plant ecologist, a limnologist, and a resource economist. Students are required to have competence in the physical sciences, the biological sciences, and ethnography and anthropology. The aim is to produce "applied human ecologists" equipped with a "working method which allows them to go anyplace using scientific data and perceptions to find out what it is, why it is what it is, and where it's going, and also to know of people why they are where they are and what they're doing, and to ask the people what their perceptions of their natural and social environment are. . . ."

The vehicle to convey McHarg's all-embracing personal vision has been a course he has been running for the past 15 years, called "man and the environment." Each year he invites a series of distinguished lecturers to take students through the evolution of the cosmos, the solar system, plants and animals, the biosphere, and finally, the evolution of man. With man thus put in perspective, lectures move on to "the attitudes toward God, man, and nature represented in the major philosophies and theologies of the world," from the polytheism of ancient Egypt to the transcendentalism of Emerson and Thoreau. Then on to human behavior, the effects of environmental stress and overcrowding—and a discussion of the Midtown Manhattan Study of 1962 in which it was concluded that 20 percent of the population were indistinguishable from patients in mental institutions.

Finally, students hear speakers whose thinking may offer guidance toward the shaping of a healthier future. Among these have been poet Howard Nemerov, naturalist Loren Eiseley, Lewis Mumford, Margaret Mead, Hans Selye, Barry Commoner, and Erich Fromm.

Academy Study Finds Low Energy Growth Won't Be Painful

A National Academy of Sciences committee that is conducting a comprehensive study of future energy options has given some intriguing hints of its thinking. The group seems to have reached a consensus that a low rate of energy growth is possible without imposing adverse effects on the economy or requiring major changes in the life-styles to which Americans have grown accustomed.

The committee may thus add credence to previous studies that have endorsed the possibility of low rates of energy growth. Two of the most prominent of those previous estimates were the controversial low-growth scenario of the Ford Foundation's Energy Policy Project (*Science*, 1 November 1974) and recent projections by the Institute for Energy Analysis, headed by nuclear expert Alvin Weinberg (*Science*, 14 January 1977).

The significance of this increasing acceptance of low growth forecasts is that—if they are right—the energy problem may be a bit more manageable than is commonly portrayed. There may be less need to despoil the earth in a frantic search for new sources of fuel; the pampered public need not worry about reverting to primitive living because of insufficient energy; and decision-makers may have the luxury of downgrading the uses of particular fuels that are considered dangerous or undesirable.

The academy's study is perhaps the most comprehensive of the many energy studies to emerge in recent years. It is certainly one of the most ambitious studies ever launched by the academy in its long history of advising the government. The study was commissioned by the federal Energy Research and Development Administration at a cost of $2 million (additional funds may be added before the project is completed). Some 250 scientists, engineers, and other professionals are participating in the study under the direction of Harvey Brooks, professor of technology and public policy at Harvard, and Edward L. Ginzton, board chairman of Varian Associates; a full-time staff is headed by Jack M. Hollander, on leave as associate director of the Lawrence Berkeley Laboratory of the University of California.

The committee's final report is not due until 30 June, and it has thus far carefully avoided announcing any conclusions or recommendations. But in an interim report issued in mid-January, the committee indicated the "thrust and direction" of its inquiry in language deliberately chosen to reveal "some trends and directions" in the committee's thinking.

It seems clear that the committee envisions the possibility of a lower rate of energy growth than those suggested by most previous studies. The scenarios currently under consideration by the committee would put total energy use in this country in the year 2010 somewhere between a low of 70 quads (quadrillion Btu's) and a high of 210 quads. The low estimate is essentially equivalent to current energy use and is far less than the low-growth estimates of the Ford study (100 quads in the year 2000) and the Weinberg study (118 quads in 2010). The academy's high estimate is higher than Weinberg's, but it is still far less than the figure that would prevail if historical patterns of energy growth continued. The academy's final report will not designate any one scenario as most probable or most desirable. But the scenarios indicate the range of future energy use that the committee considers plausible.

The reduced rate of energy growth could occur, in the committee's opinion, without harming the economy as measured by the gross national product (GNP) or by the number of jobs. The committee believes that there is "substantial technological leeway" for providing a high level of goods and services with less energy [as might occur, for example, if we built factories and automobiles that were more energy-efficient]. It concludes that "there may be considerable leeway, over the long term, in the amount of end-use energy required for a given rate of growth of GNP and employment."

Similarly, the committee suggests—at least by implication—that energy moderation need not imply a drastic change in life-styles. In a list of alternative ways to reduce energy use, the committee puts "curtailment" of demand for goods and services in last place, thereby indicating that it is not considering asking everyone to abandon cars and refrigerators. Instead, it focuses attention on increasing the efficiency of energy use and changing the mix of goods and services toward those that require less energy. Even the academy's lowest growth scenario, which projects per capita energy consumption far below today's levels, is said to envision essentially the same level of amenities as we enjoy today. Whatever changes in life-style occur are expected to result from factors other than energy constraints.—PHILIP M. BOFFEY