

1110 Stan
HD
9581
.U53
A375
1979

FINANCING THE ALASKA HIGHWAY GAS PIPELINE
WHAT IS TO BE DONE?

FINAL REPORT TO THE ALASKA STATE LEGISLATURE

BY

ARLON R. TUSSING

AND

CONNIE C. BARLOW

INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH
UNIVERSITY OF ALASKA

FOR THE

LEGISLATIVE AFFAIRS AGENCY

JUNEAU, ALASKA

APRIL 1979

HD
9581
.U53
A375
1979

PREFACE

During the 1978 legislative session the legislature and administration in the State of Alaska were approached by the sponsors of the Alaska Highway Gas Transportation System with the request that the state participate in the financing of that project. The Legislative Affairs Agency expected that this proposal would be an important issue during the 1979 legislative session.

In February of this year, John McMillian, chairman of the pipeline consortium, presented the administration with what amounted to an ultimatum:

"Financial commitments from the State of Alaska must be made in 1979, and must take the form of a definite commitment that Alaskan funds will be available unconditionally subject only to completing the remainder of the financial plan and obtaining final FERC approval."

McMillian asked for a financial commitment of \$1 billion in revenue bonds and \$500 million in preferred stock.

In order to assist the legislature in evaluating this project, the Legislative Affairs Agency last year contracted with the University of Alaska's Institute of Social and Economic Research for the preparation of several analytic reports. The first of these, entitled An Introduction to the Gas Industry, detailing the financial, economic, and political environment in which the gas industries operate, was published by the agency in November of 1978. A second study, A Look at the Current Impasse, examining the events that led up to the project's current difficulties and the state's options, was published in January of this year.

The present volume examines the conditions that must be fulfilled if the project is to move forward. We believe that this section will be of particular interest to policy makers at both the state and federal level, since it provides what we believe is the only coherent and credible outline on the public record of what is to be done if the project is to proceed.

It should be emphasized that the authors were not asked, nor do they attempt to address, the question of whether the project should be built. However, the appendices (a draft of which was given limited circulation by the agency in early March) provide a useful examination of the state and federal governments' respective interests in the project.

Gregg K. Erickson
Director of Research
Legislative Affairs Agency

Juneau, Alaska
April 1979

ARLIS

Alaska Resources
Library & Information Services
Anchorage, Alaska

TABLE OF CONTENTS

Foreward i

Introduction 1

Essential Principles of a Financing Plan 5

The Need for a Project Leader 15

The Role of Northwest 19

The Financial Role of Alaska 23

What Could the State Do? 29

APPENDIX

The National Perspective A- 1

The State of Alaska's Interests and Options A-27

Producer Interests and Perceptions A-39

Motives of the Gas Transmission Companies A-49

Motives and Views of the Major Lenders A-65

Canadian Issues and Interests A-69

The Consequences of Delay A-75

About the Authors A-89

FOREWARD

In April 1978, Northwest Alaskan Pipeline Company, chief American sponsor of the proposed Alaska Highway gas pipeline, proposed that the State of Alaska participate in financing the pipeline segment within its borders. The Alaska legislature's response to this request included contracting with the University of Alaska's Institute of Social and Economic Research to investigate the economics of the pipeline project, its commercial viability, and the effect (if any) that state investment might have on its chances for success.

The investigators turned first to the question of marketability --- whether gas could be delivered through the pipeline to Lower 48 consumers at a price they would willingly pay. In the long run the question hinges on an issue that evades confident forecasting: What happens to the prices of other fuels, particularly OPEC oil? Most gas producers and gas transmission companies express little doubt about their ability to market Alaska gas or other high-price "supplements"; but any investment strategy for the pipeline must take into account the concerns of other parties as well --- including prospective lenders, who are not as complacent about marketability risks.

The first preliminary report in this series, Marketing and Financing Supplemental Gas, was adapted from the authors' earlier work done for the Department of Energy's Office of Oil and Gas Policy. It was released on October 25, 1978, along with a primer on natural gas: Introduction to the Gas Industry, which explained what natural gas was and how it was shipped, sold, and regulated.

The report finds that market uncertainty is large enough to warrant concern by all parties involved in the production, transportation, and distribution of Alaska gas, and particularly for suppliers of debt capital. The authors attribute the gas transmission industry's complacency to its peculiar history: Few companies have yet been exposed to a situation in which the volume of gas is limited by its price.

While marketing risk might be both real and large enough to stand in the way of financing the Alaska Highway project (as well as LNG and synthetic gas facilities), the report describes a number of tariff and rate design measures by which federal and state regulators could --- if they choose --- assure that the expected volumes of Alaska gas would be saleable.

Marketability risks are only one of a number of operating risks facing a completed gas transportation system. Any of several contingencies might reduce or interrupt gas deliveries. Overshadowing all of the operating risks in a project as large and complicated as the Alaska Highway project is the possibility --- however remote --- that engineering, financing, political, or other problems (an endangered species?) might prevent some part of the system from being completed. Only one portion would have to remain out of operation in order for the whole project to become a disaster.

The second preliminary report was devoted largely to the impact of these risks on financing. The project's marginal economics, its complexity, and above all its size combine to make the issue of risk allocation central to system financing. Virtually all involved parties and informed observers other than top spokesmen for Northwest and the federal government are convinced that debt capital will be unavailable for the Alaska Highway project unless the United States government accepts at least some of the non-completion risks, and probably some of the operating risks.

The Alaska Highway Gas Pipeline: A Look at the Current Impasse, released on January 13, 1979, was the second preliminary report in this series. Reviewing the events that led to selection of the Alaska Highway route and its sponsor, it also examined the claims of Northwest and federal officials that government assistance was unnecessary. The authors concluded that the chief pipeline sponsor, the Department of

Energy, and the President had put themselves in a box with overly optimistic predictions, and that the venture surely would remain at an impasse until the sponsor and the federal government faced up to the matter of risk allocation and devised an honorable retreat from their dogmatic assurances to Congress.

Financing the Alaska Gas Pipeline: What is to be Done? is the final report from this investigation. It concludes that the pipeline is not a viable enterprise as it is now planned, and that even if Northwest's urgent demand for a half billion dollar contribution by the state were met, the project would still be unworkable. In light of this finding, the final report concentrates on what has to be done, and by whom, if the project is to have a chance of success. The main text of this volume describes the essentials of a realistic financing strategy. The key is that the project's guarantors must include some combination of gas transmission companies, gas producers, Alaska, Canadian interests, and consumers, but that no such combination will be strong enough or credible enough unless it includes the United States federal government as the guarantor of last resort. A vital counterpart to this principle, however, is that Congress is not likely to consider such a guarantee until it is satisfied that all the other parties have shouldered their fair share of the risks.

The main thrust of the report is conventional and conservative: it calls for a return to more orthodox approaches for project financing than the present sponsors propose --- back toward principles that seemed broadly accepted before the President's 1977 decision in favor of the Alcan system and its corporate sponsor. The philosophy of the report is in accord with that of the Treasury Department in its 1977 report to the President, Financing an Alaska Natural Gas Transportation System:

The sponsor guarantee approach, if it will work, is the greatly preferred financing alternative. That is, the full financial risks should, if at all possible, be borne by pipeline companies, oil companies and the State of Alaska, which together are the

most direct beneficiaries of construction of a transportation system... The consumer debt guarantee should be avoided, if possible, but may be a necessary supplement to sponsor guarantees to structure a workable financing package. In any event, a consumer guarantee is preferable to a Federal guarantee because gas consumers stand to benefit from the project directly, whereas Federal taxpayers may or may not be gas consumers... Finally, the Federal guarantee approach should be the "last resort" alternative. Federal taxpayers (through direct USG loans or guarantees) should be the last group to bear any project risks and even then should bear only those limited project risks not borne by others. The same applies to a Canadian governmental guarantee. (pp. V:1)

The investigators' only addendum to these dicta is that support for this project will be required from all parties, starting with the gas transmission companies and ending with the federal government.

No one now knows what allocation of benefits, costs, and risks will be regarded as fair by all parties, and the authors have not even drafted a hypothetical distribution of financial responsibilities. We do know that a workable allocation cannot be arranged piecemeal in bilateral negotiations among the parties or in adversary proceedings before quasi-judicial commissions. Instead, one individual must coordinate and broker this accommodation; and the report considers the character and responsibilities of such a leader.

The authors conclude that from the standpoint of project requirements and a "fair" allocation of risks and benefits, Alaska will probably have to contribute some capital, assume some risks, or at least reduce its expectations of fiscal benefits, if it wants to see the project built in the near future. Nevertheless, the state should not make a commitment until a credible process has been established for developing a realistic financial plan.

This final report is supplemented by six appendix chapters that view the pipeline and its financing requirements from the perspective of each involved party. Two chapters examine the national perspective

from both the consumer standpoint and the broader economic interest, and the Alaskan viewpoint with all the state's internal conflicts and uncertainties. Another takes up the motives and perceptions of the gas transmission companies and more specifically those of Northwest. Other chapters treat the interests and constraints on private and governmental actors in Canada, and those of the major lenders of long-term debt. The final chapter, "Consequences of Delay" reviews what each of the parties can hope to gain or lose if completion of a gas transmission system for Alaska North Slope gas is further postponed.

Acknowledgements

The individuals who assisted this project with generous commitments of time, information, and insights are too numerous to acknowledge by name. They include officers and staff of the three major North Slope producing companies, several Canadian producers, and PEMEX; a representative cross-section of the U.S. gas industry, and all the major Canadian pipeline companies; a host of investment banking firms and other financial institutions, including the two largest institutional lenders. We were gratified by the universal responsiveness and frankness.

The only exception was one company that disagreed vehemently with the conclusions of our January report. The company's chairman expressly declined to meet with us regarding the topics of the final report on the ground that:

... you waited until after you reached your conclusions and wrote your reports to try to "understand (our) views and strategy" and to "characterize them accurately and fairly." Therefore, I do not see anything to be accomplished by having a meeting at this time.

We are also indebted to staff of the Federal Energy Regulatory Commission and to certain state utility and energy commissions, to

a number of top officials and analysts at the Department of Energy, to members and staff of the House and Senate, and personnel at the Congressional Research Service, the General Accounting Office, and the Congressional Budget Office. We are grateful for the assistance of Canadian federal and provincial government officials and staff, including members of the National Energy Board and the Commissioner and staff of the Northern Pipeline Agency, along with the United States Ambassador and his embassy staff.

Other helpful individuals included members of trade associations and the regulatory bar. In Alaska we were assisted by various elected and appointed state officials and staff from both the executive and legislative branches.

The seriousness of some of the conclusions in our January 1979 report and in this final piece prevented us from circulating the drafts widely for review; so the authors are particularly grateful to those persons who took the time to make comments and criticisms about the substance, format or style of the reports. The individuals who warrant personal thanks are Gregg Erickson, Kay Brown, and Larry Eppenbach of the Legislative Affairs Agency; Michael Scott and Ron Crowe of the Institute of Social and Economic Research; Fred Boness, former Deputy Commissioner of Natural Resources; and Robert Loeffler and Norman Chappell of Washington, D.C.

Above all, Bonita Swanson deserves our thanks for tending the typewriter and managing the accounts and files throughout the past year.

Principal financial support was provided under a contract with the Legislative Affairs Agency, but part of the effort on the first report was financed under a contract with the U.S. Department of Energy. Additional backing for the final report was provided by the Institute of Social and Economic Research out of its general funds and through a grant from the Ford Foundation for research on energy policy in Alaska.

Connie C. Barlow

Arlon R. Tussing

INTRODUCTION

The Alaska Highway gas pipeline cannot be financed and built unless the United States government guarantees at least part of the project debt. This judgment, which the authors related in an earlier report to the Alaska legislature,¹ is held almost unanimously by the natural gas transmission industry, Alaska gas producers, investment bankers, lending institutions, state and federal regulators, and concerned members of Congress. The only significant dissent we encountered in more than six months of investigation came from a few top officials of the United States Department of Energy (DOE) and from Northwest Alaskan Pipeline Company (Northwest), the project's principal sponsor.

Northwest thereby bears a double handicap in moving ahead on any front. Not only does it have an unworkable financial plan, but because gas producers, potential shippers (including Northwest's own partners), state officials and important parts of the federal bureaucracy believe the plan is unworkable, many of them do not sense

1. Arlon R. Tussing and Connie C. Parlow, The Alaska Highway Gas Pipeline: A Look at the Current Impasse, University of Alaska, Institute of Social and Economic Research (for the State of Alaska, Legislative Affairs Agency, Juneau) January 12, 1979.

any urgency in cooperating with Northwest or with one another in resolving even the nonfinancial issues. Because the project's financing is not credible, in other words, the whole project as presently organized is not credible. Thus, entreaties to the other parties by Northwest's chairman, "jawboning" by the Secretary of Energy, or declarations of faith by the President of the United States come to nothing --- they only add to the suspicion that Messrs. McMillian, Schlesinger and Carter don't know what they are talking about.

The proposition that Northwest put to the state of Alaska in the spring of 1978 is a good illustration. Alaska was asked to issue \$1 billion in tax-exempt revenue bonds to be used as pipeline debt capital, and \$500 million of state equity in the form of convertible debentures. When the legislature satisfied itself that it faced no serious risks in doing the former, a bill setting up the process to issue such bonds was passed, but final approval was deferred. To respond to the equity request, the legislature appointed a special inquiry committee and commissioned the present study.

During the 1979 legislative session, Northwest repeated its request more urgently, now stating that the fate of the whole project hung on a state equity commitment before June.

Yet the company has not been able to convince the Governor or a single member of the legislature to introduce the legislation that Northwest claims is vital. Top DOE officials personally urged Governor Hammond to support Northwest's proposition, but none of them seemed to know exactly what the proposition was, and they could not even explain why Northwest thought it was essential.²

Meanwhile, there is no evidence that the United States Treasury Department (Treasury) ever took the tax-exempt bonding scheme seriously, and the needed amendment to the Internal Revenue Code did not surface at all in the Ninety-Fifth Congress. Northwest and DOE approaches to the gas producers, potential shippers and lending institutions, and the fate of those approaches, have varied in detail from the history of Northwest's courtship of Alaska, but their flavor has been quite similar.

2. In discussing the request for Alaska financial participation, our January report remarked that, ". . . unless Northwest or FERC is excessively naive about the state's comprehension . . . neither of these parties will be putting much pressure (at least directly) on the state to reach decisions during the 1979 legislative session." (p. 54). We obviously overrated the perceptivity of both the company and the federal administration: Northwest's urgent approach to the state came only a few days later. Today the prevailing opinion in state government seems to be that an Alaska equity contribution is nearly irrelevant to the success of the project as such, but is very much connected with Northwest's position within the project.

Despite a universal belief that the pipeline cannot be built according to the current plan, almost every party seems to be persuaded that the project is vital to the interests of both the United States and Canada, and that it will be built --- perhaps after some extended delay, and perhaps under different leadership. Curiously, however, in the whole course of our investigation of this issue for the Alaska legislature, we did not encounter any other parties (no matter how deep their material interest in the project's success) who admitted they had seriously considered, let alone drafted, a workable alternative to Northwest's financing scheme or an alternative strategy of organization.

The authors do not intend to rush in where Exxon, the biggest pipeline companies, and Wall Street's top investment houses have chosen not to tread. Rather than dictating a new financial plan for the pipeline, this report sets out a few of the essential principles that must guide any successful strategy, suggests the kind of leadership that is needed to carry it out, and reviews the part that Alaska can play in this drama.

ESSENTIAL PRINCIPLES OF A FINANCING PLAN

Construction and operating risks must be fully and firmly apportioned [Conclusion Number 1]. Lenders will not provide debt for the pipeline unless some creditworthy party or group of parties unconditionally guarantees that the entire project will be completed, or if it is not completed, that the entire principal and accumulated interest will nevertheless be paid off. Because of the scale of this project and resultant size of each debt commitment, lenders will also demand total protection against all operating risks, including those of gas supply shortfalls, interruption or abandonment of service, and inability to market the gas.

Conceivably, there is some combination of tariff provisions and regulatory measures, such as all events minimum bill tariffs, front-end loaded tariff profiles, rolled-in or value or service pricing, and perfect tracking,³ that would satisfy the lenders that all operating

3. All events and minimum bill tariff concepts are explained in the authors' Introduction to the Gas Industry (University of Alaska, Institute of Social and Economic Research, for the State of Alaska, Legislative Affairs Agency, Juneau: October 25, 1978), p. 103; front-end loaded tariffs are discussed in their Marketing and Financing of Supplemental Gas (published in a single volume with the foregoing), (continued on page 6)

risks had been provided for. If pipeline sponsors could prove convincingly to the lenders that no plausible combination of events could ever interrupt the flow of debt repayment and interest, it is remotely possible that a completed system could get by without additional guarantees from the federal government.

With respect to the risk of non-completion, however, there is no rational hope of avoiding federal government involvement. The project's guarantors must include some grouping of gas producers, Alaska, the sponsoring transmission companies, the government of Canada, and consumers; but no combination of guarantors will be strong enough or credible enough to the lenders unless it also includes the United States government as the guarantor of last resort [Conclusion Number 2].

All of the parties whose cooperation is necessary to the success of the project (except Northwest and DOE) firmly believe this to be the case. As a result, none of them will make a commitment to bear any substantial risk without

pp. 134-142; rolled-in and value of service pricing and related concepts are treated in op cit, pp. 65-75. Perfect tracking is the automatic and unconditional pass through of all costs in each subsequent sale (e.g., from transmission company to distribution company, and from distribution company to final consumer) without further regulatory intervention or discretion.

knowing what part of the burden the federal government will assume. The pipeline will go absolutely nowhere until it has a project leader who acknowledges this fact [Conclusion Number 3].

While federal backing is indispensable to financing an Alaska Highway gas pipeline, such backing is a vain hope unless other parties, including the sponsoring transmission companies, also bear substantial risks [Conclusion Number 4]. While the Administration and Northwest have focused on the gas producers and the State of Alaska as "beneficiaries" who ought to guarantee all or part of the project debt, they have passed over a remarkable feature of the present financing scheme --- the sponsoring companies themselves plan to bear no risk whatsoever beyond their paid-in equity.⁴ Yet they are asking for a rate of return on equity (18 percent⁵) which would be exceptionally high

4. See the authors' Marketing and Financing Supplemental Gas (1978) pp. 29-45, for an explanation of the project financing technique proposed for the gas pipeline.

5. The Federal Energy Regulatory Commission (FERC) has proposed an "illustrative" basic rate of return of 16 percent, which is still relatively high for a project in which the owners risk only their paid-in equity. The rate proposed in the company's March 1979 pro forma tariff is 18 percent. The actual (discounted cash flow) return to the sponsors would be considerable higher (in the 25-30 percent range) because of the operation of the investment tax credit.

even for projects in which the sponsors themselves guaranteed the project's entire debt.

Even some of the private parties we interviewed regarded this arrangement as unprecedented and unreasonable. Gas producers were outraged that the project sponsors expected a "free ride" on debt that they were asking the producers to guarantee. Several gas transmission companies indicated that they could (and normally would expect to) guarantee some share of the debt, at least through the construction phase. In any case, Treasury will not endorse federal loan guarantees or subsidies of any kind to the pipeline, and Congress will not authorize them, unless all of the private beneficiaries --- particularly the gas producers, Alaska, and the pipeline companies --- bear a substantial share of both the non-completion and operating risks.

The ruling principle was stated concisely and correctly in a 1977 interagency report to the President; Financing an Alaska Natural Gas Transportation System:

Even if Federal assistance were ultimately found necessary to finance the project, it should not be provided in lieu of risk-bearing by other parties. Direct beneficiaries of the project should remain obligated to bear the project risks to the largest

extent feasible, and any taxpayer risk should be residual and subordinate.⁶

Most of the major gas transmission companies in the United States (both inside and outside the present partnership) seem to be interested in the Alaska Highway system, but primarily as a source of gas rather than as an investment. Many of the companies we interviewed appeared willing to participate in the Alaska segment of the project, but only if they had to do so in order to buy or ship Alaska gas. Several (but not all) of them would even consider backing their proportionate share of the project debt.⁷

The most logical and conventional way, therefore, to strengthen the project's private financing --- and thereby to make government guarantees more acceptable --- would be to require the companies that want to ship Alaska gas to invest in the pipeline, and to require each of the owners to guarantee a proportionate share of the project's debt
[Conclusion Number 5].

6. Report to the President: Financing an Alaska Natural Gas Transportation System. Washington: U.S. Department of the Treasury [lead agency] (July 1, 1977), p. 7. Emphasis in original.

7. Northwest is a conspicuous exception on both scores: its interest in the project is overwhelmingly as an investor, while the company's small size precludes it from backing any significant portion of the debt. These two factors explain much that is unorthodox --- and troublesome --- about the present financial plan.

There are three difficulties with this orthodox and straightforward approach: (1) the gas transmission companies differ widely in their ability to provide equity or to back the project's debt, and this ability is not necessarily proportional to their need or desire for Alaska gas; (2) the Alaska Natural Gas Transportation Act (ANGTA) requires "equal access" to the pipeline for owners and non-owners;⁸ and (3) such a scheme would be extremely discomfoting to the present project leader, Northwest. Any successful organization or financing plan must effectively deal with or sidestep each of these problems.

The gas transmission industry clearly cannot --- and would not even if it could --- guarantee all of the pipeline debt. The amount of construction debt the pipeline owners can back depends upon the number, strength, and corporate ideologies of the participating companies. Marketability and other post-completion risks can be made tolerable, in turn, only if the Alaska gas can be apportioned (by resale, exchange, and displacement if not directly) among a large number of transmission companies, so that the relative

8. Section 13(a) of ANGTA provides "that no person seeking to transport natural gas in the Alaska natural gas transportation system shall be prevented from doing so or be discriminated against in the terms and conditions of service on the basis of degree of ownership, or lack thereof, in the Alaska natural gas transportation system."

price impacts of high costs, interruptions of service, etc., on any one company's customers would be minimized.

While all major beneficiaries of the project must expect to bear some risks, including some responsibility for project debt, there can be no firm a priori rule for allocating costs and risks. The various parties differ greatly in their interest in the project, financial ability, perceptions, and philosophy. These differences often seem to be as great within sectors (e.g., between Exxon and Sohio, or among United, Texas Eastern, Pacific Gas and Electric, and Northern Natural) as between them.

Successfully marketing Alaska gas and financing a transportation system will require an awareness on the part of each party of the true interests and limitations of every other party; above all it will require enormous sensitivity on the part of the project leader to these nuances of outlook and position. Northwest and DOE have thus far been extraordinarily obtuse in this respect, for example, grossly and persistently misjudging the motives and limitations of Alaska and the gas producers, and making no discernible effort whatever to ascertain the views of major lenders.

Thus, the ultimate plan of organization and the ultimate financing plan will have to permit reasonable differences

in position and treatment between owners and non-owners (Section 13(a) of ANGTA notwithstanding), between guarantors and non-guarantors, and among as well as between transmission companies and gas producers [Conclusion Number 6]. The emphasis here is on the word "reasonable": the allocation of costs, benefits, and risks among the parties should rationally reflect their different interests and financial limitations. In the case of political bodies --- Canada, Alaska, and the United States Congress --- the ultimate outcome and the process by which it is accomplished must reflect political sensitivities and limitations, even if they seem unreasonable by some more objective economic standard.

The proposition that every major interest in the pipeline must bear a palpable part of the project risk has a necessary corollary: Each party's exposure must be so limited that the worst plausible combination of events would not wipe it out or seriously debilitate it [Conclusion Number 7]. Again, a political "disaster" to any of the governmental participants must be counted as an unacceptable outcome. It is also important to recognize that the various parties would be inclined to accept a greater risk of reduced benefits from the project (such as wellhead revenues, royalties, or return on equity) than of a loss of existing

income or assets (such as revenues from Prudhoe Bay oil, or unrelated property, or return of project equity).

This need to prescribe the greatest loss that each of the parties would ever be expected to bear is one of the main reasons the role of the United States government is so crucial --- only the federal government could possibly pick up the pieces for every other player and yet itself come out nearly whole.

In short, every party with a vital interest in the pipeline must believe that the apportionment of costs, benefits and risks is fair and reasonable according to its own perceptions and philosophy [Conclusion Number 8]. In deciding whether a given arrangement is fair and reasonable, most of the parties will want to know just what burdens every other party is expected to bear, in exchange for what benefits. Right now many of them fear, or are already convinced, that someone else will get away with something. Such attitudes can be debilitating or even fatal to the project --- particularly if it ultimately requires Congressional action on federal backing. Assuring that the ultimate arrangement is regarded as fair by all the parties imposes awesome tasks of inquiry, ingenuity and persuasion on the project leader.

The need to ascertain the motives and limitations of each party, and to craft a solution acceptable to all of them means that decisions on the allocation of benefits, costs, and risks cannot be made piecemeal [Conclusion Number 9]. Field prices and responsibility for gas conditioning costs; the share that the pipeline owners, gas producers, the Canadian government or Alaska take in backing pipeline debt; the rate of return to pipeline equity; tariff conditions, including the risks shifted to gas distributors or final consumers; and the responsibilities assumed by the United States Government are all interdependent. A major shift in any one of them changes what some of the parties will regard as "fair and reasonable" with respect to all others.

THE NEED FOR A PROJECT LEADER

It would be only the sheerest coincidence if an overall settlement judged fair by all the involved parties emerged from a series of isolated bilateral negotiations and from adjudicatory proceedings before the Federal Energy Regulatory Commission (FERC), the Economic Regulatory Administration (ERA) of DOE, and state utility commissions. One individual or institution needs to coordinate and broker the resolution of all the fundamental organizational and financial issues [Conclusion Number 10]. The process, in short, needs a leader.

The project leader cannot be Northwest, because its own interests are in many respects different from (if not at odds with) those of the project as a whole; because of the obstacles the antitrust laws place on its negotiations with other transmission companies; because of the *ex parte* restrictions on its dealings with FERC and state regulatory commissions; and because of its already proved lack of insight, finesse, and persuasive power in dealing with some of the other parties. Any other gas transmission company, any of the gas producers, or the State of Alaska would suffer from most of the same incapacities.

Conceivably, one or more of the major investment banking houses could serve as leader, as Morgan Stanley and Wood Gundy did for the Arctic gas project. They too would have problems with antitrust, securities, and investment advisor laws, and probably would not be the most credible spokesmen for the project in dealing with Congress and other political bodies. On balance the most effective project leader would be one who represented the federal government as a whole, but could stand above and apart from individual agency missions, constituencies and viewpoints.

The project leader cannot be the Secretary of Energy or any other line official of the federal government, because the leader needs to be able to negotiate with and lobby FERC, ERA, Treasury, the Interior and State Departments, and Congress as separate interests with divergent missions, perceptions and ideologies --- and because the leader needs to be able to devote himself totally to the success of this project without administrative responsibilities or conflicting policy or political commitments.

Thus, the most effective project leader would be a respected senior public servant who is intimate with both government and finance, independent of any other administrative or policy responsibilities, appointed by and responsible

70

directly to the President [Conclusion Number 11]. We have in mind an American of the caliber of Canada's Mitchell Sharp, Commissioner of Canada's Northern Pipeline Agency, or the late C. D. Howe, father of the Trans-Canada pipeline. Individuals like Robert Strauss, Felix Rohatyn or John Bunting would be obvious candidates.⁹

The project leader's mandate would be to consult with all of the parties, including the relevant governmental agencies and interested members of Congress, and to help them come together to devise a workable organizational and financial plan --- one that each party believes is fair to itself and to every other party, and one that would survive Congressional scrutiny.

Congress and the President would ultimately be required to approve any arrangement that included federal debt guarantees, tax preferences, or subsidies. For this reason, the project leader can and must be free to step outside the framework of previous Congressional, Presidential, or FERC policy decisions and commitments in order to forge an accommodation among the parties [Conclusion Number 12]. Valid public

9. Several persons have suggested Vice President Mondale as a person who might serve as coordinator and broker of the project. He may not completely meet all of the qualifications we have listed here, but he is the only federal official who could conceivably fill the role in his present federal position.

policy concerns may well underlie the "equal access" provision of ANGTA, for example, the prohibition of producer participation in pipeline equity, FERC's draft ruling that the producers should absorb all gas conditioning costs, and the strictures of Congress against imposing pre-construction surcharges on gas consumers and against federal loan guarantees or subsidies. Individually or cumulatively, however, these restrictions may be serious or fatal obstacles to financing and building the pipeline. The project leader must keep in mind the reasons each policy was adopted, but he must be free to consider financing approaches that might be inconsistent with one or more of them and, where necessary, ultimately to persuade the President and Congress that changes in existing policy are worthwhile.

THE ROLE OF NORTHWEST

One of the most troublesome issues in crafting a financial strategy is the role that Northwest is to play in this strategy and in the final scheme of things. Northwest's management is not very popular anywhere in the private sector, and its lack of credibility in Congress could be an insurmountable barrier to federal credit guarantees. Both of these facts are widely recognized; yet there is no obvious sentiment in the gas transmission industry (either within or outside the present partnership) for replacing Northwest as operator and manager.

Despite general disbelief in Northwest's financing plan, and dismay at the company's conduct of relations with other businesses and Congress, we encountered no serious concern about Northwest's ability to manage the construction of a pipeline or to operate it once it was built. "Someone has to run the damn thing," was the most frequent attitude, and no one expressed any desire to take John McMillian's burdens upon himself. This sentiment was strongest among former members of the Arctic Gas group, who looked back with horror on its complex committee structure and its multi-headed executive; construction of the Alyeska oil pipeline

was often mentioned as another example of the evils of management by committee.

Northwest was chosen by the President and approved by Congress to build the Alaska portion of the pipeline because it had more foresight and greater audacity, and was willing to put a larger part of its (relatively meager) corporate assets at risk, than the other applicants. Northwest and its Canadian counterpart recognized changing market conditions in Canada, were more sensitive to environmental concerns and Native claims, and were more flexible in their program --- altering their design and organizational strategy to meet the two governments' changing perceptions of the purpose for an Arctic gas transportation system.

This history has two important implications: First, Northwest has a substantial moral as well as legal right to the conditional certificate it now holds --- it will not (and should not) give up its leading position easily or cheaply. Second, there is every reason to believe that the company is still adaptable and realistic enough to scale down its ambitions in the interest of a successful project. For there is no force short of divine intervention that will permit John McMillian to bootstrap one of the smallest domestic pipeline companies (literally nonexistent six years

ago) into a commanding equity position in the biggest utility project in North America.

The choice for Northwest may well be between total control of a phantom pipeline versus (say) a ten percent stake, plus the prestige of managing and operating a real one. One of the most challenging tasks for the project leader will be to help Northwest find a position in the venture that recognizes the company's pioneering and risk-taking role, yet which is acceptable to all the other parties, including the lenders and Congress [Conclusion Number 13].

THE FINANCIAL ROLE OF ALASKA

The State of Alaska's total net revenues from the sale and transportation of Prudhoe Bay gas will far outstrip those of any other party.¹⁰ Alaska, moreover, is the only beneficiary of the project that can unilaterally increase its take (by raising its tax rates) without the agreement of other parties or the consent of federal regulators or Congress. Finally, the state's legal right to these revenues, unlike those of the gas producers, pipeline owners, or lenders, does not depend upon any prior investment or assumption of risk.

Treasury, the President, DOE, and Northwest have all rightly inferred that Alaska is a "beneficiary" of the project that could reasonably be expected to provide some kind of financial support for the pipeline. But they also falsely assumed that the state's interest in construction of the pipeline would be so compelling that it would do "whatever is necessary" or, more accurately, whatever it is asked to do, in order to assure the project's success. There are two problems with this assumption:

10. See p. A-26 for an analysis of the state's direct revenue interests in the project, and a discussion of its other (possibly countervailing) concerns.

First, while elected officials, businessmen, the media, and citizens of Alaska are generally in favor of the pipeline, it does not have the widespread and passionate backing that the TAPS oil pipeline and the unsuccessful "All-Alaska" gas transportation system received in earlier years. There are in fact deep pockets of skepticism, apathy and outright opposition, reflecting a diversity of perceptions and motives. Some Alaskans fear that the pipeline will bring undesirable industrial development and population growth, while others hope that Prudhoe Bay gas can be kept in Alaska to fuel in-state industrialization. All this is accompanied in some quarters by an undercurrent of spite or a lingering and unrequited loyalty to the defunct El Paso proposal.

Another concern that nags many Alaskans is that cashing out the state's gas reserves now will only intensify the hard landing expected in the late 1980's and early 1990's, when Prudhoe Bay oil income will fall off sharply. Not only are they convinced that early budget surpluses would encourage the legislature to piddle away what really should be saved, but they also fear that expanded subsidy and transfer programs, a bloated state bureaucracy, and the need to service lavish public works projects would make it even harder to budget realistically for a smaller income.

The ambivalence of Alaskans about the gas pipeline, therefore, imposes a heavy burden on any elected official who would have the state make a major investment or assume onerous risks for the sake of the project. He or she must be convinced, and able to convince others, that the action is responsive to the project's financial needs and unavoidable if the state is to receive its projected economic benefits.

Second, while the Governor and the legislature have consistently indicated that the state is in principle willing to consider an investment or to incur risks, no one has really known what kind and how large a state commitment is necessary or reasonable in light of the expected benefits, and in light of the risks all the other parties would take. Of the three concepts most forcefully advanced by Northwest or DOE --- tax exempt revenue bonds, debt guarantees, and state equity investment --- the first demands improbable actions by other parties (Congress and lending institutions) and in any case is not responsive to the perceived problems of pipeline financing, while the second and third may carry large fiscal hazards.

Very few persons outside of Alaska seem to recognize how imprudent direct state involvement in financing the

pipeline might be --- at least by conventional investment standards. Alaska's state income depends overwhelmingly on Prudhoe Bay oil royalties and taxes, while the state's local government and private economy are underpinned by the same revenue flows.

If Alaska were to commit general fund or permanent fund capital, future oil revenues, or the state's credit to a venture intimately connected with the Prudhoe Bay field, any one of a number of plausible events might turn what would otherwise be a fiscal difficulty into a disaster. For example, if unforeseen production problems limited oil or gas production from the field, if an explosion closed the Valdez terminal (and hence interrupted gas as well as oil shipments), or if world energy prices collapsed, Alaska's current revenues would be sharply reduced.

If, in addition, Alaska had invested its accumulated cash reserves in gas pipeline equity, a cushion it would otherwise have against just such a contingency would be unavailable. And if the state had borrowed to buy pipeline equity (as proposed by Northwest), or guaranteed pipeline debt (as proposed by Treasury and DOE), creditors would descend on the state's remaining cash reserves (if any) and its already diminished revenues, in order to cover debt service on a distressed pipeline.

For these reasons, the major institutional lenders may be unenthusiastic about some kinds of state financial participation: they do not see state loan guarantees, for example, as credible security for gas pipeline bonds, believing (with some justification) that Alaska would attempt to recoup any losses resulting from a disabled gas transportation system via higher taxes on oil production or on the TAPS oil pipeline. Thus, state loan guarantees could turn out to be no assumption of risk whatever from the lenders' point of view, but rather a shift of risk from the gas pipeline bonds these institutions are being asked to buy, to the oil pipeline bonds they already own.

Other kinds of "backstopping" (so far not suggested by Northwest or DOE) might be more effective, yet carry less onerous risks for Alaska. In order to share the pipeline's operating risks, for example, the state and the gas producers might agree to build up a sinking fund out of gas sale revenues, which could be called upon to cover some specified portion of debt service deficiencies in the event of a marketability problem or a field-related interruption of gas deliveries. In this way, the state would put at risk only a specified part of its future net benefits from the sale of gas --- benefits that depend wholly on the existence

of a pipeline --- without gambling either current revenues
or permanent and general fund balances.

WHAT COULD THE STATE DO?

By making known its general willingness to consider financial support for the gas transportation system, and its more specific willingness to take certain actions which do not seem to carry great risks (for example, issuing industrial development bonds), Alaska has gone just about as far as is prudent or reasonable until a believable strategy for financing the whole system is on the agenda [Conclusion Number 14].

Assuming the state believes that early construction of the Alaska Highway project is vital, Alaska still cannot serve effectively either as the project entrepreneur or as the broker among other parties. Nor is it necessarily wise for the state to "lay its cards on the table," spelling out in great detail what its price is for a given kind of financial commitment.¹¹ The most useful office Alaska could now exercise would be as a catalyst to the other parties and particularly to the federal government, in the hope that the latter will assert the kind of leadership of which no other party is capable [Conclusion Number 15].

11. The authors related some of the hazards of such a "take it or leave it" stance in their January 1979 preliminary report pp. 63-68.

In any event, the state should keep its options (and those of other parties) open, by not committing its royalty gas and by not adopting hard and fast positions on controversial issues such as the volume of gas to be produced from the field, the quality of gas to be shipped, the apportionment of gas conditioning costs, the incentive rate of return, etc. All of these issues should remain open for discussion and negotiation after the state is satisfied that early construction of this pipeline is in its overall interest, that the federal government has recognized its own responsibilities, and that the other parties have acknowledged the federal role.

Meanwhile, the state should participate as it is now doing in FERC proceedings, Congressional hearings, and discussions with other governmental and private parties --- but not in order to present detailed legal critiques or negotiate definitive agreements. Alaska should, instead, use these forums to make its own concerns and limitations understood and also to offer suggestions for the process by which the pipeline's financing problems could be resolved.

To carry out these tasks, Alaska might consider having its own chief spokesman and negotiator on pipeline issues, a counterpart to the proposed federal project leader. The

state's interests and concerns are so complex, so demanding in terms of intellectual effort, time and travel, and detachment from other administrative and policy commitments, that the job cannot be done adequately by any commissioner or division director. The state's efforts to catalyze federal initiatives and, later, its negotiations with other parties, would be most effectively conducted by a full-time officer of cabinet rank, appointed by the Governor to deal entirely with gas pipeline policy issues [Conclusion Number 16].¹²

12. The suggested position should not be confused with the existing office of state pipeline coordinator, who is the counterpart of the as-yet-undesignated federal inspector. The main responsibilities of these officials are not in the area of policy, but rather to monitor the engineering performance and environmental impacts of pipeline construction.

A P P E N D I X

THE NATIONAL PERSPECTIVE

Introduction

Cost predictions for gas delivered through the Alaska Highway pipeline reach from \$5.00 to \$8.00 or more per thousand cubic feet (mcf); yet the United States Department of Energy (DOE) last summer rejected as overpriced similar quantities of Mexican gas at \$2.60. It is not astonishing that some journalists and members of Congress have concluded that the Alaska project is a needless boondoggle.

Unfortunately, \$5.00 to \$8.00 is a realistic estimate of the price of Alaska gas delivered into Lower 48 markets in the first years of pipeline operation. But this in itself does not mean that the project is a Bad Thing. First, such figures are expressed in inflated dollars several years in the future; the prices of alternate fuels, including imported gas from Mexico, will surely be higher than they are now (though how much higher is an important issue for the pipeline's financial viability).

Second, the initial price of Alaska gas delivered through the pipeline is not necessarily representative of the price that will prevail over the facility's entire economic life. Pipeline tariffs, like most utility rates, are calculated against a rate base that declines as the original investment is amortized, while larger gas shipments after the first years may also reduce the amount of the fixed capital charge that each unit of gas must bear. It is probable (though not inevitable), therefore, that the price of Alaska gas will go down over the years.

Thus, the price of Alaska gas in inflated dollars during the early years of pipeline operation is a relevant consideration in predicting the marketability of the gas and the project's commercial outlook. But

it is not the most meaningful measure against which to weigh the project's national benefits, nor an effective index of the amount U.S. consumers will have to pay in the long run.

There is no single correct method for judging either net costs and benefits to the nation or the business prospects of the pipeline venture. The following pages do, however, try to put the different measures of costs into perspective. The technical notes following this chapter contain some simple round-number projections for some of these notions [Technical Note No. 1]. The details of our assumptions and procedures may reasonably be debated, but we are confident of the major thrust of their results: The Alaska Highway gas pipeline almost certainly offers substantial net economic benefits to both the United States and the State of Alaska, but as a business venture, it is marginal at best without extraordinary kinds of government assistance.

National Benefits

The national case for the Alaska Highway pipeline is a strong one. It consists of the following generally valid arguments:

1. Measurable and predictable economic benefits. The measurable and predictable economic benefits of the project for the United States are strongly positive. Even with large cost overruns and steady real prices for imported oil, Alaska natural gas delivered in the Lower 48 states would almost certainly be worth more than its real resource cost --- the value of labor, materials, and capital inputs. With a total capital cost of \$14 billion 1979 dollars for field development, conditioning and pipeline facilities, and a gas volume of only 2.0 billion cubic feet per day (bcf/d), the average *real national economic cost* of Alaska natural gas delivered through the Alaska Highway system over a twenty year period would be about \$2.00 per thousand cubic feet (mcf) in 1979 dollars. The average cost of an equivalent volume of

imported low sulfur residual oil (No. 6 fuel oil) will probably be more than \$2.80 in 1979 alone [Technical Note No. 2]. Such figures imply that the minimum economic benefit to the nation is about \$550 million per year in 1979 constant dollars [Technical Notes Nos. 3 and 4]. A construction cost overrun of more than 100 percent on the Alaska segment of the pipeline would be necessary to wipe out the whole of this net benefit to the United States.

2. Measurable but speculative economic benefits. The existence or anticipation of a gas transportation system may be a powerful stimulus to petroleum exploration in the Arctic, and thus affect the amount of additional gas discovered. In the likely case that it carried more than 2.0 bcf/d, the total benefits of the project would be even greater than estimated in Technical Note No. 3. Increasing the average flow to 3.0 bcf/d and the economic life to 30 years (while holding all other assumptions the same) would reduce the cost of Alaska gas to about \$1.50 per mcf in 1979 dollars, for a minimum national economic benefit of about \$890 million per year [Technical Note No. 5]. If, as is likely, the price of imported oil rises more rapidly than domestic inflation, the benefits will also be magnified. With 2.0 bcf per day and a \$4.00 average cost for alternate fuels in 1979 dollars, the net national benefit would be about \$1.375 billion per year.

3. National security and international payments. Natural gas produced in the United States (or in Canada) will displace imported oil that is less secure and has a high foreign exchange cost. To the extent that Arctic gas supplies shrink world demand for OPEC oil, they will also help to restrain future price increases. Two bcf/d of Alaska gas can reduce the U.S. need for oil imports by about 350 thousand barrels per day (mb/d).

4. Environmental considerations. Environmental, safety, and social disruption problems from the Alaska Highway project are probably lower than from any other currently available source of similar amounts

of energy. It is certainly the least controversial source with respect to environmental impact. (Consider, for example, coal mining and conversion, nuclear power, and offshore drilling.)

5. Alternatives. Hypothetical alternatives to the proposed pipeline for moving or using Prudhoe Bay natural gas include transportation as methanol or by LNG icebreakers, and local petrochemical manufacturing. Moreover, the rejected El Paso Alaska or Arctic Gas proposals could conceivably be resurrected. None of these is likely to be technically, economically, or politically feasible in the near future, however. Thus, if the United States wants the potential benefits of Prudhoe Bay natural gas, an Alaska Highway pipeline is the only clearly visible means of making it available.

Consumer Costs and Consumer Prices

The *real national economic cost* of Alaska natural gas over the life of the pipeline will almost certainly be less than the cost of substitute fuel (No. 6 oil), but the *real consumer cost* of Alaska gas will not necessarily be less than that of the alternative. Because the project's viability depends upon the willingness of consumers to buy the gas, the expectation of net economic benefits therefore does not assure that the pipeline would be a sound business venture.

The *consumer cost* of gas includes, in addition to resource costs, substantial *transfer payments*, the most important of which are the excess of the field price over the *real resource cost* of gas production and conditioning, and certain state taxes [Technical Note No. 6].

The same conditions that would generate an average *real national economic cost* for Alaska gas of \$2.00 per mcf in 1979 dollars lead to an average *real consumer cost* of gas of about \$4.00 --- substantially greater than today's price for distillate (No. 2) fuel oil, not to mention residual (No. 6), which is probably the appropriate fuel to use

in assessing the value of supplemental gas [Technical Notes Nos. 7 and 8].

The profile of *current consumer prices* --- reflecting the front-end loaded capital charges that are typical in utility rate design --- suggests even greater marketing difficulties. With the same assumptions as in the two previous cost calculations but using *current prices* inflated at 8 percent rather than *constant dollar real prices*, and a conventional utility-type schedule of capital charges, we get a *current consumer price* of about \$8.00 per mcf in the first year of pipeline operation (1984) --- the equivalent of \$5.40 in 1979 constant dollars [Technical Note No. 9].

Inflation and Marketability

Measuring costs and benefits in constant dollars can conceal a very serious marketability risk. Today's capital costs reflect the capital market's beliefs about future inflation: Lenders now demand rates that offset inflationary erosion of the value of their principal, as well as compensate them for the use of their money. The high *current* or *nominal* prices projected for Alaska gas in the late 1980's reflect high interest rates (10 to 12 percent) and returns to equity (13 to 16 percent or more) engendered by the capital market's belief that prices will continue to rise at 7 to 10 percent per year.

The conviction that gas delivered through the Alaska Highway pipeline will be marketable rests on similar assumptions about future inflation: While \$8.00 per mcf in 1984 or 1985 would be a troublesome price under any assumption, the sponsors and DOE insist that Alaska gas will become competitive with substitute fuels within a vew few years because the pipeline tariff will fall while inflation is relentlessly raising the *current prices* of other sources of energy. Using *real* or *constant* dollar prices that assume an 8 percent inflation rate, DOE has

forecast that the "crossover point," when the price of substitute fuels overtakes the price of Alaska gas, could occur as early as 1987.*

But what would happen if the pipeline were financed at today's capital costs (assuring very high *nominal prices* for gas in the late 1980's), but inflation leveled out at 1 or 2 percent annually --- the rates that prevailed during most of the 1950's and 1960's --- rather than remaining around 8 percent? Using DOE's own assumptions except with respect to the rate of inflation, and assuming that prices rise at 8 percent in 1979, 7 percent in 1980, 6 percent in 1981 . . . until the inflation rate reaches and stabilizes at 2 percent, the crossover point would be postponed until 1993. If inflation were to stabilize at 1 percent per year, the crossover would not occur in this century. However unlikely it might seem, therefore, victory in the war against inflation would make the pipeline project a commercial disaster, despite the overwhelming evidence that it is a good gamble for the nation today in terms of *real or constant dollars*.

* "A comparison of the net national economic benefit and cost to the consumer of Alaska North Slope natural gas and supplemental gas supplies prices at the BTU equivalent of the world price of distillate" (January 1979). The DOE analysis was attached to John McMillian's February 9, 1979 letter to Governor Hammond with the following endorsement:

"For your information, I have enclosed a copy of an economic analysis of the project recently released by Secretary Schlesinger. The study clearly substantiates the long-term economic attractiveness of the project, even under the worst case assumptions." [Emphasis added].

Most of the crucial assumptions in the DOE paper appear in a reply to questions from Senator Kennedy in the February 26, 1979 Congressional Record (p. S1827-9). They are not worst case assumptions, and the analysis is badly flawed as a treatment of either national benefit or consumer cost: For example, it uses one inflation rate to estimate the cost of building the Alaska gasline, and a higher one to project prices for alternate fuels. And distillate fuel oil prices are used as the index of consumer benefit despite Secretary Schlesinger's own (correct) insistence, with respect to Mexican gas at least, that lower-priced residual oil is the proper measure of the value of supplemental gas. Nonetheless, the DOE projections illustrate well enough our point about inflation.

Commercial Viability

While Alaska gas is an excellent gamble to replace imported oil at a net savings to the nation, even under rather unfavorable assumptions, the prospects for Alaska gas supporting a sound commercial venture are not nearly as bright. Indeed, consumers with a choice of fuels would probably not buy Alaska gas today at its full cost. Faith that the pipeline project is viable therefore requires either (1) a firm conviction that both the nominal and real prices of substitute fuels will increase substantially, or (2) a firm conviction that consumer subsidies in the form of rolled-in and value of service pricing and front-end loaded tariff profiles could bridge any foreseeable gap that might occur between the delivered cost of Alaska gas and its market value.* There are, however, four important reasons why these conditions may not be satisfied:

First, while world oil prices will probably continue to rise, there are some very plausible circumstances in which *real prices* might remain relatively steady or even fall for a number of years despite the recent Iranian crisis.

Second, the ability of rolled-in pricing to subsidize high-priced supplemental gas depends wholly on the cushion of low-priced gas flowing under old contracts; this cushion will be largely depleted by the late 1980's.

Third, Congress and the President, through the Alaska Natural Gas Transportation Act (ANGTA) and the decision selecting the Alaska Highway system, have implicitly rejected some of the rate design mechanisms that might yet prove essential for assuring the marketability of Alaska gas.

* One of the earlier reports in this series, Marketing and Financing Supplemental Gas (1978), treats the marketing issue in detail and considers various tariff design remedies.

Finally, it is not sufficient to deal with gas marketability in general, as we have done here. Specific gas transmission companies must want to acquire the gas, and be convinced that they can track all of its costs through their distribution company customers to final consumers. Each system's willingness and ability to move the gas must be judged on the basis of its own customer mix; the size, term, and cost of its existing gas supply; and the policies of its state regulatory commissions. Most transmission companies now seem to be confident --- even complacent --- about selling all the Alaska gas (and any other supplements) they might obtain.

Our own analyses (*op cit.*) and those of others --- for example a proprietary study by Foster Associates (*Outlook for Energy Supply, Demand and Price and Its Impact on U.S. Interstate Gas Pipeline Companies*, February 1979) --- have suggested that the demand for high cost supplemental gas in 1985, 1990, and 1995 may be quite limited in the service areas of several of the major transmission companies. The most important lending institutions believe that there is a significant (if small) chance that the price of Alaska gas will exceed its market value and that this risk cannot be totally excised by currently contemplated tariff measures.

Is Commercial Viability Enough?

The previous pages have shown that a project that can be justified on the basis of predictable national economic benefits may not be a sound commercial venture. The same assumptions that generated an *average economic cost to the nation* of about \$2.00 per mcf for Alaska natural gas, suggested that its *average cost to consumers* would be about \$4.00, both in terms of constant 1979 dollars. The corresponding *first year price* in 1984 dollars would be about \$8.00 per mcf. One figure is considerably less, while the latter two are considerably greater,

than the 1979 cost of substitute fuel. The Alaska Highway pipeline project seems, therefore, to be worthwhile from a national standpoint, but questionable (or at best tricky) from the standpoint of consumers or private investors.

Just as the promise of national economic benefits does not guarantee commercial viability, so the promise of a profitable venture does not necessarily mean the project can be financed unassisted in private capital markets. A venture whose success rests on large future price increases, no matter how likely they may now seem, and on future actions by regulatory bodies, no matter how reasonable they appear today, bears a heavy load of ordinary commercial risk. The Alaska Highway project, however, is also subject to some extraordinary engineering, political and regulatory risks --- not to mention the financing difficulties imposed by the sheer size of its capital requirement.

The Need for Federal Participation

The foregoing analysis leads to several inescapable inferences:

(1) The Alaska Highway gas pipeline is almost certainly worth building from the standpoint of measurable economic benefits to the nation; the unmeasurable and speculative benefits of the project cement such a conclusion. This judgment alone warrants a federal commitment to the project's success.

(2) Alaska natural gas carried through the pipeline is probably a good buy for U. S. consumers when the project is viewed over its whole economic life. There are plausible scenarios in which the average consumer cost of Alaska gas could exceed the average cost to consumers of substitute fuels over the whole period. Nonetheless (and again, taking into account speculative additional benefits), the project appears to be a good gamble for consumers. Thus, it warrants some consumer risk-taking through tariff design.

(3) Alaska natural gas carried through the proposed pipeline is likely to have marketing difficulties at some time during the pipeline's economic life, even if the gas will be competitive with alternate fuels on the average. It is not totally clear whether the marketing risks are greater in the early years of service, when transportation tariffs are highest (particularly in constant dollars), or later when the volume of low-priced gas flowing under old contracts --- and hence the ability of rolled-in pricing to cushion high supplemental gas costs --- has been depleted. At any rate, this matter of timing may warrant the use of unorthodox tariff profiles that would allow Alaska gas to be "over-priced" and subsidized by means of rolled-in and value-of-service rate design in some years, and "underpriced" in others.

(4) The main risk-taker during pipeline operations will have to be U.S. consumers, on whose behalf federal and state regulatory commissions have gambled that the future will not, indeed, offer alternative fuels at cheaper prices. It will be an onerous task to design tariffs and other regulatory measures in a manner which will assure that consumer payments will cover the project's "cost of service" in each and every year of its life. Moreover, FERC, Congress and state utility commissions may be hard to convince that such measures are indeed appropriate. Even if suitable and effective rate profiles could be designed and implemented, the complexity of the project, its technical unknowns, and above all its size, may themselves thwart a successful financing.

(5) Other parties --- producers, Alaska, and transmission companies --- might agree to measures by which their benefits (such as wellhead prices, royalties and returns to equity) would be reduced under specified circumstances which would otherwise jeopardize gas marketability. One such approach might employ a formula for wellhead price reductions comparable to that proposed for the incentive rate of return to equity (IROR). Another approach might spell out the occasions in which the Federal Regulatory Commission (FERC) would (or would not) be authorized

to redetermine wellhead prices or the equity return; while a third might require the parties to establish a sinking fund out of their receipts, and define the conditions under which this fund could be tapped to meet debt service obligations.

(6) Likewise, it may be appropriate for some or all of the parties to bear a strictly limited portion of the non-completion risks.

(7) The project, nevertheless, will *certainly* call for the federal government to serve as the guarantor of last resort during the construction period, and, in addition, will *probably* also require the federal treasury to stand behind the project during the operations phase.

The foregoing seven points suggest that if the federal government wants the nation to reap the potential benefits of Alaska natural gas, it must participate in the project in some way. Politically, however, Congress will not approve direct federal participation or authorize additional burdens on consumers, unless the other parties take on some specified share of the project's risks. By the same token, none of the other parties is likely to choose to bear even a strictly defined portion of risks unless the federal presence both minimizes those risks and limits in advance the maximum exposure of each party.

Options for Federal and Consumer Participation

There are a number of potential approaches for consumer or federal participation (and risk-bearing) in the Alaska Highway project --- most of which would require FERC and/or Congressional approval.

(1) In order to reduce the risks that marketing problems will arise:

-- Congress has already directed "rolled-in" pricing of Alaska gas;

- FERC could authorize pre-construction surcharges or the inclusion in sponsor rate bases of "construction work in progress" (CWIP);
 - FERC could authorize unorthodox tariff *profiles* (the patterns by which fixed costs are allocated over the life of the project). If marketing risks were expected to be greatest in the project's early years, levelized or upward-tilting tariffs could be employed; if risks are greatest in later years, conventional straight-line depreciation or steep front-end loaded profiles might be in order;
 - FERC and state commissions might further implement "value of service" rate designs (based on each customer's willingness to pay);
 - Congress could expand tax preferences to equity and debt contributions such as reducing or exempting corporate equity earnings from federal income taxes, increasing the investment tax credit or granting tax-exempt status for industrial development bonds; or
 - Congress could provide capital subsidies in the form of direct federal appropriations which, through lower interest rates, would reduce the overall "cost of service."
- (2) In order to offset a revenue shortfall in the event marketing problems did arise:
- Congress could provide operating subsidies in the form of a federally guaranteed price --- that is, if for one reason or another the tariff fails to generate a specified number of dollars, the federal treasury would be obligated to make up the difference;
 - Congress could contribute capital directly to the project (preferred shares, for example), the return on and return of which could in some manner be subordinate to service on pipeline bonds.
- (3) In order to ensure project completion (or backstop sunk capital in the event of project abandonment):

- Congress might authorize federal guarantees for repayment of principal and interest of privately issued debt; this could be in the form of a strictly limited guarantee or in the form of an open-ended guarantee of last resort (triggered, of course, after other guarantors have exhausted their required contributions); or
- Congress might appropriate federal government capital for interim financing, turning over the debt to private lenders and other forms of guarantees after the pipeline has been successfully completed.

Construction by the Federal Government

The idea that the pipeline might be built by the federal government itself --- specifically by the Army Corps of Engineers --- deserves attention here. In arguing that the state should contribute equity to the project, Northwest's Chairman, John McMillian, has cast construction of the pipeline by the Corps as a disaster for Alaska, while some members of Congress view mobilization of the Corps as a way to reduce the costs and overcome some construction risks.

Management, engineering and construction by federal employees is not a real issue. The likelihood that the pipeline would be built in this way is just about zero.* Further, there is no reason to believe that direct federal construction would reduce costs or solve any of the other financing or marketing issues identified in this chapter --- except to the extent that artificially low interest rates and tax exemptions provided a hidden subsidy to the pipeline. National security benefits, incentives to additional gas exploration in the Arctic, and relations with Canada may indeed justify some kind of federal subsidy, but such a subsidy could be provided just as well (and possibly more efficiently) to a privately built and operated project as to one built and owned by the government.

* For political reasons and because even when the Corps does build a project, the actual work is done under contract by private firms.

The federal government could, however, own the pipeline assets during and only during the construction phase, taking responsibility for interim financing (with or without interest subsidies or tax exemption). It would thereby assume the pre-completion risks, and turn a completed facility over to private enterprise at a specified price. This approach would be neither an outlandish nor an unprecedented way to deal with pre-completion risks (many of which are political and regulatory risks created by the government itself). It does not necessarily entail construction by government employees or even management of construction by a government agency --- Northwest, for example, could manage and build the project under contract to the government. Such an arrangement should give Alaska no special reason to fear for its gas revenues, its regulatory authority, or its sovereignty.

Guarantees to the Pipeline in a Larger Perspective

Each of the options for federal participation admits a range of terms and conditions, including the seniority and allocation of potential losses among the parties, and the "fees" (if any) to be charged for federal involvement. Some forms of guarantees or subsidies are clearly more cost-effective than others. For example, Treasury officials and most specialists in public finance consider tax exempt bonds (such as those Northwest has proposed for Alaska to issue) as a particularly inefficient form of subsidy: Treasury claims it loses several dollars in taxes for every dollar the borrower saves in interest costs.

The appropriate kind and amount of federal and consumer risk-bearing will depend on the kind and amount of risks borne by all the other parties. We do not intend here to propose such a package; it is the proper subject for an extended and complex process of negotiations among the producers, gas transmission companies (as shippers and sponsors), Alaska, Canada, and various components of the federal government and Congress.

Whatever the merits of Federal participation may be, the matter of project scale imposes substantial problems of its own. Construction of the Alaska Highway gas pipeline will require capital in the range of \$10 to \$20 billion. Even if U.S. contributions or guarantees amount to only half of the total, that still would be an unprecedented outlay for a single private venture.

By contrast, in 1978 Congress authorized federal loan guarantees (after considerable debate) for synthetic gas plant construction --- but only up to \$50 million per project. Guarantees exceeding this figure still require full Congressional approval. A \$250 million guarantee for Lockheed corporation was approved in 1971, but it was the focus of a heated nationwide debate. New York City barely managed to squeeze a \$1.6 billion guarantee out of the U.S. Treasury.

Further, Congress has evidenced a growing concern about the cumulative impacts of such guarantees. It was recently estimated that 163 different programs issue federal guarantees, and that outstanding obligations as of fiscal year 1979 total about \$370 billion.* This compares to the entire U.S. budget for fiscal year 1979 of \$493 billion, and a national debt of about \$840 billion.

* John Mitrisin, Loan Guarantee Legislation Enacted into Law in the 95th Congress through P.L. 95-268, Congressional Research Service, Washington, D.C.: July 14, 1978, p. CRS-4.

TECHNICAL NOTES

TECHNICAL NOTE NO. 1

There are at least five distinct concepts of Alaska natural gas "costs", namely:

- a. real resource cost,
- b. real national economic cost,
- c. real consumer cost,
- d. current consumer price, and
- e. apparent consumer price.

Each of these cost concepts can be coupled with an appropriate measure of the value of Alaska natural gas in order to yield a positive or negative net benefit.

Real resource cost is the average value of the economic resources that are needed to make a unit of gas available for consumption. These economic resources include the services of land, labor and capital, and purchased materials. The value attributed to each component is the price it could command elsewhere in the economy. The value of capital includes corporate income taxes, because the price of capital to the Alaska project is reckoned by the before-tax earnings required to bid the same level of capital away from other uses. *Resource cost* does not, however, include any allowance for the "intrinsic value" of the gas, because in the absence of a transportation system it has no value. Nor does *resource cost* include most taxes outside of corporate income taxes, because taxes do not represent the consumption of economic resources, but only "transfers" from consumers to governments. By *real* cost we refer to a figure adjusted for inflation --- that is, reckoned in constant dollars of a particular year. This cost is measured on an average over the whole economic life of the fixed capital.

Real national economic cost differs from *real resource cost* in that the former includes transfer payments to governments or citizens of other countries, on the principle that Americans have to export an equivalent value of domestic economic resources in order to earn enough foreign exchange to pay the foreign charges in question. Hence, *real national economic cost* is the concept of cost we use in Technical Note No. 4 to estimate the measurable and predictable national economic benefits of Alaska gas. Property taxes paid in Canada are counted here as costs to the United States, while property taxes paid within the United States are regarded only as transfers among U.S. citizens --- and therefore do not reduce the benefit calculations.

Real consumer costs include all payments that go into the consumer price, whether they represent the cost of economic resources or are simply transfer payments. In the case of Alaska gas, *consumer costs* include the entire wellhead price (as opposed to the *real resource cost* and *national economic cost* figures which include only that part of the wellhead price which covers the value of additional economic resources actually used in developing the field and producing the gas.) In this particular case of an associated oil and gas field, *real resource cost* and *national economic cost* include only those resources which would not have been required for production of oil and reinjection of gas if there were no gas pipeline. The *consumer cost* also includes state production (severance) taxes, ad valorem property taxes, and corporate income taxes. The *real consumer cost* for Alaska gas is calculated in Technical Note No. 7. Like *real resource costs* and *real national economic costs*, *real consumer costs* are reckoned in constant dollars, averaged over the economic life of the investment.

Current consumer prices refer to the average additional cost consumers as a group will have to pay to obtain Alaska natural gas in a particular year. The figures are "current" because they are expressed in the dollars of the year in question, and they also reflect rate "profiles"

(the way transportation tariffs and other charges are spread over time.) In the case of Alaska gas, *current consumer prices* will include very high charges for depreciation and return to capital (including corporate income taxes) in the early years and much lower figures in later years --- unless FERC institutes a tariff profile significantly different from the standard "straight-line depreciation". *Current consumer prices* will also include wellhead prices and operating costs which can be expected to rise through time roughly at the rate of general inflation. As a result, the *current consumer price* can be expected to fall over the life of the project (at least in *real* terms). *Current consumer price* is the concept we use in Technical Note No. 9 to estimate the first year charges for Alaska gas.

Apparent consumer price is the price for gas actually faced by the individual consumer. With respect to Alaska gas, the *apparent consumer price* is the price charged consumers after Alaska gas has been rolled-in with gas from other sources. If 10 percent of a consumer's gas comes from Alaska, and has a price of, say, \$5.00 per mcf, while the remaining 90 percent has an average price of \$2.00, Alaska gas would have an *apparent consumer price* of only \$2.30. That consumer would probably be willing to burn \$5.00 Alaska gas even if the cost of substitute fuels were only \$3.00, because its apparent price is the weighted average of all gas prices rolled together. It is the *apparent consumer price* after rolling-in that determines whether or not Alaska gas will be marketable.

TECHNICAL NOTE NO. 2

Gas flowing in the pipeline is assumed to contain 1070 british thermal units (btu) per cubic foot.

TECHNICAL NOTE NO. 3

A delivery of 2.0 bcf per day into the pipeline is assumed to result in a delivery of 1.88 bcf per day out of the pipeline and into the Lower 48 delivery system. This constitutes a fuel efficiency of 94 percent.

TECHNICAL NOTE NO. 4

Total gas deliveries throughout the operational life of the pipeline are, therefore, assumed to be a minimum of 13.7 tcf.

The minimum economic benefit to the nation is based on a conservative assumption that the price of fuel oil will remain at \$2.80 in 1979 constant dollars over the life of the gas pipeline.

The average *real national economic cost* in 1979 dollars is estimated in round figures in Table T-1.

TECHNICAL NOTE NO. 5

Fixed capital costs are assumed to increase in proportion to the .6 power of average throughput --- that is, a 1 percent increase in throughput requires a .6 percent increase in fixed costs and results in a .4 percent reduction in average fixed costs per mcf, while a doubling of throughput requires a 52 percent increase in fixed costs ($2^{.6} = 1.52$), and results in a 24 percent reduction in average fixed costs. Operating costs per mcf are assumed to remain constant.

TECHNICAL NOTE NO. 6

As Technical Note No. 1 pointed out, U.S. and Canadian taxes on corporate income are correctly counted as part of the *resource cost of capital*, but severance taxes, property taxes, and state corporate income taxes are regarded as transfer payments --- all of which are included in the *consumer cost* of gas. Gas royalties are not counted separately, as they are simply one-eighth of the wellhead price.

TECHNICAL NOTE NO. 7

The average *real consumer cost* of Alaska gas in 1979 dollars is estimated in round figures in Table T-2.

TECHNICAL NOTE NO. 8

In this respect only, we agree with Secretary Schlesinger for rejecting the proposed Mexican gas import contracts. Whoever ultimately pays for it, supplemental gas --- be it Alaskan, Mexican, Algerian, or synthetic --- will not in the near future have the function of serving "high priority" gas markets, where the substitute fuels are distillate (no. 2) oil or electricity. Additional supplies of gas from abroad or from the Arctic will permit the United States to continue burning natural gas as an electric utility and industrial boiler fuel, where it displaces mainly residual (no. 6) oil or coal.

TECHNICAL NOTE NO. 9

The first year *current consumer price* for Alaska gas in inflated dollars (at an 8 percent annual increase in the general price level) is estimated in round figures in Table T-3.

TABLE T-1 REAL NATIONAL ECONOMIC COST OF ALASKA GAS OVER 20 YEARS

	CAPITAL COSTS ^a			NATIONAL ECONOMIC COST OF ALASKA GAS			
	(billions of 1979 US dollars)			(1979 dollars per mcf)			
	Construction Outlay	AFUDC ^b	Total Fixed Cost	Fixed Cost ^c	Operating Cost ^d	Canada Taxes ^e	Total Economic Cost
Field development	\$ 1.50	\$.35	\$ 1.85	\$.253	\$.015		\$.268
Gas conditioning	1.50	.35	1.85	.253	.015		.268
Alaska pipeline	3.00	.69	3.69	.506	.030		.536
Canada pipeline	4.50	1.04	5.54	.633 ^f	.038	\$.134	.805
Lower 48 pipelines	1.00	.23	1.23	.118 ^g	.007		.125
TOTAL	\$11.50	\$2.66	\$14.16	\$1.763	\$0.105	\$0.134	\$2.002

a Capital costs of \$11.5 billion in 1979 U.S. dollars are assumed to be spent in equal annual outlays between 1979 and 1983; deliveries commence 1984.

b Allowance for funds used during construction computed at a 7 percent *real* (inflation-adjusted) rate of return to combined debt and equity.

c Levelized fixed charge including both depreciation and a 7 percent rate of return to total capital over 20 years, divided by 1.88 bc/d delivered to the Lower 48 (corresponding to 2.0 bcf/d into the pipeline at an average fuel shrinkage of 6 percent.)

d 6 percent of fixed costs.

e 2 percent annually on fixed capital in Canada.

f One-sixth of the costs on the Canadian pipeline segment are covered by shipment of Canadian gas.

g 30 percent of the costs on the Eastern and Western legs are covered by shipment of Canadian gas.

TABLE T-2 REAL CONSUMER COST OF ALASKA GAS OVER 20 YEARS

	CAPITAL COSTS ^a			REAL CONSUMER COST OF ALASKA GAS					
	(billions of 1979 US dollars)			(1979 US dollars per mcf)					
	Construction Outlay	AFUDC ^b	Total Fixed Cost	Fixed Cost ^c	Operating Cost ^d	Other Costs	Property Taxes ^e	State Income Taxes ^f	Total Consumer Cost
Wellhead price						\$1.750 ^g			\$1.750
Severance tax ^h						.161			.161
Gas conditioning	\$ 1.50	\$.35	\$ 1.85	\$.253	\$.015	(.300) ⁱ	\$.054	\$.017	.039
Pipeline fuel ^j					.129				.129
Alaska pipeline	3.00	.69	3.69	.506	.030		.107	.035	.678
Canadian pipeline	4.50	1.04	5.54	.633 ^k	.038		.134		.805
Lower 48 pipelines	1.00	.23	1.23	.418 ^l	.007		.024		.449
TOTAL	\$10.00	\$2.31	\$12.31	\$1.810	\$0.219	\$1.611	\$0.319	\$0.052	\$4.011

A - 22

a Capital costs of \$10 billion in 1979 U.S. dollars are assumed to be spent in equal annual outlays between 1979 and 1983; deliveries commence 1984.

b Allowance for funds used during construction computed at 7 percent *real* (inflation-adjusted) rate of return to combined debt and equity.

c Levelized fixed charge including both depreciation and a 7 percent *real* rate of return to total capital over 20 years, divided by 1.88 bcf/d delivered to the Lower 48 (corresponding to 2.0 bcf/d into the pipeline at an average fuel shrinkage of 6 percent).

d 6 percent of fixed costs.

Notes to Table T-2 (continued)

- e. 2 percent annually on fixed capital.
- f. 7 percent annually on fixed capital.
- g. \$1.45 per mmbtu in March 1977, escalated to mid-1979 and adjusted for 1.07 mbtu per cubic foot.
- h. 10.5 percent on 7/8 (the non-royalty portion) of total well-head value.
- i. Producers are assumed to bear 30 (1979) cents per mcf conditioning costs, as proposed by two of the companies.
- j. Wellhead price and severance tax on 6 percent gas shrinkage.
- k. 1/6 of the costs on the Canadian pipeline segment are covered by shipment of Canadian gas.
- l. 30 percent of the costs on the Eastern and Western legs are covered by shipment of Canadian gas.

TABLE T-3 CURRENT CONSUMER PRICE OF ALASKA GAS, 1984^a

	CAPITAL COSTS			CURRENT CONSUMER PRICE OF ALASKA GAS, 1984							
	Construction 1979 \$ ^b	Outlay Escalated \$ ^a	AFUDC ^c	Total Fixed Cost	Depreci- ation ^d	Return to Capital ^e	Operating Cost ^f	Property Taxes ^g	Income Taxes ^h	Other	Total Consumer Price
Wellhead price ⁱ										\$2.571	\$2.571
Severance tax ^j										.237	.237
Gas conditioning	\$ 1.50	\$ 1.92	\$.79	\$ 2.71	\$.400		\$.024	\$.092	\$.042	(.441) ^k	.117
Pipeline fuel ^l							.190				.190
Alaska pipeline	3.00	3.84	1.58	5.42	\$.365	\$1.217	.047	.185	.085		1.899
Canadian pipeline	4.50	5.76	2.36	8.12	.493 ^m	1.526	.060	.232			2.311
Lower 48 pipelines	1.00	1.28	.53	1.81	.131 ⁿ	.408	.016	.043	.028		.627
TOTAL	\$10.00	\$12.80	\$5.26	\$18.00	\$4.450		\$0.337	\$0.552	\$0.155	\$2.557	\$7.952

A - 24

a Rate of general inflation and construction cost inflation, 8 percent between 1979 and 1984.

b Capital costs of \$10 billion in 1979 U.S. dollars are assumed to be spent in equal annual outlays between 1979 and 1983; deliveries commence 1984.

c Allowance for funds used during construction and return to capital computed at a 15.5 rate of return to combined debt and equity, equivalent to 25 percent equity at a 32 percent pre-tax return, and 75 percent debt at 10 percent interest.

d Straight-line depreciation, 20 years.

e See note (c)

f 6 percent of fixed cost per mcf.

Notes to Table T-3 (continued)

- g. 2 percent annually on fixed capital.
- h. 7 percent annually on fixed capital.
- i. \$1.45 per mmbtu in March 1977, assumed to escalate to \$1.75 by mid-1979, thereafter proportionally to 8 percent general inflation, adjusted to 1.07 mbtu per cubic foot.
- j. 10.5 percent on 7/8 (the non-royalty portion) of total wellhead value.
- k. Producers are assumed to bear 30 (1979) cents per mcf conditioning costs, as proposed by two of the companies; fixed costs for gas conditioning are levelized.
- l. Wellhead price and severance tax on 6 percent gas shrinkage.
- m. 1/6 of the costs on the Canadian pipeline segment are covered by shipment of Canadian gas.
- n. 30 percent of the costs on the Eastern and Western legs are covered by shipment of Canadian gas.

THE STATE OF ALASKA'S INTERESTS AND OPTIONS

Project Benefits

The State of Alaska clearly stands to be the biggest single fiscal beneficiary from production of Prudhoe Bay gas. The following are the main elements of Alaska's economic interest:

1. Measurable and predictable revenue benefits. If Prudhoe Bay gas sells at its legal ceiling price (\$1.45 in March 1977 dollars --- about \$1.75 in 1979), the State of Alaska could expect to receive royalties and production taxes of about \$.355 per thousand cubic feet (mcf) in 1979 dollars. The state also levies a 20 mill tax on oil and gas pipeline property, and a 9.4 percent corporate income tax. With marketed gas production of 2.0 bcf/d, the state's total revenues from these sources would be on the order of \$340 million per year in 1979 dollars.* Increases in the need for state services directly due to the pipeline or gas sales would be minor in comparison.

2. Measurable but speculative revenue benefits. Additional gas carried by the pipeline beyond the 2.0 bcf/d minimum projected for the Prudhoe Bay field would increase net state revenues almost proportionally. 3.0 bcf/d would produce expected state revenues of about \$460 million per year, with very little offsetting increase in the demand for state services. The existence of a transportation system for Arctic gas might also stimulate industry interest in exploration, thereby increasing state oil and gas leasing bonuses and rentals.

3. Direct employment effects. Field development and construction of the pipeline and conditioning plant would require 50-60,000 man years of direct labor in Alaska over a four-year period. Several hundred permanent jobs in administration, operation and maintenance of the field, plant and pipeline would remain.

* See Technical Note No. 7, p. A-19 for derivation of these figures.

4. Multiplier and induced economic effects. The spending of construction payrolls and state revenues will reverberate throughout the Alaska economy, creating further jobs, additional state receipts, and increases in gross state product and personal income. However, increased income and employment opportunities will encourage net in-migration to Alaska, further swelling the labor force and population. Values will rise for assets such as urban land and housing whose supply is fixed or relatively inelastic, thus increasing the real wealth of many present Alaska residents.

5. Energy for Alaska households and industry. A transportation system for moving Alaska gas to the Lower 48 may also make natural gas (and perhaps natural gas liquids) available for residential, commercial, industrial and electric utility use in Fairbanks and elsewhere in interior Alaska.

6. Environmental considerations. Expected and potential environmental, safety and social disruption problems from the project are probably lower than for any other foreseeable source of comparable state revenue or personal income. (Consider, for example, coal or metallic mining, timber, or even tourism.)

7. Alternatives. Exactly the same point can be made about other uses of Prudhoe Bay gas for the state as for the nation: plausible alternatives do exist, but none of them seems likely enough to merit active pursuit.

Not all the foregoing effects on Alaska's economy are wholly predictable, nor are they necessarily unmixed blessings. The net revenues from gas sales may well prove to be much less than the state now anticipates because the price for Alaska gas established by the Natural Gas Policy Act of 1978 is only a ceiling above which private sales negotiations and regulatory interference may not penetrate.

Pipeline construction would repeat the inflation and social turmoil of the TAPS oil line boom, albeit on a somewhat smaller scale. Con-

struction jobs will not necessarily mitigate Alaska unemployment even in the short term, and may indeed worsen it. The permanent increase in labor force and population, moreover, would have a mixed (and contro-³versial) effect on the Alaska environment, and the style and quality of life in the state. Not every Alaskan agrees that increased leasing, exploration and development in the Arctic is desirable at this time. Finally, some Alaskans do not regard industrial development based on natural gas or gas liquids as necessarily a Good Thing, while others would be willing to give up or postpone the predictable revenue benefits from the Alaska Highway project in the hope that an alternative system more favorable toward Alaska processing operations will eventually turn up.

Another concern that nags many Alaskans --- whether they are environmentalists or developers --- is that cashing out the state's gas reserves now will only intensify the hard landing expected in the late 1980's and early 1990's when Prudhoe Bay oil income will fall off sharply. Not only are they convinced that early budget surpluses would encourage the legislature to piddle away what really should be saved, but they also fear that expanded subsidy and transfer programs, a bloated state bureaucracy, and the need to service lavish public works projects would make it even harder to budget realistically for a smaller income.*

Notwithstanding all these reservations, there is one outstanding feature that the indirect, speculative, or debatable Alaska "benefits" of the pipeline project (other than the construction boom) have in common: state government can in principle control or at least influence them powerfully through mineral leasing, taxation and environmental policy, and by controlling the amount and kind of government spending.

* See the Appendix chapter "Consequences of Delay" for further discussion of this issue.

The measurable and predictable revenue benefits may be spent currently, used deliberately and consciously to stimulate further economic growth (perhaps as subsidies to industries as diverse as bottomfishing and chemical manufacturing), or invested outside of Alaska to meet future budget needs.

According to conventional ways of thinking, therefore, the prospective royalty and tax revenues would be real benefits to Alaska's economy, which the state might spend currently or invest for future needs at its own discretion. Nevertheless, how much it is worth to the State of Alaska to support this project and this project now is by no means clear, especially if completion of the pipeline is conditioned upon some sacrifice of expected benefits or, worse yet, assumption by the state of significant financial risks.

Considerations for State Financial Participation

In the spring of 1978, Northwest Alaskan Pipeline Company (Northwest), the chief sponsor of the Alaska segment of the pipeline, proposed that the state issue \$1 billion in tax-exempt industrial revenue bonds,* and \$500 million in convertible debentures (that is, bonds convertible to preferred equity after construction is completed).

In his February 9, 1979 letter to Governor Jay Hammond, Northwest's Chairman John McMillian set a tone of urgency (interpreted by many Alaskans as an ultimatum) with respect to state action on the equity request:

Last year we informed you that it was important, but not critical that the State provide financial support to the Alaska Highway Gas Project. Today, the financial advisors of the project inform me that such support by the State is not only a prerequisite to private financing, but must be obtained during the current session of the Alaskan legislature ... Financial commitments from the State of Alaska must be made in 1979, and must take the form of a definite commitment that Alaskan funds will be available unconditionally, subject only to completing the remainder of the financial plan and obtaining final FERC approval ... If we do not obtain State financial support and the project therefore is not privately financed, resulting in the need for Federal guarantees, we perceive consequences which are not in the best interests of either the State of Alaska, the project sponsors or the American consumer.

* While the idea was originally offered in 1978 as a proposal for state issuance of revenue bonds (on which the state's "full faith and credit" is not pledged), it is unclear whether Northwest now expects the state to consider issuing general obligation bonds (on which the state's credit is pledged) for a portion of the project's debt if attempts to secure Congressional approval for tax-exempt status of this project fail. Northwest has proposed that the state use general obligation bonds to finance purchase of equity in the pipeline.

Though not as succinctly stated, the State of Alaska's response has been likewise clear: Unconditional commitment of state funds is out of the question at the present time. Nevertheless, the day may come when it is both necessary and appropriate for the state to reach a decision on the form and level of financial participation (if any) it wishes to take. In the meantime, it is timely for Alaskans to begin thinking (at least in general terms) about this question. A discussion of a few general principles may be of value here:

(1) The state, like all other parties who hope to secure benefits from this project, will have to walk a fine line during financial negotiations --- neither prematurely agreeing to sacrifice certain benefits or to take what would otherwise prove to be unnecessary or unreasonable risks, nor holding out for a totally unrealistic package. Viewing the tariff question in isolation, for example, the state should recognize that while it may wish to pursue adoption of a zone tariff* for offtake of gas in Alaska, there may exist a compromise palatable to both the state and Lower 48 customers. Between the extreme of an open-ended zone tariff and the extreme of a strict volumetric tariff, lies the possibility of a limited zone tariff --- limited to, say, offtake of gas in Alaska for residential or commercial uses only. While such a compromise might undermine hopes --- probably unrealistic in any case --- for a petrochemical industry in Interior Alaska, by the same token it would at least allow Interior residents to benefit from a clean and competitive fuel supply. At the same time, it would impose barely noticeable burdens on downstream consumers. With respect to the tariff and other issues, therefore, the state will have to exhibit an extraordinary degree of finesse in balancing the need to be strong yet reasonable throughout the bargaining process.

* See pp. 90-92 of the authors' Introduction to the Gas Industry, (1978) for a discussion of zone and strict volumetric tariffs.

(2) An array of financial options exists from which the state can choose, including the option to participate in specific segments of the Alaska Highway system and maybe even an option to finance the state's own "undivided interest" in the pipeline.* Further, capital itself can be contributed in a variety of ways:

- contribution of debt capital of various seniorities and interest rates, purchased through issuance of revenue bonds as proposed by Northwest (if Congress can be persuaded to grant special tax-exempt status to this project), general obligation bonds, or out of general revenues;
- guarantees of a portion of the project's debt;
- purchase of convertible debentures, interest-bearing securities that are exchangeable at a later date for some form of equity;
- participation through preferred shares; or
- purchase of common equity.

Each of the above forms of financial involvement offers a different combination of risks and benefits that include:

- Security considerations. Who gets paid first if project revenues fall short of requirements? And in the event of owner default on payments, what "recourse" is legally available for recovering those funds, and from whom?
- Economic considerations. What is the rate of interest on bonds or return on equity? Is that interest or return legally assured? What are the tax consequences for the project, and can the state benefit from tax preferences obtained by private parties?

* While to our knowledge no gas pipeline has ever been financed and operated on an "undivided interest" basis, the Trans-Alaska oil Pipeline provides such an example: each equity owner arranges separately for the debt on its respective share of the total project, keeps its own books, files its own tariff not necessarily identical with the tariffs of other owners, and enters into separate service agreements with shippers as if the TAPS line were several distinct pipelines.

-- Credit considerations. How would involvement affect the ability of the state and its municipalities to sell bonds for other purposes, and the rates they would have to pay?

-- Control considerations. How much voice (if any) would the state have in management decisions?

(3) The state might wish to distinguish between sacrificing or risking a dollar of future benefits, and investing a dollar of its present or borrowed capital. The "present value" concept of money, of course, supports this distinction; but there is another reason. By way of example, if the state contributes a dollar to project construction, it runs the risk (if the project fails) of being a dollar worse off than it is today. If, on the other hand, the state agrees to put one dollar of expected gas royalty revenues at stake, even under the grimmest circumstances it would be no worse off than it is today.* The same would be the case if the state pledged future gas royalties as a guarantee of one dollar's worth of project debt.

Put simply, risking a reduction in future benefits that are directly contingent on the project is a lot less worrisome than risking a net loss of existing wealth (such as cash reserves or future oil royalties) that do not depend on construction of the pipeline. Along this line, the state might wish to broaden its own and others' discussions of options for state financial involvement to include (and maybe even focus on) ways Alaska can assist the project's financing via adjustments in its share of derived benefits.

(4) The state might consider establishing a clear distinction in policy and negotiations between those revenues and assets which are a function of its sovereign power and responsibilities, and those which flow from its proprietary interest in the gas. Taxes (whether gas severance taxes, ad valorem taxes on pipeline property, or corporate income taxes) are properly regarded either as offsets to the

* Again, the authors wish to stress that there is no intrinsic value to Prudhoe Bay gas. It is worth only what somebody is willing to pay for it --- and nobody wants it unless they see some way to get it to market.

incremental burdens imposed on the state by the production and transportation of gas, or as part of the petroleum sector's proportionate share of the costs of general government. As such, these taxes should not be put at risk or negotiated downward in order to bolster a marginal pipeline project. The fact that the legislature cannot in fact contractually bind its successors with respect to tax rates also argues for exempting these revenues from negotiation.

Royalties, on the other hand, flow from the state's proprietary interest in the gas, and have no value unless there is in fact a transportation system. If the sum of the maximum legal wellhead price and the cost of gas conditioning and transportation should make the pipeline uneconomic, the state (along with the producers) should be willing at least to consider accepting a lower price for its royalty gas or absorbing some portion of the gas conditioning costs. The state should also be willing to discuss pledging its gas royalty income as backing for the project, if doing so would assist its financing.

Technical questions, such as pipeline pressure, treatment of gas liquids, intrastate tariff terms, and the like, are also legitimate concerns of the state mainly because of its proprietary interest in gas production, and are therefore appropriate matters for negotiation.

On page 26 of the main body of this report, the authors raised the concept of placing some fixed portion of state (and producer) wellhead revenues at risk through creation of a sinking fund, designed to take on some portion of operating risks --- most appropriately, those risks associated with field and production problems. (Some Alaskans might, incidentally, view a pledging of these monies to such a reserve as beneficial, in that the reserve could be considered an investment fund legally insulated from political pressures to spend it currently or to "invest" it in speculative ventures.)

(5) One of the most important considerations with respect to state financial involvement in this project relates to portfolio management. Yet virtually nobody outside of Alaska seems to recognize the restriction wise portfolio management may place on any state participation in pipeline financing.

The state's income depends overwhelmingly on Prudhoe Bay oil royalties and taxes, while its local governments and the private economy are underpinned by the same revenue flows. If Alaska were to commit general fund or permanent fund capital, future oil revenues, or the general faith and credit of the state to any venture intimately connected with the Prudhoe Bay field, any one of a number of plausible events might turn what would otherwise be a fiscal difficulty into a disaster.

For example, if unforeseen production problems limited oil or gas production from the field, if an explosion closed the Valdez terminal (and hence interrupted gas as well as oil shipments), or if world energy prices collapsed, Alaska's current revenues would be sharply reduced. If, in addition, Alaska had invested its accumulated cash reserves in gas pipeline equity, a cushion it would otherwise have against just such a contingency would be unavailable. And if the state had borrowed to buy pipeline equity (as proposed by Northwest), or guaranteed pipeline debt (as proposed by Treasury and DOE), creditors would descend on the state's remaining cash reserves (if any) and its already diminished revenues, in order to cover debt service on a distressed pipeline.

A more obvious feature inhibiting state commitment of funds to the project is the sheer magnitude of the required capital outlay. Operating on an annual budget of around \$1 billion, Alaskan leaders would be hard pressed indeed to justify committing the state to a substantial part of a \$10 to \$20 billion pipeline financing.

(6) An important issue regarding state financial participation is whether certain forms of capital contribution would create a confrontation between the state's independent regulatory commissions and the state's treasury; or alternately, lead to a corruption of the regulators' judgment by the state's financial interest. For example, what if the Oil & Gas Conservation Board votes to restrict gas production at some future date in a manner which happens to impinge adversely on state revenues or, worse yet, triggers a call on state financial guarantees? While the importance of this potential for conflict is largely a matter of personal philosophy, several points are worth mentioning:

-- Whether or not the state puts any money into the pipeline, it nevertheless will have a very large financial stake in the flow of gas (and thereby gas royalty and tax revenues). Granted, adverse economic effects or the consequences of certain regulatory actions may be heightened by direct financial involvement, but the fact of conflict is inescapable. Already Alaska, through its economic enterprise, renewable resources, and (possibly) permanent fund loan programs, is committed to channel dollars into industries that it also regulates.

-- Some might argue that it would actually be desirable if the state is put in a position where its own budget enjoys or suffers the consequences of its regulatory actions. That argument is based on a philosophy that law is, after all, designed to be rational; and that the U.S. legal system might better serve the country if more emphasis were placed on the total consequences of regulatory actions rather than on the precise letter of the law. By way of example, the Oil & Gas Conservation Board cannot possibly make decisions strictly on a "physical waste" basis --- whether or not it is so mandated. It is not reasonable to force the producers to invest, say, a million more dollars in order to recover only one more barrel of oil. If the state were in some way a "partner" of

the producers --- or, in this case, pipeline owners --- and shared in their economic fortunes, one could argue that the state's decisions might tend to become more socially rational.

-- Northwest spokesmen have suggested that the conflict between the state's proprietary and regulatory roles would be less if state participation were in the form of preferred rather than common equity. We frankly do not see the difference: The question is not whether one votes on a corporate board, but whether one has a pecuniary interest in regulatory decisions. Why, indeed, if the state is being asked to put up half of the paid-in equity for the Alaska section (and as much as 83 percent if the investment tax credit is considered as a source of cash for the project) should not the state have a proportionate voice in governing the project? The common objection --- that state government should not get involved in profit-making enterprise --- is almost as applicable to preferred shareholding as to voting equity.

(7) The state must, however, be alert that the degree and form of its financial (or other) participation in a private venture does not in itself enable a commercially unsound enterprise to generate private funds. Likewise, it must ensure that its participation will not reduce incentives for efficient and responsible business management.

(8) Finally, the "appropriate" level of state financial risk-bearing can be judged only in relation to its expected benefits. Obviously then, it would be irresponsible for the state to commit to a certain financial position before all the benefits and risks are apportioned among the involved parties. But even then, state policy-makers cannot weigh the merits of state financial participation until they have decided what those "benefits" really mean.

PRODUCER INTERESTS AND PERCEPTIONS

Misjudgment of the gas producers' motives and interests is probably the most pernicious single impediment to realism about gas pipeline financing. The prevailing opinion in the gas transmission industry, Wall Street, and the federal government is that Prudhoe Bay oil production will have to be seriously cut back within a few years if the dissolved and associated gas is not produced and sold. The great majority of the parties interviewed by the authors in connection with this study (with the conspicuous exception of oil company officials and petroleum engineers generally) are convinced that extended reinjection of gas will damage the reservoir and drastically reduce ultimate recovery of oil.

This dogma underlies an almost universal confidence that the North Slope gas owners --- particularly Exxon and the State of Alaska --- will sooner or later be forced to make a large financial commitment to the project, perhaps by guaranteeing pipeline debt. Almost no one outside of Northwest Alaskan Pipeline Company (Northwest) and a few top officials of the U.S. Department of Energy (DOE) believes that this supposed incentive removes the need for the federal government to serve as guarantor of last resort. But the notion that delay or project abandonment would cause Exxon, Arco, Sohio, and the State of Alaska to lose not only the revenues they hope to get from gas sales, but oil revenues they now enjoy, allows some of the major transmission companies to expect they can obtain North Slope gas without risking corporate equity, and others to hope for a high rate of return on invested capital without accepting any responsibility for project debt. Further, these companies seem to expect the producers and the state to do "whatever is necessary" to get the project going --- whether it be financial participation; spurring amendment of the Natural Gas Act, the Alaska Natural

Gas Transportation Act (ANGTA) or the Natural Gas Policy Act (NGPA); or overthrowing Northwest as project leader.

No factual basis exists for this line of reasoning, or for the attitudes that flow from it. Nowhere in the public records of FERC and its predecessor, or the Alaska Oil and Gas Conservation Commission, is there any suggestion by producers or state officials that prolonged gas reinjection would reduce oil recovery. No petroleum engineer in industry or government expressed such a fear.*

In truth, the concern is just the opposite: How much oil might be lost if gas is produced and sold? How much investment in water flood might prove necessary to offset the drop in reservoir pressures? And how much earlier would that investment be needed as a result of gas production? Hence, whatever concern might exist about the interactions of oil and gas production at Prudhoe Bay, it calls for caution rather than urgency with respect to gas production and sales.

The producing companies have a common interest in selling their gas as soon as possible, for the highest price, and with the least additional investment or risk. But the threshold combination of timing, price, capital outlay, and risk that would prompt a given kind of financial support by the producers is not at all obvious; and it will have to be examined in light of the individual (and often dramatically different) interests and perceptions of Exxon, Arco, and Sohio.

* Inability to sell the gas might conceivably lead to some stretch-out of oil production: "As Prudhoe Bay oil is extracted, increasingly large quantities of gas are produced in association with the oil. Assuming no relaxation of the prohibition on flaring, this gas must be reinjected into the reservoir. If associated gas produced in conjunction with oil exceeds the capacity of gas handling facilities (compressors and the like), the producers may decide to reduce oil production rather than add to those facilities." (Gregg K. Erickson, et al, memorandum to the Honorable Bill Miles, "Analysis of Assertions in Northwest Alaskan Pipeline Company's Letter of February 9 to Governor Hammond," Juneau: Legislative Affairs Agency, February 14, 1979.)

The most visible difference in interest among the three major North Slope producers lies in the division of gas and oil ownership in the Prudhoe Bay Unit:

Company	Gas Ownership	Oil Ownership
Sohio	27%	53%
Arco	36%	20%
Exxon	36%	20%

Sohio has a relatively greater stake in the oil resource compared to the gas resource than does Exxon or Arco. For example, if faced with the issue of managing the reservoir to yield 100 more units of gas at the expense of 100 units of oil, the implications for each company clearly differ: Sohio stands to lose 53 units of oil in exchange for only 27 units of gas, while Arco and Exxon each stand to lose only 20 units of oil in exchange for 36 units of gas.

Another point at which the interests of the three producers diverge is their respective financial capabilities. From the standpoint of financial strength, Exxon could afford to finance a large portion of the conditioning plant, if not the whole pipeline. On the other hand, Sohio is so deeply in debt as a result of its investment in the Trans-Alaska Oil Pipeline (TAPS), that indenture covenants in its oil pipeline bonds simply may not allow Sohio to invest in much of anything at the present time.* Arco's position lies somewhere in the middle.

Moreover, continued development of the oil producing capabilities of Prudhoe Bay (even without gas sales) will require substantial

* One might question Sohio's protestations that it is incapable of incurring further debt in view of its involvement (apparently now abandoned) in the \$1 billion PACTEX oil pipeline scheme. And does collapse of PACTEX mean that Sohio's ability to support North Slope gas-related facilities is correspondingly enhanced?

investments by all three producers. One of these companies pegged its required share of capital needs over the next five years at \$2-1/2 billion for added production wells, flow lines, and artificial lift --- exclusive of any further investment in pipeline pumps, water flood, or for development of the Kuparuk and Lisburne reservoirs.

Just as important as differences in ownership of oil versus gas and financial strength are the nuances of corporate ideology. All three companies can be expected to protest that building a gas conditioning plant, backstopping pipeline debt, or any other action that subjects the firm to FERC jurisdiction, is anathema to their basic principles as petroleum producers. At bottom, Exxon could easily participate but, on principle, probably won't in the absence of extraordinary incentives; Sohio couldn't do much even if it wanted; and Arco's position lies somewhere in between.

While part of the companies' rhetoric can be dismissed as posturing, another part is firmly grounded on philosophical convictions about the proper role of government, the meaning of free enterprise, and a mistrust of government ever holding to its implied promises or to standards of fair play. Justified or not, the companies appear to base some of their apprehensions on their experience with Prudhoe Bay oil and the TAPS pipeline. State modification of its taxation system coupled with federal reassessment of tariff standards that had stood unchanged and virtually unchallenged for years have left the producers feeling double-crossed. To these companies, government (state or federal --- it is of little difference) has made unilateral, non-negotiable, and ostensibly unforeseen changes in the rules upon which the producers made their North Slope investments; again, justified or not.

The present mode of "negotiation" structured by FERC's rulemaking procedures fosters a coercive and confrontational atmosphere among all the parties; and, in doing so, limits the chances for peaceful compromise, particularly on issues that involve the gas producers. FERC's March 1979 draft rulemaking on gas conditioning costs effectively

thrusts both the investment responsibility and a lowered netback price onto the producers. The producers' responses are not surprisingly hostile. Unfortunately, it is impossible to discern which aspect of the rulemaking the producers find most objectionable, and which part of its decision FERC is more intent on executing. If FERC's main concern is to lower the wellhead price for the sake of consumers, while the producers (who may never have really expected to achieve a wellhead price comparable to Lower 48 reserves) object most strongly to the investment obligation and what they view as a forced entry into the utility business, one could have expected private negotiations to result in a workable compromise. It is not evident, however, that FERC's intervention leads in that direction.

Exacerbating the problems posed by ownership, financial, and ideological differences among the three major producers, the unitization of the Prudhoe Bay field means that many decisions are not made independently. While it can be argued that legal loopholes would allow one or two of the producers to build a conditioning plant outside of the geographic unit in the event interest is not unanimous, clearly this device does not solve the problem of joint field development decision-making. The question of what happens if one company votes no on a particular plan for gas development --- especially if that company owns a majority share of the oil resource and is thereby the controlling voice in all field decisions --- is a matter that none of the producers is anxious to discuss.

It is true that the producers' motives are often characterized unfairly, and that fanciful ideas circulate within government and the gas industry with respect to producer interests in this project. The producers themselves, however, are not above taking advantage of specious arguments. For example, it is in their common interest to promote the concept that Prudhoe Bay gas has an intrinsic value, and that regulatory interference is discriminatory and unfair if it holds the field

price below what producers get for new gas in the lower states. The producers claimed (in comments on FERC's proposed conditioning rule) that a Congressional intent in the Natural Gas Policy Act of 1978 was to allow gas conditioning costs to be added onto the established wellhead ceiling price for North Slope gas; and while the intent of Congress is not usually granted such revered status, in this instance the producers find it a convenient, if somewhat twisted, argument.

As to the "value" of Prudhoe Bay gas, the last thing the producers should want is a turn in the direction of a free market. If the field value (hence its price) were allowed to float on a netback basis like Prudhoe oil, there is no assurance that the price consumers are willing to pay, less transportation costs, would even meet the direct, out-of-pocket costs of producing the gas, let alone provide a profit. Wellhead price ceilings in the Lower 48 states were ostensibly measures to combat excessive producer profits and to protect consumers. This concept developed at a time when the cost of producing and transporting gas was well below what consumers would have been willing to pay. In the case of Prudhoe Bay gas, whose market value could turn out to be less than its delivered costs, the producers view wellhead price regulation as a means to ensure them of an adequate price floor in an uncertain market.

Why, then, did FERC step in and mandate a lower wellhead price (placing the full conditioning charges on producers) if a free market negotiation process between producers and shippers should not in theory result in excess profits to producers or consumer "rip-offs"? FERC's intercession may have sprung from two ways in which the simple theory strays from actual practice: One is rolled-in pricing which was decreed in order to enhance marketing of the gas and financing of the transportation system in the presence of market uncertainties, but which also creates the opportunity for producers to negotiate field prices greater than its true market value (up to the limit of the cushion of "old" underpriced gas.) The other problem is a concern that gas transmission

companies may not be in a position to perceive market limitations fully, nor to be injured by adverse market conditions.* (This point is further discussed in the next chapter.)

How does one know what is a fair price for producers (in economic rather than legalistic terms); and then, what price would be adequate to stimulate sales and investment? With respect to what is fair, free market principles call for a wellhead price no higher than the value of the gas to final consumers, less the costs of conditioning, transportation, storage and distribution. Even if this derived netback is not sufficient to cover production costs, it is still a fair price. Free enterprise does not owe everybody a profit --- particularly if one chooses to grow hothouse bananas at Point Barrow.

By the same token, free market principles suggest that nobody should be expected to invest money unless he or she is convinced that and adequate return can be achieved, and achieved without taking on disproportionate risks. Calculation of an adequate price to stimulate gas sales, field development, and other necessary producer investments is tied to the costs of those activities rather than the market value of the gas.

The question then arises, what is the "cost" of producing gas at Prudhoe Bay? Because gas is associated with oil in the same reservoir, producers will argue that production costs include some of the joint costs of purchasing the North Slope leases, exploring and developing the area, plus some part of the costs of operating oil wells and separating out solution gas from those wells. Determining which of these joint costs are attributable to gas and which to oil is quite arbitrary.

* It is interesting to note that Pacific Gas & Electric Company (the one pipeline sponsor outside of FERC's jurisdiction) recently negotiated a letter of intent for purchase of one-third of Exxon's gas. The price is the same as the Congressional wellhead ceiling, but PG&E has agreed to accept most of the responsibility for conditioning and its costs.

At bottom, "sunk" costs already incurred in leasing, exploring and developing the field for oil production have no bearing on the economically adequate field price for gas. The question, instead, is how much revenue is needed to induce the companies to incur the additional costs that accompany gas production and sale?

Putting the cost question in perspective, the North Slope producers now sell their oil to refiners in the Lower 48 at a price of about \$13.00 per barrel. This nets back a field price from \$2.50 to \$7.00; the average netback achieved for Prudhoe Bay oil sold in its principal market (the U.S. West Coast) is about \$5.00. (The producers, incidentally, in their arguments on the TAPS tariff case do not argue that transportation costs are too high, and that the netback price should be correspondingly higher.) A \$5.00 netback per barrel of oil is equivalent to about 90 cents per million btu. Out of this 90 cents, the producers must pay for all the costs of operations and severance taxes plus obtain an after-tax profit sufficient to warrant the original investment and associated risks of lease procurement, exploration, and field development. Interestingly, the pricing formula set by Congress for Prudhoe Bay gas is estimated to result in a ceiling price at the wellhead of about \$1.69 per million btu in mid-1979. (Severance taxes will not reduce the wellhead return --- those taxes will be added onto the wellhead price --- and it is not yet decided whether conditioning costs estimated at 30 to 60 cents will come out of the wellhead price.) In view of the much higher cost per btu to move gas than oil to their respective markets, it is apparent that the producers' spoken expectations with respect to gas revenues are wholly disproportionate to what they seem to regard as proper and fair with respect to oil.

All in all, it is clear that a variety of forces affect the producers' perceived interests, and that each company will make its own judgment on what is an adequate field price for Alaska gas on the basis of its own gas-oil ownership ratio, financial strength, corporate

ideology, and investment standards. Moreover, each company's decisions will depend on how it sees the costs of temporarily or indefinitely postponing gas sales, and the likelihood that another opportunity --- possibly a better deal --- might arise in the future. (This latter point is discussed more fully in the chapter, Consequences of Delay.)

Nobody can say confidently what the producers' ultimate interests really are with respect to gas sales and participation in the gas transportation system. It is questionable, indeed, whether all of the producers have even figured out for themselves the threshold balance of costs, benefits, and risks. It can be said with some assurance, however, that their bottom-line demands will be less onerous than what they now claim. But until other parties abandon the fantasy that oil recovery is jeopardized if gas is not produced and sold ---or at least that the direct costs of gas reinjection will become intolerable within a few years --- then what others believe to be the producers' interest will continue to thwart a realistic compromise.

MOTIVES OF THE GAS TRANSMISSION COMPANIES

Gas transmission companies have historically combined in a single corporate entity the role of owner and operator of pipelines with that of purchaser and shipper of gas. That is, transmission companies typically finance and operate their own "private carrier" pipelines for the purpose of transporting their own gas. Federal regulation has institutionalized the identification between gas shippers and pipeline owners: interstate gas transmission companies are not allowed to earn a profit on the buying and selling of gas as such, but rather on the transportation service they provide as pipeline owners; while authorization to build a new pipeline depends on "dedication" (purchase by the transmission company) of sufficient gas reserves to serve that particular line over its projected economic life.

The President's Decision approving the Alaska Highway gas pipeline, however, designates this pipeline as a "carrier," pipeline (one that carries gas for a fee, instead of buying and selling gas) and in doing so provides interested gas transmission companies with a distinct choice: do they wish to purchase North Slope gas and become gas shippers; do they wish to invest equity capital and become pipeline owners; or do they wish to do both? A third and somewhat separable role, that of pipeline operator, arises from joint ownership of the pipeline since for the sake of efficiency one entity has to be responsible for running it.

The Interests of Gas Shippers

In conversations with a number of gas transmission companies with different kinds and locations of markets, both within and outside the Alaska Highway project partnership, the authors found that all were interested in buying Alaska natural gas. The companies' motives for

purchasing this gas, and the benefits they expect from selling it, seem to be quite varied, and in some cases not clearly thought out.

But whatever the transmission companies believe to be the benefits of securing Alaska gas supplies they should be equally concerned about prospective risks. By far the most formidable risk is that of marketability: What are the chances that Alaska gas may in fact cost more than customers are willing to pay?

Gas marketability studies have become more fashionable and more sophisticated in recent years --- only in the last two or three years have such studies related gas demand to its price.* The most recent analysis of significance was completed by Foster Associates in February 1979.**

Setting uncertainties aside for the moment, the Foster report projects a U.S. demand for gas (based on certain assumptions about the costs of gas supplies and alternate fuels) that remains relatively stable at today's rate of gas consumption: 19 to 20 tcf per year. Of this volume, conventional domestic sources are expected to provide between 15 and 17 tcf per year between 1985 and 1995. The demand for supplemental gas (including Canadian and Mexican imports, Alaskan gas, LNG and SNG) is expected to range between 3 and 4.5 tcf in 1985, 2 and 5.5 tcf in 1990, and 2.5 and 9.0 tcf in 1995.

* The authors have produced a gas marketing model for DOE's Office of Oil and Gas Policy Analysis, cf., *Marketing and Financing Supplemental Gas* (1978). The National Perspective chapter of the present report discusses marketability in further detail.

** The report cautioned that the factors upon which any gas supply and demand forecast depend are uncertain. Moreover, the resulting outlook is extremely sensitive to variations in assumptions --- even when one considers only the range of plausible assumptions about key factors, primarily the world price of oil and the effects of deregulation on the volume and price of conventional gas supplies. (Foster Associates; *Outlook for Energy Supply, Demand and Price and its Impact on U.S. Interstate Gas Pipeline Companies*; February 1979.)

If one makes the most conservative assumptions about supplemental gas volumes --- that only the presently approved LNG projects will come to fruition (about .9 tcf per year), that Mexico will contribute only about .7 tcf per year (consistent with PEMEX's own 1978 projections prepared for prospective financiers, which assume no additional oil discoveries), that Canadian imports will not grow beyond current levels (.9 tcf per year) --- then the volumes of Alaska gas and/or other supplementals that will be required would be as follows:

Year	Total Supplementals Required/Yr	Presently Known Supplementals/Yr	Required Alaska Gas and Other Supplementals/Yr
1985	3.0 to 4.5 tcf	2.5 tcf	.5 to 2.0 tcf
1990	2.0 to 5.5 tcf	2.5 tcf	-.5 to 3.0 tcf
1995	2.5 to 9.0 tcf	2.5 tcf	0 to 6.5 tcf

Hence, just using Foster's data and conservatively estimating available supplies of non-Alaskan supplemental gas, some plausible scenarios show negative or at least inadequate demand for the projected .7 tcf/year of Alaska gas (the equivalent of 2.0 bcf/day). This, added to uncertainties plaguing anybody's best guesses, calls for caution in signing contracts for Alaska gas that have to make sense over the next 20 to 25 years. *

* Foster's results are far from unique. The Gas Requirements Committee (GRC), for example, forecasted in 1978 that unconstrained domestic gas consumption will fall from nearly 20 tcf in 1977 to 16-17 in 1985. This assumption would make some of even the presently known supplementals superfluous.

Despite such projections, the authors found gas transmission companies to be relatively confident that marketability problems would not arise. The authorization of rolled-in pricing (coupled with broadened shipper PGA clauses)* and the belief that inflation-adjusted oil prices will certainly keep rising appear to be the factors underpinning this confidence. The relative lack of concern about marketability could be attributed to one of three reasons: the companies may simply be right and the forecasters wrong; the companies may be dead wrong; or the companies may not have sufficient cause to care. This latter point should be of interest to government regulators who now entrust marketability judgments to the transmission companies; and the authors have found some indication that complacency may indeed have an influence on company decisions. One transmission company (also involved in local gas distribution) ventured that even if marketing problems did arise, the relevant state regulatory commission could not afford to let the company upon which so many citizens depend for fuel go bankrupt.

In reckoning whether gas transmission companies truly are concerned and capable of discerning marketability problems, one should consider the recent history of gas supply and demand in the United States. Unlike commodities traded in a free market, where flexible prices balance supply and demand, most interstate gas transmission companies have never (at least within the past decade) been confronted by a situation in which the volume of supplies at the prevailing price

* Prospective shippers who are also pipeline sponsors are concerned that while a cost-of-service tariff is essential from an ownership standpoint, it could be disasterous from a shipping standpoint unless shippers are allowed to broaden the purchased gas adjustment (PGA) clauses in their present service agreements in order to enable increases in transportation costs of purchased gas from Alaska to be tracked automatically through to final consumers.

exceeded demand.* This condition flowed from federal regulation of wellhead prices, designed to hold gas prices to a cost of service level --- generally well below the market demand price. Thus, the question of whether gas prices might surpass the market value for a particular volume has not been even vaguely relevant to the bulk of the transmission industry.

Overall, it appears that most major gas transmission companies are indeed interested in purchasing Alaska gas. Nevertheless, their motivations may be unclear even to themselves, and worse yet, based upon a perception of market conditions that is no longer relevant.

The Interests of Pipeline Owners^{**}

Two principles can be expected to influence how gas transmission companies will view equity investment in the Alaska gas pipeline. First, interstate transmission companies, unlike oil companies, are regulated utilities, with profits strictly limited by FERC. Since the potential for making huge gains on an equity investment is limited, no counterbalance exists to justify risking huge losses. The world view in which company management makes decisions is therefore highly risk averse.

Second, gas transmission companies are confronted by a vanishing rate base. An interstate transmission company earns a return each year only on the portion of its original investment which has not yet been

* Gas markets in the Pacific Northwest (served by Northwest Pipeline Company) have reached clearing conditions in recent years. A similar situation has arisen in Canada and in the Texas intrastate market and appears to be on the horizon in some other regional markets. It is instructive that in each case thus far, the end to growth in gas demand came suddenly, and as a complete surprise to the gas utilities concerned.

** Sometimes called "sponsors," "equity investors," or "investors."

recovered. If the tariff is designed to amortize the equity over a twenty year period, by the time the fifteenth year rolls around, very little investment is left upon which to earn a profit. Nevertheless, the company must continue operating the pipeline; and, in theory, after the twentieth year, the company must maintain operations and deliveries without making any profit whatever, except on a relatively small volume of working capital. As a result, profits of an interstate transmission company will automatically decline if the company simply maintains its existing pipeline system. The only way to stabilize (not to mention increase) profits is for the company to expand its rate base by building new pipelines, refurbishing old lines, or to invest in non-regulated business ventures.

Together, these two principles provide strong incentives for gas transmission companies to make new investments, and to avoid making regulated investments that carry risks greater than what these companies are used to taking on.

Equity investment is really of two types --- promotional money expended prior to project certification and capital invested during construction. Promotional money creates special problems for regulated gas transmission companies. While non-regulated industries are free to compensate for cash outlays via higher product prices during the promotional period, pipeline companies have to wait until the promotional effort has paid off, at which time regulators allow the accumulated spending to be put into the rate base and amortized over the life of the project. If the promotional effort fails, the company is forced to write it off as a loss to shareholders' equity, unless the regulatory commission is feeling unusually charitable and allows inclusion of the outlay in some existing part of the company's rate base.

In recent years, gas transmission companies have suffered substantial losses resulting from an inability to obtain government and/or lender approval of a variety of promotional projects. Witness the

apparent demise of the Tenneco New Brunswick LNG project (TAPCO), the El Paso II LNG project, several coal gasification projects which close to a dozen companies have sponsored, and most significantly, the unsuccessful Arctic Gas pipeline, whose writeoffs will ultimately total almost \$200 million.

With respect to the Alaska gas project, this inability to expense or "rate base" promotional money has taken its toll. Columbia Gas Transmission Company, which holds an advance payment commitment for two-thirds of Sohio's/BP's gas, has expressly refused to join the Alaska Highway partnership because FERC will not allow inclusion of promotional money in the company's rate base at the time it is spent. (The provision of ANGTA which grants "equal access" to shippers outside the partnership certainly didn't hinder Columbia's decision.) Moreover, Northwest Pipeline Company's (Northwest's) partners in the Alaska segment have successfully pressed for reductions in quarterly expenditures, and have repeatedly threatened to pull out altogether unless substantial progress is made.

Indeed, the general clamor to "prebuild" the eastern and western legs of the Alaska Highway system may be driven in part by the desire to "rate base" promotional expenses (incurred by the Arctic Gas group as well as by the existing partnership), in the event the Alaska segment is significantly or indefinitely delayed. One of the sponsors pegged its cumulative contributions to the Arctic Gas, Northwest and Northern Border projects at about \$25 million. While this sum may appear negligible in the context of a multibillion dollar project, it is appreciable when compared to that company's accounts, which show a 1977 net income of \$106 million.

Equity capital contributed for pipeline construction will, of course, be an order of magnitude greater than promotional expenditures. What are the interests of gas transmission companies with respect to investment in the Alaska gasline?

Government regulation of transmission company profits has centered on the cost of capital concept --- essentially, the profits needed both to keep existing stockholders from deserting the company and to attract additional equity capital for future ventures.* Regulated (after-tax) rates of return on equity capital have hovered between 11 and 14 percent in recent years.

FERC has been struggling to set an adequate (rather, "just and reasonable") rate of return for the Alaska project. In doing so, FERC must assess how the risks of this project differ from those incurred in other investments of regulated companies. FERC also must attempt to sort out the real concerns of pipeline sponsors from the posturing inevitable in the bargaining process now underway.

While the question of what constitutes an adequate rate of return has spawned reams of testimony and expert discussion, a few broad points are worth mentioning here. Again, the question is, how do the risks of this project differ from ordinary pipeline ventures?

Despite the enormous scale and uncertainties of the Alaska gas project, some of the risks normally carried by equity investors will be significantly reduced or even eliminated if the sponsors are successful in financing the pipeline as currently proposed:

-- Conventional pipeline financing carries not only the risk that the return of and return on equity may be lost, but that the sponsoring companies could be faced with laying out additional capital to meet principal and interest obligations on debt capital. However, the present scheme of project financing would absolve equity sponsors of any liability for debt service payments.

-- The unique cost of service tariff (as opposed to the standard fixed rate tariff**) for the Alaska gasline ensures that, at a minimum, return of equity will be forthcoming under all circumstances except, of course, outright shipper default of tariff

* For a discussion of cost of capital, see the authors' *Introduction to the Gas Industry* (1978) pp. 75-78.

** See the authors' *Introduction to the Gas Industry* (1978) pp. 97-100 for a discussion of cost of service and fixed rate tariffs.

obligations. Interestingly, if lenders are convinced that the tariff by itself provides enough security to insure repayment of debt during operations, then certainly any risk of shipper default or regulatory obstructions is very slight indeed. The pipeline sponsors are in a rather contradictory position. While they have to convince the lenders that debt issued on a non-recourse basis is perfectly safe during operations, at the same time they will have to convince FERC of just the opposite in order to glean a high rate of return.

-- While minimum billing in the event of deliverability problems may threaten the upside gain,* by the same token, it ensures against a downside loss.

-- If the producers, the State of Alaska, federal government, or even the lenders themselves are willing to "backstop" the debt during the construction phase (that is, ensure the repayment of sunk debt capital in the event the pipeline is abandoned prior to the onset of customer tariff obligations), then it is highly unlikely that such project abandonment will in fact occur. Hence, even if the equity is left at risk during construction, in practice, that risk may be very small.

-- If the required Incentive Rate of Return (IROR) is structured in a manner that induces construction cost control via the carrot of significant upside gain rather than the stick of downside loss (below the threshold of a merely adequate rate of return), then here too the downside risks are not substantially greater than for most pipelines --- despite the unusual construction cost uncertainties of this particular project.

Finally, it should be noted that the existing partnership agreement would disburse the regulated profits among the partners in a manner not fully proportional to the amount of equity (and promotional) capital invested. It places a 10 percent penalty on companies who join after November 1, 1978. The authors believe that this clause, despite its ominous appearance, will have little effect on the interest of gas transmission companies with respect to ultimate commitment of equity capital. Virtually all parties other than Northwest believe that when things settle out, such a provision will not be a part of the final contractual arrangements. The clause would, however, provide an

* For a discussion of minimum billing, see the authors' *Introduction to the Gas Industry* (1978) p. 103.

intriguing test of the adequacy of FERC's mandated return: if no additional companies joined the original partners, then maybe the established rate did accomplish its goal of being merely just and reasonable; if outside companies joined despite the penalty, then it would appear that an exorbitant profit had been granted to the partnership as a whole.

Overall, the risks and uncertainties of the project itself are unquestionably greater than for normal pipelines; however, the apportionment of those risks via the financing plan and tariffs may result in a placement of risk upon equity capital which is less than that to which regulated industries are normally subject. If this is the case, and if gas transmission companies are further motivated by the spectre of a vanishing rate base, then one could expect a great deal of interest on the part of gas transmission companies to invest in the Alaska gasline. Curiously, discussions with the partner companies revealed a general lack of enthusiasm --- and, in at least one case, outright second thoughts --- about participating in the Alaska segment of the pipeline system.*

Interactions between the Roles of Gas Shipper and Pipeline Owner

Legally, the Alaska Natural Gas Transportation Act (ANGTA) and the Presidential Decision made pursuant to that law, enable a gas transmission company to choose whether it wants to purchase and ship gas, own a piece of the pipeline, or both. Practically, however, it may become necessary to make the roles of gas shipper and pipeline owner inseparable.**

* It is likely these companies regard their participation in the Alaskan Northwest partnership as a practical though not legal precondition for the role they expect to play in the southern portions, which are apparently more attractive to them.

** See pp. 9-10 of the main body of this report.

Already the sponsors have found a way to circumvent the "equal access" mandate of ANGTA. The contract for purchase of Canadian "bubble" gas by Northwest Pipeline from Pan-Alberta (which is intended to facilitate "pre-building" of the southern portions of the gasline system) grants Pan-Alberta termination rights if Northwest sells any of the gas to buyers outside the Alaskan Northwest partnership.*

If the roles of gas shipper and pipeline owner are indeed combined, either through the legal mandate or by some approach like that used in the Pan-Alberta sale, those gas transmission companies interested primarily in the purchase of gas will have to consider: "Is the required capital commitment worth the volume acquired, or might other projects yield more gas per dollar invested?" On the other hand, if a company is interested primarily in becoming an equity participant, it will have to consider: "Is the anticipated return on investment worth the marketability or other risks that accompany the purchase of gas?" Hence, some companies might prefer a high mcf to investment ratio and others might prefer a low ratio.

While discordant interests among transmission companies pose some challenges in designing a project that looks good from a range of perspectives, the variations in marketing and financial strengths among gas companies may prove even more troublesome. Ideally, companies who take on the dual role of shipper and pipeline owner should contribute to both project goals of (1) minimizing the marketability risk and (2) maximizing the equity strength. It is unlikely, however, that the optimum mix of companies for achieving the former goal will also be the optimum consortium for achieving the latter.

* FERC found no ANGTA-related or antitrust problems with this trade restriction and granted conditional approval of the import application. While Midwestern and Michigan-Wisconsin gas companies challenged FERC's action, the courts ruled this and other substantive issues "not ripe" for judgment. (U.S. Court of Appeals, District of Columbia Circuit, Docket Nos. 78-1753, 78-1775, and 78-1789, November 2, 1978).

The best mix of companies for minimizing marketability risks is quite obviously dependent on the size of each company's cushion of low-cost gas, along with the expected relative prices of competing fuels in its service areas. Building a consortium to maximize financial strength also appears straightforward (necessitating only a review of financial statements*); yet it is equally affected by differences in corporate attitudes. For example, several gas transmission companies with whom the authors have spoken were very receptive to shouldering some credit backing for debt during construction --- even though this is not at all part of the present financial plan of the Northwest partnership. It appears that just like the Arctic gas group which preceded it, Northwest settled upon an approach that accommodated the limitations of its weakest members and the demands of the most risk-averse.**

The Number of Partners

Earlier, this chapter listed reasons to expect that a large proportion of the nation's gas transmission companies might pursue an equity interest in the Alaska gas pipeline. Almost all of the companies are interested in buying and shipping Prudhoe Bay gas to their own Lower 48 markets. And the rates of return now being considered for project equity would make it an extremely attractive investment --- provided of course that other parties, be they consumers, gas producers, Alaska, or the U.S. and Canadian federal governments, have taken on enough of the project risks to satisfy lenders of long-term debt.

* Similar to the review performed by the U.S. Treasury in *Financing an Alaska Natural Gas Transportation System*, Washington, D.C: July 1, 1977.

** It is interesting to note that the sponsors of the Western LNG project tried very hard to "project finance" their \$2 billion venture without any recourse at all upon the sponsors with respect to project debt. Unsuccessful, the sponsors restructured their financing plan to place this burden on themselves.

The United States Treasury Department (Treasury) in its 1977 report to the President (*Financing an Alaska Natural Gas Transportation System*) assumed that a large number of domestic pipeline companies would invest in the Alaska system, roughly in proportion to their total gas sales. Treasury saw such broad participation as essential to the project's financial strength, particularly if it was to be funded exclusively by private capital --- an outcome Treasury regarded as desirable but not necessarily attainable.

Treasury prepared a table illustrating this strategy and listed 11 transmission companies as hypothetical owners of the Alcan pipeline --- the earlier name for the Alaska segment of the Alaska Highway system. The largest equity commitment (13 percent) was by Columbia Gas, and the smallest (5 percent) by Northwest (op. cit., p. IV-63). Nineteen months after the President selected the Alaska Highway route and its sponsor, Northwest, only five other transmission companies have been recruited, and some of them seem to have joined mainly because membership is important for participation in Lower 48 projects designed to carry Canadian as well as Alaskan gas. Yet Northwest insists that this group can finance the entire project without assistance from the federal government.

Several factors combine to explain why more companies have not joined despite what seems to be an attractive investment opportunity, despite the near-universal interest in obtaining Alaska gas, and despite repeated pleas from DOE. The equal access provision of ANGTA is of course one reason, while another is the earlier loss of promotional money pumped into the defunct Arctic Gas and El Paso Alaska projects. More importantly, however, is that the project's present structure and financing plan are not credible; many pipeline companies do not now regard it as worth their time or money to join the partnership. Most of the companies we interviewed expected and even wanted to participate eventually, but each of them was waiting for some unspecified develop-

ment before making a move. None, however, admitted to having a program (or felt any responsibility) for forcing or even simply advocating specific changes in the present project organization or strategy.

Northwest, the Partnership and the State of Alaska

Another element in the picture is Northwest's special position in the partnership. Northwest's interest is mainly as an investor, and not as a purchaser of gas for its own customers.* The company's strategy does not depend upon the strength of a broad consortium of owner companies either to market the gas, to contribute equity, or to guarantee debt. If tariff conditions, together with backing from the gas producers and the State of Alaska, were enough to assure lenders that pipeline debt was a safe investment, as Northwest and DOE claim, Northwest could dispense with the need for additional partners who would dilute its ownership and control.

With a dozen or more transmission companies interested in Alaska gas (most of whom are now waiting outside the partnership but in principle are willing to join), and with the issue of security for project debt yet to be resolved or even posed, Northwest's urgent demand that Alaska commit itself to a \$500 million preferred equity contribution cannot be rationally related to the financial needs of the project. Northwest's proposal does make sense, however, if (and only if) the company's aim is to avoid any change in strategy that might require additional partners, or any concession that might be necessary to recruit them.

Consider some illustrative numbers: A \$4 billion Alaska pipeline segment would need about \$1 billion in equity, and would earn a \$400

* The Foster Report (op cit.) lists Northwest's 1977 year-end "reserves to production ratio" [the number of years that a company would sustain existing rates of gas deliveries to its customers from sources to which it already holds legal title]. Northwest's ratio is 26.3 compared to the national average of 9.2 (p. 619). Foster also shows that if Northwest is able to renew its existing Canadian contracts so that it merely sustains today's delivery rate, it will most likely have more gas than its market area will demand well into the 1990's (p. 633).

million investment tax credit (ITC). The partners could arrange that those who were able to take advantage of the entire ITC (for example, PG&E) would do so, and in return would contribute an equivalent amount of equity to the project in the name of those companies who were not in a position to take full advantage of the credit (such as, for example, Northwest). The total equity required by all the partners together would thus be reduced by the ITC from \$1 billion to \$600 million.

Consider now a purchase of \$500 million in non-voting shares by the State of Alaska. The state cannot use the ITC itself, but (unlike the private partners who did not have enough taxable income to shelter) the state might not demand any other settlement from the partners who are able to take advantage of the credit. Thus, the partners as a group would now need to contribute only \$100 million in order to own a \$4 billion pipeline.

According to the present partnership agreement, Northwest is permitted to contribute as much common equity to the project as it wishes; the remaining ownership shares will be divided among the other partners. There is no way that Northwest could conceivably demand and raise a controlling share of \$1 billion or even \$600 million in pipeline equity. If the ultimate contribution required of all the partners were only about \$100 million, however, Northwest might be able to keep its control without contributing another cent: its promotional expenditures to date, plus its share of AFUDC (the earnings on investment in the pipeline before it goes into service) might well exceed \$50 million by the time the project is completed.

Admitted, this scenario is grossly oversimplified. ITC becomes available as a source of funds only after the funds are invested; the partners would have to arrange with outside lenders (or among themselves) for credit to bridge the construction period. But the essential facts are beyond question. An Alaska contribution such as demanded by Northwest would have two effects:

(1) It would relieve the company of the need to recruit new partners, any of whom would be financially stronger than Northwest and would control larger parts of the consumer market, and some of whom would surely insist on having a significant voice in management.

(2) The financial leverage created would give the partners a truly stupendous rate of return on their investments. Consider the same illustrative numbers, and suppose that FERC allowed a 16 percent rate of return to total equity; suppose also that common and preferred shares receive the same rate of return on their book value. If the partners as a group received all the benefits of the ITC and Alaska received none, the partners would earn 16 percent on a 50 percent ownership in the pipeline, but would in fact have contributed only 10 percent of the equity. Their true rate of return, therefore, could in theory reach 80 percent. Again, the need for bridging credit and other financing and accounting complexities would probably reduce the real-world rate of return below 80 percent, but it would remain exceptionally high.

If this plan were successful, in other words, Northwest might obtain outright majority control and one-fourth of the net income on a \$4 billion dollar project with an investment of about \$50 million. One of the smallest domestic transmission companies (literally non-existent six years ago) would thus have bootstrapped itself into a commanding equity position in the biggest utility project in North America. We have dealt elsewhere in this report with the the likelihood that such a plan could in fact succeed.

MOTIVES AND VIEWS OF THE MAJOR LENDERS

The most important debt sources for the pipeline are the so-called Big Three insurance companies (Prudential, Metropolitan and Equitable), not only because these companies would themselves be the biggest single lenders, but also because most other sources of long-term debt will follow the Big Three in deciding whether the project is an acceptable risk. Moreover, there seems to be a general consensus among both lenders and investment bankers that a project of this size cannot be financed unless all of the Three participate.

Perhaps the most important point to keep in mind with respect to the lenders is that unlike all other parties --- the producers, gas transmission companies, State of Alaska, federal government, and Canada --- the lenders have nothing to lose by saying "NO!" The Alaska gasline is to them just one of many different investment options; finding suitable places to put their money is no real problem, with or without this multi-billion dollar venture. Moreover, if the lenders choose not to channel funds into the Alaska gasline, the project is dead unless Congress is willing to appropriate money directly from the federal treasury.

While there is doubtless room for negotiation and compromise with respect to the rate of interest,^{*} there is no such latitude on the security of funds. That principle reflects an essential difference between debt and equity: Unlike most forms of equity, debt capital has no avenue for upside gain in the event that things go better than expected. No matter how profitable a venture turns out to be, bondholders are paid a predetermined rate of interest; hence there exists no counterbalance to justify taking risks of downside loss. A prominent Wall Street investment banker raised this distinction during a conver-

* For a discussion of interest rates and risk bearing, see the authors' Introduction to the Gas Industry (1978) pp. 76-77.

sation about the marketability of Alaska gas: "Even if marketability were a good gamble, that is the sort of thing people invest dollars in, not lend on."

In deciding whether to purchase bonds for a particular project, lenders look both at the risks of the project itself and at the credit strength of the parties upon whom the responsibility for meeting debt obligations ultimately falls. What are the chances that the project will run into problems? And if it does, what are the prospects that its owners will have sufficient revenues from other sources to meet the debt payments nonetheless? If the owners default, are there sufficient assets pledged or otherwise available to ensure recovery of debt principal and interest one way or another?

The proposed gasline project, however, not only carries significant project risks --- possibility of project non-completion along with the operating risks associated with production, transportation, and marketing --- but the current sponsors propose to use "project financing" in which the debt is issued on a "non-recourse" basis. That is, the lenders are being asked to put up money on the assumption that completion is a certainty (an overrun pool of capital is designed to take care of the problem), and that after completion, the tariff arrangements will provide sufficient dollars to cover debt obligations under any and every circumstance. There is no question that an overrun pool and a cost-of-service tariff can reduce project risks, but the lenders are being asked to assume the unprecedented position of bearing those risks themselves.

During discussions with the two largest institutional lenders in the United States, we were forcefully reminded that no project of any significant scale has ever been successfully financed on a non-recourse basis. With reference to the Great Plains coal gasification proposal --- which the Department of Energy's (DOE's) Economic Regulatory Agency (ERA) has refused to backstop and for which the Federal Energy Regulatory

Commission (FERC) has so far rejected sponsor pleas to approve novel tariff arrangements --- one lender cautioned that even in the unlikely event that FERC granted the requested tariff surcharges, there is no reason to assume that this arrangement alone will ensure that debt capital will be forthcoming. Indeed, sponsors of the Western LNG project (a project of "only" about \$2 billion) recently gave up on the concept of total non-recourse financing, and agreed to secure the debt themselves during the several years of construction.

Exacerbating the problems of overall project risk and the novel allocation of those risks proposed for the gasline project is the project's sheer size. Maybe the major insurance companies could justify putting a few million dollars into the gasline on a non-recourse basis, but billions? Indeed, no matter how favorable the financial terms, prudent portfolio management argues against putting all (or even a substantial portion) of one's assets into any one venture.

On these grounds, Alaska and the gas producers probably could not --- even if they were so inclined --- play effective roles as the ultimate guarantors of pipeline debt in the manner imagined by Northwest Alaskan Pipeline Company (Northwest), the Treasury Department (Treasury), and DOE. The creditworthiness of Alaska and the major North Slope producers (excluding perhaps Exxon) depends overwhelmingly on their income from oil production at Prudhoe Bay. While the present cash flow of the producers and the state seems relatively secure, some of the very dangers against which the big lenders want their gasline debt to be protected --- for example, unforeseen production problems at Prudhoe Bay or a collapse of world oil prices --- also could jeopardize the value of their North Slope oil properties and hence their ability to make good on a debt guarantee for the gas pipeline.

Most important of all with respect to state assumption of risk may be the fact that no state financial guarantee to the pipeline would be truly credible. The institutional lenders are justifiably convinced

that if construction, operation, or marketing difficulties forced the state to make good on any deficiency in pipeline revenues pursuant to a loan guarantee, Alaska would try to recoup those losses by means of higher taxes on oil and gas production, or on a profitably operating TAPS oil line. The Big Three, therefore, will not regard backstopping by the state of Alaska as a true assumption of risk, but rather as a shift of risk from the gas pipeline bonds these companies are now being asked to buy to the oil company pipeline bonds the same lenders already hold.

In summary, one can expect the major institutional lenders, firstly, to adopt a much more conservative outlook toward this project than to practically any other investment proposal, and secondly, to be more conservative than any other party connected with the project. Northwest and DOE, who (as of the date of this writing) have had no discernible contact with the big lenders regarding the pipeline since the 1977 Presidential Decision, seem to have no grasp of this reality.

When they are finally approached, the lenders will not be generous, nor will they be easily deceived; the financial plan will really have to be good, not just look good. Moreover, the lenders can be expected to take a passive and reactive posture: The burden will be on the borrowers to demonstrate that all plausible contingencies (including ones as yet unimagined) have been covered. The lenders will not feel particularly compelled to search out the problems themselves; rather, they will require the sponsors to prove that any unorthodox approaches --- and this project has several --- are totally safe.

CANADIAN ISSUES AND INTERESTS

The Canadian segments of the Alaska Highway gas pipeline will comprise about 42 percent of the system's mileage. They are to be financed, built and operated by companies (within the Foothills group) altogether different from the sponsors of U.S. segments. Engineering, organizational, political, and regulatory problems (and the financial risks they engender) are less complicated in Canada; and except perhaps for the question of prebuilding the system's southern portions, they are certainly more tractable. The Foothills pipeline seems to face no insurmountable hurdles in its financing and construction if a number of problems can be resolved in the United States.

"If" is a powerful word: Industry and government in Canada, like the majority of the U.S. gas transmission industry, the State of Alaska, and the lenders of long-term debt, are waiting for the American pipeline sponsors and the United States government to resolve the impasse in this country. The Canadian sections of the transportation system cannot be financed and built unless completion of the U.S. portions is guaranteed, and unless lenders and equity investors in Canada are assured that no plausible combination of events in the United States could ever interrupt their revenues.

Thus, the most important financial risks arise in the United States, but their impact is indivisible between the two countries. Guarantees for U.S. sections of the pipeline also serve to protect Canadian portions, but no part of the system can be built unless some party or combination of parties agrees to guarantee completion and profitable operation of all components.

Except for the chief U.S. sponsor, Northwest Alaskan Pipeline Company (Northwest) and the U.S. Department of Energy (DOE), almost all informed observers believe that the United States government must be the ultimate guarantor for completion of the transportation system's

Alaska segment, and that the government might have to assure against some of the marketing and operating risks as well. It is not clear, however, whether the Canadian segments will require separate and explicit guarantees from the U.S. or Canadian government. The answer depends on the kind and amount of risk all other parties --- U.S. sponsors, gas producers, the State of Alaska, and Canadian owners --- are willing to accept, as well as the extent of backing the U.S. government gives to the system's domestic portions.

Notwithstanding the U.S. issues that, in part, will decide the fate of the pipeline in Canada, a number of important and explicitly Canadian questions affect the outlook for financing and building the entire system. An understanding of Canadian motives and actions toward the project begins with some of the contrasts between the political, administrative, and industrial environments of the two countries. Three key differences between the United States and Canada merit attention:

First, Canada's courts are not as inclined to second-guess official policy or administrative decisions. Canada's National Energy Board (NEB) has rarely been taken to court. In contrast, legal challenges have routinely confronted the U.S. Federal Energy Regulatory Commission (FERC) and its predecessor.

Second, the Parliamentary system of government insures that the ruling faction in the House of Commons will not seriously question (let alone overturn) a course of action chosen by the Prime Minister, his Cabinet and the party caucus. Even now with the same party in control of the Presidency and both houses of the United States Congress, agreement is by no means automatic. Further, while Canada's NEB is to a large degree legally independent, in practice it is responsive to the Government's view of national policy --- again, in contrast to its U.S. counterpart.

Finally, the industrial climate in Canada offers greater potential for compromising adverse private interests. With respect to the Alaska

project, the corporate groups currently or potentially involved are not only manageable in number (three) but they are intimately connected.* Power in each of these groups centers around a single entrepreneur,** creating an exceptionally fluid and responsive context for dealing with mutual problems. Moreover, while Canada's Combines Acts are in many ways modeled after U.S. antitrust statutes, in practice they do not have the same chilling effect on negotiations between and cooperation among private entities.

In all, governmental action in Canada is far less encumbered by the threat of court challenge; its political organization aligns the objectives of Parliament, the Prime Minister, and the NEB; and the private sector can more easily resolve its own conflicts and impasses than in the United States.

These distinctions between Canada and the United States encourage optimism for solving the problems now facing the Alaska gasline in Canada; however, several other reasons should restrain such optimism:

* Alberta Gas Trunkline (AGTL) --- one of the Foothills group --- and PetroCanada (the government's petroleum company) are partners in a proposed LNG project for Arctic Island gas. Until recently, PetroCanada was also a partner in AGTL's Q&M pipeline proposal for delivery of Western gas into Eastern provinces. Meanwhile, PetroCanada is supporting the Polar Gas Pipeline --- dominated by TransCanada Pipelines, Inc. The controlling interest of TransCanada was recently acquired by Dome Petroleum which depends on AGTL for shipment of its western gas reserves. At about the same time, AGTL vanquished PetroCanada in a successful takeover of Husky Oil. PetroCanada then looked elsewhere and bought a controlling interest in Westcoast Transmission (through its purchase of Pacific Petroleum); Westcoast Transmission is co-sponsor of the Foothills Pipeline with AGTL. This review does not exhaust the interrelations between the three groups.

** Robert Blair of AGTL, Wilbert Hopper of PetroCanada, and Jack Gallagher of Dome Petroleum (and, now also, TransCanada),

-- Some Canadians (justifiably) fear that if Alberta gas exports are liberalized to permit prebuilding of the southern portions of the Alaska Highway system --- a crucial part of the sponsors' financing plans --- then the aura of urgency about gas supply will fade in the United States, and with it any chance for early construction of the northern Canadian and Alaskan pipeline segments. Canadian officials insist that they will not authorize a large increase in Canadian exports for shipment through the prebuilt portions until construction of all segments of the line is assured; yet that stance effectively defeats the rationale for prebuilding. Nevertheless, we do not see any other politically acceptable posture for the Canadian government.

-- Canada's primary interest in the gasline is the role its construction will play in boosting the Canadian economy. The benefits it offers as a delivery system for Canadian Arctic gas are a much lesser concern. Many Canadians, incidentally, see no urgency in building the Dempster lateral, and the NEB's projections indicate that frontier gas should not be needed until 1992 or later.* Hence, the implacable emphasis Canada bestows on Canadian content (the proportion of Canadian labor and materials used in the Canadian segments) makes sense. If the U.S., however, imposes its own sense of priorities on Canada, viewing procurement policies as subordinate to the overriding goal of establishing a transportation system in the Arctic, then the stage is set for bitter confrontation.

-- No government of Canada will authorize a tariff with an effective rate of return to Canadian pipeline owners significantly less than the effective return allowed owners of the Alaska and Northern Border segments. While FERC maintains that the Internal Revenue Code requires it to ignore the investment tax credit when it approves a rate,

* National Energy Board, Canadian Natural Gas Supply and Requirements, Ottawa: February 1979.

differences between U.S. and Canadian tax treatment result in large differences in real profits even when the same nominal rate of return is employed. If the NEB were to ignore these differences, it would be hit with a torrent of outrage over Yankee exploitation of Canada's own gas transmission industry.

On the other hand, the United States probably has cause for skepticism about Canada's commitment to keep pipeline profits and construction costs reasonable. After all, nobody seriously expects the gasline to carry Canadian frontier gas --- at least until the latter years of its operational life, by which time the rate base and resulting tariff will have shrunk enormously. Even if MacKenzie gas were to find its way to market by way of the Dempster Highway segment agreed to by the U.S. and Canadian governments, (as opposed to, say, a "Y-line" connecting all frontier reserves), it would probably not be destined for ultimate use in Canada.

-- The Canadian government cannot be expected to take on any sizeable risk, nor to channel even risk-free capital or credit into the project, despite the extraordinary benefits pipeline construction would bring. The pipeline is overwhelmingly viewed by the Canadian public as a U.S. project to provide U.S. consumers with U.S. gas. Further, public debate has focused on the social disruption it will bring to the Yukon and the Native peoples. However reasonable the circumstances, and however enlightened the present leaders of Canada, elected officials cannot be expected to venture too far beyond the attitudes of their constituents.

-- If the Canadian economy does gear up for construction, if a billion dollars or more of Canadian private capital is funneled into the project, and if Canada's two or three largest gas transmission companies stake their financial futures on the pipeline, Canada is faced not only with enormous upside benefits if everything goes as expected, but it is also faced with economic and political disaster if things do not turn

out as planned. While the Canadian government has a record of undertaking large and risky public projects,* the problem with the Alaska gasline is that so many of the things that could go wrong rest outside of Canada's jurisdiction. Standing on Canadian soil and looking to the South (and to the Northwest) at the confusion characterizing U.S. energy policy and the hostility between government and industry, one can readily comprehend Canadian cause for concern. Canada would be foolish to judge the merits of this project simply on the basis of what would be rational in a rational world and by U.S. proclamations of good faith.

Finally, the specific issues in Canada that have at least peripheral bearing on gasline decisions are complex. These issues have taken on a peculiar visibility and sensitivity, in part because of the pending national elections in May and the issue of Quebec separatism. To speak of prebuilding the southern portions of the system, for example, opens up a host of sticky issues:

How does Canada cope with a gas glut in Alberta that is forcing production and exploration cutbacks ...

... while at the same time deal with an energy vulnerability in the Eastern provinces resulting from reliance on foreign oil ...

... yet recognizing that gas cannot be moved into far eastern markets at a price competitive with oil based fuels (unless either the federal government or the producers and government of Alberta provide a subsidy) ...

... especially since provincial enthusiasm to enter the industrial age spawned the construction of too many refineries in the east (and hence a glut of residual oil) ...

... while all the time the United States is searching hungrily for more gas supplies?

* See the discussion of TransCanada Pipeline in the authors' preliminary report of January 1979, pp. 40-42.

THE CONSEQUENCES OF DELAY

Introduction

Whatever state or national perceptions may be of the costs and benefits of this proposed pipeline, or of its commercial or financial outlook, the likely consequences of project abandonment or serious delay are crucial considerations in deciding how much of the financial burdens and risks Alaska or the federal government could responsibly assume. If the project is not put together now, what does the state or nation lose (or gain) in the meantime? What are the chances that it (or something functionally similar) might be put together later --- and under more or less favorable conditions?

If one believes that failure to finance and build the pipeline immediately would be a disaster to the state or to the nation, government must be prepared to step out front on financing matters. On the other hand, if the consequences of delay are not judged so ominous, then a restrained approach may be in order.

The consequences of delay should be looked at in two ways. First, what is the effect of a simple postponement of benefits? Second, how might a delay alter the actual character or scale of the expected benefits, or the project's viability?

The Effect of Delay as a Postponement of Benefits

Preceding any speculation of how conditions might change if the pipeline is delayed (and whether such changes constitute net benefits or net costs), one must examine the effect of a delay all else being equal. That is, if the costs and benefits were to remain the same whether the pipeline is built now or later, what difference would a delay mean to Alaska, the nation, or any of the private parties?

Notwithstanding Department of Energy statements that the justification for the pipeline is its long-term benefit to U.S. consumers, the unique national purpose of Alaska gas is usually perceived as its contribution to increased domestic energy security and as an offset to the increasing flow of U.S. dollars to foreign (particularly OPEC) nations. The security argument conceivably goes both ways: If world energy supplies are going to keep getting tighter, the indicated U.S. policy might be to "drain Arabia first," keeping Alaska oil and gas in the ground until it is desperately "needed." In truth, however, no one knows whether energy security and international payments problems will be more pressing in the mid-1980's, when the pipeline is scheduled to go on stream, or some twenty years later, when the Prudhoe Bay field will be largely depleted.

The recent Iranian crisis demonstrated, however, that the security and price of imported oil are real problems today, and they will almost certainly still be problems five years from now. Further, it is likely that the Alaska gas transportation system will in fact carry more gas than has yet been proved up in Arctic Alaska, and for considerably longer than 20 years. Thus, it is legitimate to view the pipeline as opening up an energy frontier that might supply the nation with secure domestic energy for thirty, fifty or more years. If so, there is little point in "saving" Alaska gas for a more acute crisis that may never materialize. All other things being equal, the national strategic benefits of the Alaska Highway system argue for building it sooner rather than later.

The primary benefits to the state from the proposed project are usually cited as jobs and money. The question of jobs now versus jobs later, like the question of how soon the nation increases its security of domestic energy supplies, does not lend itself to rigorous analysis. One observation is in order, however: Whenever it may take place, pipeline construction is too far off to be any cure for Alaska's present

post-TAPS slump. Before any pipeline jobs come along, most of the currently unemployed will have had to find other jobs, leave Alaska or starve.

On the other hand, some debate has already taken place in Alaska about the "time value" of money. All else being equal, what difference does it make whether the state receives several billion (inflation-adjusted) dollars in royalties over a twenty year period beginning in 1984 or beginning in 1990?

Simply stated the "time value" of money reflects the fact that (even without inflation) a dollar today is worth more than a dollar tomorrow because (1) we can invest today's dollar to yield more than a dollar tomorrow, and (2) we would have to repay more than one of tomorrow's dollars in return for borrowing a dollar today. This concept sounds simple on the surface --- so we will leave it at that. When employed to determine the consequences of delayed revenues, however, the simplicity connects some rather complex issues, and, like most tools of economic analysis, the notion of time value is only as good as the assumptions with which it is combined. The most difficult (and important) assumption turns on what the proper "discount rate" is for dollars accruing to a particular entity --- in this case, the state.

One way of tackling the problem is to ask whether the value of Alaska gas reserves in the ground (and thus the royalties and taxes the state expects to collect when the reserves are produced) will appreciate at a higher or lower rate than the rate at which those taxes and royalties could be invested --- or, alternatively, the rate at which the state would have to borrow for current needs.

We cannot be sure of the answer to this question, but two facts suggest that the discounted present value of the state's gas-derived revenues will probably be greater if taken earlier rather than later. On the one hand, the ceiling price for Prudhoe Bay gas will rise (pursuant to the Natural Gas Policy Act of 1978) in tandem with general

inflation. On the other hand, it is virtually impossible for interest rates (along with other rates of return on long-term investments) to remain below the rate of general inflation for long.* Thus, the regulated value of Prudhoe Bay gas (and the corresponding value of royalty and tax revenues) will probably appreciate at an average rate somewhat lower than the earnings rate on the state's cash balances.

All this is well enough, but whatever one concludes with respect to the "time value" of money for the state and the consequent costs of project delay, several qualitative factors may be even more important than the discounted present value of state revenues. If state officials attach special value to early receipt of cash --- say a need to pay for ongoing government operations, cover debt service, or fund capital improvements for which borrowing is unacceptable because of constitutional restrictions, political pragmatism, or plain business sense --- then the time value of gas revenues alone is not an appropriate basis upon which to make decisions. Similarly, those who believe that having spare cash on hand to reinvest within Alaska carries some special benefit will probably attribute a higher value to early generation of cash than might be accorded by a traditional "time value" formula.

On the other hand, if one believes "saving" the state's nonrenewable resource wealth for future generations is worthwhile yet difficult to achieve, then again the conclusions drawn from time value analyses should be viewed with skepticism. In this case, even if conventional financial analyses showed convincingly that the state would be better served by cashing out its resource wealth earlier rather than later, and investing it in assets that yielded a higher rate of return than gas in the ground, one may nevertheless wish to postpone the metamorphosis of

* The reason is straight-forward: Lenders will always demand an interest rate that both compensates them for the expected erosion in the value of their principal due to inflation, and that yields a "real" return on use of their money, while borrowers will accept interest rates that reflect the cheaper dollars with which they will repay the debt, in addition to the "real" cost of borrowing.

hydrocarbons into cash. Such an approach may be the only way to avoid swelling the bureaucracy, underwriting risky developmental ventures, or otherwise spending what should really be saved.

The Effect of Delay on the Character and Scale of
Expected Benefits and the Project's Viability

Up to this point, our discussion of the consequences of postponing pipeline construction has assumed that benefits would remain essentially the same regardless of their timing. If so, economic and strategic benefits to the nation, the producers, and the gas transmission industry, would seem to argue for early construction and gas sales. Alaska's fiscal interests probably tilt the argument in the same direction, with the important reservation that the state might be unable to carry out a financial strategy that maximizes the future worth of its present revenues --- even if it wanted to do so.

In the real world, postponement of gas production and its benefits will involve changes in the scale and character of those benefits and the project's viability. It will surely have some impact, for example, upon:

- (1) the volume of gas available for sale;
- (2) the costs of producing, processing, and transporting the gas;
- (3) the demand for the resource and its consequent market value; and
- (4) the project's momentum.

The following pages explore what these changes might be, and how they might affect the project's viability and, particularly, the benefits to Alaska and the nation.

The Effect of Delay on the Volume of Gas and
Oil Available for Sale

What is likely to happen to the physical resource at Prudhoe Bay if pipeline construction is postponed is probably one of the most important considerations from a state, national, or producer viewpoint. The authors' non-expert understanding, both from the published literature and from conversations with experts, is that prolonged gas reinjection would create no foreseeable danger to oil recovery, that the physical loss of gas would be minor (at least in comparison to the financial cost of postponing gas sales), and that the capital outlay for necessary reinjection facilities would be essentially the same whether or not the proposed gasline is built according to schedule.

This consensus among the experts is not shared, however, by officials of all the affected organizations. People with whom the authors discussed this question seemed reasonably certain that they knew what the consequences of prolonged gas reinjection would be, but surprisingly, opinions were far from unanimous. For example, a spokesman for one of the Prudhoe Bay producers maintained that loss of gas resulting from prolonged reinjection would be minimal --- and he, in fact, stressed the value of reinjection for increasing recovery of associated oil. Spokesmen for another producer, however, painted a gloomy picture, warning of substantial gas loss if pipeline construction is seriously postponed, while two institutional lenders felt certain that gas offtake and sale by the early 1980's were absolutely essential for proper field management of oil as well as gas. This latter view is also held by some of the gas transmission companies.

A related question that has spawned more visible controversy is the effect of early gas production on the ultimate recovery of oil from the Prudhoe Bay field. Most engineers seem to agree that gas production will entail some sacrifice in oil recovery, or at the very least, will

require greater investment in water injection to avoid the potential loss of oil. A few engineers have argued that prudent operation of the reservoir requires reinjecting all of the gas produced in association with crude oil, postponing gas sales until after the oil has all (or nearly all) been produced. Making a rational decision on this issue, however, requires more than engineering expertise; it requires judgment on the relative value of oil and gas at different times in the future, and on the appropriate discount rate for weighing earlier against later revenues.

The state has contracted for a detailed study of the likely costs and physical effects --- translated into economic consequences --- of various gas production profiles, including prolonged gas reinjection. There is some chance that this and other studies would indicate that prudent reservoir management (with due consideration of financial factors) dictates postponing gas shipments beyond the anticipated date of gas pipeline start-up, or limiting volumes to less than (say) 2.0 bcf per day --- but we would not rate these chances as very high.

In addition to an evaluation of the physical effects of prolonged gas reinjection, several other issues will affect the volume of gas available for sale and, thereby, the project's viability.

First, regardless of the effect of delay on the volume of recoverable oil and gas, delay will certainly increase confidence in the reservoir engineers' predictions, because of field history upon which to base their predictions. To date, a lack of production history and the attendant uncertainty about reservoir performance has been one element impairing gasline financing, which depends upon a reliable flow of gas at projected volumes.

Second, delay may also promote understanding of gas volumes in other known reservoirs on the Arctic Slope (such as the Kuparuk and Cape Thomson) and the potential for discoveries elsewhere in the region, for example, in the National Petroleum Reserve or the Beaufort Sea.

Here too, added certainty --- and particularly any increases in proved reserves --- will improve the financing prospects for a transportation system, and will assist in the design of its optimal capacity. At some point, however, delay might have a long-term adverse effect, if it discourages further gas exploration.

Third, the presently acknowledged delay in pipeline startup from 1982 to 1984 or later has already, all other things being equal, boosted the expected initial volumes of gas available for shipment, thereby reducing the transportation costs per unit. This conclusion is based on an uncontroversial axiom of reservoir engineering --- the notion that the daily volume of gas offtake consistent with prudent reservoir management increases as oil is produced.

The Effect of Delay on the Costs of Producing,
Processing, and Transporting Prudhoe Bay Gas

One commonly cited effect of delaying the pipeline project is the belief that for each year construction is postponed, the system's cost will inflate by hundreds of millions of dollars. While this statement is not particularly controversial, the extrapolation that such a consequence is "bad" has no justification, except under certain assumptions about how the market value of gas will change through time, and what is the applicable discount rate or cost of capital.

For example, if the real (i.e. inflation-adjusted) prices of construction and the market value of gas remain the same --- in other words, if construction costs and gas prices rise at the same rate as general inflation --- the profitability of the pipeline (and the net national benefits from it as well) will be essentially the same regardless of when it may be built. In this case, the "time value" principle argues for early construction. Complications arise, however, if construction costs and the value of gas are not expected to increase in

tandem. The importance of those complications is magnified if today's market value of gas does not justify the project, but future increases are expected to do so. In this instance, the timing of construction may make a big difference: Should the facility be built now, ahead of effective demand, in order to evade higher future construction costs, or should it be postponed until market conditions are more favorable despite rising costs?

The correct answer depends upon the interplay of three factors: (a) the rate at which construction costs are expected to inflate, (b) the rate at which the value of the gas is expected to increase, and (c) the time value of money, as represented by the cost of capital (the rate of return funds invested in the pipeline could earn in other uses). One principle of natural resources financing states that development and production ahead of demand is warranted only where (a) capital costs are expected to increase at a higher rate than the sum of (b) the rate at which the value of gas is expected to increase and (c) the cost of capital.

Such a circumstance is conceivable, but it is not very likely with respect to the present proposal. Consider some illustrative numbers: Suppose the value of gas is expected to increase at about 8 percent per year, while the rate of return on pipeline investment is 15 percent. Do we really expect construction costs to rise at a rate of 23 percent annually? Possibly, but not very likely!

Nevertheless, there is a widespread feeling that higher construction costs are in themselves a Bad Thing, and that delay is thereby detrimental to the Alaska gas pipeline. This attitude reflects at least two concerns --- the unit costs of heavy construction did increase more rapidly than general inflation during the 1960's and early 1970's (though there is no reason to believe that this is a permanent trend), and the lending limits of the large insurance companies have not grown as rapidly as general inflation. All in all, however, the concern about

higher capital costs keyed to general inflation stems mostly from "money illusion" --- a failure to recognize that any larger outlay required in the future would be in cheaper and presumably more abundant dollars.

Thus, we can conclude that it probably makes more sense to build the pipeline earlier than later, but only if it is otherwise worth building at this time. Anticipated construction cost escalation is a legitimate consideration in timing the project, but it would not be a sufficient reason to build the pipeline before it could meet either a net national benefit or a marketability test.

In addition to the cost effects of delay posed by changes in construction cost and market value that do not move in tandem through time, one must consider the likelihood that technological or other breakthroughs may sweeten project economics at some future date. Such a breakthrough might simply decrease the costs of constructing the project as now proposed. It might, instead, prompt a change in route or design --- for instance to take advantage of economies of scale offered by a gas transportation system that would serve the entire Canadian Arctic, as well as northern Alaska. Or the project's merits might falter relative to other means for disposing of the gas: ice-breaking tankers, or in-state processing of gas into methanol, fertilizers or petrochemicals may ultimately prove more attractive. Underlying all speculation is the fallback alternative of running the gas through an empty TAPS oil line 25 years from now.

Prudence, nevertheless, dictates that one not place unwarranted optimism in the prospects for speculative breakthroughs. The hope for any one of them must be weighed against the much greater likelihood of success for the conventional project now at hand. Any alternative that involves delay, therefore, must have promising economics indeed to overcome the presumption in favor of an early start that stems from conventional discounting of future benefits.

The Effect of Delay on the Demand for Prudhoe Bay Gas

Project spokesmen have argued that Prudhoe Bay gas must be sold quickly in order to tie up markets before cheaper (at least in the short-term) supplies of Canadian and Mexican gas flood the U.S. market. Interestingly enough, this scenario has little to do with the long-term market demand for Alaska gas; it hinges more on institutional motivations and perceptions of the "need" for Alaska gas.

Supplemental gas supplies --- be they Canadian, Mexican, Alaskan, Algerian, or whatever --- are not destined for use in so-called "premium" gas markets where residential and small commercial customers view electricity or distillate fuel oil (No. 2) as the alternative to gas. Existing Lower 48 reserves of conventional gas could satisfy these markets well into the next century. Instead, the main effect of supplemental supplies will be to allow the United States to continue burning gas in "low priority" markets, where residual fuel oil (No. 6) and coal are the alternate fuels. Given reasonable time for fuel users to adapt to the reality of more abundant gas supplies --- and assurances from federal and state regulators that they will in fact be allowed to burn gas without curtailment, penalties, or harassment --- this low priority market encompassing the use of gas, oil or coal as industrial and electric utility boiler fuel is virtually unlimited, at least within the range of foreseeable gas supplies.

Hence, Canadian, Mexican and Alaskan gas would not be competitive with one another, so long as they were all competitive in price with residual oil. The only way in which entry of substantial volumes of Canadian and Mexican gas would adversely affect marketing of Alaskan gas is if those supplies are purchased at prices that remain significantly above that of No. 6 oil --- in which case, the cushion of cheap domestic gas will be needed to offset the price excess of these imports. If the marketability of Alaskan gas depends on this cushioning effect, rela-

tively high-cost Mexican or Canadian gas will compete with Alaska gas for the implicit subsidy provided by rolled-in pricing. But this principle is not the same as the widespread and aberrant notion that "cheap" (i.e. at or below the residual oil price) Mexican or Canadian supplies will gobble up the markets for Alaskan gas. Indeed, the cheaper these supplies the less they should interfere with the marketing of Alaskan gas.*

Thus, the Department of Energy's stated position on the question of Canadian and Mexican gas imports is correct in principle (though we do not endorse the way in which the Department has implemented that position). Gas imports are indeed desirable; but at prices much higher than the cost of residual oil, they are neither a bargain for U.S. consumers, nor are they in the broader national interest. One reason for the latter judgment, in addition to inflationary impacts, is the adverse effect such imports would have on the marketability of Alaska gas.

In any case, political and psychological considerations may well have a greater effect on marketing perceptions and the need for Alaska gas than rigorous analyses of demand. If large quantities of Canadian and Mexican gas do become available and the outlook for continued shipments is reasonably secure, the crisis thinking behind the notion that Alaska gas is essential however much it costs may well recede --- and with it, the willingness of transmission companies to bear financial risks, the receptivity of federal and state regulatory bodies or Congress to consumer risk-bearing, and ultimately the justification for federal involvement in the project's financing.

* The sponsors of the gasline proposal, incidentally, believe that additional sales of Canadian gas will actually boost the financing prospects of the entire pipeline system by enabling "pre-building" of the Eastern leg (800 bcf/day) and portions of the Western leg (200 bcf/day).

The Effect of Delay on the Project's Momentum

An extended delay would certainly have an effect on the project's momentum --- more specifically, on the momentum of its present sponsorship --- but there is some truth to the argument that project momentum has already collapsed. Partnership contributions for ongoing activities have dropped markedly, and the major lenders have not even bothered to keep themselves informed of current affairs.

Moreover, if the impasse drags on much longer, and the project remains in its present debilitated state (Presidential and sponsor proclamations notwithstanding), there may come a time when even real tidings of progress (for example, the sale in late March of part of Exxon's North Slope gas to Pacific Gas & Electric Company) will not even warrant a back page note in the Wall Street Journal.

Conclusion

From a national viewpoint, it would be convenient if this analysis led to definitive conclusions on the questions: "Will consumers pay more or less for Alaska gas if the project is delayed?" and "Might a crisis develop in which the nation sorely regrets not having the gas (and potentially other Arctic supplies) available as soon as possible?"

From the standpoint of the state, a conclusion would also be convenient on whether the inflation-adjusted value of royalty and tax receipts might benefit or suffer from a delay. Likewise, both governments would be well served by certain knowledge about how postponement of pipeline construction and gas sales would affect (1) the amount of government assistance the project will need, and (2) the desires of other parties to bear financial risks.

This report, quite obviously, falls short of those goals. There is and can be no certain answer to these questions. Lack of certainty

about the future (translated into "risks" by the financial community) has been one of the biggest stumbling blocks for this project all along, and it further fosters an atmosphere in which nobody wants to make commitments --- least of all government decision-makers faced with the prospect of either consenting to extraordinary and unpleasant courses of action or being prepared to watch the project die, at least for the present.

Nevertheless, considering how future events may alter the expected volumes of gas available, project costs, and the marketing outlook, our own guarded forecasts are as follows:

(1) The economic environment within which the pipeline must be justified and financed will probably not deteriorate significantly with the passage of time. On the other hand, prudent decision-making should not opt for delay in hope that future events will substantially sweeten the project's economics. While some aspects of the project will become predictable with greater confidence, (for example, the volume of gas available), uncertainty about what may take place during the construction period and the twenty-plus years of pipeline operations is not likely to diminish whether the project is built tomorrow, ten, or twenty years from now. Uncertainty will always be with us.

(2) It is totally unrealistic to justify delay in hope of reviving the Arctic Gas project or El Paso's LNG concept, or of advancing other technologies for moving or using the gas (such as methanol).

(3) If the nation is truly concerned about domestic energy security, and if the state sees an advantage to cashing out its non-renewable resources early, it probably makes sense to encourage construction of the line now rather than later.

(4) While a further delay of one, two or more years will probably have measurable costs to the state and the nation, it is not likely to have catastrophic consequences for either of them, or for the eventual success of the project.

ABOUT THE AUTHORS

Arlon R. Tussing is a natural resources economist who divides his time between Seattle, Juneau, and Anchorage, where he is, respectively, president of his own consulting firm, consultant to several committees of the Alaska Legislature, and adjunct professor of economics in the Institute of Social and Economic Research of the University of Alaska.

Affiliated with the University since 1965, Tussing has also served as staff economist of the Federal Field Committee for development planning in Alaska and chief economist of the United States Senate Committee on Interior and Insular Affairs. In that position he was an early originator of the concept of an Alaska Highway gas transportation system.

Forty-five, Tussing holds bachelor's degrees from the University of Chicago and Oregon State College, and a Doctorate from the University of Washington. He is a pilot, skier, kayaker, bank director and the father of two girls.

Connie C. Barlow is a natural resources policy analyst who spends about half of each year as vice-president of Arlon R. Tussing and Associates in Juneau and Seattle, and the remainder in field research on outdoor recreation resources.

She has been affiliated with the National Park Service, the Federal-State Land Use Planning Commission for Alaska, and the Alaska Division of Policy Development and Planning; she has served as staff assistant to the President of the Alaska State Senate, and special assistant to the Alaska Commissioner of Natural Resources.

Twenty-seven, Barlow was graduated from Michigan State University in natural resources studies. She is a nature photographer, a water colorist, a kayaker, and an active environmentalist.