

NATURAL GAS
AS A BASIS FOR RESOURCE DEVELOPMENT
IN THE PACIFIC NORTHWEST

by
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A THESIS
submitted to
OREGON STATE COLLEGE

in partial fulfillment of
the requirements for the
degree of

MASTER OF SCIENCE

June 1956

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Date thesis is presented May 1, 1956

Typed by Clistie F. Stoddard

ACKNOWLEDGMENTS

The author wishes to express his sincere appreciation to Dr. J. Granville Jensen, Chairman of the Department of Natural Resources, Oregon State College, for his generous assistance and guidance in the preparation of this thesis. To Mr. William G. Griffith, Mrs. Miriam Ludwig, and Mr. Howard Young, Librarian, Assistant Librarian and Student Assistant, respectively, of the Engineering Library, Oregon State College, go my sincerest regards and appreciation for their invaluable help in documenting this thesis. I wish to express my appreciation also to Mr. Ray C. Fish, President of Fish Engineering Corporation and Chairman of the Board of Pacific Northwest Pipeline Corporation, for a bountiful supply of current information; to Mr. James W. Carroll, Manager of Portland Gas and Coke Company, Corvallis Branch, for generous contributions of his time and much local and current information; and to Mr. Bernard Goldhammer, economist, Bonneville Power Administration, Portland, Oregon, for supplying me with invaluable information concerning the energy base of the Pacific Northwest. I would further like to thank the public relations officers of Portland Gas and Coke Company, Washington Natural Gas Company and British Columbia Electric Company for a prompt and bounteous response to my request for infor-

mation. Lastly, I would like to thank my wonderful wife, Nancy, for her proofreading, typing, and moral support which immeasurably aided in the completion of this thesis.

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NATURAL GAS AS A BASIS FOR RESOURCE DEVELOPMENT IN THE PACIFIC NORTHWEST

CHAPTER I

INTRODUCTION

The Objective of this Study

The purpose of this study is twofold: First, to bring together existing information on the coming of natural gas to the Pacific Northwest and second, to analyze its possible impact on the region's economy.

Newspapers, commercial journals and other media have devoted many articles to the subject of which no less than 172 articles directly concerned with gas for the Pacific Northwest have been read as background for this thesis. But there does not seem to have been published a comprehensive account of the struggle, with its many ramifications, to bring natural gas to the Pacific Northwest. To consolidate the vast body of information on the coming of natural gas into a few pages is the objective of the first part of the thesis.

The second portion of the study attempts to appraise the impact on the Pacific Northwest of a plentiful supply of natural gas. What effect will it have on the economy in general? What established industries will convert to natural gas? What new industries might be attracted to

the Pacific Northwest? What heretofor unutilized resources will be exploited? How will natural gas alter the present energy base of the Pacific Northwest, and what advantages will accrue from such alteration? The answers to these questions are approached as factually as possible, with only an occasional crossing of the threshold of conjecture.

The Pacific Northwest's Energy Base

It is appropriate, in a study of natural gas as a basis for resource development in the Pacific Northwest, to first consider the present energy pattern of the Pacific Northwest and compare this pattern to that of the nation as a whole.

The Pacific Northwest is a fuel poor area. It has no proven oil, and so far, only one commercially producing gas well. The bulk of its requirements for coal and all of its requirements for oil have to be met by importation from other areas.

In 1952, at the request of the Office of Defense Mobilization, the Department of Interior made a study on the energy supply pattern in Oregon and Washington. The results of this study are shown in the following table (19, pp.1-2):

SOURCES OF ENERGY

	<u>United States</u>	<u>Oregon & Washington</u>
	(Percent of Total)	
	<u>100</u>	<u>100</u>
Coal	49	10
Oil (excluding motor fuel)	23	35
Natural Gas	22	-
Wood	Neg.	10
Hydro ¹	6	45

^{1/} These figures were calculated on the basis of inherent Btu's. Hydroelectric power converted to Btu's by using the central station equivalent of 15,000 Btu's per kwh.

There has been a considerable shift in the energy supply pattern in the United States between 1940 and 1950. In the United States as a whole, the decline in the use of coal has been balanced by increased use of oil and a spectacular rise in the utilization of natural gas, whereas in the Pacific Northwest the shift has been away from wood and coal to hydroelectric power. In the Pacific Northwest, energy from wood decreased from 22 per cent to 10 per cent between 1940 and 1950, and energy from coal decreased from 17 per cent to 10 per cent between 1947 and 1950. Conversely, energy from hydroelectric power in the Pacific Northwest increased from 23 per cent in 1940 to 45 per cent in 1950.

In the Pacific Northwest the chief source of electric energy is hydro. Capacity in service area of the Bonneville Power Administration in 1955 was about 93

per cent hydroelectric and 7 per cent thermalelectric. For the most part, fuel-fired generation is used only for peaking purposes and in emergencies. In very wet years, thermal energy is used only to a minor degree during the extreme peaks in the winter (19, pp.1-2).

With the advent of natural gas in the Pacific Northwest, it is expected that the relative importance of other sources will decline since natural gas may well come to supply a substantial share of the Btu's necessary for residential, commercial, and industrial purposes. But quantitative decrease in the use of present sources is not expected since the economy is expanding and the energy requirement is increasing.

CHAPTER II

SOURCES OF NATURAL GAS FOR THE PACIFIC NORTHWEST

The events leading up to the arrival of natural gas in the Pacific Northwest form a long story of political and business intrigue, involving regional conflicts over sources of gas and competition by various companies.

Gas Fields and General Gas Areas

Figure 1 shows the natural gas fields of the Western United States and Western Canada. The main fields now known are in Texas, Oklahoma, Kansas, the Rocky Mountain area and California.

Reserves

Shown below are the estimated proved reserves of natural gas in the Western United States by states, at the beginning of 1955 (25, p.122):

<u>State</u>	<u>Reserves in cubic feet</u>
California	9,026,603,000,000
Colorado	1,932,913,000,000
Kansas	15,758,332,000,000
Montana	723,731,000,000
Nebraska	192,946,000,000
New Mexico	17,240,669,000,000
Oklahoma	12,396,148,000,000
Texas	105,129,062,000,000
Utah	387,375,000,000
Wyoming	2,855,071,000,000
Total	165,642,850,000,000

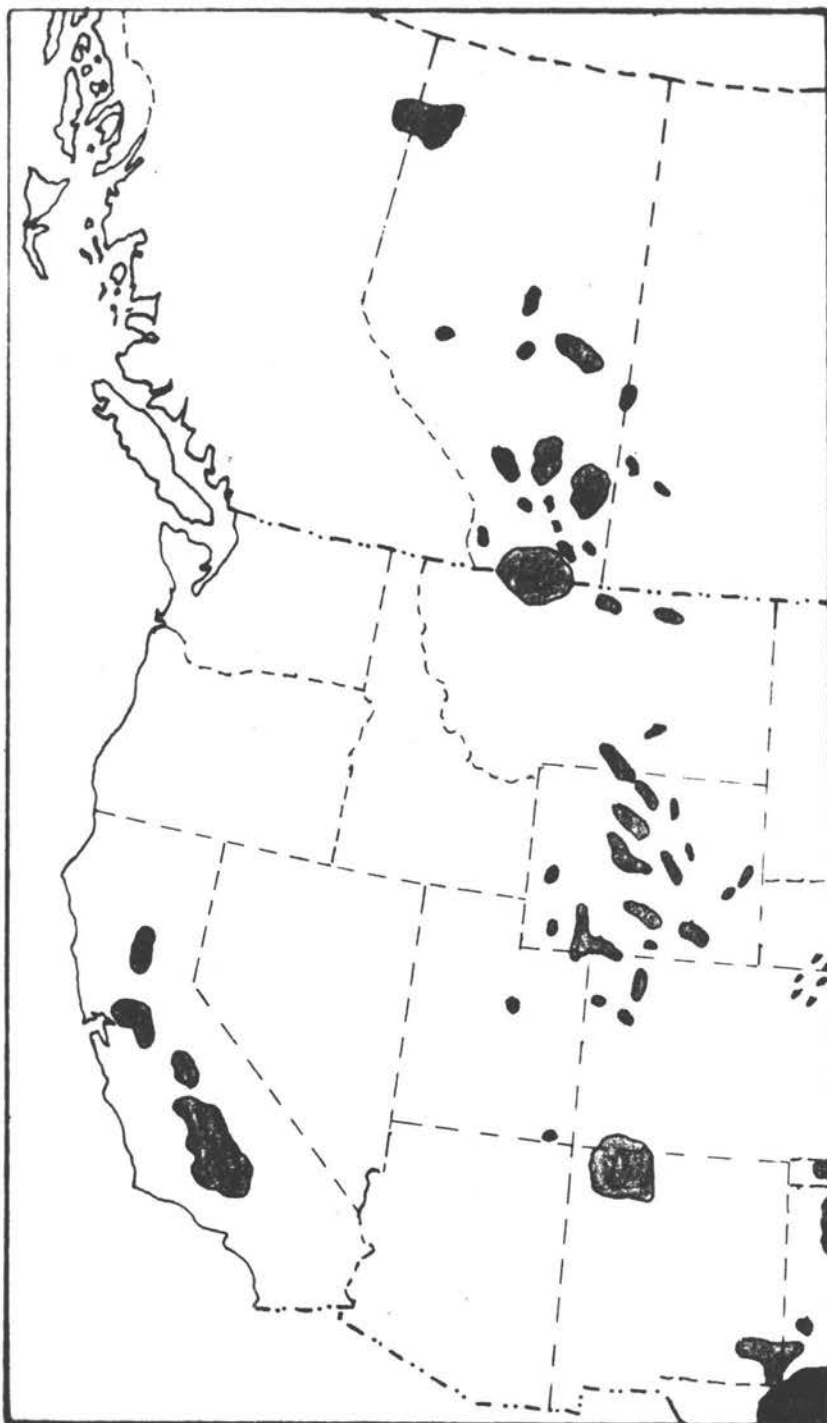


Figure 1. Natural gas fields and general gas areas of the Western United States and Western Canada. Source: Oil and Gas Journal, June 20, 1955.

The major portion of Canadian natural gas reserves are located in the Province of Alberta. Established natural gas reserves in Alberta stood at approximately 15.6 trillion cubic feet on June 30, 1955 (4, p.33). This represents a spectacular increase over the estimate of four and a half trillion cubic feet in 1949. The province may never become another Texas, but in a few short years it has grown to the stature of Kansas, New Mexico and Oklahoma, and indications are that ultimate reserves will be much greater. The proven gas reserves of the Peace River region, now one of the sources of natural gas for the Pacific Northwest, exceed five trillion cubic feet (27, p.14).

Estimated Depletion Time

The gas now allocated for the Pacific Northwest totals enough to supply expected needs for 30 years and additional reserves are known.

Reserves in the San Juan Basin of Northwestern New Mexico-Southwestern Colorado, the other principal source of natural gas for the Pacific Northwest, and the fields of Piceance Creek, Tip Top, and Big Piney along the route of the pipe line being constructed by the Pacific Northwest Pipeline Corporation, are presently proved at 3.6 trillion cubic feet. This reserve is considered adequate to supply the Pacific Northwest for the next

30 years. The Pacific Northwest Pipeline Corporation has over 100 producing wells in the San Juan Basin alone and plans to drill an additional 958 wells in the next 10 years, so it can be expected that reserves will be substantially increased over the present figure (35, pp.118-121).

As previously stated, the gas reserves in Alberta are presently considered to be 15.6 trillion cubic feet, with the reserves of the Peace River region accounting for over five trillion cubic feet of this figure. The government of Alberta has stated that it will need approximately six trillion cubic feet to meet its requirements for domestic, commercial and industrial purposes over the next 30 years. Export permits now in effect call for withdrawal of 4.3 trillion cubic feet for shipment to Eastern Canada and 1.08 trillion cubic feet for shipment to the Pacific Northwest. However, the withdrawals for Eastern Canada will come from Central and Southern Alberta and will not effect the supply from the Peace River region. The 1.08 trillion cubic feet from the Peace River region constitutes the supply stipulated in a twenty year contract, so it can be seen that the reserves in that area will more than outlast the life of the pipe line (4, p.33).

New Discoveries

The pipe line from New Mexico to the Pacific Northwest passes through three large, undeveloped sedimentary basins; the Paradox, Uinta and Green River. The proximity of the pipeline, and its consequent ready market for any new-found gas, is expected to encourage extensive exploration in these areas. A similar incentive is also provided for exploration in Idaho and Eastern Oregon and Washington. A gas well of commercial proportions was completed in Eastern Oregon in the vicinity of Ontario in 1955.

The petroleum industry considers that the potential reserves of Western Canada have barely been tapped and estimates that with the intensive exploration and development program now in progress, Western Canada's natural gas reserves will be increased by approximately 1.3 trillion cubic feet each year for the next ten years. Certain authorities feel this to be a very conservative estimate (39, p.26).

CHAPTER III

THE BATTLE OF THE PIPELINES

The Pacific Northwest, last major area in the United States without natural gas, will finally begin receiving it in the summer of 1956. The Pacific Northwest will be transformed from the only region in the United States without natural gas into the only region with plenty of it, and from two widely separated sources!

The plan to bring natural gas to the Pacific Northwest, as finally agreed upon and approved by the Federal Power Commission on 25 November 1955, calls for natural gas to be piped in from two sources: The Peace River fields of Northwest Alberta via a 650 mile line, and the San Juan Basin in Northwest New Mexico-Southwest Colorado via a 1466 mile line. That, simply stated, is the means by which the homes and industries of the Pacific Northwest are to finally receive this clean, safe, economical fuel. The story behind this final result is considerably more complicated, however. It goes back to 1949, involves no less than seven pipeline companies, several major gas utilities in the west, the governments of Canada and the Provinces of Alberta and British Columbia, and the Federal Power Commission of the United States.

Westcoast Transmission Company, Ltd.

In May, 1949, Mr. Frank McMahon, President of Pacific Petroleum, Ltd., announced that his company (and associated interests) planned construction of a pipe line to take natural gas from Alberta, Canada, west to the Pacific Coast and south through Washington and Oregon into northern California. The plan called for a 1400-mile line 30 inches in diameter, which would make it the largest gas line and one of the biggest and longest pipe line of any kind in the world. The line was to originate in the northern part of the Province of Alberta, run west and south through passes of the Canadian Rockies to Vancouver, B. C., and then south parallel to the Pacific Coast of the United States. Estimated cost was \$175,000,000. (See Figure 2).

A new firm, Westcoast Transmission Company, Ltd., under the presidency of Mr. Frank McMahon, had been formed in Canada to construct and operate the Canadian portion of the line (21, p.166).

The "associated interests" mentioned above should be kept in mind since they played an important role in the outcome of the fight to bring natural gas to the Pacific Northwest. The associated interests are Sunray Oil Corporation, Tulsa, and the New York investment banking firm of Eastman, Dillon & Company.



Figure 2. Route of the 1400 mile natural gas pipeline proposed by Westcoast Transmission Company, Ltd. Source: Oil and Gas Journal, May 19, 1949.

Sunray, through its subsidiary in Canada (Sunray Oil Company, Ltd.) is a substantial stockholder in Pacific Petroleum, and both these firms have large interests in Bear Oil Company, Ltd., which has gas reserves in Alberta.

Mr. McMahon stated in his announcement that marketing surveys had indicated a demand in the Pacific Northwest, upon completion of construction, for approximately 500,000,000 cubic feet of natural gas daily with the probability of a considerable subsequent increase in demand over the years, eventually requiring construction of a second line.

Northwest Natural Gas Company

In June, 1949, Northwest Natural Gas Company announced that it planned to bring natural gas to the Pacific Northwest from Southwestern Alberta. The proposed 24 inch line was to extend south across the border into Idaho at Kingsgate, British Columbia, and reach west through Washington to serve the cities of Spokane, Portland, Seattle, and Vancouver, British Columbia, as well as smaller cities along the route (See Figure 3). Five other routes had been surveyed by the company, and it declared that it was ready to construct any one of the six that might be approved, but the route through Washington was by far the cheapest to construct

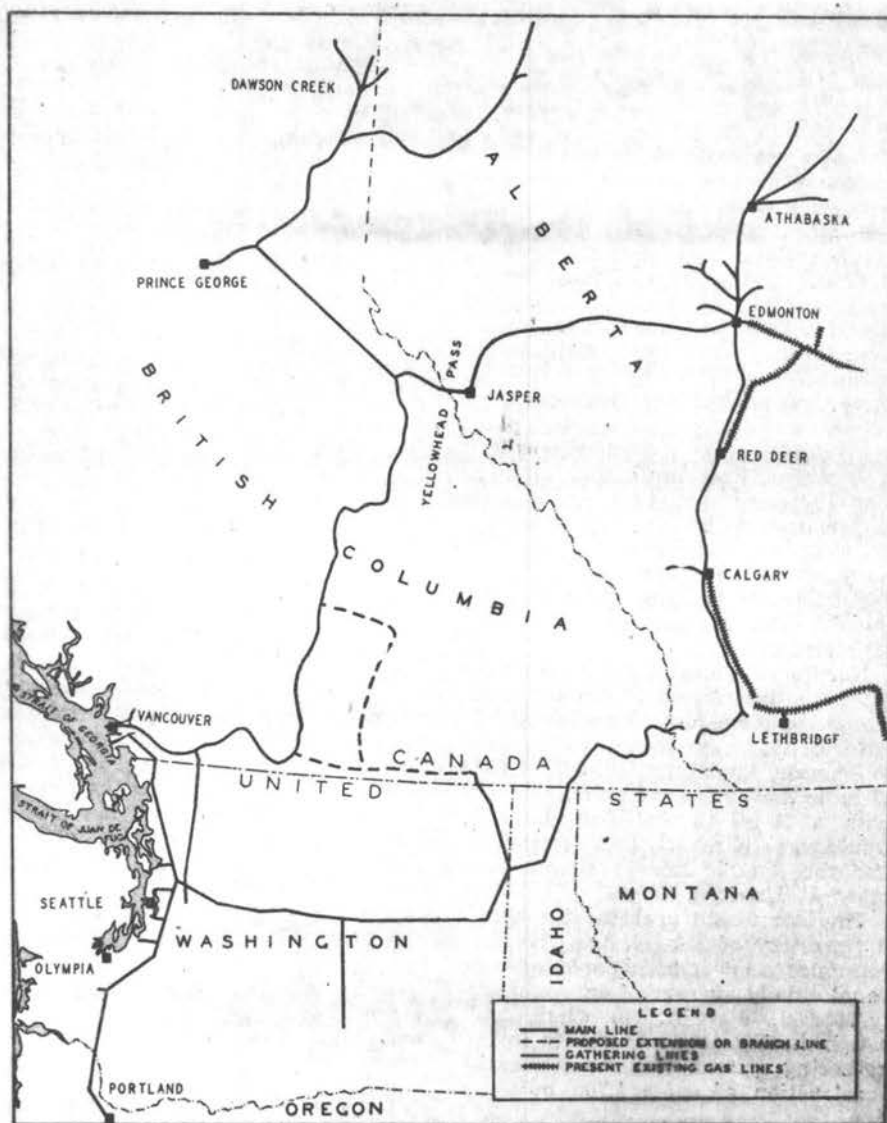


Figure 3. General routes proposed by Westcoast Transmission Company, Ltd., and Northwest Natural Gas Company, the two chief contenders, at that time, for the right to pipe natural gas to the Pacific Northwest. Source: Oil and Gas Journal, June 29, 1950.

and maintain. The Northwest Natural line was planned to deliver 222,000,000 cubic feet daily, at ultimate capacity, with reserves committed sufficient for a 20 year supply.

Northwest Natural Gas Company was backed by the New York engineering and geological firm of Brokaw, Dixon and McKee. A. Failson Dixon was president of Northwest Natural Gas Company and its two Canadian affiliates, Alberta Natural Gas Company and Alberta Natural Gas Grid, Ltd. The latter company would operate the Alberta gathering system (36, p.59; 32, p.24).

Province of Alberta Prohibits Natural Gas Exports

In July, 1949, the government of the Province of Alberta, fearing for its own welfare in view of the two recently announced and ambitious natural gas export projects, passed the Gas Resources Preservation Act. The act gave Alberta's Petroleum and Natural Gas Conservation Board almost unlimited power in regulating activities of natural gas pipe line companies operating in the area, and it prohibited the export of natural gas from the province without a permit (5, p.49).

The Alberta government took the position that it would not permit exportation of gas from the province until it was established that such exports would not in any way prejudice the local supply for a long period,

probably 50 years. The Alberta government's best estimate of proved reserves of gas in Alberta were at that time only four and one half trillion cubic feet. Five trillion cubic feet had been stipulated as the minimum amount of natural gas which should be reserved for the province's needs (32, p.24).

The above action of Alberta placed another, and for the time being, insurmountable requirement on the pipeline companies. The requirements which had to be met by any pipe line company wishing to export natural gas to the United States are outlined as follows:

1. The pipe line company had to be incorporated by a special act of the Canadian Parliament.
2. A permit to export gas out of the province had to be obtained from the Alberta Petroleum and Natural Gas Conservation Board.
3. The successful applicant must then obtain authorization to transport gas from one province to another from the Dominion Board of Transport Commissioners.
4. The final hurdle was to obtain authorization from the United States' Federal Power Commission to construct a gas transmission line in the United States (3, pp.47-48).

Prairie Transmission Lines, Ltd.

Late in 1949, Prairie Transmission Lines, Ltd., proposed to bring Alberta natural gas into Oregon, Washington and British Columbia along a route similar to that of Northwest Natural Gas Company. The proposed capacity of its line was not indicated, but the company was incorporated, along with Northwest Natural Gas Company, by the Canadian Parliament in the spring of 1950 (3, pp.47-48).

Southern Route Vs Northern Route

Proponents of the southern route (Northwest Natural Gas Company and Prairie Transmission Lines, Ltd.) argued that their route would be cheaper to construct and maintain, would serve more people, and that gas could be delivered cheaper to the customers while a higher price would be paid to the Alberta producers.

The all-Canadian, or northern route, attracted considerable support in Canada in that it was considered that this gas line would open up and assist in the development of much wilderness territory in British Columbia and Alberta. It was also pointed out that \$55 million more would be spent in Alberta and Canada than would be if the line went south and looped through the United States (3, pp.47-58; 12, p.16).

All of the arguments advanced by both sides were valid but neither could escape the fact that the government of Alberta was not about to allow the export of natural gas until sufficient reserves to insure the development of Alberta had been proven. A cheerful note, however, was injected into the contest when in January, 1950, Alberta reserves were officially estimated at 5.95 trillion cubic feet. This amounted to an increase of approximately one and one-half trillion cubic feet over the previous year. However, Westcoast Transmission's requirements for 30 years were set at nearly two trillion cubic feet. In view of the five trillion cubic feet which had been stipulated as the minimum to be reserved for Alberta's needs, it was evident that no gas would be exported in the immediate future (3, pp.47-58; 12, p.16).

Pacific Northwest Pipeline Corporation

In June, 1950, the Pacific Northwest Pipeline Corporation filed an application with the Federal Power Commission to build the most ambitious natural gas pipe line ever attempted. The 26-inch main transmission line would stretch 2,175 miles from the Gulf Coast portion of Texas to Vancouver, British Columbia (See Figure 4). The proposed new line would exceed by 315 miles the longest natural gas pipe line heretofore undertaken - namely,

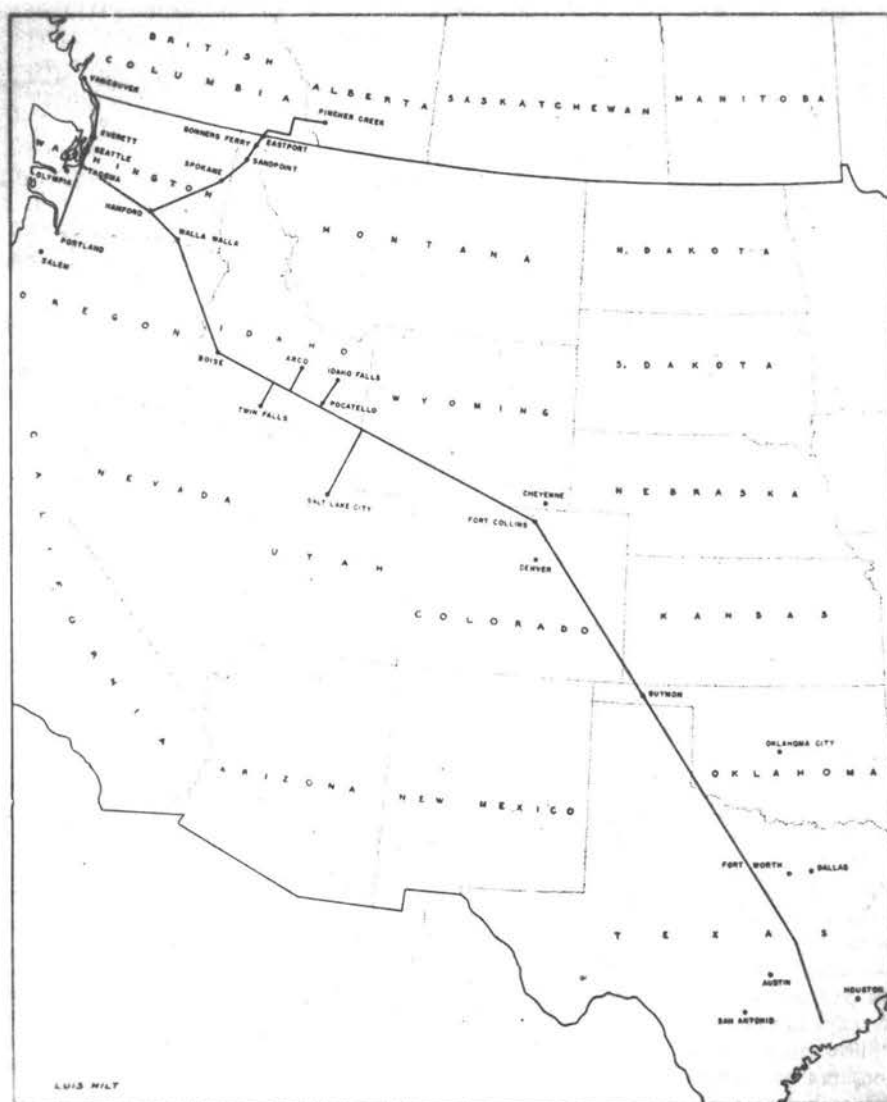


Figure 4. Pacific Northwest Pipeline Corporation's proposed natural gas pipe line route from Texas to the Pacific Northwest. Source: American Gas Journal, August, 1950.

the 1840 mile line of Transcontinental Gas Pipe Line Corporation to bring Texas gas to New York City and intermediate Atlantic seaboard points.

Capacity of the line was to be 250,000,000 cubic feet per day and the estimated cost was \$174,000,000. The line proposed to rely on Alberta fields for only 100,000,000 cubic feet daily which in turn would be sold to the Vancouver, British Columbia area, a proposition which actually placed the Alberta government in the position of supplying a Canadian market. It was thus hoped that the "no export" rule of the Alberta government would be relaxed.

Pacific Northwest Pipeline Corporation was, and still is, a subsidiary of Fish Engineering Corporation of Houston, Texas. To Mr. Ray Fish, Chairman of the Board of the former and President of the latter, a 2100-mile gas line was no deterrent, as his company - Fish Engineering - built the Texas-New York line mentioned above, and the Texas-Illinois line to Chicago. He also built Tennessee Gas Transmission line before forming his own organization (47, pp.13-14).

Pacific Northwest Pipeline Corporation Improves Position

Pacific Northwest Pipeline Corporation got on "the inside track" in the race for authority to transport

natural gas from Alberta into the Pacific Northwest by merging, in October of 1950, with Prairie Pipe Lines, Ltd., and with the latter's affiliate, Prairie Transmission Line, Ltd.

Two distinct advantages were attained by this move: First, Pacific's case was strengthened by the fact that Prairie Transmission had already been chartered by the Canadian Parliament to export Canadian gas. Second, and where Pacific definitely attained an edge, was in the fact that its combined application with Prairie to the Alberta Petroleum and Natural Gas Conservation Board contained a provision which "permits the Province of Alberta to participate in this (Pacific Northwest) natural gas market to the limit which the regulatory authorities of its government feel that their presently developed reserves will allow." Exports from Alberta fields would be expressly limited at the start to the 100 million cubic feet per day required for the British Columbia market.

Also, during this period, pressure was being applied to the Alberta government in the form of threatened loss of potential natural gas markets. Pacific Northwest Pipe Line Corporation warned Alberta that it must get busy or the market in the Pacific Northwest would be taken by United States natural gas. In addition, the Tennessee

Gas Transmission Company was seeking the Eastern Canadian markets and consequently threatening the potential market for Alberta natural gas in that area (13, p.38).

A Foot in the Door

In June, 1951, the first permit for major gas export from western Canada was issued by the Alberta government to McColl-Frontenac Oil Company and Union Oil Company of California. Both companies own important natural gas reserves in Southeastern Alberta. The permit allowed the two companies to supply 40 million cubic feet of natural gas daily to Montana Power Company of Butte "for use or consumption in the mining, smelting, reduction, and refining operations of the Anaconda Copper Company" (name since changed to Anaconda Company). The action was a wartime mutual defense measure.

This action was a blow to Northwest Natural Gas Company which planned to come directly south through these southeastern Alberta fields and to bring their gas into Oregon and Washington. It also affected Western Pipe Lines, Ltd., which planned to use this gas in its proposed line from Alberta east to Winnipeg (22, p.30; 11, p.49).

Westcoast Transmission Company Makes Progress

During the remainder of 1951 little action was reported on the projects to bring natural gas to the Pacific Northwest. In February, 1952, the never inactive Mr. Ray Fish, Chairman of Pacific Northwest Pipeline Corporation, proposed a precedent-setting international exchange of natural gas between the United States and Canada (See Figure 5). Essentially, the plan involved importing about 250 million cubic feet of gas daily from fields in Alberta to supply the United States Pacific Northwest and southern British Columbia in return for an equal quantity of gas piped to eastern Canadian markets from fields in the United States Southwest. Importation of Alberta gas would be handled by a line constructed by Pacific Northwest Pipeline Corporation of course. Mr. Fish stated that the arrangement would save about 950,000 tons of critical steel and would cost the consumer six to eight cents less per thousand cubic feet in both areas (10, pp.72-73). Simultaneously, Pacific Northwest Pipeline Corporation announced that plans for the Texas-to-Washington line had been dropped. Scarcity of material and prohibitive cost as well as economic advantages of the new plan were advanced as being factors in the decision (10, pp.72-73). Apparently this new plan was greeted with something less than

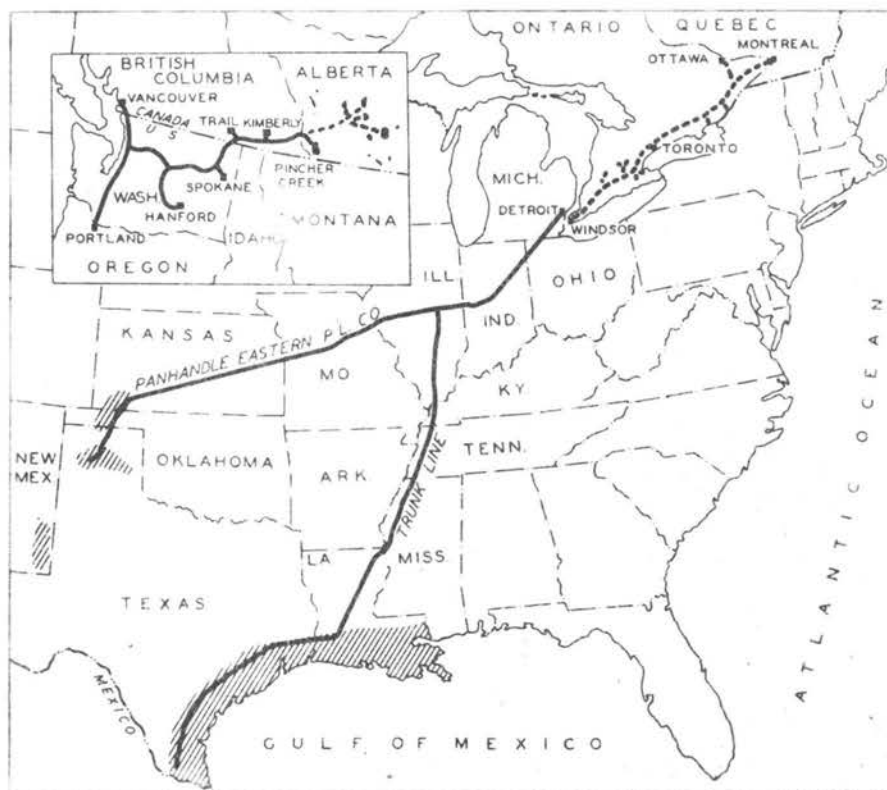


Figure 5. Existing and proposed systems through which Pacific Northwest Pipeline Corporation would supply eastern Canada with gas from the U. S. Southwest in return for an equal quantity from Alberta fields for markets in the Pacific Northwest. Source: Oil and Gas Journal, February 11, 1952.

enthusiasm for no more reports are to be found concerning it in the commercial journals.

In the meantime, Westcoast Transmission Company had been busy on its proposal to bring natural gas to the Pacific Northwest and had marked up the following achievements in rather rapid fire order:

In April, 1952, the Alberta Petroleum and Natural Gas Conservation Board recommended that natural gas be exported from the Peace River area of Northwestern Alberta and favored the plan submitted by Westcoast Transmission Company. The applications of Northwest Natural Gas Company and Prairie Transmission Company were rejected (8, p.256).

Shortly thereafter the Alberta government approved export of natural gas from Alberta by Westcoast Transmission Company and the company scheduled hearings in June before the Federal Power Commission in Washington, D. C. (17, p.99).

In October, 1952, Canada's Board of Transport Commissioners authorized Westcoast Transmission Company to build a natural gas pipe line from the Peace River area of Alberta and British Columbia to Vancouver and to the United States border (26, p.15).

Increased Reserves

In conjunction with the announced recommendations of the Alberta Petroleum and Natural Gas Conservation Board mentioned above, the board submitted a considerable volume of substantiating data concerning reserves. The board stated that the estimated proven reserves of natural gas in Alberta had increased from 4.7 trillion cubic feet as of January 1, 1951, to 6.8 trillion cubic feet as of December 31, 1951. This increase, it said, was due in part to new discoveries, in part to further development of previous discoveries, and in part to new data and new interpretations concerning previous discoveries. It also stated that an increase of one trillion cubic feet per year could be expected for the next eight to ten years.

The board recommended that Alberta hold reserves of 6.5 trillion cubic feet for its own development, an increase of 1.5 trillion cubic feet over the previous policy. This would leave 300 billion cubic feet available for export, a factor which was immediately attacked by various Pacific Northwest distributors on the basis that this amount represented only one-seventh of the Pacific Northwest's requirements for 25 years. The distributors also opposed the plan of Westcoast Transmission Company because it did not plan to supply natural

gas to Eastern Washington during the initial stages of development (2, p.48).

The Situation in 1953

The status of the various pipeline companies in early 1953 is as shown in Figure 6. Westcoast Transmission Company proposed to bring gas from the Peace River area of Northwestern Alberta, having abandoned its original idea of a feeder grid extending as far south as Calgary. Northwest Natural Gas Company had settled upon its southern route which would service Spokane, Portland, Seattle, and Vancouver with laterals to Hanford and Trail, British Columbia. Pacific Northwest Pipeline Corporation had abandoned its Texas-to-Washington plan and the previously mentioned "international gas swap" in favor of a line from the San Juan Basin, where it had recently acquired extensive gas leases in a deal with Phillips Petroleum Company. Adequate reserves in the area were assured and it represented a saving of several hundred miles of main line. The arguments stated for and against the three plans are briefly summarized in the following paragraphs.

In the case of Westcoast Transmission it was argued that the line ran through some very rough terrain with accompanying high construction and

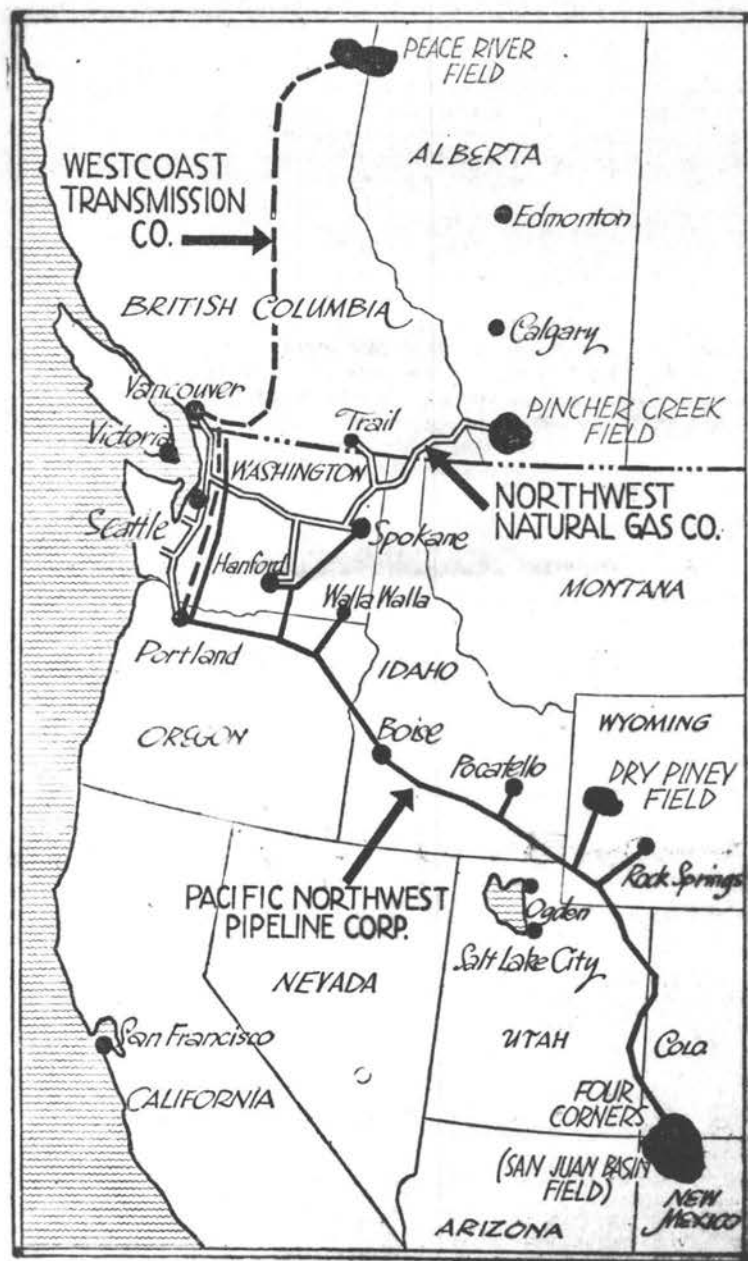


Figure 6. Routes proposed by the pipeline companies competing to bring natural gas to the Pacific Northwest. Source: Barron's, February 2, 1953.

maintenance expense and the possibility of serious interruptions to service. In addition, Westcoast, being a Canadian firm, was free from Federal Power Commission jurisdiction and according to Canadian law, gas could be shut off in an "emergency". Finally, Westcoast's delivered price appeared to be somewhat higher than those of the others. On the plus side, Westcoast's gas reserves had been certified as adequate by an official agency of the Dominion government, and the firm was the only Canadian transmission company that had received an export license from the Alberta government. Finally, there was reason to suspect that its application was supported in Washington, D. C., as the line would be an important commercial and military link between Canada and the United States.

The Northwest Natural Gas Company had one strong point in its favor and one major disadvantage. The economic factors were all on the plus side, for the company could deliver fuel to the city gates of Seattle, Vancouver and Portland at the lowest price of all three competitors. The engineers of Northwest Natural estimated that consumers would save nearly \$4.5 million a year, and \$90 million over the life of the pipeline, if Northwest Natural's application were accepted. The major disadvantage was that Northwest Natural did not have an

Alberta export license. Hopes were strong that it would eventually get one, but in the meantime the company would have to go before the Federal Power Commission without the right to sell gas in the United States.

Thus we come to the one applicant that needed no export license, Pacific Northwest Pipeline Corporation. The Fish group unquestionably had a powerful card in the fact that it was the only all-United States organization in the race. Its rates, which appeared to fall somewhere between Westcoast's and Northwest's would be subject to Federal Power Commission regulation all the way, and there was no possible threat to supply from a foreign government decree. Its route was acceptable to the Northwest utilities, which had closed ranks pretty solidly behind it. Finally, the company's reserves were estimated at over three trillion cubic feet, more than enough to satisfy the needs of the Northwest over a 20-year period. In some circles, however, the question of reserves evoked a different response. Two points were made in this connection. First, the San Juan Basin, which would supply most of the needs of the Pacific Northwest Pipeline, presented technical difficulties. Sources of supply, while plentiful, were scattered and hard to exploit. Second, other utilities in the area (including El Paso Natural Gas, which was drawing on

the Basin, and the big California distributors which it was supplying) would most certainly oppose the Fish application at the Federal Power Commission hearings. Their argument would be, simply, that in time they would need the gas themselves, and that it made no sense to use up scarce United States gas when Canadian resources were available (7, p.5).

Stated above is the complex situation which confronted the Federal Power Commission in early 1953. The Pacific Northwest needed and wanted natural gas and it was certain that one of the competing companies would receive the "Certificate of Convenience and Necessity" which was necessary before any of them could start construction. The decision that would be made by the Federal Power Commission would be based upon an investigation of the following factors:

1. Adequacy of the gas reserves dedicated to the project to supply the markets concerned for a specific number of years, usually 20.

2. Deliverability characteristics of the gas fields involved, pertaining to rate of withdrawals and the maintenance of pressure in the field.

3. Engineering studies involving accessibility of route, all-weather line maintenance, degree of construction difficulty, size and strength of pipe,

horsepower of compressor stations, etc., as well as the reasonableness of the cost estimates.

4. Financial responsibility of the promoters as well as their methods.

5. Sufficiency of the potential markets to absorb the volume of gas at the price required to support a profitable operation for all parties concerned, including the consumer. The final determination of rates that the pipeline company may charge the distributor would be made by the Federal Power Commission (38, pp.24-26).

Utilities Swing to Support of Canadian Gas

In April of 1953, Mr. Charles H. Gueffroy, President of Portland Gas and Coke Company, approved the plan of Westcoast Transmission Company, Ltd., and its United States subsidiary, Westcoast Transmission Company, Inc., as "most economical" for the region, in testimony before the Federal Power Commission.

Mr. Gueffroy succeeded in gaining the support of six other distributors. Together, the seven represented about 70 per cent of the entire market for gas in the Northwest. Companies supporting Gueffroy were Bellingham Gas, Bremerton Gas, Consolidated Gas, Cascade Gas, Northwest Cities Gas, and Wenatchee Gas. British Columbia Electric Company also endorsed the project.

Opposing the Westcoast Transmission Company plan, and officially endorsing the Pacific Northwest Pipe Line Corporation's plan to bring gas from the San Juan Basin, were Seattle Gas Company and Spokane Gas and Fuel Company. Washington Gas and Electric, serving Tacoma, did not indicate its stand at the time, but since it subsequently merged with Seattle Gas Company to form Washington Natural Gas Company, its leanings can be surmised. Mr. N. Henry Gellert, President of Seattle Gas Company, long a proponent of a natural gas supply from the United States, stated that his company's preference was based both on evidence presented in favor of the San Juan Basin project and on weaknesses which had developed in the case presented by Westcoast Transmission Company (28, pp.55-56).

Gellert vs Gueffroy

As mentioned above, the presidents of the two principal gas utilities in the Northwest were of opposing views. They were in agreement only on one point - that the Pacific Northwest must have natural gas, and both had worked long and hard to make this dream a reality. They were in sharp disagreement, however, as to the source that should be tapped. With characteristic vigor, they placed their honest and considered opinions

before the public, and this running battle between these two executives probably did more to publicize the coming of natural gas to the Pacific Northwest than all the other factors combined. This skirmish, which was described by Mr. Dennis K. Yorath, President of the Canadian Gas Association, as "the protracted and highly entertaining discussion between Mr. Gellert and Mr. Gueffroy" began officially in the spring of 1953, when the two were invited to address meetings of the New York Society of Security Analysts, and did not end until the problem was settled.

Mr. Gellert was primarily concerned with the dangers of the Pacific Northwest becoming a captive market to a Canadian source of natural gas. He feared that, in the absence of a treaty and regulatory control by the Federal Power Commission, the supply could be cut off and rates increased to suit the convenience of Canada. He also was dissatisfied with the route chosen by Westcoast Transmission as he considered it difficult for construction and precarious for maintenance. Furthermore, he felt that the pipe line could not, or would not, serve all the important cities of the Pacific Northwest with or without preferential treatment to any one of them. The specter of several hundred million dollars going into construction and development in

Canada instead of into a similar project in the United States was equally disturbing.

Mr. Gueffroy did not share the fears of Mr. Gellert concerning the possibility of our being mistreated by Canada on any natural gas arrangement, nor could he agree with his other arguments. Based on the research of his company and the report of an independent engineering firm, Mr. Gueffroy was of the opinion that the Canadian project offered distinct advantages regarding initial cost of line and operating cost, ability to expand capacity with modest increase in capital, and reliability in operation. He was considerably more optimistic than Mr. Gellert concerning Alberta's future reserves and was fearful of the rates that might be eventually charged by Pacific Northwest Pipeline Corporation, especially in the event of an underestimation of construction costs (43, pp.20-21; 20, pp.25-29).

Increasing Alberta Reserves

During 1953, while Mr. Gellert and Mr. Gueffroy were engaged in their spirited "discussions" and the Federal Power Commission was investigating the question of who offered the most qualified project, the oil companies operating in Alberta and eastern British Columbia were engaged in an intensive and accelerated wildcatting and

development program. The results were seen in the announcement by the Alberta Petroleum and Natural Gas Conservation Board in December, 1953, that the Provincial reserves of natural gas were now estimated to be 11.5 trillion cubic feet (48, pp.52-53).

Pacific Northwest Pipeline Corporation Wins

In June, 1954, the Federal Power Commission announced that it had authorized Pacific Northwest Pipeline Corporation of Houston, Texas, to construct a \$160,000,000 natural gas pipe line from the San Juan Basin in New Mexico and Colorado, and other fields along the route, to market areas in Colorado, Utah, Wyoming, Idaho, Oregon, and Washington (See Figure 7).

The commission at the same time denied competing applications proposing to import natural gas from Canada to serve some of these same markets in the Pacific Northwest. The competing companies were: Westcoast Transmission Company, Inc., a subsidiary of the Canadian firm, Westcoast Transmission Company, Ltd.; Trans-Northwest Pipeline Company, Inc.; Northwest Natural Gas Company; and Glacier Gas Company of Butte, Montana. Westcoast Transmission and Trans-Northwest both proposed to purchase gas at the United States-Canadian border from Westcoast Transmission Company, Ltd. Trans-Northwest

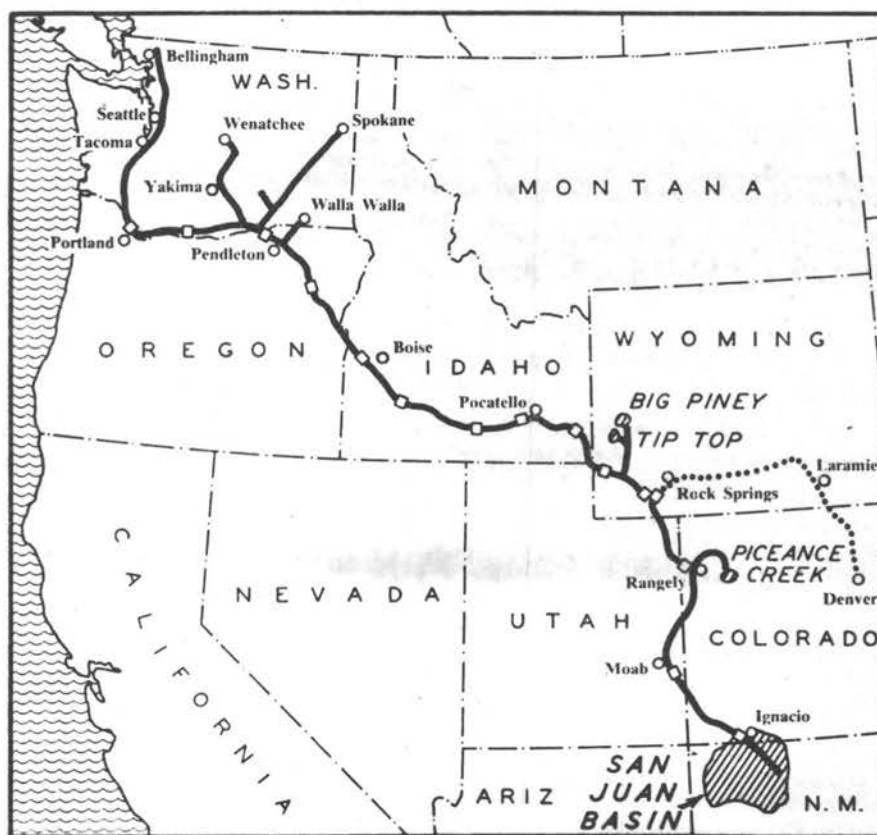


Figure 7. Pacific Northwest Pipeline Corporation's proposed route. The dotted line is Colorado Interstate's proposed route and the squares locate proposed compressor stations on the two lines.
Source: Oil and Gas Journal, June 28, 1954.

planned to serve markets in eastern Washington and Idaho, while Westcoast Transmission sought authority to supply markets in western Washington and Oregon. Both Northwest Natural Gas Company and Glacier Gas Company proposed to serve the Pacific Northwest by lines running from sources in southern Alberta.

Commenting on its decision and the proposals to bring gas in from Canada, the Federal Power Commission said that "it would not be giving the fullest possible protection to all the prospective consumers if the sole source of supply were through importation from a foreign country without some intergovernmental agreement assuring the continued adequacy of its supply."

"Otherwise," the Commission declared, "all control over the production, allocation and transportation to our border would be in the hands of agencies of foreign governments, whose primary interest would of necessity always be in the needs and advantages of their own people, and whose judgments and actions would be essentially dependent upon public opinion within that country, rather than upon the interests of American consumers."

The Federal Power Commission said that "regardless of any long and cherished friendly relations with any neighbor nation able to supply such area with natural gas, it would not be in the public interest to permit the

importation of its gas as the sole source for the consumers in need of uninterrupted supply at a reasonable price, which should always be assured by this Commission to the full extent of its powers."

The Commission further stated that the area and population to be served through Pacific Northwest's project greatly exceeded those proposed to be served by Westcoast and Trans-Northwest. Moreover, the route of Pacific Northwest's proposed system traversed at least three large undeveloped sedimentary basins in Colorado, Utah, and Wyoming, the exploration and development of which would be stimulated by providing an outlet for natural gas. The Federal Power Commission also questioned the feasibility of the Westcoast and Trans-Northwest projects, and declared that since the areas to be served by Pacific Northwest Pipeline Company in Washington and Oregon would be largely duplicated by the other two projects, the applications were mutually exclusive. Glacier Gas Company did not present any evidence in support of its application, and Northwest Natural Gas Company had been unsuccessful in its attempts to obtain the necessary Canadian authority to export natural gas. The Commission said that neither of the two applicants had made the necessary showing required by the Natural Gas Act with respect to their ability to

perform the service proposed in the delivery of natural gas from southern Alberta to the respective areas which they proposed to serve.

Consolidated hearings on the applications involved in the proceedings commenced June 16, 1952, and were concluded by the filing of briefs and presentation of oral argument on June 1 and 2, 1954, after nearly 200 days of hearing sessions. More than 28,000 pages of testimony were taken and over 600 exhibits were presented during the course of the hearings (37, pp.29-31; 18, pp.84-85).

Shortly after announcement of the decision of the Federal Power Commission, Westcoast Transmission Company stated that it would appeal (23, p.13).

Canadian Gas Reserve Estimates Again Increased

Mr. N. E. Tanner, President of Trans-Canada Pipelines, Ltd., in an address before the annual meeting of the Independent Natural Gas Association of America in September, 1954, advocated a free exchange of natural gas between Canada and the United States. In referring to all processed resources, he stated "surely by some arrangement between the two governments a treaty can be worked out whereby both countries would feel entirely safe in relying on each other for source of supply."

He also stated that "the Petroleum and Natural Gas Conservation Board placed the gas reserves in Alberta at 6.8 trillion in 1952; 11.5 trillion in 1953 and conservatively at 13.4 trillion cubic feet in 1954, and has estimated with the present trend an annual increase in the reserves of 1.3 trillion cubic feet per year, and this rate appears to have been exceeded already for the present year." (39, pp.26-28).

New Agreement in 1954 Includes Canadian Gas

Natural gas from the San Juan Basin in the United States and the Peace River Field in Canada would supply the Pacific Northwest under a new plan announced in December, 1954. The arrangement, called the "biggest deal" in gas transmission history, would cost in the neighborhood of \$400,000,000. The project, in addition, would assure increased supplies of gas to Northern California and to the Denver, Colorado area (See Figure 8).

The new plan was announced following an agreement reached in Tulsa, Oklahoma, between Pacific Northwest Pipeline Corporation, Westcoast Transmission Company and El Paso Natural Gas Company.

The agreement called for Pacific Northwest Pipeline Corporation to take 300,000,000 cubic feet per day from Westcoast at the Canadian boundary near Sumas in

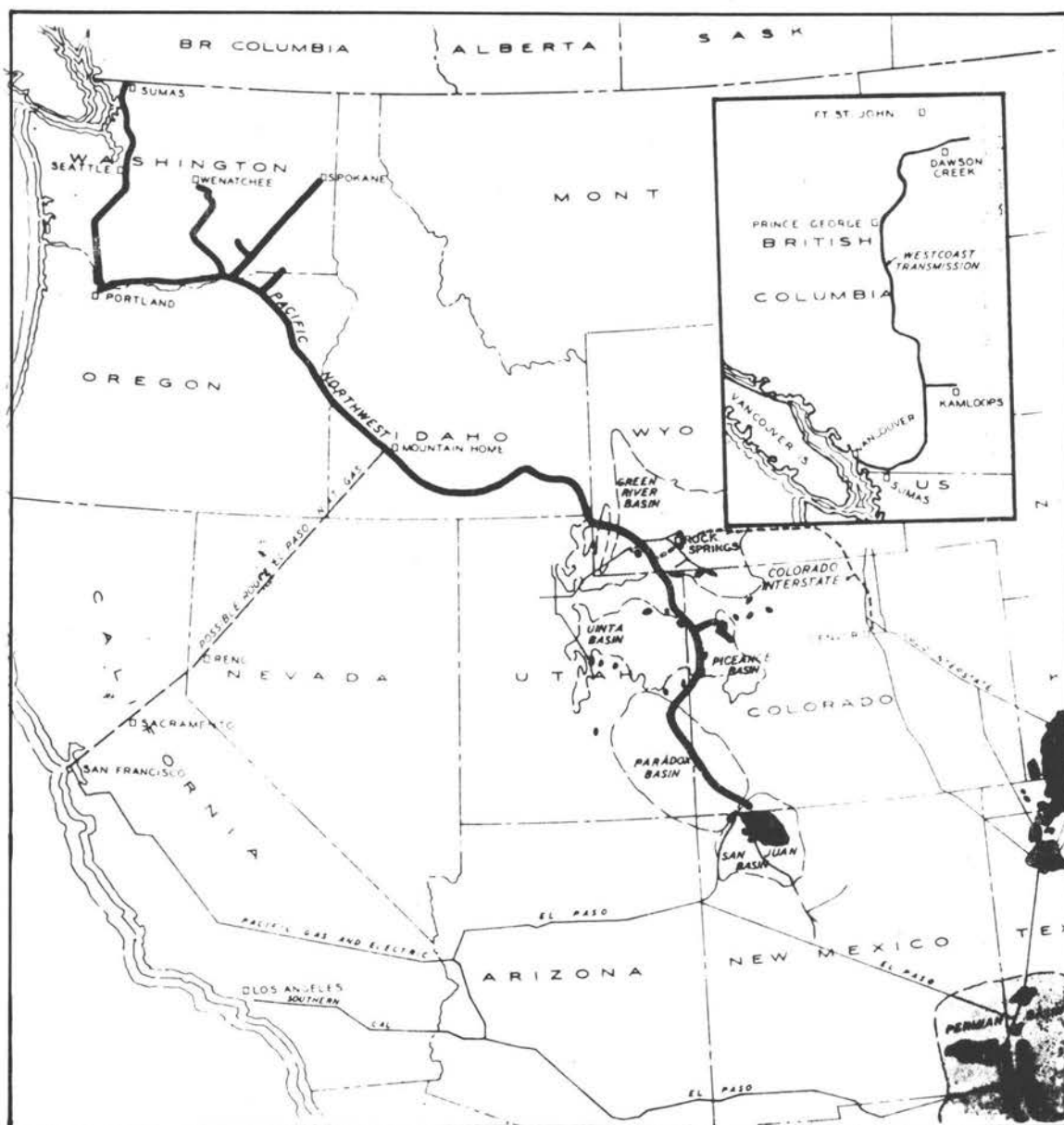


Figure 8. Proposed natural gas pipe line routes in the three-way contract called the "biggest deal" in gas transmission history. Source: Oil and Gas Journal, December 20, 1954.

western Washington. Pacific Northwest Pipeline Corporation would use 50,000,000 cubic feet, and more when developed, to supplement its primary supply from the San Juan Basin and other sedimentary basins in the Mountain States area.

Pipelineers, distributors, producers, government officials and the press of both countries hailed the new arrangement. Approval of the Federal Power Commission and the various Canadian government agencies was predicted.

The new agreement would accomplish several major objectives: British Columbia would get natural gas; Peace River reserves would be provided a major market; the United States Northwest would have a two-way supply with the protection of having a primary United States source; New Mexico would have an outlet for the shut-in portion of its reserves in the San Juan Basin, El Paso, the pipeline serving California, would be assured an abundant new source of gas for many years; and a grid of transmission lines would be formed linking all major consuming areas west of the Rockies with all the big gas-producing areas in the western half of the continent (33, pp.58-60; 30, p.30; 1, p.32).

The Story Behind This New Agreement

The three-way agreement culminated five years of planning on the part of the principals and almost as long a period of bitter wrangling among them. Mr. C. H. Wright, Chairman of Sunray Oil Corporation and Mr. K. S. Adams, Chairman of Phillips Petroleum Company were credited with being largely instrumental in bringing the rival pipe lines together.

The agreement was signed in the office of Mr. C. H. Wright. Sunray Oil Corporation has stock interest in Westcoast Transmission and in Pacific Petroleum, Ltd., of Calgary, Alberta, which fathered the Westcoast project. Sunray's Canadian subsidiary, Sunray Oil Company, and Pacific Petroleum both have extensive gas-producing holdings in the Peace River area. Phillips Petroleum Company has gas production in both the San Juan Basin and the Peace River region. The company also has a contract to supply a large amount of gas to Pacific Northwest Pipeline Corporation (33, pp.58-60; 29, pp.26-27).

One More Change

Thus ended the fight as to who would bring natural gas to the Pacific Northwest -- or so everyone thought. Pacific Northwest Pipeline Corporation applied to the

Federal Power Commission for approval of the new plan. In May, 1955, a syndicate of investors headed by White, Weld and Company put up \$162,000,000 thus completing the financing of the project to the satisfaction of the Federal Power Commission, and Pacific Northwest Pipeline Corporation began laying pipe in July. In addition, Pacific Northwest Pipeline Corporation and Westcoast Transmission Company, Ltd., had reached an agreement whereby the former would supply Vancouver, British Columbia, with gas from the San Juan Basin until Westcoast could complete its line from the Peace River field, a date estimated to be late in 1957. This arrangement was expected to receive Federal Power Commission approval along with the new plan mentioned previously (45, pp.21-22; 16, p.18; 40, p.197).

In the meantime, serious objections had been raised to the combined Westcoast Transmission-Pacific Northwest Pipeline Corporation plan. Pacific Gas and Electric, Southern California Gas Company and Southern Counties Gas Company objected strenuously to the Mountain Home Line. P. G. & E. had previously contracted to purchase from El Paso Natural 125,000,000 cubic feet per day above present takings. Southern California Gas Company and Southern Counties Gas Company together contracted for another 125,000,000 cubic feet for future delivery.

All companies insisted that this gas be delivered to them at Topock on the Arizona-California border in order that they could take advantage of that line's extra unused capacity, rather than build a new line across the Sierras from Reno, Nevada.

Colorado Interstate Gas Company also objected to the Mountain Home-Reno line which they considered uneconomic. They feared that the Pacific Northwest line would have a "dead" section in the middle and that its cost would be charged against them.

In the face of these objections, a new plan was negotiated for presentation to the Federal Power Commission. The plan calling for importation of 300,000,000 cubic feet of gas daily from Canada remained unchanged. But Pacific Northwest then would resell 200,000,000 to 250,000,000 cubic feet of the gas to customers in Washington and Oregon. It would sell only 50,000,000 to 100,000,000 cubic feet daily to El Paso Natural Gas Company instead of the 250,000,000 cubic feet which El Paso originally contracted to buy. Delivery would be taken in the San Juan Basin on an exchange basis, thus the Mountain Home-Reno line idea was abandoned. The revised contract also gave Colorado Interstate first call on the next 100,000,000 cubic feet daily available from Pacific Northwest's sources in the San Juan Basin, and with the abandonment of the Mountain Home-Reno project, Colorado

Interstate's objections were withdrawn (34, p.96).

Natural Gas for the Pacific Northwest

Federal Power Commission approval of the revised new plan on 25 November, 1955 (27, p.13) brought to a successful conclusion the long fight to bring natural gas to the Pacific Northwest. In retrospect, it is felt that the exhaustive investigations by the authorities of both Canada and the United States were for the best. After many trials and tribulations for all concerned, a project based on a firmer foundation and with a broader scope than the plan originally visualized was achieved. The pipe lines will be monuments to the foresight, brilliance and perserverance of those who made them possible.

CHAPTER IV

TRANSPORTATION AND MARKETING

During the summer of 1956, the Pacific Northwest will at last receive natural gas. The first flow will be from New Mexico, through the transmission line now nearing completion by Pacific Northwest Pipeline Corporation. Sometime in 1957 the Pacific Northwest will begin to receive natural gas from a second source, the province of Alberta, Canada, through the gas line presently under construction by Westcoast Transmission Company, Ltd. Figure 9 shows the route, with laterals, of Pacific Northwest Pipeline Corporation's line as finally approved by the Federal Power Commission. The route and pattern of Westcoast Transmission Company's pipe line remained unchanged as shown in Figure 8.

THE TWO PIPE LINES

Pacific Northwest Pipeline Corporation's main line, 1,487 miles of 22 and 26 inch pipe, will extend from the San Juan Basin in New Mexico to the Canadian border north of Bellingham. Feeder laterals of six to 16 inch pipe are being laid from the Piceance Creek, Big Piney and Tip Top gas fields of Colorado and Wyoming. Service laterals to various cities along the route in Idaho, Oregon and Washington are as shown in Figure 9 and vary

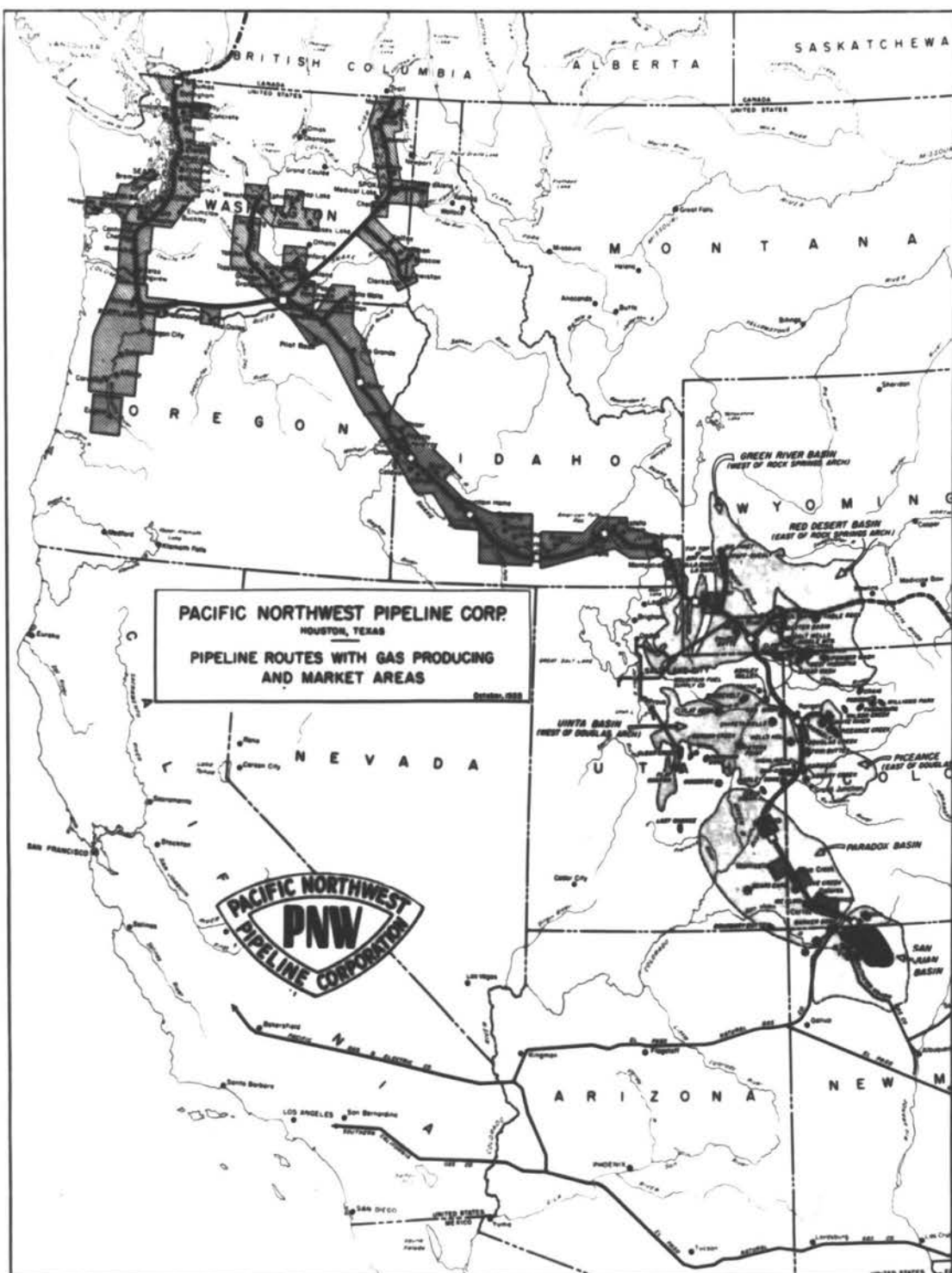


Figure 9. Pacific Northwest Pipeline Corporation's routes with gas producing and market areas. Source: Pacific Northwest Pipeline Corporation.

in size from four to 20 inches. The cost of the line will be approximately 218 million dollars.

The capacity of the line will initially be 293 million cubic feet per day and plans call for increase to 343 million cubic feet per day during the second year of operation. Colorado Interstate Gas Company has contracted to purchase 100 million cubic feet per day, leaving 243 million cubic feet per day for movement on to the Pacific Northwest. With the 300 million cubic feet of gas authorized for import from Canada, Pacific Northwest Pipeline Company's system from the two sources will have a total capacity to serve Pacific Northwest of 543 million cubic feet by 1958.

The 1,060 miles of main line south of the Columbia River have been completed and the company plans to deliver natural gas to Portland in July, 1956, and to Seattle and Vancouver, British Columbia, by the fall of 1956 (15, pp. 2 and 9; 14, p.20; 27, pp.13-14).

Westcoast Transmission Company's 650 mile line will extend from the Peace River natural gas field in Northwestern Alberta and Northeastern British Columbia, south through British Columbia to Vancouver and to the United States boundary. The line will be made up of 30 inch pipe and will have a maximum capacity of 660 million cubic feet per day. It will cost approximately 142

million dollars. Construction has started and completion of the line is planned for late 1956 or early 1957 (27, pp.14-16).

THE NATURAL GAS MARKET

The availability of 543 million cubic feet of natural gas per day by 1958 to the Pacific Northwest is a major development for the Pacific Northwest. The question of who will use it is posed. The answer will be found in the predicted rapid growth of this area and the history of ready acceptance of natural gas by the public and industry in other areas. Concerning the growth factor, Mr. Ray C. Fish (15, p.9) stated that his market survey of 1950 was so obsolete by 1954 that it was imperative that Canadian gas be brought into the picture to supplement the supply from the San Juan Basin. Concerning public acceptance of natural gas, the experience of the gas companies in the West North Central States serves as a startling example. In 1949, 37 per cent of the homes were being heated by natural gas. By 1954, the percentage had jumped to 67 - an increase of 30 per cent in five years. Nearly as spectacular are the figures for the United States as a whole. In 1949, only 36 per cent of the homes in the United States were being heated by gas. The figure for 1954 is 53 per cent,

and it is estimated that by the end of 1956, 60 per cent of the homes in our country will be utilizing gas for heating. It might also be noted that commercial and industrial customers of natural gas increased about 9 per cent during 1954 (15, p.6).

How Natural Gas is to be Marketed

The two pipeline companies have been authorized to sell natural gas for resale by gas utilities in the states of Washington, Oregon, and Idaho, the province of British Columbia and to each other. They also have authority to sell gas to towns, cities, and industrial establishments along their routes. In addition, Pacific Northwest Pipeline Corporation is authorized to sell gas to the Colorado Interstate Gas Company at a delivery point near Rock Springs, Wyoming.

The Sales Arrangement Between the Two Pipeline Companies. Pacific Northwest Pipeline Corporation will sell natural gas to Westcoast Transmission Company in the first year of the former's operation for resale to British Columbia Electric Company who will in turn market it in the Vancouver, British Columbia, area. This gas, 12 million cubic feet per day, will be delivered to Westcoast Transmission at a point on the international

Boundary near Sumas, Washington. This exportation of United States gas will terminate at such time as Westcoast is prepared to serve this customer with Canadian-produced natural gas, but not prior to July 1, 1957. When Westcoast Transmission Company's line is completed, the flow will be reversed and Pacific may purchase as much as 300 million cubic feet per day, with first delivery to start January 1, 1958, provided the facilities of both companies are ready. Actually, initial delivery to Pacific will be 200 million cubic feet per day prior to January 1, 1958, and will increase to 300 million cubic feet during the first year. Pacific also has the option to purchase an additional 100 million cubic feet per day when it becomes available, over and above the contract quantity and Westcoast's requirements for service in Canada. The average cost of gas to be purchased from Westcoast on a 90 per cent load factor basis will be 22 1/4 cents per Mcf for gas delivered prior to January 1, 1959, and 22 cents per Mcf thereafter.

An interesting sidelight to this gas importation arrangement is a sales contract between Pacific Northwest Pipeline Corporation and El Paso Natural Gas Company. El Paso will take title to 50 million cubic feet of Canadian gas per day at the international boundary, but Pacific will deliver the equivalent volume of gas

from the San Juan Basin. El Paso will buy the gas at three cents per Mcf over the cost of the Canadian gas to Pacific. Consequently, Pacific will make a profit of three cents per Mcf without moving the gas an inch.

As mentioned, Pacific Northwest Pipeline Corporation has a contract to sell 100 million cubic feet per day to Colorado Interstate Gas Company. This agreement increased the first year volume of firm, long-term contract gas sales by approximately 40 per cent. Thus, the long distance involved in the Pacific Northwest Pipeline Corporation's project was more than compensated for by this greater volume (27, p.13; 14, p.16).

Pipeline Sales Along Their Route. Both Pacific Northwest Pipeline Corporation and Westcoast Transmission Company will handle the marketing of natural gas to towns, cities, and industrials along their respective routes.

As mentioned, Pacific Northwest Pipeline Corporation will sell 100 million cubic feet of gas to Colorado Interstate Gas Company. Idaho Natural Gas Company will buy a maximum of 56 million cubic feet per day for resale to 27 cities and towns in southern Idaho, and Pacific has 3.2 million cubic feet per day in direct industrial sales under contract in Pocatello and Payette, Idaho. In addition, Pacific will sell 15 million cubic

feet per day directly to the Phillips Pacific Chemical Company for the manufacture of anhydrous ammonia in Pasco, Washington, and an undisclosed quantity of gas to Hanford Atomic Energy Plant through an eight inch line. Other cities and towns along the route other than those connected with Idaho Natural Gas Company will receive their gas direct from the pipeline company.

Westcoast Transmission Company will sell gas direct to Dawson Creek, Fort St. John, Kamloops and any other municipalities along the route who desire to contract for it (27, pp.14-16).

Major Distribution Companies. Portland Gas and Coke Company has been supplying Portland with manufactured gas for the past 95 years. Since this early date, Portland Gas has extended its service area to 80 towns and cities in the Willamette valley in Oregon, and across the Columbia River to Vancouver, Washington, and vicinity (See Figure 10). This company sells more gas than the combined sales of all the other gas companies in the Pacific Northwest. It has been able to do this in spite of the fact that the Portland area has more than 100 hydroelectric power-producing dams serving it (14, pp.7-8).

Portland Gas and Coke Company, and for that matter, all of the gas utilities in the Pacific Northwest, face

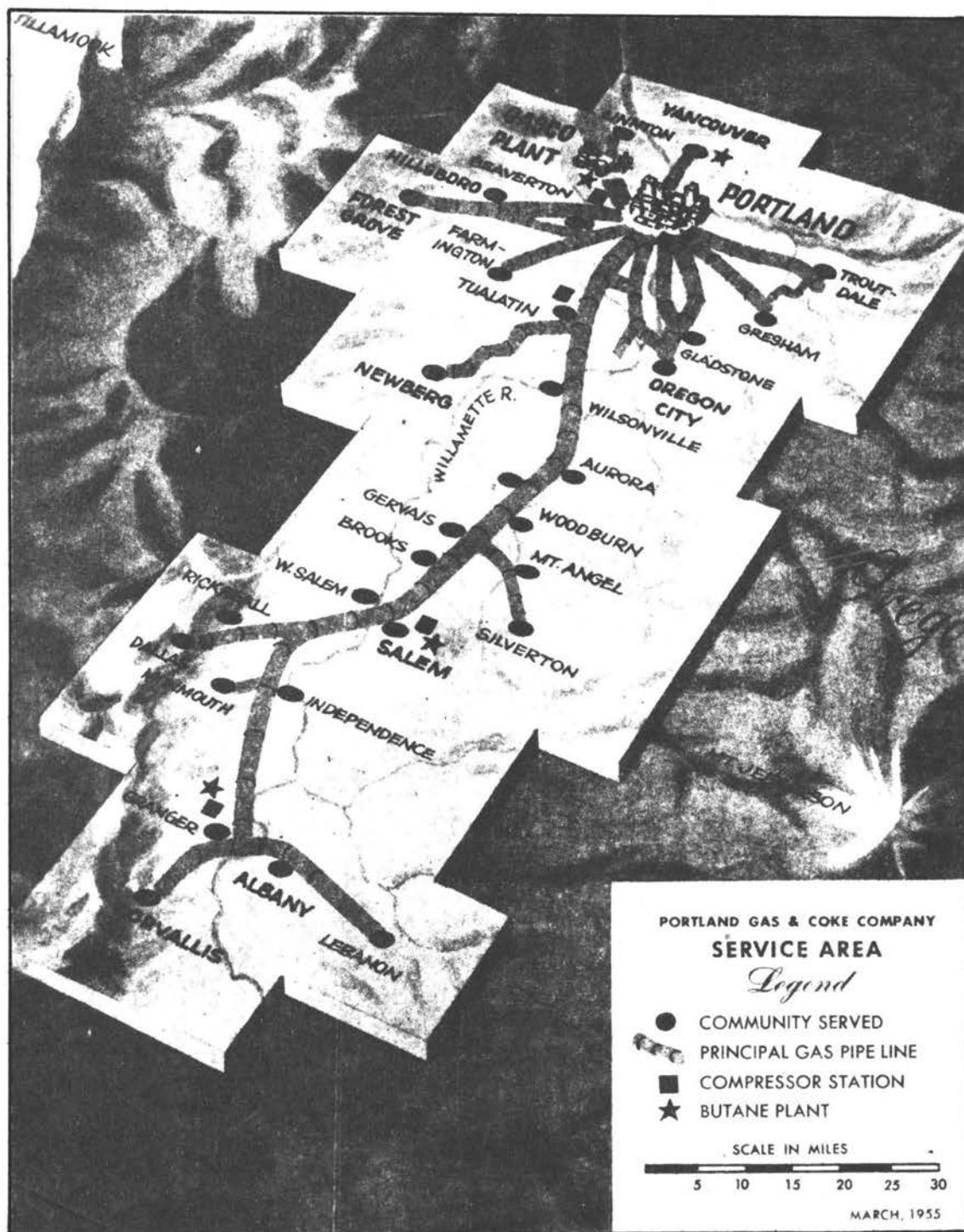


Figure 10. Portland Gas and Coke Company's service area.
Source: Portland Gas and Coke Company.

a very exciting and interesting sales venture. Although Portland Gas and Coke Company sells more gas than all the other gas companies in the Pacific Northwest combined, their present annual sales volume is only about five per cent of the capacity of Pacific Northwest Pipeline Corporation's system. This will give some idea of the new markets which must be found for natural gas. The answer lies in a substantial increase in residential space heating, as well as commercial and industrial sales.

In 1955, Portland Gas had 82,422 customers, of which 74,126 were residential and the remainder were commercial. It had no industrial customers. The company now has contracts to deliver natural gas to 27 industrial customers in 1956 and expects to increase that figure to 72 in 1957 and 117 by 1960. Total customers by 1960 are expected to number in the neighborhood of 111,000. The company expects to be marketing approximately 44 million cubic feet of natural gas per day by 1957 and to increase this volume to approximately 58 million cubic feet per day by 1960. About half of this volume will consist of special interruptible sales to industrial concerns in the area who will receive the natural gas at about cost price to Portland Gas and Coke Company. By selling large volumes on an interruptible basis, the cost of the

over-all volume to Portland Gas will be brought down to the point where the company can sell to residential, commercial and small industrial customers at a price competitive with other fuels.

In preparing for the advent of natural gas, Portland Gas and Coke Company will spend approximately seven million dollars during 1955 and 1956 in system expansion to permit connection of new industrial, commercial, and residential loads. An average of two and one half million dollars will be spent annually thereafter through 1960 (14, pp.7-8; 31, pp.32-35; 6, pp.8-9).

Washington Natural Gas Company serves the cities of Seattle, Tacoma, Olympia, Centralia, Chehalis and Everett. This new company is the result of a logical merger between Seattle Gas Company and Washington Gas and Electric Company early in 1956. Figure 11 shows the company's distribution system in Seattle.

The cities of Seattle and Tacoma and their surrounding market area have experienced at least the same growth that has been driving the entire Pacific Northwest region. They are and have been major ports and the city of Seattle has been vying with Portland for years for the undisputed crown of Gateway to Alaska and the Orient.

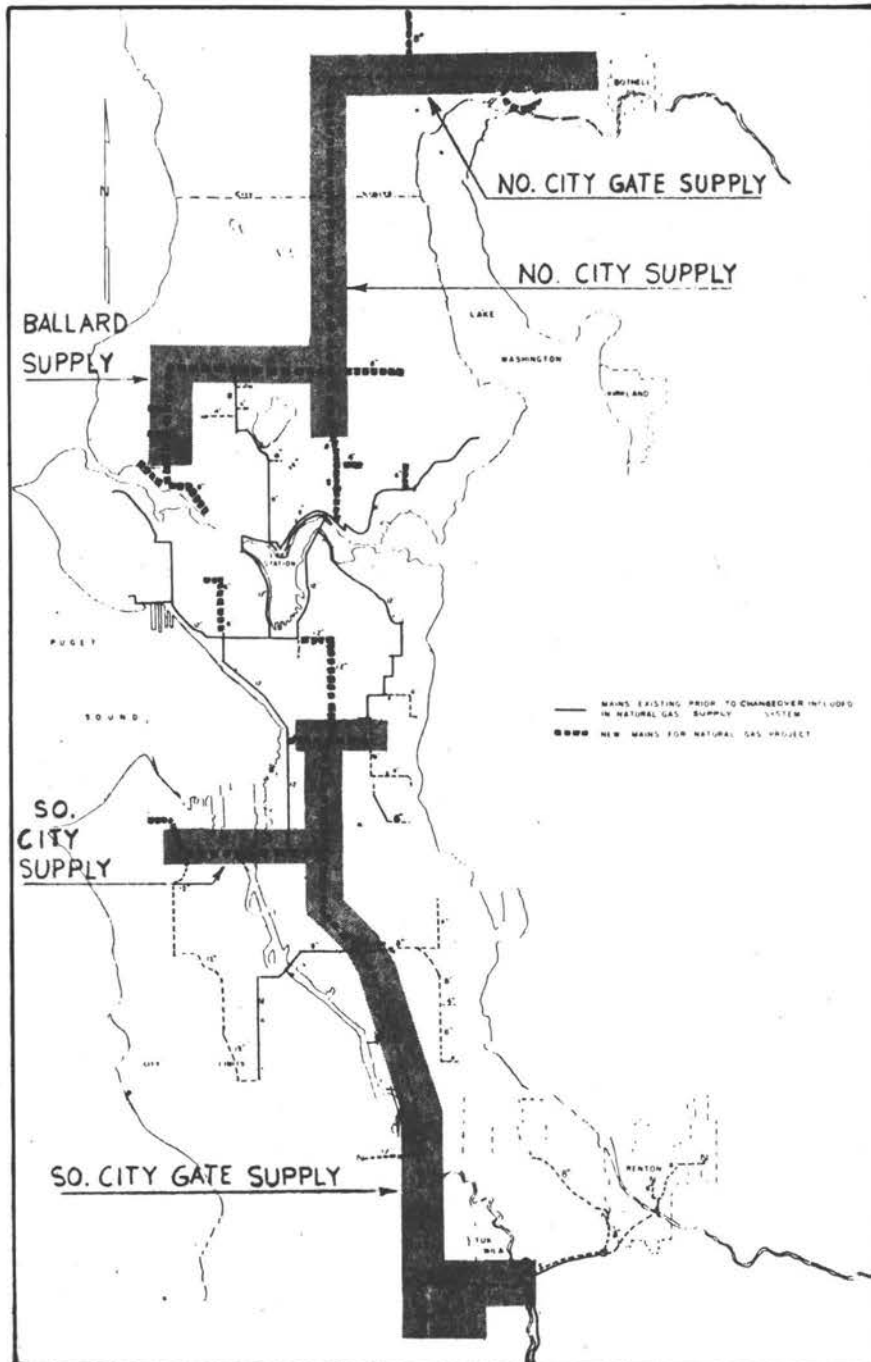


Figure 11. Simplified map of Washington Natural Gas Company's construction to feed natural gas to its distribution system in Seattle. Source: Pacific Northwest Pipeline Corporation.

Washington Natural Gas Company faces the same ambitious sales problem as Portland Gas, and expects to meet its volume sales requirements by an increased space heating and industrial load. The company will work on its industrial load by intensifying sales efforts and extending the distribution system so that additional customers can be connected, and adequate volumes of natural gas delivered. The technical advantages of natural gas are expected to increase industrial sales to existing customers and to encourage the establishment of new industries in the area. Washington Natural Gas Company has contracted to buy 36 million cubic feet per day the first year and 49 million cubic feet per day thereafter. The company's expansion program calls for an expenditure of three million dollars prior to the arrival of natural gas and the over-all five year construction program has been estimated to involve an expenditure of 15.5 million dollars (14, pp.8-12).

Cascade Natural Gas Corporation was formed in 1953 because the organizers felt that the integration of a number of small gas companies of several types into a larger organization would provide advantages of large scale financing, centralization of engineering, accounting, and management, and generally produce many other

factors leading to efficient operation. The company presently serves 23 cities in Washington, Oregon, and Idaho, has a new franchise for the town of Kennewick, Washington, and has filed for franchises in eight additional communities in Washington and two more in Oregon (See Figure 12).

Currently, Cascade has 11,000 customers, but expects its system to have about 44,000 customers at the end of the first full year of natural gas service and more than 70,000 at the end of the fifth year. The company has contracted to buy 24 million cubic feet per day during the first year and 30 million cubic feet per day by 1958. It expects to spend between eleven and twelve million dollars in preparation for natural gas and to expand the system (14, pp.12-13).

British Columbia Electric Company, Ltd., will distribute the natural gas to the Vancouver, British Columbia-Fraser Valley market area. The Fraser Valley is the largest trade and industrial area in western Canada, due to its having a world port that forms the base of commerce for British Columbia and adjacent provinces.

This area will be served with natural gas by the Pacific Northwest Pipeline Corporation until the line being constructed by Westcoast Transmission Company is completed in 1957. British Columbia Electric presently

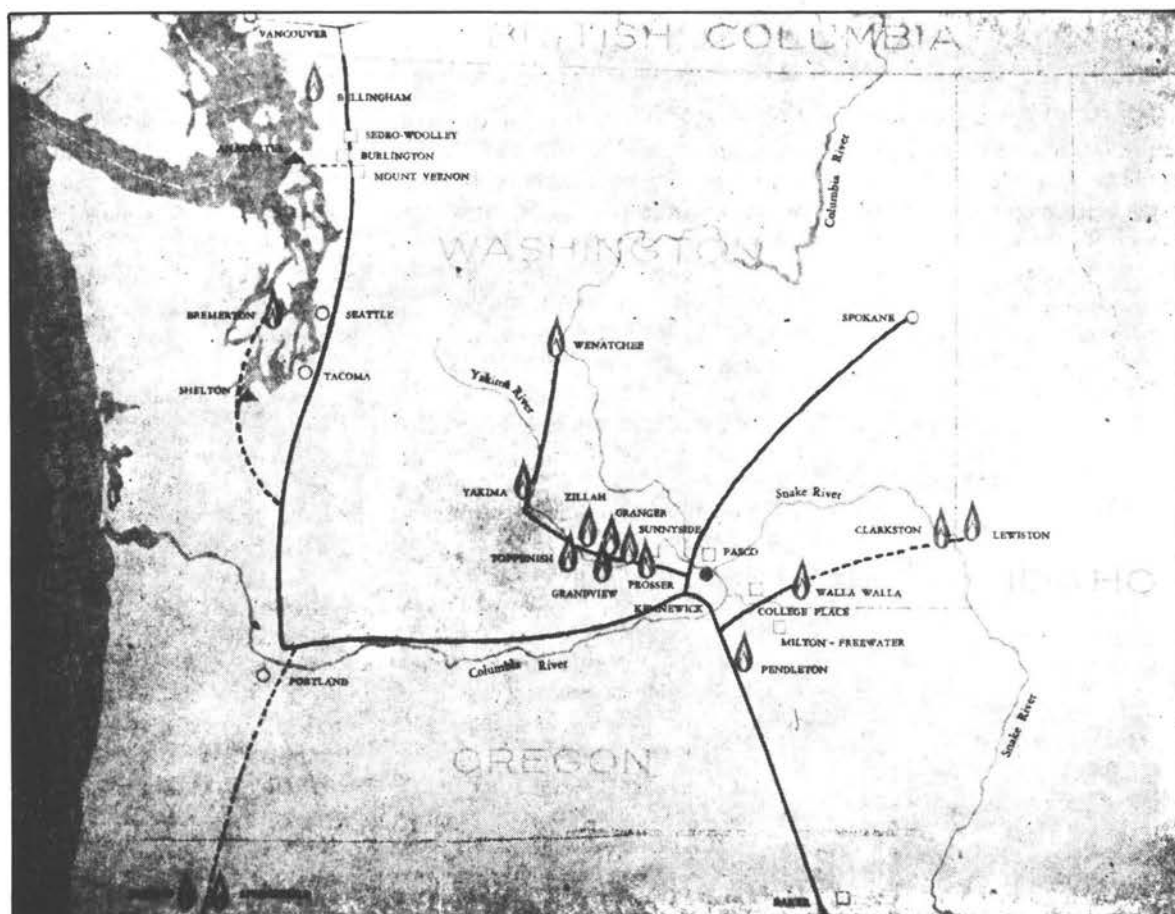


Figure 12. Area to be served by Cascade Natural Gas Corporation. Source: Pacific Northwest Pipeline Corporation.

has 55,000 customers, including industrial establishments, and has contracted to purchase as much as 50 million cubic feet of natural gas per day from Westcoast Transmission Company during the initial stages of service. As expansion progresses, a maximum of 130 million cubic feet per day may be drawn from the Westcoast line. The company expects to be able to introduce natural gas rates which, compared to present manufactured gas rates, will be lower by the following percentages:

- a. Domestic cooking, water heating and appliances - 25 per cent.
- b. Domestic space-heating - 40 per cent.
- c. Commercial - 30 per cent.
- d. Industrial rates will be materially lower and competitively priced with other fuels.

Incidentally, these percentage reductions apply pretty generally to all of the gas utilities mentioned above.

British Columbia Electric Company will spend nine million dollars in 1956 to bring natural gas to metropolitan Vancouver, and expects to spend in excess of 15 million dollars by 1959 in expanding its services in the Vancouver-Fraser Valley area (14, p.13; 46, pp.1-2).

Spokane Gas and Fuel Company has plans for spending an estimated five million dollars for system conversion and expansion to extend service throughout Spokane and

the Spokane Valley.

Spokane Gas and Fuel Company has contracted to buy 14 million cubic feet of natural gas per day during the first year, 20 million during the second year and 27 million cubic feet per day thereafter. (14, p.13).

CHAPTER V

PROBABLE UTILIZATION PATTERN

The gas industry is the sixth largest in the nation. It supplies 25 per cent of the total energy requirements of the United States. The total length of its long transmission lines is almost double the mileage of all of the railroad trackage in the United States. It supplies fuel to over 28 million customers for many and diverse uses in home, commerce and heavy industry. Natural gas will ultimately touch every activity of most of the people who live in the Pacific Northwest, the last large economic area in the United States to receive the benefits of this wonder fuel (6, p.1).

Uses and Special Qualities of Natural Gas

Except for a tank-car of compressed natural gas imported by Portland Gas and Coke Company for experimental purposes, no natural gas has yet been burned in the Pacific Northwest. Therefore, to appraise the potential utilization pattern, reliance must be placed on such factors as how manufactured gas has been used in the area, the estimates of expected natural gas utilization as set forth by the Pacific Northwest gas utilities, and how natural gas is utilized in the United States as a whole.

As has been shown, manufactured gas in the Pacific Northwest was used primarily for residential and commercial purposes since its price prevented it from competing with fuel oil in the industrial field. Therefore, past utilization does not present the complete picture. The estimates of natural gas utilization as set forth by the Pacific Northwest gas utilities is the subject of considerable discussion later on in this chapter. Therefore, let us turn to the last and most factual guide, the utilization pattern of the United States as a whole.

In 1955, approximately 9.16 trillion cubic feet of natural gas was marketed and consumed in the United States. Of this total, approximately 2.155 trillion cubic feet were consumed by residential users, 653 billion cubic feet were consumed by commercial establishments, and industry accounted for 6.36 trillion cubic feet. As to residential, commercial, and industrial customers, there were 26,300,000, 2,100,000, and 100,000 respectively (24, p. 160).

There are seven residential uses for natural gas; cooking, house heating, water heating, refrigeration, air conditioning, clothes drying and incineration. The primary commercial uses are space heating, cooking, and air conditioning. The above uses are so common and well

known that they are rarely given a thought. The number of industrial uses of natural gas are sufficiently startling, however, as to invoke some interest. American industries now employ 26,000 adaptations of more than 2500 individual uses of gas in processing. The reason for this immense popularity of natural gas is simple. It is an efficient, clean, easily controlled, and economical fuel. These collective virtues place natural gas in a fuel class by itself.

It is an established fact that gas plays a part in the fabrication or production of almost every item we use in our daily lives. For instance, in our homes the entire lighting system depends on gas; from the copper wire which gas anneals and keeps from oxidizing during the process, to the insulation which is gas baked, to the conduit which is gas welded and gas galvanized or lacquered. The electric bulbs are formed under gas heat and with gas flames, and their tungsten filaments are formed after gas heating. Our own suits are gas heat processed, our shirts are gas singed, as are our neckties. Nylons are processed with gas and our shoes are cut with gas heated dies. The yarn for our woolen socks or dresses or suits passed through open gas flames. Our television sets operate from tubes made with gas, and the metal parts of course were gas heated for forming, or gas

soldered or gas heat treated. We ride in automobiles whose manufacture is made speedy and efficient by gas, go to bed on springs tempered by gas, on sheets produced and laundered by gas.

The window panes of our houses were formed by gas heat, as was our glassware and china. The ink used for printing our newspaper was cooked with gas, as were the interior paints and lacquers of our houses. Larger buildings are reinforced by steel which was heated and reheated with gas firing during fabrication and forming.

In the rapidly growing field of petrochemistry, which now supplies more than 25 per cent of the nation's chemicals, natural gas is used both as a raw material and as a fuel. In ten years the petrochemical industry is expected to double, particularly in the production of ammonia, alcohols, plastics and fibers, synthetic rubber and detergents (6, pp.7-8).

A recitation of the list of products made from, or with the aid of, natural gas could be almost endless. However, the above brief accounting should be sufficient to underscore the tremendous influence that the gas industry exerts on the productive capacity of our nation.

A Cost Comparison Between Natural Gas, Electricity, and Fuel Oil

The daily quantity of natural gas flowing through either of the pipe lines to the Pacific Northwest will provide more energy than the average daily hydroelectric power generated for the Bonneville Power Administration. This includes the hydroelectric facilities of Bonneville, Grand Coulee, Big Cliff, Detroit, Hungry Horse, and McNary Dams. The combined quantity of gas reaching Oregon and Washington through the two pipe lines will provide almost three times as much energy daily as the hydro facilities mentioned above.

Conversion Factors

	<u>Quantity</u>	<u>BTU's</u>
Natural gas	One cubic foot	1,000
Electricity	One Kwh	3,412
Fuel oil	One gallon	140,000

In 1954, the combined hydroelectric facilities of the Pacific Northwest generated approximately 20.2 billion kilowatt-hours of electricity (44, p.17). To determine the average daily generation, divide by 365. The total number of BTU's can then be determined by multiplying the result by 3,412. The answer in round figures is 325 billion BTU's.

The capacity of Pacific Northwest Pipeline Corporation's line is planned to be 243 million cubic feet per day by the end of the second year of operation. To determine the number of BTU's in 243 million cubic feet of natural gas, multiply by 1000. The answer is, of course, 243 billion BTU's. Pacific Northwest Pipeline Corporation has contracted to buy 300 million cubic feet of gas per day from Westcoast Transmission Company at the international border. This quantity combined with the 243 million cubic feet piped in from New Mexico makes a total of 543 million cubic feet available in Washington and Oregon. Converted to BTU's this amounts to 543 billion, or not quite double the number of BTU's produced by all the existing hydro facilities in the Pacific Northwest.

Natural gas is retailed by the therm. A therm is 100 cubic feet, or measured in terms of energy, 100,000 BTU's. A comparison between the relative cost of natural gas, electricity, and fuel oil at residential rates can readily be made. Generally speaking, natural gas rates throughout the Pacific Northwest will be uniform. The residential customer will be charged rates which decrease as the quantity of gas used increases. The rates are 16, 14, 12, and 10 cents per therm, and are referred to as "blocks," 10 cents being the "low block." Assuming the

customer used the 16, 14, and 12 blocks to operate his stove, ice box and clothes dryer, his bill would be about \$10.00, and he would pay an average of 14 cents per therm or 100,000 BTU's. If, in addition, the customer heated his house with natural gas, he would, in effect, pay only 10 cents per therm for that necessity (9).

Electricity costs the residential user approximately 30 cents per therm, on the basis of one cent per Kwh.

Fuel oil costs the customer a little better than 15 cents per gallon (140,000 BTU's) so it can be seen that natural gas has a slight advantage over fuel oil for residential space heating. The advantage becomes marked when the relative efficiency of the two fuels is considered. Natural gas has a burning efficiency of approximately 89 per cent. Fuel oil efficiency is considerably below that figure.

In the field of interruptible industrial rates natural gas has the market all to itself. Portland Gas and Coke Company recently announced that its interruptible industrial rate would be 3.3 cents per therm for the first 100,000 therms and 3.1 cents per therm for all quantities above that amount (41, p.22).

Thus it is clear that natural gas at the present proposed rates will be the lowest cost fuel in the Pacific Northwest.

Probable Use of Natural Gas in the Pacific Northwest

Residential uses presently account for 72 per cent of the customers of Portland Gas and Coke Company and this percentage is fairly representative of the other gas utilities in the Pacific Northwest. Both Portland Gas and Coke Company and Washington Natural Gas Company have announced plans to materially increase their number of residential customers, with particular emphasis on the domestic space heating load. By 1960, Portland Gas and Coke Company expects to increase its number of residential customers from approximately 78,000 to 100,000 and to increase residential heating from its present 26,000 to 62,000 customers. Washington Natural Gas Company expects to add 7,000 domestic space heating customers per year for the next five years.

Industrial and commercial sales will eventually account for a major portion of the market of the gas utilities of the Pacific Northwest. Portland Gas and Coke Company, for example, expects to expand its sales, on a therm basis, by almost 500 per cent during the next five years. At the end of this period, the company expects that the sales pattern will be 39 per cent residential and 61 per cent commercial and industrial (31, pp.32-33; 6, p.8; 14, p10).

Present Industries

Industries presently located in the Pacific Northwest which can be expected to convert, in varying degrees, to natural gas are: aluminum reduction and fabrication, electrometalurgical, electrochemical, Portland cement, pulp and paper, machinery and tool manufacturing, textiles, furniture and other wood products such as plywood, fish packing, aircraft, food processing, and glass making.

As an example of utility sales already developed, Portland Gas and Coke has contracted to supply gas to 27 industries in the Portland area, beginning during the summer and fall of 1956, and expects to have 117 industrial customers by 1960. The four major industrial accounts thus far contracted for on an interruptible basis are: Oregon Portland Cement Company, Publishers Paper Company, Owens-Illinois Glass Company and Crown Zellerbach Corporation. The first three companies have contracted for 5 million cubic feet of natural gas per day and Crown Zellerbach has contracted for 20 million cubic feet per day. These four big customers assure Portland Gas and Coke Company of one-third more than its first-year industrial goal for 1957 and nearly achieve the company's fifth-year goal in the first year. However, Portland Gas officials announced that natural gas is still

available for other industries on either an interruptible or firm basis and for expansion in the residential and commercial fields (31, pp.32-33; 41, p.22; 42, p.1).

New Industries

Industries which the utilities expect to expand or to be attracted to the Pacific Northwest with the advent of natural gas are: glass, ceramics, textiles, Portland cement, chemical and petrochemical, bauxite processing, and aluminum and brass extrusion.

The Owens-Illinois Glass Company is completing construction of a glass container plant in Portland and has contracted for natural gas as previously mentioned.

Another new development mainly chargeable to the advent of natural gas is the Chemical Lime Company plant now in the process of construction at Baker, Oregon.

The Phillips Pacific Chemical Company, owned by Phillips Oil Company and Pacific Northwest Pipeline Corporation, is constructing a petro-chemical plant at Kennewick, Washington, where it will manufacture anhydrous ammonia for marketing in the Pacific Northwest. Natural gas is the raw material from which anhydrous ammonia is made (15, pp.12-13).

Columbia River Chemical Company has proposed construction of a second new anhydrous ammonia plant at Pasco, Washington.

New industries in the Pacific Northwest will in many cases utilize natural resources heretofore not fully developed. As a striking example, several pilot plants are now in operation experimenting on the recovery of alumina from laterite, of which there are huge deposits in Northwest Oregon, Southwest Washington, and in the Columbia Basin of Eastern Washington. Natural gas is the preferred fuel for this purpose. Should the experiments prove successful, and there is every indication that they shortly will be, then it is possible that alumina may be produced in the Pacific Northwest. It is understood that availability of natural gas has long been a factor in the plans of Harvey Aluminum Company for production of alumina from Oregon Clay at its proposed aluminum plant at The Dalles, Oregon, (16, p.18).

CHAPTER VI

CONCLUSION

This study has touched upon the energy base of the Pacific Northwest, the marketing pattern of the gas utilities, and the special qualities and probable utilization of natural gas. From the information compiled, and insight obtained, the following conclusions may be stated:

1. The advent of natural gas in the Pacific Northwest will result in a greater utilization of the natural resources of this area.
2. The availability of natural gas will bring some new industries to the Pacific Northwest.
3. The availability of natural gas will encourage expansion of many of the industries presently in the Northwest.
4. Natural gas will broaden the base of the Pacific Northwest by providing a new energy base.
5. Natural gas will supplement existing energy sources. It will be complementary to hydroelectric power, and make it possible to release electric power for other uses. It will very likely compete directly with fuel oil.
6. The coming of natural gas is an additional indication that the Pacific Northwest is maturing.

We are now big enough to attract a 400 million dollar natural gas system.

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