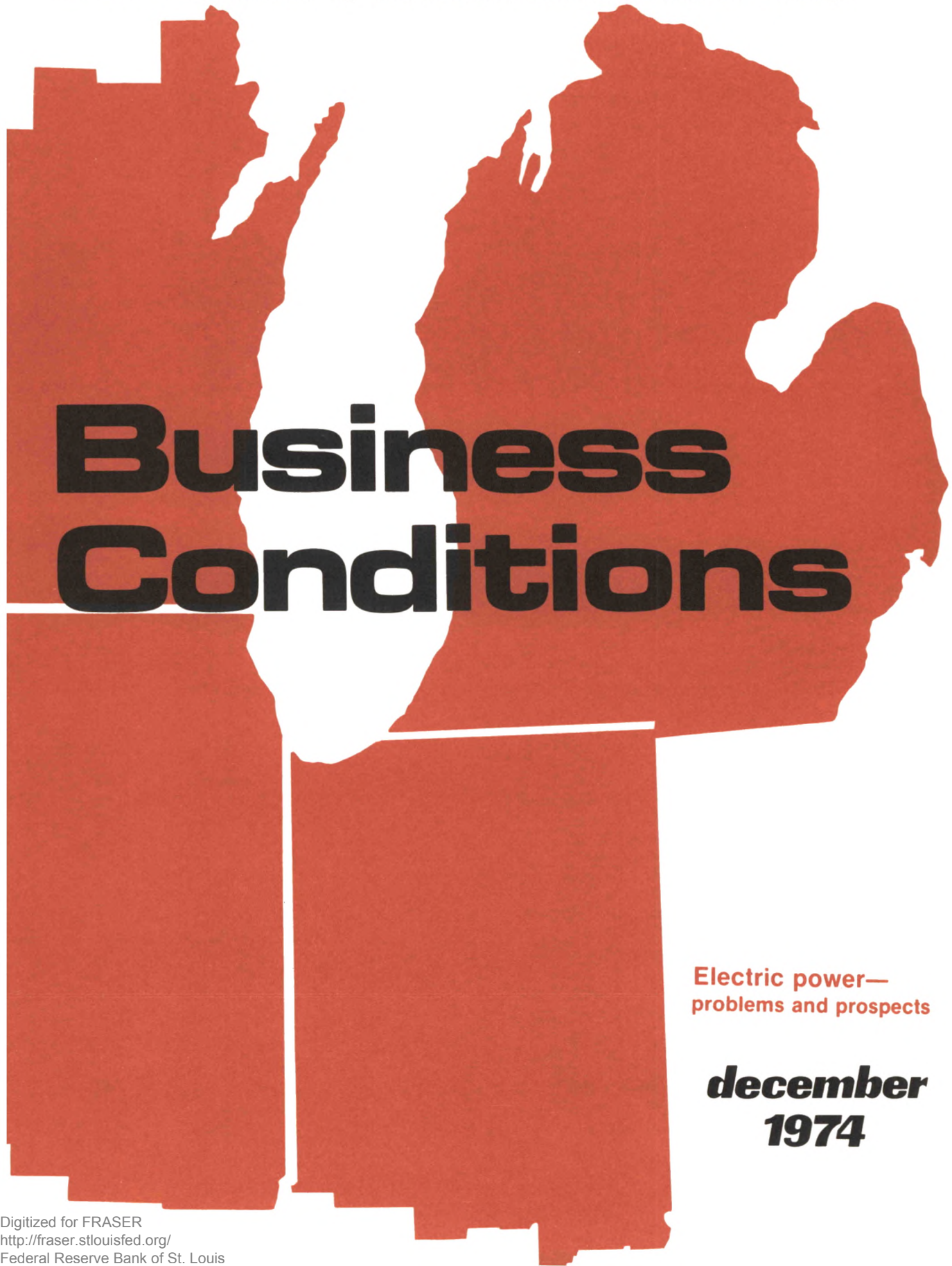
an economic review by the Federal Reserve Bank of Chicago



Business Conditions

Electric power—
problems and prospects

december
1974

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Ample supplies of electric power at gradually declining prices have played a vital role in postwar economic growth. In recent years prices of electricity have risen sharply and the industry has faced a mounting host of problems. By explaining the distinctive characteristics of the electric power industry and by reviewing historical and recent developments, this article attempts to provide the general reader with a better understanding of the system that provides this essential service.

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Electric power—problems and prospects

In the past several years, particularly in 1974, the financial and operating problems of the electric utility industry frequently have made the front pages. Seldom newsworthy in the past quarter century, electric utilities increasingly have been the center of controversies concerning pollution abatement, restrictions on choice of fuel, construction of new generating stations, proposed rate increases, and even billing practices.

Other electric utility problems have included fuel shortages associated with the oil embargo, soaring fuel costs, temporary shutdowns of nuclear plants, sharply rising construction costs, increasing customer delinquencies, and record high interest rates. Some electric utilities have experienced difficulties in selling new securities and in arranging short-term credits. Different electric utilities have been affected by these developments in varying degrees, but none have been completely immune.

In 1974 a new dimension was added to the uncertainties facing electric utilities. Demand for electricity merely equaled the 1973 total, thereby ending a 27-year string of substantial annual increases. Slower demand for electric power in the past year (declines in some regions) reflects conservation programs initiated during the energy crisis, substantial increases in rates, and the sluggish economy.

In view of recent trends, some utilities have adjusted downward their projections of increases in demand for electricity in the decade ahead. This fact, together with severe financial pressures on some companies, has resulted in an unprecedented wave of slowdowns, postponements, and cancellations of capital spending projects for increasing electric generating capacity. Moreover, some utilities, like some railroads, have been forced to pare outlays for ongoing maintenance and rebuilding. These actions have raised questions as to the future adequacy and dependability of supplies of electric power needed for economic growth and progress.

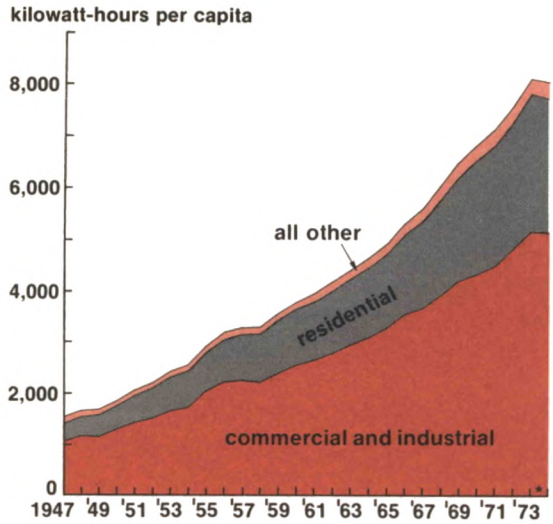
This article outlines the characteristics of the electric power industry and reviews historical and recent developments. It attempts to provide the general reader with a better understanding of this vast and complicated system that provides an essential service.

Past and present

Growth in the use of electric power has been rapid, and virtually continuous, since Thomas Edison established his first commercial plant in Manhattan in 1882. Electricity has supplemented or supplanted other forms of energy in an ever-widening array of uses. Harnessing electricity has made possible the development of new industries and products—television, for example—and modern living standards.

Few sectors of the economy have shown such continued rapid growth as electric power. Long-term growth has been approximately 7 percent per year. Surprisingly, this 7 percent annual growth rate holds fairly closely for the past decade, for the period since World War II, and even for the past half century. From 1920 to 1944 electric power output declined on a year-to-year basis only in 1921, 1930-32, and

Growth in electric power usage flattened in 1974



*1974 estimate

1938—all years of severe recession. Power output also declined in 1945 and 1946 as the economy converted from war production. From 1946 until 1974 electric power output increased every year, with recession years showing only smaller increases.

From 1946 through 1973 growth in electric power averaged 7 percent annually compared with a rise in "real GNP"[1] of just under 4 percent. A similar relationship between the rise in electricity and the rise in total output—almost two to one—also applies to the past 50 years.

A growth rate of 7 percent per year means that electric power output has doubled every ten years, and generating capacity has necessarily grown commensurately. In 1973 net production of electric energy was 1.95 billion kilowatt hours (KWH). This compares with 307 million in 1947 and 117 million in 1929, the peak before the Depression.

In 1973 total real GNP was about four times the 1929 level, while electric power output was up 17 times. Real GNP per capita in 1973 was 2.4 times the 1929 level, while KWHs used per capita was almost ten times as large. These data suggest the enormous changes in American industry and economic life in the past 45 years, especially the proliferation of business and consumer products and services produced with increasing quantities of energy and relatively fewer man-hours.

[1]The gross national product adjusted for price changes.

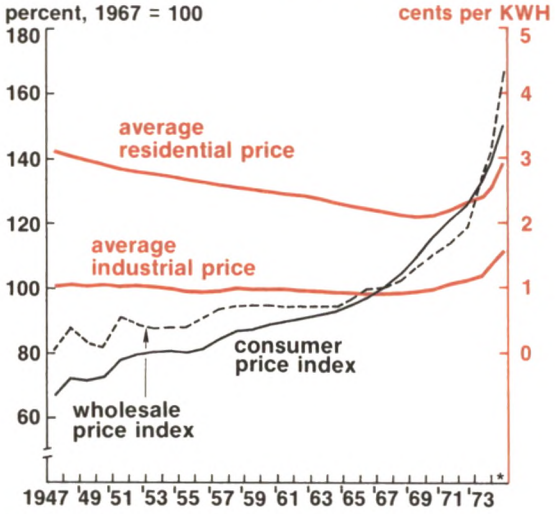
Distinguishing characteristics

Electric utilities have characteristics that set them apart from manufacturing and commercial enterprises—even from gas and water utilities. To a large extent the current problems of the industry reflect these special features.

Unlike tangible commodities, even water and gas, electricity cannot be stored. Transmission of power to the point of use is practically instantaneous. Electric utilities, therefore, are virtually unique in that their capacity must be adequate to supply peak loads at particular points in time.

Investments in electric plants and transmission facilities are very large relative both to working capital and to revenues. Unlike utilities distributing water and natural gas, electric utilities produce the product they distribute. Annual revenues of electric utilities are about one-fourth as large as total assets. In all manufacturing, revenues average about one and one-half times as large as total assets. Moreover, about 90 percent of electric utility assets consist of fixed assets, plant and equipment, compared to less than 35 percent in manufacturing. Long-lived assets imply reliance on long-term financing, either equity or bonded debt. Long-term debt accounts for about 45 percent of combined liabilities and net worth of utilities, compared to an average of less than 17 percent for manufacturing. Heavy debt suggests large interest payments, par-

General price indexes have outpaced electricity prices



ticularly so after several years of very high rates. In 1973 interest accounted for 13 percent of gross operating revenues of utilities, compared to 1 or 2 percent for the average manufacturer.

Unlike most rapidly growing industries, electric utilities typically pay out a relatively large share of their net earnings in the form of dividends. This fact, together with their leveraged capital structures, means that their financial health is dependent on relatively stable growth in revenues and profits, at least if new capital is to be attracted.

Fuel costs of electric utilities are very heavy because fuel is their raw material. Fuel bills averaged 25 percent of total operating revenues in 1973, up from 15 percent ten years ago. A further sharp rise in fuel cost occurred in 1974. Fuel is only a tiny fraction of revenues in most other businesses. Finally, virtually all electric utilities are regulated by both state and federal agencies. Managers' freedom of action to determine prices, operating procedures, and construction programs, therefore, is closely circumscribed.

Rates and regulation

Electric utilities, like most other utilities, are "natural monopolies" operating under state or municipal charters granting them exclusive rights to provide service in designated areas. Having no direct competition, they are closely regulated—particularly as to the rates that they may charge and the services they must be prepared to render, but also as to their methods of accounting, billing practices, new construction, and operating procedures. For the most part, regulation is by state public service commissions, but interstate transmission of power is regulated by the Federal Power Commission, construction and operation of nuclear facilities by the Atomic Energy Commission, and financial practices both by the states and by the Securities and Exchange Commission. In recent years the utilities also have been subject to rulings by state and federal environmental agencies concerned with air, water, and even "visual" pollution.

Actual or proposed changes in electric utility rates usually are newsworthy because adjustments affect virtually all households and businesses in the area covered. Today, most commission rulings are not contested by the utilities. In the past, rate decisions considered unfavorable to the utilities often were appealed by them to the federal courts as "confiscatory," in effect taking private property without adequate compensation to the owner.

The right to regulate rates was established in the nineteenth century, but the general principles for determining rates were argued for many years, culminating in a 1944 decision (the Hope Case) that prescribed no single method, but required that rates be "just and reasonable," and that returns on equity should be (1) commensurate with returns in other industries of comparable risks and

(2) sufficient to allow utilities to obtain needed debt and equity funds. Interpretation of these principles in particular cases, obviously, can reflect wide differences of judgment.

In recent years a growing volume of litigation involving electric utilities has been initiated by consumer or environmentalist groups. These actions have questioned rate decisions, billing practices, pollution controls, and the siting of new facilities.

Most states attempt to set rates that allow a given return on a determined "rate base"—assets devoted to serving the public. Consideration usually is given to a utility's capital structure, especially the proportions of equity (common stock and surplus), preferred stock, and long-term debt. This is because the cost of carrying existing debt and preferred stock is known, and regulators concentrate on the effect changes on rates charged for service may have on returns to equity, which should be adequate but not excessive.

Even more than for nonregulated companies, the return on equity affects the ability of utilities to sell bonds. Bond rating agencies and bond investors are vitally interested in returns on equity, which determine the margin of safety for interest and principal. Moreover, state rules often require specific earnings "coverage" of interest expense.

The trend of prices

Average prices of electric power trended downward from the 1920s until 1969. From 1947 to 1969 the average residential price dropped from 3.09 cents per kilowatt hour to 2.09, while the Consumer Price Index rose 64 percent. For the most part, this lower average price resulted because larger quantities of power were used by the average household, rather than from reduced rates. Some of the decline, however, resulted from rate reductions required by regulatory agencies.

Promotional rate structures provide for a lower average price as the quantity consumed increases. Additional blocks of power bear lower prices because these amounts can be supplied at a lower average cost per KWH. For large commercial and industrial users, the average cost of power was about 10 percent lower in 1969 than in 1947, although the Wholesale Price Index rose 40 percent in the same period. Average prices paid by large users of power are significantly lower than residential prices because of economies of scale and because power sold to large users may be subject to curtailment in periods when total demand presses on capacity. Recently, conservation and consumer oriented groups have been pressing to increase rates charged to large users relative to those paid by small users.

Electric rate increases have been granted with increasing frequency since 1969, both for residential and commercial and industrial customers, and the average price for such users has increased every year. Moreover, the rate of increase has accelerated, especially in the past year. In September 1974 the price of power for residential users averaged over 2.9 cents per KWH, up 23 percent from 1973, and the highest level since 1949. Increases have been much larger for customers of utilities heavily dependent on oil. Industrial prices for power averaged 35 percent higher in September than in 1973, and were at the highest level in the postwar period. Except for regulatory lags, power prices, at least for residential users, would have moved even higher.

The process of obtaining rate increases is complicated and may take several months to a year or more, particularly if strong public opposition develops, as it often has in the past two years. Interim rate increases frequently are allowed, pending final decisions that may require refunds. Many utilities have

been able to pass through increases in rapidly rising fuel costs. But, because they are based on the experience of previous periods, such passthroughs may involve lags of several months, during which time higher fuel costs will have accumulated.

Meeting peak loads

Electric utilities attempt to maintain generating capacity at levels that will accommodate expected peak loads, plus a margin of safety to provide for normal maintenance, possible breakdowns, and underestimates of demand. Consequently, huge amounts must be invested in facilities that operate well below potential most of the time.

Until the early 1960s, peak loads for most electric utility systems occurred in the winter. Usually, the peak developed on some evening in the week before Christmas when demand for lighting was at a maximum, perhaps augmented by power for street railways. Various factors, but most importantly the spread of air conditioning, gradually altered this pattern. For the past ten years, the peak load has occurred sometime during the summer, usually during a heat wave in July, August, or even early September. Moreover, the spread between the winter peak and the summer peak has widened, and the national average now approaches 20 percent. To even out these peaks somewhat, certain utilities have continued to urge the use of electric heat to balance loads and use generating facilities more efficiently. Other attempts to encourage use of electricity, once quite vigorous, have largely been abandoned.

The problem of required capacity varies from one utility to another depending on the nature of its markets and the availability of purchased power. Because peak loads of individual utilities vary substantially, data for the nation as a whole indicating capacity over "non-coincident" peak loads are not an exact measure of the available capacity. Nevertheless, it appears that a comfortable average margin of electric capacity over peak summer load is about 20 percent nationally when measured this way. For individual utilities a high value is placed on accurate projections of demand because excessively generous reserves are costly.

Nationally, the margin of capacity over and above peak summer load dropped from 25 percent in 1964 to less than 17 percent in 1969. Some critics said the electric utilities had seriously underestimated demand. The resulting upsurge in construction outlays helped to push the margin of capacity to 21 percent by 1973 and also created, or magnified, the industry's financial problems.

When a particular utility finds that its electric "send out" is approaching the capacity of its full-time stations, a number of steps may be taken. Normal procedures activate supplementary "peaking units" that are maintained on a standby basis. These may be either high-cost, obsolescent, and usually smaller units or they may be specially acquired modern turbines operating on gas or oil. Another common step is the purchase of power from other utilities who are partners in a "grid," or, in an emergency, from interconnected utilities located hundreds of miles away. In addition, "interruptibles," usually manufacturers who buy power at low rates on the understanding that power may be cut off periodically, may be informed that transmissions will be reduced or stopped. Public appeals may be made to all customers to voluntarily curtail usage. Finally, voltages may be cut somewhat, perhaps resulting in a partial "brownout." Too large a cut in voltage can endanger certain electrical equipment operated by businesses and consumers.

At rare intervals massive breakdowns of generating equipment or switching devices can cause major power failures.

The most prominent case was the famous blackout that hit an area of 30 million people in New York City and the northeast for several hours in 1965. Except for customers with their own standby generating facilities, lights went out, subway trains and elevators stopped, and all electrical equipment became inoperable. Citizens were suddenly confronted with the far-reaching consequences of a cessation of electric services. Procedures for dealing with power shortages give the electric industry needed flexibility. There can be no substitute, however, for continued large investments to maintain and augment total capacity in line with growth in demand.

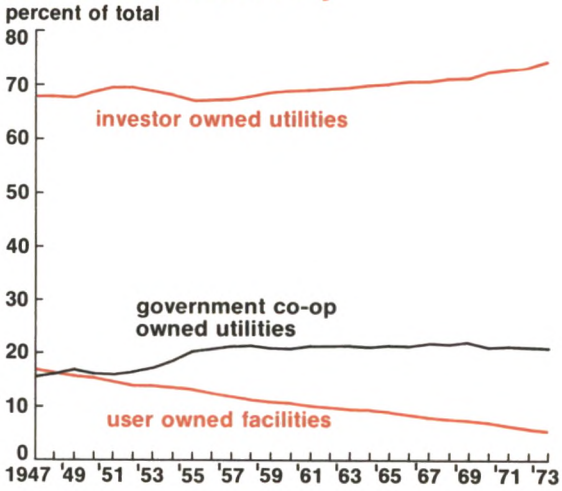
Producers and users

Investor owned utilities produced about 74 percent of the nation's total supply of electricity in 1973. The remainder was divided among federal agencies (TVA is the largest), 11 percent; municipalities and cooperatives, about 10 percent; and industrial firms, about 5 percent. Some of the power produced by private utilities, and a major share of the power produced by federal agencies, is supplied to municipally owned utilities or to cooperatives for resale.

The bulk of U.S. electric generating capacity always has been privately owned.[2] The investor owned utilities' share of the total output rose from 67 percent to 75 percent in the 1920s, as industrial firms relied more heavily on purchased power. Expansion of federal power programs (mainly hydro, initially) in the 1930s and early 1940s and growth of state, municipal, and co-op facilities reduced the private utilities' share of electric output to 67 percent just after World War II. Their share remained at about this level until the 1960s when it began a gradual

[2]This contrasts with most other countries, capitalist as well as communist, where generating capacity is publicly owned.

Private utilities produce the bulk of U.S. electricity



rise, reaching 74 percent last year. In Seventh District states the private utilities' share of electric power output is much higher, ranging from 83 percent in Iowa to 97 percent in Illinois.

The share of power produced by government owned utilities and co-ops rose to 21 percent in the mid-1950s and has remained at that level. The share of power produced by industrial companies for their own use declined fairly steadily from 17 percent of the total just after World War II to 5 percent in 1973. Since 1969 private power production has declined absolutely as well as relatively.

Revenues of electric utilities, public and private, totaled $32 billion in 1973—42 percent residential, 29 percent commercial, 25 percent industrial, and about 4 percent "other," mainly street lighting and other municipal services. In terms of KWH, however, the proportions are quite different—residential, 33 percent; commercial, 23 percent; industrial, 40 percent; and other, 4 percent.

In the past decade the proportions of electric utility revenues from the various groups of customers have not changed significantly, but, in terms of KWH, the industrial share has declined while shares of

commercial and residential customers have increased. These trends indicate first, that average prices paid by large industrial and commercial users have been, and continue to be, lower than rates paid by residential customers, but that prices paid by large users have increased faster than prices paid by residential customers since the late 1960s.

Most manufacturing companies use substantial amounts of electricity, but the biggest users are the metals and chemicals industries. Especially large amounts are used in producing aluminum and copper and in the electric furnaces used to produce steel. Availability and cost of electric power is a major factor in locating aluminum and copper refineries. Environmental considerations have encouraged the use of electric furnaces in many industrial installations in recent years, especially in foundries.

Commercial use of electricity has expanded sharply because of the rapid increase in the number of new shopping centers and highrise office buildings that require ample lighting, air conditioning, and, often, electric heating. Residential use has expanded with the proliferation of appliances, large and small. The big uses of electricity in the typical home are for air conditioners, lighting, ranges, dryers, freezers, refrigerators, and television. When dwellings are electrically heated, this use may be the largest. Perhaps 10 percent of all U.S. dwelling units are now electrically heated and the total is growing rapidly. Perhaps half of new units and conversions combined are now electric. Despite its high cost in most regions, electric heat in dwellings has been encouraged by its cleanliness and flexibility and by the fact that some gas utilities and oil distributors have had to restrict new service because of limited supplies.

Purchase of electric power by all users was 2.5 percent of GNP in 1973, up from 2.3 percent in 1964. Because electric power prices rose faster than other prices in 1974, this proportion increased. The number of residential electric customers has increased steadily to about 70 million, currently. Virtually all year-round homes, and most vacation homes, are served by electric utilities. In 1973 the average residential customer used 8,080 KWH and paid a bill of $192. Electric bills accounted for 1.7 percent of total consumption expenditures in 1973, up from about 1 percent in the 1930s and 1940s, but about the same as in the early 1960s. This ratio increased somewhat in 1974. The proportions of consumption expenditures going for telephone bills and tobacco, by coincidence, also were 1.7 percent in 1973.

Sources of electricity

While total energy used in the United States in all forms has grown about 4 percent annually since World War II (as fast as real GNP), the proportion of total energy converted to electric power has grown steadily. It now accounts for about 30 percent of the total.

All electric power is converted from a primary energy source—hydro (falling water), "fossil fuels" (coal, oil, and gas), or uranium. Nuclear power plants are steam plants with heat generated by nuclear action, rather than combustion of fossil fuels. Large steam plants are located near an ample supply of water needed to condense the steam after it has passed through the turbines. Increased use of cooling towers is underway.

Electric power generated by hydro plants from a head of water, usually controlled by damming rivers, has a major advantage in that there is no fuel cost. However, invested capital requirements are high, the volume of power generated varies with seasons and rainfall, and power sites are often far removed from markets. Hydro plants supplied over 30 percent of U.S. electricity just after World

War II. Although output of hydro-electricity has continued to increase absolutely, it has declined relatively and accounted for less than 15 percent of the total in 1973. Opportunities for further development of hydro-electricity in the United States are limited. Many sites are fully developed, and ecological problems and the desire to preserve scenic beauty preclude development of other sites.

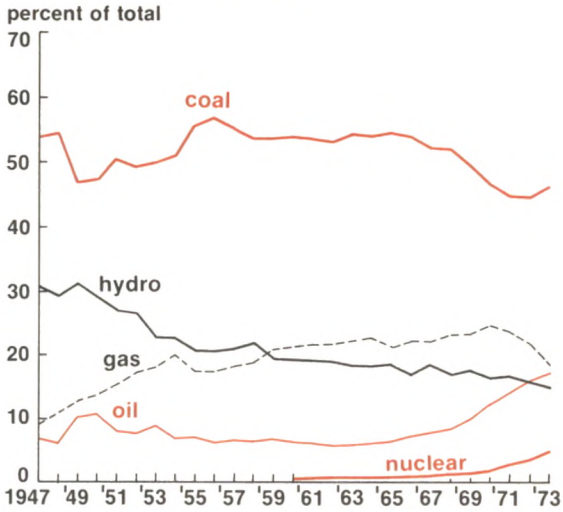
About half of U.S. electricity has been generated from coal since World War II. This proportion was 45 percent in 1973. Two-thirds of all U.S. coal was used for electric power generated in 1973, up from one-third 20 years ago. Over the years coal has been used more and more efficiently, in terms of KWH produced per ton of coal.

Coal-fired plants in many areas came under severe criticism in the 1960s for causing air pollution, particularly through emissions of sulfur dioxide. Strong pressure was placed on utilities to avoid using high sulfur coal and to shift to other fuels, including low sulfur coal and oil. These shifts have worked to boost prices of the more desirable fuels sharply, thereby increasing operating costs of affected utilities. A highly controversial issue, currently, revolves around a move to require installation of high-cost "scrubbers" at coal-fired plants to reduce sulfur-dioxide emissions.

The United States has vast reserves of low-sulfur coal, but these deposits are mainly in the Western states, and involve high transportation costs. Moreover, exploitation of these reserves has been hampered by opposition to strip mining operations. In any case, available coal is currently in short supply, and new mines, especially deep shaft mines, take years to develop.

Natural gas-fired plants, mainly in the Southwest, produced 18 percent of U.S. electricity in 1973, down from a peak of 24 percent in 1970. Use of gas for electric power has declined absolutely as well as

Coal continues as the largest source of electricity



relatively since 1971. Although gas is desirable as a clean-burning fuel, its contribution to electric generation is almost certain to decline further. Almost one-fifth of all gas produced in the United States has been used for generating electricity in recent years. Supplies of gas are restricted and home heating has priority.

Oil-fired plants produced 17 percent of U.S. electricity in 1973, and used 9 percent of all oil products. The proportion of electricity produced from oil rose rapidly from 6 percent in 1964, largely because of pressure to reduce air pollution from coal, but also because of increased availability of low cost imported oil. Utilities on the East and West Coasts are particularly large users of oil. Such plants, which were most threatened by the Arab oil embargo, often paid three times as much for oil in 1974 as in the pre-embargo period in 1973.

To reduce dependence on foreign oil, the Administration has urged that the largest utilities eliminate the use of oil by 1980, but the feasibility of this goal has been questioned. Domestic production of crude oil has declined in recent years. Current vigorous attempts to increase supplies (including the Alaskan pipeline)

are expected to reverse this decline, but only after a period of years.

The nuclear promise

The vast potential of peaceful uses of atomic energy received widespread attention in the years following World War II. Initially, the main interest was in a cheaper source of electric power. Since the 1960s, however, increasing emphasis has been placed on projections of the inadequacy of conventional sources of energy to supply a growing economy, and the role that nuclear power might take in overcoming this deficiency.

In 1960, after many years of planning, Commonwealth Edison's Dresden station, southwest of Chicago, began to generate electricity. This was the first commercially owned and operated nuclear plant in the United States. As other plants came on stream, the nuclear share of the nation's electric power output rose to 1 percent in 1969 and 4.5 percent in 1973. This proportion will increase rapidly in the years ahead. About half of all new electric plants starting operation, currently, are "nucs." The Midwest has continued to lead the nation in nuclear power and about 30 percent of power-generating capacity of utilities in Illinois, Michigan, and Wisconsin is now nuclear.

The push for nuclear power gathered strong momentum in 1966 after the dependability and economy of the first nuclear plants was demonstrated. In 1967 the AEC predicted that half of U.S. power would be nuclear by 1980. Various developmental problems and delays indicate that the actual proportion in 1980 will be about 25 percent. In March 1973 the AEC forecast that 60 percent of U.S. power would be nuclear by 2000.

In 1973 and 1974 some utilities switched planning from nuclear to coal-fired plants because of the lengthened lead times on designs, approval, and construction of nuclear plants. Operating problems in existing plants, and delays and uncertainties caused by litigation, usually initiated by consumer groups, also were factors. Nevertheless, the trend to nuclear power has strong momentum.

Construction costs of nuclear plants are greater than for conventional plants, but this is more than balanced by the fact that their fuel costs are only a fraction of the costs of coal and oil-fired plants. Moreover, the margin of difference in operating costs has increased in favor of nuclear plants since 1973. Various utility executives have commented favorably on the dependability, as well as the economy, of their nuclear installations as compared to those fired by fossil fuels. Most European countries are even more deeply committed to nuclear power for the future than is the United States, partly because their supplies of mineral fuels are even more limited than ours. The longer-term future holds the possibility of still greater economies either through "fast-breeder" reactors, which create their own nuclear fuel, or fusion plants that use heavy hydrogen obtained from water as fuel.

The scientific feasibility of the fast-breeder reactors has been demonstrated, but considerations of safety and high costs of construction suggest to some experts that this type of installation be "leap-frogged" in favor of a further advance. Generation of electric power from atomic fusion, as opposed to fission, may require many additional years of scientific research and engineering development. However, if the practicality of fusion power can be demonstrated, the goal of unlimited supplies of cheap power may yet be realized in this century.

Capital expenditures

Investor owned electric utilities apparently spent almost $18 billion on new plant and equipment in 1974, according to

the Department of Commerce, up from less than $4 billion in 1964. Outlays have increased by at least 10 percent each year in this period, and by over 20 percent in some years. Capital spending by electric utilities will account for almost 16 percent of the total for all industry in 1974, compared to 8 percent ten years ago. In the decade, generating capacity about doubled.

About half of electric utility capital spending is for generating capacity, with the remainder mainly for transmission and distribution facilities. A government report released last August indicated that almost 9 percent of electric utility capital spending in 1974 would be for abatement of air and water pollution, compared to 6 percent for all U.S. industries.

A government survey released in January 1974 indicated that electric utilities would spend $18.8 billion on capital outlays in 1974, up from $15.9 billion in 1973. Starting last spring, various utilities began to announce reductions in construction budgets for 1974, 1975, and subsequent years. In December the government estimate had been reduced to $17.7 billion, despite greater than expected increases in construction costs. Planned outlays by manufacturers rose from $44.4 billion to $45.8 billion between January and December. In November a McGraw-Hill survey indicated that manufacturing firms planned to increase capital outlays 21 percent in 1975, but that electric utilities, despite expected further sharp increases in prices, planned no rise at all.

In official announcements, reductions in planned capital outlays by electric utilities have been variously attributed to a combination of reduced estimates of demand, problems in raising funds, and the soaring costs of construction. Problems of raising funds appear to be the predominant reason for construction cutbacks. One company that stopped work on projects well underway in 1974 warned that service may have to be curtailed in 1975.

Contracts for new generating stations are among the largest contracts reported by F. W. Dodge. Awards of over $100 million for individual projects are common, and several have been for over $500 million. Usually, these projects take nearly a decade to complete. Obviously, decisions to go ahead or cancel are momentous.

Raising funds

Despite curtailed expansion plans, investor owned electric utilities necessarily will continue to raise huge sums in the capital markets. Planned outlays for several years to come are very large, and inflation doubtless will continue to raise construction costs.

Working capital needs of these utilities are relatively small and short-term borrowing, mainly through bank loans, traditionally is used only on a temporary basis, pending the issue of securities. Therefore, long-term financing over the years about equals outlays on plant and equipment—summed up as "construction." Of the $108 billion capital structure of private utilities at the end of 1973, 35 percent was represented by common stockholders' equity, 12 percent was preferred stock, and 53 percent was long-term debt. These proportions have been fairly stable over the past decade, while capitalization has more than doubled.

Long-term financing is either "internal" (depreciation and retained earnings, the latter adding to stockholders' equity) or external (sales of stocks and bonds). The heavy investments of utilities during the past decade have greatly increased dependence on external financing. In 1964 and 1965 internal sources (three-fourths depreciation) accounted for 59 percent of all long-term funds. Internal funds have continued to rise in absolute terms, but the proportion has declined. In the period 1970-73 internal sources supplied only about 30

percent of long-term funds, with the remainder coming from sales of securities.

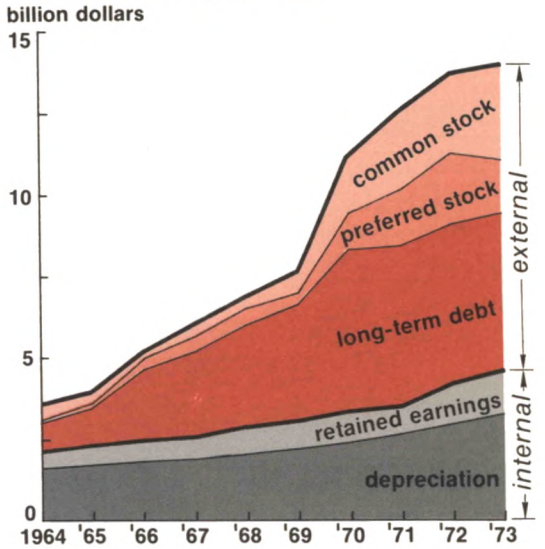
In each of the three years 1971-73, electric utilities sold over $9 billion of securities, net of retirements, up from $1.5 billion in 1964. Because security sales by other corporations declined in the 1971-73 period, the proportion of electric utilities issues to the total rose from 24 percent to 43 percent. Bond issues alone totaled $5 billion per year from 1970 through 1973, accounting for about 40 percent of all corporate bond sales in the latter year. In the first half of 1974 issues of utility bonds were about 95 percent larger than in the same period of 1973, while total corporate issues were up 80 percent.

The flood of new debt, coupled with lower earnings, caused private agencies to lower the quality rating of many utility issues in the past two years. Yields on new bonds rose to record levels and some issues were withdrawn. Charters commonly prevent utilities from selling bond issues if the earnings coverage of interest charges falls below a prescribed level, a factor of only academic interest until recently.

Just after World War II, yields on outstanding utility bonds were about 2.5 percent, the lowest level of the century. These yields rose gradually to about 4.5 percent in the early 1960s, and then increased sharply late in the decade, averaging over 8 percent in 1970. After declining somewhat from the 1970 peak, yields rose again and in the fall of 1973 new issues of the highest grade issues bore yields of over 10 percent, and yields on less highly regarded issues were even higher.

High rates on new bonds in 1974 and problems in marketing new issues resulted in relatively heavy use of temporary bank loans. In mid-November 1974 outstanding loans of large commercial banks to utilities (mainly electric) totaled $8 billion, up 50 percent from a year earlier, and up 140 percent from November 1972. Many of these loans bore interest above the prime rate,

Securities supply a growing share of utility funds



which has been even higher than the rate on new bond issues this year.

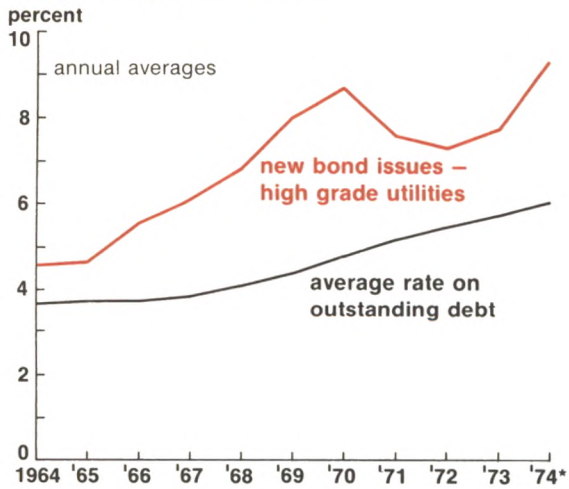
Because of large existing debts, the average rate paid on outstanding long-term debt by electric utilities has remained below market rates. Nevertheless, this "embedded" interest cost is now close to 6 percent, up from 3.7 percent ten years ago. Total interest expense rose from 8 percent of gross revenues in 1964 to 13 percent in recent years.

Stock prices decline

Electric utilities have had trouble selling new stock, despite the desire to do so to keep their debt-equity ratios from rising. In the years 1971-73, they sold about $2.5 billion in common stock, and almost $2 billion in preferred stock, each year. Sales of common stock have had the effect of diluting the value of existing stockholders' equity because most market prices have been well below book value.

Common stocks of electric power companies were almost all held by holding companies prior to the mid-1930s. The Public Utility Holding Company Act of

Yields on new utility bonds hit record highs in 1974



*1974 estimate

1935 required that many of these issues be distributed to the public. Utility stocks soon acquired a reputation as sound investments, virtually equivalent to bonds, for purchasers interested in income and price stability.

From the end of World War II to the mid-1960s, prices of utility common stocks trended upward, although not so rapidly as industrial stocks. Standard and Poor's average of 35 electric utility stocks reached a peak in 1965, while average prices of industrial stocks led by the "glamour" industries continued to rise to record levels in January 1973. Prices of industrial stocks averaged 29 percent higher in 1973 than in 1965, while electric utility stocks averaged 36 percent *lower*.

The stock market decline of 1973-74 hit electric utilities even harder than most industrials. At the end of November 1974, the S and P electric utility group was 60 percent below the 1965 level, while industrials were 17 percent lower. Market yields on electric utility stocks were 10.4 percent at the end of November, compared to 3.2 percent in 1965. For industrials, these figures were 4.8 percent and 2.9 percent.

Market declines have pushed prices of most electric utility stocks far below book values. In 1965 stock prices averaged more than double book values. Recently, prices of many utility stocks were only half of their book values.

The financial health of investor owned utilities is far more closely related to stock market prices than are industrial companies. This is because funds must be raised through sales of both bonds and stock, and a favorable market for bonds is dependent, in large degree, on ability to sell stock.

Earnings on common stock equity of investor owned utilities were about 12 percent in the mid-1960s, and this ratio has declined only to 11 percent in recent years. But investors are cautious of earnings reports of electric utilities if they include a substantial "allowance for funds used during construction" (AFDC). In most states this amount must be capitalized and added, both to the asset rate base and to surplus on the right-hand side of the balance sheet. AFDC rose from 4 percent of total earnings on common stock in 1965 to 35 percent in 1973. Moreover, in the face of large increases in profits for most corporations in the first nine months of 1974, many investor owned utilities reported lower earnings—despite AFDC.

A brighter future?

Some analysts have suggested that the problems of the electric power industry will moderate in 1975 and in the years ahead. Lower interest rates and a leveling of fuel prices, widely expected, would alleviate two of the difficulties that have caused the financial squeeze of the past year. Speedier action on needed rate increases, and a slower pace on pollution control measures would help many companies. Even the generally expected slower growth in demand for power, partly because of escalating prices, would ease the pressures of raising funds and the

special problems sometimes involved in bringing new units into service at a specified time.

The electric utility industry may also benefit in 1975 from an increase in the investment tax credit. Utilities have been allowed a 4 percent credit, instead of the 7 percent credit available to other businesses. Some support exists for raising the investment tax credit to 10 percent, both for utilities and for other businesses.

The problems of the utilities were spotlighted in April 1974, when Consolidated Edison of New York passed a dividend for the first time in its long history.[3] This company, particularly hard hit by the various problems facing the industry, is by no means typical. But its decision to sell generating facilities to the state of New York suggests the possibility of public subsidies or public ownership to maintain needed service.

Demand for electric power is virtually certain to grow in future years, although probably not at the traditional 7 percent per year. Further improvement in American life and in industrial efficiency apparently requires steadily expanding capacity to generate kilowatts. Doubtless this job will remain largely in the hands of the private companies, whose financial health is a matter of concern to government and the public.

George W. Cloos
Morton B. Millenson

[3]"Con Ed" subsequently resumed quarterly dividends at a reduced level.

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