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FINANCIAL OVERVIEW OF INTEGRATED COMMUNITY ENERGY SYSTEMS

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by

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FORWARD

ENERGY CONSERVATION VIA INTEGRATED COMMUNITY ENERGY SYSTEMS

This report is part of a series of studies designed to analyze the commercialization potential of various concepts of community-scale energy systems that have been termed Integrated Community Energy Systems (ICES). This report documents a case analysis of alternative ICES concepts applied to a major metropolitan development complex. The intent of this study is twofold: (1) to develop a framework for comparing ICES technologies to conventional energy supply systems and (2) to identify potential problems in the commercialization of new systems approaches to energy conservation.

The Need for Integrated Community Energy Systems

Events of recent years have created public demand at the community as well as the national level for energy supply systems that are energy-conserving, safe, environmentally acceptable, reliable, and "price stable"--that is, consumers can expect that their energy expenditures will be a relatively constant share of their total budgets. The Integrated Community Energy Systems (ICES) Program of the ERDA Office of Energy Conservation is designed to develop community-scale energy systems with these characteristics. These systems will represent an integration of community design planning and energy technology concepts and will help achieve the national goal of conserving energy, and, in particular, of conserving scarce fuels.

A Definition of "Community"

The definition of "community" as used in the phrase "integrated community energy systems" is: a complex of buildings (and open space that are employed in human activities and that are connected by networks for moving people and their messages, as well as goods and services, to residential, commercial, industrial, agricultural, recreational, or cultural; the "networks" may be transportation routes or modes, pipelines, communications links, telephone or electrical transmission lines, etc. Superimposed on the physical landscape of any community are complex political, social, and economic systems and jurisdictions that determine the types and levels of the community's activities. Thus, a "community" may be as diverse as a municipal or suburban business district, a farm community, or a multiply-zoned Planned Unit Development to name only a few. Furthermore, the ICES Program is conceived for communities in various stages of development in both new and redeveloped areas.

Integrated Community Energy Systems and Their Role in Communities

An integrated community energy system is more than a new hardware system -- although equipment certainly would be part of an ICES. Neither can the concept be limited to simply designing buildings or arranging activities in space. An integrated community energy system would not

necessarily supply only a single service, e.g., electricity, in an energy-conserving fashion, such as by recovering waste heat from the energy system. Rather, the whole ICES concept seeks an optimal combination of all of these dimensions to meet the energy requirements of a particular community. An ICES -- as an investment in integrated human, building, network, and machine systems -- would become an integral part of the larger community providing energy-using services to support the residents' lifestyles in a stable and environmentally sound fashion.

Designs for Energy-Conserving Communities

Energy conservation in a community development can be accomplished by:

1. Reducing or minimizing energy consumption in a development plan via design options linked to existing, conventional energy supply systems. This assumes that development design is independent of the energy supply. Achieving this objective will require:
   - choice of activity (residential, commercial, public, etc.) mix to facilitate the intended community functions,
   - choice of building types and density to achieve energy conservation while meeting the expectations of building users, and
   - careful attention to site planning with sensitivity to local topography and climate and to internal circulation requirements as they affect energy consumption.
2. Designing energy conserving supply systems to meet the demands of a given community. This assumes that the development plan is fixed and merely produces energy demand load profiles and engineering design parameters. Achieving this goal will require:
   - reliable delivery of primary (electrical and thermal) services in an energy-conserving fashion,
   - electrical (or other) grid or non-grid connected systems when appropriate,
   - incorporation of appropriate, ancillary energy-related services, such as solid and liquid waste recovery, wastewater treatment, transportation, and communication, and
   - development and demonstration of new energy-conserving technologies and systems in the community context.

ICES Program Objectives

The major thrust of the ICES Program combines both of the above design options whereby the entire development design, including energy supply, is allowed to vary in a systematic manner to achieve specific design criteria while simultaneously minimizing or reducing energy consumption. In this case, the development plan and energy supply system are designed simultaneously. Achieving this objective will require integration of the various fields of technology, institutions, organizations, and processes that:

- design and build communities and energy systems,
- finance community development and utility services, and
- own, operate, and regulate community development and energy and waste management systems.

Some circumstances exist under which energy or scarce fuels can be conserved within the community structure while simultaneously benefiting all vested interests in community development. That these targets of opportunity exist is implied by recent construction of solid-waste recovery systems used in conjunction with steam or electrical generation facilities in various municipalities throughout the country. Under these conditions, the objective of the ICES program would be to identify those opportunities and to provide the necessary information and technical assistance to bring about implementation.

A second set of circumstances may also exist where energy might be conserved by proposed community energy system development, but not all vested interests would benefit from the venture; in fact, there would be a net cost to some parties. In this case, the classical tradeoff situation would exist whereby some parties would have to be compensated to encourage their support; this would involve a change in public policy, such as a modification of regulatory requirements or a transfer of payments of one form or another. Another major objective of the ICES Program is to identify the costs and benefits of such policies to delineate the high payoff strategies that would bring energy conservation into balance with other social goals.

A third set of circumstances may exist where significant energy saving can be achieved by the application of an emerging, possibly untried technology or a novel synthesis of existing technology. In this case, investment from the private sector may not be readily forthcoming because of the high risks involved. The ICES program would then undertake development and demonstrations programs to prove out these concepts and thus encourage their commercialization.

Finally, the ICES program seeks to integrate and apply emerging technologies within the community context that have been developed within other energy RD&D programs. Simultaneously, ICES seeks to identify specific RD&D objectives for these programs that could further benefit the community energy system concept.

This general definition of objectives for Integrated Community Energy Systems can be understood to apply to such diverse potential recipients as:

- municipalities owning and operating utility systems,
- municipalities served by private utility companies,
- redevelopment projects and new community developments, and
- institutional building complexes and campuses.

Summary

In brief, the ICES Program is intended to identify the opportunities for energy conservation in the community context through analysis, development, and/or demonstration of:

- location and design of buildings, building complexes, and infrastructure links,
- engineering and systems design of existing, emerging, and advanced energy production and delivery technologies and systems,
- regulatory designs for public planning, administration, and regulation of energy-conserving community development and energy services, and
- financial planning for energy-conserving community development and energy supply systems.

EXECUTIVE SUMMARY

FINANCIAL OVERVIEW OF INTEGRATED COMMUNITY ENERGY SYSTEMS

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For the purpose of this financial overview, the objective of the integrated community energy systems (ICES) commercialization program is the promotion of joint capital investments by utilities and municipalities (or developers) to conserve fuel possibly in the provision of two or more utility services. This objective is broader in scope than those identified with past system development and demonstration programs but narrower than the entire scope of efforts to promote community energy conservation. Factors affecting commercialization, defined in this sense, are limited to those affecting utility or municipal investment decisions.

Traditionally, the ranking of utility investment programs according to their effect on the cost of customer service is the method used by regulatory commissions, investor-owned utilities, and municipalities. Thus, ICES adoption depends on a demonstration that ICES will lower the cost of service while not adversely, financially affecting the provider of the service. However, utility investment decisions are complicated by regulatory conditions specific to the utility and to the service area. This study highlights some of the more significant regulatory conditions and trends that would either encourage or discourage adoption of ICES as an investment opportunity. Among the major regulatory factors that tend to improve the financial performance of ICES, four are significant.

First, many potential ICES applications appear to be in areas where federal grants or loan guarantee programs already exist and which might be used to finance an ICES as part of a larger project. Such programs include rural electrification, hospital construction, governmental building construction, environmental facility projects, urban redevelopment, etc. Preliminary discussions with federal construction grant officers uncovered no restrictions in the use of an ICES as part of a project that would otherwise qualify for a federal grant or loan.

Second, many areas of the country are now threatened by interstate natural gas curtailments. Federal Power Commission projections indicate that the level of interstate curtailments will be 19% of the total natural gas market in 1976. In affected areas, ICES investments will no longer directly compete with low-priced natural gas but with electrical resistance heating and other costlier sources of energy. To sell housing or commercial developments, developers may be required to adopt innovative methods to ensure a reliable source of energy.

Third, the cost of solid-waste disposal is rising rapidly, partly because of environmental restrictions on the operation of conventional land fills and incinerators. In cities with populations over 100,000, 70% of which use incineration, solid-waste disposal cost may run $7 to $12 per ton, or more. The trend in such costs already is encouraging municipalities, sometimes in cooperation with local utilities, to offset these costs by using solid waste as an energy source.

Fourth, a recent trend in electrical rate regulation has been the emergence of off-peak rates, designed to shift the electrical demand profile facing a utility. Inducing electrical usage in off-peak hours reduces the required generating capacity of the utility and improves plant utilization. The impetus for off-peak pricing has come from regulatory commissions. Ten states presently are considering or experimenting with off-peak schemes. The peak price per kilowatt hour can be as much as 400% higher than off-peak rates.

Such pricing policies, adopted in Europe, have led to investments in thermal storage systems which are heated in off-peak hours and supply some of the heating load in peak periods. Community storage systems, introduced under peak load pricing conditions, may alter drastically the economies of district heating operations.

Certain significant regulatory factors raise the financial risk of adopting ICES. For example, regulatory commissions discourage investor-owned utilities from expanding into service areas outside their charter. However, utilities have formed holding companies that have invested in propane distribution, synthetic gas facilities, petrochemicals, and other energy-related products. Because such activities border on the fringe of charter restrictions, there is a reluctance among utilities to actively and openly promote diversification of the type required by ICES operations. Although

federal guidelines do not prohibit ICES usage as part of a qualifying construction project, neither do they generally encourage conservation. Conventional practice has not normally included ICES-type operations; thus, grant requesters are reluctant to propose innovative utility systems.

Municipalities and states have seen their debt rise by as much as 100% in the last decade because of the impact of inflation, environmental and health requirements, labor union requests, deteriorating tax base, etc. The first area of economizing for local governments has been "postponable" capital construction projects. The capital expenditures for such projects dropped by $5.4 billion in 1974. The aftermath of the recession has left many governmental units cautious about assuming new responsibilities requiring large capital outlays.

Finally, the present uncertainty in the fuel markets, caused partly by environmental regulations, frequently is disadvantageous for smaller utility operations. Without the ability to secure large long-term contracts for fuel and its transportation, ICES operations may be subject to wide swings in prices in the spot fuel markets. Differentials of over 120% have occurred in the last two years between the price large investor-owned utilities pay for coal and the spot market price.

In view of factors that aid or inhibit the ICES commercialization effort from a financial perspective, we recommend the following actions for ERDA consideration:

1. Negotiations with federal construction project offices should be initiated to explore ways of strengthening the incentives to adopt energy-conserving technologies, such as ICES in federally supported construction.

2. A policy statement regarding utility diversification into ICES areas is needed from utility rate commissions. A more thorough investigation, however, of the effects of utility diversification on the cost of service will be required to initiate the process culminating in an ICES rate commission policy. Argonne National Laboratory is considering a conference on utility investment diversification.

3. Given the novelty of ICES applications in the overall investor utility picture, some tax incentive may be necessary initially to encourage ICES investment. A shorter tax writeoff for equipment (60 months) might be feasible if the potential for technical obsolescence of ICES systems is significant.

4. Municipalities need some way of reducing initial capital outlays for ICES, given their reluctance toward new capital spending. A new federal grant program would suffice, but the creation of such a program would be a significant undertaking. An alternative is to set up a municipal loan guarantee program to reduce the default risk of an ICES investment. Some demonstration projects may be viable using as incentives, loan guarantees rather than grants. A third option might be to use the guarantee to back a state non-profit leasing corporation or a conventional leasing company willing to specialize in ICES investments. These alternatives would have to be explored further.

5. Municipalities facing natural gas curtailments should be actively encouraged and aided in planning for supplies of alternative energy sources. A publication, indicating the potential of ICES and its relative cost compared with electrical resistance heating, for example, should be developed for these communities.

6. The entire question of future fuel prices for smaller utility operations is critical to ICES commercialization efforts. The problem of forecasting such price variations to aid in ICES investment analysis is only one aspect of the question. A second aspect is what can be done to aid ICES operators in securing a reliable fuel supply. The most dramatic solution would be the organization of a fuel futures market so that low-volume buyers could be assured of future price stability. Other arrangements might involve the creation of fuel purchasing cooperatives or allowing larger utilities to go partially into the business of selling fuel to ICES operations under long-term contracts. This final option again involves the utility diversification issue.

7. A proper method for the evaluation of ICES alternatives *from the overall viewpoint of public policy* must be developed. Here dollars, Btu used of various kinds, and environmental considerations must be included. Those ICES alternatives found to be attractive on the basis of this evaluation should be promoted using whatever federal devices seem appropriate -- ranging from grants, loan guarantees, tax breaks, pressure on state regulatory bodies, etc, so that the ICES projects, after the federal intervention, appear attractive to the individual home owner, developer, municipality, or utility -- whoever the user of an ICES option is likely to be.

1 INTRODUCTION

The scope of the commercialization study of integrated community energy systems (ICES) depends critically on what operational definition of ICES is adopted. In this financial analysis, the term ICES will mean any capital investment undertaken by a community alone, or in concert with a utility, for the purpose of providing one or more utility service(s) in a scarce-fuel conserving fashion. This definition is broader in scope than many of the former integrated energy system study concepts (where specific technical or system configurations were investigated) but narrower than the conceptual framework that encompasses the entire relationship between community design and conservation.

The goals of this investigation, reflecting the use of this definition, are twofold:

1. to provide an overview of the utility and municipal investment decision-making process, and

2. to identify promising federal initiatives that may aid in encouraging ICES investment.

Three specific questions will be addressed in the sections that follow:

1. Under what financial conditions will a utility and municipality be most likely to undertake projects to provide utility services in a scarce-fuel conserving manner? This question will be analyzed assuming the existing utility and municipal regulatory framework. The objective is to identify, from a financial viewpoint, promising market areas for ICES.

2. How can ICES projects be financed? What financial instruments are available, and what effect does their use have on the capital cost of a project?

3. What actions might be taken to alter the regulatory framework in such a way as to encourage ICES commercialization?

2 PRIVATE AND PUBLIC UTILITY INVESTMENT DECISION FRAMEWORK

The general objective of both private utilities and public agencies engaged in providing utility services is to provide a specified level of service at a minimum cost. Private utilities and the public agencies normally must deliver these services for periods longer than the life of any specific utility capital investment. The choice of the methods of providing these services, therefore, involves the analysis of the lifetime costs of alternative investment programs and their impact on the cost of service. The objective of minimizing the cost of service is subject to a great many regulatory constraints that affect the final patterns of investment.

For private utilities, one of the most significant of such constraints is the regulatory specification of a rate of return on invested capital. The major reason that investment decisions can be expressed in terms of minimizing the cost of service instead of maximizing corporate profits is that the rate of return is fixed by a regulatory commission. A company is allowed enough revenue to cover its direct-operating expenses and still allow a reasonable rate of return on invested capital. This rate has varied from about 10% to 14%.

A second institutional constraint affecting utility investment decisions is that utilities must furnish service on demand to their customers. Even if a return, that is greater than that allowed by the regulatory commission, could be earned in another area, a utility is not free to withdraw its investment from a regulated area.

Third, the regulators can specify whether any particular outlay is a resonable cost. For example, expenditures on specific components in the production process may come under review. Moreover, if input prices, such as the price of fuel to generate electricity, rise sharply, there may be long delays before the cost can be passed on to the customer in the form of higher rates. In the intervening period, the rate of return may be less than reasonable.

Fourth, all investments are scrutinized to determine if they are necessary outlays. The regulator can effectively disallow investments, for example, that were made to provide service to an area in anticipation of future growth if that growth is not forthcoming. Therefore, if transmission

lines are laid that have a capacity to serve 200 customers (which the area is forecast to have) but the area only has 50 customers now, the excessive investment may not be allowed to enter the rate base.

Fifth, the regulatory bodies can determine what capital structure (i.e., how much debt and equity) is appropriate for the utility. They do this by first determining the cost of debt and the cost of equity. If these two costs differ, regulatory agencies can allow a rate of return on invested capital that covers the cost of securing these funds in the debt-equity ratio they deem appropriate. For example, assume that a utility has 50% debt financing and 50% financing from common and preferred stock. The commission finds that the debt costs are 5% and the equity costs are 10%. The average cost of capital is thus 7.5%. If this value is used, the company would earn 7.5% times its rate base above its operating costs. However, if the commission finds that a more appropriate capital structure would be 60% debt and 40% equity, it may allow an average of only 0.6 x 0.5 + 0.4 x 0.1 or 7% rate of return.

A fifth institutional constraint on utility investment decisions is regulatory control over the rate structure. The commission may specify a different rate according to the size of the customer, the hour of the day or season of utility service, the type of customer, etc.

Finally the regulatory commission can determine how income is to be defined in estimating the rate of return. Some commissions require utilities to use accelerated depreciation for calculating their federal income tax. Others require that interest charges, paid during construction of facilities, be treated as revenues. The use of such accounting conventions can alter the cash flow position of the company, the estimated rate of return, and the cost of service to the customer.

Municipalities and public agencies also provide a variety of utility services, such as water supply, waste disposal, electricity, and transporation; but they generally operate in a different regulatory environment than do private utilities. For municipal services that are not provided within a regulatory commission type framework, no specified rate of return exists. In theory, a municipally owned utility could operate at a profit; however, the municipalities may not make a profit in the normal sense of the term. In fact, municipal utilities are subsidized in a number of ways, such as inter-governmental transfers, exemption from property tax, and the tax-free status of

municipal bonds. The structure of these subsidies has been of great significance to public utilities. Such subsidies have allowed public electric utilities to offer somewhat lower rates for electricity than private companies even though private firms generally can take advantage of larger economies of scale in generation.

Municipalities have greater flexibility than do private utilities in terms of the requirement to provide service. If they are not presently providing a utility service, they may choose not to do so based on their assessment of the public demand for it or on an alysisis of the costs of private vs. public provision of the service. If it is engaged in providing a service, a municipality may, under certain conditions, transfer the responsibility to privately owned companies. Furthermore, a municipality may take the initiative in introducing a totally new service for the sake of community general welfare or health, e.g., pollution-control activities. Thus, municipalities have a wide degree of latitude in planning their investment programs.

For nonregulated services, no formal mechanism exists for determining the appropriateness of municipal expenditures, except the political process itself. Generally, the municipalities have a great deal of discretion regarding accounting practices and cost definitions.

With respect to capital structure and financing, two major restrictions exist on municipalities' power to raise capital:

1. The charter of the municipality may provide a limit to the amount of general obligation bonds that may be issued in relationship to the municipal tax base; and

2. State restriction may exist on the maximum interest rate allowable for revenue bonds (from 7% to 10%). This restriction, in effect, may limit the allowable degree of financial risk associated with a municipal project that is not backed by the full faith and credit guarantee of general obligation bonds.

Adoption of ICES in this regulatory framework depends on: (1) the utility and municipality perceiving that the community energy system will provide a utility service at a minimum cost, and (2) the municipality deciding that it should actively engage in the provision of the service provided by the ICES facility. The condition that municipalities must decide to expand existing services into new utility areas provides the major focus for deciding which market areas should be considered for the commercialization of the ICES.

3 MARKET ASSESSMENT FOR INTEGRATED COMMUNITY ENERGY SYSTEMS

A basic assumption regarding the market identification discussion presented here is that, under the existing United States private utility regulatory framework, it is difficult for investor-owned utilities to expand their scope of services into new utility areas that may be provided by ICES. Regulatory commissions currently do not generally favor utilities making investments in areas not directly related to their basic charter requirements. Some utilities have expanded through vertical integration, i.e., ownership of coal mines, railroad cars, etc., but horizontal integration -- except for combined power and gas companies specifically chartered to do so -- has not been encouraged.

The potential of ICES in a different utility regulatory environment, however, is indicated by the large-scale penetration made by ICES-type systems in Europe. For example, it is estimated that by the end of the century, up to 25% of the heating needs of West Germany will be met by district-heating systems. A guideline for the competitive applicability of these sytems is expressed in terms of a minimum population density necessary to support district heating in a German community. This density was determined to be 45 dwellings per acre.

Identification of domestic ICES commercialization potential will proceed by examining special regulatory and economic conditions in this country where either specific subsidies may already exist to aid ICES commercialization or where ICES operations can improve the financial performance of utility investments in centralized facilities, i.e., where ICES investments complement central facility investments. Six scenarios are presented in which the cost effectiveness of ICES is enhanced because of specific regulatory or economic factors. Cost, in the sense used here, means cost to the utility and community involved and not necessarily the total cost of the system. This distinction is important where subsidies are involved and where the central issue under discussion is the determination of the market potential of ICES to local communities. The six ICES investment scenarios discussed in this section are:

1. situations in which federal grant programs already exist to aid in supporting utility services that might be provided by ICES;

2. programs that are heavily subsidized by federal guaranteed loans;

3. ICES programs in areas of severe industrial and residential natural gas curtailments;

4. ICES investments by municipalities required to make large expenditures for solid-waste disposal;

5. municipal utility investments in community thermal storage systems that are aimed at reducing electrical peak load demands; and

6. ICES applications for municipally-owned utilities.

3.1 FEDERAL GRANT PROGRAM

The federal government exerts a significant force indirectly in the selection of utility systems today through its complex structure of construction grants. These grants, usually to states or municipalities, result in massive construction programs. Federal action or inaction in implementing conservation measures in the lighting, cooling, and heating of federally financed structures could play a significant role in commercializing community energy systems. In addition to grants, construction of federal facilities by the Government Service Agency (GSA), the Department of Defense (DOD), the Veterans Administration (VA), and others, constitutes a sizable building program. GSA alone expended $89 million on construction of new buildings in 1975. An institutional description of those grant and construction programs that is most relevant for ICES commercialization is given in more detail in Section 4.

An examination of the conditions of access to existing federal grant programs funds is critical in determining whether these programs can be used to finance ICES. Grant programs can be divided according to: (1) eligibility of the recipient, i.e., discretionary vs. entitlement funding; and (2) eligibility of project spending, i.e., categorical vs. general-purpose programs. Discretionary grants are those of which recipients must convince agency administrators that they are worthy. Entitlement grants are those that go automatically to those applicants that meet certain legislatively determined criteria. Categorical grants may be used only for certain rigidly specified purposes; whereas, general-purpose grants afford a level of flexibility in meeting general policy goals. The enactment in recent years of federal

revenue-sharing legislation has had a major impact in shifting many grant programs from discretionary-categorical to entitlement-general purpose. In other words, the grantee now has a more significant role in the decision on how to use the grant funding.

The implication of this fact on ICES commercialization is that information or demonstration of ICES financial viability should be directed toward influencing local officials. It is the local municipality, for example, which, having decided to construct a community center with federal funds under the Housing and Community Development Act, will also decide on whether to install an ICES in it.

The major point to be stressed here is that, even if an ICES initially is more costly than a conventional system, local government may pay for only 10% or 20% of the additional cost yet retain the full energy operating savings from the system over its lifetime if an existing grant program can be used. Because capital cost could represent over 30% of the cost of the heating system for a community center, this situation will alter the benefit/cost ratio of the ICES for communities. The marginal costs to the federal government of demonstrating the commercializing ICES through existing grant programs would be lower than instituting new, separate grant programs because much of the fixed cost of the project would be covered under the existing grant mechanisms. This is the central reason for exploring the federal grant structure to commercialize ICES.

Despite the trend set by revenue sharing, there exist several major categorical programs for which federal guidelines and control are still significant. For example, EPA construction grants are subject to an extensive set of guideline criteria whose specifications are at the discretion of the administrator. VA, GSA, and DOD construction funds are controlled directly by federal agencies. In these cases, not only the municipalities requesting funds, e.g,, for the construction of a waste-water treatment plant, but also the federal administrator must be convinced that an ICES should be built as part of the project. *Recent investigation and discussions with regional federal officials uncovered no restrictions in any of the discretionary grant programs that would preclude the funding of ICES as part of a facility constructed with federal grant money.*

3.1.1 Recommendations for ERDA Action

With regard to the federal grant program, three recommendations are made for ERDA action.

1. Negotiations with HUD, EPA, VA, Department of Agriculture, and GSA should be initiated to see if they will allow ERDA to inform municipalities by some means that adoption of ICES might be funded under existing grant programs as part of a larger construction grant;

2. A number of municipalities that are in an early stage of planning a facility using existing grant monies should be offered technical assistance by ERDA to explore the feasibility of ICES use; and

3. At least some ERDA ICES demonstration programs should be linked to projects funded by other grant programs.

3.2 FEDERAL GUARANTEED LOAN PROGRAMS

The federal government helps to finance, through guaranteed loan programs, billions of dollars of construction every year. There are loans for new communities (HUD), for public works (Department of Commerce), for rural power (Rural Electrification Administration, REA), rural construction (Federal Housing Authority, FHA), and others. FHA alone guaranteed $4 billion of loans in 1975. Usually the loan guarantee is for 80% of the construction cost of the facility. An institutional description of the more significant loan guaranteed programs is given in the next section.

Federal loan programs are initiated when public policies, such as health care, rural development, and urban redevelopment, are not being carried out by the private sector. This situation occurs when the cost to the private sector of making investments in areas that would further a public policy outweigh the private returns of the investment. These estimated returns could be discounted in the view of a private investor by the risk that the investment would not turn out as planned. Reducing this risk is, in fact, one of the major functions of the federal guarantee. The interest rate for mortgages on high-risk investments could run 14%. With a federal loan guarantee, this rate could be reduced 7% or 8%. For a 25-year mortgage, the difference could result in reducing debt service payments by 60% per year. In other cases, investments could be so risky that they could not even be financed at any interest rate without federal guarantees.

The importance of federal loan guarantees to ICES commercialization is in reducing interest payments. The federal guarantees could become a significant financial aid if, for example, revenue bonds were planned as a financial instrument to fund a construction project using an ICES. As mentioned earlier, some municipalities cannot issue revenue bonds over a certain interest rate. Thus, an ICES application may be precluded from being financed by revenue bonds without a loan guarantee if the market viewed the ICES as a risky investment. Even with the guarantee, the municipality still has to bear the cost of repaying the lower interest loan. However, the federal loan guarantee at least protects the private financing agent.

Federal loan guarantees are in some way the least expensive method of supporting an ICES by the federal government because the guarantee of a loan costs nothing if the project succeeds. Initial investigations have found no restrictions on the use of federal loan guarantees for construction of an ICES as part of facilities eligible for financing under federal loan guarantee programs.

3.2.1 Recommendations for ERDA Action

With regard to guaranteed loan programs, two recommendations are made for ERDA action:

1. Negotiations should be initiated with the relevant administrators of the federal loan programs to ensure that ICES construction would indeed be allowed as part of a larger federal loan guaranteed project; and

2. A demonstration project should be considered for a facility using federal loan guarantees. A particularly promising area appears to be the Rural Electrification power generation facilities for the following reasons:

    a. These facilities are generally smaller than private investor-owned generating plants. A sample of REA generating plant sizes is given in Fig. 3.1. Smaller size is dictated by the low-density population which is served. Only communities of less than 1,500 population are allowed to obtain REA loan guarantees. This restriction means that these rural plants do not enjoy the economies of scale of private investor-owned utilities.

    b. The administration of REA loans is highly centralized in Washington, and it would be relatively easy to determine what communities or cooperatives were considering power plant construction.

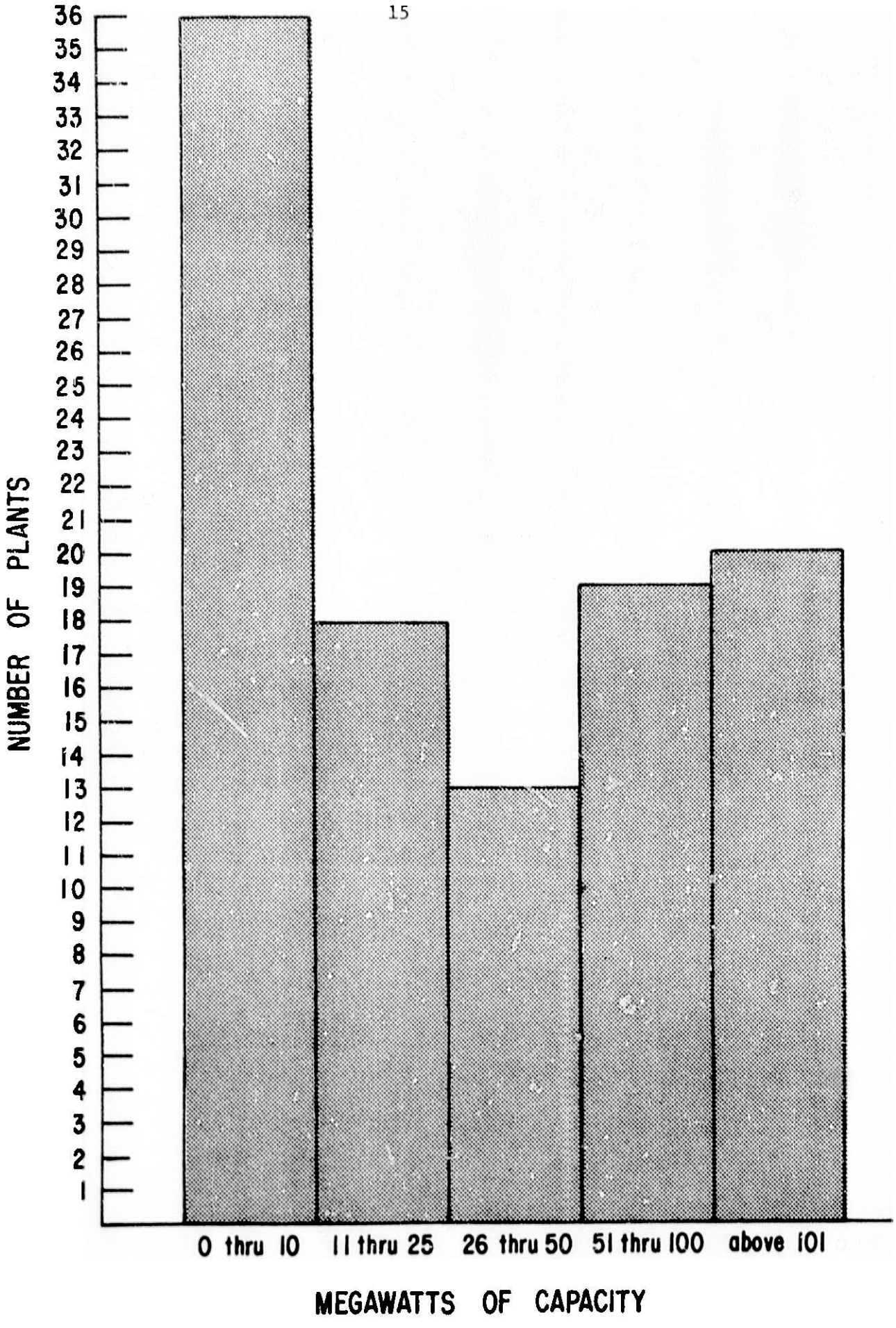

Fig. 3.1. REA Generating Plant Sizes

4 NATURAL GAS CURTAILMENTS

The natural gas available to interstate supply will continue to decline throughout the next several years in the absence of a major shift in supply from intra-state markets. Based on total gas reserves to the interstate pipeline at the end of 1974, under all existing contracts and commitments the annual decline in deliveries will be about one trillion cubic feet through 1979, which translates to a doubling of curtailments in three years. The trend in curtailments is shown in Table 4.1. The 1976 curtailment level was projected by the FPC to represent 19% of the market potential for interstate natural gas. Table 4.2 shows the states most affected by this situation.

The FPC has specified a priority ranking for gas users in case of the necessity of curtailment. In decreasing order of priority, the current ranking is as follows:

1. residential, small commercial,
2. large commercial,
3. all industrial requirements not otherwise specified,
4. firm industrial requirements for boiler-fuel use where alternative fuel capabilities can meet such requirements,
5. firm industrial requirements for large-boiler use where alternative fuel capabilities can meet such requirements,
6. interruptible requirements of less than 1500 mcf,
7. interruptible requirements of 1500 to 3000 mcf per day,
8. interruptible requirements of 3000 or more mcf per day.

Thus, with industrial users of natural gas having the lowest priority, many industries are searching for reliable energy alternatives. Even in the residential sector, government moratoria restricting new additions using natural gas have occurred in 20 states served by interstate pipelines. The curtailments adversely affect a community by both restricting growth in the residential-commercial sector and by threatening the existing industrial base from which a community derives its income. For these reasons, the securing of a reliable energy source is a community, as well as a utility problem. Under these conditons, municipalities and states may be willing to undertake

Table 4.1. Curtailment Trends[a]

Year (April-March)	Annual Firm Curtailments (Tcf)	Heating Season (Nov.-Mar.) Firm Curtailments (Tcf)
1970/1971	0.1	0.1
1971/1972	0.5	0.2
1972/1973	1.1	0.5
1973/1974	1.6	0.6
1974/1975	2.0	1.0
1975/1976[b]	2.9	1.3

[a]Pipeline-to-pipeline curtailments not included in 1974/1975 data; contractual commitments, not incorporating an interruptible supply provision, are included.

[b]Previously estimated.

Table 4.2. Projections of Natural Gas Shortage During Winter of 1975-1976 in Most-Affected States

	Total Curtailments		Increase Over Last Winter
	Bcf	% of Requirements	Bcf
Arizona	22	24	2
California	370	34	46
Delaware	1	12	0
Florida	50	49	10
Georgia	63	29	11
Indiana	17	6	5
Iowa	36	18	4
Kansas	60	23	5
Kentucky	13	10	6
Maryland/D.C.	14	12	1
Missouri	35	15	5
Nevada	24	51	6
New Jersey	21	11	(-10)
New York	41	10	6
North Carolina	41	46	6
Ohio	78	12	11
Pennsylvania	37	9	10
South Carolina	59	55	4
Tennessee	31	22	9
Virginia	12	14	(-1)
West Virginia	12	13	3

Source: FEA/FPC Distributor Survey, Updated December, 1975.

ICES investments alone or in concert with natural gas utilities. The existence of a constraint on natural gas supply alters the applicability of assumptions regarding the relative economics of conventional heating systems vs. ICES. In the absence of available gas, community district heating systems using a prime mover might compete with other alternatives, such as electric heating, in the residential sector and coal-fired boilers in the commercial and industrial sectors.

The natural gas utilities themselves will be taking vigorous action to reduce the level of these curtailments. One solution that has been widely discussed is the production of high-Btu synthetic gas from coal. Two major difficulties exist, however, in using synthetic high-Btu gas to reduce the short-term trend in curtailments:

1. the high cost of these syn-gas projects, and
2. the rate of commercialization of these systems.

The cost of a syn-gas plant is enormous. For example, one of the leading pipeline companies recently indicated that its proposed coal gasification project, including the mine, would cost approximately $900 million (1974 dollars) to construct. The actual figure would be over $1 billion. The total existing plant for this company amounts to only $1.7 billion. Because the output of the syn-gas plant is only 10% of the company's total output, the company is expanding its investment by 50% to increase output by 10%. The risk of technical failure of these systems together with their cost is one of the impediments to financing them. Recently, Congress rejected a proposal to extend the federal guaranteed loans to support syn-gas projects. This decision seems to be based on the desire to avoid subsidizing the major energy companies with a public support program.

The second problem with syn-gas production is the timing of the investments. Only about six high-Btu projects currently are being planned, and long lead times are envisioned until syn-gas becomes a significant source of energy.

These problems may be lessened in the case of low-Btu gasification production. The technology for low-Btu gas production is well developed and used extensively in Europe. Low-Btu gas also was used in the United States before the construction of the pipeline network. The limiting factor in the use of low-Btu gas is that it cannot be transported economically over 50 miles. This

limits its use in some urban areas. These characteristics may suggest that a state-municipal-utility investment project in low-Btu gasification may be one viable community energy approach to some of the problems posed by curtailments of interstate gas.

4.1 RECOMMENDATIONS FOR ERDA ACTION

With regard to natural gas curtailments, two recommendations are made for ERDA action:

1. an assessment should be made of the plans of industries, communities, and utilities for providing substitute energy sources in areas of projected curtailments; and

2. several design studies might be initiated in these areas to evaluate the competitive position of alternative ICES with conventional energy supply alternatives.

5 SOLID WASTE DISPOSAL INVESTMENTS

The cost trends of solid-waste removal in large cities have generated increased interest in heat recovery from incineration as a method of offsetting some of the solid-waste disposal costs. The national average cost for the disposal of solid waste is projected to be $5.00 per ton in the 1980s. The cost in larger cities, however, may run from $7.00 to $12.00 or more per ton. According to a 1973 EPA estimate, 30% of disposal in the 50 largest cities is accomplished by incineration. The total dollars spent on solid waste disposal is projected to increase by about 40% in the next ten years.

Community resource recovery, in response to these cost trends, has received wide-spread attention. Several projects are being initiated or are ongoing in the United States and Europe, mostly in larger urban areas. In Chicago, for example, garbage will be used to partially fire utility boilers. Recovery projects also are being planned or implemented in Ames, IA, Baltimore, MD, and St. Louis, MO. In Europen applications, refuse incinerators provide heat during off-peak periods while the main district heating systems are being overhauled. Lack of consistent calorific value of garbage, variations in the supply availability, and restrictions on allowable operating temperatures and pressures of boilers because of corrosion effects continue to present technical problems in this area.

The assessment of the financial performance of solid-waste incineration, heat-recovery systems must be linked in its impact to other energy facility investments. In the case of the Chicago project, refuse incineration constitutes an inexpensive supplemental fuel source for central station power. In Europe, it represents an alternative to constructing off-peak facilities or increased capacity in the primary facilities. A third potential linkage with other energy facility investments which is being investigated in the ANL Fox Valley ICES study is the use of supplemental refuse incineration heat recovery systems to increase the coefficient of performance of community heat pumps.

These types of ICES applications represent a significant departure (in a financial sense) from the previous scenarios described. Community energy systems using federal grants or loans or those constructed in areas of natural gas curtailments constitute substitutes for centrally provided energy. ICES may be competitive in these cases because of special regulatory or supply

conditions. In the resource recovery case, ICES is viewed as an economic complement to central station power. In the examples cited, it may either lower the cost of central station operations or lower the cost of operating an electrically powered heat pump. In any of these cases, a resource recovery ICES is not competitive to central utility investments.

5.1 RECOMMENDATIONS FOR ERDA ACTION

With regard to solid waste disposal, three recommendations are made for ERDA action:

1. A survey of resource recovery projects in the planning or operation stage should be made for the largest cities. The EPA Office of Resource Recovery should be of service in this regard;

2. A sample rate structure should be developed for the sale of refuse from municipalities to utilities; and

3. The impact on the system coefficient of performance of combining refuse incineration heat recovery with other ICES applications should be explored.

6 OFF-PEAK ELECTRICAL RATE STRUCTURES

In recent years, rate commissions and utilities have become interested in experimenting with off-peak rate structures. Under such schemes, the cost of electricity will vary according to the time of day usage. The peak rate may vary as much as 400% over nighttime rates. For example, in Florida the peak-off-peak price differential is 8¢ to 2¢ per kilowatt hour; whereas in Connecticut it is 16¢ to 3¢ per kilowatt hour. Experiments in off-peak rate structures currently are being run in New York and Vermont. Several other states are also considering or are in the experimental stages of implementing off-peak rates. These include Arizona, California, Connecticut, Florida, Georgia, Iowa, Maine, Missouri, New Jersey, and Virginia. In addition, Minnesota has a new law that includes peak load pricing.

In a recent industrial publication, 11 major utility executives were in near unamimous agreement that despite personal opinions such rate design changes as peak load pricing are here to stay. In general, there has been a degree of opposition by utilities to peak load pricing because of the greater administrative difficulties in billing. The basic advantage to the utility in introducing such schemes is in improving the use rate of its generating equipment by leveling the demand for electricity. This is accomplished when customers, responding to the lower off-peak prices, shift the time of day of their consumption.

One way this shift has been accomplished is through the purchase of thermal storage devices that are heated by electric resistance heating during off-peak hours and which are then used to provide space heating during the day. Home-owned storage systems, consisting of heated bricks, have been introduced successfully in Europe where significant peak load demand smoothing has been accomplished. The characteristics of thermal storage may actually make it more beneficial to use in a centralized community facility rather than individual home units. From a technical viewpoint, the smaller the surface-to-volume ratio of the storage medium, the less the thermal losses will be for identical storage periods. This advantage to community size storage devices may be offset by the longer distances required for transmission of heat from a central storage unit. From a utility point of view, administering

off-peak rates to a single municipality is considerably less costly then performing the required metering for every individual household or commercial establishment. Community storage puts the burden on the municipality to administer off-peak rates or to establish some other form of cost recovery mechanisms. If the thermal storage devices are used only to heat publicly owned buildings, such metering is no longer a problem because all costs are charged to the municipal budget.

Off-peak rates may provide a positive impetus to the introduction of district heating schemes because of the low cost of electricity during nighttime hours. The introduction of off-peak rates in conjunction with some of the other regulatory energy factors including natural gas curtailments, may provide a significant motivation to local municipalities to engage in new utility services that previously were not considered necessary or desirable. Furthermore, community storage should receive the support of utilities because investments by communities in this area would be complementary rather than competitive to the investments in central station facilities.

6.1 RECOMMENDATIONS FOR ERDA ACTION

With regard to off-peak rate structures, the following recommendations are made for ERDA action:

1. An assessment of the potential financial performance of a community district heating operation using thermal storage under conditions of off-peak rates should be made.

2. Discussions with communities that are facing gas curtailments should be initiated to determine the feasibility of a small-scale demonstration project.

3. Discussions with GSA and utilities on a potential demonstration of the use of thermal storage systems to heat large federal structures should be initiated.

7 EXPANSION OF MUNICIPALLY OWNED ELECTRIC UTILITY FUNCTIONS

As noted earlier, municipalities are much freer in their ability to expand or introduce new services than are private, investor-owned electric utilities. If, for example, a municipality wished to sell a district heating service in conjunction with its municipal electric services, it could set up a separate agency whose sole purpose was the purchase and resale of steam from the generating station. The bonds to finance such an agency would be tax exempt; the agency would pay no property tax, and it might benefit from the subsidies that are received by the municipality under revenue sharing.

The desire of municipalities to expand their utility services in this way depends on a number of factors, including:

1. the municipal financial experience with existing utility services,
2. whether other governmental services in the area of health or welfare, etc., have a higher priority in the view of municipal governments, and
3. whether expenditures for ICES will burden the municipal financial position in relationship to its power to raise funds.

Municipal utility company experiences have, in general, followed the trends of private investor-owned utilities. Municipal utilities have provided about 10% of the nation's electrical power for the past decade. Of the eight million customers served by municipal electric utilities, 86% are residential and 12% commercial or industrial. From 1960 to 1976, some 107 municipally-owned power companies have failed, while 34 new ones have been formed. Officials of the American Public Power Association and personnel of the Edison Electric Institute have indicated agreement that publicly owned power utilities presently are in good financial condition.

The desire and ability of municipalities to extend utility services must be considered in light of recent municipal spending and revenue patterns. During the past decade, municipal governments, especially larger ones, have assumed many new responsibilities that have affected their ability to finance expansion into the community energy field. During the period, 1962-1972, the total revenue for local governments, expressed on a per-capita basis, has

increased by $318 or 137%. This rapid increase came from both intergovernmental grants (which have more than tripled) and from revenues raised through the government's own sources. While revenues rose, per-capita annual expenditures increased even more rapidly. In 1962, per-capita expenditure was $215; by 1972 it had increased to $569.

As a result of this expenditure and revenue pattern, local governments have begun to incur deficits. In 1962, local governments were in a surplus position. By 1967, the per-capita surplus reversed itself and became a $10 deficit. By 1972, this per-capita deficit rose to $18. The deficits were financed by issuing new debt. In 1962, the total debt per capita was $316. By 1972 it had increased to $579. Moreover, the makeup of the debt changed. In 1962, short-term debt, that is, debt maturing in less than one year, was only about 5% of the total debt. By 1972, short-term debt increased to over 10% of the total. As a result of this change in the composition of the debt, local governments came under increased financial pressure. The short-term debt must be continually refinanced, and each time a community comes to market with a bond issue, lenders have the opportunity to reevaluate its credit.

The financial problems of the largest municipalities, i.e., those with populations above 100,000, are substantially more severe than those of smaller communities. Thus, 150 municipalities that have a population above 100,000 incurred an average deficit of $11 per capita; whereas, communities with 10,000 to 25,000 people incurred a per-capita deficit of only 18¢.

A second difference lies in the amount of intergovernmental aid that the largest municipalities receive. Not only is the per-capita figure substantially higher, but intergovernmental transfers account for a larger proportion of the municipality's total revenues. Over 37% of the total revenue, received by the largest communities, comes from intergovernmental transfers. In all other communities, the ratio is closer to 23%.

The statistics presented here, taken from census records, show the position of municipalities before the effective date of the state and local Financial Assistance Act of 1972 (revenue sharing). Although the effect of this legislation on the financial position of state and local governments is substantial, data are not yet available for study.

In response to the deterioration of their financial positions in recent years, municipalities have greatly curtailed construction programs as well as the provisions of goods and services. For 1974, municipal purchases were lowered by $5.4 billion. Such actions have improved the financial position of municipalities from a low point in 1972 to a position where state and local governments were reported to be running an operating surplus ever since the first half of 1975. The implications of this situation for ICES commercialization are that, while municipalities and states are in better financial position than previously, they are generally cautious about committing themselves to large-scale construction programs.

8 NEW POLICY OPTIONS FOR COMMERCIALIZING INTEGRATED COMMUNITY ENERGY SYSTEMS

An earlier section discussed the financial environment of Community Energy System commercialization under existing regulatory conditions. In this section, changes in this environment are considered. The options described here are not presented as recommendations but are an enumeration of some of the suggestions that have been put forth by the research team during the course of study. As such, they are really a starting point for investigation rather than a conclusion of the previous six months' effort. These suggestions are described under three categories:

1. ERDA-related initiatives,
2. tax-policy incentives, and
3. state-related initiatives.

8.1 ERDA-RELATED INITIATIVES

8.1.1 Establishment of ICES-Related Information Programs

The initial financing of ICES is deterred not only by the first costs involved in its adoption, but also by subsequent costs involved in its operation. Once an ICES is in place, technical maintenance problems, administrative difficulties, and manpower training may pose significant hurdles to be overcome by an owner of an ICES. Under such circumstances, a municipality, thinking of extending into ICES services, may be deterred by the risk of rapidly escalating operating expenses.

Federal information programs already have been established to aid private businesses under circumstances in which the government is attempting to introduce a new technology. Probably the most successful of these efforts is seen in the Department of Agriculture, Technical Extension Program. Representatives affiliated with local universities are designated to work directly with farmers to aid in the introduction of new agricultural techniques. The localized nature of the program has increased its effectiveness. Municipalities facing natural gas curtailments, having solid-waste disposal problems, or considering changes in the status of their utility service provisions might make use of a similar information extension service geared to energy engineering and financial problems.

Another suggestion to improve information dissemination for community energy system users concerns the ability to maintain a reliable source of fuel. The price and availability of coal today, for example, varies considerably from one time period to the next and between those who can buy in large quantities and those who must purchase on the "spot" market. Spot market prices have been as high as $50 a ton while utilities were signing contracts for $18 a ton. The establishment of a fuel's future market would reduce some of the advantages to large-scale energy buyers by allowing all buyers and sellers easier access to market information and by allowing buyers to secure future fuel supplies at a predictable price. Given such a market, ICES operations would not have to bear a larger financial risk of wide swings in fuel costs and availability in comparison to central facility operations.

8.1.2 Establishment of a Federal Loan Guarantee Program

A logical extension of the discussion in the two sections regarding federal loan guarantees is the attempt to make ICES eligible for such guarantees under the auspices of a new federal program. An effort should first be made to negotiate amendments to the guidelines of present loan programs to explictly allow guarantees for ICES. Recall that there is no prohibition on the use of federal loan guarantees for ICES in the programs described in Section 3; however, to assure a more thorough assessment of ICES potential as part of facilities constructed using loan guaranteed funds, a direct statement regarding conservation and ICES would be beneficial.

The status of direct-loan guarantees for energy facilities seems to indicate that ICES would be viewed favorably as an object of such federal assistance. Solar energy projects are included under such a loan guarantee program. The major reason that coal gasification projects were turned down for eligibility seems to be the private nature of the investors in them. In the case of integrated community energy systems, however, communities would be the major recipient of such loan guarantees.

8.2 TAX-POLICY INCENTIVES

Under present U.S. tax laws, incentives normally take one of three forms:

1. special provisions allowing recovery of investments in a project over a period of time shorter than the economic useful life of the project;

2. reduction in the amount of required investment by allowing special tax credits; or

3. allowance of tax-exempt income, deferred tax, or special-rate taxation.

8.2.1 Recovery of Investment over a Period Less than Economic Life

An investment that may be recovered entirely in the year of initial expenditure obviously is more valuable from a tax-incentive standpoint than one which would have to be recovered over a longer period of time. Under the current tax law, the treatment of research and development costs is an investment which meets this criterion and will have some application to the integrated energy systems project.

Under the law, a taxpayer may deduct currently (or amortize over a 60-month period) expenditures incurred with respect to research and experimentation. The term "research and experimental expenditures" generally includes research and development costs in the laboratory sense. These would include the cost incident to the development of an experimental or pilot model, plant process, a product, a formula, an invention (or similar property), and the improvement of already existing property of the type mentioned above. If such costs are incurred in connection with the developers trade or business, they may be deducted in the year incurred. The qualifying expenditures do not include expenditures made to perform a market survey or other feasibility study or the costs incurred to manufacture the product after the pilot model has been created.

The qualifications of various expenditures in connection with the integrated energy project as research and development costs must be based on the facts of the particular case. Because many of the systems to be used in the energy conservation program currently are operational, to this extent, the present deduction of research and development costs must be based on the facts of the particular case. However, with respect to new energy systems, i.e., solar-assisted systems, the opportunity exists to write off research and development costs incurred by the builder or other developer. To the extent that these research and development costs are reimbursed by the government, a deduction would not be available.

Other than securing a current deduction, an expenditure may be recovered over a period shorter than the economic life of the project through special amortization periods or through the use of accelerated depreciation.

8.2.2 Pollution-Control Facilities

Expenditures, subject to special 60-month amortization, include certain pollution-control facilities. Pollution-control facilities essentially are certified new identifiable treatment facilities that will abate or control water/atmospheric pollution or contamination by removing, altering, disposing of, storing, or preventing the creation or emission of pollutants. However, the facility must have been used in connection with a plant in operation before January 1, 1976. Thus, this special amortization would not be available for equipment connected with the proposed integrated energy system because the system was not in service on January 1, 1976.

Pollution control property, connected with generating property owned by electric utilities, will qualify for rapid amortization; thus a potential competing source of energy theoretically has a better competitive position because of the availability of the tax incentive.

8.2.3 Accelerated Depreciation

The Internal Revenue Code also allows a taxpayer to depreciate business assets using accelerated methods of depreciation. The law also provides a depreciation class life system (ADR) which in many situations may allow assets to be depreciated over lives shorter than the physical and economic life of the property.

The ADR system provides depreciation lives for various classes of assets and allows taxpayers to select depreciation periods 20% shorter than the prescribed lives. This shorter life, when coupled with accelerated depreciation methods, allows a rapid recovery of investment.

Accelerated depreciation methods are available only for personal property and other property that essentially is a piece of machinery or equipment. Most real estate will not qualify. These accelerated methods of depreciation would appear to be available for the portion of the energy systems used in the generation of electricity. A question arises as to whether the systems used in creating other forms of energy, i.e., a diesel pump, or solar panels, are a permanent part of the building or would qualify as "personal property" and thus qualify for accelerated depreciation.

8.2.4 Tax Credits as Investment Incentives

Congress has also provided incentives to stimulate investment in business machinery and equipment by allowing a direct investment credit against the tax otherwise payable.

There are limitations on the amount of credit which may be utilized to offset the tax liability of a taxpayer. Currently, the investment credit rate is 10% of qualifying investment. Assuming that a taxpayer can utilize all of the available investment credits, the actual cost of acquiring qualifying equipment is 10% less than it would be if the credit were not available. Investment tax credit is available to all business taxpayers who acquire personal property or other property, i.e., a machine.

8.2.5 Recommendations

To increase the rate of return available and thus encourage the investment of the additional capital required, it is recommended that the proponents of new community energy systems seek additional tax incentives. Proponents should request that:

1. the Internal Revenue Code be amended to allow rapid amortization (possibly over a 60-month period) of amounts expended by builders or other developers in installing the new integrated energy systems. Those amounts subject to amortization could include expenditures for market surveys and community designs.

2. special investment tax credit should be introduced for those companies who invest in new integrated energy systems. Inasmuch as the current investment tax credit is at a 10% rate, the special investment credit could be raised to 20% for property qualifying for the integrated systems.

3. a special credit should be made available to residents and other utility customers who are required to purchase the energy generated by the integrated systems. This credit could be an offset against the income taxes reported on their individual returns. Such a credit may be necessary because the customers initially may be subject to a higher cost for energy used, inasmuch as the energy produced by the integrated system will be more than the cost from conventional sources.

4. special incentives be made available to investors who are financing integrated energy systems. These incentives could take the form of tax deferrals for a limited period of time or the nontaxing of interest or dividends on securities related to this development.

One note of caution should be made with respect to the effectiveness of a tax policy on utility investment patterns. An examination of the tax payments of utilities over the past decade indicates the effective tax rates that utilities have paid have steadily declined. In 1966, the rate was 38%, but in 1975, it was only 32%. There is a lower limit as to how far taxes can fall. Once a firm pays no taxes, further tax relief is no longer a stimulus to a change in behavior. Past regulation of utilities has encouraged the minimization of tax payments. Even though the rate is still at approximately one-third of net income, the utilities may feel that reducing taxes much below this level would be unsound for purposes of public relations. The desire of utilities to seek further tax benefits for ICES or other purposes should be explored before selection of a tax policy aimed at commercialization.

8.3 STATE-RELATED INITIATIVES

Initiatives by state governments to aid municipalities in adopting community energy systems could come about in a number of ways. One method would be the establishment of a state energy financing agency. Such an agency would act as a focus for providing municipal aid and guarantee loans for ICES as well as for perhaps providing technical information and support. The justification for state intervention in this manner is that providing a reliable energy source for state communities and industry is a problem that goes beyond the boundaries of a single municipality.

Two states, New York and Maryland, have set up environmental facility corporations to aid municipalities in financing and operating wastewater treatment facilities. The rationale for the establishment of such groups in the environmental financing area largely parallels the situation with respect to community energy problems. The establishment of such agencies allows for the consolidation of debt at the state level thus lowering the risk of default on bonds and reducing financing costs. A central state agency can provide technical support and manpower which would not be available to single municipalities. Finally, a state agency could keep municipalities abreast of technical developments and techniques that would aid in the operation of integrated community energy systems.

In general, the states are in a better financial position to initiate the financing of the expansion of utility services than are most municipalities. Most states finish their fiscal years with surpluses remaining in their general funds account after all revenues have been collected and all expenditures made. The survey of 48 states indicated that 12 states have increased or are expected to increase the size of their unencumbered surplus from the beginning of fiscal year 1975 to the beginning of fiscal year 1976. Two states showed no change in their unencumbered surpluses, and 34 showed declines. The level of the combined surpluses for the 48 states was $3.9 billion on July 1, 1975, representing approximately a 40% reduction in the unencumbered surpluses during the course of fiscal year 1975. Thus, while most states still enjoy a better financial position than do municipalities, a decline in surpluses has generated a certain amount of caution with respect to increased spending. In fact, many states have been forced to cut current levels of service during the 1976 fiscal year. Capital expenditures were delayed in most states due to the delay of highway construction projections. These budgetary considerations will, of course, affect the state's willingness to initiate a new energy financing support program.

A second area in which the states can aid in the commercialization of community energy systems concerns the definition of the charter of privately owned utilities. As was mentioned earlier, the regulatory restrictions on the expansion of private utility operations provide one of the most significant constraints to the commercialization of community energy systems. Despite such constraints, it was reported that 22% of the natural gas utilities' net income is derived from non-utility operations. The exact nature of the investments that produced this revenue is not yet known. Officials at the American Gas Association indicate that natural gas companies have been diversifying to some extent in the area of energy. Large integrated companies have gotten into the business of propane distribution, appliances, farming, and real estate. It would, therefore, appear that some latitude is allowed in terms of the investments that a private utility can make through the operation of holding companies that it forms. Further investigation, with respect to the allowable operations of holding companies of privately owned utilities, may be desirable in terms of allowing such utilities to enter into the community energy system field. A relaxation of the regulatory restrictions on the operation of such holding companies by state utility commissions may pave the way for easier entry by the private utilities into this field.

9 FINANCIAL STRATEGIES

9.1 INTRODUCTION

The objective of this section on financial strategies is to describe the financing opportunities available to a utility and/or municipality considering installation of some form of integrated community energy system. Specifically the following aspects of a financing strategy selection are described:

1. the applicability rules of alternative funding instruments;
2. the types of projects for which the funding instrument has been applied;
3. a brief history of the cost of using the funding instrument including interest costs;
4. the limitations on the use of funding associated with the funding instrument; and
5. the kinds of preliminary efforts, e.g., proposals, that are required before a funding instrument can be utilized.

The instruments to be discussed in this section are: federal loans, federal grants, leasing, pollution-control bonds, revenue bonds, and general obligation bonds. Corporate bonds, except for utility bonds and corporate equity financing, are not considered as normal avenues of financing community energy systems.

9.2 FEDERAL LOAN PROGRAMS

Four major loan and loan guarantee insurance programs are now in existence. Together they handle tens of billions of dollars each year. Because they have different applicability rules, they are treated below as separate entities. Under the Rural Electrification Act of 1936, as amended, the REA under the Department of Agriculture makes long-term, self-liquidating loans to state and local governments to finance cooperatives and non-profit organizations. These loans ($7 billion worth in fiscal 1975) are restricted in use to the construction of facilities that will generate and distribute electricity in rural areas. REA disbursements since 1970 have exhibited annual ups and downs from $338 billion in 1970 to $626 billion in 1971 and back down to $519 billion in 1973. Although there is now an upward trend in this financing, it is not the major growth program it once was.

In using REA funds, the extent of local matching funds is variable although usually quite low. The size of a typical project ranges from $250,000 to $2,000,000. The projects are restricted to rural areas with populations of less than 1,500 people. REA has little in the way of legislative or regulatory restrictions concerning the kind of projects that may be constructed using its funds except that these projects must generate power in a rural area. The interested community usually must hire a consulting engineering firm to design facilities to meet its needs. The design is sent to Washington, D.C. for approval. However, there appears to be no written guidelines to govern this review procedure.

Under the Housing Act of 1949, as amended, the Farmers Home Administration (FmHA) under the auspices of the Department of Agriculture, guarantees loans to farmers and other owners of rural property for the construction, repair, or purchase of low-to-moderate income housing. In 1975, 102,000 such loans were made for a total of $1.926 billion. Usually these loans are granted to private or non-profit organizations that develop rural sites. The mechanism for such loans is through direct loans and guaranteed insured loans in which the extent of matching funds required by the local agent is variable. The projects are for site development of low-cost, rural housing, sewage treatment plants, and water supply. Loans range from $45,000 to $500,000. In 1975, six direct loans were made, and 16 guaranteed loans were implemented.

Under the National Housing Act of 1934, as amended, the Federal Housing Administration (FHA) provides federal mortgage insurance to families to facilitate home ownership. In fiscal year 1975, total obligations amounted to $4.332 billion. In this program, 80% of a loan is guaranteed by the federal government thereby removing most of the risk to the lender. This kind of loan can be used for any purpose subject to mortgage security in the general housing area. In addition to securing mortgages for individual home owners, a typical FHA project may be an apartment complex; $20 million in insured loans were granted in 1974. This program appears to be a large and expanding one.

There also exists loan guarantees for the purchase of homes by veterans administered by the V.A. Loans guaranteed in this program totaled $8.072 billion in fiscal year 1975. Although not as prominent as it once was, this program is still significant.

There are other loan programs relating to the provision of utility services. The guaranteed loan program is summarized in Table 9.1.

9.3 FEDERAL GRANT PROGRAMS

Grant programs are by far the most common form of federal construction expenditure. There are grants for airport development (DOT), for public libraries (HEW), for nursing homes (V.A.), etc. A summary of grant programs applicable to the construction of facilities requiring utility services is shown in Table 9.2.

Under the Hill-Burton Hospital Survey and Construction Act of 1946, broadened by the Health Program Extension Act of 1973, the Department of Health Education and Welfare offers grants for hospitals, medical schools, and ambulatory care centers. These grants are discretionary and categorical, meaning that the recipient must develop a project within specified guidelines and must further demonstrate his worthiness to the HEW administrators. Funding under this program on an annual basis declined steadily from $315 million in fiscal year 1970 to $188 million in fiscal year 1973, only to rise under the impetus of the Health Programs Extension Act passed in 1973 to $557 million in fiscal year 1975. A typical grant under this program might be the construction of a large teaching hospital with 90% of the funds coming from HEW.

Under the terms of the Housing and Community Development Act of 1974, every urban community is entitled to an allocation of funds, the precise amount depending on the community's population and extent of poverty and lack of housing capacity it exhibits. This program of community development block grants rests with the Department of Housing and Urban Development under the terms of the 1974 Act. The overall objective of the program is to make urban communities better places in which to live, especially for persons of low or middle income. This is a relatively new program and clearly falls into the entitlement general purpose category of grants. Funding for fiscal year 1975 was $1.855 billion, for fiscal year 1976 $2.780 billion, and for fiscal year 1977 it is estimated to be $3.248 billion. Increasing funding levels for this program in the future seems certain to be forthcoming.

Under this Act, communities can identify for themselves their own eligibility to receive funds and the amount of funding to which they are entitled. Only an application from the municipal planning department, usually prepared

Table 9.1. Summary of Federal Guaranteed Loan Programs

Regulation	To	From	Mech.	Amount	Matching	Uses	Sector	Assets	Range of Projects	Projects	Typical Project
Industrial Development Grants	Public Bodies Serving Rural Areas	AGRI	Grants Federal Home Admin.	10 m	NR	Grants to Extent Utilities, Pollution Control, Water Supply	Comm. Serv.		70 - 800K	136 Grants	
Supplmental Loan Insurance	Owner of Facilities Financed by HUD/FHA	HUD	G/I Loans	2 mm in 1976	90% Federal Loan	Insure Lender Against Loss of Loans	House	7 mm	50 to 200 Occupancy	30	100 Bed Nursing Home
Mortgage Insurance Experimental Homes	Owners of Experimental Homes	HUD	G/I Loans	250 m in 1976	30% Loans	"	"	6 mm	Single Family	448	Single Family
Mortgager Insurance Other than Housing	Those Eligibile Under HUD/ FHA Group Practice or Land Development Program	HUD	G/I Loans	6 mm in 1976	90% Loans	"	"	90 mm	Any Over 25 Units	4,496 Units	50 Unit Rental Project
Rural Electrification Loans	Power Coop. Power Company, Municipality	AGRI	G/I Loans	1,286 mm in 1976	Variable	Finance Central Station Power in Rural Areas	Prime Mover	7 mm Consumers	250 K to 2 mm		Power for Population Centers Less Than 1,500
Health Professional Teaching Facilities	Teaching Schools of Medicine	HEW	G/I Loans	500 K in 1975	90% Federal	Construcation of Teaching Facilities	Health	96 mm	$3 mm to $29 mm	6	Large Hospital
Rural Housing Site	Private or Non-profit Organizations Which Develop Rural Sites	AGRI	Direct Loan & G/I Loan	3 mm G/I Loans	VA	Develop Sites for Low Cost Rural Housing-Sewage Treatment & Water Supply	Utility Services		45-500 K G/I Loans	6 Direct Loans & 16 G/I Loans in 1975	Development Site
Water & Wastewater Disposal Systems for Rural Commun.	Municipalities Under Financial Stress in Such Areas	AGRI	Grants & G/I Loans	150 mm in Loans in '75	None	Construction of Rural Water & Wastewater System	Utility Service	492 mm	50 K-20 mm Loans Grants 5 K - 1 mm	1,326 Loans 241 Grants	Wastewater Treat-Plant

Table 9.1. Summary of Federal Guaranteed Loan Programs (Cont'd)

Regulation	To	From	Mech.	Amount	Matching	Uses	Sector	Assets	Range of Projects	Projects	Typical Project
Business & Industry Development Loans	Private or Co-op Organizations to Obtain Loans to Develop Business in Rural Areas	AGRI	G/I Loans FHA	300 mm in Loans	90% Fed. Loans	Pollution Abatement & Control NOTE: FMHA Administrator Must Approve			11 K-31 mm	784 Loans in '75	Pollution Abatement & Control
Community Facilities Program	Non-Profit Agencies in Rural Areas	AGRI	G/I Loan FMHA Funds	200 mm Loans	NR	Community Facilities for Transport, Health	Comm. Serv.		5 K-5 mm Loans	102 Loans in '74	
Property Improvement Loan Ins.: All Existing Structures	Lenders	HUD	Guaranteed Insured Loans		90% of Any Single Loan	Any Improvement of Maximum $10 m	H	21.B	ANL 2m	300 m Projects in '74	Apartment Complex
New Communities Loan Guarantees	Lenders	HUD	Guaranteed Insured Loans		Maximum Project 50 mm	To Guarantee Loans on Real Property and Development	H	354 mm	7.5 mm to 50 mm	16 Total	Apartment Complex
Mortgage Insured Land Development & New Communities	Lenders	HUD	Guaranteed Insured Loans		80% of UIU Guaranteed	Anything Subject to Mortgage Security	H	1.4 mm	ANL 1.2 m	20 m Insured in '74	Apartment Complex
Airport Development Aid Program	State & Local Gov'ts. & Agencies	Dept. of Trans.	Project Grants		Fed. Share 50-75%	Everything but Facilities for Private Use	CPA	350 mm	4 m to 15 mm	647 Grants in '74	Airport Runway Repair
Construction Grants for Wastewater Treatment Works	State & Local Agencies	EPA	Project Grants		Fed. Share 75%	For Construction of Wastewater Treatment Works	W&WP	5B	26 m to 1.5 mm	2,500 Projects in '75	Wastewater Treatment Plant
Community Development Block/Discretionary Grants	Private Developers and Public Development Agencies	HUD	Project Grants		NR	Construction/ Rehabilitation of Housing & Public Projects	H	50 mm	n/A	0	

Table 9.1. Summary of Federal Guaranteed Loan Programs (Cont'd)

Regulation	To	From	Mech.	Amount	Matching	Uses	Sector	Assets	Range of Projects	Projects	Typical Project
Grants & Loans for Public Works & Development Facilities	State & Local Gov'ts. & Other Non-Profit Orgs.	Dept. of Commerce	Project Grants & Direct Loans		50% of Grant	Water & Sewer, Roads; Railroad Sidings, etc.	CPA	142 mm	5 m to 7 mm	205 Projects in '76	
Construction of Public Libraries	State Library Extension Agencies	HEW	Formula Grants		Fed. Share of 33% to 66%	Construction of and Additions to Bldgs.	CPA	4 mm	25 m to 500 m	40 Projects in '75	

Table 9.2. Summary of Federal Grant Programs

REGULATION	TO	FROM	MECH.	AMOUNT	MATCHING	USES	SECTOR	ASSETS	RANGE OF PROJECTS	# PROJECTS	TYPICAL PROJECT
Airport Development Aid Program	State & Local Gov'ts. & Agencies	Dept. of Trans.	Project Grants		Fed. Share 50-75%	Everything but Facilities for Private Use	CPA	350 mm	4 m to 15 mm	647 Grants in '74	Airport Runway Repair
Construction Grants for Wastewater Treatment Works	State & Local Agencies	EPA	Project Grants		Fed. Share 75%	For Construction of Wastewater Treatment Works	W&W P	5B	26 m to 1.5 mm	2500 Projects in '75	Wastewater Treatment Plant
Community Development Block/Discretionary Grants	Private Developers and Public Development Agencies	HUD	Project Grants		NR	Construction/ Rehabilitation of Housing & Public Projects	H	50 mm	N/A	0	
Grants & Loans for Public Works & Development Facilities	State & Local Gov'ts. & Other Non-profit Orgs.	Dept. of Commerce	Project Grants & Direct Loans		50% of Grant	Water & Sewer Roads, Railroad Sidings, etc.	CPA	142 mm	5 m to 7 mm	205 Projects in '76	
Construction of Public Libraries	State Library Extension Agencies	HEW	Formula Grants		Fed. Share of 33% to 66%	Construction of and Additions to Bldgs.	CPA	4 mm	25 m to 500 m	40 Projects in '75	

in-house is required. If the proposed use of funds is legislatively legitimate, then the money is forthcoming. The type of approved expenditures greatly reflects the nature of the program. Grants have been used for the acquisition of property, for the construction of various community facilities, including playgrounds, senior centers, water and sewage facilities, and for solid-waste disposal facilities. There are few legislative restrictions. Although funds from this grant mechanism may be used for the rehabilitation of old housing, they may not be used for the construction of new housing. There is little cost to the community in requesting funds under this program, and matching funds are not required. The 1974 law also provides for a more limited HUD program of discretionary grants for innovative projects. There are priority categories in the funding of these grants.

Under the Federal Water Pollution Control Act of 1972, the Environmental Protection Agency provides matching grants for the construction of municipal waste water treatment works. Annual funding has grown steadily from $1.9 billion in fiscal year 1973 to an estimated $4.5 billion in fiscal year 1976. These funds have been expanded in an attempt to ensure that the 1980 water pollution discharge standards are met on schedule. The waste water treatment works construction grants program is far more restrictive than the previous programs described. Federal criteria for approval of an application require the demonstration of a real enviornmental problem, the effective control of which at a reasonable cost would not impose a financial burden on the municipality applying for the grant. In addition, the municipality must prepare a facility plan detailing what is to be built, how it is to operate, and at what cost. Preparation for this kind of plan takes an average of seven months. Completed plans must be reviewed first by the state and then by the federal EPA. As a result, the average time span from planned completion to the start of construction is 15 months.

Construction grants are reviewed by EPA on the basis of a guideline notebook which is at least three inches thick. One guideline states that no grant may be made for any project which is an amount exceeding 30% of the estimated "reasonable" cost of the project. This could affect the inclusion of community energy system projects in the grant proposal. Certain exceptions to this rule are permitted by the EPA. Energy conservation is not one of the existing justifications for an exception. The grants for individual projects range in size from $26 million to $1.5 million. Twenty-five hundred projects were funded

in 1975 with the federal government providing 75% of the construction cost and the municipality supplying the balance.

Another major federal construction program is that conducted directly by the government through the General Services Administration. The GSA is responsible for the design, construction, operation, and maintenance of nearly all federal civilian facilities. In fiscal year 1975, it expended $89 million on construction and $98 million on repair maintenance. The GSA could be a major participant in the development and use of community energy systems.

The financing mechanisms discussed in Sections 9.2 and 9.3 represent subsidies applicable only under certain regulatory conditions. More general financing instruments, used in the private and municipal sectors for the support of long-term financing of capital equipment are discussed below.

10 MUNICIPAL PRIVATE LEASING ARRANGEMENTS

Leasing has been an important form of long-term financing for capital equipment. The widespread use of leasing was stimulated by the introduction of cost-plus contracts after World War II. These contracts allowed the owner of the leased equipment some assurance of a return on his investment. In the 1960s, leases were introduced in the private sector to finance railroad cars, computers, and other medium-sized capital investments. In the 1970s, Congress enacted bank holding company legislation and the Federal Reserve Bank issued regulations permitting bank holding companies to engage in leasing. This brought large-scale financial resources into the leasing business. Since 1971 it is estimated that the total value of equipment leased exceeds $150 billion.

Leasing is now being used frequently by local governments to finance the use of capital equipment. A lease arrangement involves a third party, the lessor who purchases an asset with his own money and the local municipal government, the lessee, who rents the use of the asset. The lessee, or user of the equipment, usually decides on the equipment, manufacturer, terms of warrantees, guarantees, delivery, installation, services, and the negotiation of its price just as if the user owned the equipment. Negotiations between the lessor and lessee then determine the length of the lease, lease rentals, and charges. The property taxes, services, insurance, and maintenance are paid for by the user of the equipment. The owner of the equipment must take on the risk of ownership in exchange for which the leasing company claims a tax benefit of property ownership. These tax benefits depend upon the 10% investment tax credit and a normal or accelerated depreciation charge.

The lessor is the owner of the equipment upon termination of the lease. A purchase at fair market value is sometimes permitted by the owner under the lease agreement. No purchase agreement at a nominal price is permitted under existing tax laws since such an arrangement would be tantamount to the ownership of the equipment by the lessee during the leasing period. Of course, a lease renewal option is permitted.

Leasing has several advantages and disadvantages for the municipality relative to other forms of financing:

1. Leasing allows a municipality to participate in tax advantages such as depreciation even though it pays no taxes itself. These are realized in the form of lower lease rental payments for the equipment.

2. Relative to the effective interest rates on tax-exempt bonds, the costs of lease rentals are high, amounting to 10% to 18% of the capital cost of the equipment per year.

3. Lease rental payments may provide a net cash flow in the early years of the use of the equipment superior to that which would have occurred if the asset were owned by the municipality. This is due to the high initial cash outlays for the equipment.

4. Large depreciation charges and interest expenses in the early years of an asset tend to reduce the reported income for the use of the equipment. The high depreciation expenses in the early years of the life of the equipment, if accelerated depreciation is used, lowers the reported net earnings for the municipality. Of course, the lower reported net income has no tax benefits for public agencies.

5. Leases allow a local government to use an asset without forcing a municipality to raise the capital necessary to purchase the asset.

6. There are few institutional limitations on leases, and they can be instituted quickly.

7. Other costs incurred in using an asset, e.g., installation charges and delivery charges, can be structured into the lease, reflected in lease rental charges, and thereby amortized over the life of the lease.

Leasing may be an attractive alternative for municipalities where other sources of funding, such as municipal bonds, are not available because of institutional or political restrictions. Although the direct costs, in terms of lease rental payments, may be larger under a lease than some other forms of financing, it does facilitate a cooperative effort between, for example, an electrical utility and a municipality.

In recent years, a form of leasing, known as leverage leasing, has been used to increase the tax benefits of leasing in relationship to the size of the initial investment of the lessor. In effect, the lessor provides only part of the financing of the equipment and obtains the remaining capital from the lessee either directly or through a lessee guaranteed loan. Nevertheless, the lessor still takes the entire benefit of the depreciation write-offs. In effect, he receives tax benefits of financing 100% of the equipment while only providing a percentage of the initial required capital. This arrangement was prohibited by recent tax legislation, so that now only the tax benefits associated with the percentage of the investment provided by the lessor could be obtained by the lessor.

10.1 PROJECT FINANCING

Project financing is implemented by use of municipal revenue bonds and industrial revenue or development bonds. In securing repayment of bond funds for project financing, the bond, principal, and interest repayments depend on the expected project revenues. The expected revenues must offset all future operating and capital recovery costs.

Municipal revenue bonds are long-term, tax exempt obligations issued directly by municipalities, authority, or quasi-public agencies. Project revenues are pledged to guarantee repayment of the debt. Revenue bonds have been used to finance a variety of projects, such as bridges, sewers, and housing developments. A typical revenue bond is negotiated rather than competitively underwritten. Because voter approval is not required for a revenue bond, decisions may be made directly by municipal officials regarding its use. Moreover, because the projects that are financed by such bonds are not backed by the taxing power of the municipality, municipal debt limitations do not usually apply to revenue bonds.

The issuance of revenue bonds requires detailed documentation including a summary of the project's technology, products and economic viability. Revenue bonds usually are not suitable for financing projects that cost less than $1 million because of the high fixed front-end administrative and transactional costs. Interest rates on revenue bonds are at least 30 to 45 basis points (a basis point is one one/hundredth of a percent) higher than on similarly rated general obligation bonds. Revenue bonds pay the higher rate of interest because investors assume a higher degree of risk in purchasing them. Indeed, the revenue bonds for many projects are meeting severe resistance from potential purchasers today. This may make the premiums that must be offered to sell revenue bonds as much as 100 basis points above that required for similarly rated general obligation bonds.

In general, revenue bond funding is used only when a major project requiring long-term capital is to be managed by a independent authority or a distinct municipal agency and only when the service provided will generate enough revenue to operate and maintain the facility as well as to cover interest and principal on the debt. If these conditions can be met by a community energy system, project financing is the logical strategy for a municipality to use.

Under special circumstances, project financing can be arranged to have the same degree of risk as general obligation bonds. For example, suppose that the municipality establishes an energy authority whose sole function is to hold legal title to the integrated energy plant and be directly responsible for the revenue bonds. The municipality then may sign a non-cancelable contract with the energy authority with stipulated payments in the exact amount of the bond payment schedule. Then investors in the revenue bonds view these bonds as if they were general obligation bonds. This could be an important device in financing integrated energy systems.

The energy authority in this scenario might also build a plant and then lease it to specific firms. The lease payment from these firms then replaces the municipal contract in guaranteeing the interest and principal repayment on the bonds. The firm leasing the equipment could benefit if the lease charges are less than it would have to pay elsewhere to obtain the use of similar equipment. The lease costs may be lower in this case because, due to the tax-exempt status of the project financing bonds, the bond interest costs are less than are otherwise possible. Moreover, the local government will not charge itself property taxes and may have lower costs than a private corporation in acquiring the site for the facility.

10.2 GENERAL OBLIGATION FINANCING

The basic instrument for municipal general obligation financing is the general obligation bond. With general obligation fiancing, the capital market evaluates the credit worthiness of the local government and does not specifically evaluate the technical and market risk of a particular project. General obligation bonds are long-term, tax-exempt obligations secured by the full faith and credit of a political jurisdiction with the power to levy taxes. These bonds typically are offered competitively for sale to bidders. Usually underwriting syndicates are formed by groups of firms to purchase the entire issue. The bidder offering the lowest net interest cost to the jurisdiction wins the right to place the bonds with its customers. Before issuance of general obligation bonds, voter approval usually is required. General obligation bonds carry the lowest coupon rate of any financial instrument and also have a low effective interest rate compared to other long-term debt instruments. The effective interest rate is the ratio of the yearly interest payments to the net financing proceeds received by the municipality. The minimum offering size

for a general obligation bond is $500,000. General obligation bonds can be used to finance any project approved by the voters. Thus if a project costs less than $500,000, a local government might finance it by combining several such projects in a single offering.

The question of which of these bond financing instruments is the least expensive for a municipality cannot be resolved on the basis of interest rates alone, because these rarely represent the true cost the local government must pay on borrowed capital. The government must compare the effective interest cost and effective debt service rate on the funds it finances. Effective debt service rate is the yearly cost of interest payments plus the yearly repayment of capital divided by the amount of capital the local government actually receives. The denominator in this case depends in part on the fee charged by investment bankers (usually 2% of the total issue) and other financial agents. For example, a bond council might charge 0.4% of the gross amount to certify the propriety and legality of the bond issue.

10.3 CORPORATE FINANCING

Loans to the private sector, like those to the public sector, are made on the basis of estimates of the lender's ability to repay. In the case of utility bonds, the monopolistic situation of the utility ensures that the utility will not face competition or go out of business. However, it does not assure that the utility may earn a lower rate of return than the maximum allowable specified by the regulatory commission. Thus the earning power of the utility constitutes an area of risk generally not found in the assessment of the risk of loan repayment by municipalities. In evaluating the ability of a utility to repay loans, several financial ratios of the utility are considered:

1. the ratio of the firm's income to the interest charges that must be paid by the firm to service all debts outstanding;
2. the ratio of the firm's cash flow to the sum of the total debt service charge plus 1/3 of its rental payments;
3. the ratio of the total debt to the total debt plus equity of the company;
4. the ratio of the short to long-term debt; and
5. the ratio of profits to equity.

Each of these ratios reflects a different aspect of the financial performance of the utility. If these ratios are improving or are now at an acceptable level, the perspective borrower has passed his first test. Aspects, specific to the project for which the loan is being proposed, also are considered by constructing a cash budget reflecting the expenditures required for the project and the revenues generated by it. The demonstration of how and when the indebtedness will be repaid is indicated in this cash budget. These projections of revenue and cost are uncertain, and the lender may spend considerable time and effort to verify them.

Depending on the specific project and financial profile of the utility, project bonds are rated in terms of the financial strength of the company and the assessment of the risk of default. In 1975, the spread between a AAA-rated bond and a BAA-rated bond was approximately 200 points. The interest rate for a AAA bond was 9.13%, while that of a BAA bond was 11.29%.

10.4 POLLUTION-CONTROL BONDS

Ordinary corporate bonds play a role similar to that of the general obligation bonds of a municipality. Issuance of pollution-control bonds, one form of bond available to corporations, is similar to project financing in municipalities. Pollution-control revenue bonds are long-term, tax-exempt obligations issued by a public agency on behalf of a private corporation. They are secured by the assets of the corporation and the projected revenues of the project. The credit rating of the corporation determines the cost of the bond. Interest rates are at least 50 basis points higher than for general obligation bonds and nearly 200 basis points lower than the rate for ordinary corporate debt. A corporate guarantee of debt service often is required to ensure their marketability. Although the credit worthiness of the corporation is a controlling factor in the interest rate charged for the bond, technically the local government owns the facility, and the equipment is leased to the private firm.

The lease payments are tailored to meet the scheduled payments of principal and interest on the bonds. If payments between the corporation and the local government are structured on an installment basis, the corporation may claim ownership for tax purposes, giving the corporation tax benefits in the form of accelerated depreciation and investment tax credits. Administrative complexity and broadly defined tax guidelines frequently require the Internal

Revenue Service to make rulings that can delay the financing for six months. Often the credit worthiness of the corporation borrowing through the use of pollution-control bonds is improved through a long-term contract with the municipality for the purchase of services from the pollution-control project.

10.5 RELATIVE COSTS

It is difficult to generalize about the relative cost to a municipality and corporation of using the instruments just described. The cost normally associated with each use is not fully reflected in the interest rate charged. In general, however, only the interest rates can be estimated using secondary sources of data. Reasonable estimates of the interest rates on alternative financing are shown below:

Method of Financing	Interest Charge
Federal grant funds	0%
Federally guaranteed loans	6%
Leasing	15%
Revenue bonds	9%
General obligation bonds	6%
Utility bonds	11%
Pollution control bonds	9%

These rates are subject to variations from one municipality or utility to another and from one period to another.

A municipality can, under certain circumstances, combine aspects of various financial instruments. For example, a revenue bond could be issued with a United States Government guarantee as to principal and interest. In this case, the bonds would not be tax-exempt and would carry a higher coupon rate. An alternative to the U.S. Government guarantee would be a municipal bond carrying an insurance company guarantee. These bonds would be tax exempt.

Loan financing or guarantees also can be combined with a federal grant. For example, a municipality might obtain a grant covering 80% of the total cost of the project and issue tax-exempt industrial revenue bonds for the remaining 20%. The latter may carry a rate of about 7%. The funds obtained from the government would be considered equity and thus the effective cost of capital would be about 1.4%. Obviously, the number of arrangements and combinations among the various instruments that have been discussed are too numerous to detail here.

Rather, this description intends only to indicate the basic financial alternatives that might be investigated under circumstances in which a municipality or utility wishes to undertake a integrated community energy system.

APPENDIX A

APPENDIX A

FINANCIAL DECISIONS OF UTILITIES AND MUNICIPALITIES: AN OVERVIEW

A.1 INTRODUCTION

A life-cycle costing approach is used to evaluate the investment decisions of privately owned utilities. Traditional life-cycle costing is, however, heavily influenced by regulatory factors which restrict the patterns of utility investment. Most importantly, utility investment decisions in the private sector depend on the fact that the cash flow these companies generate is ultimately determined by regulatory commissions. A privately owned utility differs from other private businesses in that it is "guaranteed" to earn a fair and reasonable rate of return on its investment. Other business ventures do not have such guarantees. In exchange for this guarantee, utilities must furnish services on demand to customers in their service areas. Consequently, a regulated utility cannot omit a segment of the market even if a better return could be earned in another area. Thus, the utility is not free to withdraw its investment from the regulated area.

This kind of regulated monopoly structure requires that the utilities generate enough revenues to cover their direct operating costs and to allow a reasonable return on the invested capital. In practice, the application of this mark-up pricing formula frequently is difficult and often leads to litigation. Whether any particular outlay is a reasonable cost, for example, is a source of controversy. Regulators often review salaries, as well as the expenditures on specific components in the production process. If input prices, such as the price of fuel to generate electricity rise sharply, there may be long delays before the cost can be passed on to the customer in the form of higher rates. In the intervening period, the return may be less than fair and reasonable.

Because the regulatory body determines the rates that the utility may charge its customers, it can segment the utility's customers by the type of service they receive (interruptable vs. non-interruptable), by the season of the year (summer vs. winter rates), by the hour of the day (night vs. day rates), by the type of customer (residential, commercial, factory), and by the quantity of service taken (either step-down, flat, or step-up rates as the quantity of service increases). These examples of segmentation are not exhaustive.

Furthermore, the regulatory commission can determine how income is to be defined for determining the rate of return. Some commissions require utilities that use accelerated depreciation for calculating their federal income taxes to include the resulting tax deferrals over the straght-line depreciation method as part of their revenue. These interest charges will then be capitalized and become part of the rate base. The effect of considering interest expenses as revenue makes reported profits higher than they would otherwise be. The resulting accounting profits, however, do not generate any cash; rather, they produce cash outlays.

Finally, the regulatory commission monitors the quality of service that is supplied by the company to the customers served. It keeps records of complaints by customers and the length of time it takes to repair damage. Moreover, the commission may call for an upgrading of standards and deny any rate increases until the new and higher performance standard is met.

A.2 INVESTMENT DECISION RULES FOR CAPITAL OUTLAYS

The capital outlays of any organization can be subdivided into four major areas:

1. new product line introductions,
2. capacity expansion of existing product line,
3. cost reduction projects, and
4. maintenance outlays.

In the case of investor-owned utilities, only one of these, cost reduction outlays, forms the basis of investment decisions. The private utility is usually denied the right to introduce new products. It is required by its charter to undertake all necessary expansion and maintenance outlays. In the area of cost reduction expenditures, a private utility must decide how to rank the various investments it can make. The question it faces is: "Given a limited amount of funds, which investment project is most attractive?"

To answer this question, a method of ranking the available investments is required. One proposed ranking scheme is as follows:

1. Determine the one-year cost savings that will result if a new investment is employed. This cost saving should identify the change in operating cost only and should be associated with specific cash flows;

2. Determine the change in cash flows that will result in one year from the effect of the new depreciation allowances on taxes;

3. Determine the net cash outlay that must be made. This is equal to the cost of the new investment less the salvage value (after taxes) of the old machine;

4. Estimate the savings that will arise from doing the replacement now rather than one year from now.

If the price of a machine is expected to rise rapidly because of inflation, the savings will be relatively large from investing now rather than a year from now. If, however, there are rapid technological changes in the field, the price of the machine may either fall in price or larger cash savings could arise from postponing the investment. Replacement savings may be negative rather than positive.

If we sum (1) the operating savings, i.e., the cash savings from lower operating input costs; (2) the tax savings, i.e., the cash tax savings arising from different depreciation schedules; and (3) the replacement savings, i.e., the expected increase in cost that will arise from waiting one more year, and then divide that sum by the cash outlay, i.e., the cost of the new machine less the salvage value of the old machine, then we have the equivalent of the benefit/cost ratio. Investments can be ranked according to this ratio.

A straight-forward use of this ratio ignores the fact that the cash outlays normally are made early in the year; whereas, the rewards from the cash outlays occur later in the year. Consequently, an alternative scheme is to equate the cash outlays to the sum of the benefits divided by a discount factor. Investment projects can be ranked according to the size of the discount factor necessary to bring the two sides of the equation into balance. Of course, in using any of these ranking schemes, a privately owned utility must also take into account the regulatory costs that will be incurred if the new cost reducing equipment involves a technological change. The case of nuclear fuels is an obvious illustration of the monumental regulatory costs that can be incurred when a new cost-cutting technology is introduced. It is possible that when these costs are recognized, the cash outlays for a new project may far exceed any cash benefits that can arise from the change.

A.3 MUNICIPAL UTILITIES

Many municipalities own and operate utilities. These utilities are heavily subsidized. For example, unlike an investor-owned utility, municipal utilities do not pay property taxes. Moreover, they have operating freedom because they are not regulated as stringently by the state regulatory commissions. In spite of the subsidies and absence of regulation, the rate of return these utilities earn on their invested plant frequently is less than the interest rate on government bonds.

The investment decision framework of a municipal utility parallels that of an investor-owned utility, i.e., expenditures are made to provide service to meet the demands of the community at a minimum cost. The prices charged for the services are mostly related to the costs of providing the services and to the tax structure of the community. In this sense, pricing policy is not directly a decision variable for the municipal administration. As in the case of privately owned public utilities, the revenue side of the decision is essentially predetermined. Consequently, the problem becomes one of supplying the service at the lowest possible cost.

Differences between municipal and private utilities may, in some cases, be important. One of the most significant differences relates to the important role of intergovernmental transfers on municipal decisions. In larger cities, up to 30% of the total revenues of the city may be derived from intergovernmental transfers. Moreover, a number of federal programs, in one way or another, subsidize municipalities in performing the duties required of them. In some cases, these subsidies take the form of outright grants for the construction of new facilities, and in other cases they take the form of low-interest loans. Often these subsidies reflect federal programs usually aimed at environmental considerations, energy conservation, or some other aspect of general welfare. These programs have the significant effect of often making a substantial difference between the cost of providing the services and the cost to residents of a particular municipality providing those services. For example, if a new water treatment plant is financed, in terms of construction costs, 90% is financed by the federal government and only 10% by local tax resources. Then there is a substantial difference between the cost of providing that service to the country, as a whole, and the cost of providing that service to the municipality. The

municipality, because it is concerned only with the welfare of its own residents, will base its investment decision on the cost *to it* of supplying the service.

In a manner of speaking, the local voters of the municipality play a role similar to that of the regulatory commission in the case of investor-owned public utilities. The voters determine the rates a municipality may charge for its utility services. Voters also help to determine the quality of municipal service required, and even more importantly, they determine the extent to which they are willing to pay for these services.

It is clear that, given a federal government subsidy of up to 90% of the investment cost, a particular cost reduction investment in municipal services might have a cost/benefit ratio that is highly favorable as far as the municipality is concerned. Despite this highly favorable cost/benefit ratio, a local objection to taxes to pay even for the small portion of the project not covered by the federal funding may make it difficult for a municipality to proceed with the project.

In some cases, the funding available in some of the federally sponsored programs is not expended on an annual basis because municipalities do not submit proposals sufficient in number and scope to exhaust the funding allocated by Congress. For small municipalities, one possible reason for this may be the expense and difficulty involved in preparing and selling proposals to the federal government. It can indeed be an expensive proposition requiring the services of engineering and architectural firms involving resources beyond those easily available for this kind of effort in smaller municipalities. Furthermore, it is possible that the programs funded by the federal government are in response to national objectives which may or may not be shared by the particular municipalities involved. The federal programs may be part of a set of new regulations that are imposed upon municipalities and that may "require" them to make investments in new capacity that they would ordinarily have postponed indefintely.

Thus, municipalities are squeezed, on the one hand, by the growing reluctance of taxpayers to tolerate increased tax rates, and on the other hand, by the growing reluctance among some investors to accept municipal bonds. Moreover, they are influenced by increasing population and expectations that require increases in capacity to supply municipal services and by federal government regulations that may require additonal capacity, which in the eyes of the municipal government, is "unwanted and unneeded."

A.4 CONCLUSIONS

With respect to ICES the similarity between investment decision-making in the private and the public utility sector may initially make it appear that both sectors should be equally attractive in terms of ERDA/ICES commercializaton efforts. However, the strong tradition of regulatory restrictions regarding private utility investments in areas outside their charter and the fundamental nature of the changes required to allow private utilities to easily expand into a multi-service mode of operation reduce the short-term potential of private utility ICES commercialization.

Compared with the private sector, municipal utility operations have a number of characteristics that improve their ICES commercialization potential. Municipalities have historically been engaged in multi-utility operations, and the size and heat balance requirements of a municipality are well defined by the definite physical boundaries and zoning controls that characterize most communities. Financing is relatively cheap through tax-exempt municipal bonds. Municipalities have the utility needs — residential, commercial, and industrial — required to achieve an economic heat recovery utilization with an integrated energy system. Municipalities have a long-time horizon which encourages proper consideration of lifecycle costs and concern for responsible operation and maintenance of an integrated energy system. Because the costs and inconvenience of installing an integrated energy distribution system in an established city may be prohibitive, it is likely that municipalities with urban renewal master plans that include massive reconstruction would be more interested in the integrated energy systems than would static communities. Local, regional, and national objectives, such as energy conservation and pollution control, are given greater emphasis with governmental developers and, in particular, with municipalities than they are with private developers. Finally, the municipality might facilitate the removal of institutional obstacles more successfully than could a private developer.

APPENDIX B

APPENDIX B

MODES OF MUNICIPAL FINANCING

B.1. INTRODUCTION

The purpose of this Appendix is to review some of the mechanisms that can be used by municipal governments for raising funds. These comments made here are based on documents related to resource recovery plant implementation,* but are generally applicable to other forms of municipal fund raising.

Financing decisions by municipalities are extremely complex and time-consuming and require the services of experts. For example, the State of Connecticut has had an eight-person staff, plus an investment banker and general counsel, working for nearly one year to finalize its contract for a $50-million resource recovery system.

Local governments draw capital for purchasing facilities and equipment from two sources, namely, current revenues and borrowings. Under a current revenue scheme, all purchases are fully funded as they are made. This practice has been common, for example, in the solid-waste area where it is usually used to purchase collection vehicles and solid-waste disposal sites. It is dependent on the community's ability and willingness to raise surplus capital, and therefore, it is not feasible to finance big ticket capital intensive purchases. Its major advantage is that it is extremely simple.

Borrowing options may be divided into three categories: short-term options, medium-term options, and long-term options. Short-term options generally are used for items that cost less than $500,000. Unless a local government generates a large revenue surplus, short-term financing alternatives have a limited place in funding capital intensive purchases (short-term is considered to be one to five years in this report and medium-term five to ten years). The repayment of the principal of the loan often is too heavy a drain on the local government's cash flow. Examples of short-term borrowing instruments are bank loans and trade credit. Long-term municipal financial alternatives can be classified into two broad types: revenue bond or project financing and general obligation financing.

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*U.S. Environmental Protection Agency, "Guides for Municipal Officials, Resource Recovery Plant Implementation and Financing" (U.S. Government Printing Office: 1975 631-404/475). This material was written by Robert E. Randol, a financial analyst with the Resource Recovery Division, Office of Solid Waste Management Programs, U.S. Environmental Protection Agency.

B.2 LEASING FOR INTERMEDIATE-TERM PROJECT

Traditional leasing frequently is being used by local governments to finance medium-term use of capital equipment. A lease arrangement involves a third party, the lessor, who purchases an asset with his own money, and the local government, the lessee, who rents use of the asset. These leases usually last approximately five years. They have the advantage of reducing the demand on municipal capital or outlays and also they can be instituted quickly. However, leasing rates are high, ranging between 10% and 16% of the capital cost of the equipment. Furthermore, after the termination of the lease, the local government will neither own nor control the facility.

Leverage leasing is technically not a financial instrument; rather it is a financial package that combines several financial mechanisms. It involves two major participants, a financial intermediary, the lessor, and a local government, the lessee. It differs from traditional leasing in that both the lessor and the local government provide capital funds to purchase the asset. Usually the lessor puts between 20% to 30% of the cost of the asset and the local government finances the remaining portion through a typical borrowing method. The leverage leasing concept is based upon the benefits (lower long-term capital and interest costs) that accrue to a city if a financial intermediary, corporation, or individual is interposed between a long-term source of capital and the local government. The financial intermediary purchases the tax advantage of ownership which cannot be used by a local government by charging the local government a very low interest rate on its share of the cost of the asset. The low interest rate is possible because of the depreciation and investment tax credit accompanying tax ownership of the asset. Essentially, the depreciation and tax credit act to shelter the financial intermediary's other income which allows it to receive an adequate after-tax return on its initial investment in the asset.

B.3 LONG-TERM FINANCING

With project financing, the bond principal and interest repayment are guaranteed by expected project revenues. The expected revenues must offset all future operating and capital recovery costs. Typical mechanisms that may be grouped under project financing are municipal revenue bonds, industrial revenue or development bonds, and pollution-control revenue bonds.

Municipal revenue bonds are long-term, tax-exempt obligations issued directly by municipalities, authorities, or quasi-public agencies. Project revenues are pledged to guarantee repayment of the debt. Municipalities have used revenue bonds to finance such services as sewers, bridges, and housing projects. A typical revenue bond is negotiated rather than competitively underwritten even though negotiated interest rates are generally higher than competitive interest rates. However, some of these extra costs are offset by some of the free advice the investment bank provides during its examination of the project and its preparation of the revenue bond circular and official statement. Voter approval is not required for a revenue bond so that decisions may be made directly by the municipal officials. Furthermore, municipal debt limitations usually do not apply because the projects are not backed by the taxing power of the city. The issuance of a revenue bond requires detailed documentation including a summary of the project's technology, products, and economic viability. Revenue bonds generally are not suitable for financing projects that cost less than $1 million because of their high fixed front-end administrative and transaction costs. Interest rates on revenue bonds are at least 30-45 basis points (a basis point equals 1/100 of one per cent) higher than on similarly rated general obligation bonds. Revenue bonds pay higher interest rates because the investor assumes a higher risk when he invests in them. Revenue bonds may be used to finance only a single project. In general, the mechanism is issued only when a major project requiring long-term capital is to be managed by an independent authority or by a distinct city agency and only when the service provided will generate enough revenue to operate and maintain the facility while paying interest and principal on debt.

Pollution control and industrial revenue bonds involve both a municipality and the private sector. Pollution-control revenue bonds are long-term, tax-exempt obligations issued by a public instrumentality on behalf of private enterprise. Pollution-control revenue bonds are secured by the assets of the corporation and by the projected revenues of the project. Interest rates on industrial and pollution-control revenue bonds are over 50 basis points higher than those on general obligation bonds, but they are nearly 200 basis points below the current corporate debt rate. If the bond is to be marketable, pollution-control revenue bonds often require a corporate guarantee of the debt service payments. Many of the same characteristics that apply to municipal

revenue bonds also apply to pollution-control revenue bonds. Two other characteristics are peculiar to pollution-control revenue bonds. First, the local government technically owns the facility. It owns both the facility and the equipment which it then leases to the private firm. Second, the lease payments are tailored to meet the scheduled payments of principal and interest on the bonds. If the payments between the corporation and the local government are structured as an installment sale or as a financing lease, the corporation tax benefits in the form of accelerated depreciation. Administrative complexities and broadly defined tax guidelines frequently require Internal Revenue Service rulings which can delay financing by up to six months.

The basic instrument for municipal general obligation financing is a general obligation bond. With general obligation financing, the capital market evaluates the credit worthiness of the local government and does not specifically evaluate the technical and marketing risk of a particular project. General obligation bonds are long-term, tax-exempt obligations secured by the full faith and credit of a political jurisdiction which has the ability to levy taxes. These bonds typically are offered competitively for sale to bidders. Usually underwriting syndicates are formed by groups of firms to purchase the entire issue. The bidder offering the lowest net interest cost to the jurisdiction wins the right to place the bonds with its customers. Voter approval is typically required for general obligation bonds.

The general obligation bonds carry the lowest coupon rate of any financial instrument and also have a low effective interest rate compared to other long-term debt instruments. (The effective interest rate may be determined by dividing the yearly interest payments by the net proceeds the city receives from a particular financing option.) The effective minimum offering size for general obligation bonds is approximately $500,000, but general obligation bonds can be used to finance any project approved by the voters. If a project costs less than $500,000, a local government might finance it through general obligation bonds by grouping several projects together for a single offering.

The question of which of these various means of financing is the least expensive for a municipality cannot be resolved simply by looking at interest rates because these seldom represent the true cost paid by the local government on borrowed capital. The local government may compare the

effective interest cost and the effective debt service rate on the funds it finances. The effective debt service rate may be defined as the yearly cost of the interest payments plus the yearly repayment of capital divided by the amount of capital and local government actually receives from the project. Table B-1 indicates the comparative costs of using general obligation revenue and revenue bonds with leverage leases to obtain $10 million in capital funds. The costs shown are based on general assumptions and are only approximations. Table B-1 assumes a 20-year debt.

When a municipality decides to raise funds in the capital market, several other groups of individuals participate, including the financial consultant, the investment banker, and the bond counsel. Frequently, an outside financial consultant will assist the local government in choosing a particular financing mechanism with specific variations most suited to the circumstances. The task is typically performed by independent consultants, commercial banks, attorneys, accounting firms, or investment banking firms. Occasionally an outside party performs the two separate functions of the financial advisor and of underwriter. The financial consultant's responsibility includes gathering all necessary data, preparing the bond circular, advising on timing and marketing methods, and recommending bond terms, e.g., maturity schedules, interest payment dates, call features, and bidding limitations. With a competitive offering, the local government must do its own preparatory work or hire a financial consultant to do it. For a negotiated offering, most of this preparatory work is done by the investment banker.

The role played by the investment banking firms is relatively straightforward because they act as financial intermediaries that purchase bonds from the issuing city or other governmental unit and in turn sell them to the ultimate investor. The underwriter assumes the market risk of price fluctuations during this period and also fulfills a distribution function. An investment banker charges a fee which is a percentage of the total bond underwriting. On issues of less than $5 million, 2% of the total is a common rate.

The bond counsel's main role is to render an opinion regarding the validity of the bond offering. The counsel must determine if the bond issue is in compliance with all constitutional, statutory, and charter provisions applicable to the local government issuing the bond. Fees for general

Table B.1. $10 Million Financing

		Serial General Obligation Bonds	Municipal Revenue Bond*	Revenue Bond Leverage Leasing $7M by Revenue Bonds $3M by Lessor
I.	FRONT-END COSTS			
	Rating Agency Fees	$ 3,000	$ 5,000	$ 5,000
	Commission to Underwriter	150,000	250,000	170,000
	Counsel to Underwriter	5,000	7,000	7,000
	Counsel to City	10,000	10,000	11,000
	Bond Counsel	18,000	35,000	30,000
	Accountants Fees	8,000	8,000	8,000
	Initial Trustee Fees	6,000	6,000	6,000
	Printing and Engraving	30,000	40,000	35,000
	Third Party Engineer and Accountant		60,000	60,000
	Debt Service Reserve		817,000	572,000
	Election Cost	X+		
	Total	$230,000	$1,238,000	$904,000
II.	NET PROCEEDS TO CITY	$9,770,000	$8,762,000	$9,096,000
III.	YEARLY COST TO CITY†			
	GO Bond — 5.75%	$ 848,000		
	Revenue Bonds — 6.25%		$ 883,000	
	Leverage Leasing — 4.88%**			$ 788,000
IV.	EFFECTIVE DEBT SERVICE RATE++	8.7%	10%	8.6%

* IRB costs are not detailed, since all costs are passed on to the involved corporation.

\+ Election costs are unknown.

† This is the dollar amount the city would have to pay to retire and pay the interest on the debt. It was assumed that a city made steady payments for the life of the financing to retire the debt. The payments were made semi-annually for twenty years. The assumed interest rate for each debt instrument was arbitrary. The actual rate will vary according to the credit-worthiness of a project (or city) and the current capital market conditions.

** The 4.88% rate is the weighted average cost of capital.

++ The Effective Debt Service Rate is the yearly percentage cost to the city. It is calculated by dividing the yearly cost (interest plus debt retirement) by the net proceeds a city received.

obligation bonds are somewhat less than for revenue bonds of comparable size. A typical bond counsel's fee for a medium-sized revenue bond, that is, $10-$20 million, may range from .3% to .4% of the gross amount of the issue.

The future of tax-exempt municipal bonds offerings is somewhat in doubt. For many years, secretaries of the treasury have advocated abolition or at least curtailment of the tax-exempt bonding authority of municipalities. Consider, for example, that the average municipal bond buyer is always in a higher tax bracket than the marginal purchaser. The Treasury invariably loses much more in foregone tax revenues than the municipalities save in interest costs. In 1971, it was estimated that for every dollar in interest the local community saved, the Treasury gave up $1.32 in taxes that it could otherwise have collected.*

One of the proposals would give municipalities the option of issuing taxable or tax-exempt bonds with the understanding that if they issue taxable bonds, a federal subsidy helping them to pay the necessary higher interest rates would be forthcoming. In general, the effect of this policy with current interest rates, would probably be to encourage municipalities to finance their capital expansion using taxable bonds, and a corollary to this effect would be to remove the lower and middle income investors who now purchase municipal bonds from the municipal bond market. Presently, it is not clear what changes, if any, will be made in the flexibility granted municipalities in their own funding.

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*Sanford, Rose, "The Trouble with Municipal Bonds is Just Not New York" *Fortune*, p. 100 (December, 1975).

APPENDIX C

APPENDIX C

TRENDS IN UTILITY RATE REGULATIONS

C.1 INTRODUCTION

A survey of utility literature of recent years reveals a growing concern with revision of existing rate structures. Such dissatisfaction with the *status quo* on the part of both the power industry and its regulators is a fairly new development. Although many recent forces have been acting on the utility industry -- consumerism, environmentalism, etc. -- by far the most potent force has been the surge in the price of energy resources in the aftermath of the 1973 Arab oil embargo. Before then, customer feelings in favor of rate revisions failed to reach the rate commission level. However, when the energy crisis became a point of public debate, many rate revision proposals with a variety of different (and frequently conflicting) goals came into focus. Always labeled rate "reforms" by their sponsors, the suggestions ranged from conservation-minded "time-of-day pricing" to welfare-minded "lifeline rates." Although some proposals have advanced farther than others, their collective impact has been to foster both creativity and confusion in the utility sector.

The considerations involved in drawing up a utility rate schedule used to be uncomplicated and easily agreed upon (at least by those of influence). Thus, as recently as 1970, the author of a primer on the electric power business had no difficulty in summarizing "some of the principles which are observed in rate making" as:

1. The rate should be simple and understandable.
2. The rate should be salable.
3. The rate should be competitive.
4. The rate should be promotional
5. The rate should be non-discriminatory.
6. The rate should cover the cost of furnishing the service.

Today, however, many of these basic assumptions of the power industry are under attack both from within and without. A welfare ethic which maintains that the poor and elderly should receive power at discount rates is challenging the "no discrimination" and "cost of service" tenets. Another school of thought maintains that what is wrong is that the first and sixth criteria in the list above have never been met. But the biggest assult has been on principle #4, that "rates should encourage the customer to use more electricity."

Presently, rates are based on the fixed cost of maintaining the generating facilities, the variable costs of distribution, and the quantity of power consumed by each customer. The declining block structure of most utility rates incorporates a 3-to-1 ratio of fixed to variable costs; thus the larger-volume user of electricity pays less per kilowatt-hour than does his "thriftier" neighbor. Suddenly, however, after all the years of this practice, conservation has assumed new emphasis even though rate principles based on cost of production favor lower per kWh rates for the large user.

With the backing of the federal government, the state regulatory commissions have moved forward with a number of energy conservation experiments and programs. To our knowledge, only one state commission, the Michigan Public Service Commission, has gone so far as to order utilities to apply inverse (i.e., lower usage → lower cost-per-unit) rates, but conservation is the new ethic of many of the nation's commissions -- if not of the power companies they are charged with regulating. The commitment to "load management," i.e., influencing the level and state of demand for electric energy so that demand conforms to individual present supply situations and long-run objective constraints, can take many forms. The most direct form of load management -- full control by the utility of customer load via ripple control, radio signals, etc. -- has yet to win acceptance anywhere in this country. In contrast, indirect management of load via the price mechanism is a popular device. In New York and North Carolina, this phenomenon has manifested itself in the insistence by the state commissions that utility prices fully reflect all costs so as to discourage the wasteful consumption that occurs when prices fall below cost.

C.2 PEAK-LOAD PRICING

The most popular application of the price mechanism to the conservation challenge is "peak-load" or "time-of-day" pricing. Under this system, the consumer pays more for electricity during peak hours of use and substantially less during off-peak hours. Conservation of electricity is accomplished under this plan by rewarding customers with cheaper energy during off-peak hours and lessening the load on the power company. Actually, what is conserved is not necessarily kWh of power but the need for additional generating capacity on the part of the power companies. The generating capacity, and consequently the capital costs, are determined by the peak hour demand. Distributing demand evenly over all the customers throughout the opposed to an uneven peaked demand, would permit the same capital stock to provide even more

kWh to the same population. Higher prices for a kWh of electric power during peak periods may be interpreted as a move toward making the rates charged more in keeping with the total costs of production.

Peak-load pricing is not popular with the power companies because of the bother and expense of installing new metering devices and the more complex accounting system required by time-of-day rates. According to utility trade journals, the whole move toward conservation by rate revisions has not yet been fully accepted by the power companies. For example, to the best of our knowledge, no power company yet has initiated even an experiment with peak-load pricing without orders from the state commission to do so. Nevertheless, at the initiative of the state commissions, peak-load pricing is being imposed. The first commission to require the introduction of peak-load pricing was the Wisconsin Public Service Commission in 1974. Subsequently, time-of-day rates have been fully implemented in New York and Vermont and are in the experimental stage in ten other states (Arizona, California, Connecticut, Florida, Georgia, Iowa, Maine, Missouri, New Jersey, and Virginia). In addition, Minnesota has a new law that includes peak-load pricing. The experiments exhibit wide variation in definition of peak period, in duration, in test subjects, and in peak/off-peak price differential. Peak periods range from four hours per day in Connecticut to twelve hours per day in Virginia, and the experiments last from three months (Iowa) to three years (Missouri). Southern California Edison is testing only its very large (5,000 kW/month) customers; whereas, Arizona Public Service is using a random sample of 210 electric customers. In Florida, the peak/off-peak price differential is 8¢/kWh-to-2¢/kWh; while in Connecticut, it is 16¢/kWh-to-3¢/kWh.

In a recent industry publication, eleven major utility executives were in near-unanimous agreement that, whether they like it or not, such rate design changes as peak-load pricing are "here to stay." One of the single, most important reasons why this is so is the moral and financial commitment of the federal government to energy conservation. Officials of both the Environmental Protection Agency (EPA) and the Energy Research and Development Administration (ERDA) have urged the utility industry to conserve. In addition, the Federal Power Survey for 1975 listed among its twelve recommendations: "Rate structures must be modified to relate the price of electricity more closely to costs, and to discourage peak use." The most imporrant federal role, however, has been played by the Federal Energy Administration (FEA) through

its grants to states, localities, and utilities for peak-load pricing and other load management experiments. FEA funded seven demonstration projects in load management at a total cost of $1.5-million in fiscal-year 1975, and was expected to spend at least $2.2-million to continue funding these and additional projects in fiscal-year 1976. Seven of the ten peak-load pricing experiments listed above involved FEA grants (requested or received) at an amount averaging in the $200,000 range. Early reports on the results of most of the experiments have been positive. Iowa Power and Light, for example, was encouraged to discover that "industries can cut consumption without cutting production or making drastic changes in production schedules."

After peak-load pricing, the current most-discussed rate restructuring proposal is the so-called "lifeline" rate for electrical service. The basic idea is that a certain minimal level of electric power (usually estimated to be 300-500 kWh/month) is a necessity of modern life and, therefore, should be priced much lower than additional power consumption. While lifeline rates might have some conservation benefits (at the dividing line between lifeline and regular consumption), they are primarily designed as a welfare measure to aid the poor and the elderly. The assumption, of course, is that the poor and the elderly use less electricity than other consumers. But that assumption has been challenged in several recent studies. The utilities argue that it is not properly the responsibility of utilities to effect a redistribution of income. It is further maintained by industry representatives that charging some customers less for their electricity than it costs unfairly requires that others be charged more than it costs for their electricity. Nevertheless, lifeline rates have found some users albeit far fewer than peak-load pricing. Lifeline rates have been instituted only in California and Maine (and in the latter only for persons 62 years or older of specified low income). However, in the past year lifeline proposals have faced the legislatures of five other states (Florida, Massachusetts, Michigan, New Jersey, and Vermont) and the Public Service Commission of another (Alabama). The lifeline concept has sparked some interest at FEA, which is funding one lifeline electric-rate demonstration project as one of ten "non-traditional-rate" demonstration projects this year. Although lifeline rates may not win as much acceptance as peak-load pricing, the probability is high of some kind of welfare measure for the energy sector (e.g., government-subsidized "fuel stamps").

Although there are other, lesser trends in utility rate structures, perhaps the mostimportant shift of all is not substantive but procedural. Utility companies seem to be less and less autonomous in their effective control over rate policies as long-passive state regulatory commissions become far more active. In addition, there is the ever-expanding role of the federal government through FEA, ERDA, EPA, etc. Reflecting this change is the serious consideration presently being given in Congress to HR 12461, the Electric Utility Rate Reform and Regulatory Improvement Bill. Among other things, this bill would mandate marginal cost pricing, peak-load pricing, and lifeline rates for the entire nation. Following hearings in the spring of 1976, the bill was scheduled for markup during a recent session of Congress. Its passage would certainly eclipse in significance any and all of the state-by-state trends discussed in this appendix.

APPENDIX D

APPENDIX D

RECENT FEDERAL ENERGY LEGISLATION

Some legislation concerning energy conservation has been enacted by the Congress of the United States. The first major legislative attempt to address the energy crisis -- the National Fuels and Energy Conservation Act of 1973 -- passed the Senate but not the House. Two years later the Energy Policy and Conservation Act of 1975 did become a law, albeit with most of the strong energy conservation incentives and enforcement provisions excluded. What remained was a requirement that each state prepare, within five months of the bill's enactment (December 22, 1975), an energy conservation plan to be submitted to the Federal Energy Administration (FEA). To be eligible for a federal planning grant, the state plan had to include:

1. mandatory lighting efficiency standards for public buildings;
2. programs to promote the availability and use of carpools, vanpools, and public transportation;
3. mandatory standards and policies relating to energy efficiency to govern the procurement practices of the state and its political subdivisions;
4. mandatory thermal efficiency standards and insulation requirements for new and renovated buildings; and
5. a traffic law or regulation which, to the maximum extent practicable and consistent with safety, permits the operator of a motor vehicle to turn such vehicle right at a red stop light after stopping.

Each state energy conservation plan might include:

1. restrictions governing the hours and conditions of operation of public buildings;
2. restrictions on the use of decorative or nonessential lighting;
3. transportation controls;
4. programs of public education to promote energy conservation; and

standards had been adopted and is being implemented on a statewide basis or within the area in which such building is to be located...Each federal instrumentality responsible for the supervision, regulation, or insuring of banks, savings and loan associations, or similar institutions shall adopt regulations prohibiting such institutions from: (1) making loans for the construction or financing of buildings, or (2) purchasing loans made after the effective date of any energy conservation standard for the construction or financing of buildings, unless such buildings are to be located in areas where federal assistance for construction is permitted under...this section."

The magnitude of the potential impact of these provisions on a variety of federal agencies, especially GSA, REA, FHA, FmHA, and VA, is immediately apparent. They are being enlisted, at least theoretically, in the cause of energy conservation. But the new law has yet to be printed in the *Federal Register* and follow-up guidelines have yet to be issued. What is the present level of energy conservation consciousness in the departments and agencies overseeing federal construction programs?

Regardless of any policy statements on the subject which may have been made by the people at FEA, officials in REA, FHA, HEW, FmHA, and VA, most other federal agencies involved in construction work have not placed a high priority on energy conservation as a national policy goal. The problem goes far beyond mere failure to initiate conservation programs. At EPA, for example, regional officials responsible for reviewing municipal wastewater treatment plant facility plans were unable to state with any certainty whether structural modifications for the purpose of reducing energy consumption would be a valid extra expense. They have received neither any guidance from Washington nor any energy conservation schemes from applicant municipalities.

What little action has been taken on the energy issue has come from HUD and GSA. In the last two or three years, HUD has funded several small-scale demonstration projects involving reduction of energy consumption. Among the systems demonstrated (or to be demonstrated shortly) are solar power, wind power, and modular integrated utilities.

As noted above, GSA construction and alteration rules for public buildings do not address the subject of energy conservation, but two recent GSA publications do. The books, both published in July, 1975, are *Energy Conservation Guidelines for Existing Office Buildings* and *Energy Conservation Design Guidelines for New Office Buildings*. Then-GSA Administrator Sampson

5. any other appropriate method or programs to conserve energy.

Neither the legislation nor FEA's follow-up guidelines mentioned integrated energy systems.

On August 14, 1976, the nation's newest piece of energy legislation, the Energy Conservation and Production Act of 1976, was signed into law. In addition to extending the life of the Federal Energy Administration, the law incorporates many provisions of the ill-fated Energy Conservation in Buildings Act of 1975. Some of these provisions could be highly significant in promoting the use of community energy systems. One section of the bill authorizes federal assistance to low-income persons to help them insulate their homes. Another (Section 304) directs the Secretary of Commerce and the GSA Administrator, using the services of the Director of the National Bureau of Standards, to develop, within three years, sets of performance energy conservation standards for both new residential buildings and new commercial buildings. The three most important sections of the new law (for the purposes of this study) are as follows:

• Section 306: "The head of each federal agency responsible for the construction of federal buildings shall adopt such procedures as may be necessary to assure that such construction meets or exceeds the applicable energy conservation standards promulgated pursuant to this title (Section 304)."

• Section 202: "Failure to provide adequate energy conservation measures increases long-term operating costs that may affect adversely the repayment of and security for loans made, insured, or guaranteed by federal agencies or made by federally insured or regulated instrumentalities; and state or local building codes or similar controls can provide an existing means by which to assure, in coordination with other building requirements and with a minimum of federal interference in state and local transactions, that newly constructed buildings contain adequate energy conservation features."

• Section 305: "No federal officer or agency shall approve any financial assistance for the construction of any building in an area of a state unless the state has certified that the unit of general local government having jurisdiction over such area has adopted and is implementing a building code or similar requirement which meets or exceeds the minimum standards promulgated pursuant to Section 304 of this title, or unless the state certifies that a state code or requirement providing for the enforcement of such standard or

states plainly in the introduction to the latter volume (a second edition of a 1974 work): "Last year the U.S. General Services Administration, the Nation's largest landloard, set a goal that will reflect reduced energy consumption in the design, construction, and operation of new federal buildings by up to 50% over current practices." Among the dozens of energy-saving techniques and devices discussed in the guidelines for new buildings are total energy sytems. While it remains unclear whether or not these are just idle suggestions, there are certainly no barriers to the implementation of community energy systems in GSA projects.

APPENDIX E

APPENDIX E

NATURAL GAS INDUSTRY PROFILE

Today, natural gas is the dominant domestic source of U.S. energy. The Bureau of Mines figures for 1975 show natural gas at 23.9 quadrillion Btu -- more energy than produced by domestic oil (18 quadrillion Btu) plus anthracite (.1 quadrillion Btu). The natural gas industry has almost $50 billion invested in plant and equipment and distributes 22 quadrillion Btu to 160 million Americans. By way of contrast, there is $132 billion worth of investment in the electric utilities designed to deliver a little more than 6 quadrillion Btu; thus, capital efficiency favors gas by a nine-to-one margin.*

Natural gas production followed a trend of rapid increase from 1950 to 1970; since then, production has abruptly leveled off; and in 1974, there was a significant decline -- the first since the mid-1940's. Since the latter half of the 1960's, discoveries and extension of natural gas reserves have not kept pace with production. Reserves have decreased in six of the past seven years with most major natural gas producing states experiencing reserve declines. Proved recoverable reserves of natural gas in the United States in 1974 dropped to the lowest level since 1956. Annual net production and additions to gas reserves are shown graphically in Fig. E.1 and E.2, both taken from *Gas Facts*.

The decline in natural gas availability, according to the gas industry, has been largely a consequence of price control of the well head price of natural gas sold in interstate commerce. Artificially controlled prices have resulted in increased consumption and decreased supply. Note that the proved recoverable reserves shown in Figs. E-1 and E-2 represent known working inventory and do not relate to those volumes of gas as yet undiscovered. These potentially undiscovered resources will be critical to the future availability of natural gas beyond the present known quantity.

According to *Gas Facts*, 1974 revenues for the gas industry increased 18.3% over 1963 as a result of the increase in the cost of gas purchased for

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*C. J. Gauthier, "Memories, Migraine, and Moving Ahead," *Public Utilities Fortnightly*, October 9, 1975, pp. 19-21. (Mr. Gauthier is Chairman of the Board of the American Gas Association.)

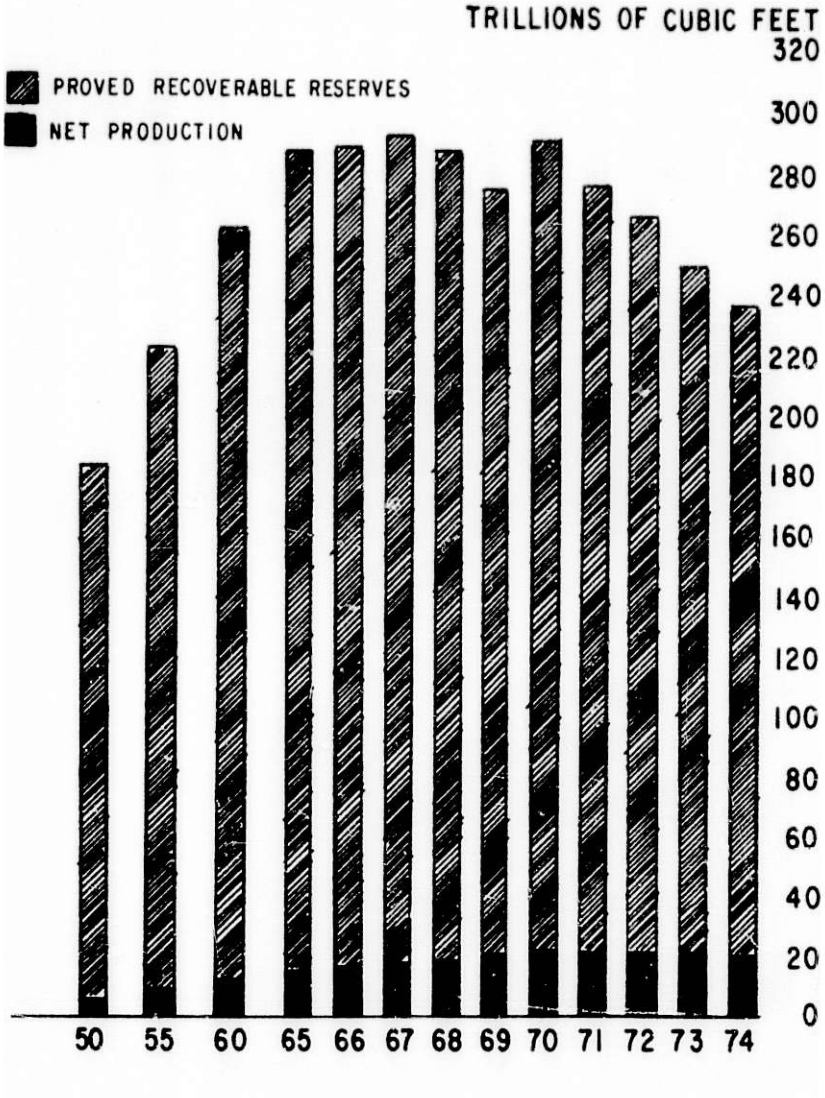

Fig. E.1. Proved Recoverable Reserves and Net Production of Natural Gas in the United States

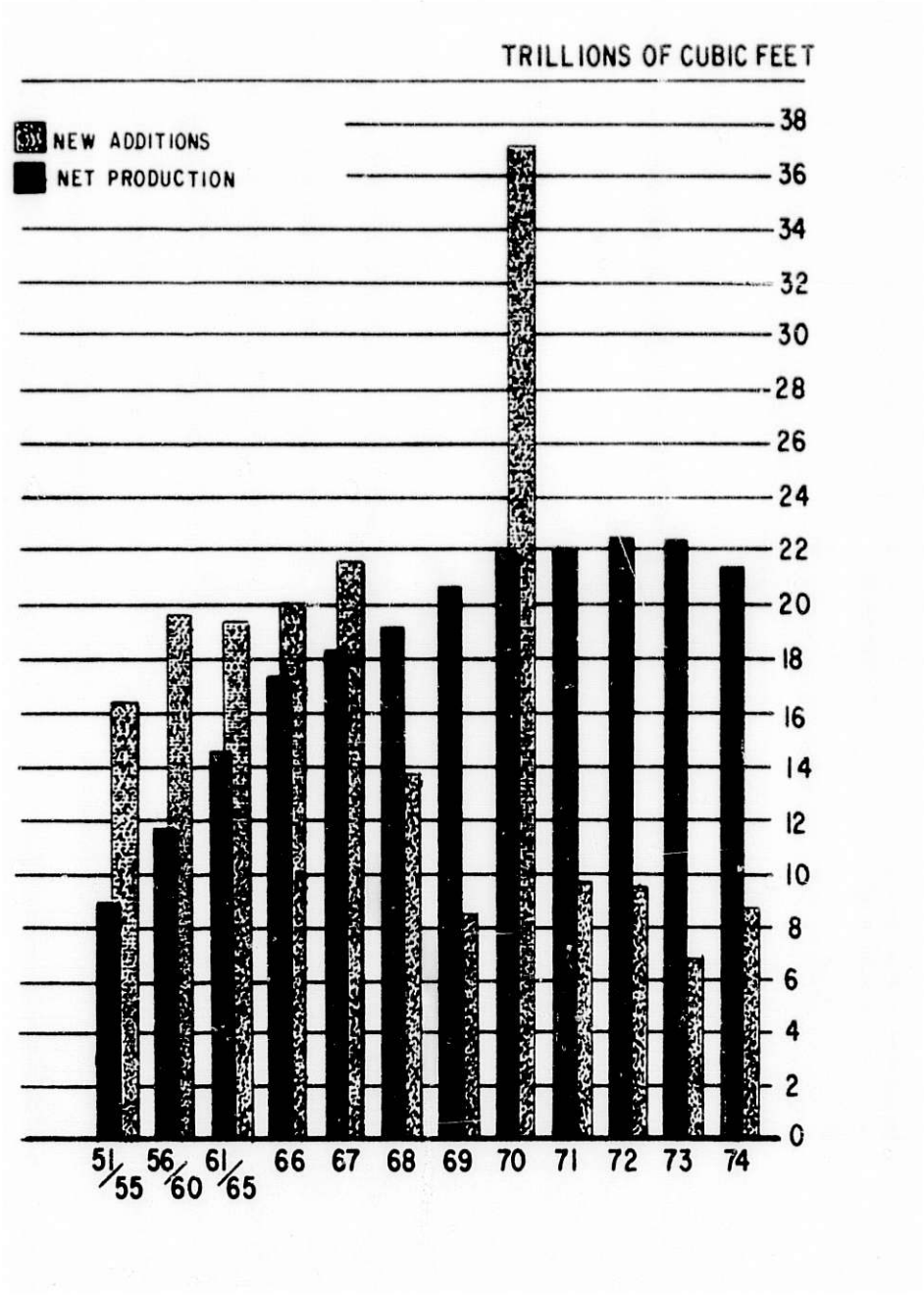

Fig. E.2. Net Production and New Additions to Gas Reserves

resale and the continuing escalation of the costs of goods and services, labor, and money -- all of which were reflected in rate increases granted to the industry. Residential revenues were up 10.4%, and represented 44.9% of the year's total revenues. The average cost per million Btu of natural gas for residential purposes increased from $1.25 to $1.42. Commercial revenues increased 16.9% and remained at 16.7% of the total revenues. Average cost per million Btu of natural gas for commercial purposes was $1.11 in 1974. Industrial sales revenues increased a substantial 31.3% and comprised 35.9% of the 1974 total revenues. The average cost per million Btu of natural gas for industrial purposes was 67.6¢. Figure E.3 indicates the distribution of gas utility industry revenues by class of service.

Natural gas prices continue to lag behind other energy prices. In 1974, gas was about half the cost of No. 2 fuel oil and only about 1/6 the cost of electricity. The Federal Power Commission* reported that 1974 average prices per million Btu of fossil fuels delivered to steam-electric utility generating plants were $1.92 for fuel oil, $.71 for coal, and $.48 for natural gas. The average price to all utility gas consumers rose 21.5%, but the increase was not evenly distributed. In the residential sector, for example, prices rose 13.6%; whereas commercial prices increased 16.8%, and industrial prices went up 36%.

External long-time financing by the gas utility industry, including combination companies, amounted to $7.9 billion in 1974, up 25% from the $6.3 billion in 1973. Of this total, common stock accounted for $1.1 billion; preferred stock accounted for $1.1 billion, and debt issues for $5.6 billion. Common stock financing by the gas utility industry decreased during 1974 due primarily to a decline in utility stock prices to levels below book values. First mortgage bonds accounted for 77% of the advance in debt financing, while debenture financing increased for the first time in three years. Both preferred stock and debt issues of the gas industry reflected the higher cost of financing associated with the capital and money markets in 1974. Average cost and yield of preferred stock were 9.6 and 9.82 respectively. For bonds it was 9.76 and 9.67, and for debentures 9.48 and 9.40. Each figure represents a 25-year high for the gas utility industry.

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*FPC News Release, No. 21257, (March 26, 1975).

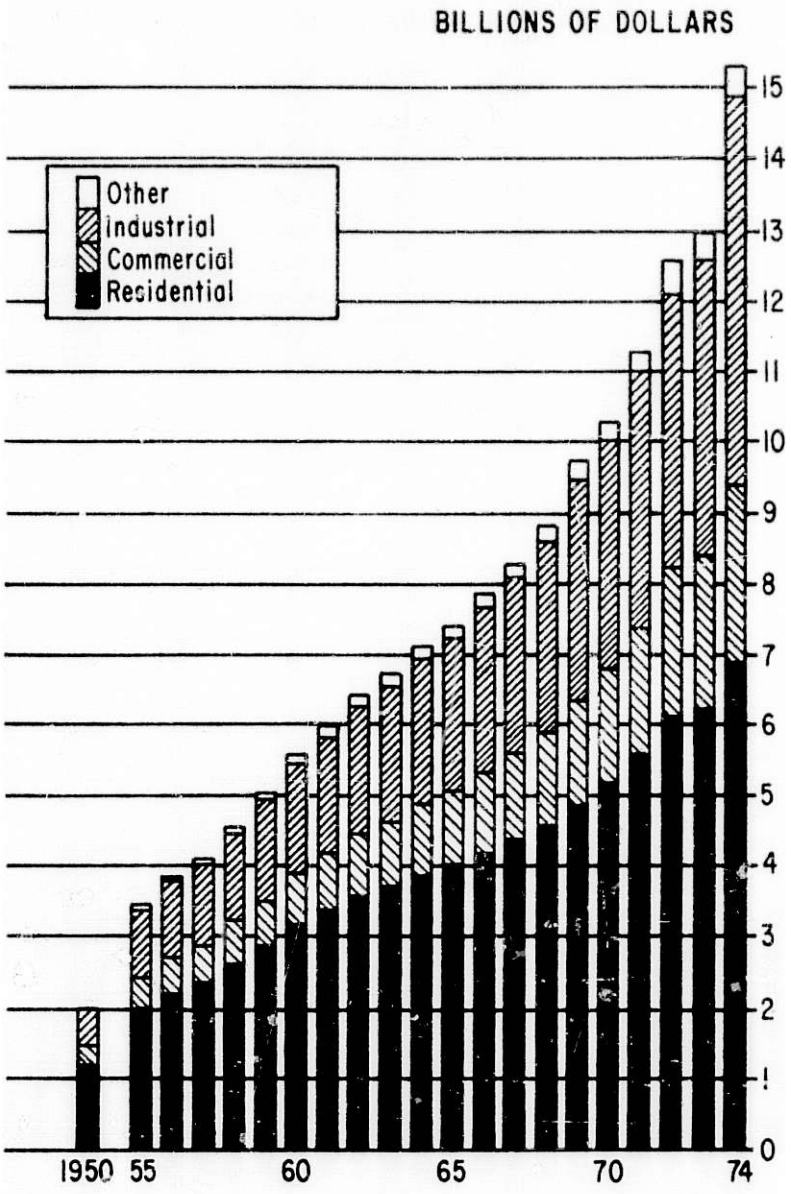

Fig. E.3. Gas Utility Industry Revenues by Class of Service

The purchased gas adjustment clause, conceived to relieve increasing natural gas costs, helped to sustain profitability for investor-owned gas and utility operations in 1974. Total operating revenues of investor-owned companies advanced 18.2% to $24.3 billion. Total operation and maintenance expenses increased at a faster rate, up 20.1% from 1973. Operations expenses accounted for nearly 98% of this advance, rising $2.9 billion. Depreciation and related expenses rose 16.4%, totaling $1.6 billion, and federal, state, and local taxes amounted to $2.3 billion-- an increase of 13.3% from 1973. Approximately 22% of this figure represents income derived from non-utility operations. Interest on long-term debt rose 10.3%, totaling $1.3 billion in 1974. Other interest expenses continued to rise, reaching 72.9% in 1974 and increasing 207% since 1972. These data are summarized in Figs. E.4 and E.5.

Total utility plant of the investor-owned industry increased 5.5% in 1974 to $48.1 billion, with integrated companies reporting the largest percentage increase -- up 12.3% from 1973 and totaling $11.5 billion. Current and accrued assets reached $5.9 billion, up 23.5%, while deferred debt totaled $872 million, a 30.1% increase. Common stock equity at the end of 1974 increased to $5.5 billion, up 5.9% from 1973, while the amount of preferred stock rose 8% reaching $2.5 billion. Bonds outstanding remained nearly the same, while debentures rose from 5.2% to $4.8 billion. Notes increased slightly, up 3.1% to $3.6 billion. Figure E.6 summarizes these trends of the gas utility industry companies.

Operating revenue, as a percentage of total plant, increased for the industry from 45.1% in 1973 to 50.6% in 1974. Common dividend payout ratio for the industry dropped to a 20-year low of 57.9% in 1974. Return on common equity for the gas utility industry rose from 12.3% in 1973 to 14.3% in 1974, due primarily to the success of transmission in integrated companies. With respect to return on equity, it is important to note that 22% of the reported gas utility net income is derived from non-utility operations. The relative stability of the financial ratios representing the gas utility industry as a whole are shown in Fig. E.7.

Construction expenditures for the full year 1974 totaled $3 billion, virtually unchanged from 1973 expenditures. These were used as follows: $830 million for production and storage facilities; $632 million for transmission; $230 million for underground storage; $1.1 billion for distribution; $176 million for general construction expenditures. Of the $830 million

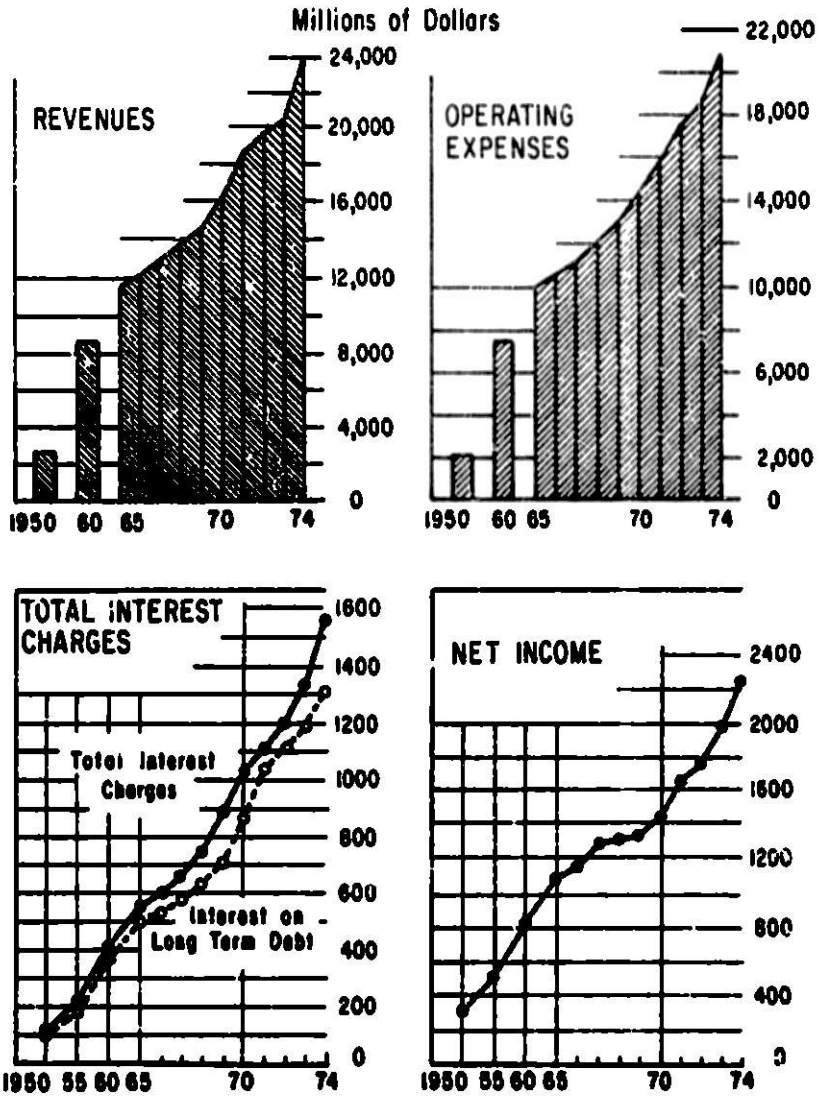

Fig. E.4. Composite Income Accounts – Gas Utility Industry (Investor-Owned)

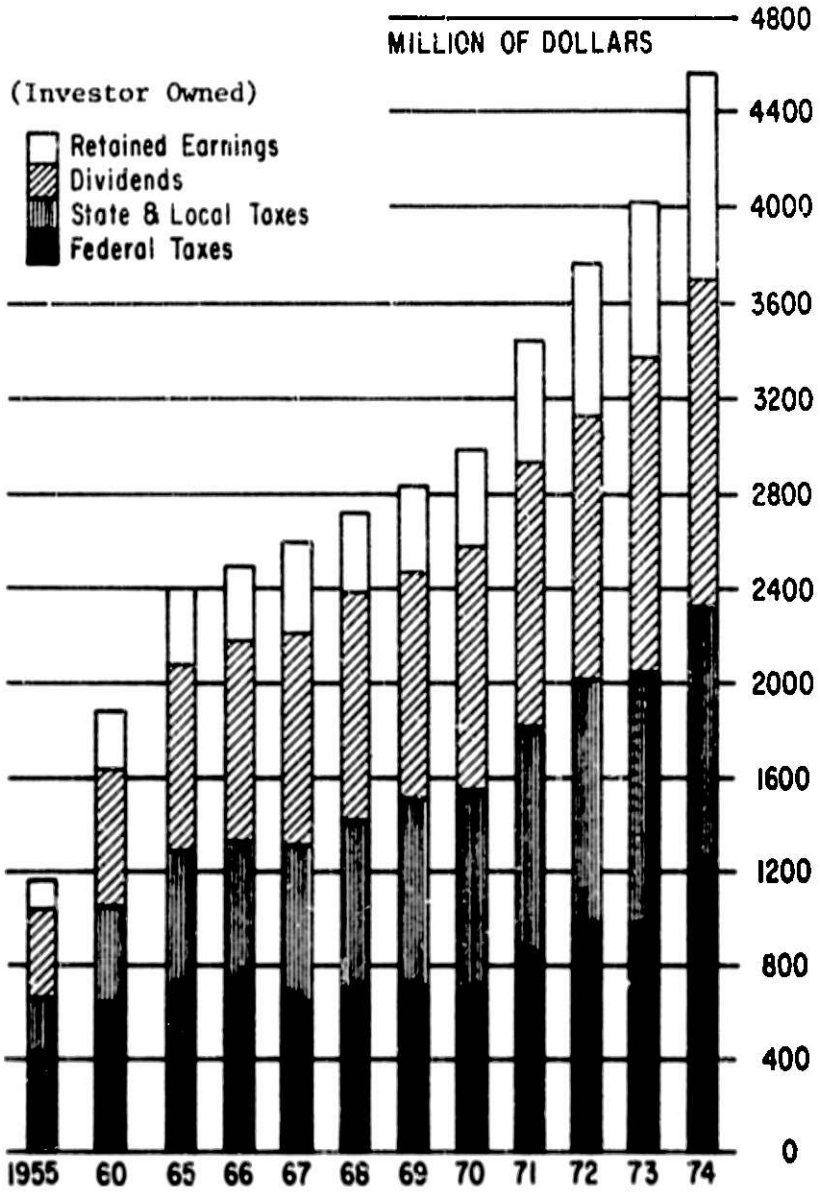

Fig. E.5. Gas Utility Industry
Disposition of Net Income before Taxes

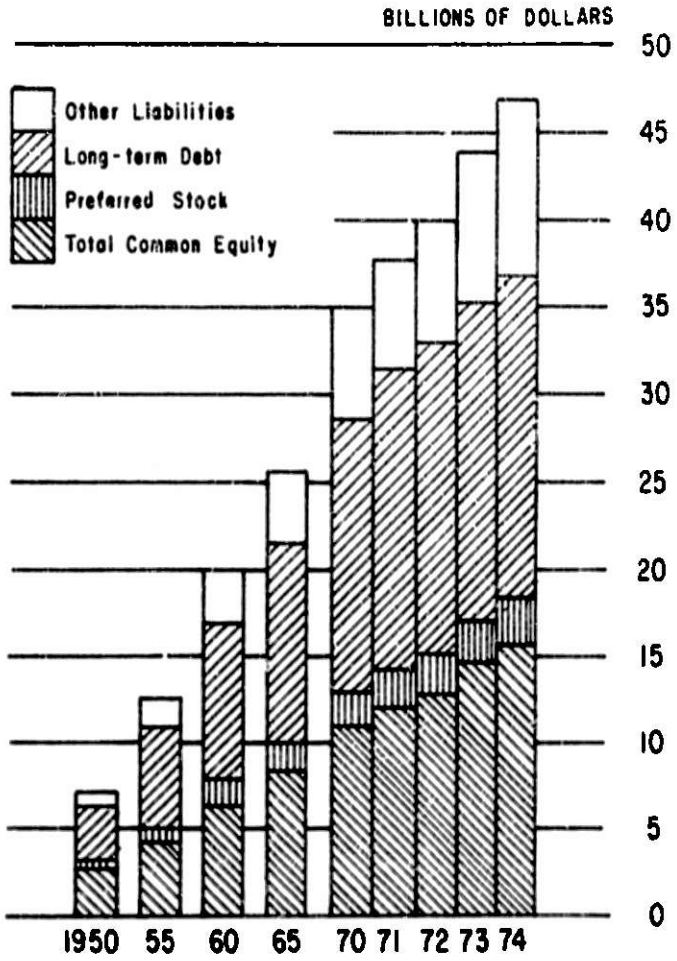

Fig. E.6. Gas Utility Industry Investment Trends (Investor-Owned)

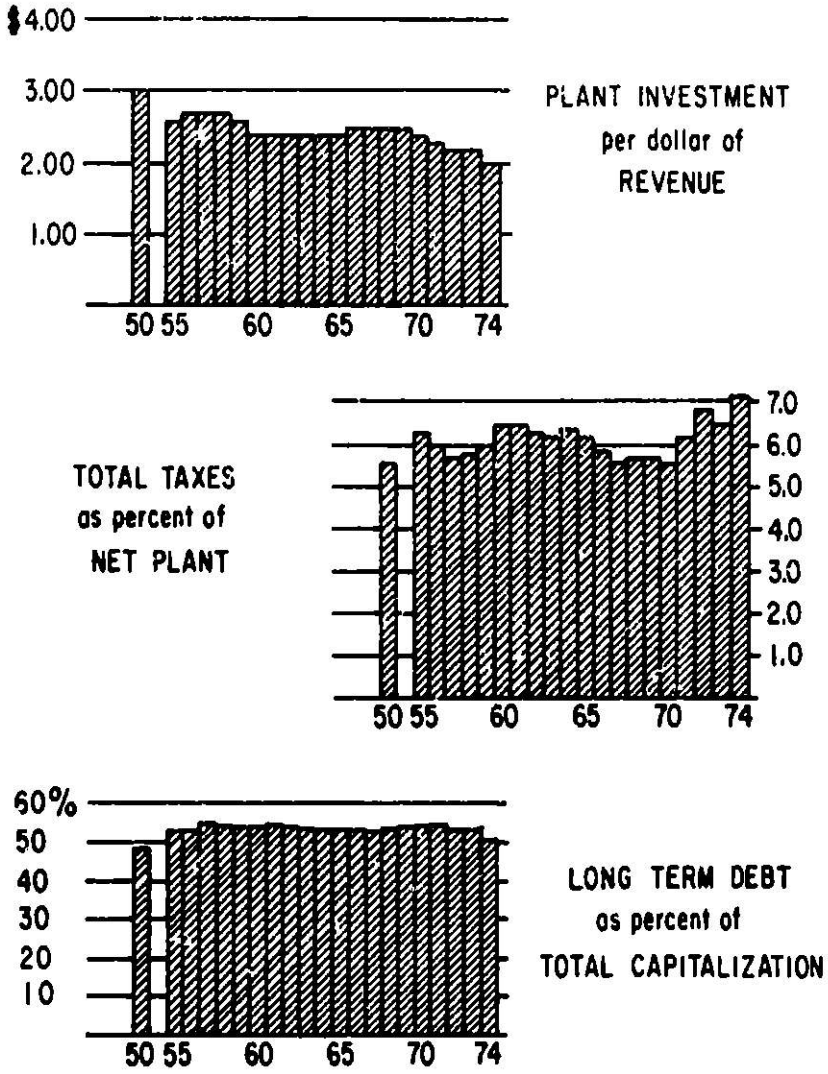

Fig. E.7. Gas Utility Industry Financial Ratios (Investor-Owned)

million expended on production and local storage facilities in 1974, 29.5% went to synthetic natural gas plant expenditures, 1.7% to liquefied natural gas plant, 3.3% to propane plants, 20.9% to exploration and drilling, 10% to liquefied natural gas storage, 30.9% to other production and 2.9% to other storage. Actual expenditures were 21% less than the $3.7 billion forecast for 1974. Forecasts for 1975 are 1% lower and for 1976, 2% higher than the same forecast made last year. Figure E.8 indicates past and projected construction expenditures by the industry.

The natural gas supply available to interstate pipelines will continue to decline throughout the next several years in the absence of a major shift in supply from the intrastate market.* Based on total natural gas reserves committed to the interstate pipelines at the end of 1974, under all contracts and commitments, the annual decline in deliveries would be about 1 Tcf through 1979. If these supplies are not augmented, there will be a doubling of current curtailments within three years. Potential supply additions include: (1) increased production from newly dedicated reserves to the interstate market, (2) increased supplies from the intrastate market through emergency and short-term contracts, and (3) increased imports. Even if prices increase under deregulation, production levels will not increase for at least the next few years, although more gas would be available to the interstate market. FEA estimates a substantial increase in the natural gas shortage in 1976-1977 as the economy reaches normal levels of activity. Several factors can substantially reduce the effects of natural gas curtailments. The most important factor will be the availability and cost of alternate fuels.

The short-term problem is but a symptom of the fundamental long-term inability of demestic natural gas supplies to meet demand at the presently regulated price levels. The long-term outlook for natural gas supply and demand is uncertain and dependent on several factors. The long-term demand depends on:

1. the world pricing strategies for oils because natural gas and oil are close substitutes in both the utility and industrial sectors;

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*Federal Energy Administration, "National Energy Outlook," FEA-N-75-713, p 126 (February, 1976).

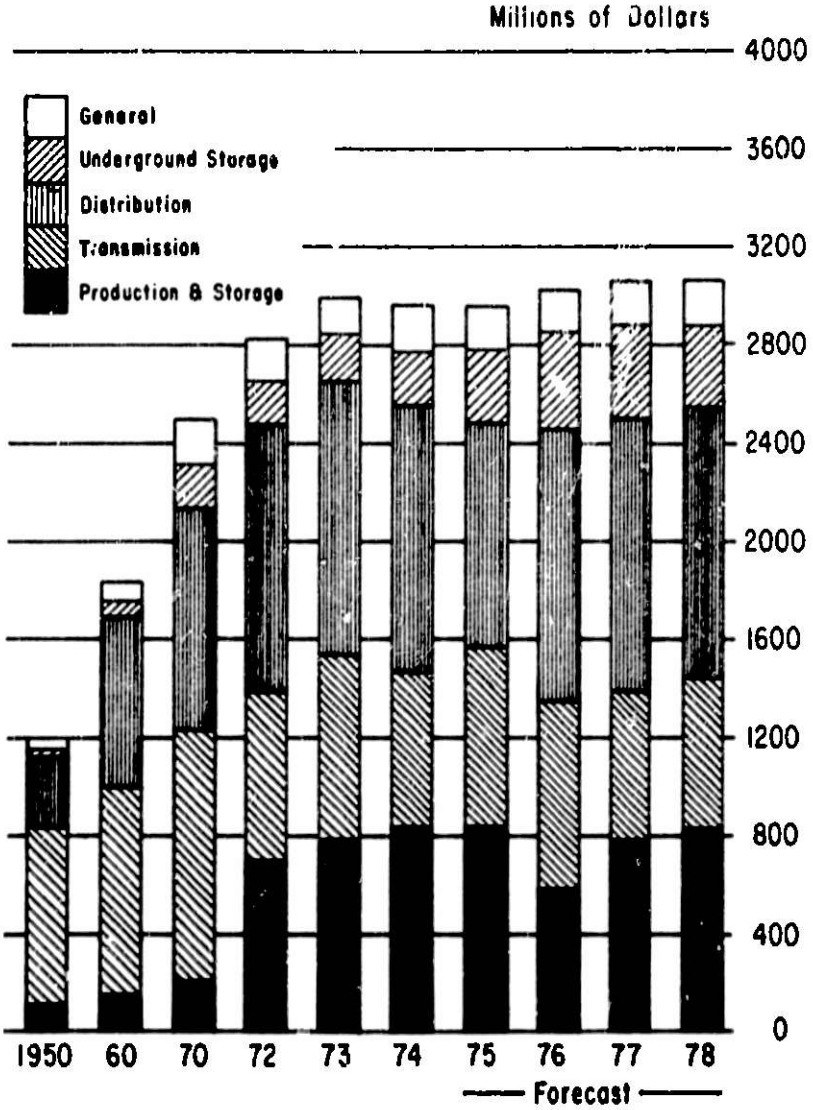

Fig. E.8. Gas Utility Industry Construction Expenditures

2. the degree and structure of price regulations over domestic oil;

3. government conservation initiatives, particularly those directed at building and industry and the degree of commercialization of existing energy-saving technologies in these sectors;

4. government policy regarding the availability of natural gas for use in industrial and utility boilers; and

5. the status of local government moratoria.

Natural gas demand is expected to increase from actual consumption of 21.2 Tcf measured in 1974 to 23.4 Tcf by 1985. However, the curtailments of 1.9 Tcf in 1974 added to the 21.2 Tcf used in 1974 generates an unconstrainted demand for natural gas of about 23.1 Tcf for 1974, almost the same as that projected for 1985. Thus, aggregate demand for natural gas in 1985 will remain the same as the unconstrained demand observed in 1974, assuming world oil prices remain at current levels and both new and natural gas and oil prices are deregulated. Although the overall demand will remain relatively constant, the sources of supplies will differ in 1985 from those prominent in 1974; consequently, substantial investment will be required.

Projections of capital expenditures from the gas utility industry have been made by the Institute for Gas Technology for the American Gas Association. In constant 1974 dollars, accumulative requirements of the U.S. gas utility industry during the period 1975-1985 totaled $63.2 billion which translates into $90.4 billion at a 6% inflation rate per year. During this period, expenditures for utility and pipeline construction, exploration, and development will account for $37.8 billion in constant dollars. The additional requirement of $25.4 billion is for imported liquefied natural gas, synthetic pipeline gas from coal, and Alaskan gas. By 1985, these supplemental gas sources could reach 3 to 3.6 trillion cubic feet per year which would equal 14.1% to 16.9% of the 1974 gas production. Projections of capital requirements and gas quantities for the supplemental gas sources are based on the announced projects. Figure E.9 shows the extent of projected capital expenditures on a year-by-year basis.

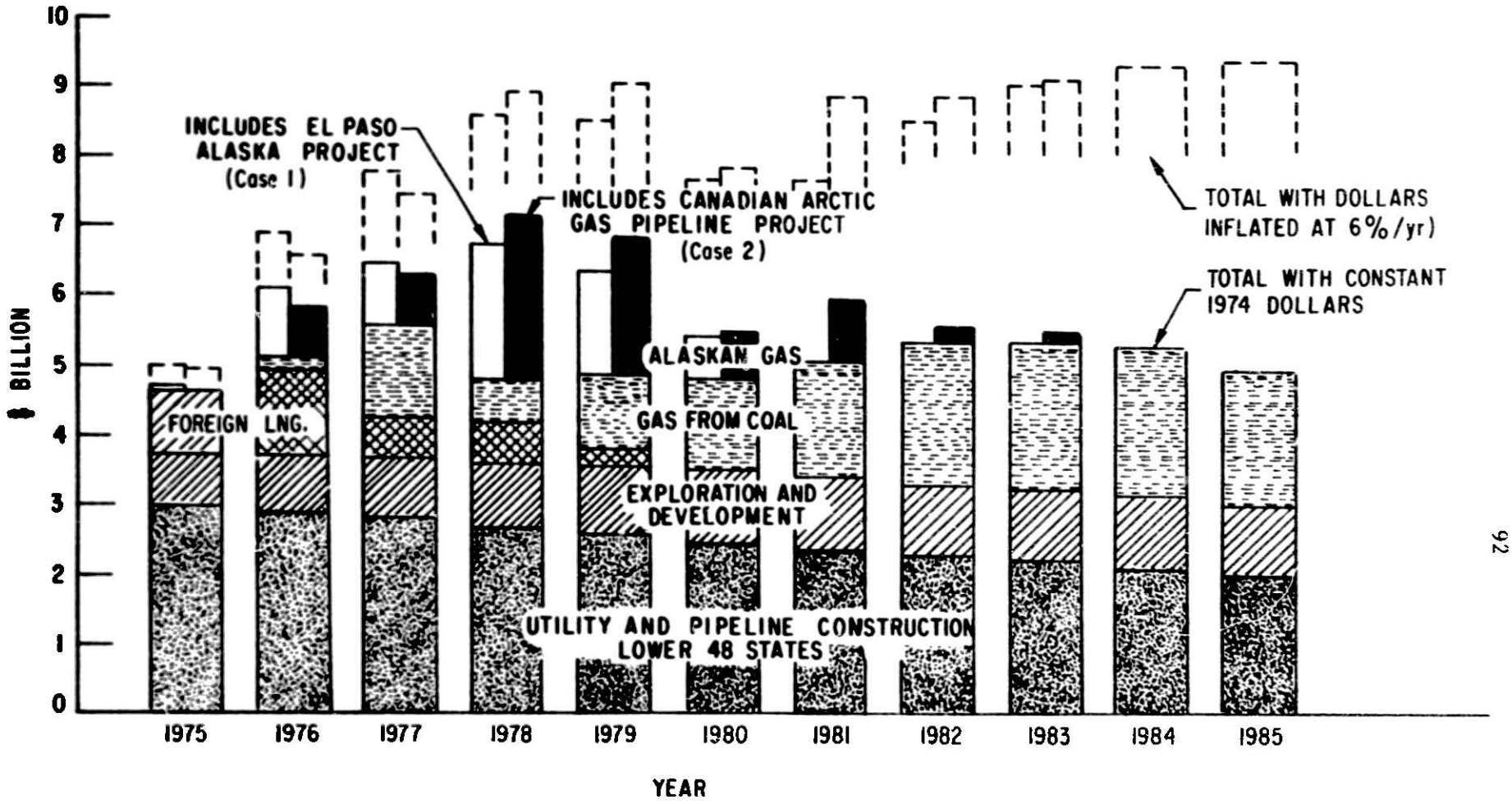

Fig. E.9. U.S. Gas Industry Capital Expenditure Projection

One of the areas for investment in the gas industry is the development of synthetic gas. Here the major problem is the high costs of the projects compared to the size of their sponsors and the regulatory problems surrounding the high cost of the gas coming from them. The cost of a synthetic gas project is enormous. For example, one of the leading pipeline companies recently indicated that its proposed coal gasification project, including the mine, would cost approximately $900 million (1974 dollars) to construct; the actual future price would surely be over $1 billion.* The total existing plant of this company amounts to only $1.7 billion, and its permanent capital consists of only $1.5 billion; this represents a quantum jump in the size of the productive assets of this company's control. When it becomes available, the output of this new plant is expected to constitute about 10% of this company's total gas supplies. Thus, the company must increase its assets by more than 50% to increase its supply of gas by 10%. Notice, however, that the company is a pipeline company that is now beginning to engage in gas production. The high capital cost is, of course, translated into a high cost of gas coming out of the plant being proposed. The average well head price of natural gas in this country is now about 30¢ per million cubic feet. The FPC recently has allowed 50¢ per million cubic feet for new gas. Sales of new gas on an intra-state basis, which are free from FPC jurisdiction, are now generally in the cost range of $1.30 to $1.50 per million cubic feet. The coal gasification plant, just discussed, will produce gas costing $4.00 per million cubic feet. Mr. Beim claims that he does not know of any supplemental gas project which expects to produce gas outside of the $3.00-$4.00 per million cubic feet range.

The FPC is concerned with the dramatic increase in the cost of using gas that these changes would represent. It is expected that the FPC will be very cautious in determining the return on equity allowable in such supplemental gas projects and it may also take actions detrimental to returns on such projects should cheaper alternative supplies be devloped at some future time. This kind of attitude by the FPC tends to make the financing of these plants virtually impossible. Problems of large size and potentially limited profitability aggravate each other.

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*Beim, D. D., *Financial and Regulatory Considerations for the Supplemental Gas Industry*, presented at the Gas Processors Association Convention, Houston, Texas (March 11, 1975). Mr. Beim is Vice President of the First Boston Corporation.

As Mr. Beim points out, "There are some in the industry who feel that we ought to take all this in stride -- make the supplemental projects subject to FPC jurisdiction, include them in the rate base, roll the supplemental gas into the overall tariff, sell securities in the capital markets, in short, do as we have always done and finance the supplemental projects as the pipelines were financed in the 1950's and 1960's. If the magnitudes were smaller, I would agree that this could be done. Unfortunately, we have a whole new order of magnitude, and I doubt if the investors will buy it."

The total amount of capital raised by private companies in the United States through the sale of debt and equity securities is about $35 billion to $40 billion per year. Of this amount, substantially less than $1 billion has been allocated annually to the gas industry in recent years. The bulk of gas companies financing takes the form of bond issues. Gas industry bond issues totaled approximately $578 million in 1974. This is a modest sum compared to the larger amount contemplated for supplemental gas projects. The total capital costs of all supplemental gas projects are being planned, including the large pipelines from northern Canada, amount to perhaps $50 billion during the next ten years. Mr. Beim then questions:

> "What is going to induce the capital markets to provide a total sum to the gas industry so very much greater than the amount this industry has traditionally obtained?"
>
> "What happens if a supplemental gas plant, for example, fails to operate properly after it has been integrated into the main stream of a pipeline company's rate base?"
>
> "Or alternatively, what happens if a future federal power commission decides that the cost of the gas coming from the plant was not reasonably and prudently incurred and that purchases of alternative sources would benefit the consumer?"
>
> "Who guarantees that the shareholders of the company will not be sacrificed?"
>
> "Would it be possible for security salesmen to persuade investors that risks like these can be absorbed by the companies and their shareholders in reliance that the FPC will always be fair and reasonable?"

Because, for the major energy developments -- with the possible exception of those directly undertaken by oil industry companies -- the conventional financing schemes may be inappropriate, new schemes may be necessary. Perhaps these should begin with the state regulatory commissions, which are concerned enough about the gas shortage that they are willing to endorse the kind of contractual arrangements that will aid in the financing of supplemental gas projects and other new energy systems, even if it means higher consumer costs. The basic question is whether the gas company which enters into a supplemental gas project or any utility which enters into a new energy system will be entitled to flow through to its customers, automatically and on a prompt basis, all significant costs of producing gas or energy from the project. For example, the New York Public Service Commission allows the purchase gas adjustment clause, that is, gas companies in New York automatically flow through higher gas costs to their customers without going through a regulatory proceeding. This clause was amended on May 1, 1973 to permit inclusion of liquefied petroleum feed stock and enrichment products in its cost calculations so that the feed stock and related costs of synthetic natural gas plants can be flowed through automatically. The clause was further amended on September 18, 1974 so that the basis for computing rates would not be just the historical volume of gas sold but, in the case of a new source, could include estimated volumes from the new source. This would mean that the New York gas companies could commit funds to a synthetic natural gas project with complete assurance that the high cost of the new supply could be passed on to customers on a timely basis without the need for regulatory hearings.

A new naphtha-based synthetic natural gas plant on the east coast is being constructed. Eight gas distributing companies are sponsoring the project, and they will establish a new corporation to construct and operate the plant. The corporation will sell gas to each of the sponsoring companies under long-term contracts. These contracts provide that each sponsor must pay a demand charge and a commodity charge for its gas. The demand charge represents the fixed cost of the plant, including all interest on borrowed money and other financing costs. The commodity charge includes the cost of feed stock and other variable costs involved in operating the plants. The contracts provide that the demand charge is payable in all events, even if no gas is delivered from the plant. The demand charge is paid directly to a trustee, who ensures that the investors receive their required amounts. Ultimately, this scheme relies on the credit of the sponsoring companies that buy the gas, and their

credit depends, in turn, on the regulatory commissions, which are expected to keep them credit-worthy by allowing the demand charge and the commodity charge to be flowed promptly through to the consumers in a purchase gas adjustment clause. Notice that this arrangement provides that the consumers conceivably could demand charges for gas which does not exist because of a service interruption for any reason, including lack of feed stock or plant malfunction. Nevertheless, it is precisely this automatic quality that investors insist upon. This scheme avoids the necessity of developing enormously higher profitability for the utility companies if conventional financing were to be used. Although this scheme may result in higher prices for consumers, it does not lead necessarily to higher profitability for the companies, because the risk and cost are passed on to the consumer, rather than being absorbed by the company. Because the risks are not in the company, investors will not demand enormous profits to compensate for them.

APPENDIX F

APPENDIX F

LOCAL GOVERNMENTAL EXPENDITURE PATTERNS

In recent years, the state and local government sectors of the economy have become increasingly important. Since 1967, total employment in state and local government sectors has grown 28%, a rate of growth significantly above that for the remainder of the economy. In the same period, state and local government purchases of goods and services have increased as a percentage of gross national product from 11.3% in 1967 to 13.7% in 1974.*

Most states finish their fiscal years with surpluses remaining in their general fund accounts after all revenues have been collected and all expenditures have been made. These unencumbered surpluses are carried over into the next fiscal year and can be appropriated for expenditures in that fiscal year. These surpluses often act as a contingency fund which is spent to keep the budget in balance if revenues fall short of expectations or if expenditures exceed expectations. Consequently, shifts in the size of the unencumbered surpluses are a good indication of the relative fiscal position of the states from one year to the next. A survey of 48 states, indicating that 12 had increased, or anticipated an increase, in the size of their unencumbered surpluses, is good evidence of the relative fiscal position of the states from one year to the next. The 48-state survey indicated that 12 had increased, or anticipated an increase, in the size of their unencumbered surpluses from the beginning of fiscal year 1975 to the beginning of fiscal year 1976. Two states showed no change in their unencumbered surpluses, and 34 showed declines. The level of the combined surpluses for 48 states was $3.9 billion on July 1, 1975, representing an approximately 40% reduction in the unemcumbered surpluses during the course of fiscal year 1975. The size of the surpluses, as a percentage of the states' budgets, had declined from approximately 70% in fiscal year 1975 to approximately 4% in 1976.

Two types of states seem to be faring better than the others. The 13 states (Oklahoma, Texas, Louisiana, West Virginia, Ohio, Utah, Indiana, New

* *The Current Fiscal Position of State and Local Governments: A Survey of 48 State Governments and 140 Local Governments*, a study produced for the Subcommittee on Urban Affairs of the Joint Economic Committee of the Congress of the United States, dated December 17, 1975.

Mexico, Alabama, Kansas, Montana, Wyoming, and Tennessee) that had a per-capita energy input above the national average (i.e., the major energy-producing states) had a combined unencumbered surplus of $0.1 billion during fiscal year 1975 and a surplus of $1.8 billion on July 1, 1975. Thus, the energy-conserving states experienced a 14% decline in the size of their unencumbered surpluses compared to a 52% decline for all other states. Seven of the 13 states experienced an increase in their unencumbered surpluses, and one state showed no change. A similar pattern exists in the states that derive a large percentage of their income from agriculture. Of the eight significantly agricultural states (Iowa, Minnesota, North Dakota, South Dakota, Wisconsin, Kansas, Nebraska, and Idaho), three experienced increases in the size of their unemcumbered surpluses, while one state remained approximately constant. Discounting the energy and agricultural states, the remaining 25 states showed a decline in their unencumbered surpluses from $3.3 billion on July 1, 1974, to $1.3 billion on July 1, 1975, or a decline of more than 60%. The surplus of $1.3 billion is less than 2% of the budgets of these states. Thus, the surpluses concentrated in the resource-rich, agriculturally independent, and low-unemployment states.

In 1976, net tax increases of approximately 2% of the combined state budgets are expected. These tax increases are in a variety of levies, with less than 40% being income tax increases. Tax increases will be concentrated in the high-unemployment states, where tax increases will average about 3.5% of the combined high-unemployment state budgets. Tax increases will go as high as 15% of the budget in states that are particularly hard hit by the recession.

Many states have been forced to cut current levels of services during the 1976 fiscal year. Most states made reductions in state operations and personnel first, with only a few states reducing the level of state assistance to local government. The net total value of the cuts in current services by state governments is approximately $1.8 billion. These occurred most commonly in highway maintenance and servicing, capital projects funded from general funds, salaries and personnel, and welfare and other social services, particularly mental health and corrections. Expenditures for higher education also seem to be subject to particular scrutiny. The high-unemployment states have been forced to make the most severe cutbacks in levels of services. Approximately 85% of the service cutbacks occurred in the 18 high unemployment states, although these 18 states comprise only 50% of the total state expenditures.

Reductions in personnel, rather than tax increases and cuts in current services, seem to be evenly distributed among low-and high-unemployment states. However, personnel reductions appear to be more concentrated in the high-unemployment states.

The easiest way a state government can balance its budget is to delay or to cancel capital construction. Twenty-five states have delayed some capital projects -- delays were defined as postponements of one fiscal year or more -- although few were able to quantify the dollar amounts involved. These delays occurred in all types of states, regardless of their financial positions; 13 out of 18 high unemployment states, 3 out of 8 farm states, and 5 out of 13 energy states. Most commonly delayed were highway projects, because of the reduction in the rate of increase of gasoline-tax revenues. While half the states were delaying capital construction, seven states were accelerating the rate of expenditure on capital facilities to stimulate the economies of their states and also to take advantage of what were perceived as reduced construction costs.

Unencumbered surpluses are much less significant for local government budgets than for state governments. Nevertheless, 122 of the 140 local governments surveyed entered 1975 fiscal year with a combined surplus of approximately $340 million, or slightly above 1% of their total budgets. This surplus is being totally depleted and had been expected to become a deficit of approximately $40 million by July 1, 1975. The most significant deterioration of the size of the unencumbered surpluses occurred in large jurisdictions with high unemployment. The aggregate decline in unencumbered surpluses for the 122 jurisdictions reporting data was $380 million, turning a $340 million surplus into a $40 million deficit. The most significant deterioration occurred in high-unemployment jurisdictions with populations in excess of 250,000. These 24 jurisdictions would have experienced, without further adjustments in revenues and expenditures, a deficit of $220 million on July 1, 1975, after entering the fiscal year with a $99 million unemcumbered surplus.

Fifty-two of 140 communities surveyed reported that significant increases in the tax rate have been enacted or will be required to keep their budgets in balance. The total value of the tax increases was $850 million, or approximately 2.7% of the combined budget of all 140 communities. Only five communities enacted reductions in tax rates. Tax increases occurred in both large and small communities as well as in high and in low unemployment jurisdictions. However,

the tax increases occurred primarily in large jurisdictions of 500,000 or more population with high unemployment rates where tax rate increases amounted to 3.6% of these jurisdictions' total budgets. Without the high unemployment, large jurisdictions, all other governments enacted tax increases amounting to 1.2% of their combined budgets. Smaller jurisdictions -- 100,000 population or less -- also enacted significant tax increases, approximately 2% of their total budgets. The sample of 140 local governments includes approximately 40% of all local government revenues and expenditures.

Expenditure reductions by the surveyed local governments followed almost exactly the same pattern as revenue adjustments. Fifty-six of the 140 surveyed governments reported that significant cuts had been made in current service levels. The total value of expenditure cuts was $855 million or approximately 2.7% of the combined budgets of the 140 communities. The expenditure reductions were concentrated in the high-unemployment governments with reductions in these jurisdictions often being more than four times as large as a percentage of their budgets as those in low-unemployment areas. Similar jurisdictions in the survey exhibited a reluctance to reduce service levels, cutting services by an amount equal to only 0.7% of their total expenditures. Local governments are more labor-intensive than are state governments, and expenditure cutbacks are more likely to be accomplished through personnel reductions. In fact, 52,000 positions were affected by hiring freezes, layoffs, and reductions in the work week initiated by some of the surveyed local governments. The reductions have been greatest in the high-unemployment areas.

Delays and cancellations in capital construction usually are the most common and least disruptive adjustment in the short run that a local government can undertake to keep its budget in balance. Some 71 of the 140 surveyed local governments have initiated delays or cancellations in capital construction. The adjustments have occurred about equally in all jurisdictions -- high unemployment or low unemployment, large or small. The delays have occurred in all types of projects, with streets, recreation, public facilities (i.e., police and fire stations, city hall, courthouse, and so forth), and school construction constituting the bulk of the cancelled or delayed projects.

An historical summary of the finances of state and local governments combined is given in Table F.1 where the sources of revenue of the state and local governments are broken down. It is of interest to note that revenues

Table F.1. Historical Summary, Finances of State and Local Governments: 1970-71 to 1973-74

Item	Amount (millions of dollars)				Per capita		
	1973-74	1972-73	1971-72	1970-71	1973-74	1972-73	1971-72
REVENUE							
TOTAL	237 916	r217 616	189 726	166 090	1 125.48	1 037.00	911.12
TOTAL GENERAL REVENUE	207 730	r190 216	166 352	144 927	982.69	906.42	798.87
INTERGOVERNMENTAL REVENUE	41 831	39 256	31 253	26 144	197.86	187.07	150.08
REVENUE FROM OWN SOURCES	196 085	r178 360	158 471	139 945	927.60	849.94	761.03
GENERAL REVENUE FROM OWN SOURCES	165 899	r150 958	135 100	118 782	784.80	719.36	648.79
TAXES	130 722	121 102	108 801	96 975	618.39	577.09	522.49
INDIVIDUAL INCOME	19 491	17 994	15 257	11 900	92.28	85.75	73.17
CORPORATION NET INCOME	6 010	5 425	4 416	3 426	28.45	25.85	21.20
SALES AND GROSS RECEIPTS	66 098	62 047	57 486	53 253	216.07	200.37	180.03
GENERAL	26 316	22 992	20 294	17 812	124.48	109.56	97.45
SELECTIVE	19 [illegible]	19 054	17 194	15 420	93.69	90.80	82.57
PROPERTY	47 734	45 283	42 135	37 852	225.90	215.79	202.33
OTHER	11 364	10 358	9 527	8 567	53.76	49.34	45.75
CHARGES AND MISCELLANEOUS GENERAL REVENUE	35 177	r29 856	26 299	23 807	166.41	142.27	126.29
UTILITY REVENUE	9 392	8 622	7 787	7 276	44.43	41.09	37.39
LIQUOR STORES REVENUE	2 385	2 278	2 168	2 083	11.18	10.85	10.50
INSURANCE TRUST REVENUE	18 439	16 504	13 368	11 804	87.23	78.65	66.34
EMPLOYEE RETIREMENT	10 900	10 064	8 456	7 451	51.56	47.96	40.52
UNEMPLOYMENT COMPENSATION	5 729	4 964	3 681	3 096	27.10	23.65	17.29
OTHER	1 809	1 476	1 359	1 253	8.56	7.03	6.53
EXPENDITURE, BY CHARACTER AND OBJECT[1]							
TOTAL	b226 032	r209 336	188 829	170 766	1 069.27	978.48	906.80
CURRENT OPERATION	156 810	r138 978	125 630	111 829	739.96	662.25	603.32
CAPITAL OUTLAY	36 084	r35 272	34 257	33 137	180.16	168.08	168.42
CONSTRUCTION	30 582	r28 291	28 107	26 970	144.48	134.62	134.98
EQUIPMENT	4 192	r3 741	3 118	2 965	19.83	17.83	14.97
LAND AND EXISTING STRUCTURES	3 350	r3 279	3 012	3 203	15.85	15.63	14.46
ASSISTANCE AND SUBSIDIES	11 290	12 187	11 527	10 104	53.41	58.07	55.36
INTEREST ON DEBT	8 840	7 828	6 893	5 904	41.82	37.30	33.10
INSURANCE BENEFITS AND REPAYMENTS	12 667	11 074	10 938	9 793	59.92	52.77	50.61
EXHIBIT: EXPENDITURE FOR PERSONAL SERVICES	96 054	86 082	78 679	70 561	446.93	410.01	377.84
EXPENDITURE, BY FUNCTION[1]							
TOTAL	226 032	r209 336	188 829	170 766	1 069.27	978.48	906.80
GENERAL EXPENDITURE[1]	198 959	r181 227	166 873	150 674	941.19	863.60	801.36
EDUCATION	78 633	r69 716	64 886	59 813	350.74	332.21	311.60
LOCAL SCHOOLS	53 089	48 780	45 458	41 766	251.60	232.49	219.27
INSTITUTIONS OF HIGHER EDUCATION	18 684	r17 370	15 946	14 785	89.33	82.77	76.57
OTHER EDUCATION	3 899	3 565	3 282	3 081	18.48	16.98	15.76
HIGHWAYS	19 946	18 615	19 010	18 095	94.56	88.71	91.29
PUBLIC WELFARE	25 083	23 582	21 070	18 226	118.87	112.37	101.18

See footnotes at end of table.

Table F.1. Historical Summary, Finances of State of Local Governments: 1970-71 to 1973-74 (Contd.)

Item	Amount (millions of dollars)				Per capita		
	1973-74	1972-73	1971-72	1970-71	1973-74	1972-73	1971-72
EXPENDITURE, BY FUNCTION—CONTINUED							
GENERAL EXPENDITURE—CONTINUED							
HOSPITALS	12 693	11 112	10 273	9 386	59.10	52.93	49.83
HEALTH	3 482	2 732	2 578	2 119	16.33	13.02	12.36
POLICE PROTECTION	7 289	6 710	5 976	5 228	34.48	31.98	28.78
LOCAL FIRE PROTECTION	3 037	2 770	2 577	2 303	14.37	13.20	12.37
SEWERAGE	4 088	3 606	3 166	2 646	19.30	17.17	15.19
SANITATION OTHER THAN SEWERAGE	1 919	1 718	1 569	1 441	9.06	8.19	7.51
LOCAL PARKS AND RECREATION	2 991	2 561	2 323	2 109	13.96	12.20	11.19
NATURAL RESOURCES	3 441	3 278	3 110	3 083	17.32	15.62	16.93
HOUSING AND URBAN RENEWAL	3 461	3 169	2 781	2 150	16.37	15.08	13.35
AIRPORTS	1 306	1 418	1 156	1 361	6.15	6.76	5.55
WATER TRANSPORT AND TERMINALS	629	601	527	506	2.96	2.86	2.52
PARKING FACILITIES	214	209	171	139	1.01	0.98	0.82
CORRECTION	2 809	2 383	2 108	1 389	13.27	11.36	10.12
LIBRARIES	968	877	816	761	4.56	4.18	3.90
EMPLOYMENT SECURITY ADMINISTRATION	1 308	1 282	1 136	965	6.19	6.11	5.65
FINANCIAL ADMINISTRATION	3 189	2 811	2 460	2 271	14.97	13.40	11.91
GENERAL CONTROL	4 371	3 841	3 487	3 027	20.68	18.30	16.36
GENERAL PUBLIC BUILDINGS	1 902	1 682	1 548	1 409	9.00	8.02	7.43
INTEREST ON GENERAL DEBT	7 666	6 788	5 963	5 089	36.27	32.33	28.63
OTHER AND UNALLOCABLE	11 633	9 781	8 256	7 269	55.05	46.61	39.56
UTILITY EXPENDITURE	12 487	11 206	9 697	8 673	59.07	53.39	46.57
LIQUOR STORES EXPENDITURE	1 919	1 831	1 717	1 629	9.08	8.73	8.25
INSURANCE TRUST EXPENDITURE	18 667	11 876	10 530	9 793	90.92	52.77	50.61
EMPLOYEE RETIREMENT	6 630	5 626	4 757	4 155	31.60	27.79	22.83
UNEMPLOYMENT COMPENSATION	8 703	4 881	4 761	4 708	23.25	19.49	22.77
OTHER	1 326	1 170	1 081	929	6.27	5.58	5.30
INDEBTEDNESS							
DEBT OUTSTANDING AT END OF FISCAL YEAR	206 610	178 683	174 903	138 847	977.42	898.18	838.31
LONG-TERM	189 993	172 609	158 781	143 617	898.99	822.51	762.91
FULL FAITH AND CREDIT	110 991	102 965	93 813	84 328	524.86	488.56	463.12
NONGUARANTEED	79 002	69 644	64 968	59 302	373.73	331.93	302.39
SHORT-TERM	16 603	15 879	15 723	15 210	78.63	75.67	75.50
LONG-TERM DEBT ISSUED	23 218	21 804	21 889	19 232	109.84	103.90	105.11
LONG-TERM DEBT RETIRED	9 995	9 813	8 186	7 670	47.28	46.95	39.32

(Note: Because of rounding, details may not add to totals. Local government amounts (estimates subject to sampling variation; see text).

[p] Revised.
[1] Duplicative transactions between levels of government are excluded, see text
[2] Excludes $343,194 thousand contributions from states to Federal Government not shown in detail, below

from utility operations are relatively minor. Also notice that, on a per capita basis, almost all revenue sources have increased. Notice further that expenditures on utilities are a relatively minor item, but that expenditures on utilities exceed revenue from utilities.

Table F.2 breaks down all governmental expenditures by function and by level of government; while Table F.3 provides further breakdowns of expenditures and points out the dominant role of local government in the finance of water supply, electric power, gas supply, and transit. Expenditures by type of utility are presented in Table F.4 and in Table F.5.

The preceding discussion of the financial status of state and local governments concentrates on fiscal years 1974 and 1975 with tabular data from still earlier periods. Only fragmentary data on fiscal year 1976 are now available. The reports that are available indicate that state and local budgets look a lot healthier than they did a year ago.*

State and local governments have made moves toward retrenchment through their budget outlook, and aggregate figures have been revised substantially in their recent overhauling of the national income accounts, thereby narrowing their deficits of 1974 and 1975. The national income version omits spending, chiefly repayment of debt and purchase of land. Although it does not directly promote the production of goods and services, it is clear that states and localities have managed their fiscal affairs more prudently than had been thought. Because caution still persists, spending is likely to be controlled for a while. Much of the improvement in the accounts arises from a downward revision of purchases of goods and services. For 1974, purchases were lowered by $5.4 billion. As a result of this statistical revision and technical changes, the overall operating deficit for 1974 (i.e., excluding the growth of pension funds) was lowered from $7.9 billion to $1.7 billion. The data show that state and local governments have been operating with a surplus ever since the first half of 1975.

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*"State and Local Budgets Are Back in the Black," *Fortune*, p. 50, (May, 1976).

Table F.2. Governmental Expenditures by Function and by Character and Object, by Level of Government: 1971-72

(Millions of dollars)

Function	Total	Inter-Governmental Expenditure	Direct Expenditure						Assistance and Subsidies, Insurance Trust, and Interest on Debt
			Total	Current Operation	Capital Outlay				
					Total	Construction	Equipment	Land and Existing Structure	
ALL GOVERNMENTS									
Total Expenditure	[1]399,098	([1])	399,098	226,953	55,446	33,223	18,039	4,183	116,700
General Expenditure	[1]323,066	([1])	323,066	219,494	52,423	30,447	17,676	4,099	51,144
National Defense and International Relations	79,258	-	79,258	59,676	14,999	1,421	13,519	59	4,583
Postal Service	9,366	-	9,366	8,764	602	272	325	5	-
Space Research and Technology	3,369	-	3,369	3,228	141	50	91	-	-
Education	[1]70,918	([1])	70,918	59,074	8,161	6,535	1,314	311	3,682
Highways	[1]19,453	([1])	19,453	7,038	12,406	10,700	424	1,282	9
Public Welfare	[1]23,604	([1])	23,604	12,937	95	65	29	1	10,573
Hospitals	[1]12,796	([1])	12,796	11,567	1,140	995	129	16	90
Health	[1]4,392	([1])	4,392	3,619	251	165	82	8	522
Police Protection	[1]6,559	([1])	6,559	6,257	303	107	189	7	-
Local Fire Protection	[1]2,579	([1])	2,579	2,413	166	70	91	5	-
Sewerage	[1]3,299	([1])	3,299	1,097	2,202	2,117	49	36	-
Sanitation Other Than Sewerage	[1]1,587	([1])	1,587	1,413	173	86	72	15	-
Local Parks and Recreation	[1]2,318	([1])	2,318	1,949	773	573	61	134	-
Natural Resources	[1]14,228	([1])	14,228	10,272	3,357	2,692	484	181	597
Housing and Urban Renewal	[1]3,364	([1])	3,364	2,730	2,388	935	35	1,618	46
Air Transportation	[1]3,697	([1])	3,697	2,437	1,260	1,051	138	71	-
Water Transport and Terminals	[1]2,243	([1])	2,243	1,329	604	508	73	28	307
Correction	[1]2,223	([1])	2,223	2,029	144	160	28	6	-
Financial Administration	[1]4,068	([1])	4,068	3,982	87	8	78	1	-
General Control	[1]4,097	([1])	4,097	3,976	121	66	30	5	-
Other and Unallocable	[1]47,686	([1])	47,686	14,175	2,795	2,071	415	309	30,739
Liquor Stores	1,683	-	1,683	1,679	4	(2)	3	1	-
Local Utilities	9,715	-	9,715	5,780	3,017	2,374	360	83	918
Insurance Trust Expenditure	64,634	-	64,634	-	-	-	-	-	64,634
FEDERAL GOVERNMENT									
Total Expenditure	242,186	33,384	208,802	100,130	20,816	4,801	14,810	1,209	87,656
General Expenditure	188,100	33,384	194,916	100,130	20,816	4,801	14,810	1,209	33,570
National Defense and International Relations	79,258	-	79,258	59,676	14,999	1,421	13,519	59	4,583
Postal Service	9,366	-	9,366	8,764	602	272	325	5	-
Space Research and Technology	3,369	-	3,369	3,228	141	50	91	-	-
Education	13,045	7,941	5,104	2,437	18	16	2	-	2,649
Highways	9,540	9,108	432	357	66	63	3	-	9
Public Welfare	13,739	13,251	2,488	2,401	9	-	7	-	80
Hospitals	2,446	96	2,350	2,155	105	105	-	-	90
Health	3,032	1,216	1,816	1,216	78	31	47	-	322
Police Protection	955	1	994	953	1	1	-	-	-

Table F.2. Governmental Expenditures by Function and by Character and Object, by Level of Government: 1971-72 (Cont'd)

(Millions of dollars)

Function	Total	Inter-Governmental Expenditure	Direct Expenditure						
			Total	Current Operation	Capital Outlay				Assistance and Subsidies, Insurance Trust, and Interest on Debt
					Total	Construction	Equipment	Land and Existing Structure	
FEDERAL GOVERNMENT (Cont'd)									
Natural Resources	11,729	624	11,105	7,941	2,567	2,087	412	68	397
Stabilization of Farm Prices and Income	4,895	-	4,895	4,305	1	-	1	-	389
Housing and Urban Renewal	4,611	1,981	2,630	1,661	923	-	3	920	46
Air Transportation	2,538	119	2,419	2,063	334	231	123	-	-
Water Transport and Terminals	1,747	25	1,722	1,111	304	238	65	1	307
Correction	126	15	111	107	4	4	-	-	-
Financial Administration	1,567	-	1,567	1,523	44	2	42	-	-
General Control	678	-	678	635	23	11	11	1	1
Other and Unallocable	32,754	3,207	29,547	4,280	380	269	160	151	24,687
Veterans' Services, N.E.C.	6,882	-	6,882	489	228	2	85	141	6,165
Insurance Trust Expenditure	54,086	-	54,084	-	-	-	-	-	54,086
Old Age, Survivors, Disability, and Health Insurance	46,949	-	46,949	-	-	-	-	-	46,949
Other	7,137	-	7,137	-	-	-	-	-	7,137
STATE AND LOCAL GOVERNMENTS									
Total Expenditure	[1]190,496	([1])	190,496	126,825	34,627	28,420	3,228	2,978	29,044
General Expenditure	[1]168,550	([1])	168,549	119,364	31,607	25,846	2,866	2,894	17,578
Education	[1]65,814	([1])	65,814	56,637	8,143	6,519	1,312	311	1,033
Highways	[1]19,021	([1])	19,021	6,681	12,340	10,637	421	1,292	-
Public Welfare	[1]21,117	([1])	21,117	10,536	88	65	22	1	10,493
Hospitals	[1]10,447	([1])	10,447	9,413	1,035	899	120	16	-
Health	[1]2,576	([1])	2,576	2,403	173	134	35	4	-
Police Protection	[1]6,005	([1])	6,005	5,704	302	106	189	7	-
Local Fire Protection	[1]2,579	([1])	2,579	2,413	166	70	91	9	-
Sewerage	[1]3,259	([1])	3,259	1,057	2,202	2,117	49	36	-
Sanitation Other than Sewerage	[1]1,587	([1])	1,587	1,413	173	86	72	15	-
Local Parks and Recreation	[1]2,318	([1])	2,318	1,343	773	573	61	139	-
Natural Resources	[1]3,122	([1])	3,122	2,331	790	605	72	113	-
Housing and Urban Renewal	[1]2,734	([1])	2,734	1,069	1,665	939	32	698	-
Air Transportation	[1]1,279	([1])	1,279	372	906	820	15	71	-
Water Transport and Terminals	[1]523	([1])	523	218	305	270	8	27	-
Correction	[1]2,112	([1])	2,112	1,922	190	156	28	6	-
Financial Administration	[1]2,501	([1])	2,501	2,459	43	6	36	1	-
General Control	[1]3,419	([1])	3,419	3,321	98	35	39	4	-
Other and Unallocable	[1]18,139	([1])	18,139	9,871	2,215	1,802	255	158	6,052

Table F.2. Governmental Expenditures by Function and by Character and Object, by Level of Government: 1971-72 (Cont'd)

Function	Total	Inter-Governmental Expenditure	Direct Expenditure						Assistance and Subsidies, Insurance Trust, and Interest on Debt
			Total	Current Operation	Capital Outlay				
					Total	Construction	Equipment	Land and Existing Structure	
STATE AND LOCAL GOVERNMENTS (Cont'd)									
Local Stores	1,683	-	1,683	1,679	4	(2)	3	1	-
Local Utilities	9,715	-	9,715	5,780	3,017	2,974	360	83	918
Water Supply	3,740	-	3,740	1,920	1,358	1,214	101	42	462
Electric Power	3,281	-	3,281	1,864	1,119	987	124	9	298
Gas Supply	404	-	404	350	44	34	9	1	10
Transit	2,290	-	2,290	1,647	495	334	126	31	148
Insurance Trust Expenditure	10,548	-	10,548	-	-	-	-	-	10,548
STATES									
Total Expenditures	109,255	36,759	72,496	39,790	13,286	13,022	892	1,369	17,422
General Expenditure	98,810	36,759	62,051	38,299	15,282	13,022	389	1,369	8,472
Education	38,348	21,193	17,153	13,050	3,070	2,512	462	96	1,033
Highways	13,380	2,633	12,747	2,749	9,998	8,713	150	1,135	-
Public Welfare	19,191	6,944	12,247	6,941	25	14	11	(2)	5,281
Hospitals	5,050	147	4,902	4,388	513	464	45	6	-
Health	1,913	807	1,106	1,005	101	83	17	1	-
Police Protection	984	84	900	827	72	14	57	1	-
Natural Resources	2,595	125	2,470	1,927	543	340	55	98	-
Housing and Urban Renewal	149	115	34	25	9	8	(2)	1	-
Air Transportation	178	34	144	42	103	101	1	1	-
Water Transport and Terminals	166	7	159	73	84	77	1	6	-
Correction	1,389	80	1,309	1,203	106	83	19	3	-
Financial Administration	1,235	13	1,222	1,203	17	3	14	(2)	-
General Control	945	33	912	884	27	19	8	(2)	-
Other and Unallocable	11,288	4,541	6,747	3,976	612	342	38	20	2,158
Liquor Stores	1,495	-	1,495	1,491	4	(2)	3	1	-
Insurance Trust Expenditure	8,950	-	8,950	-	-	-	-	-	8,950

Table F.2. Governmental Expenditures by Function and by Character and Object, by Level of Government: 1971-72 (Cont'd)

Function	Total	Inter-Governmental Expenditure	Direct Expenditure						Assistance and Subsidies, Insurance Trust, and Interest on Debt
			Total	Current Operation	Capital Outlay				
					Total	Construction	Equipment	Land and Existing Structure	
LOCAL GOVERNMENTS									
Total Expenditure	[1]118,568	[1]367	118,001	87,033	19,344	13,399	2,335	1,610	11,623
General Expenditure	[1]107,066	[1]367	106,499	81,065	16,327	12,823	1,975	1,327	9,106
Education	[1]48,711	[1]30	48,661	43,387	3,073	4,007	851	215	-
Highways	[1]6,315	[1]41	6,274	3,932	2,342	1,924	271	147	-
Public Welfare	[1]9,058	[1]189	8,869	3,595	63	51	11	1	5,212
Hospitals	[1]5,647	[1]103	5,544	5,024	321	426	84	11	-
Health	[1]1,492	[1]22	1,470	1,398	72	51	18	3	-
Police Protection	[1]5,107	[1]1	5,106	4,877	229	92	131	6	-
Local Fire Protection	[1]2,981	[1]2	2,579	2,413	166	70	91	5	-
Storage	[1]3,269	[1]10	3,259	1,057	2,202	2,117	49	36	-
Sanitation Other than Sewerage	[1]1,387	[1](2)	1,387	1,413	173	86	72	15	-
Local Parks and Recreation	[1]2,331	[1]13	2,318	1,345	773	373	61	139	-
Natural Resources	[1]662	[1]9	653	404	249	216	17	16	-
Housing and Urban Renewal	[1]2,701	[1]1	2,700	1,044	1,656	927	32	697	-
Air Transportation	[1]1,135	[1]1	1,134	330	804	719	14	71	-
Water Transport and Terminals	[1]364	[1](2)	364	143	220	193	6	21	-
Correction	[1]832	[1]30	803	719	84	73	9	2	-
Financial Administration	[1]1,283	[1]4	1,279	1,293	25	3	22	(2)	-
General Control	[1]2,508	[1]1	2,507	2,436	71	36	31	4	-
Other and Unallocable	[1]11,480	[1]88	11,392	3,895	1,604	1,261	205	138	3,894
Liquor Stores	188	-	188	188	(2)	(2)	(2)	(2)	-
Local Utilities	9,715	-	9,715	5,780	3,017	2,574	360	83	918
Water Supply	3,740	-	3,740	1,920	1,358	1,214	101	42	462
Electric Power	3,281	-	3,281	1,864	1,119	987	124	9	298
Gas Supply	404	-	404	350	44	34	1	1	10
Transit	2,290	-	2,290	1,647	295	339	126	31	148
Insurance Trust Expenditure	1,599	-	1,599	-	-	-	-	-	1,599

Note: Because of rounding, detail may not add to totals.

- Represents zero or rounds to zero.

(2) Less than half the unit of measurement shown.

[1] Duplicative intergovernmental transactions are excluded: see text.

Table F.3. Governmental Expenditure for Capital Outlay, by Function, by Level of Government: 1971-72

(Millions of Dollars)

Item	Total Capital Outlay					Construction Expenditure Only				
	All governments	Federal Government	State and local governments			All governments	Federal Government	State and local governments		
			Total	State	Local			Total	State	Local
ALL FUNCTIONS	35,446	20,316	34,427	13,386	19,344	33,223	4,801	28,422	13,023	15,399
National Defense and International Relations	14,949	14,994	-	-	-	1,421	1,421	-	-	-
Other, Total	40,447	3,817	34,627	13,286	19,344	31,802	3,380	23,422	13,023	13,399
Space Research and Technology	141	141	-	-	-	30	30	-	-	-
Postal Service	602	602	-	-	-	272	272	-	-	-
Education	8,141	18	8,143	3,070	3,073	6,335	16	6,519	2,312	4,007
Institutions of Higher Education	2,980	(1)	2,980	2,331	429	2,386	-	2,386	2,031	335
Local Schools	4,833	-	4,833	189	4,644	3,851	-	3,851	179	3,672
Other	348	18	330	330	-	297	16	281	281	-
Highways	12,406	66	12,340	9,998	2,342	10,700	63	18,637	8,713	1,924
Hospitals	1,140	105	1,035	315	521	995	106	890	464	426
Sewerage	2,202	-	2,202	-	2,202	2,117	-	890	464	426
Local Parks and Recreation	775	-	773	-	773	373	-	373		373
Natural Resources	3,357	2,367	790	343	249	2,692	2,047	605	390	216
Housing and Urban Renewal	2,386	923	1,665	9	1,634	935	-	935	8	927
Air Transportation	1,260	354	906	103	804	1,051	231	820	101	719
Water Transport and Terminals	609	304	305	84	220	308	238	270	77	193
Correction	194	4	190	104	34	160	4	134	83	73
General Public Buildings (State-Local)	741	-	741	263	478	650	-	650	244	406
Local Utilities	3,017	-	3,017	-	3,017	2,374	-	2,374	-	2,374
Water Supply	1,358	-	1,358	-	1,358	1,214	-	1,214	-	1,214
Electric Power	1,119	-	1,119	-	1,119	987	-	987	-	987
Gas Supply	44	-	44	-	44	34	-	34	-	34
Transit	495	-	495	-	495	339	-	339	-	339
All Other	3,250	733	2,317	341	1,925	1,988	314	1,674	431	1,244

Note: Because of rounding, detail may not add to totals.

-Represents zero or rounds to zero.

[1]See footnote 1, table 8.

Table F.4. Finances of Utilities Operated by Local Governments, by Type of Utility and Type of Government: 1971-72

(Millions of dollars)

Item	Utility response	Utility expenditure				Utility debt outstanding at end of fiscal year			Utility debt issued	Utility debt retired
		Total	Current operation	Capital outlay	Interest on utility debt	Total	Full faith and credit	Non-guaranteed		
Total	7,701	9,715	3,780	3,017	918	22,195	8,591	13,605	2,004	912
Water Supply	3,171	3,740	1,920	1,358	462	11,342	4,782	6,760	986	495
Municipalities	2,348	2,622	1,449	867	305	7,712	2,783	4,929	371	101
Special Districts	430	770	339	320	112	2,853	1,332	1,321	327	101
Townships	91	130	73	62	16	325	204	121	38	20
Counties	103	198	39	109	30	653	264	389	30	12
Electric Power	2,831	3,281	1,864	1,119	298	6,631	491	6,160	837	217
Municipalities	2,223	2,312	1,473	669	170	3,335	149	3,406	387	124
Special Districts	334	909	334	443	127	3,085	334	2,747	249	92
Townships	39	38	30	7	1	9	3	7	(2)	1
Counties	3	2	2	(2)	(2)	1	-	1	-	(2)
Transit	1,262	2,290	1,647	495	148	3,779	3,247	482	176	188
Municipalities	760	1,176	970	135	71	1,996	1,908	88	108	143
Special Districts	488	1,096	663	336	77	1,778	1,389	389	68	84
Counties	13	18	14	4	(2)	5	-	5	-	1
Gas Supply	436	404	350	44	10	225	21	202	4	12
Municipalities	305	273	240	28	5	118	20	98	4	8
Special Districts	130	124	108	16	5	105	(2)	104	-	4
Townships	1	1	1	(2)	(2)	(2)	(2)	-	-	(2)
Counties	1	(2)	(2)	(2)	- -	-	-	-	-	-

Note: Because of rounding, detail may not add to totals.

- -Represents zero or rounds to zero.

(2) Less than half the unit of measurement shown.

Table F.5. Per Capita Amounts of Selected Items of Governmental Finances, by Level of Government: 1971-72

Item	All governments	Federal	State and Local		
			Total	State	Local
Revenue					
Total Revenue	1,836.30	1,072.74	914.28	539.31	351.26
Total General Revenue	1,480.47	820.39	804.39	473.64	305.41
Intergovernmental Revenue	([1])	-	130.32	134.37	190.62
Revenue From Own Sources	1,838.50	1,072.74	763.74	403.14	360.64
General Revenue From Own Sources	1,480.67	820.39	634.07	339.24	314.79
Taxes	1,264.66	738.28	526.38	287.32	238.66
Property	203.91	-	203.91	6.04	199.87
Sales and Gross Receipts	276.71	96.33	180.17	134.68	20.30
Customs Duties	13.79	15.79	-	-	-
General Sales and Gross Receipts	99.71	-	97.71	84.61	13.10
Selective Sales and Gross Receipts	163.21	80.75	82.47	73.07	7.40
Motor Fuel	34.95	20.01	34.94	34.63	0.28
Alcoholic Beverages	32.86	24.44	8.42	8.09	0.34
Tobacco Products	24.99	10.60	14.39	13.60	0.80
Public Utilities	20.85	10.74	10.10	3.84	4.27
Other	29.36	14.95	14.61	12.90	1.71
Income Taxes	703.76	609.43	94.33	83.62	10.71
Individual	528.08	454.96	73.13	62.41	10.71
Corporation	173.68	134.47	21.21	21.21	-
Motor Vehicle Licenses	10.01	-	10.01	14.93	1.08
Death and Gift	32.32	36.11	6.21	6.21	-
Other	29.94	6.21	23.73	17.04	6.70
Charges and Miscellaneous	216.01	88.31	127.64	31.77	73.93
Current Charges	150.65	39.94	90.71	37.35	53.15
Miscellaneous General Revenue	63.34	28.37	34.99	14.22	22.77
Utility Revenue	34.98	-	34.98	-	34.98
Liquor Stores Revenue	10.22	-	10.22	9.13	1.07
Insurance Trust Revenue	310.63	294.13	64.49	36.70	7.79
Expenditure					
Total Expenditure	1,916.60	1,163.04	914.83	324.68	369.40

Item	All governments	Federal	State and Local		
			Total	State	Local
Direct Expenditure--continued					
Direct General Expenditure Continued	61.45	11.29	30.17	23.34	26.62
Hospitals	61.45	11.29	30.17	23.34	26.62
Capital Outlay	3.47	0.30	4.97	2.47	2.30
Other Than Capital Outlay	55.55	10.35	45.20	21.07	24.13
Health	21.09	8.72	12.34	-	12.39
Police Protection	31.30	2.66	28.84	4.32	24.32
Local Fire Protection	12.39	-	12.39	-	12.39
Sewerage	13.65	-	13.65	-	13.65
Capital Outlay	10.37	-	10.37	-	10.37
Other Than Capital Outlay	3.08	-	3.08	-	3.08
Sanitation Other Than Sewerage	7.62	-	7.62	-	7.62
Local Parks and Recreation	11.13	-	11.13	-	11.13
Natural Resources	68.33	93.33	14.99	11.36	3.14
Capital Outlay	16.12	12.33	3.79	2.61	1.20
Other Than Capital Outlay	49.33	41.00	11.19	9.25	1.94
Housing and Urban Renewal	25.76	12.63	13.13	0.16	12.97
Capital Outlay	12.43	4.43	8.00	0.04	7.95
Other Than Capital Outlay	13.11	7.99	3.13	0.12	3.01
Air Transportation	17.75	11.62	6.14	0.69	5.45
Water Transport and Terminals	10.78	6.27	2.31	0.76	1.75
Local Parking Facilities	0.82	-	0.82	-	0.82
Correction	10.68	0.33	10.14	6.29	3.86
Libraries	3.92	-	3.92	0.30	3.41
Social Insurance Administration	11.01	3.35	5.46	5.44	0.02
Financial Administration	19.34	7.33	12.01	3.87	6.14
General Control	19.68	3.26	14.42	4.38	12.04

Table F.S. Per Capita Amounts of Selected Items of Governmental Finances, by Level of Government: 1971-72 (Cont'd)

Item	All governments	Federal	State and Local		
			Total	State	Local
Total General Expenditure	1,331.47	903.32	809.43	474.32	314.17
Intergovernmental Expenditure	(1)	161.28	(1)	176.33	42.72
Direct Expenditure	1,916.60	1,001.78	914.83	348.19	366.68
Personal Services Expenditure	642.38	258.93	383.45	108.90	274.30
Direct General Expenditure	1,331.47	742.04	809.43	297.99	911.44
Capital Outlay	251.73	99.97	151.79	73.39	78.4i
Other Than Capital Outlay	1,034.08	480.84	373.23	183.92	389.30
Space Research and Technology	16.18	16.18	-	-	-
National Defense and International Relations	380.62	380.82	-	-	-
Capital Outlay	72.03	72.03	-	-	-
Other Than Capital Outlay	286.38	286.38	-	-	-
Postal Service	44.98	44.98	-	-	-
Education	390.57	26.51	316.06	82.37	233.69
Capital Outlay	39.19	0.09	39.11	14.74	24.36
Other Than Capital Outlay	283.69	11.70	271.99	62.67	209.32
Institutions of Higher Education	76.17	(2)	76.17	64.26	11.91
Capital Outlay	14.31	-	14.31	12.25	2.06
Other Than Capital Outlay	31.86	-	61.86	32.01	9.85
Local Schools	224.13	-	224.13	2.36	221.77
Capital Outlay	23.21	-	23.21	0.91	22.30
Other Than Capital Outlay	200.92	-	200.92	1.45	199.47
Other Education	40.27	24.37	13.76	13.76	(1)
Highways	93.42	2.07	91.35	61.22	30.13
Capital Outlay	39.38	0.32	39.26	48.01	11.25
Other Than Capital Outlay	33.80	1.71	32.08	13.20	18.88
Public Welfare	113.35	11.95	101.41	38.81	42.39
Cash Assistance, Categorical Programs	42.29	0.29	47.04	24.44	22.60

Item	All governments	Federal	State and Local		
			Total	State	Local
General Public Buildings	7.34	-	7.34	1.38	3.38
Capital Outlay	5.36	-	3.36	1.26	2.30
Other Than Capital Outlay	3.78	-	3.78	0.70	3.09
Interest On General Debt	111.14	82.19	28.95	10.25	18.70
Other and Unallocable	94.78	54.16	40.62	14.44	28.17
Utility Expenditure	46.65	-	46.65	-	46.65
Current Operation	27.76	-	27.76	-	27.76
Capital Outlay	14.49	-	14.49	-	14.49
Interest On Debt	4.41	-	4.41	-	4.41
Liquor Stores Expenditure	8.08	-	8.08	7.18	0.09
Insurance Trust Expenditure	310.39	259.74	30.66	42.98	7.68
Debt					
Total Debt Outstanding	2,893.01	2,051.85	841.17	261.50	379.67
Long-Term Debt	(2)	(3)	764.04	242.72	321.32
Full Faith and Credit	(3)	(3)	462.59	121.13	341.44
Nonguaranteed	(3)	(3)	301.45	121.37	179.88
Short-Term Debt	(3)	(3)	77.13	18.79	38.34
Long-Term Debt by Purpose of Issue:					
Education	(3)	(3)	220.31	64.34	133.77
State Institutions of Higher Education	41.19	-	41.19	40.32	0.67
Local Schools	172.37	-	172.36	16.47	133.10
Other	(3)	(3)	7.35	7.35	-
Local Utilities	106.39	-	106.39	-	106.39
Water Supply	33.43	-	33.43	-	33.43
Other	31.16	-	31.16	-	31.16
Other and Unallocable	(3)	(3)	437.14	178.18	238.96
Cash and Security Holdings	(3)	(3)	761.78	481.15	280.62
Insurance Trust Systems	(3)	(3)	389.16	304.72	89.84
Offsets to Debt	(3)	(3)	54.Co	23.30	28.37

Table F.5. Per Capita Amounts of Selected Items of Governmental Finances, by Level of Government: 1971-72 (Cont'd)

Item	All governments	Federal	State and Local			Item	All governments	Federal	State and Local		
			Total	State	Local				Total	State	Local
Cash Assistance, Other	3.49	1.13	3.35	0.92	2.43	Bond Funds	(1)	(1)	84.86	30.18	34.68
Other Public Welfare	62.38	11.36	31.02	33.46	17.36	Other	(3)	(3)	233.69	121.69	112.33

- Represents zero or rounds to zero.

(2) Less than half the unit of measurement shown.

(1) Duplicative intergovernmental transactions are excluded; see text.

(2) Service academies are included under "National defense and international relations" and other relatively minor Federal amounts are included under "Other education."

(3) Not computed; data not developed for this report.

Apart from the revisions, the most important factor affecting the balance has been a continuing downward trend in real construction outlays. In fact, in the first quarter of 1976, construction outlays declined -- even when measured in current dollars. It is politically easier to refrain from construction than it is to cut highly visible services, such as police protection. Statistics for 1976 show construction programs to have been adversely affected by conditions in the municipal bond market; but in 1975, gross municipal bonds quotations rose to about $30 billion from $23 billion in 1974. The bond experts think that new bond quotations will be down in 1976, as financially weak governments retrench. Nevertheless, in the first quarter of 1976, gross bond issues were $8.2 billion compared with $6.5 billion a year ago, representing backed-up issues floated by governments that had avoided coming to the market during the troubles experienced by New York in 1975. Moreover, the first-quarter figures reflect a move from notes into bonds. In 1975, new notes totaling $7.6 billion were floated in the first quarter; whereas, in 1976 only $5 billion were floated. This shift has been encouraged by a decline in interest rates on municipal bonds that began in early March, 1976. Further, federal grants-in-aid escalated from $10.4 billion to a total of $54.3 billion, the gain being mostly due to court-ordered releases of funds impounded by the White House, to a larger federal funding for public service jobs, and to higher spending for various forms of public welfare. In 1976, the administration asked for a $5 billion increase.

As a result, job rosters increased by 4.8% from the end of 1974 to the end of 1975. About 40% of the rise was in public service employment financed by Washington. However, it seems that for now, at least, the push in public service employment is over; state and local jobs rose at a mere 1.6% rate during the first quarter of 1976.

With spending in check and the economic upturn producing more tax revenues, a substantial operating surplus has begun to appear in the combined state and local budgets. Fiscally sound governments thus are in a position to raise their spending, but they seem disposed to rebuild liquidity first. Financially pinched governments are avoiding fiscal brinks at the cost of reduced services or higher user charges to the public. For a while then, real state and local spending seems likely to be advancing less than the GNP and thus contributes little to the general economic upswing. This picture seems not only to indicate the potential of participation by state and local

governments in development of an integrated energy system, but also to indicate a reluctance on their part to participate in any major capital spending program at this time.