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Oh Brave New Moon

When someone in industry or government wants to let the world know about an invention or an improved process, he arranges a press conference complete with food or food and drink, a speaker or two, a movie projector, and, as the *pièce de résistance*, a gadget to be unveiled. If the project is "classified," the unveiling is incomplete—the works of the gadget are not fully exposed—and the dramatic effect is not as great as the sponsors would wish. So also in such conferences the answers to questions are often reminiscent of the reluctant testimony sometimes offered to Congressional committees. The thrust and parry may go something like this: "Would you say that the XK-93 has ten times as much potential velocity as the XK-79?" *Answer* (blandly, in a self-righteous tone): "All that security regulations permit me to disclose is that the XK-93 has substantially greater velocity than its immediate predecessor and that we feel it is an advanced design." One almost expects the spokesman to plead the Fifth Amendment.

Conferences dealing with nonsecret matters follow a different course: questions and answers range over a wide area, and speculative forecasts can be discussed. We recently attended a breakfast conference of this kind to hear some Westinghouse Electric Corporation scientists talk about the requirements for a manned base on the moon. Westinghouse scientists think a manned base would have to be essentially self-sustaining to be practicable. The costs of space transport being what they are, they envision a very lightweight electrical generating system as the heart of a self-supporting base. Given such a system the lunar pioneers could generate heat to set oxygen free from the oxides presumably present and could release hydrogen from hydrides. The hydrogen and oxygen could be combined to produce water. In a similar way the stage could be set for photosynthesis by freeing carbon dioxide from carbonates. In addition, a lunar technology could be developed to produce structural materials, rocket fuels, and so on.

Potential power systems on the moon are obviously fewer than those that are economically usable on earth. No one, for example, wants to buck the mass ratio (ratio between take-off mass and burn-out mass) by sending conventional fuels into space. Even lightweight and unshielded nuclear reactors would weigh several kilograms per kilowatt of capacity. The high intensity of solar radiation on the moon points to a generating system that would exploit this advantage by use of solar furnaces, solar batteries, devices to take advantage of geothermal (lunathermal?) gradients, or—and this is at present scarcely more than a gleam in the corporate eye—a photoelectric generating system consisting of a plastic sheet coated with a light-sensitive electron emitter and a wire grid.

Such a system as the last is especially suitable for the moon because of its light weight and the fact that it will function only in a vacuum. The gadget that Westinghouse unveiled was a small working model of this system. Questioning of the company spokesman made it apparent that a good many improvements will have to be made before a photoelectric generator will be practicable. The model demonstrated had an efficiency of about 0.1 percent; to be attractive for lunar operation it should have an efficiency of about 25 percent. If this efficiency can be attained—and the engineers seemed confident that it can—then the system will be able to produce about 1200 kilowatts per acre at a weight of only 1.7 kilograms per kilowatt.

Before this kind of system can be tried out on the moon a number of obstacles—too familiar to be listed here—will have to be overcome. And we continue to be haunted by the possibility that the moon's surface may be, as John R. Platt recently suggested [*Science* **127**, 1502 (27 June 1958)], so chemically unstable that exothermic reactions would be easily set off and that "the first man who plants a rubber boot on a lunar surface may be in for an unpleasant surprise."—G.DuS.