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Costs versus Benefits of Increased Electric Power

Typical estimates of future demand for electric power in the United States assume a continuation of the previous rate of growth; power consumption eight times that of the present is projected for the year 2000. Little attention is devoted to the anatomy of the future demand. It is pointed out that population is growing, the gross national product is expanding, and energy demands are expected to increase. However, it is physically impossible for exponential growth to continue indefinitely. Already it is apparent that the generation and distribution of electricity entails some damage to the environment. Utilities can be expected to minimize the damage through the use of cleaner fuels, better siting, and underground transmission of power. However, some problems will persist. If conventional fuels are employed, the increased demands on them will speed exhaustion of oil and gas, and the use of large quantities of coal is likely to despoil large areas. Nuclear power carries with it many risks. Thus the utilities can expect to face continuing opposition in their efforts to expand power generation. The outcome of the battle is likely to rest on a balancing of social costs versus benefits to the consumer.

Much of the electric power goes to industry and to commercial use. However, the public is most immediately affected by that part going to individual consumers, and the electorate is likely to base many of its attitudes on personal experience.

If private consumers were to increase their use of power by a factor of 8 by the year 2000, where would the demand come from? Only a small fraction of the increase would come from population growth. There continues to be a proliferation of electrical gadgetry, but power consumption by most of these devices is trivial. For example, an electric razor consumes only a kilowatt hour per year, which is less than an air-conditioned house uses in an hour. In general, the devices that are used intermittently consume only modest amounts annually. Major items and their approximate typical annual consumption in kilowatt hours are color television, 500; lighting, 600; electric range, 1200; frost-free refrigerator-freezer, 1700; freezer, 1700; water heater, 3500; air conditioning, 5000; home heating, 20,000.

The more affluent segments of society already have about all the television sets, lighting, and cooling that they can use. Future expansion in public power consumption is dependent on an increased standard of living by the less affluent and on widespread adoption of electricity for home heating. At present only about 3.5 million homes are heated electrically; the major potential market is in home heating. Utilities are responding to the public's concern about pollution by extolling the virtues of clean heat. They soft-pedal the fact that the pollution problem is merely transferred elsewhere. However, it is technically much more feasible to eliminate pollution at a few major emitters than in millions of individual homes. Another consideration is the thermodynamic inefficiency introduced when electrical energy is dissipated resistively. However, if heat pumps were utilized at the homes, the overall efficiency would be acceptable. So-called all-electric living has a major disadvantage that should not be overlooked. It makes society terribly vulnerable to power failure, especially in winter.

The era of unquestioned exponential growth in electric power has come to an end. The future course of expansion will be determined by the public's estimate of costs versus benefits.—PHILIP H. ABELSON

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Philip H. Abelson

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