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Commentary

Health Costs of a Reduced Energy Supply

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Health effects associated with electricity production, especially air pollution from fossil fuel combustion, have received much attention in the past 30 years. Virtually no attention has been paid to the health costs of a reduced or overpriced energy supply although these are real and formidable. Stringent regulations mandating control technology on stack emissions and/or burning of low sulfur fuels have been promulgated which cost the American public billions of dollars. These have indeed alleviated some health problems, but pressures to further tighten regulations offer little chance of further health benefits commensurate with their cost and are most likely to produce a new series of problems.

Much attention has been directed to health effects associated with various processes for energy generation, particularly nuclear power and fossil fuel combustion. Virtually no consideration has been given to the health costs of a reduced energy supply or to energy priced beyond the reach of many citizens. Yet demands for cleaner fuel and for enormously expensive control technology are escalating energy costs to a point where many in our population, particularly the chronically ill, the poor and the elderly, may have to curtail their use of energy drastically. We can anticipate the health costs associated with such curtailment will far outweigh health effects produced by present energy generation processes of whatever type.

Throughout the history of this republic, we have seen a steady and satisfying increase in life expectancy at birth. Initially, this increase could be attributed largely to improved environmental sanitation as the major waterborne epidemic diseases of our society were engineered out of our cities. Later, the diseases associated with poor living conditions, such as tuberculosis, came under control as a direct result of a rise in our standard of living. The major and basic factor in this change was the availability of a cheap and increasingly abundant energy supply.

Although life expectancy at birth has been rising steadily since 1900, it is only in the past few years that a marked increase in life expectancy of the elderly has occurred (*1*). This is a totally new phenomenon, not before experienced, and is causing concern to social planners and those attempting to keep our Social Security system solvent. A major factor in this change has also been cheap and abundant energy. I believe two factors, both related to cheap and abundant energy, play a major role in extending life expectancy of the senior citizen.

Twenty years ago a British physician, Geoffrey Taylor, suspicious of the large numbers of deaths occurring in elderly persons living alone—deaths that were being variously ascribed to heart attacks, strokes and arteriosclerosis—undertook an extensive investigation of the problem (*2*). His conclusion: a great proportion of these deaths were due to hypothermia—a lowering of the core temperature of the body.

Long known to be the cause of death of those outdoors in inclement weather, hypothermia had not been expected as the cause of death for thousands of elderly in their own homes. Body temperature regulation mechanisms lose sensitivity in the elderly, and a fall of only a few degrees in a home environment may be sufficient to cause lowering of the body core temperature which can be fatal. Interestingly enough, the person affected does not perceive cold and is unaware of what is happening to him. Subsequent research has confirmed the widespread occurrence of this phenomenon, particularly in the elderly.

As home heating systems improved, as our standard of living rose and as central heating became the rule rather than the exception, literally thousands who might have been victims of hypothermia continued to live as a direct result of better home heating. If energy costs rise precipitously, the concern arises that we may see hypothermia reappear as a frequent cause of death in

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the elderly.

A second reason for the increasing longevity of our elderly is due to electrical energy in the form of air conditioning. Heat is the single greatest environmental stress for the elderly. If one charts daily deaths for a major city, there are today only two factors which can cause major increases in daily deaths—influenza epidemics and heat waves.

A heat wave can triple and even quadruple the number of daily deaths in a city like New York, where 250 deaths each day are normally expected. With the arrival of a major heat wave, daily deaths there can soar to 600, 800 or 900 in one day (*3*). These deaths were regularly seen until about 15 years ago, when air conditioning became a regular amenity in hospitals and nursing homes where the elderly are so often congregated. Today these mortality peaks are no longer seen in New York in response to a heat wave, thanks solely to air conditioning.

A third recurrent major cause of death in the elderly is from pneumonia following an influenza infection. Influenza epidemics, in spite of immunization and antibiotics, regularly hit us every few years, and their impact is measured by excess mortality from pneumonia (*4*). If high energy costs cause reduced home heating, we can expect more of the influenza infections to progress to pneumonia and death. Here again, the toll could well be many thousands.

Increasing energy costs have also stimulated efforts to more tightly seal our homes and workplaces creating other health problems. Some of the synthetic building materials used during recent years may elicit toxic gases such as formaldehyde at levels high enough to be unsafe (*5*). Other sources of indoor pollution such as NO_2 from gas stoves, water heaters or furnaces in tightly sealed houses may also pose health problems (*6*). We must also remember that in the average home the principal cause of high particulate levels is the presence of one or more smokers in a home. To date, when air changes in most homes have been adequate to assure adequate ventilation, this may not have been much of a problem. However, as homes are further sealed in an effort to save energy, there may well be buildup of toxic particulates to dangerous levels. Several reports have been published to date purporting to find higher lung cancer rates in nonsmoking spouses of smokers, presumably from exposure to smoke from their mates (*7*). Should buildings become further sealed as an energy conservation measure, this may turn out to be a significant health hazard.

Other injuries and deaths attributable to inadequate energy supply are the tragic toll of childhood burns experienced when attempts are made to supplement home heating with various types of kerosene and other open-flame heaters. These injuries and deaths, already common today in the poorer sections of our cities, can be expected to take a sharp rise if costs of adequate energy increase significantly. Other deaths regularly occur each year from carbon monoxide poisoning when supplementary home heating appliances are not adequately vented.

All these health costs are real, have cost many thousands of lives in the past, and will take many more in the future if energy costs are priced beyond the means of many of our citizens. At the present time, the American people are paying premiums of billions of dollars for low sulfur fuels and for stringent emission control technology to reduce sulfur oxide emissions from power plants to extremely low levels to meet mandated ambient air quality standards. To date, no one has been able to demonstrate any health benefit to the American public remotely approaching this enormous expenditure (*8*). While due care must be given to generating our necessary energy supplies in a safe and environmentally acceptable manner, we must also be careful that unnecessarily stringent regulations of what types of fuels may be used, and what emission controls are needed to protect the public health, do not raise the price of energy to a point where the cost will also exact a significant health toll. This is a delicate equation, and its solution requires a reasonable and serious consideration from all segments of our society.

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