

North Carolina's Public Power Systems Choose the "Hard" Energy Path

In his widely-read article, "Energy Strategy: The Road Not Taken?" Amory Lovins (1976:65) describes two alternative energy futures for the United States, which he terms the "hard" and "soft" paths. The "hard" path, which would continue present trends, "relies on rapid expansion of centralized high technologies to increase supplies of energy, especially in the form of electricity." The "soft" path, in contrast, would combine "a prompt and serious commitment to efficient use of energy" with "rapid development of renewable energy sources matched in scale and in energy quality to end-use needs." (Lovins, 1976:65).

Lovins' soft energy path would have a number of advantages for meeting energy needs in the State of North Carolina. There would be economic advantages, moral or ethical benefits, and better coordination of state policy. However, despite these advantages, a number of the state's public power systems have recently chosen the "hard" path by investing in large, centralized nuclear generating plants.

There are two types of publicly-owned electric supply systems in North Carolina: rural electric cooperatives, also known as Electric Membership Corporations (EMCs), and municipal electric utilities. The individual EMCs are organized into a state-wide cooperative, the North Carolina Electric Membership Corporation (NCEMC), while a group of nineteen municipal electrics form a public corporation called North Carolina Municipal Power Agency #1 (NCMPA #1). On November 29, 1978, NCMPA #1 completed the purchase of about one-third of Duke Power Company's Catawba nuclear electric generating station. Earlier in the year, on April 14, NCEMC had signed a letter of intent with Virginia Electric Power Company (Vepco) to purchase a share of two of Vepco's new nuclear power plants over the next seven years.

According to Lovins (1976:96), the hard and soft energy futures are mutually exclusive:

Enterprises like nuclear power are not only unnecessary but a positive encumbrance for they prevent us, through logistical competition and cultural incompatibility, from pursuing the tasks of a soft path at a high enough priority.

Seen from this perspective, the public power systems' decision to invest in nuclear power re-

presents an irrevocable commitment to the hard energy path. This paper will attempt to analyze that decision in a larger context by first identifying the advantages of a soft energy path for North Carolina, which should have led the public and private power systems to choose this future. Next, the ideal soft choice will be contrasted with the actual events leading up to the Catawba purchase and the letter of intent with Vepco. Finally, some of the broader implications of public investment in private utilities will be discussed.

ADVANTAGES OF THE SOFT ENERGY PATH FOR NORTH CAROLINA

ECONOMIC ADVANTAGES

Lovins (1976:80) argues that "appropriate" energy technologies, matched in scale and location to end-use energy needs, "can achieve important types of economies not available to larger, more centralized systems." These economies include reduced overhead and distribution costs, increased reliability of small systems, less inflation of capital costs due to shorter lead times for system construction, and the economies offered by mass production of system components. Perhaps the most important of these economic advantages of small-scale energy technologies is that of increased reliability. In 1977 testimony before the U.S. House of Representatives Subcommittee on Environment, Energy, and Natural Resources, Lovins (1977:4) cites Edison Electric Institute statistics showing that forced outage rates (periods when a plant is shut down for repairs) are typically 2-3 times lower for small (200-400 MWe) fossil-fueled electric generating plants than for fossil or nuclear plants over 600 MWe.

In his testimony, Lovins notes that when a large power plant is closed down for repairs, a large amount of generating capacity is lost. Therefore, these plants must be constructed with a large "reserve margin" of backup capacity.

Margaret Hilton will complete the MRP program at the University of North Carolina in May, 1980, with a concentration in energy planning. This article provided the basis for a research proposal to the North Carolina Energy Institute and the Southeastern Solar Energy Center.

Smaller generating plants, as noted above, are less likely to require repair shutdowns. In addition, it is unlikely that several small generating plants would break down at the same time. Because of this, a system of several smaller plants requires less total reserve capacity (and hence less overall capacity) than would be required for a single large plant of equal size: Lovins cites a 1977 study by the Wisconsin Public Service Commission which showed that three 400 MWe coal plants could deliver a given amount of electricity at a given level of reliability equal to the amount delivered by two 900 MWe nuclear plants. (Lovins, 1977, p.4, footnote 17). This large saving in total generating capacity required makes a system of smaller plants much more cost-effective than a single large plant.

"ACCORDING TO LOVINS, THE HARD AND SOFT ENERGY FUTURES ARE MUTUALLY EXCLUSIVE."

In addition to losing the economies offered by the increased reliability of smaller, decentralized power plants, North Carolina's public power systems have lost the economic advantages offered by less inflationary impact of a shorter period of plant construction: The total cost estimate for NCPA #1's purchase of a portion of the Catawba plant increased from \$848 million to \$915 million over the course of one summer due to inflation and the need for additional safety equipment.

ETHICAL ADVANTAGES

A soft, decentralized energy future may have moral or ethical value for individuals in North Carolina as well as economic benefits. According to E.F. Schumacher (1973:31), modern capitalist society is "propelled by a frenzy of greed." He goes on to say that the continuation of this centralized economic system, which rests on individual self-interest, will adversely affect the individual: "If human vices such as greed and envy are systematically cultivated, the inevitable result is nothing less than a collapse of intelligence." (Schumacher, 1973: 31). This will result in a waste of "the human substance," which Schumacher views as the most important component of society's "natural capital." (Schumacher, 1973:20).

To avoid this waste of the human substance, Schumacher proposes that technology and society be reordered and decentralized. He argues that society needs methods and equipment which are:

- cheap enough so that they are accessible to virtually everyone;
- suitable for small-scale application; and
- compatible with man's need for creativity (Schumacher, 1973:34)

According to Schumacher (1973), the use of such methods and equipment, "technology with a human face", will allow people to enjoy themselves while they are working and result in a society of nonviolence and permanence.

The use of small-scale, decentralized energy technologies by North Carolina's public power systems could give local citizens a chance to become involved in producing their own energy supplies. Individuals' creativity could be channeled into the development of innovative, small-scale technologies. In addition, decentralized systems using renewable energy resources would result in Schumacher's "relationship of man to nature which guarantees permanence." (Schumacher 1973:34). Instead, some public power systems have chosen to invest in privately-owned, privately-managed nuclear power plants, which they neither understand nor control and which are located far from the citizens they are intended to serve.

COORDINATION OF STATE POLICY

North Carolina's population is presently distributed across the state in a variety of settlements ranging from small villages to five major cities of over 150,000 persons. Of the state's 1970 population, 55 percent lived in rural areas, with the majority, classified as "rural non-farm," residing in villages and small towns. (Clay, et. al., 1975:34). In order to maintain this population distribution, Governor James Hunt has led the state government in developing a "balanced growth" policy.

Under the balanced growth policy, state and local officials would designate municipalities of varying size in each region of North Carolina as "growth centers." State and federal funding would be channeled to each center to build up its infrastructure and hence its ability to assimilate economic growth. In addition, state industrial recruitment efforts would focus on these growth centers: one state official described the policy as an attempt "to match the industry with the community" (Vass, 1978:12).



*The decision to invest in hard power sources may curtail development of other alternatives.
Photo by Omaha Public Power District.*

By distributing industries across the state, thus providing "more and better jobs to where people live" (N.C. State Goals & Policy Board, 1978:ii), the policy would maintain the present, decentralized pattern of population distribution.

The problem, then, is how best to supply this dispersed population with energy. If the balanced growth policy accurately reflects the desire of North Carolinians to maintain "the small, more liveable scale of our cities and towns" (N.C. State Goals & Policy Board, 1978:iii), then energy supplies should also be kept to a small, liveable scale. The state should seek not only to "match the industry with the community" but also to match an appropriately-sized energy supply with both the industry and

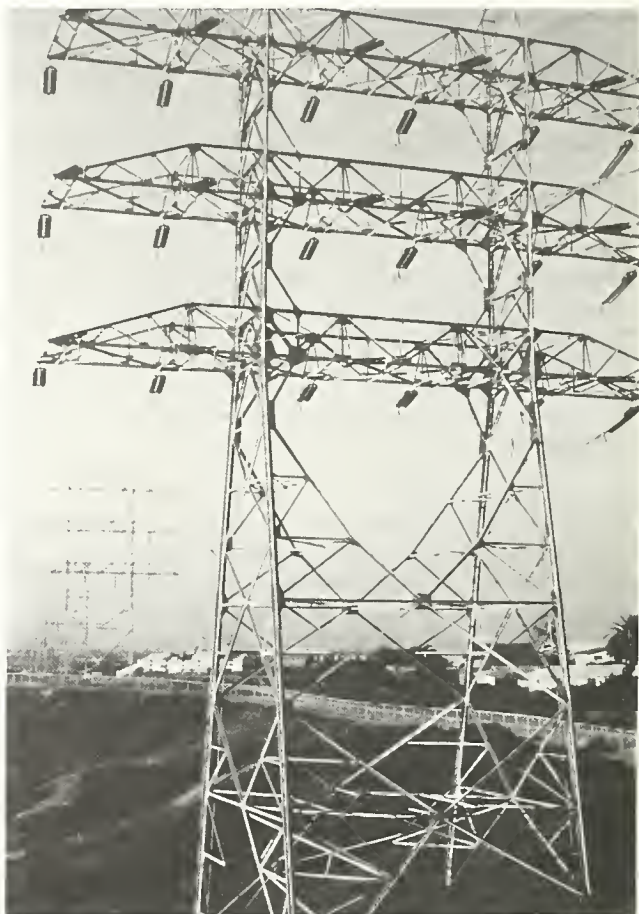
"THE STATE'S ELECTRIC MEMBERSHIP CORPORATIONS WERE CREATED FOLLOWING PASSAGE OF THE RURAL ELECTRIFICATION ACT."

its community. According to Lovins and Schumacher, this matching of energy supply with population would combine both economic advantages. However, state policy does not encourage this soft, decentralized path, and has left both the private and public power systems to choose centralized, nuclear power.

CHRONOLOGY OF EVENTS IN THE NUCLEAR PLANT PURCHASE

Thomas Edison first demonstrated the feasibility of central station electric power generation in 1882. At that time, both municipalities and private companies became involved in the business of generating power. In North Carolina, a number of municipalities constructed and operated electric generating plants in the early 1900s, but most of them later found it more economically prudent to purchase power from the private utilities (Electricities of North Carolina, 1978). The State's Electric Membership Corporations were created following passage of the Rural Electrification Act by Congress in 1936. Under the Act, low-interest loans were available to municipalities, co-operatives, and investor-owned utilities for the purpose of producing and/or distributing power in rural areas. The money, which was channeled through the Rural Electrification Administration (REA) in the Department of Agriculture, was used primarily by the newly-created non-profit rural electric cooperatives.

In anticipation of the federal electrification program, the North Carolina legislature approved enabling legislation for the Electric Membership Corporations in 1935. At that time, the high cost of *distributing* power to dispersed rural populations was seen as the key problem in rural electrification (N.C. Electric Membership Corporation, 1978). Perhaps this emphasis on power distribution rather than generation explains why REA, in 1949, denied a loan to a federation of eastern North Carolina EMCs to construct their own generating system. The money was denied on the basis that Carolina Power & Light offered lower rates. Like the municipalities, North Carolina's EMCs were distributors, rather than generators, of electric power.



*There are 28 Electric Membership Cooperatives distributing power to rural consumers in N.C.
DOE photo by Jack Schneider.*

At the present time, nearly all of North Carolina's electric power is produced by three major private utilities: Carolina Power and Light, Duke Power, and Virginia Electric Power Company (Vepco). There are now 28 EMCs which purchase most of their power from these companies and distribute it to about 409,000 rural customers (N.C. Association of Electric Cooperatives, et al., 1978:17), or about 7.2 per-

cent of the state's estimated 1978 population of 5,679,000 (N.C. Division of State Budget & Management, 1978, Table 26). Of the state's 72 municipal electric systems, only one, Fayetteville, has its own generating capacity (peaking plants), while the rest purchase both base and peak load power. Together, these "electric cities" distribute power to over one million customers (Electricities of North Carolina, 1978), which is approximately 17.6 percent of the state's 1978 population.

The 1950s and 1960s were an era of cheap power in the United States, as fuel prices were kept artificially low and economies of scale in centralized electric power generation were captured. By the early 1970s, fuel prices started to increase, and economies of large-scale electric generation started to disappear, but the small municipal electrics and rural electric co-ops were just getting onto the large-scale bandwagon.

A brochure sent out by the American Public Power Association, a national lobbying group, in 1974, stated in part:

Over the past few years, generation, and transmission facilities have become larger as 'economies of scale' have made it less costly to generate electricity in large than in small plants. Local public power systems have taken, and will continue to take advantage of technological improvement...Recent legislative, regulatory agency, and court decisions have made it clear that small systems have the right to share, on an equitable basis, in the ownership and output of large facilities built by neighboring power companies. (American Public Power Association, n.d.:7)

This group saw "joint action" with the private utilities as a means of capturing economies of scale and keeping costs lower. No doubt North Carolina's EMCs and electric cities, like other local public power systems, were influenced by this argument.

"INDIVIDUALS' CREATIVITY COULD BE CHanneled INTO THE DEVELOPMENT OF INNOVATIVE, SMALL-SCALE TECHNOLOGIES."

Along with other public and private electricity suppliers, North Carolina's public power systems began to feel the pinch of escalating costs in the late 1960s. Their first response was an attempt to develop an independent electricity supply. In 1970, after two years of negotiations, 45 electric cities and 30 of the 36 EMCs then in existence joined to form a non-profit corporation called EPIC (Electric Power in Carolina) (Aulic, 1978:32). The group

planned an extensive electric supply system consisting of a pumped storage hydroelectric plant in the mountains, one coal-electric and one nuclear generating plant in the Piedmont, and a nuclear plant in the northeast coastal area. These four plants and three substations were to be linked by a 500-KV transmission line.

At the same time that the public power systems were investigating their own source of supply, the state's private utilities were beginning to investigate the possibilities of joint ownership with the public systems. The attractiveness of low-interest financing by the public power systems had increased as the utilities' capital costs soared during this period. In 1973, as construction of the Catawba nuclear station was beginning, Duke Power Company began to discuss the possibility of joint ownership with the North Carolina Electric Membership Corporation and Electricities, the state-wide organization of municipal electric utilities (Bishop, 1979).

In 1974, the North Carolina Supreme Court ruled that the legal uncertainties surrounding joint construction of generating facilities by EMCs and municipalities made the EPIC plan "so premature that the matter was not an appropriate issue for decision" (Aulic, 1978:32). While the EPIC plan died with this decision, both the public power systems and the private utilities were still interested in the possibilities for joint action. In the same year, Electricities participated in the drafting of a bill which would allow any two or more municipal electric systems to jointly engage in electric generation or transmission.

During 1975, the Joint Municipal Electric Power and Energy Act was passed by the State Legislature, and Duke Power made a formal proposal to sell one of its two Catawba units to its municipal customers. This proposal spurred the decision, in January 1976, to form an independent corporation to enter into negotiations with the company. NCMPA #1 was created by the 22 municipal electric systems served by Duke, and negotiations were begun. Later that year, the municipalities served by Vepco formed NCMPA #2, and in December, NCMPA #3 was formed by electric cities in the Carolina Power and Light service area. It was around this time that NCEMC's discussions with Duke began to break down, and the organization entered into negotiations with Vepco to purchase a portion of its generating capacity.

In November of 1977, the final legal barriers to joint ownership with the private utilities were removed. After an "aggressive campaign" over the summer, funded by a special assessment on members of Electricities, North Carolina voters approved Amendment 4 to the North Carolina Constitution (Electricities of

North Carolina, 1978). This constitutional amendment granted the municipal electric systems and the EMCs full authority to jointly finance generating and/or transmission facilities with both the private utilities and other electric cities of EMCs.

With the granting of full legal authority, the planned joint ownership projects went ahead in 1978. On January 31, NCMPA #1 signed a letter of intent with Duke Power to buy 75 percent of one of the two 1145 MWe generating units and 37.5 percent of the support facilities at the Catawba nuclear station. Later that year, on April 14, representatives of NCEMC and Old Dominion Electric Cooperative (an organization of Virginia electric co-ops) signed a similar letter of intent with Vepco.

Under the NCEMC-Vepco agreement, the cooperatives would immediately purchase a portion of Vepco's Surry Nuclear Station in Surry County, Virginia. When construction of the North Anna Nuclear Station, located in Loisa County, Virginia, is completed, the co-ops would also own a share of that plant. The agreement calls for a total purchase of 67 MWe of generating capacity for a price of around \$51 million (*Carolina Country*, 1978:8).

By June of 1978, NCMPA #1 had grown to 20 member cities, 19 of which had signed contracts with the agency (NCMPA). These "take or pay" contracts ensured that the cities would pay for the cost of operating that portion of the Catawba plant which NCMPA #1 planned to purchase (around 640 MWe). On November 28, 1978, NCMPA #1 sold \$400 million in electric revenue bonds to raise the required capital, and on November 29 the final purchase for the power was made.

CONCLUSIONS

The events of 1978 indicate that the nineteen municipal electric utilities now included in NCMPA #1 have indeed chosen a hard energy path which will prevent them from investing time and money in other, more appropriate technologies. The first \$400 million in bonds has been sold, and another \$500 million, at least, will be added to it. The small towns which are financing this venture cannot afford to seek further investments even in decentralized energy supplies. Thus, these particular public power systems will not serve as a model to the state's private (or public) electric utility industry, demonstrating the economic competitiveness and other advantages of small-scale, decentralized power generation.



The world's largest wind turbine, located in Watauga County, N.C., was built with DOE funds.

DOE photo by Dick Pebody.

Another issue related to the Catawba purchase is that joint ownership by private and public generating systems removes the traditional competition between the two. Without competition from the rural electric co-ops, North Carolina's private utilities would never have entered the less profitable markets. If all of the state's public power systems invest in joint action with the utilities, there will no longer be an impetus for regulatory hearings from public power distributors seeking lower rates from the private companies. Thus the private utilities will lose their incentive to keep wholesale electric rates reasonably priced and distribute power in rural areas.

Whether the state's remaining electric cities choose the hard path remains to be seen. There is every indication that they will do so, since the remaining two municipal power agencies are negotiating with Vepco and Carolina Power & Light. However, it should be noted that NCMFA #2 considered constructing its own peak-load plants, but found it would be economically infeasible when the City of Greenville, its largest member, decided to concentrate on load management, conserving existing supplies, rather than construction (ElectricCities of North Carolina, 1978). It appears that Greenville has chosen at least one element of the soft path. In addition, Amendment 4 allows the electric cities to finance construction of new facilities, either jointly or with the EMCs. Thus, any group of two or more cities could choose to develop an independent supply, and an EPIC-type project could be revived.

The state's twenty-eight EMCs stand at a crossroads: although they have signed an agreement with Vepco, they have not yet made a financial commitment. The length of time since the signing (one year at the time of this writing) casts serious doubts on the completion of the proposed purchase. In addition, NCEMC is investigating the possibility of building a 600 MWe peat-fired electric generating plant at First Colony Farms in Washington County (Carter, 1978). The Blue Ridge EMC in Watauga County will soon be operating a 2000 KWe wind generator, designed by NASA and built with DOE funding (Ayers, 1979). Finally, Randolph EMC in Randolph County is investigating the feasibility of generating hydroelectric power at an old mill site (Hussey, 1979), and a number of EMCs are operating load management programs. The EMCs may yet choose the soft path.

REFERENCES

- American Public Power Association. n.d. *The People's Right to Choose*. Washington, D.C.
- Aulis, Jack. 1978. "Joint Action Agencies Gain in North Carolina." *Public Power* Sept-Oct:32-35.

Ayers, Grant W. Director of Engineering, Blue Ridge EMC. Phone Conversation, March 23, 1979.

Carolina Country. 1978. "EMCs to Acquire a Share of Six VEPCO Nuclear Power Plants." *Carolina Country* 10(6):8-9.

Carter, Luther J. 1978. "Peat for Fuel." *Science* 199(4324):33-34.

Clay, James W., Douglas M. Orr, Jr., and Alfred Stuart (eds.). 1975. *North Carolina Atlas*. Chapel Hill: The University of North Carolina Press.

ElectricCities of North Carolina. 1978. *1978 Annual Report*. Raleigh, N.C.

Hussey, W. Granton. Randolph EMC. Phone Conversation, March 23, 1979.

Lovins, Amory. 1976. "Energy Strategy: The Road Not Taken?" *Foreign Affairs* 55(1):65-96.

Lovins, Amory, 1977. Invited Testimony for Hearings on the Costs of Nuclear Power before the Subcommittee on Environment, Energy, and Natural Resources, Committee on Government Operations, U.S. House of Representatives. September 21.

North Carolina, Division of State Budget and Management. 1978. *North Carolina Population Projections*. Raleigh, N.C.: State of North Carolina.

North Carolina, State Goals and Policy Board. 1978. *A Balanced Growth Policy for North Carolina: A Proposal for Public Discussion*. Raleigh: State of North Carolina.

North Carolina Association of Electric Cooperatives, Tarheel Electric Membership Corporation, and North Carolina Electric Membership Corporation. 1978. *1978 Annual Report*. Raleigh, N. C.

North Carolina Electric Membership Corporation. n.d. "Owned by Those We Serve: Questions and Answers about Rural Electrification and Consumer-Owned EMCs." Raleigh, N.C.

Schumacher, Ernst F. 1973. *Small is Beautiful*. New York: Harper and Row.

Vass, Thomas. 1978. "A Critical Analysis of 'A Balanced Growth Policy for North Carolina.'" Unpublished.