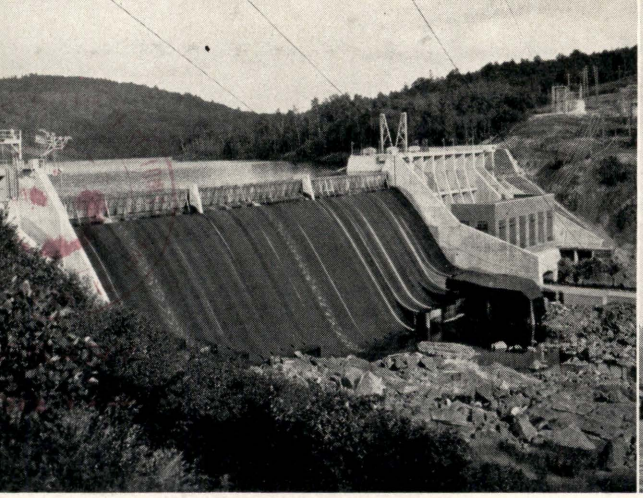

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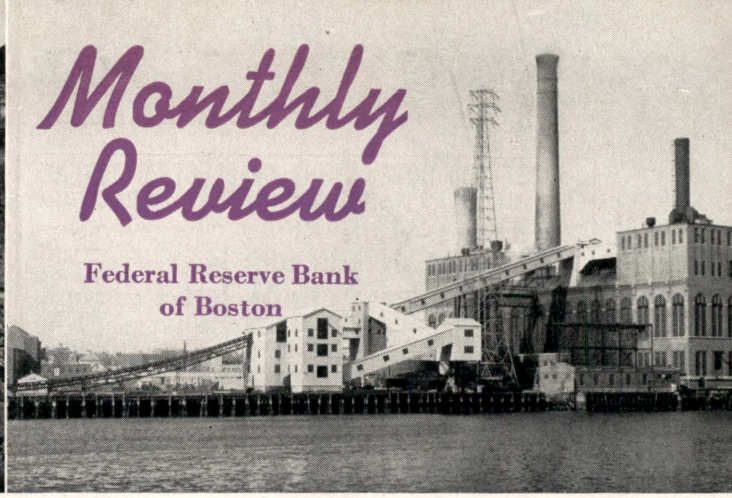
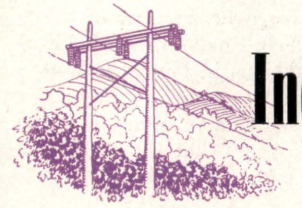


ELECTRIC PLANT: Ayers Island Station, Public Service Company of New Hampshire, and New Hampton, N. H.

STEAM-ELECTRIC PLANT: Manchester Street Plant, The Narragansett Electric Company, Providence, Rhode Island.



# Industrial Power Costs in New England

## . . . Their Level, Effects, and Causes

THE AVAILABILITY, reliability, and cost of electric power are factors considered by most manufacturers when they select a location for a new enterprise. The same factors also affect the manufacturing costs and competitive strength of a manufacturer who is already located in a particular community.

New England's power problem is highly charged. The various interest groups have divergent views, and the general public possesses few facts upon which it can base its opinions and conclusions. It is widely known that industrial power costs in New England are higher, on the average, than those in the United States as a whole. The extent and causes of the differences are not so generally known, however, nor is the impact of higher costs upon New England's economic position. There is also substantial disagreement about what should be done to reduce power rates in the region and how effective reductions would be in improving the competitive position of New England's factory producers.

This article presents the over-all status of power costs, rates, consumption, and related measures in New England. Most data pertain to the year 1947, the latest year for which fairly complete information is available.

### *How High Are New England's Power Costs?*

New England manufacturers as a whole paid an estimated average of 1.45 cents for every kilowatt-hour of electric power they consumed in 1947. That cost was 61 per cent higher than the estimated average of 0.90 of a cent per kilowatt-hour paid by all United States manufacturers for their power requirements.

Maine was the only New England state in which the unit power cost was less than the national figure. Moreover, the average cost per kilowatt-hour for each state in the region except Maine exceeded the average cost for all other leading industrial states outside the region. The differentials indicated in an accompanying chart are typical of the situation which has existed for many years and which still exists, although minor variations in spread occur from year to year.

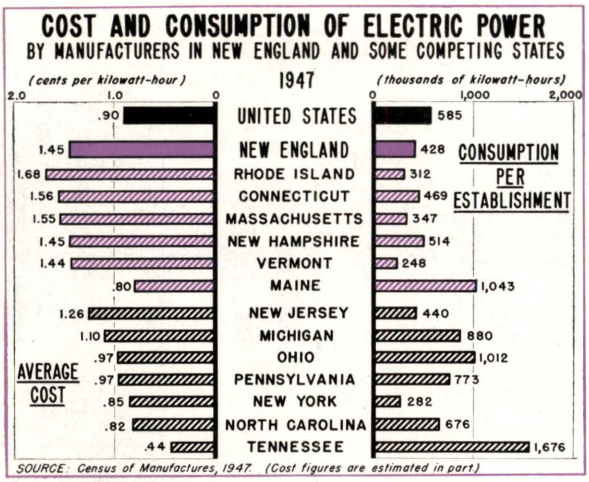
The rates charged industrial power users in New England are higher than those in virtually all other states. Since the average manufacturer in New England uses less electric power than the typical industrial concern in the nation, the regional excess in cost per kilowatt-hour is greater than the differential in rates alone.

The cost of electric power is usually small in relation to the value created by the manufacturing process. Power costs have been of little importance in the outmigration of New England manufacturers. However, power costs have been one disadvantageous factor, though probably not the most important, in retarding the economic growth of New England.

The New England electric utilities make maximum use of the hydroelectric capacity already installed in the region, but steam generation provides more than three fourths of the power sold by utilities. Fuel expense is the largest single cost element in steam generation. Higher fuel expense, which results primarily from greater transportation costs, explains about two thirds of the differential in power costs. Several other regional differences also contribute to the New England excess.

There are a number of possible approaches to lower power costs in New England, many of which are also available to the rest of the country. They might aid in improving the competitive position of some of the region's manufacturers. Nevertheless, it appears that New England as a whole, because of its geographical location, will remain indefinitely a high power-cost area.

The cost of purchased electric power to a particular customer depends on both the rate structure and the amount of power consumed. Whatever the level of rates, the unit charge to a customer declines as his consumption increases. It is conceivable that manufacturers in one area who use less electric power than those




in another area might pay more per kilowatt-hour even though the level of their rates is lower.

Since industrial power consumption per establishment is smaller in New England than in the rest of the country, the lower level of use is undoubtedly responsible for a substantial part of the unfavorable comparison between unit power costs in this region and in the United States as a whole. Nevertheless, much of the cost differential is directly attributable to higher rate structures in New England.

Comparisons of rates quoted by privately owned and municipal utilities throughout the country for industrial users in cities of 50,000 and more population show that the levels of rates in Rhode Island, Massachusetts, Connecticut, and Michigan are the highest in the country. The three southern New England states provide more than 80 per cent of the manufacturing employment in New England, and their factories consumed 71 per cent of all electric energy used by New England manufacturers in 1947.

Maine is the only New England state in which published rates compare favorably with those in most other states. Moreover, Maine manufacturers generate more electric power for their own use than they buy from utilities, which further reduces their power costs. Even though industrial power rates in Michigan cities rival those in New England, the much larger consumption by the average Michigan industrial user pulls down the average cost per kilowatt-hour.

For the most part, published rates for cities in a given state are closely clustered. This is especially true for small states such as those in New England, where utility interconnections tend to produce rate uniformity. In a few states there are great differences in rates from city to city. Communities close to Niagara Falls in western New York, for example, enjoy lower than average rates, while those in southeastern New York, where conditions are similar to those in southern New England, have high rates.

In both New England and the United States about 70 per cent of the electric energy consumed by industrial concerns in 1947 was purchased, and the rest was generated by the manufacturers for their own use. Factories such as woolen and worsted mills, which require process steam, usually find it most economical to generate their own electric power as a by-product. Mills which own economical hydroelectric plants can often produce at least part of their energy requirements more cheaply than they can buy it. In general, manufacturers generate their own power only when they can do so at a lower cost than that for purchased power.

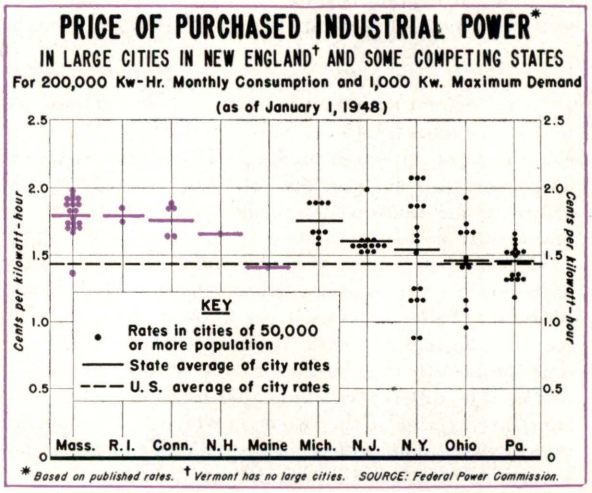
Maine and New Hampshire are unique because of the high proportion of industrial power requirements produced by the states' manufacturers. The importance of paper and woolen manufacturing in those states accounts for the unusual share. Most of New England's leading competitors show a division between purchased and industrially generated power which is much like that in the other New England states. The very large proportion of total industrial power requirements provided by the utilities in most states dominates the interstate cost comparisons. Moreover, in view of the higher level of utility rates in New England, the differences between generating conditions in New England and the rest of the country, and the region's slightly smaller than national proportion of generation by manufacturers themselves, it appears that the costs of self-generated power are also higher in New England than in the country as a whole.

## *Industry Differentials in Power Costs*

The discussion so far has been in terms of differences in industrial power costs, rates, and consumption among states and regions. Since the structure of industry and the requirements for electric power differ from state to state, it is necessary to examine the effects of varying rates upon particular industries.

The power-cost differential between New England and the United States extends to all of the region's leading industry groups except apparel. The differential is fairly small for such industries as leather and shoes, miscellaneous manufactures, and paper, but it is fairly large for textiles, lumber, rubber products, and several other industry groups. It is very large for primary metals and chemicals, primarily because of the influence of aluminum production and certain chemical processes outside New England.

Table I shows how unit power costs compare for major industry groups in New England and in the nation



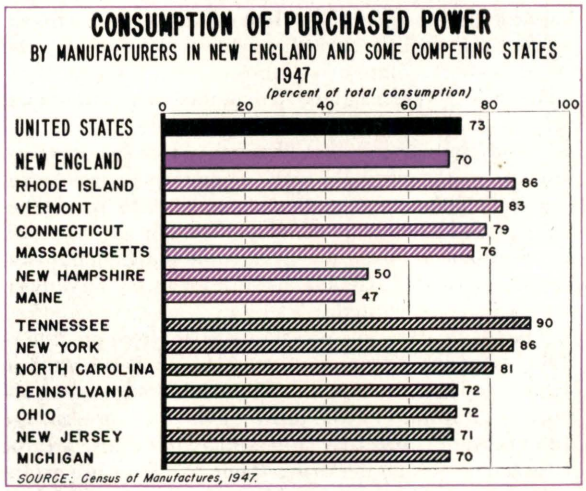
(columns (1) to (3)). It is important to note that the cost disadvantage for the individual industry groups is smaller in all but three instances than the calculated cost disadvantage for New England industry as a whole. This apparent contradiction results from the relatively greater concentration in New England of industries which use small amounts of power and which, therefore, pay high average power rates. An adjusted cost disadvantage for New England industry as a whole is actually about 42 per cent. The gross figure of 61 per cent rests in part upon variations in the structure of industry between the two areas.[1]

The percentage by which average power costs in New England exceed those in other areas is not in itself as important as its effect upon total manufacturing costs in dollars. Fortunately, power costs equal less than two per cent of value added by manufacture in most industries.[2] The 1.86 per cent figure for all manufacturing in New England during 1947 was only a little larger than the 1.70 per cent figure for the country as a whole during the same year. Most individual industries in New England also paid only a moderate extra amount for power in relation to value added by manufacture in comparison with producers in the same industries outside the region (see column (6) in the table). The excess was fairly large, however, for lumber, electrical apparatus, transportation equipment, furniture, paper, and textiles. Despite New England's high power rates, the percentages of power costs to value added by manufacture were lower in New England than in the country as a whole for the primary metal, chemical, rubber, instrument, and stone, clay, and glass industries. Differences in types of products and their varying power requirements account for the apparent New England advantage in this respect.

The largest industrial consumers of electric power in New England are the manufacturers of paper and textile products. Each industry group typically accounts for approximately one fourth of all industrial power used within the region. The paper industry generates about 60 per cent of its own requirements, but it is still second only to textiles in the purchase of electric energy from utilities. The textile industry supplies 30 per cent of its own power needs. The producers of textiles and paper buy roughly 40 per cent of all industrial power sold by utilities and generate about 70 per cent of all power produced by industrial concerns for their own use. Only two other industry groups, primary metals and nonelectrical machinery, account for more than five per cent of total industrial power used in the region. Their share is only eight per cent each. Moreover, in every industry group other than paper and textiles the manufacturers generate only a small fraction of their total power requirements.

### *Adjustment to High Power Costs*

The ability of New England industry to hold down the size of its power bill in relation to value added by manufacture in the face of high rates and unit costs has rested upon various types of adjustment. The adjustment of the region's industrial structure has been of greatest importance. Those industries which require large quantities of low-cost power are either not present or have been slow to expand in most parts of New England. The paper industry of northern Maine and New Hampshire is the only important exception to that generalization. Its successful growth has rested on relatively cheap local hydroelectric power and ample near-by sources of raw materials, conditions which do not exist for most other New England industries. On the other hand, the apparel industry, which pays very high rates for electric power but consumes very little, has been one of the fastest growing industries in the six-state region.




Most individual manufacturers in New England have avoided the use of processes which require large quantities of power, whether for present or proposed new products. As a result of adjustments of this sort, the composition of manufacturing in New England has become more or less adapted to the high average level of power rates.

There is one fortuitous circumstance which has decreased the importance of New England's power-cost disadvantage during recent years. The cost of electric power in 1947 was only about half as large in relation to value added by manufacture as it was in 1939. Power rates have remained close to their prewar level in most areas and have declined in some, while wage costs and most other operating costs have typically risen greatly along with product prices. The difference in price behavior has lessened the seriousness of the power-cost problem for many New England manufacturers, although it remains important to many others.

### *Opinions of Manufacturers*

The averages cited above are useful in making broad comparisons, but they do not reveal much about the impact of power costs upon the competitive position of individual manufacturers in New England. Averages can and do hide broad variations in individual situations. Since the extreme cases are the ones in which high power costs are most likely to affect the competitive situation, it is necessary to determine how many

[1]The adjustment was made by weighting the ratios in column (3) of the table by kilowatt-hour consumption in the various industries. Even the adjusted figure of 42 per cent contains some inflation, as a result of the differences in products made by the same industries in New England and the rest of the United States.

[2]Value added by manufacture is a measure of the increment created by the manufacturing process. It excludes the value of purchased materials and supplies, containers, fuel, and purchased power.

such cases there are among New England producers.

The opinions of a large group of New England manufacturers about the effect of power costs on their competitive position are available. They were collected as part of a study of "The Present Position and Prospects for New England Manufacturers" conducted in 1949 by the Federal Reserve Bank of Boston in cooperation with the New England Council and nine manufacturers' associations in the region.[3] Six hundred sixty-three New England factory producers, who provide one fifth of the factory jobs in the region, participated in the survey.

Fourteen per cent of the executives who expressed definite opinions about power costs stated that they provided their companies with an advantage over their competitors outside New England. Sixty per cent stated that power costs were of little competitive importance for them. The remaining 26 per cent expressed the opinion that their power costs constituted an important competitive disadvantage. About three quarters of New England's manufacturers, therefore, believe that they are either aided or are not affected adversely by power costs. The unfavorable competitive impact of the region's high average of power rates evidently falls on at most only one fourth of its factories. Even that proportion may be a little too large, as additional information from some respondents suggests that some of the claims of injury may have been somewhat exaggerated.

The evaluation of power costs by manufacturers differs somewhat from state to state, as is indicated in an accompanying chart. Vermont has the largest proportion of producers who feel that their power costs are an important competitive advantage, but it also has the largest percentage declaring them to be an important competitive disadvantage. Maine is close behind Vermont in its advantage percentage, and its disadvantage percentage is much smaller. Manufacturers in Connecticut are the least dissatisfied of those in any New England state with their power costs.

These state comparisons of manufacturers' opinions suggest that the state averages of power rates and costs are not of primary significance by themselves. The most critical comparisons are those between the power costs of producers in this region and the costs of their competitors in other regions.

The situation varies greatly from industry to industry. The survey showed that the percentage of companies reporting power costs as an important competitive disadvantage ranged from 64 per cent for manufacturers of rubber products down to nine per cent for producers of apparel and related products. The following tabulation gives the disadvantage percentages for all major industry groups in New England:

| | | | |
|---|---|---|---|
| **All Nondurables** | **27%** | **All Durables** | **20%** |
| Rubber products | 64% | Lumber | 40% |
| Textiles | 37 | Stone, clay, and glass | 28 |
| Chemicals | 27 | Furniture | 27 |
| Food | 25 | Primary metals | 26 |
| Printing and publishing | 25 | Machinery | 20 |
| Miscellaneous mfg. | 23 | Electrical apparatus | 17 |
| Paper products | 20 | Instruments | 16 |
| Leather products | 16 | Transportation equip. | 11 |
| Apparel | 9 | Fabricated metals | 11 |

For fabricated metal products, apparel, paper products, and stone, clay, and glass products, the proportion of companies reporting power-cost advantages equaled or exceeded the proportion reporting disadvantages. The percentages were almost the same for producers of leather and leather products. In all other industries the reported disadvantages far outbalanced the reported advantages.

The survey also casts light on another phase of the power problem in New England. It is occasionally said that there is not enough electric power in New England to supply the region's industrial needs. According to the participating manufacturers, only three per cent of the region's factories are handicapped by inadequate or

[3] See "New England Manufacturing—Its Future Prospects," *Monthly Review*, September 1949.

**TABLE I**

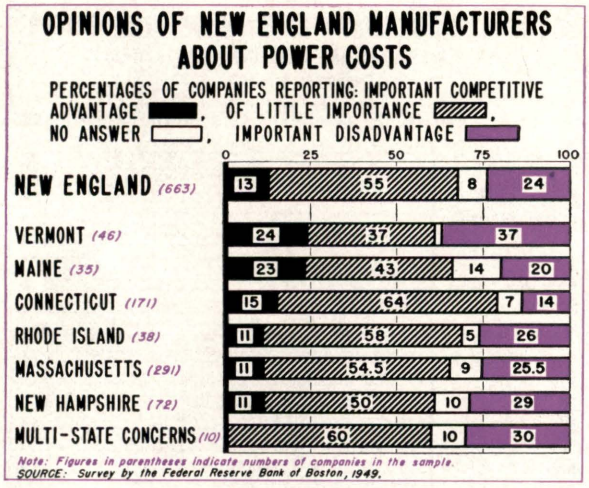
**POWER COSTS IN NEW ENGLAND AND THE UNITED STATES, BY INDUSTRIES**

| | 1947 Cost Per Kilowatt-Hour | | | 1947 Per Cent of Power Cost to Value Added by Manufacture* | | |
|---|---|---|---|---|---|---|
| | N. E. (1) | U. S. (2) | N. E. as Per Cent of U. S. † (3) | N. E. (4) | U. S. (5) | N. E. as Per Cent of U. S. † (6) |
| **All Manufacturing** | **1.45¢** | **0.90¢** | **161%** | **1.86%** | **1.70%** | **109%** |
| Apparel | 2.44 | 2.45 | 100 | 0.5 | 0.5 | 106 |
| Miscellaneous Manufactures | 1.80 | 1.67 | 108 | 1.0 | 0.9 | 117 |
| Leather and Products | 2.13 | 1.85 | 115 | 0.8 | 0.7 | 106 |
| Paper and Products | .96 | .82 | 117 | 5.5 | 4.4 | 126 |
| Machinery (nonelec.) | 1.62 | 1.33 | 122 | 1.2 | 1.0 | 117 |
| Printing & Publishing | 2.33 | 1.90 | 123 | 0.7 | 0.6 | 118 |
| Fabricated Metals | 1.85 | 1.47 | 126 | 1.3 | 1.2 | 113 |
| Instruments | 1.77 | 1.41 | 126 | 0.7 | 0.7 | 98 |
| Transportation Equip. | 1.43 | 1.08 | 132 | 1.4 | 1.1 | 128 |
| Electrical Apparatus | 1.48 | 1.09 | 136 | 1.3 | 1.0 | 134 |
| Food | 1.74 | 1.28 | 136 | 1.5 | 1.4 | 107 |
| Furniture | 2.27 | 1.62 | 140 | 1.2 | 1.0 | 128 |
| Textiles | 1.44 | 1.00 | 144 | 2.3 | 1.9 | 121 |
| Rubber | 1.30 | 0.90 | 144 | 2.2 | 2.4 | 91 |
| Lumber | 1.95 | 1.26 | 155 | 1.8 | 1.2 | 152 |
| Stone, Clay, and Glass | 1.55 | 0.90 | 172 | 2.1 | 3.1 | 69 |
| Chemicals | 1.35 | 0.70 | 193 | 2.2 | 2.6 | 87 |
| Primary Metals | 1.45 | 0.60 | 242 | 3.5 | 4.2 | 84 |

* Value added by manufacture is a measure of the increment created by the manufacturing process. It excludes the value of purchased materials and supplies, containers, fuel, and purchased power.

† Percentage calculations were based upon unrounded figures.

Source: Estimated from *Census of Manufactures*, 1947.




undependable power supplies. Thirty-four per cent of the executives who expressed definite opinions stated that the adequacy and dependability of their power supply gave them a competitive advantage, and the rest reported that their position was neutral. The only state in which a sizable minority (15 per cent) reported power supply disadvantages was Vermont.

While the possible seriousness of power shortages for occasional firms may be important, it seems clear from the opinions of the region's manufacturers themselves that the shortage problem is insignificant for New England as a whole in comparison with the cost problem. It appears further that the dependability of electric service is an important advantage to many of New England's industrial concerns.

### *The Consequences of a Power-Cost Disadvantage*

The preceding discussion has suggested some of the effects of high power rates and costs on the New England economy. Some additional observations and conclusions can also be stated.

The effects of relatively high power rates and costs upon the strength of New England's manufacturing industries and the employment they provide cannot be measured precisely, but it appears that competitively unfavorable power costs may have contributed to the slower rate of industrial expansion in this region than in the nation as a whole. The influence of high power costs might be felt in three ways, through a limited outmigration of manufacturing establishments, through a smaller number of new establishments locating in the region, and through a slower rate of growth in the size of existing establishments.

Since the cost of electric power is usually small in relation to value added by manufacture, it has not been of great importance in the outmigration of textile and other firms. The average difference in annual cost of power between New England and the South Atlantic states has been estimated at $34,100 for a cotton mill which produces 22 million yards of cloth a year. For cloth selling at 20 cents a yard, the potential saving would be less than one per cent of the annual sales value of $4,400,000. That amount alone would hardly be enough to induce a New England cotton mill to move south and to build a new plant. The influence of power costs on outmigration is felt only in combination with potential savings in labor costs, transportation costs, and other elements of cost. When other location factors are more attractive elsewhere, New England's high average power costs simply add their small influence to the outward pressure. Some of the individual firms which have left New England have done so, in fact, despite unusually low power costs.

A relatively high level of power costs is of greater importance in connection with the location of new manufacturing establishments in a region. Smaller differences in cost items can influence the decision for or against a prospective location, for there is no loss of investment in existing facilities to be considered. The effect of power costs on this aspect of New England's industrial growth has undoubtedly been greater than its part in the outmigration of firms. The power situation in New England, for example, has been an important consideration in the failure of the six-state area to participate in several branches of the primary-metal and chemical industries.

High power costs can contribute to a slower rate of growth for existing firms in a region by discouraging the introduction of new products or processes or by reducing their profitability. As one machinery manufacturer stated in the opinion survey discussed in the preceding section, "The high cost of electric power in Massachusetts is a distinct disadvantage to us, as we use fairly substantial quantities of power in our research work and pilot-plant operations. This makes such work costly and, in addition, makes the process-cost information unappetizing."

The profitability of established concerns is, of course, affected by many factors other than power costs, and many of the other factors are more important. Excess power costs alone rarely make the difference between profit and loss. Nevertheless, they do play a part. In the words of one textile producer, "There is a small disadvantage to us insofar as our electrical power is concerned. This is not a large differential, but it is significant when added to other competitive disadvantages."

This summary of the effects of high power costs on the New England economy has stressed the adverse effects, which were reported by one quarter of the manufacturers questioned. The effects are just the opposite for those manufacturers who state that they enjoy a competitive advantage in power costs. Since the companies claiming power-cost disadvantages outnumbered almost two to one those claiming advantages, however, it seems clear that on balance relatively high power costs have provided a small but definite handicap to the growth of manufacturing in New England and to the expansion of the entire New England economy.

### *New England's Power System*

The generation of electric power in New England depends on a balanced use of steam and hydroelectric plants to take full advantage of existing hydroelectric capacity. Except for the state of Maine, where the Fernald Act of 1909 forbids the export of almost all hydroelectric power, New England's power system is highly interconnected within the region. Since water flow varies with the seasons, a system which relied

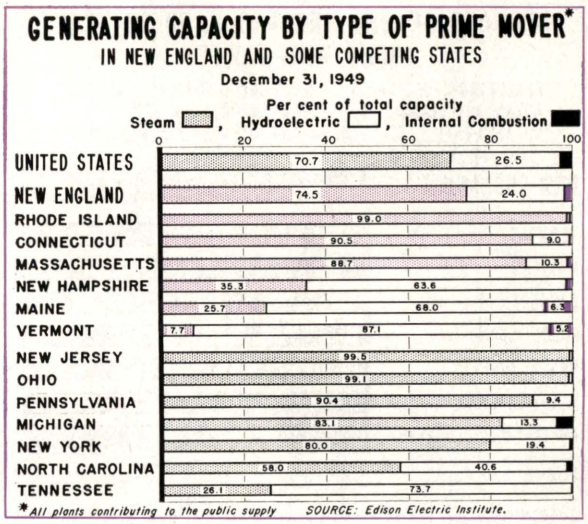
exclusively upon hydroelectric generation would have periodic surpluses and shortages. Exclusive use of steam generation would lose the economies of water-generated power. Interconnection of hydro with steam plants permits the hydro surpluses to be used, provides a source of power to meet hydro shortages, and holds down the average level of generating costs.

New England as a region depends heavily on steam-generated power, though not much more so than the country as a whole. Many New England rivers and streams have been dammed at appropriate points, and hydroelectric power plays a vital role in the adequacy of supply for the entire region. At the end of 1949, the installed capacity of New England's hydroelectric plants was 5.6 per cent of the nation's hydroelectric capacity, even though the six states represented but 2.1 per cent of the country's land area.

Most of the generating capacity in southern New England, which consumes more than 70 per cent of all electric power used by manufacturing concerns in the region, consists of steam plants. They typically carry the bulk of the base load for industrial and other users in Massachusetts, Connecticut, and Rhode Island. The peak-load requirements are normally met with the aid of hydroelectric power brought down from New Hampshire and Vermont. In Vermont, on the other hand, hydroelectric power generally carries most of the base load, and the steam plants of southern New England assist in meeting peak requirements. The hydro and steam plants of Maine and New Hampshire are used within each state in a similar fashion.

An accompanying chart shows the division of generating capacity by type of prime mover in New England and in some competing industrial states. The other northeastern states depend upon steam generation about as much as Massachusetts, Connecticut, and Rhode Island. In almost all states, in or outside New England, the generating capacity of internal-combustion engines is a small factor in total power resources.

The shares of actual power generation by the various types of prime mover are approximately the same as those for generating capacity. The proportion of power generated by hydroelectric plants fluctuates slightly from year to year, however, and reflects changes in water conditions. Utilities adjust the output of the steam plants to compensate for variations in hydroelectric output. The generation of power by internal combustion engines is small in relation to their capacity, since they are widely used as stand-by facilities in conjunction with hydroelectric generators.




### *Public Utility Operating Expenses*

Why are average power rates and costs to the industrial consumer higher in New England than in any other region of the country? The low proportion of generation by hydroelectric plants does not explain the excesses, since the national percentage is almost as low, and there are lower percentages in several competing states with lower average power rates and costs. The lower level of consumption per customer accounts for part of the excess in power costs, but it does not explain why rates were higher in the first place.

To get to the heart of the problem, it is necessary to compare the expenses incurred in generating, transmitting, and distributing electric power in New England with those in the rest of the country. Operating information of this sort is available for all privately owned utilities with annual electric revenues of $250,000 or more.[4] They sell most of the electric power offered for sale in this country.

Expense information is not available for manufacturers who generate power for their own use. Except for the concerns which generate power as a by-product of process steam, however, the manufacturers who produce their own electric energy are generally faced by generating conditions approximately the same as those for utilities in the same area. Moreover, in most states utilities supply more than two thirds of all industrial power requirements. The interregional differences in operating data for the utilities, therefore, should be reasonably representative of interregional differences in expenses for most privately operated generating units.

The information available for privately owned utilities does not, of course, allocate the expenses incurred for the generation and sale of electric energy among the various classes of consumers. Generating expenses within a plant are essentially the same per kilowatt-hour for all categories of use. There are somewhat greater differences among unit expenses in the distribution of energy to different kinds of customers and in customer accounting and collection. These differences apply to all utilities, however, and do not greatly affect the expense comparisons between New England and the United States as a whole.

The operating revenue of the combined New England utilities in 1947 was 1.93 cents per kilowatt-hour sold, which was .33 of a cent greater than the national average (see Table II). Operating expense per unit was 1.16 cents in New England, which was .31 of a cent larger than the figure for the country as a whole. Unit depreciation charges of .14 of a cent were approximately the same for New England and the rest of the country, and New England's total state, local, and federal taxes of .31 of a cent per kilowatt-hour were .02 of a cent higher than the national average. Net operating revenue

[4] *Statistics of Electric Utilities in the United States*, 1947, Federal Power Commission, Washington, D. C. (Compiled by the F. P. C. from data reported by the individual utilities.)

per kilowatt-hour was almost identical for this region and for the entire United States. There was considerable dispersion about all these averages, of course, in the figures for individual utilities within each area. Some New England utilities compared more favorably with those in the rest of the country, and some did not compare so favorably.

It is evident that unusually large profits cannot explain the higher power rates and costs in New England as a whole. Net operating revenue per unit of sales was the same as that in the United States, and net revenue was smaller than the national average as a percentage of sales. Depreciation charges also played no part in the revenue differentials. Total taxes per unit were somewhat larger in New England, but they accounted for only seven per cent of the difference in operating revenue per kilowatt-hour.

Most of the difference between unit operating revenues in New England and the United States is accounted for by higher New England operating expenses, and by higher production expenses in particular. Transmission and distribution expenses per kilowatt-hour of electric energy sold were approximately the same in each area, and the overhead items of customer accounting and collection expense, sales promotion expense, and administrative and general expense showed a disadvantage for New England about as large as that for taxes.

There were individual differences among the New England and non-New England states in the various expense classifications and in net operating revenue per kilowatt-hour. Despite the local significance of the fluctuations in the non-production expense items, it seems clear that production expenses are the key to the higher power rates in New England as a whole and especially in New England's most important states.

## *Production Expenses*

Why are the unit production expenses of New England's utilities so much higher than those in the rest of the country? In particular, why are they higher than expenses in the other northeastern states?

Detailed information about production expenses and plant operation is available for 200 major steam-electric plants in the United States.[5] These plants represented 66 per cent of the nation's steam-generating capacity owned by utilities in 1947, and they produced 73 per cent of the total steam generation by utilities during that year. They were the most modern plants in the United States for which comparable data were available over a period of two or more years. Most of them were among the largest in their respective areas. Fifteen of the plants are in New England, where in 1947 they accounted for 60 per cent of the steam capacity owned by utilities and 67 per cent of their steam generation.[6]

The total production expenses of the 15 New England steam plants in 1947 were .68 of a cent per kilowatt-hour generated. That was 55 per cent higher than the comparable figure of .44 of a cent for the 200 leading steam plants in the nation. The average production expense per kilowatt-hour for the individual New England states ranged from .65 of a cent for Massachusetts to .75 of a cent for Rhode Island. All states in the region had higher unit expenses than those in any other major industrial state.

Fuel expenses typically represent from 75 to 80 per cent of all production expenses in a steam-generating plant. Fuel expenses in the 15 New England plants averaged .52 of a cent per kilowatt-hour of energy produced, which was larger than the total production expense per unit and 57 per cent more than the unit fuel expense of .33 of a cent for the 200 plants combined. The average fuel figures for the selected plants in the various New England states were clustered from .47 of a cent for Massachusetts to .57 of a cent for Rhode Island. The highest non-New England industrial state was New York, with average fuel expenses of .44 of a cent. Comparable figures for major plants in the other leading industrial states in terms of proportions of a cent were as follows: New Jersey, .43; North Carolina, .38; Michigan, .36; Pennsylvania, .32; Ohio, .29; and Tennessee, .20.

As is indicated in an accompanying chart, there are only two other important elements in the production expenses of steam-electric plants — maintenance and the grouping of labor, supervision, and engineering. In each category the average expenses per unit for the New England plants were substantially higher than those for the United States. Labor, supervision, and engineering expenses in New England were highest in Maine and New Hampshire and lowest in Connecticut and Massachusetts. Even Connecticut and Massachusetts, however, had higher unit expenses in that classifi-

**TABLE II**

**REVENUES AND EXPENSES OF ELECTRIC UTILITIES * IN NEW ENGLAND AND THE UNITED STATES 1947**

(Cents Per Kilowatt-Hour of Total Sales)

| Item | New England | United States | Difference between New England and United States | |
|---|---|---|---|---|
| | | | Cents | Per Cent |
| Operating Revenue | 1.93 | 1.61 | +.33 | +20 |
| Operating Expenses: | | | | |
| Production Exp. | .79 | .50 | +.29 | +58 |
| Transmission Exp. | .02 | .03 | —.001 | — 5 |
| Distribution Exp. | .14 | .14 | +.003 | + 2 |
| Customer Acctg. and Collection Exp. | .06 | .05 | +.01 | +14 |
| Sales Promotion Exp. | .02 | .03 | —.01 | —22 |
| Admin. and Gen'l Exp. | .12 | .10 | +.02 | +16 |
| Total Operating Exp. | 1.16 | .85 | +.31 | +37 |
| Depreciation | .14 | .14 | —.008 | — 5 |
| Taxes | .31 | .28 | +.02 | + 8 |
| Total Deductions | 1.60 | 1.27 | +.33 | +26 |
| NET OPERATING REVENUE | .33 | .33 | +.003 | + 1 |

Note: Details may not add to totals because of rounding. Percentages were calculated from unrounded figures.

* All privately owned utilities with annual electric revenues of $250,000 or more.

Source: Compiled from Federal Power Commission data.

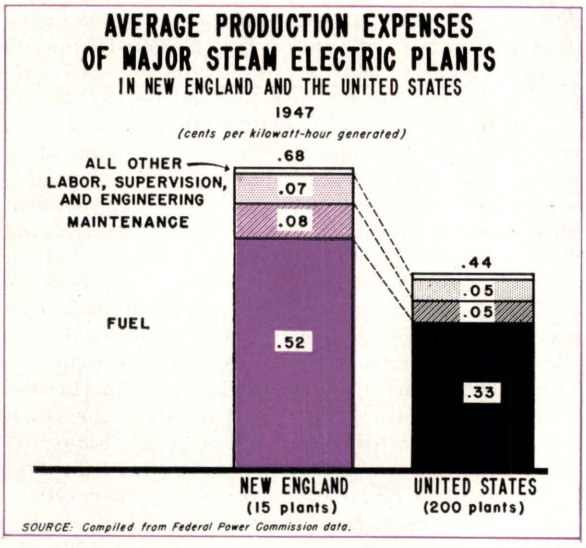
[5] *Steam-Electric Plant Construction Cost and Annual Production Expenses, 1938–1947*, Federal Power Commission, Washington, D. C. (Compiled by the F. P. C. from data reported by the utilities owning the plants.)

[6] The New England plants are as follows: *Connecticut*, Devon and Montville plants of the Connecticut Light and Power Company, Housatonic Avenue Plant of the Derby Gas and Electric Company, South Meadow plant of the Hartford Electric Light Company, and the English and Steel Point plants of the United Illuminating Company; *Maine*, Bucksport No. 2 and Mason plants of the Central Maine Power Company; *Massachusetts*, L Street and Mystic plants of the Boston Edison Company, Somerset plant of the Montaup Electric Company, and the West Water Street station of the Taunton Municipal Lighting Plant; *New Hampshire*, Manchester plant of the Public Service Company of New Hampshire; and *Rhode Island*, Manchester Street and South Street plants of the Narragansett Electric Company.

cation than every near-by industrial state except New Jersey. The maintenance situation in New England was the reverse. Maintenance expenses were higher in the southern part of the region, and they were particularly high in Massachusetts. New York also had unusually large maintenance expenses, and the figure for New Jersey was approximately the same as those for Connecticut and Rhode Island. All other leading states showed substantially lower figures.

The combined effect of these other production-cost components raised the total production expense per unit of the New England plants over the national average by an additional amount of .05 of a cent. While far from insignificant, that sum was overshadowed by the excess in fuel expenses. In fact, the fuel disadvantage alone explains about two thirds of the difference between the average amount paid per kilowatt-hour by utility customers in New England and by those in the country as a whole.

The steam plants not included in the selected list were, for the most part, older and smaller stations. Their average production expenses were considerably higher than those of the plants included in the Federal Power Commission compilation, both in New England and in the rest of the country. An analysis of average expenses in 1947 for all steam plants of the privately owned utilities, however, reveals the same state and regional differences as for the selected plants but at higher levels. A similar pattern existed for both the total and the individual components of production expense per kilowatt-hour.




Hydroelectric plants produce about one fourth of the electric energy generated by privately owned utilities in both New England and the United States. The average production expenses of the New England hydroelectric plants were only .13 of a cent per kilowatt-hour in 1947, but even that low figure was 43 per cent greater than the corresponding average of .09 of a cent for the nation. Production expenses of hydroelectric plants were especially high in southern New England, and even in Maine the unit expense was greater than that in the nation as a whole.

The largest components in production expenses of hydroelectric plants are maintenance and the supervision, labor, and engineering category. These expenses are typically smaller per kilowatt-hour for a hydro plant than for a steam plant of comparable capacity. New England's utilities paid substantially more per unit than the national average in each category.

Carrying charges of depreciation and interest are much larger than production expenses for hydroelectric plants, and so are taxes and office expenses. The overhead items per kilowatt-hour are considerably larger than those for steam plants because of the greater investment required for hydroelectric facilities. Higher carrying charges compensate for much of the advantage that the hydroelectric generating plants have in direct production expenses.

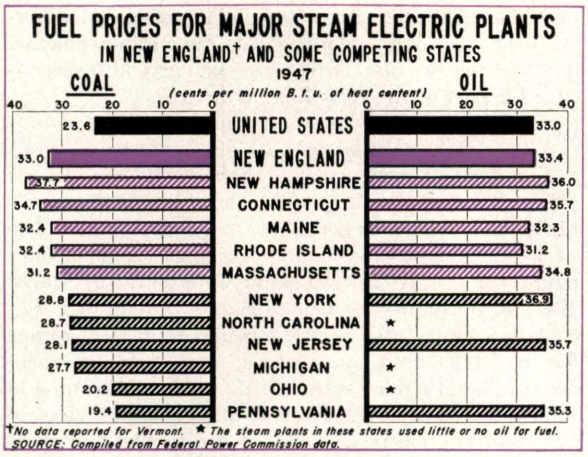
The proportion of hydroelectric capacity to total capacity is roughly the same for privately owned utilities in New England and in the United States. In addition, unit depreciation expense for all power sold by utilities is equal for each area. Consequently, it appears that the depreciation charges on hydroelectric plants do not contribute significantly to the New England excess in power rates. We shall consider the matter of interest charges shortly.

### *Fuel Prices*

The single most important factor responsible for high expenses of electric-power generation in New England and, therefore, for high average costs per kilowatt-hour to power users, has been the cost of fuel for the region's steam-generating utilities. In 1947 coal was by far the most important fuel used in steam-electric generation throughout the nation. The 15 steam plants which accounted for two thirds of New England's steam generation by utilities consumed almost 3,000,000 tons of coal at an average cost of $8.86 per ton. That price was 57 per cent higher than the average of $5.64 paid by the nation's 200 leading steam plants for the 63,300,000 tons of coal which they consumed.

The price of coal per ton was higher in each New England state than it was in every other northeastern state. Approximately one half of the average delivered price in New England consisted of transportation charges. Since New England is farther from the coal mines than all other northeastern states, a higher average price was inevitable.

The quality of coal varies considerably, however, and prices per ton must be modified according to the heat content of the fuel. New England's utilities generally use very high grades of coal in order to minimize transportation charges. The average heat content of the coal consumed by the leading steam plants in the region in 1947 was 12 per cent greater per pound than the average for comparable plants in the country as a whole. In terms of heat content, therefore, the price of coal in New England was 40 per cent higher than in the United States. The New England cost was 33.0 cents per million British thermal units, while the national average was only 23.6 cents. Even on the basis of cost per B.t.u., coal costs in the individual New England states were higher than those in all other industrial states. The figures for New York, North Carolina, New Jersey, and Michigan were also well above the national average,




however, as is indicated in an accompanying chart.

The cost of oil for leading New England steam plants was only slightly higher than that for similar plants in the rest of the country during 1947. The average cost per barrel of 42 gallons was $2.13 in this region, as compared with $2.08 for the entire country. Since the heat content of the oil consumed by New England plants averaged a little higher, the cost per million B.t.u. was even closer for the two areas. Oil costs in the rest of the country were higher than coal costs, but in New England the cost of each type of fuel was nearly the same. It was only in areas with high coal costs, such as New England, that oil could compete effectively with coal. It is not surprising, therefore, that the New England steam plants derived almost one fourth of their heat requirements from oil, while oil represented only five per cent of fuel consumed by the steam plants in the rest of the country. In Maine and Rhode Island the utilities used more oil than coal in 1947.

Many steam plants located west of the Atlantic seaboard were aided greatly by the availability of natural gas. During 1947 they paid only 9.1 cents for gas per million B.t.u., on the average, which was less than half the cost of coal even in such states as Ohio and Pennsylvania. The extremely low average cost of gas was influenced greatly by plants in Texas, Louisiana, and other producing regions, but even in such states as Minnesota and Missouri the cost per million B.t.u. was only 14 cents. The total consumption of natural gas by the steam plants outside New England was more than twice as large as their use of oil, in terms of heat content. Unfortunately, New England's utilities have not had access to supplies of natural gas.

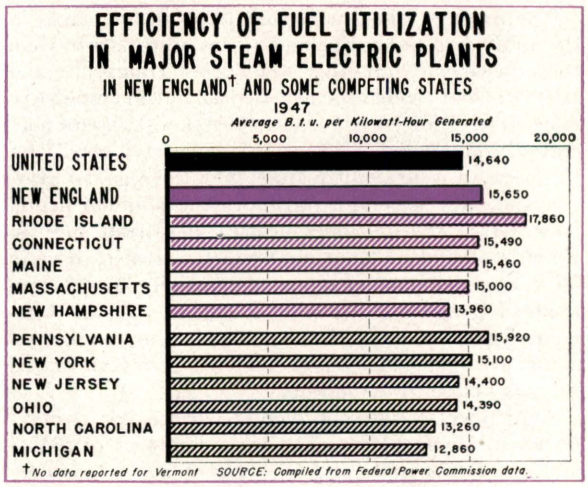
For all fuels combined, the average cost per million B.t.u. for the New England plants was 33.1 cents in 1947, compared with an average cost of 22.5 cents for comparable plants in the United States as a whole. The cost advantage which other regions had in coal alone, therefore, was increased by their use of natural gas. The average fuel cost per million B.t.u. for each New England state was higher than that for all other leading industrial states.

One further factor affects the cost of fuel per kilowatt-hour generated. The New England steam plants included in the sample required 15,650 B.t.u., on the average, to generate one kilowatt-hour of electric energy. For the entire 200 plants throughout the country, the comparable figure was 14,640 B.t.u. The best plants in New England used only about 11,000 B.t.u. per kilowatt-hour, and they equaled the best performance of plants in other parts of the country. The relatively greater importance of less efficient plants in New England, however, lifted the average for the region above the national figure.

The larger proportion of old generating equipment in New England in 1947 (see below) and the necessity of using the less efficient stand-by plants more intensively than usual because of water conditions during that year evidently accounted for a large part of the higher fuel requirements. The method of using steam plants to relay hydroelectric power and the large spinning reserve made necessary by high standards of service in the region contributed further to the less efficient fuel utilization. Regardless of the causes, the less efficient utilization of fuel in the major New England plants forced fuel expense per kilowatt-hour generated seven per cent higher in 1947 than if heat requirements had been the same as in the plants outside the region.

Since 1947 there have been changes in fuel prices, as well as in several other factors which affect utility expenses. Since most steam plants in New England are equipped to burn either coal or oil, they are able to shift from one to the other as prices fluctuate. Between 1947 and 1949 coal prices rose, and oil prices declined temporarily. The proportion of energy supplied by oil rose sharply, and many steam plants in the region fired their boilers exclusively with oil. During the last year oil prices have risen again to a level above that of 1947, though the expanded importation of foreign petroleum products seems to have retarded the increase somewhat. Coal prices were reduced during May 1950 to become more competitive with oil.

The net effect of these changes has been to hold oil prices in New England this year closer to their 1947 level than the prices of coal. Since the consumption of oil increased while that of coal went down, the average total fuel cost in terms of heat content did not rise as much as the cost of coal alone. The situation in certain other Atlantic seaboard states was similar to that in New England. In many areas throughout the rest of the country, on the other hand, coal prices were so low



in 1947 compared with those for oil that even the increases since that date have not led to substitution. In such areas the fuel-cost differential with New England has apparently narrowed a little. In still other states increased use of natural gas in steam-electric plants has undoubtedly widened the fuel-cost gap. On balance, it appears that the changes since 1947 have not appreciably changed the excess in New England's fuel costs.

Extensive new construction of steam plants throughout the country has probably lowered average heat requirements for each unit of output since 1947 in most states. The newest plants in New England require only about 9,000 B.t.u. per kilowatt-hour. Data are not available, however, to determine whether the new plants have reduced New England's unit fuel requirements below the national average.

## *Other Causes of High Expenses*

While fuel prices explain the largest part of the differential between power costs in New England and those in the rest of the country, there are several other factors which contribute their bit to increasing the regional disadvantage. Some of these items should be discussed before we turn to a consideration of possible avenues for reducing the level of industrial power costs in New England.

### Efficiency of Labor Utilization

We have seen that the expenses for operating labor, supervision, and engineering were .07 of a cent per kilowatt-hour generated in 1947 in New England's major steam-electric plants owned by utilities. The comparable national figure was .05 of a cent. The New England excess of 41 per cent in labor expense was almost precisely the same as the New England excess in number of steam-plant employees required to generate a given amount of electric energy. In the leading New England steam plants, an average of 31 workers were employed in 1947 to produce 100,000,000 kilowatt-hours of power. Only 22 workers were required, on the average, to generate the same amount of energy in the major steam plants owned by utilities in the rest of the country. There were large variations in the labor requirements of steam plants within most states, however, and even among different plants owned by the same electric utility.

The average labor requirements of steam plants in the individual New England states were larger than those in virtually all other states. New Hampshire and Rhode Island headed the list with 45 and 43 employees, respectively, for each 100,000,000 kilowatt-hours generated. The figures of 29 for Massachusetts and 27 for Connecticut were slightly lower than the regional average, but they were still far above the national figure. New Jersey was the only near-by industrial state in which steam plant labor requirements rivaled those in New England, just as it was the only important contender for high ranking in labor expense per kilowatt-hour. In most other leading states the number of employees per 100,000,000 kilowatt-hours generated was very close to the national average.

A number of different factors affect labor requirements in steam plants. The sizes and ages of plants and generating units and the sizes of power loads explain some of the interstate and interregional differences. State safety requirements, union agreements, and high service standards were evidently also responsible for part of the New England excess.

### Wage Rates

The level of wage rates in New England's electric plants was not an important factor in the region's higher labor expenses per kilowatt-hour generated. The average straight-time hourly earnings of all utility plant workers in New England were $1.39 in March 1948, according to the United States Bureau of Labor Statistics, only three per cent higher than the average for the United States as a whole. Average hourly earnings in New England were a little higher than those in the Great Lakes states. Even in the southern regions of the country, hourly earnings of utility plant workers averaged only about ten per cent less than those in New England.

The higher hourly earnings in New England did not extend through all plant occupations. Groundmen, load dispatchers, trouble men, janitors, and a few other categories had higher average wage rates than those for the country as a whole, but many other types of workers were lower paid in New England than in the rest of the country. In fact, it appears that the higher average hourly earnings in this region resulted more from a large proportion of workers in the better-paid occupations than from a genuinely higher wage level.

A similar diversity appears in comparisons of hourly wage rates for electric-utility office workers. The New England average is higher than the national figure for many classifications, but it is lower in an even larger number of categories. In general, the rates paid are below those in the Middle Atlantic states. Utility office wages in New England, therefore, are not a significant element in the higher level of utility overhead expenses.

### Age of Generating Equipment

An analysis of the ages of turbo-generators in the 200 major utility steam-electric plants for which data are available shows that the average generator in the United States in 1947 was twenty years old. The average age of generators in the 15 leading New England steam plants was twenty-one years. Despite the similarity in averages, there were important differences in the age composition of generators in the two areas. Twenty-five per cent of the region's generators were installed in or before 1920, while only 17 per cent of those in the United States were that old. On the other hand, 23 per cent of New England's generators were installed after 1940, and but 19 per cent of those in the country as a whole were so new.

A great many old generators have been replaced since 1947 both in New England and the rest of the nation, but information is not available to show whether New England has improved its standing relative to the other states. In any event, New England's electric utilities, particularly those in Massachusetts and Rhode Island, faced more extensive modernization requirements in 1947 than did the utilities in the country as a whole. Pennsylvania, New Jersey, and New York had similar problems, however, as is indicated in Table III.

The larger proportion of old generating equipment

in New England steam-electric plants seems also to be representative of the situation for boilers and other station equipment. It explains, in part at least, the higher maintenance expenses per kilowatt-hour generated during 1947 and also the greater labor requirements for a given amount of energy produced.

### Cost of Plant

In 1947 the average cost of plant per kilowatt of installed capacity was $97 for the 200 major American steam plants. For the New England plants in the sample the average was $115. The average cost in each New England state except Maine was higher than the national figure. Plant costs were also fairly high in New York and Pennsylvania, however, among New England's leading competitors.

The cost pattern of the 200 selected steam plants was characteristic of the costs for all steam plants owned by private utilities. The individual plants excluded from the list of 200 were, for the most part, smaller and older than those included. Their cost per kilowatt of installed capacity was also somewhat less, but the relatively high average cost for New England plants was unchanged by their exclusion.

Similarly, the cost of all hydroelectric plants owned by New England's utilities in 1947 was $187 per kilowatt of installed capacity, in contrast with a countrywide average of $137 for the privately owned utilities. Hydroelectric plant was particularly costly in Vermont and Massachusetts at $235 and $228 per kilowatt, respectively. Even Maine and New Hampshire had high costs of $188 and $176. Comparable figures for other leading states were Michigan, $208; New York, $148; Pennsylvania, $129; North Carolina, $123; and Ohio, $98.

The cost of transmission plant in New England compares favorably with similar costs in the rest of the country, in terms of both installed capacity and kilowatt-hours sold. New England is not so fortunate in its position with respect to distribution plant, which in most leading states is an even larger component of total plant investment than production plant. The New England cost per kilowatt of capacity and per kilowatt-hour of sales is unusually high, influenced particularly by large investment in Massachusetts and Rhode Island. Even New York, with its expensive distribution system in New York City, compares favorably with Massachusetts in this respect.

Some of the excess total electric-plant cost in New England seems to have arisen from the unusually small proportion of equipment installed during the thirties, when costs were depressed. The unusally large proportion of installations during the high-cost period since 1940 is another factor in the regional excess in plant costs. Finally, there also seems to be a genuine New England differential in utility construction and installation costs which gives the region a plant-cost disadvantage in all years.

Cost of plant enters into electric utility expense through depreciation charges. Despite the higher cost of plant, the actual depreciation expense in New England for each kilowatt-hour sold was about the same in 1947 as the figure for the country as a whole. Evidently the low depreciation expense charged to the large proportion of plants and equipment erected or installed in New England prior to 1921 helped to compensate for the higher average cost of plant.

In view of the unusually large proportion of old equipment in New England's electric plants and the very high present level of replacement costs, it seems likely that average plant costs in the region have risen further since 1947 and will continue to rise for some time. Almost inevitably, plant costs will remain well above the national average. As replacements occur, therefore, depreciation expense per kilowatt-hour sold will probably increase more rapidly in New England than it does in the rest of the country.

### Efficiency of Plant Utilization

The efficiency with which generating plants are operated affects certain labor and other operating expenses. It also affects the depreciation charges applicable to each kilowatt-hour of electric energy that is sold. The 200 leading steam plants in the United States generated 61 per cent of their theoretical capacity during 1947. The major New England steam plants had a "plant factor" of only 51 per cent. The method of using steam plants to take full advantage of available hydroelectric power accounted in part for the

**TABLE III**

**SOME CHARACTERISTICS OF 200 MAJOR STEAM-ELECTRIC PLANTS OWNED BY UTILITIES IN SELECTED AREAS OF THE UNITED STATES**

**1947**

| Area | Number of Employees per 100,000,000 Kw-Hr Generated | Per Cent of Turbo-Generators Installed before 1926 | Cost of Plant per Kw. of Installed Capacity | Plant Factor* (Per cent of actual to capacity generation) |
|---|---|---|---|---|
| **UNITED STATES (73%)** | **22** | **39%** | **$ 97** | **61%** |
| **NEW ENGLAND * (67%)** | **31** | **48** | **115** | **51** |
| Connecticut (89%) | 27 | 38 | 125 | 57 |
| Maine (68%) | 38 | 0 | 93 | 40 |
| Massachusetts (48%) | 29 | 58 | 119 | 48 |
| New Hampshire (43%) | 45 | 0 | 119 | 71 |
| Rhode Island (89%) | 43 | 73 | 99 | 43 |
| Michigan (88%) | 21 | 18 | 86 | 60 |
| New Jersey (80%) | 31 | 54 | 91 | 53 |
| New York (72%) | 23 | 45 | 106 | 50 |
| North Carolina (88%) | 14 | 23 | 63 | 74 |
| Ohio (90%) | 22 | 38 | 88 | 66 |
| Pennsylvania (81%) | 20 | 62 | 109 | 70 |

Note: Figure in parentheses following name of each area indicates proportion of total steam generation by utilities represented in the sample.
* No data reported for Vermont.
Source: Compiled from Federal Power Commission data.

lower New England figure. Plant utilization was particularly low in Massachusetts, Rhode Island, and Maine. New York and New Jersey also had relatively low plant factors, which exerted an upward pressure on the level of their operating and depreciation expenses, but most other states showed relatively greater utilization of their steam plants.

The major steam plants were more efficiently used than the smaller ones in all areas, but the plant factors for all utility steam plants showed essentially the same interstate variations. The national ratio was 55 per cent in 1947, and the New England figure was 46 per cent. Moreover, the adverse comparison for this region carried over into hydroelectric generation. For the country as a whole, hydroelectric plants had an operating factor of 60 per cent in 1947, while the New England ratio was only 45 per cent. Even for internal combustion plants the national plant factor of 24 per cent was higher than the regional figure of 21 per cent.

### Taxes

Total taxes per kilowatt-hour of energy sold by privately owned utilities were .31 of a cent in New England in 1947 as opposed to .28 of a cent in the United States as a whole. Each amount included an allocation of federal corporate income taxes, however, and the available data do not permit a comparison of state and local taxes alone. There was a large variation in taxes from utility to utility, even within an individual state. For example, one major company in Massachusetts had a tax bill of .45 of a cent per kilowatt-hour. It appears that for New England utilities as a whole the federal taxes are approximately the same per kilowatt-hour as those for the country as a whole. The regional tax excess seems to result from higher average state and local taxes, and probably from higher local taxes in particular.

Even if local assessment levels and tax rates were the same as in the rest of the nation, however, the New England utilities would bear a heavier property-tax burden per unit of energy sold. The investment in production and other plant facilities is higher per kilowatt in New England, and the plant-utilization rate is lower. Despite the somewhat larger tax bill in New England per kilowatt-hour sold, the total taxes paid by privately owned electric utilities in this region were actually a smaller proportion of their gross and net plant investment and of their operating revenues in 1947 than were the total taxes of all utilities in the country.

### Long-term Debt

Even though interest payments are not part of a utility's operating expenses, they do affect the net profits and strength of the organization and hence its ability to retain earnings or to attract stock investment for financing modernization and expansion. New England's electric utilities as a whole had a lower ratio of long-term debt to capital stock, to surplus, and to assets in 1947 than did the nation's utilities as a whole. Despite the more intensive use of production plant facilities outside New England, the debt burden for a given amount of energy generated or sold was also smaller in New England. It is evident that the region's power rates were not unduly raised by a heavy burden of long-term utility debt.

## *How Can Industrial Power Costs Be Reduced in New England?*

This lengthy discussion of the expenses of electric utilities in New England and other areas has brought out several factors which are responsible for the excess in the region's power rates and costs. Our final question is, "How can these differentials be reduced to minimize the power-cost disadvantage which approximately one fourth of the manufacturers in the region believe they encounter?"

There are a number of possible avenues to improvement in the situation. Some are short-run approaches, and some are long-run. None is necessarily a recommendation of this Bank.

### 1. Lower Cost of Fuel

Since fuel expense is the largest single item of expense for steam plants, and since steam generation provides about three fourths of the energy generated for sale in New England, it is apparent that reductions in fuel costs would be of major and immediate importance. The price of coal will probably not decline much, for the trend in recent years has been upward. The situation in oil is different, however, for New England's location is favorable to the importation of foreign oil. Foreign producers have increased their petroleum exports to this country, and they have helped to narrow the wide gap between oil prices in New England and coal prices in the rest of the country. It is possible that there may be further effects of the same sort if foreign oil continues to flow into this country.

It is important to New England that oil tariffs should not be raised. An increase of $.90 a barrel in duties, for example, would be equivalent to an increase in fuel costs of .22 of a cent per kilowatt-hour generated. That amount is almost equal to the entire fuel-cost differential which existed in 1947 between New England and the United States. Actually, trade sources estimate that an increase in oil prices of only 10 to 15 cents a barrel from end-of-May levels would dissipate oil's price advantage over coal in coastal New England. Any increases in import duties on oil which permitted a price rise of even that amount, therefore, would wipe out any improvement which has occurred since 1947 and would still further penalize power users in New England.

Another possible source of lower-cost fuel in New England is natural gas. As yet, the region receives no gas from the mid-continent producing wells. Plans under way contemplate completion of natural gas pipelines to southern New England and other necessary installations by 1952. It is uncertain how soon enough gas will be available to permit its use as a fuel for steam-electric plants. If it can be used in large quantities at attractive rates, it should appreciably reduce steam-plant fuel costs.

### 2. Modernization of Generating Equipment

New England's utilities had a higher percentage of new generating equipment in 1947 than did utilities in the rest of the country, but they also had a larger proportion of old generators. The more extensive use of old steam equipment in New England affected expenses for direct operating labor and maintenance, and it also

influenced the efficiency of the conversion of heat into electric energy.

The installation of modern apparatus to replace obsolete equipment and to expand capacity reduces these elements of expense per unit of energy produced, although it increases depreciation expenses. Modernization has proceeded rapidly in the region since 1947, but it has also proceeded rapidly in states outside New England. To narrow the gap in these expense items the utilities in the region must have the incentive and the new capital to modernize their plant more rapidly than utilities in the rest of the country. Plant modernization requires new capital, which can be raised most readily when all parties interested in power costs work constructively to bring about the investment necessary to reduce them.

### 3. Rate Reductions to Favor Industrial Users

All major classes of power users pay more per kilowatt-hour in New England than in the nation as a whole. The proportionate disadvantage is greatest for industrial users, even though industrial rates are usually considerably lower than those for residential and commercial customers. In view of the direct and indirect importance of manufacturing operations to the employment and income of the region, reductions in industrial rates might redound to the long-run benefit of the utilities as well as to the immediate benefit of manufacturing concerns, their employees, and various other groups throughout the region. Such reductions would tend to encourage around-the-clock factory operations, which would increase the efficiency of electric-plant utilization. Legislation limiting night work clearly works against lower power costs.

If industrial rates were reduced, the consumption of power by manufacturers would inevitably rise somewhat to offset at least part of the initial revenue losses. Any improvement in the competitive position of manufacturers would in time be reflected in larger residential and commercial sales of electric energy.

### 4. Completion of the New England Power Grid

At present the other New England states are unable to benefit appreciably from the lower cost of hydroelectric power generated in Maine, and Maine is deprived of a profitable export to its neighboring states which might produce a small increase in employment. It seems that the regional power-cost disadvantage could be reduced somewhat if Maine's Fernald Act were repealed and if all of New England were united in a comprehensive power grid.

### 5. Lower Taxes

Tax payments by privately owned utilities total about three tenths of a cent, on the average, for every kilowatt-hour of energy sold. Local, state, and federal taxes are all important components in that total. If any reductions could be effected in taxes on utilities, rates could be reduced commensurately.

### 6. Increase in Low-Cost Hydroelectric Generation

Hydroelectric installations currently represent about one fourth of the installed capacity and total generation of New England's utilities. Under existing levels of plant construction costs, it is extremely difficult for private utilities to acquire the necessary land in heavily populated river valleys and to erect dams and power plants at investments low enough to permit substantial reductions in operating expenses, including carrying charges. In many instances it appears to be more economical to erect new steam plants of high efficiency rather than to develop inferior or expensive hydroelectric sites.

Nevertheless, the expenses of hydroelectric plants do not rise as much during periods of inflation as those of fuel-burning plants, and an area with a high proportion of its power generated in hydroelectric plants can benefit greatly over the years. A number of recent surveys have indicated that there are still economically feasible sites for further hydroelectric development in Maine and four other New England states, although there is substantial disagreement about the kilowatt potential of the prospective sites. Further study of the problem and cooperation among the utilities, the state governments, and the federal government seem to be desirable to produce the most efficient utilization of the region's developed and undeveloped water resources and to reduce its power-cost disadvantage.

### 7. Use of Atomic Fuels

A long-term and still somewhat visionary possibility for reducing power rates and costs in New England is the substitution of atomic for combustion fuels in steam plants. If such a development should become economically feasible, it would be applicable first to such high-cost areas as New England. It would also have the greatest impact and offer the greatest benefits to such areas. New England might make a strong bid for the first commercial atomic power plant that can be shown to have lower costs than those of present plants powered by other fuels.

* * *

Despite the variety of possible approaches to lower power costs in New England, it appears inevitable that this region will remain a high-cost area until cheap atomic power generation is widely practicable. The other approaches could probably reduce the margin of New England's power costs over those in competing states, but it is doubtful if the margins could be eliminated. The other approaches might be of great importance to individual manufacturing concerns, however, or to individual communities. Only one fourth of the region's manufacturers claim that their power costs constitute an important competitive disadvantage. It is for that group that reductions are most desirable. Expanded employment opportunities in such situations would be of considerable benefit to New England, even if average power costs in the region as a whole were not greatly reduced.

# How Profitable Are Bank Trust Departments?

ARE TRUST DEPARTMENT operations profitable? This is a question ignored by many banks which are content with a showing of over-all profit in their bank operations. But it is a question in which many trust officers and trust associations are becoming increasingly interested. They want to know whether trust departments merely provide an expensive stand-by service which in four years out of five is supported by the earnings of other banking departments, or whether trust departments are actually self-supporting. Trust departments are self-supporting if their total costs of operations are adequately covered by the sum of compensations received for the services which they render.

Forty-two New England banks accepted the invitation of the Federal Reserve Bank of Boston to cooperate in the determination of trust department costs and net earnings in 1949. With collective income of $12 million and responsibility for assets valued at $4.4 billion, these 42 trust departments are a major factor in New England's corporate fiduciary activity.

The survey discloses considerable variation in earnings experience, especially among the smaller departments. The costs of the specialized personnel and specialized procedures which are required for trust department operations do not quickly adjust themselves to fluctuations in the flow of the department's income. Hence, changes in income often have a magnified effect upon net earnings. Relatively small income changes in large departments permit net earnings to stabilize at about 19 per cent of income. Relatively large income changes in small departments may become translated into very satisfactory net earnings or very severe losses. Largely because of the experience of the small departments, the average reporting department retained only 5.2 per cent of its 1949 income as net earnings, and 11 showed net losses.

The survey indicates that profit from trust department operations has some association with the relative development of the department within its parent bank. It is quite possible that some banks which have achieved creditable development and management of other banking operations may have overlooked some of the benefits to be derived from commensurate expansion and cost management within the trust department.

The percentage composition of the direct operating expenses of the average reporting trust department is shown in the chart. Variations are to be expected, but most departments conform well to the general pattern.

Salaries and wages account for almost 70 per cent of total direct operating expenses. A highly trained permanent staff is vital to the proper handling of the special problems posed by the varied accounts. The expense of such a staff is rather inflexible. Expenses for social security programs, for group life, medical, liability, and fidelity insurance are closely tied to salaries and wages. The 2.7 per cent required for pension systems is influenced by the absence of such expenses in 14 of the reporting departments. Total personnel expenses make up three quarters of all direct operating expenses.

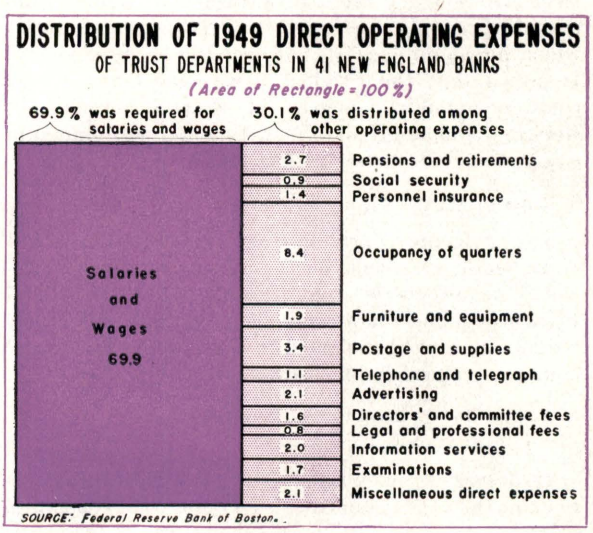
The various expenses incidental to occupancy and use of quarters account for an average of 8.4 per cent of the total. Such expenses include rent, heat, light, power, real estate taxes, building insurance, depreciation, maintenance, and service, as well as allowance for return on investment in land and buildings.

Other direct expenses shown on the chart are relatively small. Percentages chargeable to furniture and equipment tend to increase with the size of the department, due to greater use of mechanical equipment. Percentages chargeable to books, periodicals and other information services, and to examinations and audits, tend to decrease with the size of the department.

To these direct operating expenses of the bank there should be added an amount to cover overhead — that portion of general bank expense which is fairly allocable to the trust department. Most banks computed overhead at 15 per cent of direct operating expenses as suggested by the Trust Division of the American Bankers Association. Those using other methods of estimation averaged close to this relationship.

Operating income of trust departments comes from the commissions, fees, and charges made against the individual accounts for the services rendered. For the average reporting department the percentage origin of this operating income was 50.3 from personal trusts and guardianships, 22.6 from estates, 20.9 from personal agencies, and 6.2 from corporate trusts and agencies. Corporate activities are mainly concentrated in the larger departments, and 6 out of 12 reporting departments found that they had handled such accounts at a loss in 1949. Small departments are more dependent upon estate accounts. As the income from estates consists largely of nonrecurring settlement fees, the flow of income to small departments may be uneven and net earnings, therefore, subject to wide fluctuations.

Profitable trust department operation, therefore, consists of a careful estimation and control of all operating costs, including overhead, and the adoption of a balanced schedule of compensations adequate to cover them. Most of the departments which followed these principles and reported their experience in this study were profitable in 1949.



# Prices Rise as Orders Increase

THE GENERAL LEVEL of business activity in New England continued to be high during May and early June. Manufacturers received an increasing volume of new orders, and raw material shortages began to appear. Most raw material prices moved higher, and some made spectacular leaps. Claims for unemployment insurance benefits declined as idle workers found jobs and the number of layoffs shrank.

The weekly pay checks of industrial workers in New England were slightly higher in April than at the first of the year. The gains in manufacturing came mostly from the durable-goods industries. In the nonmanufacturing industries, construction workers were widely successful in obtaining wage increases as the building boom continued in this region.

Over-all employment increased in spite of seasonal weak spots. The number of nonfarm jobs in New England had increased to 3,101,900 in April, 0.8 per cent below the year-ago figure. Preliminary reports indicated a further rise in May. Among the manufacturing categories, metal-working lines expanded their work forces. The recovery began at the first of the year when business optimism and the attempt to reduce costs by machinery replacement started to gain momentum. New England's machine tool industry did not reach capacity production, but most plants booked orders which enabled them to continue a profitable level of operations. Boom conditions did prevail among the producers of specialized tools for the automotive industry. A release of the National Machine Tool Builders' Association reported that the April ratio of unfilled orders to shipments was the highest since August 1947.

New England manufacturers of electrical products operated well above year-ago levels in April and May. Government orders swelled total demand. The appliance industry sought assembly parts. Consumer interest in television recently experienced a slight seasonal setback, but production for inventory helped to avert employment layoffs.

Textile mills in New England were fairly busy despite the influence of the customary slack season in the late spring. The cotton and rayon sections of the industry have fared better than the woolen and worsted section, which continued to be hampered by unsettled conditions in the wool market.

Activity at high-quality men's wear worsted mills was slow during May as management was confronted by soaring raw wool prices, and buying lagged because of resistance to higher fabric prices. In early June several large government orders and increasing buyer interest in piece goods brightened the picture. Fabric prices edged upward as mills had to pay higher prices for supplies of raw wool. In spite of price trends, cutters placed only small orders for their fall lines, probably because of uncertainty over wool prices. Nevertheless, mills are encouraged by the favorable retail response to the fall openings of coat and suit firms.

New England employment in the leather and leather products industries declined seasonally during April and May. However, production did not decline as much from April to May this year as it did last year, according to trade reports. The leather market is active, but tanners fear that rising hide and skin prices may force leather higher and reduce buying.

Hiring for construction jobs has contributed to recent employment gains in New England. Construction contract awards totaled $83,692,000 in May, according to the F. W. Dodge Corporation. That amount was 14 per cent lower than in April, but 46 per cent higher than in May 1949. In the April-May comparison this year, residential awards continued at about the same pace and nonresidential awards registered most of the decline.

Other boosts to total nonagricultural employment in this region are now coming from service and trade industries, as the summer season commences. Prospects for the 1950 vacation season are not clear as yet. Advance reservations at New England's resort hotels on May 1 for the summer season were about nine per cent above those on the books at the same time a year ago. Some hotel men believed, however, that reservations did not come in as fast as they should have in May. Reservations at tourist lodging places on May 1 lagged about three per cent behind year-ago levels. Registrations at private New England boys' and girls' camps at the first of May led last year's by one per cent.

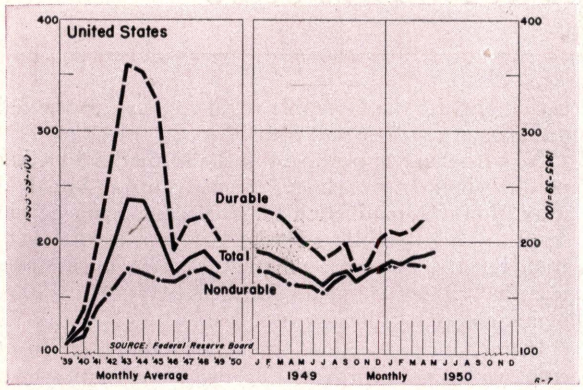
The amount of outstanding loans at weekly reporting member banks in the New England district was slightly less in May than in April but 5.9 per cent higher than in May 1949. Between April and May this year commercial loans rose 0.8 per cent and real estate loans 5.6 per cent, while loans to purchase or carry securities dropped 9.2 per cent.

Total retail dollar sales in New England remained at year-ago levels for the first four months of 1950, mainly because of advances in automobile and other durable-goods sales. Sales in May at downtown Boston department stores declined about four per cent from those in May 1949. Stores are hoping for a pickup in sales of soft goods. Outstanding orders for merchandise placed by department stores in April this year were four per cent higher in Boston and 18 per cent higher in the Other New England segment of stores than in April a year ago.

Spot primary market prices have continued to rise during the past month. Between May 9 and June 9, the general index of 28 basic commodities (Bureau of Labor Statistics) increased 4.6 per cent. Substantial increases occurred in a variety of New England's raw materials: copper, 15.5 per cent; lead, 7.1 per cent; zinc, 19.7 per cent; hides, 5.3 per cent; raw cotton, 4.6 per cent; rubber, 17.1 per cent; and wool tops, 2.6 per cent.

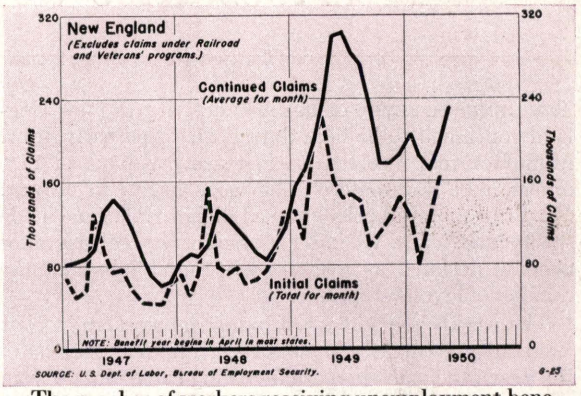
# Business Conditions

## INDUSTRIAL PRODUCTION



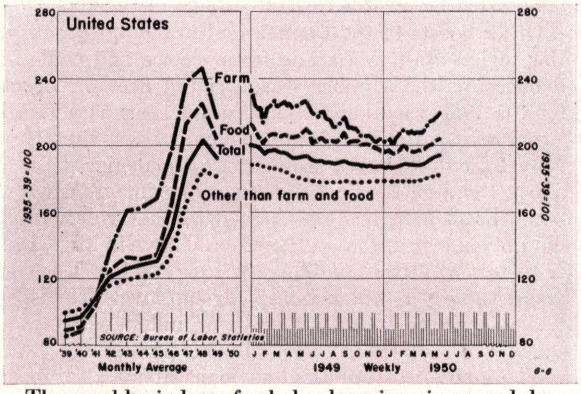

The index of industrial production rose to an estimated 193 in May, and will probably increase again in June. This would carry production back to the high level of late 1948. Expansion of durable-goods production has led the rise since March.

## UNEMPLOYMENT INSURANCE CLAIMS



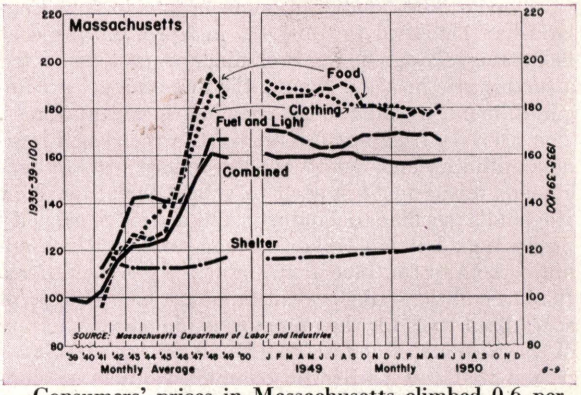

The number of workers receiving unemployment benefits averaged 16.7 per cent higher in May than in April, but 24.3 per cent lower than in May 1949. The level of compensable claims fell each week this May, reflecting a steady improvement in employment.

## WHOLESALE PRICES



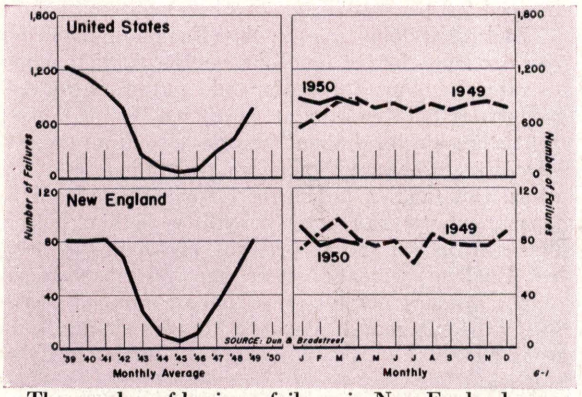

The weekly index of wholesale prices increased by 3.3 per cent from March 21 through May; farm products rose 6.4 per cent, and food, 4.1 per cent. In late May the index exceeded comparable year-ago levels for the first time in 1950.

## CONSUMERS' PRICES



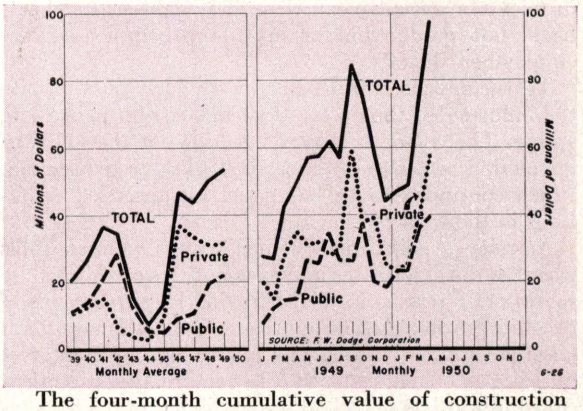

Consumers' prices in Massachusetts climbed 0.6 per cent between April and May to a level only 0.6 per cent below that for May 1949. Upward pressure has recently come from the food component, which increased 1.9 per cent in the April-May period.

## BUSINESS FAILURES




The number of business failures in New England continued about the same in April as in March and February. The level was 12.4 per cent below that during the same three-month period in 1949, when failures increased during the inventory recession.

## CONSTRUCTION CONTRACTS IN N. E.




The four-month cumulative value of construction awards in New England this year totaled $268.9 million. This amount topped that in the comparable period of 1949 by 83.4 per cent; private awards rose 49.3 per cent while public awards jumped 150 per cent.