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# Gasoline

Recently, Professor Marvin Paul of the City Colleges of Chicago suggested to *Science* that we devote an entire issue to energy. The idea was received with skepticism, but consultation with readers scattered across the United States caused us to proceed. The decision was taken February 4. Publication of the issue at this time was made possible by unusually good cooperation of both contributors and staff.

The content of this issue was chosen to present material relevant to important public decisions of the next few years. Some such topics have been recently treated in *Science** and repetition here was unwarranted. Other topics will be dealt with later.

One important matter not covered specifically in the following articles is gasoline and the automobile. Special notice seems desirable, for those long lines at the service stations are telling us something. When people are willing to appear at 5 a.m. at a station that is not scheduled to open until 8 a.m., they convey a message about the importance that many people attach to their automobiles. In part the attachment is economic. To many people, auto transportation is essential to their livelihood. In part the attachment is emotional, as Kenneth Boulding suggests in an article in this issue. Whatever the source of the demand, it would be politically impossible to force people this summer to get along on supplies as limited as those of February 1974. In future years as people adjust, as they change to vehicles consuming less gasoline, the acceptable level of supplies may drop. For this year and probably the next few years, a minimum acceptable daily consumption averaged over the whole year is about 6.2 million barrels a day or about 5 percent less than we consumed in 1973. Such a level would entail tension and grumbling.

With present-day refinery practice, a demand of 6.2 million barrels a day for gasoline fixes a minimum value for the input of crude oil. In typical instances, 48 percent of the crude petroleum is converted to gasoline. Thus to supply the minimum demand for gasoline, something like 13 million barrels of petroleum must be processed. Our total consumption of oil and its products has been averaging about 17 million barrels a day and our total production of crude oil and condensate has been about 11 million barrels a day. These figures indicate the central importance of gasoline consumption in dictating needs for crude oil. They also show that, in order merely to obtain enough gasoline, large quantities of gasoline or crude oil must be imported. There are, of course, other important uses of the gasoline chemicals in oil that will increase the lower limit on our need for oil.

Because of the central role of gasoline in energy problems, especial efforts should be made both to decrease demand and increase supply. Had we been driving smaller, less gas-consuming cars, there would have been no energy crisis. Some other forms of transportation consume less gasoline, and their use should be encouraged.

In principle, the oil companies could increase the yield of gasoline from crude oil. This would require changes in refineries. Today about 10 percent of the energy of crude oil is used in providing heat for the refining processes. In principle, this heat could be furnished by coal. Through more intense input of hydrogen in the cracking process, larger yields of gasoline could be obtained. One refinery expert has guessed that yields might be raised to as high as 75 percent from the present 48 percent. Such a shift would entail other shifts in the product patterns and in the consumption of hydrocarbons.

The barriers to increased yields are costs and time, but these can and should be overcome. Petroleum is too important to be used merely as a source of heat.—PHILIP H. ABELSON

* For a list of selected material related to energy that has appeared in *Science*, see page 386 of this issue.