picture drastically. Since interruptible customers are the first to be cut off when supplies drop below demand, these consumers are now being fully curtailed for most of the cold weather months. In many areas of the country this has been the case for the last few years. As a result, the quantity of alternate fuels required and the problems associated with delivery and storage have strained some interruptible gas consumers to the point where they have had great difficulty in meeting all their energy needs.

### EFFECTS OF INDUSTRY AND ELECTRIC UTILITIES

The allocation of natural gas to consumers in a period of gas shortages is based on priority plans established by the various regulatory commissions. Those schedules which govern the gas utilities are usually set up by the State

regulatory commissions. These plans are similar, although not always identical, to the priority system established for deliveries by interstate pipelines by the FPC (Table 2), although exceptions to the FPC plan may be permitted under extraordinary circumstances. b Further, a given pipeline plan does not necessarily correspond to those schedules put into effect by the various gas utilities which purchase natural gas from that pipeline. Although these variations exist, the general result is the same, namely,

residential and small commercial consumers receive priority over firm industrial and large commercial consumers and, finally, interruptible consumers (Table 2). As a result, the primary effects of the curtailment of firm contract volumes of natural gas will be in the industrial and electric utility sectors. For interruptible customers, who will usually be curtailed before firm customers, the burden is spread amongst large commercial, industrial, and electric utility users.

**Table 2**  
**Priority System Established**  
**by Federal Power Commission**

- (1) Residential, small commercial (less than 50 Mcf on a peak day).**
- (2) Large commercial requirements (50 Mcf or more on a peak day), firm industrial requirements for plant protection, feedstock and process needs, and pipeline customer storage injection requirements.**
- (3) All industrial requirements not specified in (2), (4), (5), (6), (7), (8), or (9).**
- (4) Firm industrial requirements for boiler fuel use at less than 3,000 Mcf per day, but more than 1,500 Mcf per day, where alternate fuel capabilities can meet such requirements.**
- (5) Firm industrial requirements for large volume (3,000 Mcf or more per day) boiler fuel use where alternate fuel capabilities can meet such requirements.**
- (6) Interruptible requirements of more than 300 Mcf per day, but less than 1,500 Mcf per day, where alternate fuel capabilities can meet such requirements.**
- (7) Interruptible requirements of intermediate volumes (from 1,500 Mcf per day through 3,000 Mcf per day), where alternate fuel capabilities can meet such requirements.**
- (8) Interruptible requirements of more than 3,000 Mcf per day, but less than 10,000 Mcf per day, where alternate fuel capabilities can meet such requirements.**
- (9) Interruptible requirements of more than 10,000 Mcf per day, where alternate fuel capabilities can meet such requirements.**

The curtailment priority system established in FPC Order 467-B to be applied to interstate pipeline companies under FPC jurisdiction. The high-priority items are the last to be curtailed in the event of a deficiency of natural gas supplies.

The effect of the growing gas shortage on the industrial and electric utilities as a result of the priorities is indicated in Table 3, which compares total industrial and electric utility consumption of natural gas for the years 1970 through 1974 to total energy use for these sectors. These figures include both inter- and intra-state natural gas, and firm and interruptible contract volumes. Note that the contribution of natural gas to the total energy supply of industry and electric

utilities remained essentially constant from 1970 to 1972 and then began to decline sharply in 1973. This clearly shows the effect of the decreasing natural gas supplies on these customers. It indicates that significant conversion from natural gas to alternate fuels, primarily oil, has and is taking place. Based on the figures in Table 3, over one trillion cubic feet of gas have been displaced by alternate fuels since 1972.

**Table 3**  
**Energy and Natural Gas Use**  
**Industry and Electric Utility Sectors**  
**Total United States<sup>7</sup>**

<u>Year</u>	<u>Natural Gas</u> <u>Trillion</u> <u>Cubic Feet</u>	<u>Quadrillion</u> <u>BTU</u>	<u>Energy—All Sources</u> <u>Quadrillion</u> <u>BTU</u>	<u>Percent</u> <u>Natural</u> <u>Gas</u>
1970.....	13.8	14.0	36.5	38.4
1971.....	14.1	14.5	37.2	38.0
1972.....	14.7	15.0	39.1	38.4
1973.....	14.4	14.7	41.2	35.7
1974.....	13.8	14.1	40.3	34.0

Total natural gas consumption and total energy use by the industrial and electric utility sectors for the years 1970 to 1974. These figures include both interstate and intrastate natural gas. They demonstrate the declining contribution of natural gas to the total energy supply for these sectors, nearly all of which has occurred in the interstate market,

### **NATIONAL DISTRIBUTION OF NATURAL GAS CURTAILMENTS**

The gas supply problems in the interstate market are not uniformly distributed throughout the country nor, indeed, within individual states. The cause of this problem is that the interstate pipelines are in differing supply positions as shown in Table 4.<sup>8</sup> This is a result of the historic acquisition patterns by

pipelines of natural gas reserves. Some, such as Michigan-Wisconsin Pipeline, Co., have purchased reserves sufficient to result in minimal curtailments. Companies like Transcontinental Gas Pipeline Co., on the other hand, have not developed natural gas supplies as large and, therefore, are curtailing heavily. The net result is those regions of the country, depending on pipelines in a poor supply position are in much worse shape to meet demands than those depending on pipelines in good supply positions. A list of the states whose projected curtailment percentages for this winter are

Table 4

## April 30, 1975 Report of Projected Firm Requirements and Curtailments for Heating Season November 1975-March 1976<sup>8</sup>

April 30, 1975 Report  
Heating Season Nov. 1975-March 1976  
Projected

	Firm Requirements <sup>1</sup> (Mcf)	Deficiency	Percent Deficient
Alabama-Tennessee Natural Gas Company .....	15,927,000	5,183,000	32.54
Algonquin Gas Transmission Company .....	92,702,000	14,711,000	15.87
Arkansas-Louisiana Gas Company .....	235,401,000	66,708,000	28.34
Bluefield Gas Company .....	750,000	- 0 -	- 0 -
Cities Service Gas Company .....	299,405,000	81,423,000	27.19
Colorado Interstate Gas Company .....	203,024,000	13,600,000	6.70
Columbia Gas Transmission Corporation .....	848,726,000	235,177,000	27.71
Commercial Pipeline Company, Inc. ....	345,000	- 0 -	- 0 -
Consolidated Gas Supply Corporation .....	431,900,000	18,979,000	4.39
East Tennessee Natural Gas Company .....	39,611,000	13,343,000	33.69
Eastern Shore Natural Gas Company .....	3,361,000	1,644,000	48.91
El Paso Natural Gas Company .....	605,814,000	148,568,000	24.52
Florida Gas Transmission Company .....	19,965,000	- 0 -	- 0 -
Grand Gas Corporation .....			
Granite State Gas Transmission, Inc. ....	2,356,000	- 0 -	- 0 -
Great Lakes Gas Transmission Company .....	37,063,000	- 0 -	- 0 -
Kansas-Nebraska Natural Gas Company .....	41,395,000	- 0 -	- 0 -
Kentucky-West Virginia Gas Company .....	11,887,000	- 0 -	- 0 -
Lawrenceburg Gas Transmission Corporation .....	2,299,000	642,000	27.93
Louisiana-Nevada Transit Company .....	2,363,000	369,000	15.62
McCulloch Interstate Gas Corporation .....	5,036,000	- 0 -	- 0 -
Michigan Wisconsin Pipe Line Company .....	505,022,000	17,000,000	3.37
Mid Louisiana Gas Company .....	15,461,000	2,097,000	13.56
Midwestern Gas Transmission Company .....	150,900,000	13,695,000	9.08
Mississippi River Transmission Corporation .....	131,693,000	997,000	0.76
Montana-Dakota Utilities Company .....	25,852,000	- 0 -	- 0 -
National Fuel Gas Supply Corporation .....	139,612,000	5,198,000	3.72
Natural Gas Pipeline Company of America .....	526,616,000	- 0 -	- 0 -
North Penn Gas Company .....	17,499,000	1,258,000	7.19
Northern Natural Gas Company .....	392,944,000	18,050,000	4.59
Northwest Pipe Line Corporation .....	215,822,000	32,384,000	15.00
Ohio River Pipeline Corporation .....	5,649,000	259,000	4.58
Pacific Gas Transmission Company .....	130,765,000	- 0 -	- 0 -
Panhandle Eastern Pipeline Company .....	360,975,000	85,646,000	23.73
South Georgia Natural Gas Company .....	8,415,000	27,000	0.32
Southern Natural Gas Company .....	282,298,000	- 0 -	- 0 -
Tennessee Gas Pipeline Co., .....			
A Division of Tenneco, Inc. ....	592,035,000	70,139,000	11.85
Tennessee Natural Gas Lines, Inc. ....	16,231,000	- 0 -	- 0 -
Texas Eastern Transmission Corporation .....	501,370,000	117,491,000	23.43
Texas Gas Pipe Line Corporation .....	1,484,000	- 0 -	- 0 -
Texas Gas Transmission Corporation .....	353,408,000	44,987,000	12.73
Transcontinental Gas Pipe Line Corporation .....	496,700,000	180,426,000	36.32
Transwestern Pipeline Company .....	194,905,000	43,572,000	22.36
Trunkline Gas Company .....	249,312,000	120,483,000	48.33
United Gas Pipe Line Company .....	709,971,000	320,182,000	45.10
West Texas Gathering Company .....	36,785,000	- 0 -	- 0 -
Western Gas Interstate Company .....	3,355,000	- 0 -	- 0 -
Western Transmission Corporation .....	923,000	- 0 -	- 0 -
<b>Totals</b> .....	<b>8,965,302,000</b>	<b>1,674,238,000</b>	<b>18.67</b>
<b>Net Curtailments</b> <sup>4</sup> .....		<b>1,326,733,000</b>	

<sup>1</sup> Requirement volumes reported in the April 30, 1975 Form 16's have been adjusted to eliminate volumes transported for others and volumes exchanged with others.

<sup>2</sup> Reported all sales to Northwest Pipeline Corporation and no curtailments.

<sup>3</sup> Sales deliveries were added to curtailments to obtain requirements.

<sup>4</sup> After elimination of pipeline-to-pipeline curtailments.

Firm requirements and curtailment volumes of interstate pipeline companies reporting to the Federal Power Commission for the heating season 1975-76. The firm requirements are determined from an historical base period and do not necessarily reflect real demand for the coming heating season.

equal to or greater than the national figure is shown in Table 5.<sup>8</sup> Again, these figures must be interpreted with caution. For one thing, the firm requirements may not reflect actual demand as discussed above. Another potential pitfall is that in some states a high percentage of the gas may be used for purposes which are relatively easily convertible to alternate fuels, such as electric utility boiler fuel.

Table 5  
**Projected Curtailments-winter 1975-76°**  
 (Nov. 1, 1975-Mar. 31, 1976)

State	Firm Requirements " (MMCF)	Projected Curtailment (MMCF)	Percent
Arizona . . . . .	93,042	32,818	35
California . . . . .	553,280	118,694	21
Delaware.. . . . .	2,640	1,603	61
Indiana . . . . .	360,788	91,595	25
Kentucky . . . . .	131,359	22,946	17
Maryland :. . . . .	69,224	19,124	28
Nevada . . . . .	20,088	12,153	60
New Jersey,.....	176,424	45,982	26
North Carolina . .	88,470	46,207	52
Ohio. . . . .	617,895	138,575	22
Pennsylvania . . .	411,067	89,919	22
Tennessee . . . . .	137,832	25,410	18
Virginia . . . . .	73,873	24,112	33
West Virginia . . .	83,472	17,447	21

Firm requirements and curtailment volumes in millions of cubic feet (MMcf) for the 1975-76 heating season for states whose percent curtailment equals or exceeds the national average. The firm requirements are determined from an historical base period and do not necessarily reflect the actual demand this winter. For this and other reasons given within the text, these figures may not truly represent the level of difficulty these states will face this winter.

Therefore, a high curtailment percentage may not be indicative of the degree of difficulty that states will face this winter. On the other hand a lower curtailment percentage may be more serious than implied simply because a high fraction of the industrial natural gas use is for processes and/or feedstock which can only be converted to alternate fuels at great difficulty and expense or not at all. In this context, the pipelines themselves, in addition to having different curtailment percentages, also have a wide variance in the percentage of customers in the various priorities. Therefore, a pipeline with a lower percentage curtailment but a high percentage of customers in priorities one and two (Table 4) could be worse off than the raw curtailment volumes indicate.

Within the states, themselves, there are regions where the supply situation will be worse than the state average. A case in point is Pennsylvania, whose statewide curtailment this winter is projected at 23.5 percent. However, the hard-hit Columbia, Texas Eastern, and Transcontinental interstate pipelines, which feed the heavily industrial southeastern portion of the State, could cause local curtailments in excess of 31 percent, while the northwestern portion may actually experience an increase of supply.

Therefore, the actual situation in these regions and within the various states cannot be determined solely from curtailment data. It is necessary to investigate further by inquiring into the situation by seeking specific information from those people who will have to deal with the problems. The following section describes the results of this inquiry.