LOCAL ECONOMIC IMPACT OF NUCLEAR POWER PLANTS

by

Alice W. Shurcliff

July 1975

No. MIT-EL 75-005WP
LOCAL ECONOMIC IMPACT OF NUCLEAR POWER PLANTS

Reasons for wide divergence of impacts are pin-pointed.

Alice W. Shurcliff

July 1975

The author is a Research Economist at the Energy Laboratory of the Massachusetts Institute of Technology. She was formerly a Senior Research Associate at Education and World Affairs, a Manpower Expert of the International Labor Office, and an Economist of various agencies of the U.S. Government.
Many a community has accepted a nuclear power plant in the belief that it will contribute to the economic well-being of the community as well as to that of the State or region. A recent study of citizens' views about the Hartsville, Tennessee project, proposed by the Tennessee Valley Authority (TVA), indicates that 65 percent of the inhabitants of Hartsville favor building the plant, that 90 percent expect the community to benefit from the jobs created by its construction and operation, and that about 55 percent expect the plant to improve pay rates and to bring long-term development. Proponents and opponents of the plant alike see economic growth as both a desirable and a likely outcome of the project (1). More is known about citizens' opinions of the economic impact of nuclear power plants than about impacts themselves.

The effects of nuclear power plants differ from those of fossil fuel plants in that they are more capital intensive, they take longer to build, they require refueling only once a year, and, for reasons of safety, they are put into rural areas. The capitalized value of a single generating unit is usually great than the combined value of all the other property in the local tax district. As most sites selected are planned to accommodate two to eight such units, the base of the local property tax may ultimately be doubled several times over.

The present report was written to raise the level of understanding regarding the range of consequences which may follow a decision to site one or more nuclear generating units in a sparsely populated locality.
Impact of a Completed Plant

Employment and Payroll. - It is possible to operate a nuclear power plant with a small staff, 77 for a single station unit and 128 for a dual unit, according to AEC estimates shown in Table 1 below. In practice the figures seem to be nearer 100 - 175, the extra personnel being utilized in surveillance and testing activities and security. Policies of upgrading personnel through on-the-job training, union rules regarding seniority, and licensing requirements of regulatory bodies all mitigate against local hiring except for clerical, maintenance and guard duties.

For most on-site jobs, the educational prerequisites and pay rates are modest. Reactor operators typically have a high school education followed by specialized reactor training by the power company. Senior reactor operators have a year or two of college, conventional power plant experience and specialized training (2). The plant manager and his assistant would normally have a four-year college degree. In 1975 the pay rates of plant managers ranged from $25,000 to $38,000. The attraction of the work is not in high earnings but in job security and pleasant working conditions.
Table 1
Plant staffing and pay rates

<table>
<thead>
<tr>
<th>Position</th>
<th>Single Unit Plant Staff</th>
<th>Two Unit Plant Staff</th>
<th>Two unit plant maximum monthly rates of pay (June 1975)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superintendent</td>
<td>1</td>
<td>1</td>
<td>Open</td>
</tr>
<tr>
<td>Assistant</td>
<td>1</td>
<td>1</td>
<td>$2,945</td>
</tr>
<tr>
<td>Operations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations Supervisors</td>
<td>1</td>
<td>2</td>
<td>2,678</td>
</tr>
<tr>
<td>Shift Supervisors</td>
<td>6</td>
<td>6</td>
<td>2,198</td>
</tr>
<tr>
<td>Lead Operations/Foremen</td>
<td>-</td>
<td>5</td>
<td>1,800</td>
</tr>
<tr>
<td>Control Operators</td>
<td>11</td>
<td>16</td>
<td>1,517</td>
</tr>
<tr>
<td>Auxiliary Operators</td>
<td>11</td>
<td>16</td>
<td>960</td>
</tr>
<tr>
<td>Lead Fuel Handlers/Foremen</td>
<td>-</td>
<td>3</td>
<td>1,390 and 1,670</td>
</tr>
<tr>
<td>Fuel Handlers</td>
<td>-</td>
<td>6</td>
<td>1,390</td>
</tr>
<tr>
<td>Technical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Supervisor</td>
<td>1</td>
<td>1</td>
<td>2,678</td>
</tr>
<tr>
<td>Professionals</td>
<td>6</td>
<td>9</td>
<td>1,610 - 2,198</td>
</tr>
<tr>
<td>Technicians</td>
<td>9</td>
<td>16</td>
<td>1,610</td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Supervisors</td>
<td>1</td>
<td>2</td>
<td>1,800</td>
</tr>
<tr>
<td>Craft and Repairmen</td>
<td>18</td>
<td>28</td>
<td>938 - 1,428</td>
</tr>
<tr>
<td>Security¹</td>
<td>11</td>
<td>16</td>
<td>Contracted</td>
</tr>
<tr>
<td>TOTAL</td>
<td>77</td>
<td>128</td>
<td>$250,000 approx.</td>
</tr>
</tbody>
</table>

¹Plant of the Commonwealth Edison Corporation, in Zion, Illinois.
²More guards are required by current regulations than when the data were published.

Nuclear physicists and nuclear engineers are usually attached to the
headquarters of the power company and are assigned temporarily to whichever
plant or project may require their expertise in meeting non-routine
circumstances. The same arrangement exists for the technical and blue
collar personnel who perform the corrective non-routine maintenance
occasionally required.

As a result of the relatively small size of the staff attached directly
to the plant and the moderate rates of pay, the total payroll is only about
$2 million a year for a one-unit plant and $3 million for a two-unit one.

**Plant Operation.** The logistics of keeping a nuclear plant operating
involves frequent replacement of sophisticated instrumentation and equipment
and replenishment of industrial gases. Local merchants usually do not have
the capability of supplying these goods in bulk at competitive prices. Nor
can they supply the nuclear fuel which is needed once a year to refuel each
reactor. The lifeline between the plant and the industrial suppliers
consists of trucks which haul the costly, but not bulky, products to the
plant.

The annual refueling operation may be carried out by a different
corporation. The Boston Edison, for example, has its Pilgrim plant in
Plymouth, Massachusetts, refueled by General Electric. The process takes
about six weeks. General Electric has its own supply of shipfitters,
riggers, and other specialized personnel and brings in about 40 of them to
oversee the operations. General Electric in turn is assisted by a
subcontractor who employs about 80 shipfitters, riggers, pipefitters and
laborers, obtained from union hiring halls in a nearby city (3).
The power generated, which goes out through extra high voltage transmission lines into the regional power grid, is sold to distributing companies. Regulatory bodies usually require that the price of power be based upon the average costs of all generating units contributing to the grid. Thus proximity to a generating unit is not a source of competitive advantage for power users in a community.

While plant operations do not appreciably stimulate the local economy, neither do they hurt it. Most residents believe the plant to be safe, and are not concerned about the Price Anderson Act and its limitations of the power company's liability in regard to major accidents. Land usage in the immediate vicinity of the plant usually does not change.

The impact of plant operations on aquatic life is of concern although biologists cannot yet measure the effect on commercial fish catches. Excessive heat may cause organisms to spawn prematurely, that is, at times of the year when food for their young may not be available. Organisms acclimated to life in the heated effluent experience thermal shock when the plant is shut down for refueling or repairs. Organisms small enough to pass through intake screens are subjected to a variety of stresses including heat, mechanical injury and biocidal additives. Combined stresses result in the mortality of virtually all entrained plankton. Fish and other organisms that swim into heated effluents in order to prey on injured organisms are themselves subjected to heat, biocidal additives, and gas bubble disease. Although sportsmen fish with unusually great success in effluent plumes, fish catches elsewhere may be decreased (4).
To reduce the number of organisms subjected to these stresses the federal government requires that where feasible water be recirculated after being cooled through evaporation in cooling towers. Although some water is drawn in from rivers, lakes or oceans to replace that lost through evaporation, the amount withdrawn is not nearly as great as in the case of plants using once-through cooling systems. The intake velocity of the cooling water may be too great for some fish and, when schools of them come into the vicinity, many may be entrapped upon intake screens. In this manner huge mortalities of menhaden on the Atlantic coast and of anchovies on the Pacific coast have occasionally occurred.

**Multiple Use of Facilities.** Use of a site for a power plant limits but does not preclude other uses. The hydro systems created by the Tennessee Valley Authority not only produce electricity but also control floods, create navigable waterways, improve public water supplies, and provide attractive lakes for boating, fishing and other recreational activities. In addition, reservoir shorelands set aside for public use enhance the local tourist and recreation industries. Similarly, land areas associated with nuclear power plants are made available for public use while still serving the primary protective function for which the major portion of the land was acquired (5).

Nuclear power companies, as a part of their local public relations programs, normally encourage public use of a considerable part of the plant site, reserving about 200 - 300 acres for the plant proper. For example, the
Calvert Cliffs plant site in Maryland comprises 1,135 acres, stretching along a 9,000-foot shoreline; the plant and associated equipment occupy only about 100 acres of land and 2,000 feet of shoreline; the public is allowed access to most of the rest (6). The Millstone plant in Waterford, Connecticut opened 375 acres to public uses, including a beach visitors' house, a picnic area, a wildlife refuge and a ballpark (7). At a number of plants deep water harbors, built for off-loading building material and equipment, can be used for pleasure craft.

Three principal problems exist in allowing such public access. One is that access may have to be denied when new construction projects are undertaken and entrance roads are preempted by heavy trucks. Another is that power companies cannot be assured that the costs involved will be considered a legitimate business expense by the regulatory bodies that set rate structures. In hydroelectric plants, such costs can be passed on to consumers because the Federal Power Act requires multiple use (8). The third problem is that the National Regulatory Commission and various licensing bodies and courts have become concerned about the security of nuclear power plants. In order to prevent terrorist attacks and sabotage, more stringent security regulations have been ordered which are not entirely compatible with public access.

Most power companies have built visitors' centers where slide shows are given and questions are answered. Tens of thousands of persons, including groups of children, come to each center annually. Nuclear plants thus contribute to the tourist industry.

The potential uses of the waste heat in the cooling water have
been under study for some time (9). In areas of low population density, such as are chosen for nuclear plant sites, the most economically promising uses appear to be fish farming, open field agriculture in which irrigation is required, and hothouse production of vegetables. In northern climates the waste heat from plants cooled with fresh water could increase yields, extend the growing season and reduce some diseases and pests.

Unfortunately the obstacles to profitable use of the waste heat are overwhelming. The temperature of nuclear plant cooling water in a once-through system ranges from about 60°F in the winter to 90°F in the summer, in a closed-cycle system slightly higher, and there is no ready-made market for such lukewarm water. Nor are the prospects good for creating a sufficiently large one.

An open field farm one square mile in area would dispose of less than one percent of the waste heat of a 1,000 megawatt reactor. Long interruptions of supply would occur when reactors close down for refueling or repair. Sites are not chosen to take into account requirements of farmers. To do so would add to siting problems. States in which irrigation is needed regulate how much river water can be withdrawn and not returned.

Farmers would need the heated water only at certain times of year. The installation of pipes and pumps would entail a high initial investment. The heat might cause some unforeseen changes in soil and its nutrient matter. Effective demand for produce from such farms might be impaired by real or imagined dangers associated with eating food grown in association with low levels of radioactivity.

The continued funding of research on this matter seems to be justified mainly as a part of public relations programs (10).
Construction Impact

Projects now getting underway are considerably larger than those of a decade ago and thus may have a greater economic impact. Not only has the generating capacity of each unit risen from about 600 megawatts (e) to about 1,200, but the number of units included in a single construction project has increased. Thus the time span for construction has lengthened from 3-5 years to 5-7 years for plants now nearing completion. Eight years will be required for the TVA's four-unit plant near Hartsville and 10 years for the Philadelphia Electric Company's high-temperature gas-cooled reactor, a two-unit plant to be built in Fulton, Pennsylvania (11).

Work Force. The number of construction workers on a site increases for the first half of the construction period and then decreases progressively. Peak employment ranges from about 1,200 for a one-unit plant to 5,400 for a four-unit plant.

At each site the mix of construction skills changes from year to year, but in general is characterized by a large proportion of skilled workers, particularly of steam fitters and electricians. Table 2 below gives a breakdown of the work force by occupation for each year during the construction of a recently completed two-unit plant. The figures do not include the clerical workers, technicians and supervisors who together add about 15-20 percent to the totals given (12).
Table 2

Payroll and man-years of employment of construction workers by occupation during each year of construction (1968-1974) at the Zion two-unit plant

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimated Payroll ($ millions at 1974 levels)</td>
<td>$4</td>
<td>$14</td>
<td>$24</td>
<td>$38</td>
<td>$28</td>
<td>$22</td>
<td>$4</td>
</tr>
<tr>
<td></td>
<td>TOTAL Man-Years</td>
<td>147</td>
<td>552</td>
<td>978</td>
<td>1536</td>
<td>1136</td>
<td>882</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>Skilled Man-Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pipe/steam fitters</td>
<td>8</td>
<td>33</td>
<td>155</td>
<td>423</td>
<td>427</td>
<td>293</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Electricians</td>
<td>2</td>
<td>7</td>
<td>53</td>
<td>353</td>
<td>299</td>
<td>174</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Carpenters</td>
<td>49</td>
<td>174</td>
<td>203</td>
<td>148</td>
<td>62</td>
<td>40</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Iron workers</td>
<td>25</td>
<td>88</td>
<td>148</td>
<td>111</td>
<td>52</td>
<td>57</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Boilermakers</td>
<td>--</td>
<td>--</td>
<td>85</td>
<td>57</td>
<td>46</td>
<td>22</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Operating engineers</td>
<td>16</td>
<td>46</td>
<td>45</td>
<td>57</td>
<td>37</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Truck drivers</td>
<td>5</td>
<td>19</td>
<td>16</td>
<td>19</td>
<td>10</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Insulation workers</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>117</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Millwrights</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>23</td>
<td>34</td>
<td>31</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Cement Masons</td>
<td>3</td>
<td>12</td>
<td>19</td>
<td>39</td>
<td>13</td>
<td>13</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>Plumbers</td>
<td>--</td>
<td>--</td>
<td>26</td>
<td>26</td>
<td>14</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sheet metal workers</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>41</td>
<td>22</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Unskilled Man-Years</td>
<td>33</td>
<td>183</td>
<td>228</td>
<td>239</td>
<td>120</td>
<td>92</td>
<td>6</td>
</tr>
</tbody>
</table>

1 One unit was placed in commercial operation in October 1973 and the other in September 1974.

2 Average number of workers at beginning and end of the year.

3 The AEC estimates that on most projects about 17 percent of the craftsmen are nuclear qualified welders, including a third of the pipe/steamfitters, iron workers and sheet metal workers, and a quarter of the millwrights and boilermakers.

Sources: Unpublished data provided by Commonwealth Edison in June 1975.
Recruitment of construction workers poses no special problem if the project is small, if it is located within commuting distance of a major city, and if the pay rates are competitive. This was true of the six plants now in operation in New England: about 85 percent of the workers were either local people or commuters; only about 15 percent were workers who had moved their domiciles in order to come within commuting range as compared to 20 or 30 percent at larger construction projects elsewhere (13). Those who did come from afar were able to find accommodation in existing houses, apartments, sleeping rooms and mobile homes within a 30-mile radius of the plant site. School enrollments did not skyrocket, public services were not strained and retail stores could handle the extra business without enlarging their facilities.

Part of the reason for the low level of impact was that power companies and the prime contractors have taken pains to consult with local officials, inform them about construction schedules, and advise them about the desirability of instituting zoning and other types of controls that can prevent shanty-town situations from arising.

Even with such policies, however, it becomes difficult to avoid stressful situations with the larger, longer projects. The largest project yet proposed is that of the TVA, at Hartsville. The TVA has concluded that in the Counties near the project, there will be no way to avoid an influx of workers. About 500 are expected after the first year and 2,700 at the peak of employment. These 2,700 will be accompanied by about 1,700 school age children and 1,700 other family members for a grand total of 6,100. Plans have, therefore, been made to ease the impact by arranging in advance for the construction of some conventional houses and mobile home parks, extending
sewage systems, expanding health facilities and providing temporary classrooms adjacent to existing schools. To keep the volume of commuter traffic on roads down to acceptable levels, the TVA plans to develop a mass transportation system utilizing buses, vans and carpools (14).

An example of a construction project that did create a considerable though not entirely unwelcome impact is the two-unit Brunswick Plant costing $635 million (15). It is owned by the Carolina Power and Light Company and is located near the coast in Southport, Brunswick County, North Carolina. This plant is now nearing completion with one unit coming on line in 1975 and the other being postponed until 1977. Construction started in 1969 and peaked in 1972 at 3,400 workers, instead of the anticipated 2,400. This increase was caused by delays in completing the designs. Brown and Root, the prime contractors, brought in many more outside workers than the Carolina Power and Light Company had forecast in their initial talks with County officials. As a result Brunswick County was not prepared in terms of ordinances related to mobile homes and of public services. Some 1,700 workers moved into Brunswick County on a semi-permanent basis. Of these about half rented, purchased or built conventional housing and half settled in mobile homes. The total population of Brunswick County (population about 24,000) increased 15 percent from 1969 to 1973 and school enrollment 25 percent. Retail stores experienced a large increase in trade. The school system and the sewage transport system were overloaded.

Several factors combined to make the influx so large. Only about 200,000 persons resided within a 65-mile radius of the plant. Few were skilled construction workers. Furthermore, the pay rates offered by Brown
and Root, the prime contractor, while competitive locally in the low wage area of Southport, were not competitive in certain other parts of nearby North and South Carolina. (Brown and Root has never been unionized and did not pay union rates.) Thus some construction workers within the commuting radius preferred to take jobs elsewhere. Training programs provided by Brown and Root were of marginal use because most of the workers, once trained, switched to higher paying union jobs with other employers in higher wage areas. Some women who applied for construction jobs, apparently to see if discrimination was a problem at the site, were hired and proved satisfactory but soon quit. Brown and Root had such difficulty finding an adequate labor supply that its recruiters were working as far afield as California.

Brunswick County was able to deal with the population influx in a constructive manner because the assessed value of the plant increased rapidly during the construction period, and the actual funds which became available through the property tax were augmented by funds borrowed in anticipation of even greater revenues later. So it was possible to build new schools and improve the quality of education to the point that in 1975, for the first time ever, all schools in the County were accredited.

No great exodus of population occurred in conjunction with layoffs, after peak employment was reached, because there were other large construction projects seeking labor nearby. Also, retirees and others moving permanently from cities to coastal resorts--a movement which started before the plant was thought of--offset some outward movement.

Complaints which arose in Southport, as well as in other towns in
the nation close to nuclear plant sites, were made, as might be expected, by employers whose labor costs increased as a result of the necessity of raising pay rates to meet the competition, and by employers who could not survive the competition and went out of business. Especially vulnerable were farmers growing perishable commercial cash crops, and local building contractors.

**Procurement of Equipment and Materials.** Procurement for any nuclear construction project stimulates industry over such a wide geographic area through so many indirect economic linkages that there is no good technique for allocating a particular percentage of the procurement to the locality near the plant site. Attempts to do so in the environmental impact statements are usually accompanied by an explanation of the limitations of the techniques used.

At the local level reliance must therefore be placed upon statements of informed residents, which are usually to the effect that construction companies procure few materials locally other than sand, gravel, stone and ice. Officials of power companies confirmed this in conversations, while explaining that there are day-to-date purchases they would like to make locally of paint, nuts and bolts and conduits, but that local merchants do not usually wish to stock these supplies for them. In order to economize, the power companies buy most standard building materials in bulk on the basis of competitive bids, with the result that such procurement involves large scale, often distant, suppliers.
Much of the machinery and equipment which is procured is highly specialized and is bought as a part of unified systems supplied by the few companies qualified to manufacture them. For example, the reactor pressure vessel for the TVA's Browns Ferry Unit No. 1 was manufactured in Ohio, and vessels for units No. 2 and 3 were made in Japan. The reactor vessel for the Pilgrim Plant in Plymouth, Massachusetts was manufactured in Chattanooga, Tennessee, and was shipped in by barge. The turbogenerators also are apt to come from afar.

There is general agreement among power company officials and local residents that local procurement by the company has little effect on the local economy, and that the construction workers who commute to work spend little money locally.
Tax Benefits

Local governments in certain States receive revenue from local sales and payroll taxes. Construction and operation of a nuclear plant swells these revenues, but not to an extraordinary degree. The real bonanza is the property tax. The amount of revenue that local tax districts receive directly or indirectly from the property tax on power plants ranges from zero up to millions of dollars. As a result, tax rates on property are often reduced as much as 50 percent and occasionally 100 percent. The main variables are the type of ownership (public or private) and the proportion of the tax revenue, which is, according to State laws, allocated to the local tax district. (A third variable, the proportion of utility property which is exempted by law from taxation, is less relevant to this report and is not discussed.)

A locality experiencing approximately zero impact is Limestone County in Alabama, the location of TVA's Browns Ferry Plant. The TVA, being an agency of the Federal government, cannot be taxed by other units of government, but it does make payments in lieu of taxes. Under the TVA formula, construction of new power plants tends to increase the amount of TVA's payments in lieu of taxes. These payments are made to States, not to the local units of government. Some States redistribute part of the TVA payments to the localities. In Alabama no such redistribution takes place. Although Limestone thus receives no property tax revenue from the plant and no payments in lieu of taxes, the plant is not considered an economic liability because it pays for its own security, fire and waste disposal systems and demands little in the way of costly public services.
The County in which Hartsville is located will receive a small tax benefit because the State of Tennessee reimburses Counties for "theoretical" taxes on land (only) and the value of this particular land under its former agricultural use is slightly lower than under its proposed use.

Fulton Township's benefit will also be slight because in Pennsylvania the State levies the property tax on public utilities and redistributes the revenue to all tax districts on the basis of the amount of revenue each Township raises by its tax on other types of property. This system was devised by the legislature, and enacted in 1970, with the intent of preventing windfall profits in areas which had a high concentration of public utility realty (17).

High tax impacts occur in most States. This applies, for example, to Wiscasset, Maine, a town with 2,300 inhabitants. Construction of the Maine Yankee, a single unit plant, started there in 1969 and finished in 1972. The town's total municipal tax revenue increased from $623,467 in 1968, when the plant paid nothing, to $2,201,371 in 1974 when it paid 85.2 percent of the total property tax of the town. (Another 9.5 percent was paid by the Central Maine Power Company's fossil fuel plant.) Figure 1 illustrates the changes in revenue which have occurred.
Source: (18)
Wiscasset used the new revenue not so much to reduce the tax rate as to improve the town. The town voted to construct a new primary school, an addition to the high school, a new municipal office building, a municipal garage, sidewalks, and sewers. The town also rebuilt some streets, bought a new fire engine, expanded the police department, opened a health center and started a number of projects designed to beautify the town (18).

One type of anomaly exists when plants are located near the boundaries of political subdivisions. Such is the case of the St. Lucie plant of the Florida Light and Power Company, which is located in St. Lucie County near Martin County. Authorities of both counties are involved in such activities as emergency evacuation plans and emergency drills, yet Martin County receives none of the revenue from the property tax (19).

An extreme tax impact precipitated a change in the tax law of Wisconsin in 1971 when the first nuclear plant was being built in Two Creeks, a town of about 600 inhabitants. In that State before 1971 towns could not tax the property of power companies but were entitled to a share of the proceeds of the utility taxes levied on such property by the State. The revenue which Two Creeks received from this tax increased as the Wisconsin Electric Power Company built first a fossil fuel plant and then a two-unit nuclear power plant. The actual amount received by Two Creeks rose from about $10,000 in 1967 to about $1,600,000 in 1971 and, in the absence of an amendment, would have leveled off at about $3,700,000 within two or three years. Under the 1971 amended law, shared revenue was reduced to about $470,000, an amount still far greater than is needed to offset town expenditures for the plant, and about four times that of the total town budget before the plant was built. Since 1970 no property tax has been
levied by the town. The Department of Revenue of Wisconsin, with the support of the Governor, now seeks to amend the law again in such a way as to limit the amount a town can receive from shared revenue on the utility tax to an amount not exceeding what the town spends on public services for the plant (20).

Utility officials in many States fear that such restrictions might reduce potential tax benefits in some communities to the point that public opposition would add to the already difficult and time-consuming process of acquiring land for plant sites and obtaining the necessary permits to build and operate them (21). TVA officials, however, point out that the communities it serves have accepted power plants without substantial tax benefits because citizens are convinced that more power is needed, that plants have to go somewhere, and that sites are intelligently selected.
Long Term Impacts

Long range forecasts regarding local impacts must be speculative. We do not know what will happen to tax benefits when plants are decommissioned either after a normal lifespan of 25 - 40 years, or even sooner, if current difficulties in reprocessing fuel are not overcome. Real or perceived changes for the better in regard to the safety of plant operations might result in locating future reactors, not on existing sites, but on sites nearer to cities. Changes for the worse might result in premature decommissioning. Sudden cessation of local tax impacts, should some of these events occur, might be cushioned by offsetting payments by Federal or State governments. Measures might also be taken to ensure that the cost of denying public access to the entombed radioactive areas of decommissioned facilities (for the 100 or more years considered necessary by the National Regulatory Commission) does not become a burden upon local taxpayers. Future changes which may occur in the tax laws are another important but speculative matter. Without any major changes in lifespan, safety or tax laws, one generation of nuclear power plants will probably be replaced in the local tax structure by succeeding generations on the same site, as has usually been the case with large fossil fuel plants. It is less expensive for power companies to reuse sites than to make all the changes required in the distribution system to accommodate a new site.

As for the trends observable to date, it is hard to separate the economic developments which have occurred because of the plant siting from those which would have occurred anyway because of certain common characteristics of the localities selected.
Many similarities in economic development have occurred because the localities already were similar in regard to growth potential. Three site selection criteria— that the site be not too near nor yet too far from a city (i.e., a load center of the regional power grid), that the site be by the shore of some large body of cooling water, and that the site have access to some major highway— resulted in the selection of localities that had considerable potential as bedroom towns for commuters, as retirement communities for the elderly, and as resorts for vacations. Hence such localities were already attracting people who no longer cared to live in the cities and were experiencing increased land values (22). Another site selection criterion, namely low population density, had a strong correlation first with vacant land available to accommodate housing for more people and second with circumstances discouraging to the growth of modern industry. These circumstances seem to have persisted even in localities in which property taxes rates were reduced.

The impetus for the economic growth which has occurred seems to have been caused by migration of people into the area, a movement accelerated in the localities which receive significant tax benefits by the combined attraction of good schools, good public services, and lower-than-normal levels of taxes on the residential housing purchased. With more people moving in, the demand for a great variety of consumer goods and services has increased, thus providing stimulus for economic growth.
Summary

A completed plant has few direct linkages with the local economy. Fewer local jobs are created by plant operations than by activity related to plant construction.

Tax benefits range from zero to high.

In most States the tax laws are such that localities with privately owned nuclear power plants receive large tax benefits. These in turn stimulate civic improvements and economic growth.
References and Notes


8. Title 16 of U.S. Code §797.


14. TVA, Final Environmental Statement, Hartsville Nuclear Plant (1975), Chapter 4.

15. Department of Natural and Economic Resources, State of North Carolina, "The Economic and Social Effects of the Oil Refinery and Gasification Plant Proposed for Tunis, in Hertford County, North Carolina," Xeroxed, pp. 3 ff. Also, interviews of Matilda Sugg with: Ward Fuller, former superintendent of electrical work and instrumentation for the Brunswick Plant Construction Project; Jackie W. Stephenson, Director, Resources Development Commission for Brunswick County; and Ralph King, Superintendent of Schools, Brunswick County.


23. I thank Paul W. MacAvoy and Matilda Sugg.