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PROBLEMS AHEAD, BUT TECHNOLOGY CAN HELP

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The current energy crisis is just the forerunner of a number of situations which we will face in the next few decades that will change our attitudes, behavior and institutions. We will face a number of critical materials shortages and some failures in our technological systems that will force us into fairly radical changes in the way we conduct our lives and manage our society. Underlying these will be the continuing need to conduct our affairs with great care and frugality in the use of energy.

Crises in the supply of natural resources only can be averted by sound planning. As a nation with 6% of the world's population, we have increased our demands to the point where today, the United States is a net importer of minerals, consuming about 30% of the world's production.

Rapidly as our consumption is rising, it is rising even faster in many other parts of the world. As economic growth and industrialization accelerate over much of the world, the competition for mineral supplies will increase and the developing countries will exert more control over the disposition of their mineral resources. This situation has the seeds for crises if we plan no better here than we have in the energy area.

Science and technology can do much to postpone our day of reckoning. Chemists and geochemists, working with geologists, can help us understand the origin of minerals and hence can lead us to the discovery of concealed deposits. Chemical engineers can develop methods for use of lower-grade minerals, improve the efficiency of mineral recovery, and reduce the waste of valuable by-product materials. And with the help of science, we can develop more substitute alloys and materials that can shift the burden from substances in short supply to those available in greater abundance.

As the most basic change, we will need to create a "recycle society." In such a society, the present materials situation is literally reversed; all waste and scrap--what

are now called "secondary materials"--become our major resources, and our natural, untapped resources become our backup supplies. This eventually must be the industrial philosophy of a stabilized society and the one toward which we must work. It first involves a shift in industry to the design and production of consumer goods that are essentially non-obsolescent. This means that products will be built to be more durable, easily reparable with standardized replaceable parts.

Building toward the world of the future will call for increased emphasis on international cooperation. We should not delude ourselves into believing that self-sufficiency in energy and other resources is the total solution to national security and well-being. In fact, self-sufficiency in mineral resources is probably an impossible goal. And much of the developing world faces a food problem that can be solved only by means of international cooperation.

We will have to make enormous strides--together--in controlling population, increasing food production, managing our environment, investigating and controlling the resources of the seas, conducting global research, developing methods to reduce the human impact of natural disasters, and generally uplifting the economic conditions of a large number of the world's peoples. There are no alternatives to these measures--except a tremendous increase in human misery that ultimately will affect all the world's peoples.