The original documents are located in Box 22, folder "Natural Gas Shortage Report" of the James M. Cannon Files at the Gerald R. Ford Presidential Library.

THE NATURAL GAS SHORTAGE:

A PRELIMINARY REPORT

AUGUST, 1975

FEDERAL ENERGY ADMINISTRATION

TABLE OF CONTENTS

EXECUTIVE SUMMARY

THE SHORTAGE

- The natural gas shortage has been growing rapidly.
  - ° In 1970, curtailments were 0.1 Tcf or less than 1 percent of consumption. Last year curtailments were up to 2.0 Tcf or 10% of total demand.
  - ° For 1975 they are forecast to increase by 45% to 2.9 Tcf (about 15 percent of demand).
- The shortage is most severe in the winter.
  - ° This winter curtailments will be 1.3 Tcf, up from 1.0 Tcf last winter. This lower than expected increase is due to the lag in demand growth as the economy begins its upswing.
  - ° A very cold winter (once every 10 years) would raise the shortage to about 1.45 Tcf.
- Even with natural gas deregulation, which is the greatest potential policy solution, shortages can be expected to grow in each succeeding winter for several years and could approach 1.9 Tcf in the 1976/77 heating season.

ECONOMIC IMPACT THIS WINTER

- Because of the economic slowdown and much higher prices, no shortage and possibly a surplus exists in the intrastate markets, primarily Louisiana, Texas, and Oklahoma.
- Economic impacts last winter were very scattered and not significant nationwide. This was due to:
  - ° Alternate fuels were available and many gas consumers switched to propane and oil.
  - ° The economic slowdown and mild weather reduced demand.
  - ° Conservation programs were implemented in some local areas.
  - ° Some emergency natural gas deliveries were allowed under existing FPC authorities.

- To the extent there were economic impacts, they were localized mainly in eastern and midwestern states.

- This coming winter the shortage will increase by about 0.3 Tcf and this increment is probably the most accurate measure of economic impact.

- This shortage is likely to be focused in about 10-15 states including the mid-Atlantic coast (from New York to South Carolina), and others such as Ohio, West Virginia, Pennsylvania, and Kentucky.

    ° The potential economic impact is concentrated in these states because the particular pipelines in these areas are the most short of supply and because of a higher concentration of industrial use in some of these areas.

    ° Local communities within these states are likely to feel an even greater impact where a factory, which is a major employer, may be forced to shut down or reduce output.

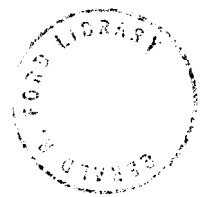
- The economic impact could be magnified many fold by a concurrent Arab embargo, as alternate fuels would be unavailable.

NEXT STEPS

- The President will announce his decisions on policy actions to mitigate the shortage within the next few weeks.

- FEA has made available to the States its preliminary assessment of the natural gas shortage. In about a month, the FEA will produce and make available the first results from its more sophisticated and continuing data and forecasting systems before the start of the heating season. These systems will assess the size of the shortage for each major distributor of gas in the country, each end user's alternate fuel capability and will forecast the shortage regionally based upon economic and weather conditions.

TAB 1



TAB 1

THE NATURAL GAS SHORTAGE:

A PRELIMINARY REPORT

AUGUST, 1975

FEDERAL ENERGY ADMINISTRATION
OFFICE OF POLICY & ANALYSIS

THE NATURAL GAS SHORTAGE

Introduction

In May, President Ford directed the Energy Resources Council to assess the magnitude and possible impacts of this winter's natural gas shortage and to recommend policy actions to deal with the shortage.

This report, coordinated by the FEA, is a preliminary assessment of the natural gas problem and its impacts. Final policy recommendations will be issued shortly and a complete monitoring, forecasting, and data system will be operational before the start of the heating season.

Natural Gas Trends

The natural gas shortage has been growing at a rapid rate in recent years. Demand for natural gas has steadily increased because of its clean-burning properties, low-cost, and until recently, accessibility. After World War II, the availability of abundant supplies of natural gas -- most of it found in the search for oil -- and improved quality of pipe for high-pressure, long-distance delivery enabled the gas utility industry to expand rapidly and widely. Marketed gas production increased from four trillion cubic feet (Tcf), in 1946, to eight Tcf by 1952 and continued to grow at a 6.5 percent average annual rate in the 1950's and 1960's (see Figure 1 for natural gas trends).

Natural gas production peaked in 1973 at 22.5 Tcf and declined significantly for the first time in 1974 to 21.2 Tcf, a decline of almost 6 percent. Last year's production decline is equivalent to over 230 million barrels of crude oil. Reserve additions failed to equal or exceed production for the seventh straight year and gas reserves in the lower 48 states are now at their lowest level since 1952. The only major reserve additions in recent years has been the Alaskan reserves of 26 Tcf added in 1970 (see Figure 2 for reserve and production trends).

The U.S. natural gas system is composed of producers, interstate and intrastate pipelines, distributors, and end-users (see Figure 3). Interstate pipelines supply about two-thirds of the approximately 20 trillion cubic feet (Tcf) consumed annually in the U.S. Domestic production is concentrated in six states (Texas, Louisiana, Oklahoma, California, New Mexico, and Kansas), with most of this production in Texas and Louisiana. Consequently, most of the intrastate pipelines are found in these states.

Growth in U.S. Natural Gas Consumption 1920 - 1974

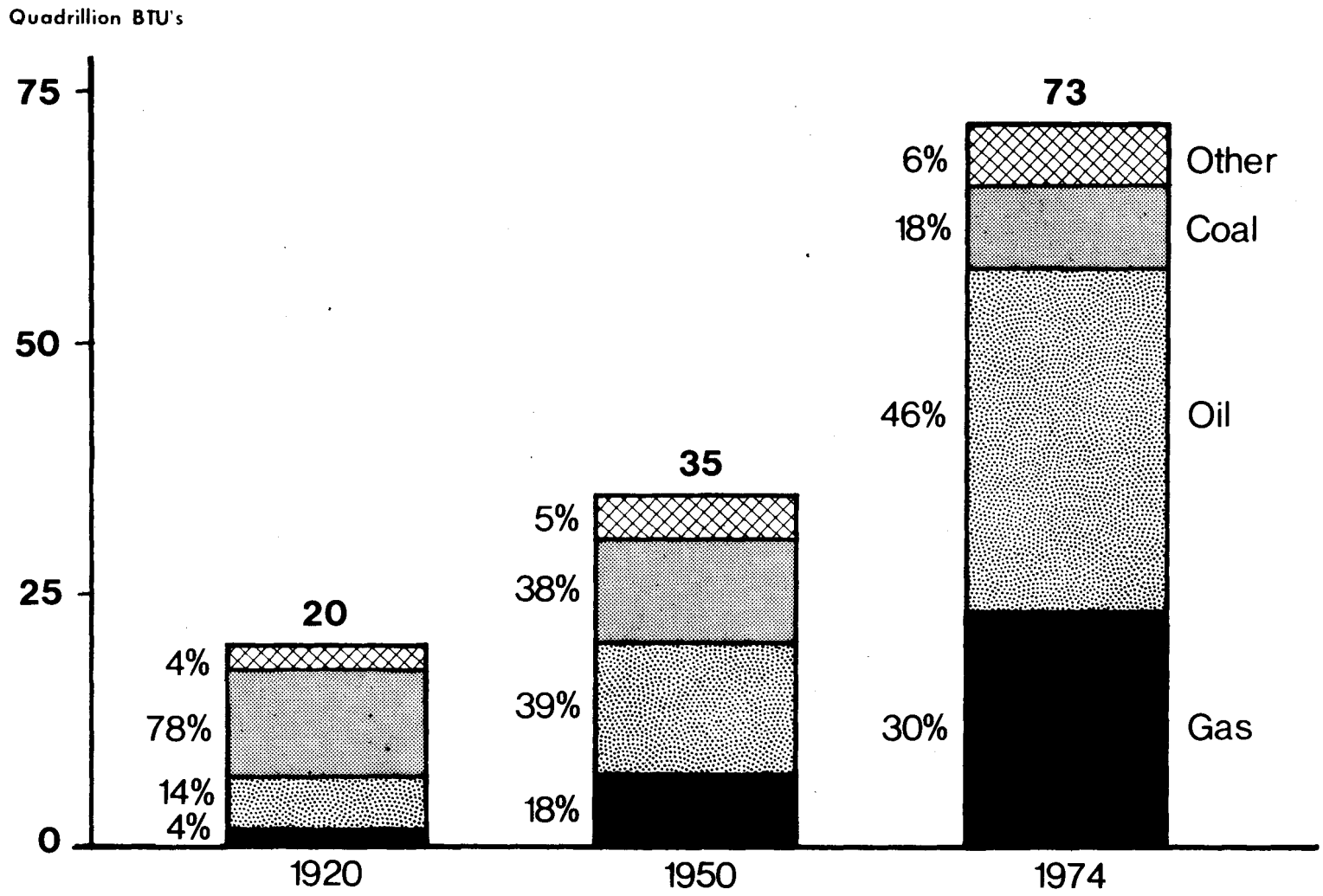


FIGURE 1

U.S. Natural Gas Reserves (Excluding Alaska)

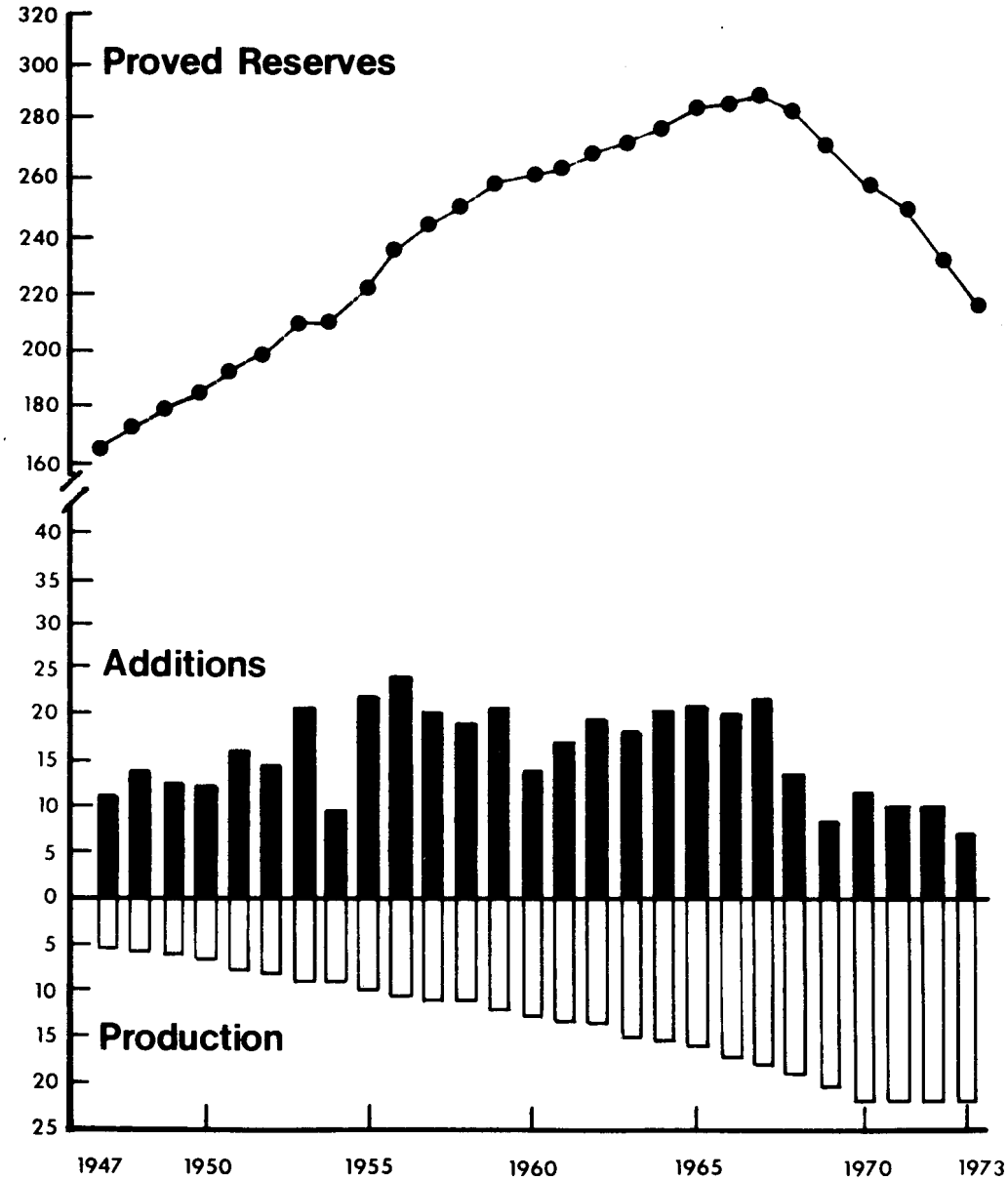


FIGURE 2

Overview — U.S. Natural Gas System [Bcf]

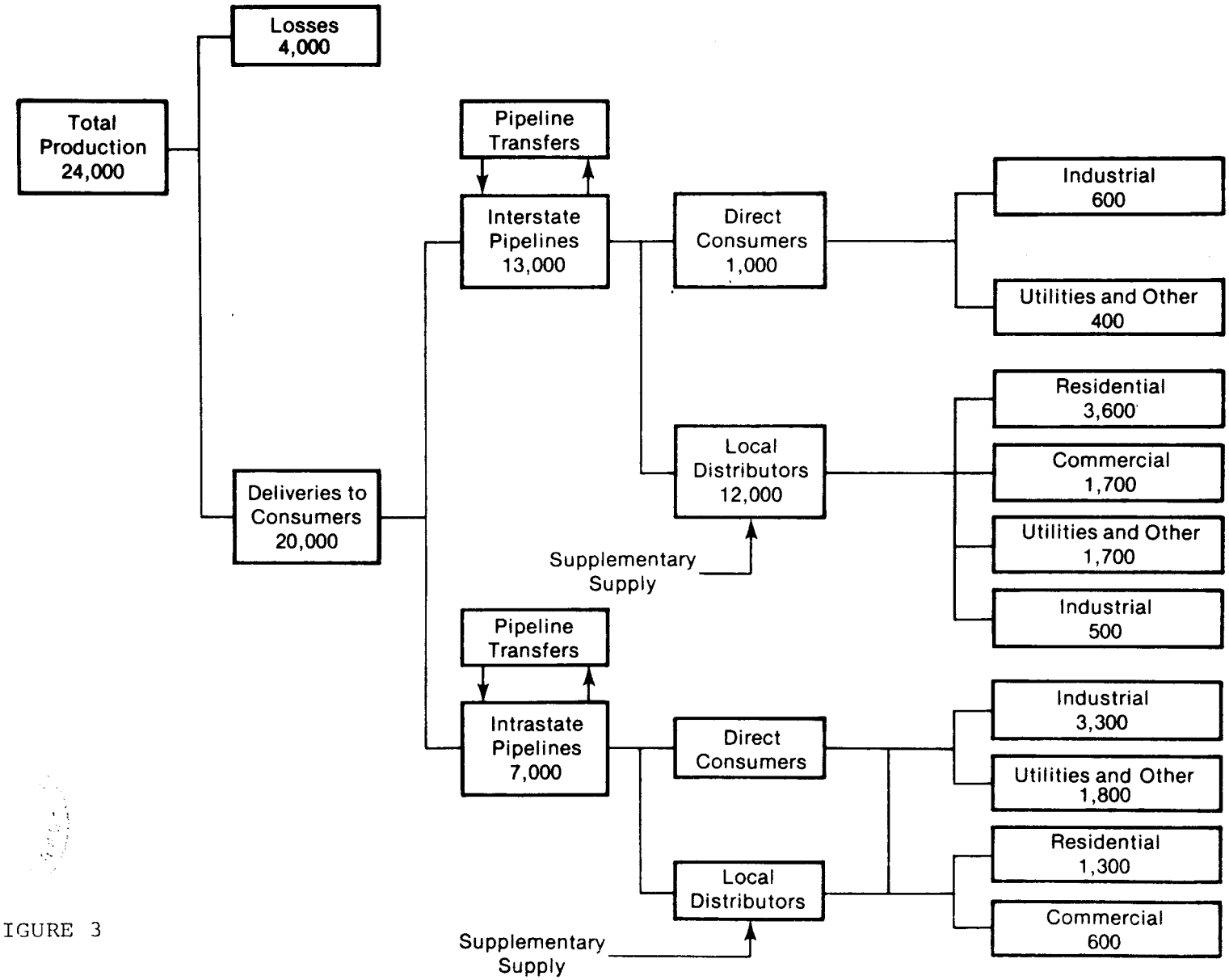


FIGURE 3

Natural gas now represents about one-third of the total energy consumed by the Nation and almost one-half of the non-transportation uses -- an amount twice that supplied by either oil or coal. It is consumed by over 40 million residences, 3.4 million commercial establishments, and over 200,000 industrial users.

Natural gas is predominantly consumed by industry, as indicated below:

residential use	24.5%
commercial use	11.6%
industrial use	46.2%
electric power	16.5%
other	1.2%

Most of the residential use of natural gas is for space heating (over 70 percent) and water heaters (about 20 percent). The largest industrial gas users are chemical and allied products (about 24 percent), petroleum and coal products (16 percent), and primary metal industries (about 13 percent). Almost 40 percent (about 3.5 Tcf) of the industrial gas use is as a boiler fuel in the chemical, petroleum, food, and paper industries. Gas consumption plays an important role as a feedstock and process fuel in the manufacture of ammonia, fertilizer, and methanol.

The greatest percentage of natural gas use occurs in the West South Central census region (Texas, Louisiana, Oklahoma, and Arkansas), which consumes over 30 percent of the natural gas used and which also accounts for more than 50 percent of gas used in electric utilities. The smallest use of natural gas occurs in New England, which uses less than 2 percent of the gas. Boiler fuel gas use remains over 1/3 of the gas market and is substantial in the West South Central and Mountain States where intrastate gas is more plentiful. (See Figure 4 for the distribution of natural gas consumption in each region.)

Regional Distribution of Natural Gas Consumption, 1974

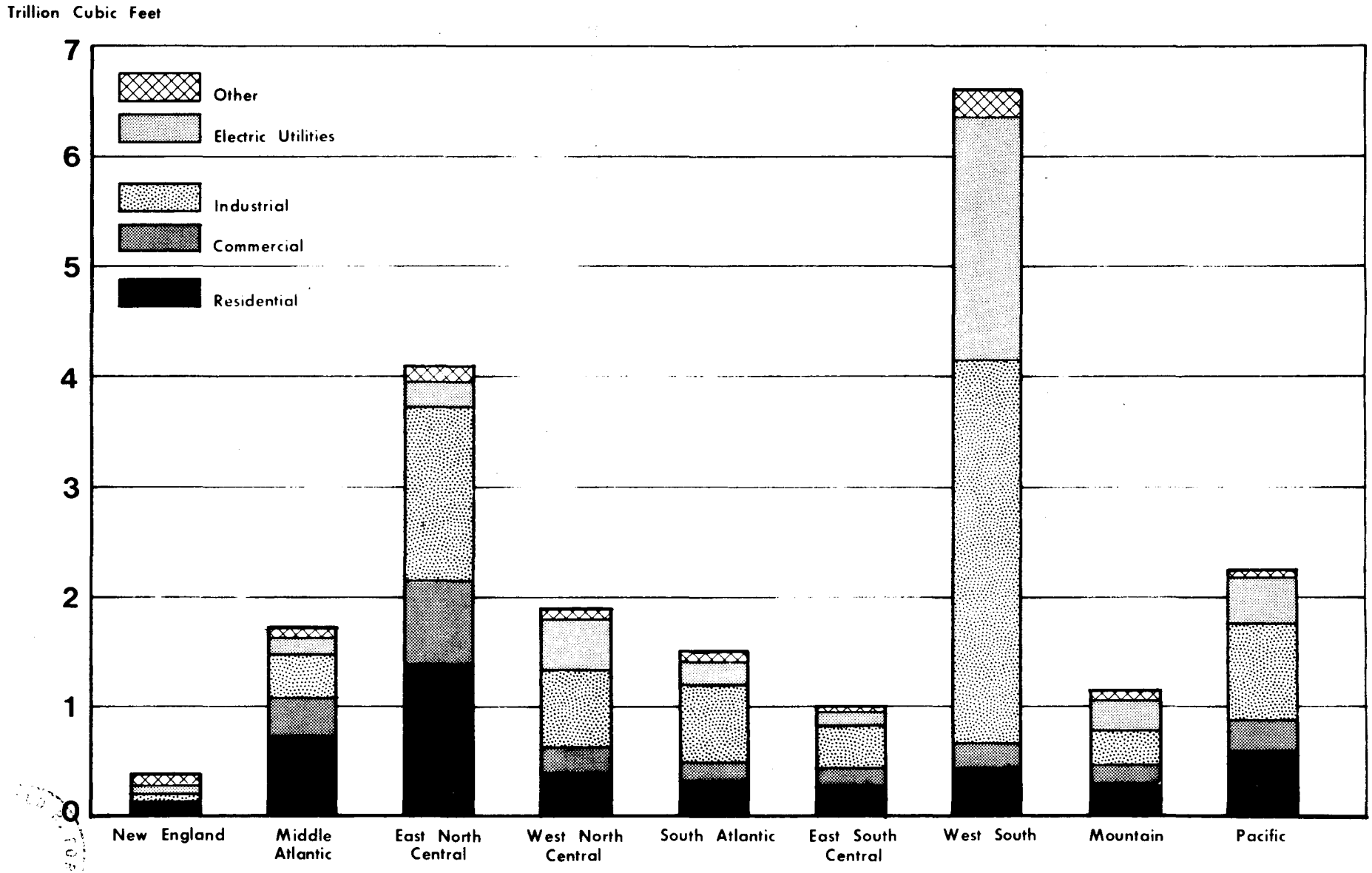


FIGURE 4

The Growing Shortage

In the 1970's, the demand for gas has exceeded its supply. Many gas distribution companies have found it necessary to deny gas service to new customers and to curtail some customers. Additionally, the Federal Power Commission has set priorities on gas use (see Table 1 for priority list). The highest priority users -- residential and small commercial customers and industrial use for plant protection, feedstock, and process needs -- are the last to be curtailed in times of shortage.

Curtailments (generally defined as requirements less deliveries) grew from 0.1 trillion cubic feet (Tcf) in the 1970/71 season (April-March) to 2.0 Tcf in 1974/75, as shown below:

TABLE 2
CURTAILMENT TRENDS

Year (April-March)	Annual Firm 1/ Curtailments (Tcf)	Heating Season (Nov.-Mar.) Curtailments (Tcf)
1970/71	0.1	0.1
1971/72	0.5	0.2
1972/73	1.1	0.5
1973/74	1.6	0.6
1974/75	2.0	1.0
1975/76 (expected)	2.9	1.3
1976/77 (forecast)	4.0	about 1.9

1/ Pipeline to pipeline curtailments not included in 1974-1976 data.

While firm natural gas requirements of 9.0 Tcf are projected for the winter heating season (November 1975 to March 1976), the firm curtailments of 1.3 Tcf exceed last year's curtailments during the same period by 30%. Corresponding figures for the year (April - March) indicate curtailments of 2.9 Tcf, which is 45 percent worse than last year.

For many years, interstate and intrastate gas sold at about the same price. Within the last ten years, intrastate prices have increased more quickly than the regulated interstate prices and this has led to a change in the share of the market held by interstate and intrastate distributors (market share has shifted about 5 percent since 1970). Since the intrastate gas can be sold at higher prices, more exploration has been occurring in the intrastate area. In fact, in the last five years over 90 percent of the reserve additions have been in the intrastate area; whereas in the preceding five years only one-third of reserve additions were intrastate (see Figure 5).

TABLE 1

Federal Power Commission
Natural Gas Curtailment Priorities

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.

4-5. Firm industrial requirements for boiler fuel use where alternate fuel capabilities can meet such requirements.

6-9. Interruptible requirements where alternate fuel capabilities can meet such requirements.

Average Annual Net Reserve Additions to Interstate and Intrastate Pipelines

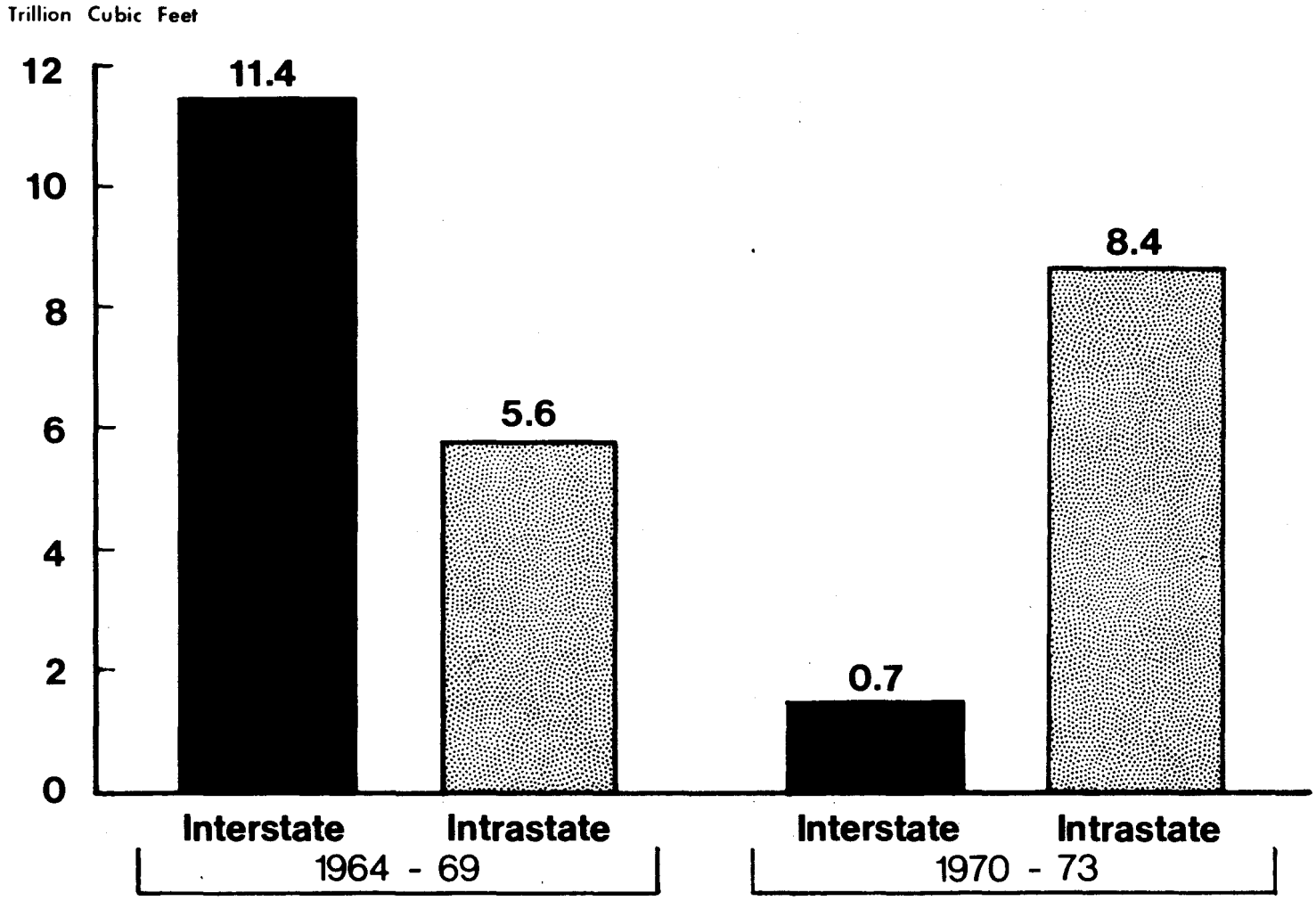


FIGURE 5

Pipelines are not only linked to specific fields, but are linked to specific distribution areas as well. Of the 48 interstate pipeline companies reporting, five major interstate pipelines represent nearly 80% of the volume of projected curtailments and less than half the total requirements. These pipelines are: Columbia Gas Transmission Corp.; El Paso Natural Gas Co.; Texas Eastern Transmission Co.; United Gas Pipeline Co.; and Transcontinental Gas Pipeline Corp. As indicated in Table 3, each of these pipelines projects curtailments to exceed firm requirements by more than 20 percent; but others such as Consolidated Gas Supply, Michigan-Wisconsin Pipeline, and Natural Gas Pipeline have very small curtailments. The map shown in Figure 6 indicates that a few key pipelines experiencing substantial curtailments serve the most affected states.

Thus, natural gas shortages are distributed unevenly. Within one region or state, some areas may have adequate supplies while other areas are being severely curtailed, because the shortage depends upon a particular pipeline's supply situation.

While natural gas deregulation is a major remedy for the problem, shortages are expected to grow in each succeeding winter for the next several years, although at a much slower rate than without deregulation.

Last year's shortage was also felt in the intrastate market and curtailments were experienced in several producing states (e.g., Louisiana). In the last year, however, the increase in intrastate prices, economic slowdown, reduced refinery runs (many refineries use natural gas as fuel) and conservation have relieved the intrastate shortage and probably resulted in a temporary surplus.

While curtailments are normally used to measure the shortage, the most appropriate and consistent measure of the problem we face this year is the reduction in deliveries this year over last, plus any increase in demand. Curtailments, which are generally requirements less delivery, are defined differently by different pipelines and thus there may not be a uniform description of the problem within the same state. Deliveries are expected to decline this winter by about 350 billion cubic feet (Bcf), but demand is also expected to decline. Even assuming a normal winter the economic recovery will not be rapid enough to increase natural gas demand over last winter. With a normal winter, demand will be about 125 Bcf less than last winter; with a cold winter, it will be about level. Thus, the incremental shortage in this heating season over last year will be between 225-375 Bcf.

TABLE 3

Firm Requirements and Deficiencies for Ten Largest Interstate Pipelines

	'75 – '76 Projected			'74 – '75 Actual
	Firm Requirements [Bcf]	Deficiency	Percent Deficient	Percent Deficient
Columbia	849	235	28	21
United	710	320	45	39
El Paso	606	148	24	17
Tenneco	592	70	12	14
Natural Gas Pipeline	527	0	0	0
Michigan-Wisconsin	505	17	3	0
Transco	497	180	36	26
Texas Eastern	501	117	23	20
Consolidated	432	19	4	3
Panhandle Eastern	361	86	24	16

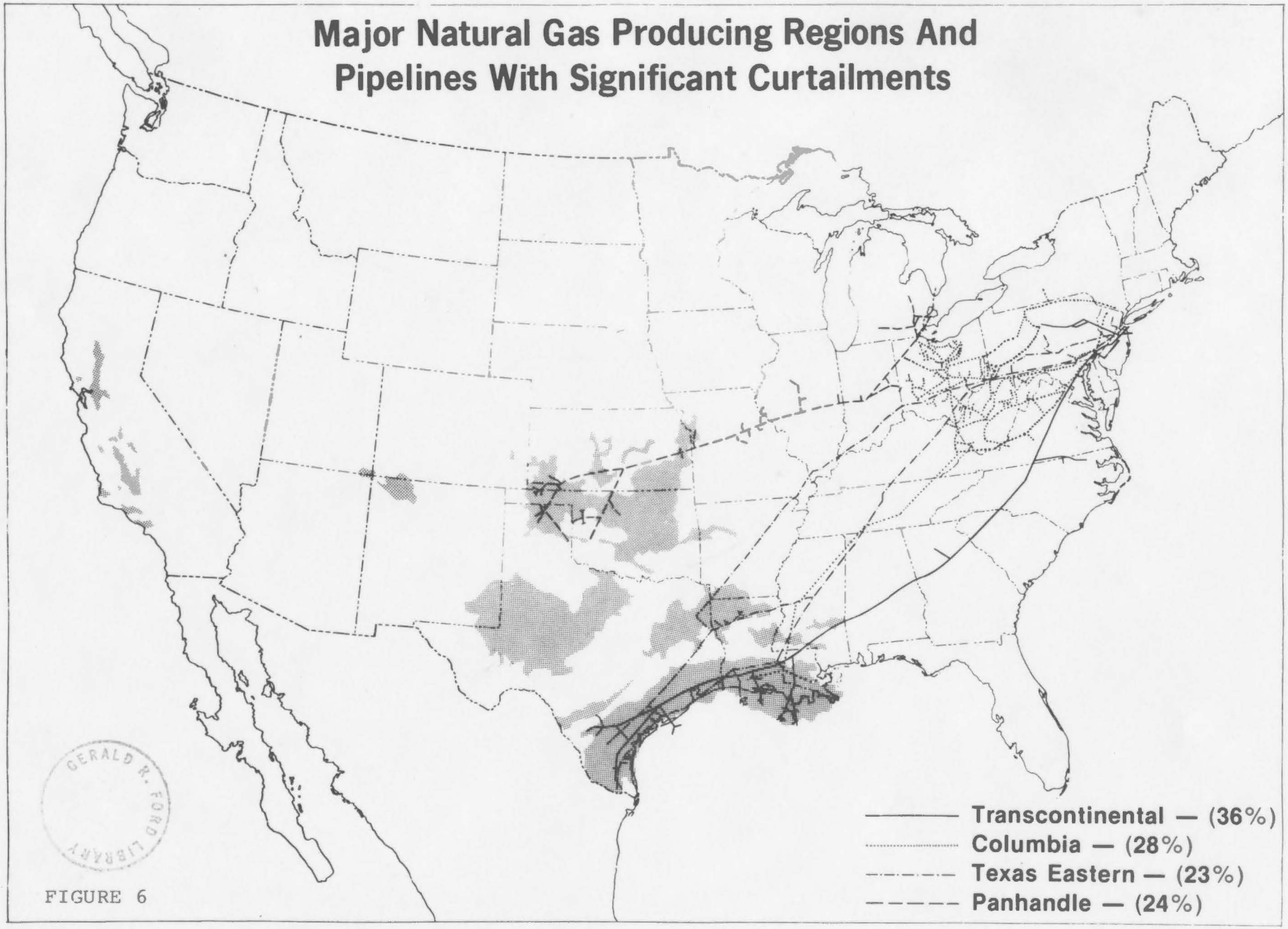


FIGURE 6

Economic Impact

Last year, very little unemployment and few plant shutdowns occurred as a result of natural gas unavailability. Most plant closings occurred because of the recession and many shutdowns were avoided by availability of alternate fuels (propane, butane, distillate or residual oil), emergency diversion of natural gas, mild weather or conservation. There were scattered examples of plant closings during the heating season in Virginia, North Carolina, New Jersey and other states, but in general, almost everybody was able to squeak through.

This year's economic impact of natural gas curtailments will depend upon several major factors: the heating demand by residential and commercial customers which is a function of the temperature; the extent to which industrial activity for natural gas has recovered from the economic downturn; the ability of industry to use alternate fuels and remain competitive despite higher energy costs; the availability and cost of alternate fuels; and the extent of the supply deficits.

The areas likely to experience the greatest economic impact this winter are the mid-Atlantic states stretching from southern New York to South Carolina and several midwestern states, such as Ohio, West Virginia, and Kentucky. Others such as Missouri and Iowa could have spot shortage problems and California, which used over 1.5 Tcf last year could also experience some impacts.

In North Carolina, which is probably the most severely impacted state and is served primarily by the heavily curtailed Transcontinental Pipeline Co. (Transco), it is estimated that about 96 percent of total industrial demand will not be met. Almost 20 percent of these firms have no capability to convert to alternate fuels and others cannot afford to do so. The textile, chemical, and glass industries are particularly large users of natural gas and need gas to maintain the quality of their products. In New Jersey, which is also heavily curtailed by Transco, the northern part of the state is relatively free of curtailments, while southern New Jersey's chemical industries may be affected. Ohio's industrial curtailments could reach 60 percent, but most impacts will be experienced by smaller stone, clay, and glass industries in the central part of the state. Even in states that are not as short of gas, such as Indiana, a utility serving 50 small towns each with only one industry may have to shut down one-third of these plants. In New York, the Southern part of the State will experience considerably reduced deliveries, while the Northern and Western areas will see increased or level deliveries (see Figure 7).

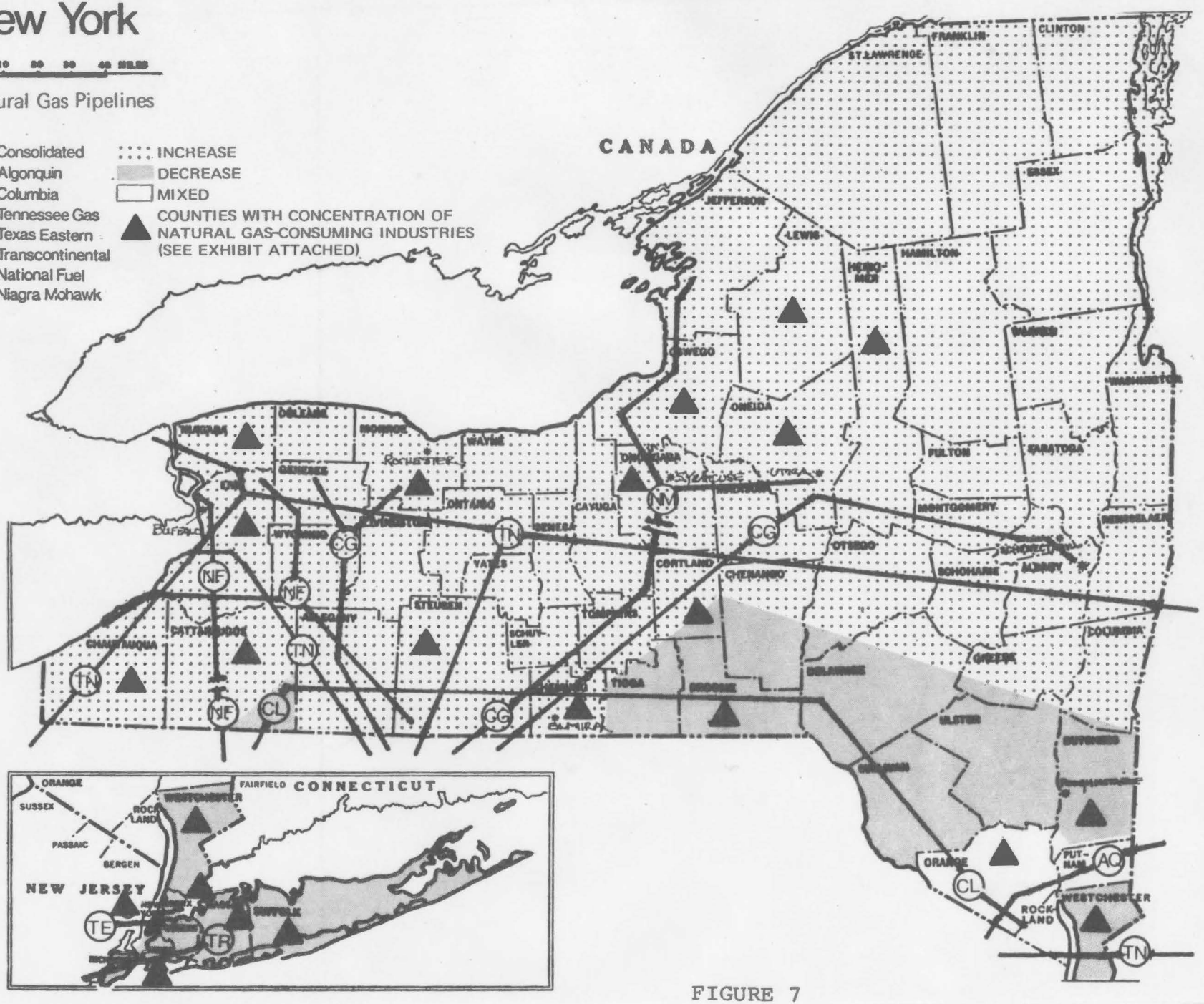


FIGURE 7

In some communities the impacts could be especially severe. In Danville, Virginia last year, concerted action by local government officials, industry, and residential gas users avoided the shutdown of four major manufacturing plants (Dan River Textiles, Corning Glass Works, Goodyear Tire and Rubber's largest truck and airplane tire facility, and U.S. Gypsum) employing over 10,000 of the area's 50,000 residents. A massive public education media campaign and conversions to alternate fuels by a local hospital saved almost 15 percent of the city's heating requirements in about half the winter.

Since residential and commercial users receive first priority under Federal Power Commission guidelines, natural gas curtailments generally affect industry most. In particular, industries which cannot switch to alternate fuels or are not prepared to switch (such as chemicals, motor vehicle parts, textiles, fertilizer, and glass) may experience considerable impacts. Even when alternate fuels are available, their use will increase costs and will put some companies at a competitive disadvantage with companies in other states that are not experiencing curtailments.

To evaluate the impact for each state, FEA examined the data supplied to the FPC by the major pipelines to determine their levels of shortage and to ascertain the specific areas to which they delivered gas. As indicated in Table 4, the reductions in deliveries are concentrated in about 14 states. In some of these states, the reduction in deliveries will be more than half the 1973 industrial gas consumption. Also, in some states, about one-third of industrial employment is in industries that use natural gas. Nevertheless, it should be recognized that availability of alternate fuels can substantially reduce the unemployment effects, but the accompanying higher priced fuel may result in economic problems. (See Tab 2 for a more detailed discussion of each of these states. A map showing the pipelines serving these states and counties where gas deliveries will increase or decrease is also attached.)

Next Steps

In the next several weeks, there will be the following key milestones:

- Within a few weeks, the President will announce his recommended administrative and legislative program to mitigate this year's shortage.

TABLE 4

Economic Impact in Most Affected States

State	Projected Reduction As % of 1974/75 Deliveries	Reduction As % of 1973 Industrial Gas-Consumption	State Employment In Gas Using Industry: As % of Total Employment	State Employment In Gas Using Industry: In Thousands
New Jersey	8%	41%	32%	717
Maryland	19	60	20	202
Virginia	20	50	9	116
North Carolina	29	41	33	552
South Carolina	12	20	29	227
Pennsylvania	8	17	23	854
Ohio	9	22	29	996
New York	(1)	(3)	21	1,249
Kentucky	4	11	28	196
West Virginia	16	26	19	77
Delaware	16	33	7	11
Missouri	10	31	18	249
Iowa	5	11	14	101
California	4	10	18	972

[ ] Indicates an increase

- By about the end of September, the permanent data and forecasting systems developed by FEA will be completed and operational. The data system will be updated quarterly and will contain a survey of over 1600 distributors and hundreds of thousands of end users of natural gas and will analyze the shortage and the ability to use alternate fuels. (See Tab 3 for a more detailed description of the data system.) The forecasting system will forecast quarterly natural gas supply and demand on a state by state basis and will be sensitive to changes in weather and economic activity.

TAB 2

CALIFORNIA

Situation at a Glance, Major Suppliers[1]

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
El Paso Natural Gas	962	-8
Pacific Gas Transmission	347	4
Transwestern	202	0
Total Interstate Pipelines	1,511	-4

Natural Gas Consumption by Sector, 1974[2]

Sector	Billion Cubic Feet	Percent of Total
Residential	580	33
Commercial	220	13
Industrial	642	37
Utilities	293	17
Other	9	--
Total	1,744	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups[3]

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Petroleum	30	17.2	0.3
Stone, Clay, & Glass	19	48.8	0.9
Food	15	137.0	2.6

[1] Source: FEA Report, prepared by Resources Planning Associates dated 7/2/75.

[2] Source: U.S. Bureau of Mines, Mineral Industry Surveys, Natural Gas Production and Consumption, 1974 (preliminary)

[3] Source: Gas Use: USDC, Bureau of the Census, Census of Manufactures, 1972
Employment: USDC, Bureau of the Census, County Business Patterns, 1972.

Supply Situation

California consumed 1744 Bcf of gas in 1974 and is expected to have about 4 percent less in 1975-76. Three interstate pipelines supplied 1,511 Bcf in 1974-75. The remainder is made up from California's domestic gas production which was about 450 Bcf in 1973 but has probably declined somewhat since then. El Paso Natural Gas feeds to California utilities which serve both Southern California and the Bay Area. Transwestern Gas is mainly fed into southern California. Pacific Gas and Electric imports Canadian gas through its Pacific Gas Transmission line for use in the Bay Area and northern California.

Industrial Impacts

Traditionally, California energy demand has come from oil and gas. For many years gas was a very cheap by-product of abundant California oil production. As a result, the state depends heavily on natural gas including the utility sector. In 1973, utilities consumed 455 Bcf; preliminary figures for 1974 show a large decrease, but a substantial 293 Bcf was still consumed in the utility sector.

The distribution of demand by sectors in California is notable for its particularly large component of electrical utility demand -- 23 percent in 1973 and 17 percent in 1974. Residential/commercial demand consumes 43 percent of the state's gas, and industry consumes 33 percent. The steep decline in utility use of gas consumption between 1973 and 1974 will leave a smaller cushion for other users to draw on in the future.

Of all industrial gas consumption, about 65 percent is utilized by the petroleum, food, and stone, clay, and glass groups. The food industry is the most labor intensive major gas consuming industrial group in California, accounting for 2.6 percent of total state employment. Petroleum and the stone, clay and glass group combine to another 1.2 percent of employment.

The California Energy Commission is now in the process of making an end-use survey of gas consumed. The office does not believe that California differs in any significant way from the ordinary pattern. The bulk of industrial gas consumed in California goes for various kinds of process, boiler, and space heating and only a relatively small percentage is assumed to be for petrochemical feedstocks for which no technical substitute exists.

Alternate Capability

The large component of gas-fired electrical generation in the state, accounting for 455 Bcf in 1973, probably provided a substantial cushion of alterable demand from which gas service was maintained to industries in the past year. However, as noted above, 1974 utility gas use was only 293 Bcf, a rate of reduction which would substantially end utility gas use shortly. Twenty-seven percent of all fuel used in large combustors in the Pacific region was identified in a recent survey as natural gas. Data on the conversion capability of these combustors is not available, but it is quite probable that substantial alternate capability exists. There is a problem in California, however, because the only technically feasible alternate fuel for small and medium sized users is the petroleum distillate group. California has not historically used any significant volume of coal. California uses large quantities of domestically produced residual oil but unlike the East Coast, it has not imported large quantities. Therefore, the whole alternate fuel load must be made up almost entirely by distillates.

The problem is further compounded because the extensive agricultural sector consumes large volumes of distillates for burning smudge pots to protect crops during unseasonably cold weather. Thus just at the time when interruptible gas customers are cut off and need to turn to distillate substitutes, the agricultural sector also comes in with a huge demand.

The California Energy Commission estimates that industrial and commercial distillate users have an average four day reserve fuel supply and the petroleum industry has not much more.

The past three winters have been unseasonably warm in California. If there is unseasonably cold weather this winter, there could be a more difficult situation for California. There would probably not be nearly enough distillate to maintain industrial production even though the industrial users have alternate fuel burning capability.

***NOTE:** On this map increases and decreases have been shown ONLY for interstate deliveries, and that approximately 20% of California's deliveries are intrastate.

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Transco	20	16
Total Interstate Pipelines	20	16

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	7	36
Commercial	3	16
Industrial	9	44
Utilities	1	4
Other		
Total	20	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Chemicals	(n.a.)	7.9	4.6
Primary Metals	11	2.1	1.2

Supply Situation

The State of Delaware is supplied all of its natural gas by the Transcontinental Pipeline Corporation (Transco). Transco supplies Delmarva Power and Light Co. and the Eastern Shore Natural Gas Company, which in turn supplies Cheaspeake Utilities. The end-users supplied by Delmarva are largely residential, while Chesapeake Utilities' customers are mainly industrial users.

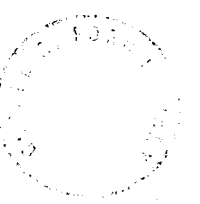
In 1973, Delaware was delivered 22.9 Bcf of natural gas. Of this, 12.3 Bcf, or approximately 53% of total gas deliveries was consumed in the industrial/utility sector. Transco is currently projecting curtailment levels of 43.5% in the upcoming heating season.

Industrial Impact

Last winter Delaware experienced curtailments of 7.8 Bcf, or 28% total requirements without any significant industrial shut-downs resulting directly from the shortages. However, because of the economic slump and nationally slack demand, two major automobile assembly plants, General Motors and Chrysler, as well as several smaller companies were forced to shut down. Had these plants been able to remain in operation, it is highly unlikely that the state could have endured these shortages without some shut-down due to a lack of fuel. This winter, with the economic recovery coupled with increased curtailments of natural gas, there is potential for a greater disruption of Delaware's industrial sector due to natural gas shortages. In the extreme cases, 41% curtailments might mean that all interruptible and 20% of firm contracts would be unfulfilled during the year's winter season. Alternate fuel capabilities will mitigate the impact, although the cost of utilizing such alternate fuels could be significant.

Alternate Fuel Capability

Delaware's economy relies heavily on several gas-consuming industries. The largest employing industry in the state (4.6% of total employment) is the chemical industry, specifically the DuPont and Stauffer Companies. The chemical industry has limited capabilities for switching to alternate fuels; natural gas is required both as a



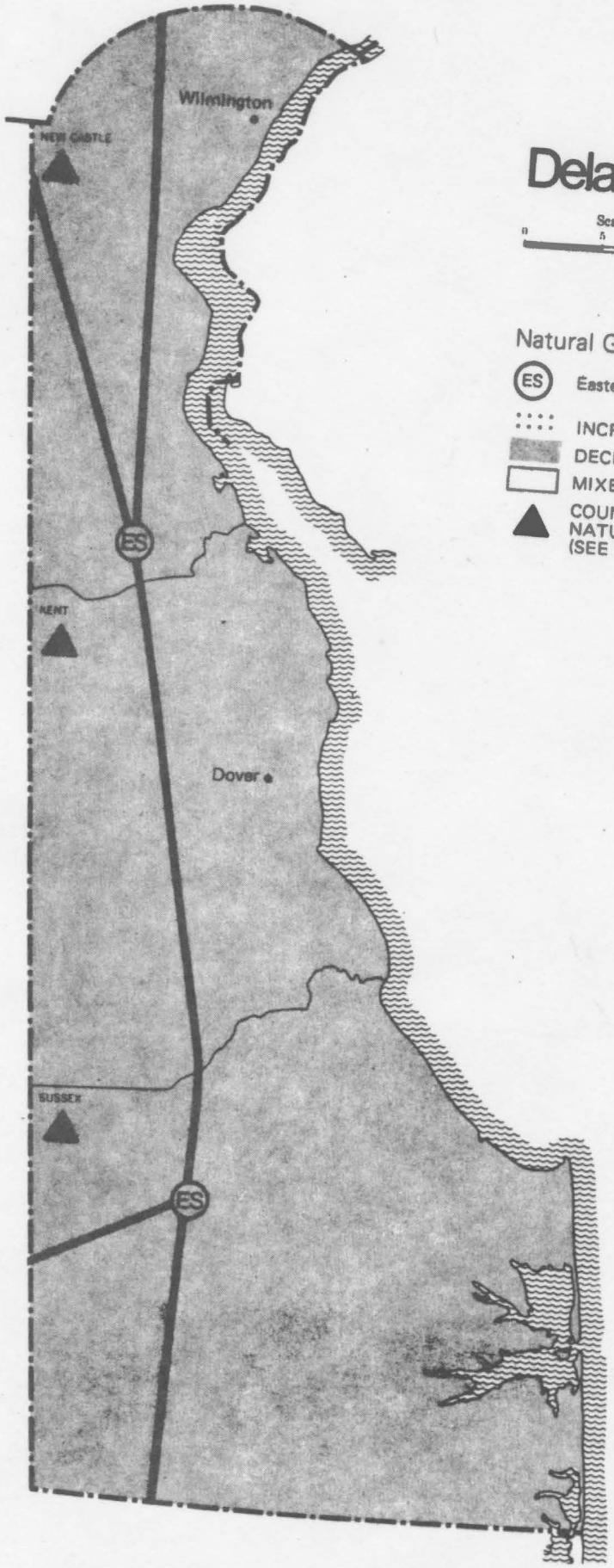
feedstock, and for its unique heat and flame characteristics which pre-dispose it to use in chemical production.

A second major gas-consuming industry in Delaware is the primary metals industry, which accounts for 1.2% of total state employment. It may be possible to utilize alternate fuels for up to 21% of this industry's total gas requirements, although this would entail significant cost increases.

The two auto assembly plants must use a gaseous fuel for paint drying, but may be able to switch to propane. Propane, however, may be in short supply during the 1975-76 heating season.

State Programs

For three consecutive years, the Department of Public Safety has been soliciting conversions to alternate fuels among industrial end-users. In 1971, new residential sales of natural gas were banned, and the state is conducting an aggressive public education program. In addition, Delmarva has proposed a new curtailment schedule to the FPC, based on pro-rata sharing, to help alleviate the potential impact of the projected natural gas shortages.



Delaware

Scale of Miles
0 5 10 15

Natural Gas Pipelines

ES Eastern Shore

INCREASE

DECREASE

MIXED

COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Northern Natural Gas	166	-9
Michigan-Wisconsin P/L	32	-7
Nat. Gas P/L of America	87	+3
Total Interstate Pipelines	285	-5

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	89	26
Commercial	51	15
Industrial	142	42
Utilities	59	17
Other	0	0
Total	341	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Food	26	49.8	7.5
Machinery	8	42.5	6.4

Supply Situation

Although Iowa's firm natural gas users may face some curtailment of their fuel supplies most of the reduction in gas supply will be offset by further reduction of gas to interruptible industrial and electric generation gas users. The 1975-76 natural gas deliveries will be 5 percent less than the amount delivered in 1974-75, when 22.5 Bcf of gas were curtailed (over 7 percent of total gas requirements).

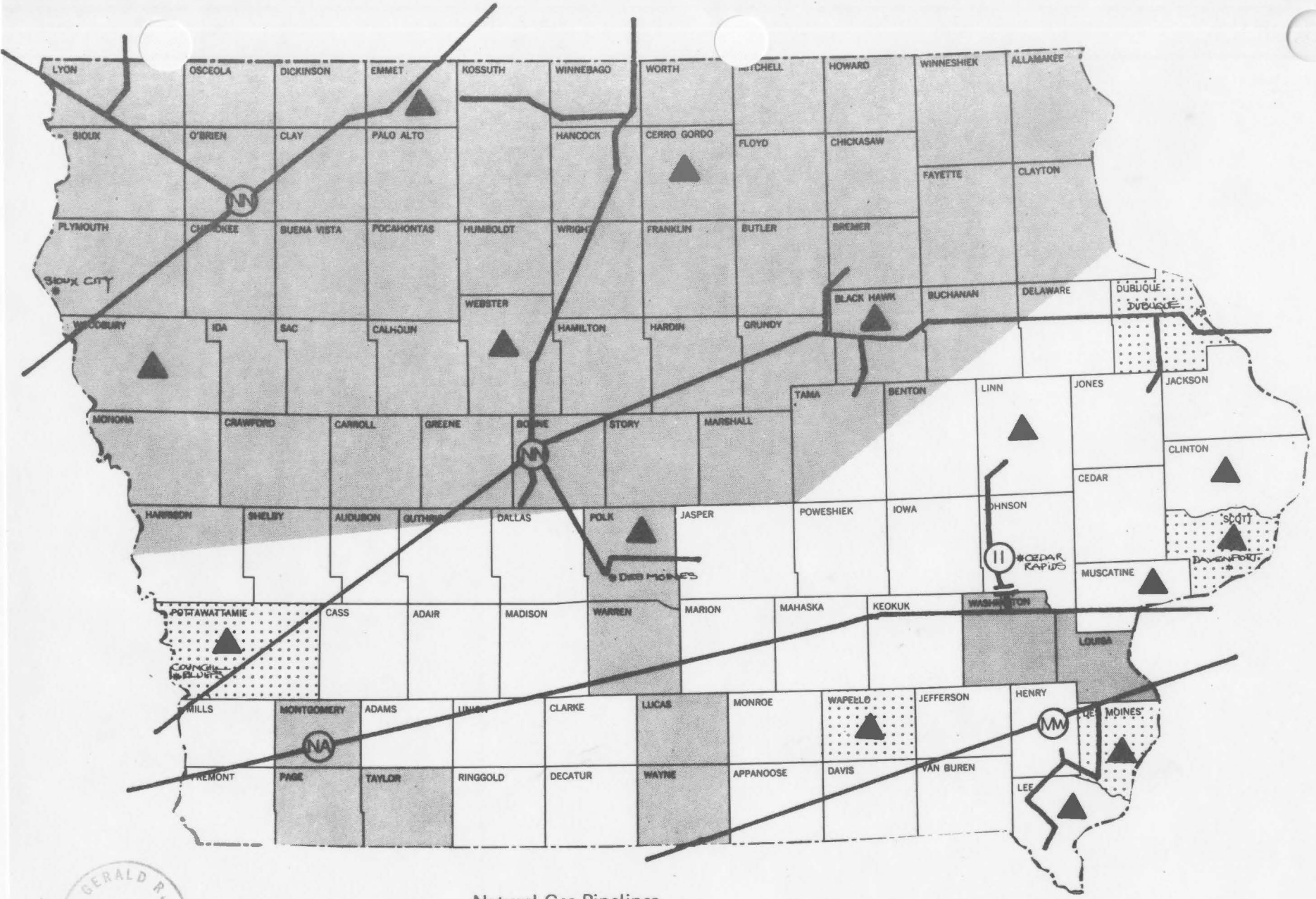
Only because Michigan-Wisconsin Pipeline received FPC approval to implement a pro-rata instead of an end-use curtailment system will large interruptible gas users in southern Iowa have any gas at all after January 1, 1976.

Industrial Impact

The 14 Bcf gas shortfall for Iowa will result in a shortfall of more than 10 percent for industrial and electric utility customers. This shortfall will largely be absorbed by the state's gas-fired utilities, and industrial impacts will likely be very small. In the industrial sector, the two major consumers are the food (26%) and machinery (8%) industries. These two industries are also the two largest employers in the industrial sector. The food industry employs 49,788 workers or 7.5 percent of total state employment, and 42,501 workers or 6.4 percent are employed in machinery industry.

Alternate Capability

The alternate fuel capability for Iowa's gas-fired electrical capacity is substantial. Also, the principal industries affected are believed to have a substantial alternate fuel capability. In sum, the problem this winter, in Iowa is not expected to be substantially greater than last winter, unless there is prolonged adverse weather.



Natural Gas Pipelines

Iowa

Scale of Miles

0 10 20 30 40

(11) Iowa—Illinois Gas & Electric
NA Natural Gas Pipeline of America
NN Northern Natural Gas
Mw Michigan—Wisconsin Pipeline

INCREASE
DECREASE
MIXED
▲ COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)

KENTUCKY

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Columbia Gas	53	-15
Tennessee Gas	8	19
Texas Eastern	2	-33
Texas Gas Trans.	128	- 1
Total Interstate Pipelines	191	- 4

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	76	38
Commercial	35	18
Industrial	74	38
Utilities	5	3
Other	7	3
Total	197	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Primary Metal	29	13.8	2.0
Chemical	15	12.5	1.8
Paper	10	5.2	0.7

Supply Situation

Kentucky is served by seven interstate pipelines, two of which provide approximately 95 percent of the state's supply. Texas Gas Transmission Corporation, the major supplier accounting for 67 percent of total deliveries, is expecting only a one percent reduction in deliveries this year over last. The state's significant supply shortfall is from Columbia Gas Transmission Corporation, which accounts for about 28 percent of total deliveries. Columbia has projected a 15 percent reduction in deliveries to the state this year. Overall the state is projected to receive only four percent less gas than last year.

Industrial Impact

Of the 197 Bcf of natural gas delivered to Kentucky in 1974, the residential and industrial sectors each consumed 38 percent. The major industrial consumers of natural gas in Kentucky are the primary metal (29%), chemical (15%), and paper (10%) industries. These are not highly labor intensive industries. The primary metal industry employs 2.0 percent of the state's total employment, the chemical industry 1.8 percent, and the paper industry only 0.7 percent.

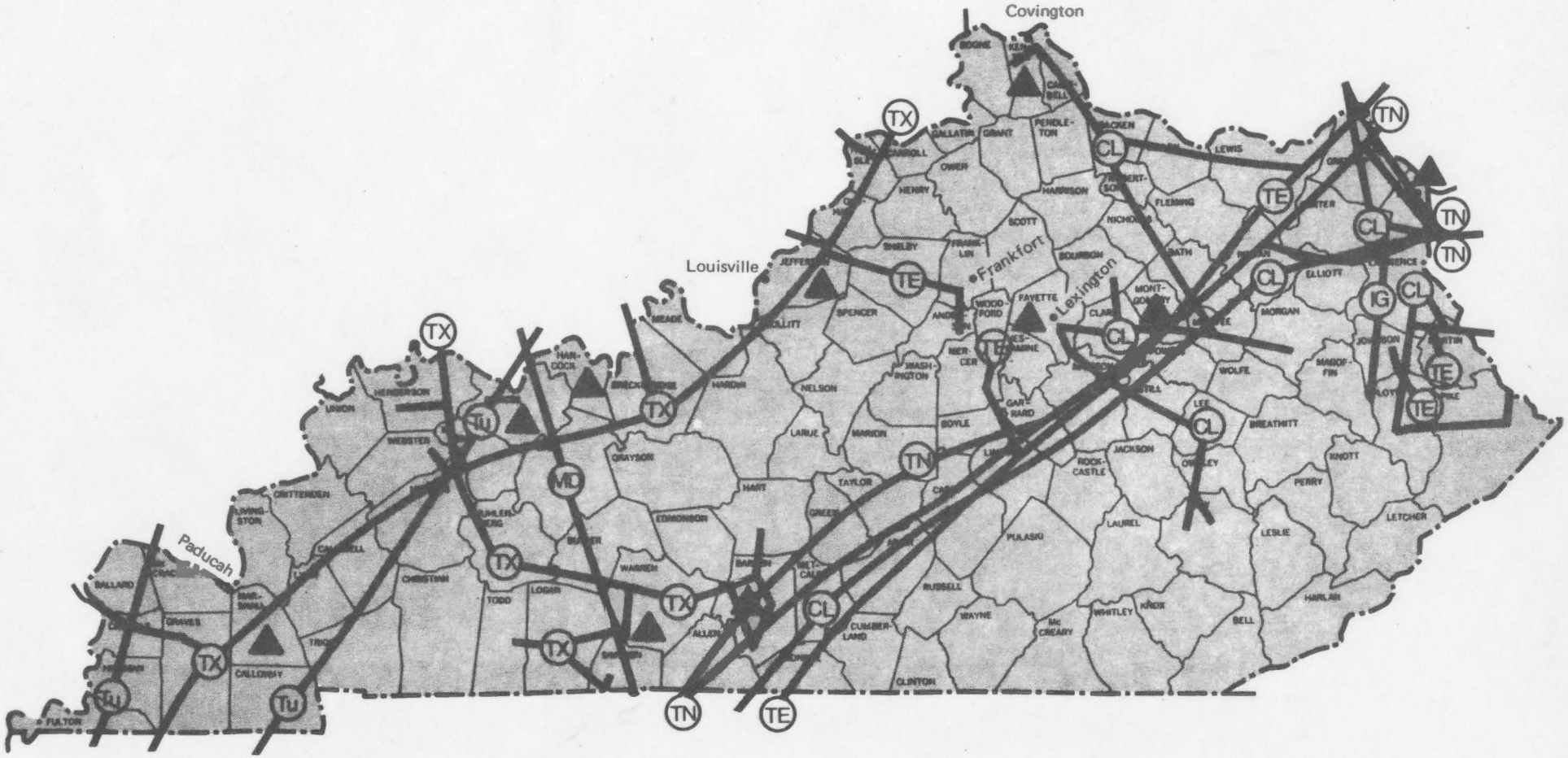
The area of the state which could be most affected by curtailments is central Kentucky which is served by Columbia Gas of Kentucky, an affiliate company of Columbia Gas Transmission Corporation. Columbia Gas Transmission Corporation is currently anticipating a curtailment level of 28 percent which would be distributed on a pro-rata basis under its current curtailment system. A curtailment of 28 percent of requirements would require Columbia Gas of Kentucky to completely cut off its industrial users this winter and to curtail some large commercial users up to 40 percent. Since Columbia Gas Transmission's pro-rata plan expires October 31, 1975, a new curtailment plan will have to be approved by the Federal Power Commission. The Kentucky Energy Office has supported a modified end-use curtailment plan under which Columbia Gas of Kentucky would be curtailed only 22 percent and provision would be made for essential industrial users.

Alternate Capability

Since Columbia Gas has traditionally signed firm rather than interruptible contracts, many industrial users do not have alternate fuel capability. Therefore, a complete cutoff of industrial users could have a severe impact on the region. Last winter the State Energy Office developed the

"Columbia Industrial Pool Plan." Under this plan, commercial users with alternate fuel capability switched to other fuels, making more gas available to industrial users who were experiencing 85 percent curtailments. The higher cost of the alternate fuels was paid for by the industrial users. The energy office has proposed use of the pooling system again this winter. The Governor would ask large Columbia Gas customers with alternate fuel capability to participate in the pool. The energy office has proposed to the Public Service Commission that large natural gas users be notified that within one year they will be assumed to have alternate fuel capability.

It appears that other areas of the state will get through the winter without severe problems. Demand in most areas is down due to the economic slowdown and conversion efforts. At least one pipeline has been able to contract with an intrastate producer for additional supplies for the winter.



Kentucky

Scale of Miles
0 10 20 30 40 50

Natural Gas Pipelines

CL	Columbia	TN	Tennessee Gas
IG	Inland Gas	TX	Texas Gas
Mw	Michigan-Wisconsin	TE	Texas Eastern
MD	Midwestern	Tu	Trunkline

- INCREASE
- DECREASE
- MIXED
- COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Columbia Gas	183	-21
Transco	15	- 9
Total Interstate Pipelines	198	-19

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	83	42
Commercial	36	18
Industrial	58	29
Utilities	13	7
Other	7	4
Total	197	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Primary Metals	32	34.7	2.7
Chemicals	16	15.6	1.2

Supply Situation

The Maryland/D.C. area is served by two major pipelines. Columbia Gas Transmission Company accounted for approximately 92 percent of deliveries last year and Transcontinental Gas Pipeline Corporation accounted for most of the remaining supplies. Columbia is the sole supplier of Western Maryland and a small pipeline, Eastern Shore Natural Gas Co., is the sole supplier of Eastern Maryland.

Last year Columbia Gas Transmission Company supplied about 183 Bcf to Maryland/D.C. and is projected to have 21 percent less available for this year. Transcontinental Gas Pipeline Corporation (Transco) supplied 15 Bcf in 1974-75 and is projecting a 9 percent decrease for this year. (The Washington, D.C. Metropolitan Area received 90 percent of its supply from Columbia and 10 percent from Transco).

Industrial Impact

The Maryland/D.C. area is projected to receive approximately 20 percent less gas this year than last. No customers on firm contracts are expected to be interrupted unless there is a severe winter or a much faster economic recovery than is currently expected. All customers on interruptible contracts are required to have alternate fuel capability and adequate storage facilities.

The demand for natural gas by several large interruptible industrial customers has been much less than anticipated. There are 11 interruptible customers on the Western Maryland distribution system. Two of the largest, Pittsburgh Plate Glass and Celanese, are operating at capacities of only 25 percent and 50 percent, respectively, due to the economic slowdown. Bethlehem Steel Corporation in Baltimore is also expected to operate at less than full capacity for at least the remainder of this year. These production slowdowns have caused a considerable reduction in natural gas demand over what was originally anticipated.

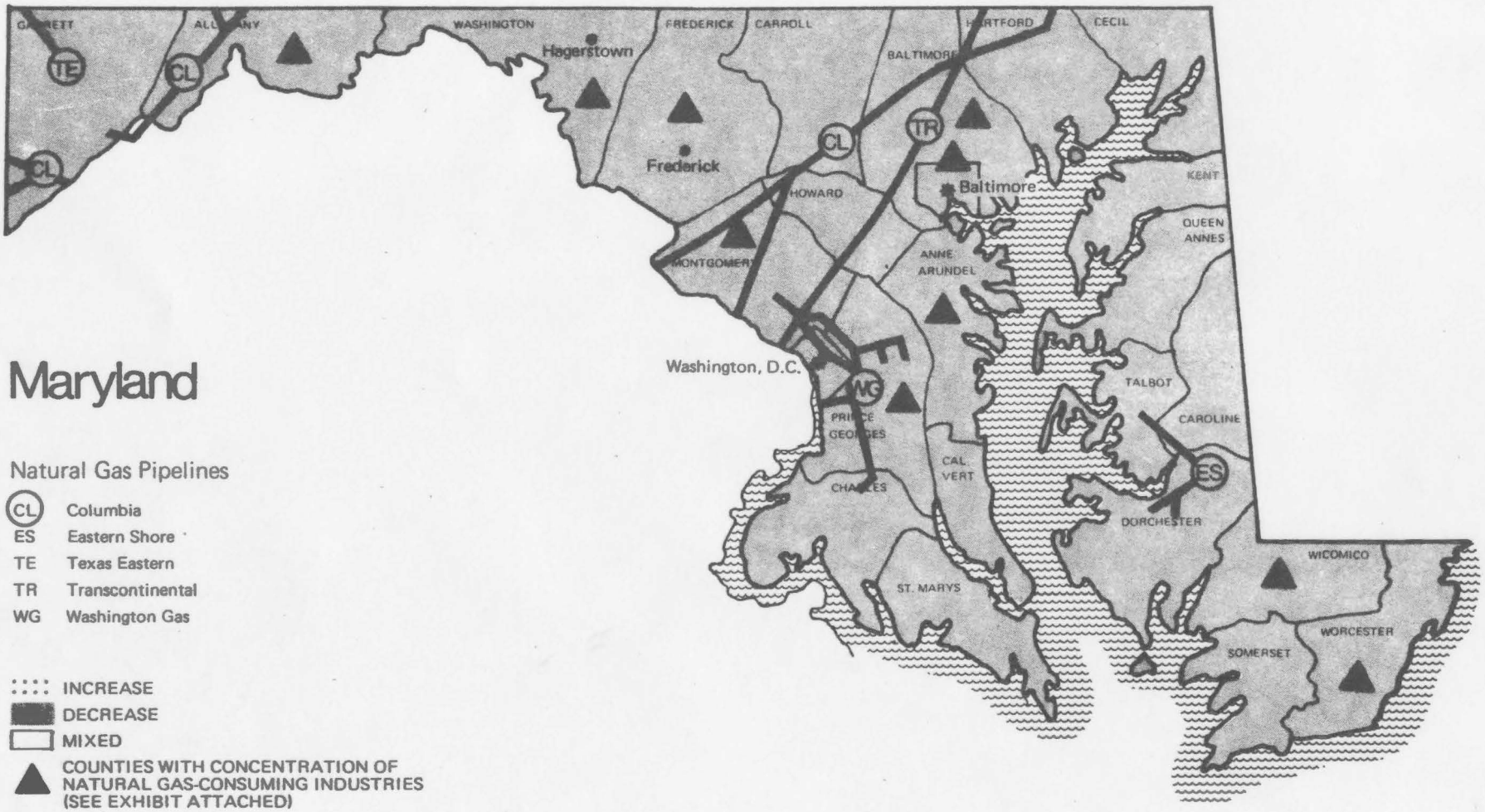
The gas utilities in Maryland are taking actions to relieve potential supply problems. Baltimore Gas and Electric Company, the largest gas distributor in Maryland, submitted a modified end-use curtailment plan to the state Public Services Commission to assure that low priority customers would be provided the minimum amount of gas to maintain operations (for pilot lights, etc). Baltimore Gas and Electric has an underground propane storage capacity of 6 million gallons and LNG storage of 1 million Mcf. In addition, it is constructing an SNG plant for operation in 1976 which will

produce 60 million cubic feet of gas per day. Since April 1974, it has accepted no orders for new or expanded service from commercial or industrial users.

Alternate Capability

The Maryland Energy Policy Office has notified all 341 interruptible customers in the state that they should secure alternate fuel supplies for this winter. The office has completed a breakdown of anticipated alternate fuel demand throughout the state. In addition, it sent questionnaires to all industrial firms using over 900 Mcf of gas per year to determine alternate fuel capability in the industrial sector.

The Metropolitan Washington Council of Governments has met with Washington Gas Light Company to discuss projected natural gas curtailments this winter. The Council has developed an area-wide plan to deal with different levels of possible curtailments.



Maryland

Natural Gas Pipelines

CL	Columbia
ES	Eastern Shore
TE	Texas Eastern
TR	Transcontinental
WG	Washington Gas

INCREASE

DECREASE

MIXED

▲ COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)

MISSOURI

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Cities Service	173	-10
Michigan-Wisconsin Gas	5	2
Mississippi River Trans.	142	- 2
Panhandle Eastern	41	-20
Texas Eastern	12	-17
Total Interstate Pipelines	374	-10

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	153	38
Commercial	74	19
Industrial	110	27
Utilities	48	12
Other	16	4
Total	401	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Stone, Clay, & Glass	24	12.3	0.9
Food	20	40.8	3.0
Chemicals	13	21.6	1.6

Supply Situation

A 10 percent reduction in deliveries of natural gas is anticipated in Missouri this year. The southwest corner of Missouri, which is supplied by Cities Service Gas Company, and an area in the West Central and Northeast sections of the state, served by Cities Service Gas Company and Panhandle Eastern Pipeline, are expected to be most affected by the natural gas shortage.

Virtually no impacts are expected in the southeastern part of the state and St. Louis which are served by the Mississippi River Transmission Company. Texas Eastern also serves the southeastern part of the state and will curtail deliveries; however, most of the curtailments are expected to be absorbed (as in the past year) by the electric utility sector and other large users without serious effects. Michigan-Wisconsin Pipeline, serving the northwest corner of the state, expects to deliver as much or more gas than a year ago.

Industrial Impact

Since the electric utility and industrial sectors normally use less than one-half of total gas consumed, the real shortfall to these sectors may be expected to be in the range of 20 to 25 percent.

In Missouri, natural gas is allocated according to the FPC classification of priorities and few, if any, firm contracts are expected to be curtailed. All residential and commercial requirements will be met, and next winter's shortfalls in natural gas deliveries will be absorbed by the electric utility and industrial sectors.

There are about 1,100 industrial customers in Missouri with interruptible natural gas contracts and these may be expected to bear the brunt of the curtailment program. Preliminary reports indicate that most large industrial users have alternative fuel-using capabilities and that, in Missouri, potential adverse impacts of gas shortfalls will be limited to the industrial users with interruptible contracts who have not previously been curtailed and may not have prepared themselves to switch to alternative fuels.

The major industrial gas consumers in Missouri are found in the stone, clay and glass industries (24 percent of total industrial gas consumption), the food industries (20 percent) and the chemicals industry (13 percent). These industries are not labor intensive, accounting for less than 6 percent of state employment while consuming 60 percent of Missouri's industrial gas.

Alternate Capability

A considerable amount of natural gas is used for process fuels and feedstocks, precluding the substitution of alternative fuels for a substantial percentage of its gas requirements, particularly in the manufacture of bricks and fertilizers.

In summary, Missouri's natural gas supply problem is of manageable proportions, with potential impacts limited to small purchasers of interruptible gas from the Cities Service and Panhandle Systems, and some process and feedstock users such as brick, and fertilizer plants.

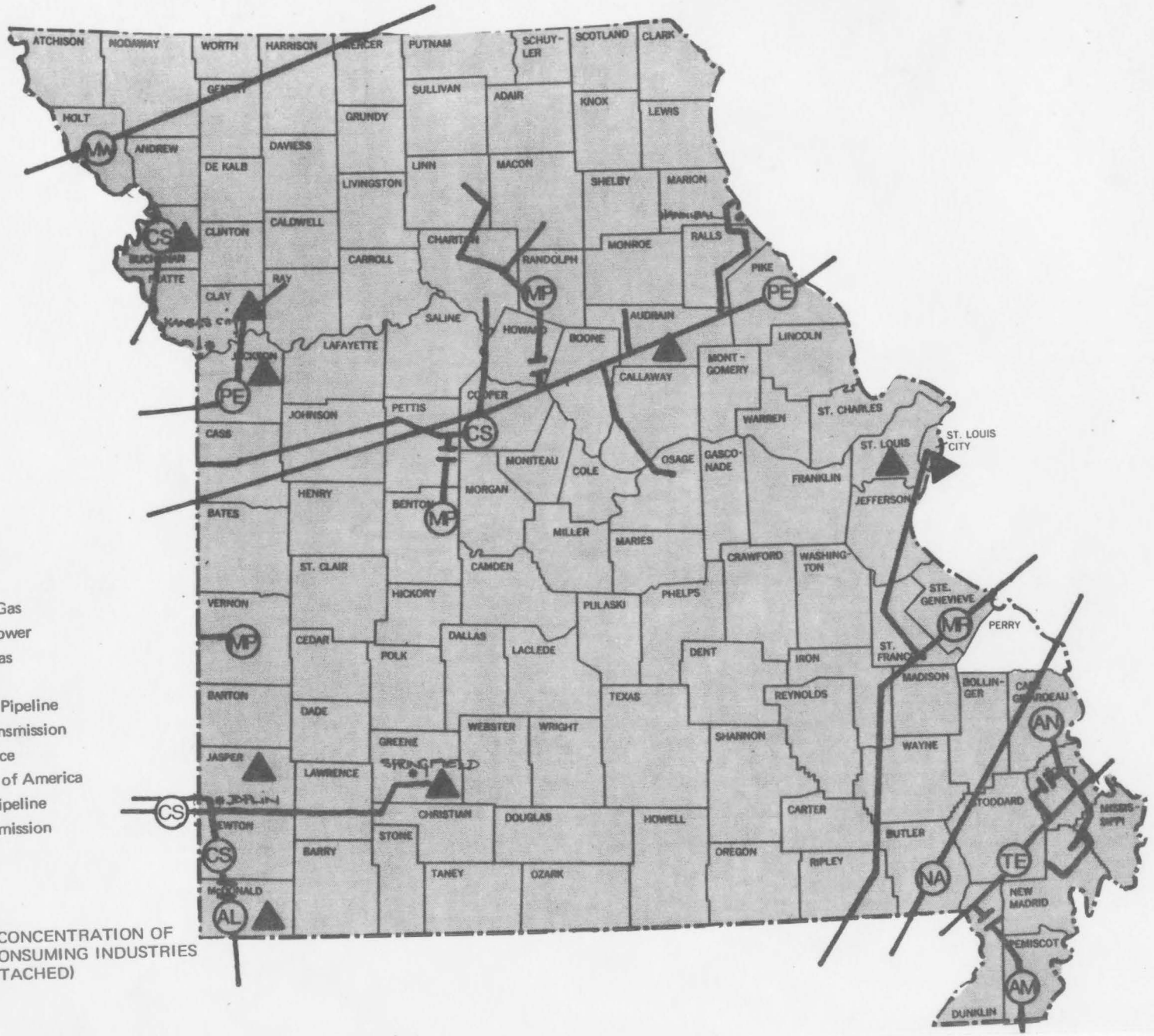
Missouri

Scale of Miles
0 10 20 30 40 50

Natural Gas Pipelines

- (AL) Arkansas—Louisiana Gas
- AM Arkansas—Missouri Power
- AN Associated Natural Gas
- CS Cities Services Gas
- MW Michigan—Wisconsin Pipeline
- MR Mississippi River Transmission
- MP Missouri Public Service
- NA Natural Gas Pipeline of America
- PE Panhandle Eastern Pipeline
- TE Texas Eastern Transmission

INCREASE
DECREASE
MIXED
▲ COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)



NEW JERSEY

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Tennessee Gas	9	15
Texas Eastern	90	- 9
Transcontinental	160	- 9
Columbia Gas	2	-17
Algonquin	2	-38
Consolidated	2	
Total Interstate Pipelines	263	-8

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	136	49
Commercial	57	21
Industrial	65	24
Utilities	15	5
Other	1	1
Total	274	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Stone, Clay & Glass	24	35.3	1.7
Chemicals	21	103.4	4.9
Primary Metals	11	30.7	1.4

Supply Situation

The state of New Jersey receives its natural gas deliveries from six major pipelines (Transco, Texas Eastern, Algonquin, Columbia, Consolidated, and Tennessee Gas) serving four utility companies (New Jersey Natural Gas Company, South Jersey Gas Company, Public Service Electric and Gas Company, and Elizabethtown Gas Company). Four of these pipelines are projecting significant curtailments for the upcoming heating season. However, New Jersey's major natural gas problems appear to be in the Southern part of the state which is serviced by the South Jersey Gas Company. South Jersey's sole supplier is the Transcontinental Pipeline Company which is predicting curtailments of up to 52 percent for the coming winter.

Industrial Impact

Southern New Jersey is faced with potential economic disruption. Transco is its main supplier, and is projecting the highest curtailments of all the pipelines serving the entire state. In addition, South Jersey Gas Company supplies a large percentage of industrial end-users; 40 percent of their customers are industrial users, as compared with New Jersey Natural Gas Company which supplies 95 percent of its gas to residential users. Because of existing FPC curtailment priority schedules, much of the gas in the Transco pipeline will have to be diverted away from Southern New Jersey to Northern New Jersey, in order to meet the needs of the residential end-users.

Major problems were averted last winter by a combination of factors which included Transco's ability to locate additional supplies. At present, South Jersey Gas Company is expecting curtailments of 5.7 Bcf, or 33 percent of normal winter demand for this winter. This will result in a shortfall for firm requirements of 2.5 Bcf, or 65 percent of the total firm industrial requirements. South Jersey has so far been able to negotiate with other companies to receive 2.5 Bcf of synthetic natural gas and liquefied natural gas. Although the costs of utilizing these alternate fuels will be significant (South Jersey is proposing to buy SNG at $5/Mcf), with a conscientious conservation program and a normal winter, none of the utilities in New Jersey should have serious problems supplying their customers. However, should a cold winter occur, the utilities in Northern New Jersey may not be able to supply South Jersey with the entire 2.5 Bcf of alternate fuels, which could have a serious effect on the industrial area of the state.

Alternate Capability

The problem in New Jersey is further complicated by the fact that the major industrial gas consumers, the glass and chemical industries, are both located in Southern New Jersey and both have limited capability to switch to alternate fuels. In the glass industry, 23 percent of the total gas consumption is for use as a process fuel for which no alternate fuel capabilities exist. The same is true in the chemical industry, in which 21 percent of the total gas consumption is as a process fuel and feedstock.

State Program

The State Energy Office, Public Utilities Commission, and the Department of Labor & Industry played a role in setting up the negotiations between utility companies to arrange for company transfers in order to supply South Jersey with the alternate fuels it will need to make it through this winter. The State Energy Office is currently conducting a survey of all interruptible customers to determine if there will be any difficulty in obtaining alternate fuel supplies.

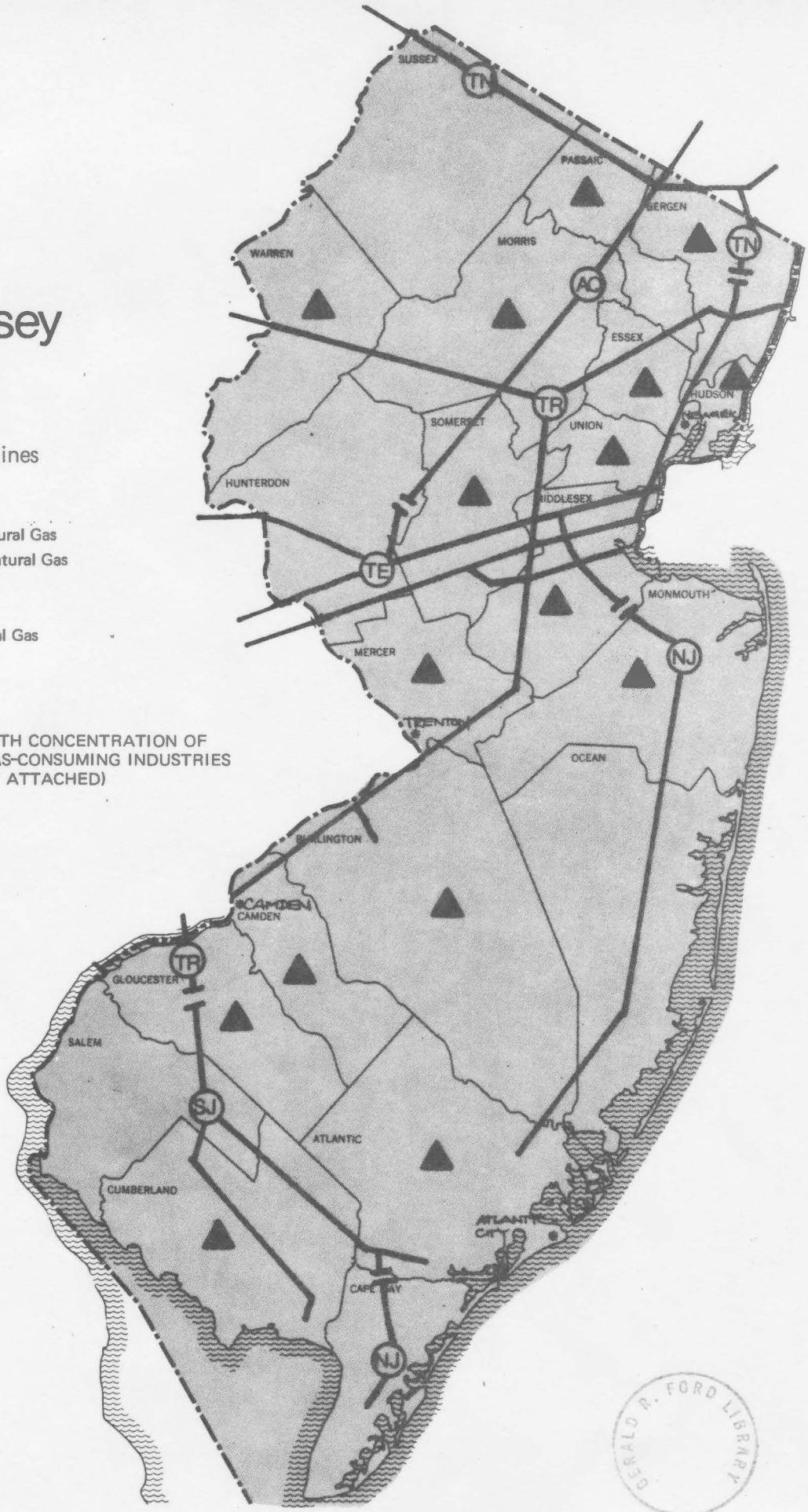
New Jersey

Scale of Miles
0 5 10 15 20

Natural Gas Pipelines

AQ	Algonquin Gas
NJ	New Jersey Natural Gas
SJ	South Jersey Natural Gas
TN	Tennessee Gas
TE	Texas Eastern
TR	Transcontinental Gas

:::: INCREASE
DECREASE
MIXED
▲ COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)



NEW YORK

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Algonquin Gas Transmission	6	-13
Columbia Gas Transmission	37	-19
Consolidated Gas	199	3
National Fuel Gas Supply	90	41
Tennessee Gas Pipeline	107	2
Texas Eastern	37	-2
Transco	192	-18
Total Interstate Pipelines	668	1

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	341	55
Commercial	119	19
Industrial	108	17
Utilities	38	6
Other	18	3
Total	624	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Primary Metal	24	99.8	1.7
Stone, Clay, & Glass	14	64.6	1.1
Food	11	33.9	0.6

Supply Situation

Overall, New York is expected to get slightly more gas this year than last year; however, the New York City Metropolitan Area and southeastern New York will be getting substantially less volume than last year.

New York is served by seven interstate pipelines. Transco which serves the New York Metropolitan Area and Long Island (about 29 percent of total deliveries) will have an 18 percent reduction. Columbia Gas Transmission Company which serves the Olean and Binghamton industrial areas and southeastern upstate New York above New York City is projecting a 19 percent reduction. The remaining pipelines serving this area are Algonquin which is projecting a 13 percent decrease and Texas Eastern which is projecting a 2 percent decrease.

The principal supplier for northern and western upstate New York, Consolidated Gas Supply (about 30 percent of total deliveries), is projecting a 3 percent increase. The two smaller volume pipelines serving the area, National Fuel Gas Supply, and Tennessee Gas Pipeline are also projecting increases.

Thus, the gas shortage problems in New York will concentrate in a few small areas served by Columbia Gas along the southern border of the state and in the southeastern and New York Metropolitan Area served by Transco and Columbia Gas.

Industrial Impact

About 70 percent of New York's natural gas is consumed by residential/commercial users, and 30 percent by utilities and industry. The three largest industrial group consumers of New York's gas-food, stone-clay-glass, and primary metals account for 50 percent of all industrial use. The employment impacts of industrial gas curtailments in New York are not likely to be large because these three industry groups are estimated to have only about 3.4 percent of total employment.

The parts of the state served by Transcontinental and Columbia Gas Transmission could be significantly affected, however, because these systems are projecting large curtailments.

Columbia Gas which serves the Olean and Binghamton areas has projected 100 percent curtailment of industrial customers.

Transco which serves the New York City distribution system (consolidated Edison, Brooklyn Union Gas, and Long Island Lighting) will have to curtail its interruptibles; however, the scale of curtailment will depend upon the severity of the weather.

Information supplied by the Public Service Corporation (PSC) of New York indicates that a high percentage of industrial gas use is for various boiler fuel, space heating and process heating purposes for which there are potential alternative fuels. Thus, the impact on industrial employment should not be severe since most establishments are likely to stay in operation at least on a reduced production basis rather than close down completely for a long period due to the unavailability of gas.

Alternate Capability

One hundred percent of the total energy consumed (1.1 Bcf) in ferrous metal large combustion, and 69 percent of the .8 Bcf used in the food industry is gas. Of this, about 33 percent of the ferrous metal consumption is convertible, and practically all of the food processing usage is convertible.

Most New York interruptible industrial customers appear to have some level of alternate fuel burning capability based on information supplied to the New York PSC. However, the problem of assessing the practical level of alternate fuel use is complex depending upon the degree and length of interruption, price of alternate fuel, etc. New York has only one big gas feedstock consumer (a fertilizer plant in Olean). Most of the industrial gas consumed in New York is used for process and space heat for which there are at least technically feasible alternatives.

The New York PSC permitted Niagara Mohawk Power Corporation to initiate an innovative alternative fuels concept in the winter of 1974-1975. Under this new plan, effective February 1, 1975, Niagara Mohawk will contract with some of its largest industrial customers who can use an alternate fuel to switch to oil or propane and give up a matching amount of gas for distribution among the utility's other customers. Niagara Mohawk would eliminate the economic penalty of the fuel change by paying the higher cost of the oil or propane. The company would recover the amount it pays such customers through the operation of its Gas Adjustment Clause, which would spread the cost equally over all the gas sold by Niagara Mohawk.

The plan is expected to add about three cents per 1,000 cubic feet to Niagara Mohawk's rates, but since all the receipts will be paid out to the cooperating industrial customers, there will be no increase in the utility's income. The additional cost is expected to average about $6 a year for a residential customer who heats with gas.

With this plan, Niagara Mohawk was able to "buy back" substantial quantities of gas from customers with alternate fuel capability for sale to those who did not have such facilities. The unique feature was assessing all gas customers for the cost incurred by the fuel switchers.

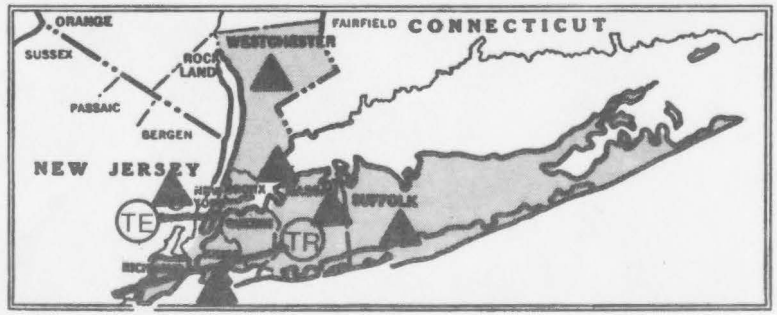
New York

0 5 10 20 30 40 MILES

Natural Gas Pipelines

- CG Consolidated
- AQ Algonquin
- CL Columbia
- TN Tennessee Gas
- TE Texas Eastern
- TR Transcontinental
- NF National Fuel
- NM Niagra Mohawk

- INCREASE
- DECREASE
- MIXED
- ▲ COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)



Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Transco	133	-29
Total Interstate Pipelines	133	-29

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	27	20
Commercial	17	12
Industrial	87	64
Utilities	1	1
Other	4	3
Total	136	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Textiles	33	267.0	17.9
Chemicals	25	23.6	1.5
Stone, Clay & Glass	13	13.4	0.8

Supply Situation

The State of North Carolina, which consumed 136 Bcf of gas in 1974, is supplied by Transcontinental Pipeline Company which is projecting system-wide curtailments of 43 percent for the upcoming 1975-76 winter heating period. North Carolina is in a unique position in that it is served by only one interstate pipeline and that pipeline is heavily curtailed. Also, because a high proportion of natural gas use in North Carolina is for industrial purposes -- generally of a low priority classification -- the curtailment for the state is expected to reach 60 percent during the 1975-76 heating season.

State energy officials have compiled data from five natural gas utilities operating in North Carolina, which show the projected supply of gas by source and projected sale of this supply to the end-user. The data indicate that at a 60 percent state curtailment level, 96 percent of all industrial use would be curtailed. In addition, of the 1,486 plants in North Carolina which use natural gas, 283 plants did not have alternate fuel capabilities as of June 1975. Approximately 190 of the 283 plants are industrial customers employing 71,000 people. The remaining 93 installations without alternate fuel capability include schools, universities, hospitals, grocery stores, motels, and public buildings.

For the heating season, natural gas demand has been estimated to be 86 Bcf of which 62 percent is industrial and 38 percent is residential and commercial. It is estimated that of the 53 Bcf of gas (62 percent) for industrial requirements, 60.5 percent will be used as boiler fuels and 39.5 percent for "process" use (direct flame, feedstock, plant protection). While less than 4 percent of industrial demand will be met, all residential and small-volume commercial requirements should be met, assuming a normal winter.

Industrial Impact

Since North Carolina is solely dependent on the Transcontinental Interstate Pipeline for its natural gas supply, the entire state will suffer from a natural gas shortage. The greatest economic consequences will fall in the central (Piedmont) area, coincident with industrial and population concentration. The textile, chemical, and stone, clay and glass industries will be most severely affected. In particular, industries which use natural gas as a process fuel will experience some difficulty switching to propane and even then the industries' competitive position could be affected because of the higher costs of the alternate

fuel and the lower quality product that results from using propane. Many small customers do not have alternate fuel capability and the state now estimates that it is 20 Bcf short of gas needed for process use. Last winter the natural gas shortage impacted the fertilizer industry. In Tunis, North Carolina, a fertilizer plant was forced to stop production for about three weeks because of the unavailability of natural gas. However, no unemployment resulted because workers performed plant maintenance and other housekeeping functions.

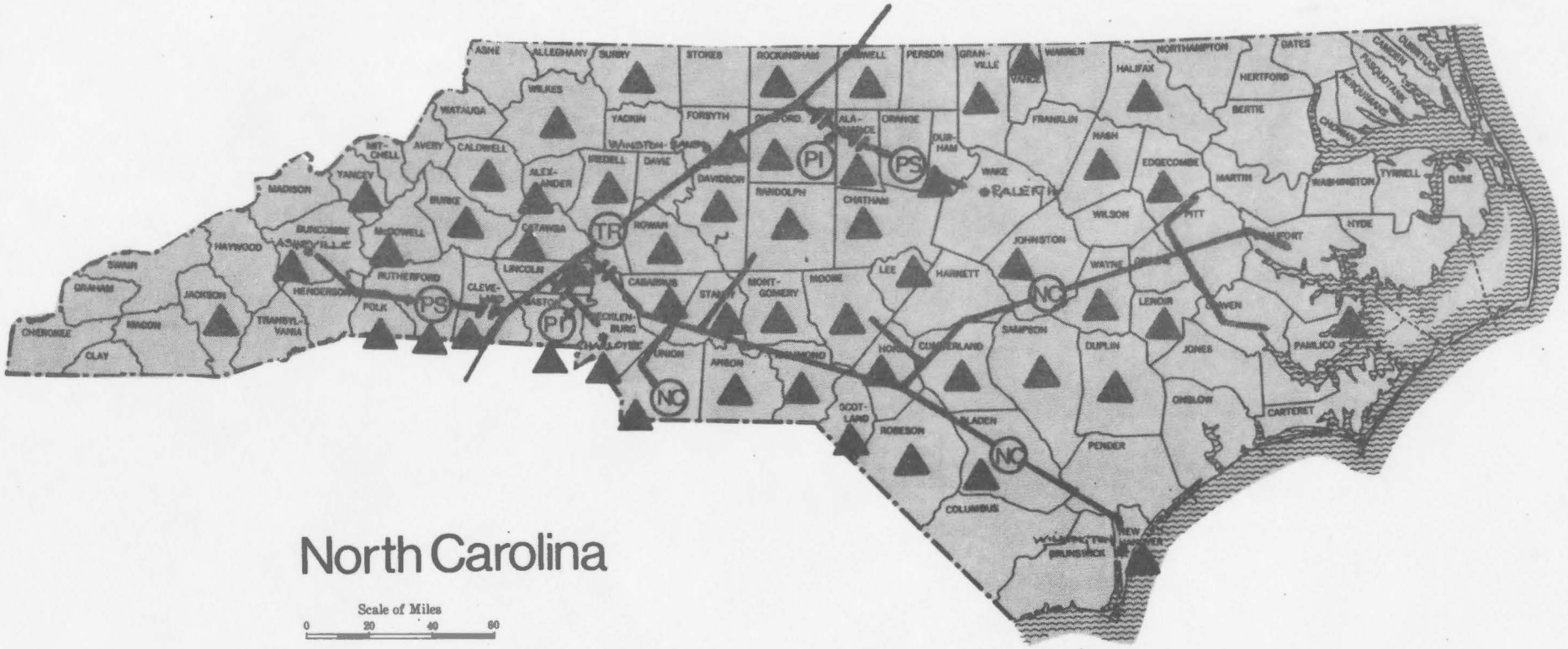
Alternate Capability

The expected use of alternate fuels this winter (including about 145 million gallons of residual oil, 118 million gallons of No. 2 oil, and 73 million gallons of propane) would mean a significant increase to the users in the price paid for fuels. State officials believe that these volumes must be contracted for now in order to assure adequate supplies this winter.

Assessment

Last winter, 1974-75, the statewide curtailment was about 43 percent. At that time, the low level of economic activity in conjuction with a mild winter substantially lessened the demand for natural gas -- industries were operating below capacity and unemployment was higher than the national average. Current indications are that the economy of North Carolina is recovering at a more rapid pace than the U S. economy as a whole because the textile and furniture industries tend to feel the negative effects of recession first and the positive benefits of recovery sooner than other industries.

Hence, in light of the expected curtailments of 60 percent this coming winter, some industries may not be able to achieve potential levels of production and employment. State officials also believe that a number of potential industrial firms have decided not to locate in North Carolina because of fuel supply problems.



North Carolina

Scale of Miles
0 20 40 60

Natural Gas Pipelines

- (NC) North Carolina Natural Gas
- PI Piedmont Natural Gas
- PS Public Service Co. of North Carolina
- TR Transcontinental Gas

:::: INCREASE
DECREASE
MIXED
▲ COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Columbia Gas	577	-15
Consolidated Gas Supply	290	3
Panhandle Eastern Pipeline	72	-11
Tennessee Gas	3	8
Texas Eastern Gas Trans.	121	- 7
Texas Gas Trans.	8	15
Total Interstate Pipelines	1,072	- 9

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	436	40
Commercial	183	17
Industrial	424	40
Utilities	21	2
Other	10	1
Total	1,074	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Primary Metals	38	157.7	5.0
Stone, Clay, & Glass	17	57.2	1.8

Supply Situation

Ohio received 1,072 Bcf of natural gas from interstate pipelines in the April 1974 to March 1975 period; projections for 1975-76 are 974.9 Bcf, a reduction of 9 percent. Columbia Gas Transmission Company, which provides over half of the state's natural gas, and serves nearly every part of the state, is projected to have 15 percent less volume available this year. The areas of Ohio expected to be most impacted by the projected curtailments are the northwest (Toledo), central (Columbus), and the southwest (Dayton, and to a lesser extent Cincinnati).

Industrial Impact

About 10 percent of Ohio's industrial requirements are expected to be curtailed this winter. The two major gas consuming industries in Ohio -- the primary metal and the stone, clay, and glass industries -- represent significant employers of the state's labor force. The primary metal industry accounts for 5.0 percent of total state employment; while the stone, clay, and glass industry employs 1.8 percent of the total. More specifically, the glass refractory and brick industries, many of which are small, will be most severely hit by natural gas curtailments. The severity of a natural gas shortage will be especially acute for these industries since:

- They receive their natural gas under firm contracts and in most cases have not experienced curtailments in recent years.

- The ability of these industries to switch to alternative fuels is limited, since natural gas is used as a unique process fuel. (Where capabilities exist for alternative fuels it would require 1307.7 million gallons of oil and 2.5 million tons of coal, assuming a 75 percent oil/25 percent coal mixture to meet the requirements).

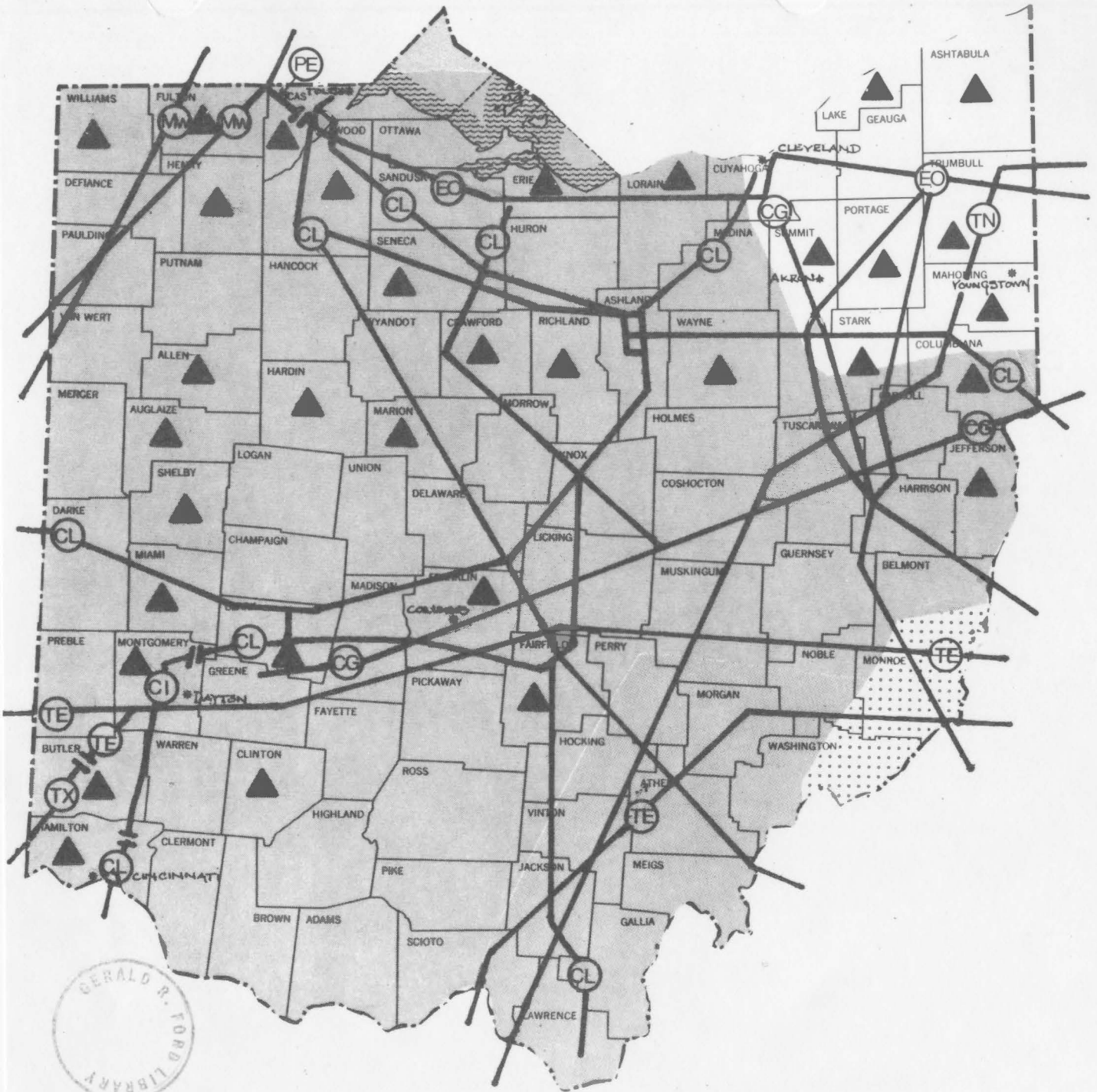
Alternate Capability

The decreased supply of natural gas presents a serious problem for the industrial sector of the State of Ohio. While most customers with interruptible contracts have adjusted to the use of alternative fuels, the shortage now affects firm contract customers as well. The ability

of the latter group to use alternative fuels is less certain--and in some cases impossible. Still, by local area adjustments in gas distribution (and assuming normal weather conditions) the state will be able to manage the gas shortage through next winter with only minor direct economic impacts.

State Program

The Energy Group of the Ohio Department of Economic and Community Development has underway an "Industrial Energy Alert" program of meetings around the state. The purpose of the program is to alert gas users about the curtailment problem, and to aid them in planning for alternate fuel use capability.



Ohio

Scale of Miles

0 10 20 30 40

Natural Gas Pipelines

CI	Cincinnati Gas
CL	Columbia Gas
CG	Consolidated Gas
EO	East Ohio Gas
Mw	Michigan—Wisconsin Pipeline
PE	Panhandle Eastern Pipeline
TN	Tennessee Gas Pipeline
TE	Texas Eastern
TX	Texas Gas Transmission

INCREASE

DECREASE

MIXED

COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)

PENNSYLVANIA

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Columbia Gas	206	-18
Consolidated Gas Supply	95	1
National Fuel Gas	78	- 1
Tennessee Gas P/L	72	- 6
Texas Eastern	140	- 8
Transco	130	- 6
Total Interstate Pipelines	723	- 8

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	272	39
Commercial	94	14
Industrial	311	45
Utilities	8	1
Other	8	1
Total	693	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Primary Metals	57	211.3	6.0
Stone, Clay, & Glass	12	51.0	1.4

Supply Situation

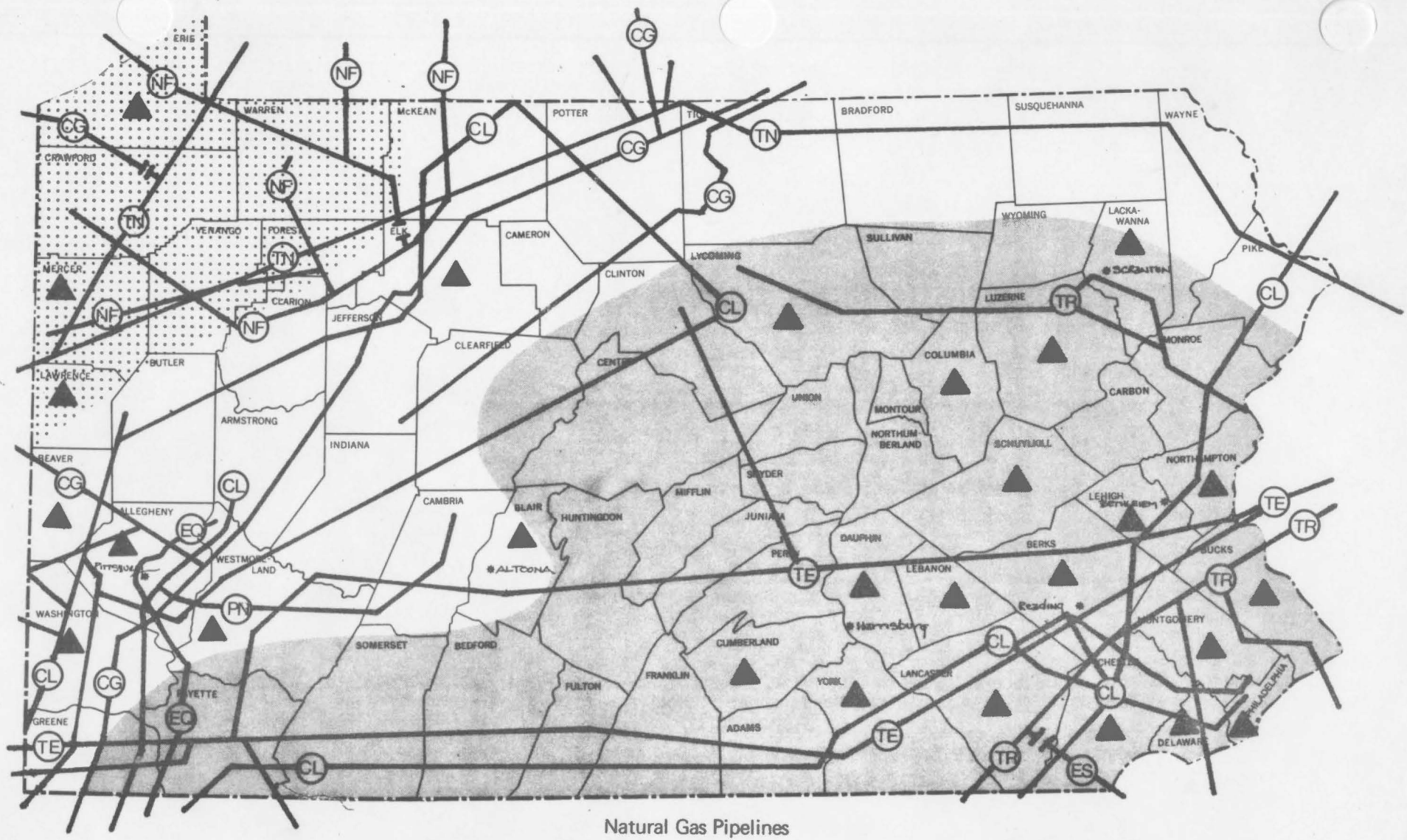
Pennsylvania received deliveries of 723 Bcf of natural gas for the year April 1974 through March 1975; this year a reduction in deliveries of about 60 Bcf is expected (about 8 percent). Pennsylvania receives more than it consumes because it transports some gas to Delaware. Assuming a normal winter, virtually all residential and commercial needs will be met. Thus, nearly the entire impact of reductions in deliveries will fall on the industrial and electric utility sectors -- a reduction of an additional 15 to 20 percent from their estimated requirements. The area of the state hardest hit by natural gas curtailments is the southern portion, extending from Pittsburgh in the west to Philadelphia in the east, and the east-central, and northeastern sections. These areas are served by Columbia Gas Transmission Company, Transcontinental Gas Company, and Texas Eastern Gas Transmission Company -- the pipelines bringing the greatest volumes of gas to Pennsylvania and also imposing the greatest curtailments.

Industrial Impact

As noted above, Pennsylvania's industrial sector will absorb virtually all of the projected gas shortage in the winter ahead. In the past winter, while most interruptible contracts for natural gas were curtailed, firm contracts were largely unaffected; in the winter of 1975-76, a large number of firm industrial contracts will be curtailed for the first time.

While the state has a very diversified industrial base, the largest consumers of natural gas are the primary metals industry (57 percent) and the stone, clay and glass industry (12 percent). The primary metals industry can substitute alternate fuels for many purposes, but still requires substantial amounts of gas for process fuel. The stone, clay and glass industry is even less able to substitute for natural gas because a high proportion is used as a process fuel in unique production techniques. The manufacture of glass, ceramics, and bricks is particularly dependent on the use of natural gas. Other industries which require substantial amounts of natural gas as a process fuel and may be significantly affected by reduction in supply are food processing, agriculture, and chemicals (where natural gas is used as a feedstock).

Most industrial users of natural gas in Pennsylvania will substitute alternate fuels for boiler fuel and space heating needs. There is, however, a distinct possibility that there will not be sufficient gas to satisfy the essential process requirements of the industrial sector. Should the economy recover more quickly than expected, the natural gas shortage could become a critical constraint.



Natural Gas Pipelines

Pennsylvania

Scale of Miles
0 10 20 30 40

CL	Columbia Gas
CG	Consolidated Gas
ES	Eastern Shore
EQ	Equitable Gas
PN	People's Natural Gas
TN	Tennessee Gas
TE	Texas Eastern
TR	Transcontinental Gas
NF	National Fuel

INCREASE
DECREASE
MIXED
COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Southern Natural Gas	98	-11
Transco	25	-25
Total Interstate Pipelines	123	-12

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	20	16
Commercial	14	10
Industrial	73	56
Utilities	22	17
Other	1	1
Total	130	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Textiles	33	132.9	20.0
Chemicals	20	23.0	3.4
Stone, Clay, & Glass	20	9.6	1.4

Supply Situation

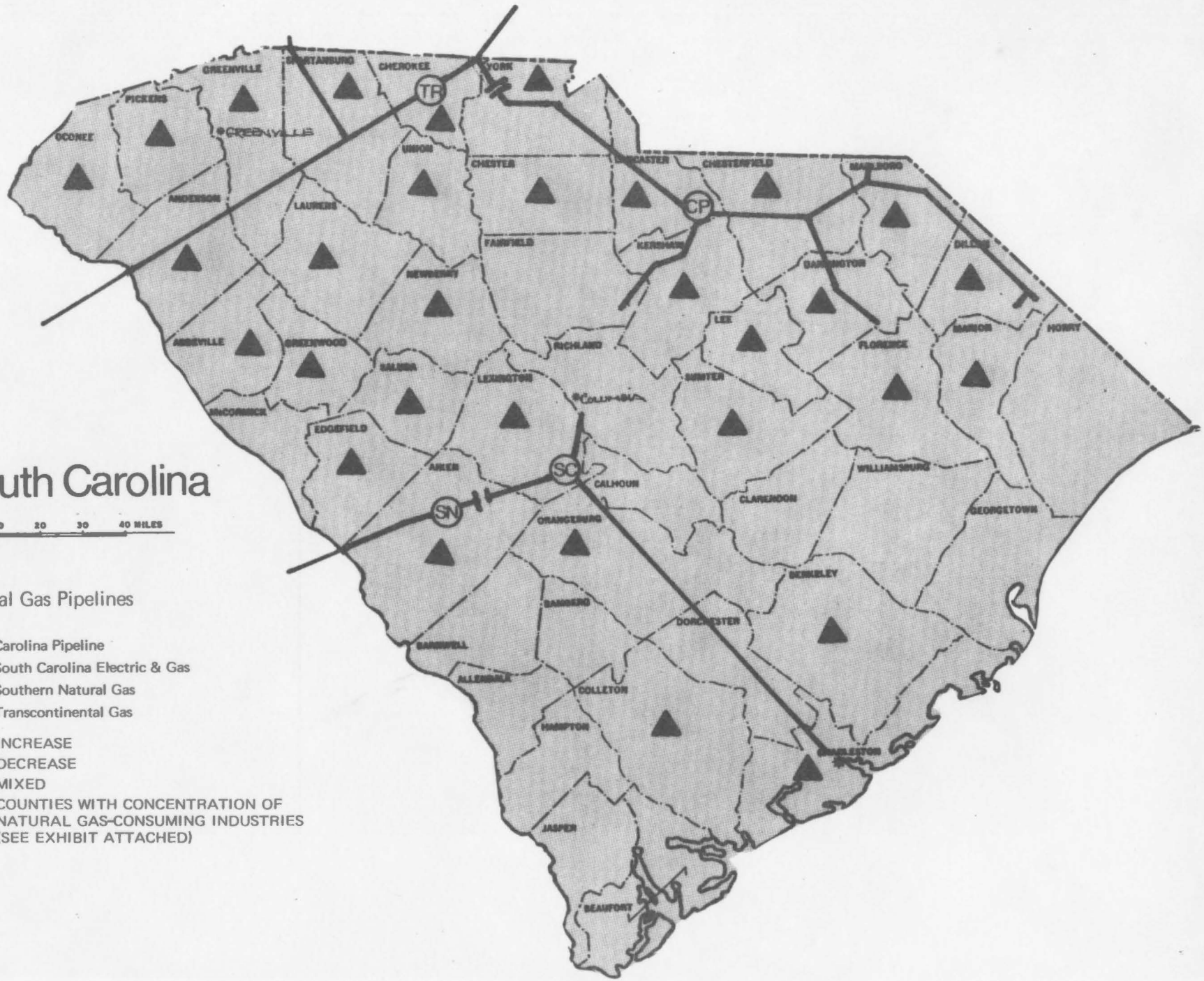
The two major pipelines serving South Carolina are Southern Natural Gas Company and Transcontinental Gas Pipeline. They are projecting gas deliveries of 102 Bcf for 1975-76 (April through March). This is 12 percent less gas than was supplied to South Carolina in 1974-75 (123 Bcf). While Southern is projecting 1975-76 deliveries to be 11 percent below 1974-75, Transcontinental is projecting a 25 percent decrease.

Industrial Impact

A 12 percent reduction in deliveries for the state will result in about a 25 percent shortfall for the industrial sector. The textile, chemicals, and stone, clay and glass industries are the major gas consuming industries in the state. In addition, they are significant employers of the state's workforce accounting for one of every four jobs and one of every two manufacturing jobs. In particular, the textile industry accounts for one of every five jobs in the state.

The northwest portion of South Carolina serviced by Transco, is expected to be severely affected. The textile industry is concentrated in this area employing almost 80,000 people. The chemical industry and the stone, clay, and glass industries also employ a substantial work force (7,000) in northwest South Carolina. The northwest area accounts for about 40 percent of total state employment.

Last year's curtailments did not have a major effect on the state's industries because economic activity was reduced. Since these industries were operating at 40 to 60 percent of capacity and resources were not fully utilized, very little unemployment could be attributed to the natural gas shortage. With the economic recovery, these particular industries are expecting to operate near capacity. Another important economic impact is the inability to attract new industry to the state.



VIRGINIA

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Columbia Gas	96	-20
Transco	37	-16
Total Interstate Pipelines	133	-20

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	48	35
Commercial	27	19
Industrial	51	37
Utilities	5	3
Other	8	6
Total	139	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Stone, Clay & Glass	24	10.7	1.0
Paper	13	13.9	1.2
Textiles	13	41.2	3.7

Supply Situation

Virginia was supplied with 133 Bcf of natural gas in 1974-75 from Columbia Gas and Transco. Transco serves the Virginia-North Carolina border area and Columbia Gas serves most of the rest of the state including the Washington, D.C. Metropolitan area. Both lines are projecting 15-20 percent decreases in available gas for 1975-76.

Industrial Impact

The natural gas curtailments will impact heavily on the industrial sector. The major users of natural gas in Virginia, the stone, clay, and glass industry, the paper industry and the textile industry account for 50 percent of total industrial gas consumption. These industries are not major employers within the state on an aggregate basis; however, on a regional and local basis, such as textiles in the Danville area, the industries are often major employers. The stone, clay, and glass industry accounts for only 1.8 percent of total state employment, the paper industry for 1.2 percent, and the textile industry 3.7 percent. The state has a few industries with a need for natural gas as a unique process fuel (some kinds of textile finishing, glassware manufacture, metal annealing, automated baking lines, and specialty brick manufacture). These industries either must find propane-air replacement or obtain emergency gas supplies.

Nevertheless, the employment impacts of gas curtailments are not expected to be severe because a small percentage of total state employment is affected.

Alternate Capability

Except for the few plants noted above, gas is used for process and space heating for which oil, coal, or propane can be substituted. The Virginia Energy Office reports that all large interruptible customers know they will have no gas for the winter and have converted to alternate fuels. There is expected to be enough gas in Virginia to honor firm contracts.

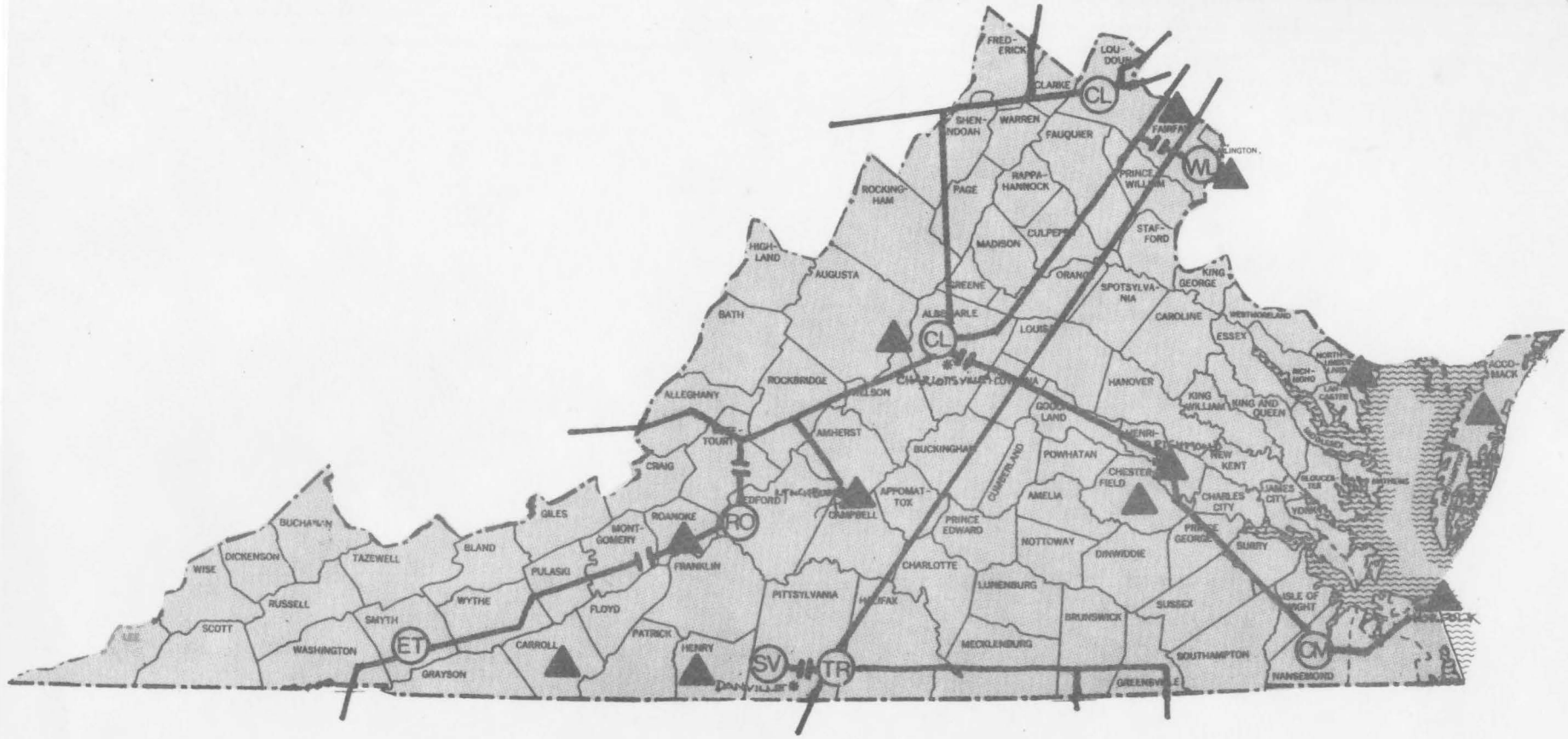
There are 950-1,000 small and medium commercial and industrial customers who could be subject to curtailment if natural gas supplies do not meet projected volumes. Many of these customers do not have alternate fuel capability and may risk shut-downs rather than incurring the expense of converting.

Those brick producers who do not have firm contracts are at an economic disadvantage with those which do have such contracts because of the much higher costs of alternate fuels.

Some of the largest gas consumers are in the process of arranging to purchase propane or intrastate gas. The State Energy Office reports that a number of industries which must have some limited gas to stay in operation have purchased and stored propane for this winter.

Assessment

Virginia will have considerably less natural gas available for use this winter than in the past; however, the effect on employment should not be serious because gas consuming industries do not account for a major share of state employment, the conversion of interruptible customers is already accomplished and alternate fuels are expected to be available.



Virginia

Scale of Miles

0 10 20 30 40 50

Natural Gas Pipelines

- CL — Columbia Gas
- CM — Commonwealth Gas
- ET — East Tennessee Natural Gas
- RO — Roanoke Gas
- SV — Southwestern Virginia Gas
- TR — Transcontinental Gas
- WL — Washington Gas Light

:::: INCREASE

DECREASE

MIXED

▲ COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)

Situation at a Glance, Major Suppliers

Supplier	Natural Gas Deliveries 1974-75 Volume (Bcf)	Projected Change 1975-76 From 1974-75 (percent)
Columbia Gas	85	-22
Consolidated Gas	49	- 7
Tennessee Gas	4	6
Total Interstate Pipelines	138	-16

Natural Gas Consumption by Sector, 1974

Sector	Billion Cubic Feet	Percent of Total
Residential	53	33
Commercial	23	14
Industrial	86	52
Utilities	-	-
Other	2	1
Total	164	100

Estimated Gas Consumption and Employment in Major Gas Consuming Industry Groups

Industry	Percent of Total Industrial Gas Use (percent)	Employment (000)	Percent of Total State Employment (percent)
Stone, Clay and Glass	38	19.2	4.8
Chemicals	29	23.8	6.0
Primary Metals	24	21.8	5.4

Supply Situation

The State of West Virginia is a major producer-exporter of natural gas. In addition to a substantial quantity of gas produced from its own reserves, the State also received 138 Bcf from the interstate market last year. Only 164 Bcf of these total gas supplies were consumed in the State itself. The remaining supplies were exported for sale or resale on the interstate market.

West Virginia's interstate supplies are delivered through three interstate pipelines, Columbia, Consolidated, and Tennessee Pipeline, which serve five distributors - Bluefield, Cabot, Columbia, Equitable, and Hope. The interstate gas which has been available to West Virginia will be curtailed to some extent during the coming winter, however, which could cause a shortage problem in spite of the state's production capabilities.

Industrial Impact

Over 50 percent of the natural gas consumed in West Virginia is utilized in the industrial sector. This is an extremely high percentage for industrial gas consumption and indicates that the state could be adversely affected by natural gas shortages, as industrial and utility end-users are the first to be curtailed when a shortage arises.

The major gas consuming industries are the stone, clay and glass, chemical, and primary metals industries. These three groups account for a total of 91 percent of all industrial gas consumption in the state. These industries, in addition to being major gas consumers, are also major industrial employers within the state. Of the state's total employment, 4.8 percent is in the stone, clay and glass industry, 5.9 percent in the chemical industry, and 5.4 percent in the primary metals industry.

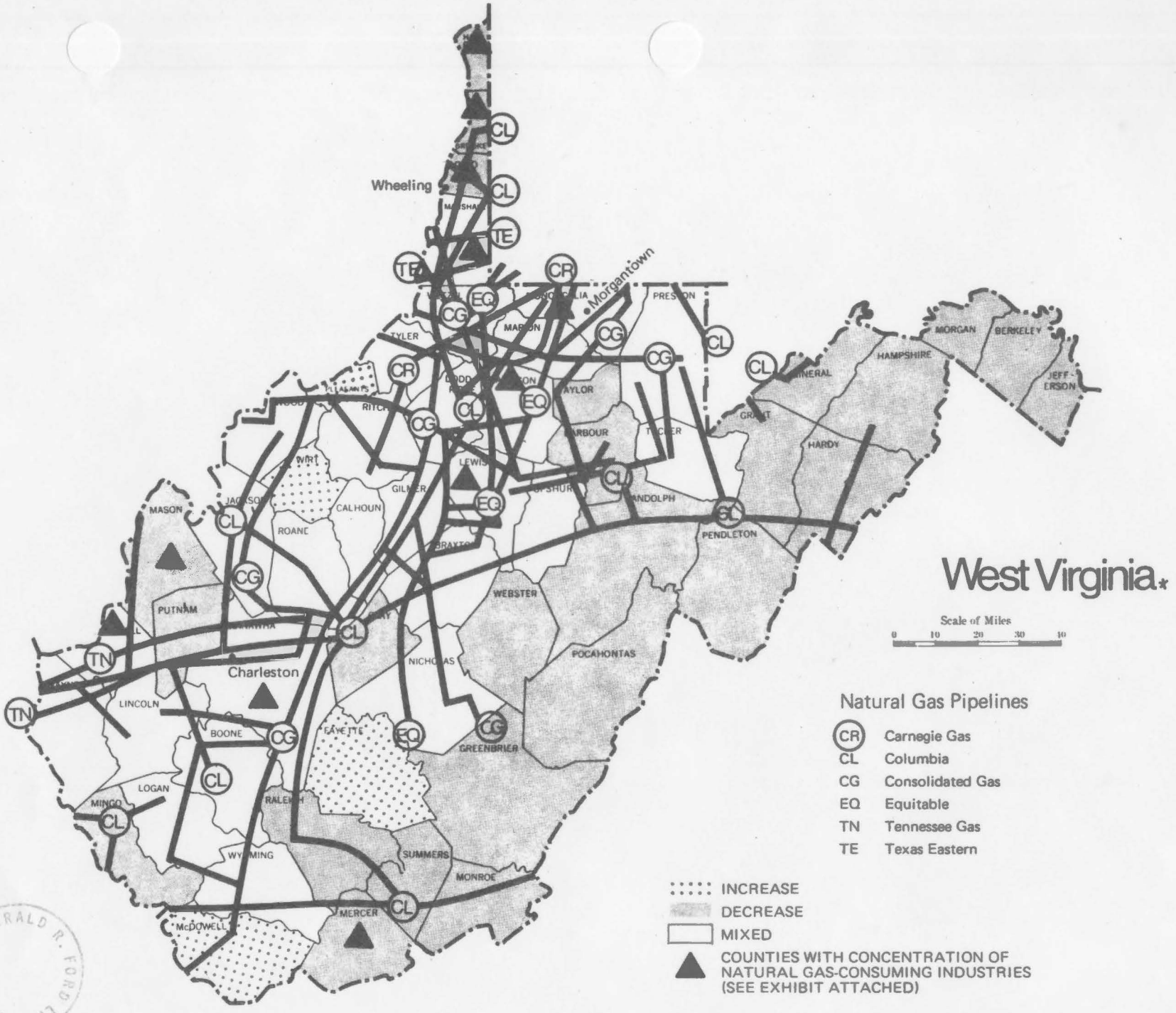
The industrial sector in West Virginia is supplied primarily by three gas distributors - Columbia Gas of West Virginia, Cabot Corporation, and Hope Natural Gas Company. Columbia Gas received its supplies from Columbia Gas Transmission Corporation, which projects considerable curtailments, and Hope is supplied by Consolidated Supply Corporation which is projecting little, if any, curtailments. Cabot is a producing distributor, and will, therefore, be able to meet its requirements through its own supply.

Alternate Capability

A large part of the gas which is consumed in the glass and chemical industries is used as a feedstock or industrial process fuel and, therefore, cannot be replaced by alternate fuels. However, some of the gas consumed in these industries and much of the gas consumed in the primary metals industry and the utility sector can be replaced by alternate fuels.

State Program

The State Fuel and Energy Office is conducting a public education program to alert the public to the possibility of a natural gas shortage, and to point out measures that will help conserve the gas which is available.



West Virginia*

Scale of Miles
0 10 20 30 40

Natural Gas Pipelines

CR	Carnegie Gas
CL	Columbia
CG	Consolidated Gas
EQ	Equitable
TN	Tennessee Gas
TE	Texas Eastern

INCREASE
DECREASE
MIXED
COUNTIES WITH CONCENTRATION OF NATURAL GAS-CONSUMING INDUSTRIES (SEE EXHIBIT ATTACHED)

***NOTE:** On this map increases and decreases have been shown ONLY for interstate deliveries, and that approximately 23% of West Virginia's deliveries are intrastate.

TAB 3

NATURAL GAS DATA SYSTEM

The Federal Energy Administration and the Federal Power Commission are currently developing a new data system to assess projected natural gas shortages for the 1975-76 heating season and the demand that such shortages would produce for other fuels. Data are being collected from approximately 2,000 pipelines and distribution companies, who were to obtain and report curtailment impact information for approximately 5,000 of their large end users and aggregated data for hundreds of thousands of their smaller customers. Most of the data forms have been subminted to FEA and a first report is expected in about a month. The objectives of this effort are to provide the first comprehensive and continuing monitoring system for natural gas and to provide tabular or graphic reports for use in evaluating the economic impact as well as the demand for alternative fuel engendered by gas shortages. The system will be updated periodically to keep the data current.

The primary data collection form is designed to provide end-use data for customers of natural gas interstate and intrastate pipelines, distribution companies and municipalities. Using a base year of April 1974 thru March 1975, the changing natural gas shortage is estimated for the next year. The information being collected is described below:

(1) General information about the reporting company including identification of the type of operation, supplier's names and percent of curtailment by interstate, intrastate and foreign companies during base and current years, as well as a summary of customer curtailments by type of service during base and current years.

(2) Natural gas deliveries to non-curtailed direct end-use customers by type of service during base and current years.

(3) Large end users (100 MMcf in base year) during base and current years:

    (a) market sector, geographic area, type of service, priority assignment, historical worker-days lost;

(b) deliveries and curtailments;

(c) alternative fuel requirements.

(4) Curtailed small end-users (aggregated) during base and current year:

(a) market sector (gross), geographic area, type of service, worker-days lost;

(b) deliveries and curtailments;

(c) alternate fuel requirements.

Another data base in this system will provide data on underground gas storage including withdrawals from and injections to reservoirs and reservoir identification data.

Once the data have been entered into the system and validated, a series of reports will be produced as a basis for analysis, problem solving and decision making. The reports described below will be produced for the following levels of aggregation: Entire United States, FEA Regions, FPC Regions, Petroleum Allocation Districts (PAD), Individual States (and portions of states) and by end-user category -- residential, commercial, industrial and utilities -- for each geographical aggregate:

(1) Total Deliveries and Curtailments for the base year and/or the current year.

(2) Alternate Fuel Requirements for the base year and/or the current year for companies that do not currently have an alternate fuel capability.

(3) Alternate Fuel Requirements for the base year and the current year and identification of level of curtailments for customers who have no alternate fuel capability.

(4) Workers days lost during past Quarter and base year due to curtailments.

Detailed information on underground storage will be available after November 1, 1975.