Second thoughts on the hydrogen economy

A major problem facing proponents of the various so-called "exotic" energy sources is whether or not such sources can be made socially and economically feasible—issues theoretically inclined scientists sometimes have trouble judging. The idea of using hydrogen as the basic fuel of the future, for example, has recently gained popularity (SN: 7/15/72, p. 46), and a conference last week at Cornell University offered a rare opportunity for multidisciplinary debate on the subject.

As the cost of oil imports rises and increased use of coal faces stiff environmentalist objections (SN: 7/7/73, p. 10), the need to find a new fuel increases. The need for greatest change, according to S. William Gouse, dean of engineering at Carnegie-Mellon University, will be concentrated in the areas of transportation, which uses 25 percent of today's energy supply, and industry, which uses 41 percent. However, the problems of economics and acceptability are doubly troublesome here, because the exigencies of a free market may force industry to choose an environmentally inferior fuel, and changing people's transportation habits is notoriously difficult. Says Gouse: "Fooling with your car is like fooling with your wife or husband!"

Ultimately, most of the energy for industry and transportation must come from the heat of burning coal, nuclear reactors, or solar heating units—usually located some distance from the consumer. The energy must then be transported either as electricity or as a "created" fuel—hydrogen, for example, produced by electrolysis from water. The question dominating much of the conference was: When can hydrogen compete economically with electricity?

The time to start using hydrogen is now, contends Derek P. Gregory of the Institute of Gas Technology in Chicago. Electricity is relatively inflexible,

Photos: John H. Douglas

Derek P. Gregory: Hydrogen now . . .

Philip N. Ross: . . . a limited role.

particularly in running small transportation systems, he says, but hydrogen can be used directly as a combustion fuel to run cars or heat homes. Electricity now offers only about 10 percent of such "end-use" applications and major technological breakthroughs will be needed before it can begin to replace petroleum.

Philip Ross of Westinghouse disagrees. "In a few instances the hydrogen economy may find a unique place, but it will play only a secondary role." An electric engine has six times the efficiency of a combustion engine, he says, and rapid progress is being made in developing light-weight batteries to run electric cars. True, electric heating of houses is today less efficient than, say, hydrogen combustion in furnaces, but he believes that as electric "heat pumps" gain popularity, the efficiency balance will shift.

The consensus of conference participants seemed to be that hydrogen would find greatest importance in "energy intensive" applications, such as jet airplanes, where low weight, high temperature and simplicity are at a premium. One speaker claimed that the fully loaded weight of some jets could be reduced a third by switching from petroleum fuels to hydrogen. Other participants emphasized the need to give innovative schemes a fair trial. One speaker showed pictures of an efficient, hydrogen-powered catalytic heater. A group of young entrepreneurs who created the Energy Research Corporation of Provo, Utah, let delegates test drive a 1931 Model A Ford powered by hydrogen. Donald Bogart of NASA said efforts are under way to convert a small but highly efficient Braton cycle hydrogen engine developed for spacecraft into a large unit suitable for earthbound applications.

The Cornell conference was sponsored by the Cornell Energy Project and School of Engineering, under the chairmanship of Simpson Linke. Says Linke: "I wanted to get the advocates and the skeptics together." □

A month in space and a month to go

The Skylab 2 crew of Alan Bean, Jack Lousma and Owen Garriott passed the midway point in their mission last week, surpassing the 28 days of the Skylab 1 crew.

Garriott demonstrated for television audiences how a drop of water snakes around but still adheres to a straw as the straw floats in the Skylab. Also making a television debut was Anita, the spider, who was placed in the cage vacated reluctantly by her traveling companion Arabella. Anita had the same difficulty beginning her web as had Arabella. "Give her another day," Garriott said. Astronaut Karl Henize quipped back from the ground, "Okay, but tell her to get on the ball. The NASA program doesn't allow prima donnas."

The second spacewalk to replace solar telescopes, film and six gyroscopes that help provide stabilization by relaying to the computer the attitude of the space station went smoothly. Disconnecting the electrical cables to the gyros had been billed as "risky," but replacement went without a hitch. "However, one of these days we may break a piece of china," astronaut Rusty Schweickart said of the latest in the many repairs done on Skylab.

Royce Hawkins, deputy director for medical operations at the Johnson Space Center (JSC), indicated that the crew was in many ways in better shape than the Skylab 1 crew had been after 28 days in weightlessness. Some of this fitness was credited to the increased exercise the crew is getting. Each astronaut lost from 4 to 6 pounds during the initial period of motion sickness and had not regained the weight. Each had also lost an inch in the calves, but this loss appeared to be leveling off. After some initial difficulty attributed to the week of sickness, the crewmen were completing the full tests on the machine that simulates gravity by pulling the blood to the lower part of the body from the chest area where it tends to collect in weightlessness.

This week the astronauts photographed areas of the Milky Way galaxy in which young, hot stars are abundant.

The crew participated from space in the ceremonies formally renaming the Manned Spacecraft Center in Houston in honor of the late Lyndon B. Johnson. Bean radioed greetings to the guests, which included Mrs. Johnson, Texas dignitaries and NASA top management. "We think the work in which we are engaged right now in Skylab would not have been possible except for his [Johnson's] strong support and leadership as Senator and President." □