

Letter Report

RATE DESIGN TECHNICAL ASSISTANCE

entitled

RATE DESIGN PRESENTATIONS  
TO THE NARUC  
STAFF SUBCOMMITTEE ON ACCOUNTING

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## Introduction

The objective of The National Regulatory Research Institute's (NRRI) Rate Design Program is to help strengthen the capabilities of state regulatory agencies to analyze rate design issues. Numerous state regulatory agencies and their staff have a strong need for an objective economic analysis of the strengths and weaknesses of specific ratemaking alternatives. An on-site technical assistance presentation to the National Association of Regulatory Utility Commissioners (NARUC) Staff Subcommittee on Accounting is an example of how the rate analysis capabilities of state regulatory agencies and their staffs can be enhanced. Therefore, the NRRI accepted an invitation from Eric Leighton, Chairman of the NARUC Staff Subcommittee on Accounting, to present objective economic analysis of current rate design alternatives.

This letter report deals with these presentations to the NARUC Staff Subcommittee on Accounting on September 16 in Rapid City, South Dakota by The National Regulatory Research Institute. Funding for these presentations was provided by the Economic Regulatory Administration (ERA) of the U.S. Department of Energy.

## Objectives and Format

The presentations were designed to familiarize the attendees at the NARUC Staff Subcommittee on Accounting meeting with the economic considerations associated with selected rate design issues. Accordingly, the format of the presentations included presentations on selected NRRI studies that were funded by ERA: calculating marginal costs for a gas distribution utility, regulation as a system of incentives, commission preapproval of utility investments, and electric utility construction cost overruns. Each presentation was composed of 30-35 minutes of delivering a paper and 10-15 minutes for questions and answers.

### Operational Steps

The presentations took place at the Alex Johnson Hotel in Rapid City, South Dakota on September 16, 1981, from 8:30am to 12:00pm. The time and location coincided with the NARUC Staff Subcommittee on Accounting's conference that met from September 14 to 17, 1981. The NRRI presentation was a part of the agenda concerning non-accounting topics that have an impact on accounting.

The NRRI presentation format was drawn up to address economic considerations of current rate design alternatives. The presenters (listed in appendix A) were drawn from the NRRI professional staff and faculty associates and were chosen because of their knowledge and familiarity with their topics. The agenda, time, and location of the NARUC Staff Subcommittee on Accounting meeting were published in the NARUC Bulletin No. 33-1981 on August 17, 1981. The agenda of the NRRI presentation (see appendix A) was distributed to the attendees at the meeting on September 14, 1981. The list of presenters does not match the distributed agenda due to staff attrition and illness.

Copies of the papers, or the transparencies from each paper (listed in appendix B), were mailed to each attendee (listed in appendix C) requesting the material.

### Conference Attendance

Representatives from 23 state utility commissions, the Rural Electric Administration, the Federal Energy Regulatory Commission and the Federal Communications Commission attended the NARUC Staff Subcommittee on Accounting meeting. The state commissions represented were Alabama, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Idaho, Iowa, Kentucky, Maryland, Michigan, Missouri, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, Utah, Virginia, West Virginia, and Wyoming. There were also representatives from the telecommunications industry in attendance.

### Conclusion

The presentations to the NARUC Staff Subcommittee on Accounting were an effective means of reaching senior utility commission staff of several commissions. Indeed, one measure of the success of the presentations was the number of state commissions in attendance. In addition, Mr. Eric Leighton, Chairman of the NARUC Staff Subcommittee on Accounting indicated that the presentation was well received (See appendix D). A similar format can be used in the future.





APPENDIX A

AGENDA AND LIST OF  
MODERATORS AND PRESENTERS



AGENDA

NRRI PRESENTATION

NARUC Staff Subcommittee on Accounting

Rapid City, South Dakota

September 16, 1981

- 8:30 AM Introduction: Kevin Kelly
- 8:45 AM Calculating Marginal Costs for a Gas Distribution  
Utility: Jean-Michel Guldmann
- 9:30 AM Regulation as a System of Incentives: William  
Pollard
- 10:15 AM Coffee break
- 10:30 AM Commission Preapproval of Utility Investment:  
Robert Burns
- 11:15 AM Electric Utility Construction Cost Overruns:  
Roger McElroy

Each 45 minute session will be composed of 30-35 minutes of delivering a paper and the rest of the time for questions and answers.

Moderator and Presenters  
Presentation to the  
NARUC Staff Subcommittee on Accounting  
Rapid City, South Dakota  
September 16, 1981

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APPENDIX B  
LIST OF MATERIALS

A sample of available materials is attached to this report.



CRITERIA FOR A DESIRABLE  
RATE INCENTIVE PROVISION

- (1) THE INCENTIVE SHOULD BE DIRECTED TOWARD THE INTERESTS THAT MOTIVATES THE UTILITY'S BEHAVIOR.
- (2) THE INCENTIVE SHOULD ADDRESS THOSE ASPECTS OF A UTILITY'S PERFORMANCE UNDER THE CONTROL OF ITS MANAGEMENT.
- (3) TO THE EXTENT FEASIBLE, THE UTILITY SHOULD BE GIVEN A CLEAR EXPECTATION AS TO HOW ITS PERFORMANCE UNDER THE INCENTIVE PROVISION IS TO BE EVALUATED AN REWARDS OR PENALTIES CONFERRED.
- (4) APPLICATIONS OF THE INCENTIVE PROVISION SHOULD RESULT IN A POSITIVE NET BENEFIT TO THE UTILITY'S CONSUMERS AND SOCIETY AS A WHOLE.
- (5) THE INFORMATION NECESSARY TO EVALUATE THE DESIRED BEHAVIOR SHOULD BE FREE FROM MANIPULATION AND CONTRADICTION AS TO PROPER INTERPRETATION BY EITHER THE UTILITY OR REGULATORS.
- (6) THE GOAL AND METHOD OF APPLICATION SHOULD STAND IN A CLEAR AND LOGICAL RELATIONSHIP TO ONE ANOTHER.
- (7) THE GOAL AND METHOD OF APPLICATION SHOULD BE NEUTRAL IN ITS EFFECTS AND HAVE NO UNINTENDED CONSEQUENCES.
- (8) THE INCENTIVE SHOULD BE CONSISTENT WITH OTHER GOALS AND INCENTIVES EMBODIED IN CURRENT REGULATORY PRACTICES.
- (9) THE INCENTIVE SHOULD ADDRESS AND ELIMINATE DISINCENTIVES THAT CURRENTLY EXIST IN PRESENT REGULATORY PRACTICES.

## THE COST CONTROL PROBLEM

- (1) INPUTS, SUCH AS FUEL, LABOR EQUIPMENT, AND STRUCTURES, MAY NOT BE COMBINED IN A MANNER THAT MINIMIZES THE ANNUAL COSTS OF PRODUCTION GIVEN THE EXISTING TECHNOLOGY AND INPUT PRICES.
- (2) INPUTS MAYBE PAID FOR IN EXCESS OF THE AMOUNTS NECESSARY TO RETAIN THEIR SERVICES IN THE EMPLOYMENT OF THE UTILITY.
- (3) TECHNOLOGICAL ADVANCES AND ORGANIZATIONAL CHANGES ARE NOT DEVELOPED NOR ADOPTED IN SUCH A WAY AS TO ASSURE THAT OUTPUT WILL BE PRODUCED AT THE LOWEST FEASIBLE COST IN THE FUTURE.



COMMISSION PREAPPROVAL

OF

UTILITY INVESTMENTS

Robert E. Burns, Esq.  
Senior Research Associate

Remarks Prepared

For

Delivery To:

The NARUC Staff Subcommittee on Accounting  
Rapid City, South Dakota  
September 16, 1981

THE NATIONAL REGULATORY RESEARCH INSTITUTE  
2130 Neil Avenue  
Columbus, Ohio 43210

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Remarks Prepared

For

Delivery At

NARUC Staff Subcommittee on Accounting

Rapid City, South Dakota

September 16, 1981

The topic of this speech is "Commission Preapproval of Major Utility Investments". This speech is based upon a report being prepared for the U.S. Department of Energy (DOE), Economic Regulatory Administration, Division of Regulatory Assistance under an existing grant to The NRRI. The speech will address: what is preapproval; whether preapproval is already occurring, and if so, whether preapproval has any discernible effect on cost reduction; whether any additional or new type of preapproval would have an effect on cost reduction; whether preapproval could be made to stick; and whether preapproval would upset (to a poor result) the traditional roles of utilities as active managers and regulators as aloof holders-to-accountability.

#### What Is Preapproval?

The concept of commission preapproval of major electric utility investments denotes a formal decision making process on behalf of a state public service commission to approve the investment decisions of jurisdictional electric utilities before expenditures called for by those decisions actually take place. The commission states in a formal decision or order that it approves of the investment decisions to be undertaken by the utility and will undertake the necessary actions, in terms of providing an adequate rate of return on investment, to support those decisions.

The type of investment decisions covered by commission preapproval agreement may vary. At one extreme, all major investment contemplated by a jurisdictional electric utility may be subject to commission preapproval. This would include investments in generating plant, transmission and distribution facilities, conversion of existing generating plants from oil-burning to coal, investments in pollution control equipment, and land held for future use. At the other extreme, only certain types of utility investments would qualify for commission preapproval, such as investments in pollution control equipment, conversion of existing oil-fired plants to coal, or construction of a coal or nuclear plant to replace an economically obsolescent oil plant even though this would result in "excess" capacity.

State public service commissions cannot only vary the scope of preapproval by varying the types of investment decisions covered by preapproval, but state public service commissions might vary the effect of preapproval. At one extreme, a state public service commission might preapprove each major investment decision and guarantee to provide the necessary revenues to support the investment. Under this type of preapproval, there would be no retrospective examination of whether or not an expenditure had been prudently and reasonably spent. We term this type of preapproval "preapproval of expenditures".

Under preapproval of expenditures, a commission, again, has several options. It may simply preapprove a particular construction program and then provide those revenues necessary to support that program either on an ongoing basis (CWIP) or at the completion of the construction program (AFUDC). This procedure would involve little oversight by a commission of actual utility expenditures. A commission would simply supply enough revenue to support the investment made by a utility, including a fair rate of return.

On the other hand, a commission, as a condition to granting preapproval, may become involved in the day-to-day operations of the construction program. This would be done to assure that the expenditures undertaken by the utility are prudent and to help prevent undue cost overruns and inefficiencies. A commission may also want to review periodically the overall construction program to determine if changing economic and financial conditions may have rendered the initial investment decision obsolete.

At the other extreme, state commissions might simply preapprove an action proposed by a jurisdictional electric utility, such as conversion of existing oil-fired generation to coal without preapproving the initial (or escalated) cost figure. We term this type of preapproval "preapproval of actions".

Under preapproval of actions, a commission reviews the concept as proposed by the utility and agrees to support those expenditures prudently and reasonably undertaken to achieve its fulfillment, again, either on an ongoing basis (CWIP) or at the completion of the construction program (AFUDC). The commission would reserve the right to retrospectively examine a capital expenditure before it goes into the rate base in order to determine the expenditures' prudence and reasonableness. In the case of coal conversion, for example, a commission may review financial analyses performed by the company (or may perform its own financial analysis) and determine that such a program is in the best interest of the company's ratepayers. It would then preapprove the actions of the utility and promise not to deny revenues to support those actions prudently undertaken by the utility in achieving its goals even if final approval by other regulatory agencies (e.g. environmental agencies) could not be accomplished. Through this type of preapproval, programs might be initiated by utilities that would not otherwise be undertaken due to the high degree of risk that would be associated with them, absent preapproval.

Commission preapproval, then, is defined as a formal review and approval of an electric utility's investment decisions either with a retrospective examination of capital expenditure for prudence and reasonableness before the expense goes into the rate base (preapproval of actions) or without such a retrospective examination (preapproval of expenditures). The exact nature of this process, in terms of the amount and timing of revenues provided by the commission to support the investment decision of the company, may vary as different states might adopt different preapproval approaches. However, the major purpose of the process is to reduce the risk and uncertainty associated with major electric utility investments by obtaining from the appropriate regulatory commission a formal approval and promise to provide sufficient support to major construction programs before funds are expended by the utility.

The next question is whether preapproval is already occurring, and if so, whether preapproval has any discernible effect on cost reduction. Something similar to a "preapproval of actions" presently occur in most

states. In several states, the need for a major addition to electric generating facilities and for electric transmission additions is usually formalized by a determination of need in a certification of public convenience and necessity. Indeed, according to Lehman Brothers, "Today, 39 of 50 states have some sort of certification process for new generating plants at the commission level or at some other state agency charged with determining the necessity for and location of generating plants." In addition, state public service commissions are also involved in approving the utility's financing of major utility investments. The 1979 Annual Report on Utility and Carrier Regulation of the National Association of Regulatory Utility Commissions lists forty-eight public service commissions as requiring commission approval prior to the issuance of mortgage bonds, and at least forty-six state public commissions as requiring commissions approval prior to the issuance of debentures by privately owned public utilities. Forty-eight public service commissions are listed as requiring commission approval prior to the issuance of preferred stock, and forty-three commissions are listed as requiring commission approval prior to the underwriting of new stock.

Thus, something similar to a "preapproval of actions" currently occurs. Most state public service commissions review the need for a major utility investment in one hearing, either a certification of convenience and necessity or a power siting hearing, and then review the need for a major securities issuance in another hearing. Thereafter, the usual course of events is that those expenditures prudently and reasonably undertaken in constructing the major utility investment are included in the rate base, either on an ongoing basis (CWIP) or at the completion of the construction program (AFUDC), after the commission has an opportunity to examine retrospectively the capital expenditure for prudence and reasonableness. However, while this description might be similar to that of a "preapproval of actions", it is not quite the same.

The present regulatory process differs from a "preapproval of actions" because the preapproval is implicit, not explicit. Public service commissions do not explicitly approve the utility's construction plans nor find

that the issuance of a security won't harm the company's ability to provide service, i.e., a financial finding. And because there is no explicit pre-approval of the utility's construction plans, the commissions are not necessarily bound to include prudent and reasonable capital expenditures in the rate base. For instance, there have been at least four instances in the last year where utilities have been denied recovery of capital expenditures.

In the first case, the Missouri Public Service Commission declared the Kansas City Power and Light Company's interest in its Iatan generating Unit No. 1 in excess of its system's needs, and refused to recognize any costs associated with the plant in fixing rates. The Commission held that the Company's actions fell short of rational planning and management prudence.

In the second case, the Minnesota Commission held that concerns about the need for a generating plant may bar its inclusion in rate base as construction work in progress, even though the utility had previously been granted a certificate of need and had expended funds on the project. Northern Power Co. had obtained a certificate of need from the Minnesota Energy Agency for its Sherco Unit 3 in 1975. When reduced demand forced the utility to postpone the in-service date and propose joint ownership for the plant, the Minnesota Energy Agency decided, in 1980, to reconsider the need issue. On this basis, the commission found an absence of the requisite "substantial certainty" that the plant would be used and useful and it excluded expenditures on the plant from the rate base as construction work progresses.

In the third case, slower load growth and financial problems lead the Arizona Public Service Company to cancel Units 4 and 5 of the Palo Verde nuclear project. The company sought to recover its costs associated with its interest in these units. However, the Arizona Corporation Commission refused any recovery of sunk cost, notwithstanding its staff's recommendation that a five-year amortization be allowed.

In the fourth case, in the recent Ohio Supreme Court Decision in Consumer's Counsel v. Public Utilities Commission, the potential impact of a disallowance of prudent utility expenditures on major utility investments became apparent. The facts of the case are that the Central Area Power Coordination Group (CAPCO), which included the Cleveland Electric Illuminating Company (CEI), sought to achieve economies of scale and greater service reliability by jointly planning, constructing, and operating electric generating facilities. Because of the forecasts of substantially increasing demand for electricity in the 1970's and 1980's, based upon the best data then currently available, the CAPCO group committed itself to build four nuclear generating plants. Later, these forecasts were revised substantially downward. In addition, the Nuclear Regulatory Commission in 1979 issued stringent and costly new standards requiring major redesign changes in the Babcock and Wilcox units that CAPCO planned to construct and operate. After much study of redesign, the CAPCO companies decided to terminate the four units on January 23, 1980. When CAPCO announced its decision to terminate its plants, CEI's share of the preliminary expenses in the four cancelled plants was approximately \$56.4 million.

In reversing a decision by the Public Utilities of Ohio, the Ohio Supreme Court held:

that the commission unreasonably and unlawfully exceeded its statutory authority when it approved amortization of CEI's investment in the four terminated nuclear plants.

While the case was actually determined on the issue of whether the cancelled plant expenditures represent "the cost to the utility of rendering the public utility service for the test period" as required in Ohio's statutory language, the court set the test period considerations aside in its reasoning and disallowed the amortization on the grounds that the investment never provided any service whatsoever to the utility's customers. Thus, the disallowance of the utility investment as an expenditure that could be



amortized was based upon a theory somewhat akin to the "used and useful" doctrine, which concerns the inclusion of plant in the ratebase.

As noted in the Ohio decision, the overwhelming weight of authority from other jurisdictions supports amortization of the costs of a plant terminated before it is brought into service. However, Ohio is the only state in which the highest court of the jurisdiction has reached a decision. And while the Ohio Supreme Court based its decision on Ohio Statute, other states have similar statutes requiring plants to be "used and useful" in order to be included in ratebase.

In addition, the FERC Uniform System of Accounts allows only for the amortization of "property abandoned or otherwise retired from service" as an extraordinary property loss. The Federal Energy Regulatory Commission (FERC) has in the past ordered that cancelled plants be amortized. But, state public service commissions using the FERC Uniform Systems of Accounts are not necessarily bound by the FERC interpretation of its Uniform System of Account. Similar issues arise for jurisdictions using the NARUC Uniform System of Accounts, because Account 182 also provides for extraordinary losses, net of income taxes, "on property abandoned or otherwise retired from service." Thus, even though other state courts might give deference to the state public service commission's own administrative interpretation of their statutes, there can be substantial grounds for concern by the industry that other state supreme courts might reach a decision similar to Ohio's. If this happens, the utilities might be caught in a "double-bind." If the utility at the time of the load forecast prudently estimates a load that time shows exceeds actual demand, but the utility completes its construction, the plant might be excluded from the rate base as being excess capacity based on a "used and useful" doctrine. However, if the utility decides prudently to terminate the plant, the prudent and reasonable costs up to the date the plant is terminated might be excluded from rate base because the plant was never brought in service and hence the expense was not service related. Such a result might be viewed as especially burdensome, or inequitable, or as making the utility business more risky than it has been considered historically.

The point of these four cases is that: 1) the present regulatory system is not necessarily binding on the commissions, and 2) these case results, reflecting slower load growth than forecasted and high cost of equity, are new.

Because this type of case results are new, to the degree that something similar to preapproval in the present institutional framework is already taking place, it has yet had little discernible effect. Also, little discernible effect would be expected as the present institutional framework that is similar to preapproval is not necessarily binding on the states. The next question is whether any additional or new types of preapproval would have an effect on cost reduction.

Under traditional regulatory procedures, the status of major utility investments, including coal conversion, is not decided until after construction is completed and the facility is ready to go into operation. If the date of operation is delayed, or if the amount of investment is greater than the original estimate, or if the facility is not permitted to operate due to environmental restrictions, then ratebase recognition of the full investment by the regulatory commission is highly questionable.

Given the nature of the investment, the current inflationary and uncertain economic environment, and the nature of the regulatory process as it currently exists, utilities may favor investments in "safe" programs such as a home insulation program, where regulatory approval is more certain, over other more risky but also potentially more beneficial programs such as coal conversion, where regulatory approval is questionable. The remedy for this type of induced investment bias may be to amend the regulatory process and allow preapproval of certain utility investments, where the benefits to the company and its ratepayers can be clearly demonstrated. This process would reduce the regulatory uncertainty associated with a particular investment program and, thereby, enhance the ability of the utility to acquire financing.

Mr. Peter J. Jadrosich, vice president and associate director of the Corporate Bonds Department of Moody's Investment Service, noted in a paper presented before a recent conference that while he sees some merit to the commission preapproval concept, he finds the practical implementation of the concept fraught with problems. Mr. Jadrosich stated that from Moody's standpoint, anything that reduces the risk of investment acts to improve a company's bond rating. However, he felt that the regulator must weigh the total costs and benefits of a particular action over its useful life to determine the ultimate impact on the consumer and on the investor. In the case of commission preapproval of utility investments, Moody's would focus on the certainty of recovery of the utility's investment and costs in arriving at an appropriate rating for a particular bond issue. The regulator, however, must consider the potential savings associated with proceeding immediately with a particular investment program against the potential costs of ultimate rejection of the program by environmental agencies and the actual cost of delaying the program.

Mr. Jadrosich also stated that regulatory preapproval of utility investments may reduce perceived risks to investors, but not always actual risks. That is, while some peace of mind may be derived from regulatory commission assurances and pronouncements in the early stages of a project, as costs mount and load growth projections change the investor must still bear the risk of regulatory reversal.

One viewpoint is that the financial health of the electric utility industry is deteriorating and that there is a possibility that some utilities might not be able to finance necessary construction over the next decade.

In support of this contention, certain facts are often cited. For instance, from 1976 through 1979 the pretax interest coverage (i.e. the ratio of pretax income to fixed charges) on long-term debt for the electric utility industry averages about 3.0. During 1980, however, the pretax coverage ratio declined to 2.5 with approximately 80 percent of electric utilities experiencing a declining in the ratio. Normally, this ratio is

expected to be about 5.0 or higher. The ratio is an important factor in determining utility bond ratings and hence, the cost of capital. During the same period of 1976 through 1979, the average market to book value for electric utility stocks averaged just below 1.0. During 1980, the average market to book value declined to approximately 0.75 which means that investors expect that the rate of return on equity actually earned will be less than the market cost of common equity. This will cause new common stock issues to be sold at less than book value and cause dilution to occur. Allowing dilution to occur could impede the utility's ability to attract new equity capital. Indeed, the average return on common equity actually earned for the electric industry declined from 11.3 percent in 1979 to 10.5 percent in 1980.

The main factors attributing to this decline in the rate of return on equity actually earned includes inflation, regulatory lag, lagging demand due to conservation and recession, increasing capital needs, and a lack of investor confidence. Most proposals for improving the financial condition of electric utilities are intended to increase cash flow and reduce regulatory lag, thereby lessening the impact of inflation on earnings. These proposals include automatic adjustment clauses, inclusion of construction work in progress in the rate base (CWIP), normalized accounting for accelerated depreciation and investment tax credits, use of future test years in utility rate cases, and limiting the amount of time a commission has to decide a rate case. Commission preapproval of major utility investments, on the other hand, would address increasing capital needs, lagging demand, and hopefully would bolster lack of investor confidence by attempting to assure that demand forecasts, capacity planning and the utility's plans to finance a new major investment meet with the commission's approval. Preapproval might bolster investor confidence because the probability that plants would be excluded from the rate base as excess capacity and that the expenses of a cancelled plant would not be amortized would be lessened.

Thus, some additional or new type of preapproval might have some small effect on risk reduction. However, the risk reduction effect of preapproval will not match that of the regulatory devices and methods that are designed to increase the utility's cash flow.

The next issue is whether preapproval can be made to stick. This issue can be considered through a discussion of the legal concepts of res judicata, estoppel, and stare decisis as they might be applied in various administrative settings for both preapproval of expenditures and preapproval of actions. The essential purpose of res judicata is to prevent the parties in the proceeding from unnecessarily litigating the same question a second time or litigating piecemeal. The doctrine of res judicata is designed for adjudication and works best when applying law to past facts and shifting politics. Res judicata does not apply to a rate order, whether or not fixing rates for the future is deemed to be legislative or judicial, principally because conditions change. The rate for one period may well be inappropriate for another period.

Shifting policy decisions, as well as continually changing circumstances, might be involved in preapproval of major utility investments. Load forecasts, environmental and safety regulations, and the range and types of technologies available to satisfy customer demand change over time. A state public service commission needs to have the flexibility to react to those changes in its policy decisions. Therefore, res judicata would appear to be inappropriate in a preapproval setting.

There is, however, the possibility that a court might attempt to apply res judicata to a preapproval proceeding and thus bind a commission to the past decisions of earlier commissions. This possibility is greatest when the administrative procedure used in a preapproval process purports to be judicial in nature. The possibility would lessen if there is a recognition by the legislature or the courts that the preapproval process is legislative in nature even though these may be a trial-like hearing. There would be a little risk of res judicata being applied to a preapproval process if this

process would take the form of a rulemaking or informal ruling process. The informal ruling process could take the form of advisory opinions and rulings similar to those used by the Internal Revenue Service. If an informal ruling were not formally considered, formally issued statement which the public service commission states is not binding, it is unlikely to be reviewable by the courts. In this case, the issue of res judicata would not arise. Such an informal ruling, while persuasive, might also have little effect.

The doctrine of res judicata can also be avoided if the state public service commission sets forth in clear language in its orders that it is continuing the original proceeding and only entering an interim order. This would prevent res judicata since there would be no final action on the merits upon which res judicata can be based. Such a strategy would allow the state commission to account for changing circumstances.

The doctrines of stare decisis, estoppel, and retroactive law making probably would not in and of themselves bind a future state public service commission from changing a past policy, nor from creating new law, and applying it prospectively. The issue, then, becomes one of whether or not a state public service commission could be prevented from disallowing expenditures based upon either preapproval of expenditures or preapproval of actions. The doctrine of estoppel, either explicitly recognized or implicitly applied, becomes extremely relevant in this case. The key to estoppel is justifiable reliance and a detrimental change in position. The doctrine of estoppel operates to prevent miscarriages of justice. This doctrine might prevent a state commission from disallowing either expenditures or expenses prudently and reasonably incurred by its utility. Without the operation of an estoppel, neither preapproval of expenditures nor preapproval of actions would have any effect different from the present administrative processes concerning major utility expansion plans. Estoppel would operate only if a utility could justifiably rely on a state public service commission's preapproval of an expenditure or an action. Justifiable reliance by the utility upon the actions of the commission would be more certain if clearly established in statutory language.

A state public service commission, which preapproved a utility's expenditures without explicitly providing that the expenditures must be prudent and reasonable, might encourage a utility to make expenditures that are not prudent and reasonable, although in such a case there might be an issue as to whether or not the utility's reliance was justifiable. A well-drafted public service commission order preapproving a utility's actions toward a specified end and only allowing prudent and reasonable expenditures toward that end would avoid these problems.

The final issue is whether preapproval would upset (to a poor result) the traditional roles of utilities as active managers and regulators as aloof holders-to-accountability. To address this issue I will address the degree of state public service commission involvement.

The degree of state public service commission involvement under certain schemes of "preapproval of expenditures" of major facility additions might be no greater than the present level of commission involvement in that the state public service commission could simply preapprove expenditures after examining load forecast, capacity expansion planning, and any securities issuance with which the utility plans to finance the plant. In other words, the degree of state public service commission involvement might be no greater than the present level of involvement in the power siting or certification of convenience and need, and approval of securities issuance processes. However, if such is the case, the utility might lack sufficient economic incentives to ensure rigorous cost control, in effect gold-plating a project by allowing construction cost escalation. This situation can be eliminated if preapproval of the utility's expenditure is set a particular level so that the utility would not have an incentive to exceed that amount.

Even so, there might be no guarantee that the utility's expenditures under a "preapproval of expenditures" would be prudent and reasonable, unless there were continual interaction between the public service commission and the utility management. This would be so because the

definition of "preapproval of expenditures" does not provide for the traditional post-construction review of whether the expenditures were prudent and reasonable before the expenditures are placed in the rate base. There are at least two risks to such a course of action. One risk is that the commission might in effect be co-opted by the utility so that the commission might not only lose its objectivity and independence in determining the appropriateness of expenditures, but also be estopped (i.e. prevented) from disallowing any expenditures it would have otherwise determined to be imprudent and unreasonable. Another risk is that the state commission staff by becoming involved in the day-to-day management of the utility may violate the utility's "managerial prerogatives", especially if commission staff interfered with sound business practices of the utility.

The degree of state public service commission involvement in "preapproval of actions" need not be greater than the existing level of commission involvement, except that it might consolidate several of the present proceedings into one. Of course, if the preapproval of actions process involves checking intermittently for changing circumstances, such checking would probably involve, in most states, increased commission involvement. The commission's involvement would neither necessarily co-opt the staff by involving them in the day-to-day managerial decisions of the utility, nor necessarily encroach on the utility's managerial prerogatives. Rather, the involvement might periodically review the circumstances concerning the need and feasibility of the plant in light of changed circumstances and give the utility guidance as to whether its present course of action is prudent and reasonable in the view of the commission. However, this would definitely change the role of the regulator from being an aloof holder-to-accountability to a manager of the utility's long range purchases. Whether or not this is viewed as upsetting (to a poor result) the traditional roles of utilities and regulators depends upon whether preapproval is viewed as a risk shifting or a risk reduction device.



Preapproval of expenditures can be viewed as shifting risks from the stockholder to the ratepayer because there is no guarantee that the utility's capital expenditures will be prudent and reasonable. Preapproval of actions, on the other hand, can be viewed as either risk shifting or risk reducing depending on the view of the public service commission concerning who ought to bear regulatory risk, the ratepayer or the stockholder.

In summary, preapproval of major utility investments is a concept that state public service commissions might find useful to examine, particularly if the state public service commission is of the opinion that regulatory risks, i.e., the risks that prudent and reasonable capital expenditures will come to naught due to the risks of changing regulations, ought to be borne by the ratepayer.

Even if the state public service commission has such a philosophical outlook, it might decide to avoid "preapproval of expenditures" because of the likelihood of risk shifting. Nonetheless, preapproval of expenditures might be a useful device when coupled with an incentive mechanism to discourage construction cost overruns.

Preapproval of actions might be a viable risk reduction alternative in states where the costs of cancelled plants are amortized. It might be useful, because: it would allow the state public service commission to explicitly review the utility's construction program; it would consolidate existing proceedings, and it would send clear regulatory signals to the utilities so that they might be more likely to invest in coal conversion, nuclear plants, and other major investments with a high degree of regulatory risk.

# CALCULATING MARGINAL COSTS FOR A GAS DISTRIBUTION UTILITY

- I. AGGREGATE PLANT AND O&M COSTS.
- II. COMMUNITY PLANT DISTRIBUTION COST.

# AGGREGATE COST FUNCTIONS

## DATA SOURCES

119 U.S. GAS DISTRIBUTION UTILITIES

1979 ANNUAL PUC REPORTS

1979 AGA UNIFORM STATISTICAL REPORTS

## DATA CHARACTERISTICS

### A. PLANT IN SERVICE

TRANS = Transmission (FERC 365 → 371)

TDIST = distribution (FERC 374 → 387)

TGEN = general (FERC 389 → 398)

### B. OPERATION AND MAINTENANCE (O&M) COSTS

TROXP, TRMXP = transmission (FERC 850 → 867)

TDOXP, TDMXP = distribution (FERC 885 → 905)

CAO = customer accounts (FERC 901 → 905)

CSO = customer service & information (FERC 907 → 910)

SAO = sales expenses (FERC 911 → 916)

AGO, AGM = administrative and general expenses  
(FERC 920 → 932)

### C. MARKET DATA

RMEF, CIMCF = sectoral sales: residential / comm.-industrial

RCUS, CICUS = sectoral numbers of customers

AREA = service territory area (sq. miles)

CUSTOMER SIZES : Derived variables

$$RCUZ = RMCF / RCUS$$

$$CICUZ = CIMCF / CICUS$$

Other data : 3-digit FERC Accounts  
(not used)

Monthly peak sales

Peak-day sendouts

Salaries / number of employees

## MODEL SPECIFICATION

$$Y = K * RMCF^{\alpha_1} * CIMCF^{\alpha_2} * RCUZ^{-\beta_1} * CICUZ^{-\beta_2}$$

$$Y = K + a_1 RMCF + a_2 CIMCF - b_1 RCUZ - b_2 CICUZ$$

Alternatively, replace  $\begin{cases} RMCF \text{ by } RCUS \\ CIMCF \text{ by } CICUS \end{cases}$

Multiplicative model  $\rightarrow$   $\begin{cases} \text{non-separability of costs} \\ \text{economies / diseconomies of scale} \end{cases}$

Approach : stepwise regression analysis

# SELECTED RESULTS

## A. PLANT IN SERVICE

$$\text{TRANS} = -2,482,629 + 0.24 * \text{RMCF} + 0.54 * \text{CIMCF} + 553 * \text{AREA}$$

$(1.54) \qquad\qquad (5.07) \qquad\qquad (2.67)$

$$R^2 = 0.822 \quad N = 52$$

---

$$\text{TDIST} = 566.9 * \text{RMCF}^{0.878} * \text{CIMCF}^{0.117} * \text{RCU}^{-0.990}$$

$(16.39) \qquad\qquad (2.45) \qquad\qquad (10.94)$

$$R^2 = 0.953 \quad N = 119$$

---

$$\text{TGEN} = 0.765 * \text{RMCF}^{0.502} * \text{CIMCF}^{0.421}$$

$(3.20) \qquad\qquad (2.94)$

$$R^2 = 0.659 \quad N = 117$$

## B. OPERATION AND MAINTENANCE COSTS

$$\text{TDOXP} = 13.908 * \text{RMCF}^{0.919} * \text{CIMCF}^{0.075} * \text{RCU}^{-0.878}$$

$(17.79) \qquad\qquad (1.63) \qquad\qquad (10.07)$

$$R^2 = 0.957 \quad N = 116$$

---

$$\text{CAO} = 17.89 * \text{RCUS}^{1.012}$$

$(55.9) \qquad\qquad R^2 = 0.965$   
 $N = 116$

---

$$\text{CSO} = 0.0019 * \text{RMCF}^{0.729} * \text{CIMCF}^{0.384}$$

$(3.13) \qquad\qquad (1.73) \qquad\qquad R^2 = 0.627$   
 $N = 75$

$$SAO = 2.041 * RCUS^{0.973} \quad R^2 = 0.364$$

(7.18) N = 92

---

$$AGO = 27.6 * RMCF^{0.820} * CIMCF^{0.131} * RCUZ^{-0.692} * CICUZ^{-0.640}$$

(11.31) (1.95) (5.46) (1.00)

$R^2 = 0.924 \quad N = 116$

---

## MARGINAL COST CALCULATIONS

### A. DISTRIBUTION PLANT

$$MC(RMCF) = \frac{\partial TDIST}{\partial RMCF} = 497.7 * RMCF^{-0.122} * CIMCF^{0.117} * RCUZ^{-0.990}$$

$$MC(CIMCF) = \frac{\partial TDIST}{\partial CIMCF} = 66.3 * RMCF^{0.878} * CIMCF^{-0.883} * RCUZ^{-0.990}$$

Average utility  $\left\{ \begin{array}{l} RMCF = 33,071,717 \\ CIMCF = 49,591,488 \\ RCUZ = 119.13 \end{array} \right. \quad (MCF)$

$$\begin{aligned} \rightarrow \overline{MC}(RMCF) &= 4.214 \text{ \$/MCF} \\ \overline{MC}(CIMCF) &= 0.374 \text{ \$/MCF} \end{aligned}$$

Ⓐ Replacement plant multiplier = 2.5

$$\rightarrow \left\{ \begin{array}{l} \overline{MC}(RMCF) = 10.535 \\ \overline{MC}(CIMCF) = 0.935 \end{array} \right\} \text{ \$/MCF}$$

(1979 dollar)

$$\overline{MC}(\text{RMCF}) / \overline{MC}(\text{CIMCF}) = 11.27$$

Average residential customer marginal cost:

$$\text{RCUZ} = 119.13 \text{ MCF} \rightarrow \text{MC} = 10.535 * 119.13 = \$1255$$

This marginal cost includes short-term hook-up costs and long-term system adjustment costs

### B. DISTRIBUTION OPERATION COST

$$\text{MC}(\text{RMCF}) = \frac{\partial \text{TDOXP}}{\partial \text{RMCF}} = 12.781 * \text{RMCF}^{-0.081} * \text{CIMCF}^{0.075} * \text{RCUZ}^{-0.878}$$

$$\text{MC}(\text{CIMCF}) = \frac{\partial \text{TDOXP}}{\partial \text{CIMCF}} = 1.043 * \text{RMCF}^{0.919} * \text{CIMCF}^{-0.925} * \text{RCUZ}^{-0.878}$$

$$\text{Average utility} \rightarrow \left\{ \begin{array}{l} \overline{MC}(\text{RMCF}) = 0.1786 \\ \overline{MC}(\text{CIMCF}) = 0.0097 \end{array} \right\} \text{ \$/MCF (1979 dollar)}$$

$$\overline{MC}(\text{RMCF}) / \overline{MC}(\text{CIMCF}) = 18.41$$

### EXTENSIONS OF THE ANALYSIS

- Introduction of new variables: labor costs, regional indices, load factors, peak loads
- Disaggregated 3-digit FERC Accounts analysis
- Analysis of other cost categories: natural and manufactured gas production, LNG, storage (above/underground)

# COMMUNITY DISTRIBUTION PLANT COSTS

## FORMER STUDIES

- Too much prototype-related (Real Estate Research Corporation)
- Refer only to urban extensions
- Do not account for metropolitan-wide cost implications (reinforcement of the existing network)
- Focus only on the residential sector

## PRESENT APPROACH

- Extends the aggregate plant cost analysis
- Accounts for additional variables such as:
  - \* population density
  - \* degree-days measures
  - \* load factors and load shares
  - \* heating vs. non-heating customers, etc.
- Sales and customer sizes are adjusted for normal degree-days



CAPITAL COSTS OF PROVIDING GAS TO THOUSAND HOUSING UNITS  
IN SIX NEIGHBORHOODS

Variable	Neighborhood					
	A Single Family Conventional	B Single Family Clustered	C Townhouse Clustered	D Walk Up Apartments	E High Rise Apartments	F Housing Mix (20% A,B,C,D,E)
Total Pipeline Length	56,000'	35,800'	22,800'	13,604'	8,055'	25,500'
% of Road Length	90%	80%	80%	80%	90%	85%
Cost Per Linear Foot of Pipe	\$2.30	\$2.30	\$2.30	\$3.00	\$3.00	In proportion to the Housing Mix
Total Pipeline Cost	\$124,200	\$82,340	\$52,440	\$40,812	\$24,165	\$64,791
Overhead and Profit	\$37,260	\$24,702	\$15,732	\$12,244	\$7,249	\$19,437
Total Capital Cost	\$161,460	\$107,062	\$68,172	\$53,056	\$31,414	\$84,228

Source: The Costs of Sprawl: Detailed Cost Analysis. U.S. Government Printing Office, 1974.

## GAS UTILITIES

LONG ISLAND LIGHTING COMPANY : 58 communities

COLUMBIA GAS OF OHIO, INC. : 24 communities

PACIFIC GAS AND ELECTRIC COMPANY : 94 communities

NATIONAL FUEL GAS DISTRIBUTION CORP. : 33 communities

EAST OHIO GAS COMPANY : 43 communities

PEOPLES NATURAL GAS (IOWA) : 21 communities

## DATA SOURCES

\* 1979 Annual PUC Reports

\* Data prepared by the company (PG&E, NFGDC, EDGC, PA

\* New York State Board of Equalization and Assessment

\* 1970 Census of Population

MODELS COEFFICIENTS IN THE CASE OF THE TWO-SECTOR AGGREGATION

Company	Multiplicative Constant	$\alpha_1$ Residential Sales Elasticity	$\alpha_2$ Commercial/Industrial Sales Elasticity	$\beta_1$ Residential Customer Size Elasticity	$\beta_2$ Commercial/Industrial Customer Size Elasticity	$\gamma$ Density Elasticity	$R^2$
LILCO	270.65	0.6783	0.2625	-0.1756	-0.2789	-0.2505	0.952
CGO	446.64	0.8502	0.1329	-0.5789	-0.2084	-0.2559	0.995
PG&E	397.02	0.7872	0.1435	-0.4416	-0.1437	-0.2746	0.940
NFGDC	143,738.80	0.6863	0.3401	-1.6755	-0.3167	-0.2049	0.904
EOGC	434.50	0.7494	0.1649	-0.5035	-0.0985	-0.0672	0.981
PNG	1,709,431.80	0.6186	0.5103	-2.1955	-0.5290	-0.0000	0.979
	K	RMCF	CIMCF	RCUZ	CICUZ	TEDN	

$$DPS = K * RMCF^{\alpha_1} * CIMCF^{\alpha_2} * RCUZ^{\beta_1} * CICUZ^{\beta_2} * TEDN^{\gamma}$$

# DATA FOR INTER-UTILITY MODEL COMPARISONS

## LOAD FACTORS AND MAXIMUM MONTHLY DEGREE-DAYS

Company	Maximum Monthly Degree-Days DD <sub>max</sub>	MONTHLY LOAD FACTORS			Daily Load Factor (1979) Total Market
		Residential Market	Commercial Industrial Market	Total Market	
LILCO	1029	0.550	0.559	0.628	0.354
CGO	1150	0.499	0.701	0.599	0.425
PG&E	692	0.556	0.793	0.645	0.494
NFGDC	1280	0.527	0.664	0.587	0.436
EOGC	1208	0.496	0.674	0.580	0.404
PNG	1414	0.486	0.756	0.624	0.556

## AVERAGE MARKET SIZE PARAMETERS

Company	Residential Sales (MCF)	Commercial/ Industrial Sales (MCF)	Total Sales (MCF)	Residential Customer Size	Commercial/ Industrial Customer Size (MCF)	Total Customer Size (MCF)	Population Density (people/acre)
LILCO	415,169	304,293	692,843	86.716	745.088	156.963	9.734
CGO	2,749,610	1,025,960	3,775,570	149.218	700.241	185.334	5.502
PG&E	1,827,815	1,739,220	3,571,712	94.256	1,453.701	176.749	5.970
NFGDC	1,164,969	1,154,172	2,319,060	155.590	2,731.041	291.540	6.053
EOGC	1,402,734	2,141,275	3,540,149	167.463	3,404.882	388.219	4.186
PNG	476,086	613,004	1,092,571	147.361	1,025.545	283.386	2.615

# EXTENDED MODELS

## I. PACIFIC GAS AND ELECTRIC

$$\text{DPS} = 0.3745 * \text{ARMCF}^{0.732}_{(16.43)} * \text{ACIMCF}^{0.193}_{(5.02)} * \text{ACICU}^2_{(4.34)} \\ * \text{LFRM}^{-0.423}_{(1.49)} * \text{DDM}^{0.765}_{(2.15)} * \text{TEDN}^{-0.205}_{(6.18)} \quad R^2 = 0.948$$

ARMCF, ACIMCF, ACICU<sup>2</sup> : normalized sales & customer size

LFRM : residential monthly load factor

DDM : maximum normalized monthly degree-days

## II. PEOPLES NATURAL GAS

$$\text{RDPS} = 62.9515 * \text{RMCFH}^{0.6338}_{(8.53)} * \text{RMCFN}^{0.0512}_{(2.00)} * \text{CMCF}^{0.2983}_{(3.16)} \\ * \text{IMCF}^{0.1163}_{(2.40)} * \text{RCU}^2_{(0.95)} * \text{CCU}^2_{(1.49)} * \text{ICU}^2_{(2.53)}$$

$$N = 96 \quad R^2 = 0.965$$

RDPS = replacement distribution plant

RMCFH/RMCFN = heating/non-heating residential sales

## INTER-UTILITY COMPARATIVE ANALYSIS

Sales elasticity : YRF, YCF

$$YRF = 0.6067 + 0.9077 * 10^{-7} * XRF \quad R^2 = 0.96$$

(6.17)

$$YCF = 0.3994 - 0.1207 * 10^{-6} * XCF \quad R^2 = 0.31$$

(1.36)

Customer size elasticities : YRZ, YCZ

$$YRZ = 2.6545 - 8.0583 * XLFD \quad R^2 = 0.50$$

(2.00)

$$YCZ = 0.2602 - 1.1756 * XLFD \quad R^2 = 0.29$$

(1.29)

Population density elasticity : YSD

$$YSD = -0.249 * 10^{-5} * XD^{6.0119} \quad R^2 = 0.70$$

(3.11)

### Conclusions

- \* Sectoral sales elasticities sensitive to sectoral market size
- \* Localized economies of scale with higher load factor
- \* Higher economies of scale with higher densities

## PNG MARGINAL COST CALCULATION

Hypothetical community : - RMCFH = RMCFN = CMCF = IMCF =  
100,000 MCF

- RCUZNF = 30  
CCUZ = 500  
ICUZ = 15,000 } MCF

$$MC (RMCFH) = 9.6576$$

$$MC (RMCFN) = 0.7800$$

$$MC (CMCF) = 4.5453$$

$$MC (IMCF) = 1.7722$$

} \$/MCF





APPENDIX C  
LIST OF ATTENDEES

The names listed are those submitted by the attendees on a registration form at the meeting.



Joe Barton  
Michigan Public Service Commission

Rich Beary  
Iowa State Commerce Commission

Marlene Bingham  
Arkansas Public Service Commission

Todd Carden  
West Virginia Public Service Commission

Terry Carloch  
Idaho Public Utilities Commission

Sheldon Chazih  
Rural Electric Administration

Dell Coleman  
Kentucky Public Service Commission

Don Craig  
Georgia Public Service Commission

John Dial  
Pennsylvania Public Utility Commission

Walter Edger  
Rhode Island Public Utilities Commission

Mike Foley  
National Association of Regulatory Commissioners

Greg Follensber  
Florida Public Service Commission

Jack Gibbons  
California Public Utilities Commission

Dave Hill  
Alabama Public Service Commission

Archie Holbert  
Idaho Public Utilities Commission

Sam Housley  
Maryland Public Service Commission

Erick Kenworthy  
Wyoming Public Service Commission

Ben Knowles  
Georgia Public Service Commission

Eric Leighton  
New York Public Service Commission

John Lorez  
Federal Energy Regulatory Commission

Bill Meyer  
Missouri Public Service Commission

Roland Miller  
Connecticut Department of Public Utility Control

Hobart O'Brien  
Wyoming Public Service Commission

Joe O'Hara  
Pennsylvania Public Utility Commission

Ray Paetzke  
North Dakota Public Service Commission

Tom Peel  
Utah Public Service Commission

Kathy Randall  
Kentucky Public Service Commission

Jim Richards  
Colorado Public Utilities Commission

Ed Sigurdson  
Oregon Public Utility Commissioner

Ed Skipton  
Ohio Public Utilities Commission

Steve Streckler  
Federal Communications Commission

Bill Tallott  
Florida Public Service Commission

Ed Vassar  
Virginia State Corporation Commission

Pam Walker  
Virginia State Corporation Commission

Sam Weaver  
Georgia Public Service Commission

APPENDIX D  
LETTERS FROM ERIC LEIGHTON

Two congratulatory letters from Eric Leighton, the Chairman of the NARUC Staff Subcommittee on Accounting, are attached to this report.



# STATE OF NEW YORK DEPARTMENT OF PUBLIC SERVICE

THREE ROCKEFELLER STATE PLAZA, ALBANY 12223

## PUBLIC SERVICE COMMISSION

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RICHARD E. SCHULER  
ROSEMARY S. POOLER



DAVID E. BLABEY  
Counsel

SAMUEL R. MADISON  
Secretary

September 22, 1981

Mr. Robert Burns  
The National Regulatory Research Institute  
2130 Neil Avenue  
Columbus, Ohio 43210

Dear Bob:

We were happy that you could join us for two days of the meeting in Rapid City before the NRRI presentation. You did an excellent job pinch-hitting for Kevin Kelly as well as with your own presentation. It was very well received. Thanks again and please convey my thanks to the other panel members.

Sincerely,

A handwritten signature in cursive script that reads "Eric A. Leighton".

ERIC A. LEIGHTON

Chairman, NARUC Staff Committee on Accounting and  
Director, Office of Accounting & Finance

EAL:ns

September 22, 1981

Mr. Kevin Kelly  
The National Regulatory Research Institute  
2130 Neil Avenue  
Columbus, Ohio 43210

Dear Kevin:

We were sorry you could not join us in Rapid City because of illness, and I hope you feel better now. Rest assured that your team did extremely well. Robert Burns kept the program moving well and made a fine presentation himself. Please accept our heartfelt thanks for sending such a fine team and putting together such an interesting program.

Sincerely,

ERIC A. LEIGHTON  
Chairman, NARUC Staff Subcommittee on Accounting and  
Director, Office of Accounting & Finance

EAL:ns

cc: R. Burns ✓