ELECTRIC RATE ANALYSIS FOR PV/BATTERY ENERGY SYSTEMS

Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439 (U.S.A.)

The objective of this study is to determine how the utility rate system will be affected by increasing penetration of customer-side-of-the-meter photovoltaic/battery systems. ANL will analyze the efficiency and practicability of alternative utility rate designs including time-of-day rates, demand charges, and load management contracts.

The solar/utility interface problem was analyzed within a standard economic representation of the periodic load problem. The basic approach was to use the welfare function formation of traditional peak load pricing theory as the framework for investigating the pricing and welfare implications of the solar/utility interface. In representing the essential features of solar supply technologies, both the periodic and the intermittent nature of the solar output was considered.

Work on this contract was completed March 1982.

Recent publications

1 J. G. Asbury and R. O. Mueller, *The Peak Load Problem with a Periodic (Solar) Supply Technology*, Argonne National Laboratory, May 1982.

CONSULTATION ON INTERACTIVE SOLAR ENERGY SYSTEMS FOR SMALL UTILITIES

C. H. Guernsey and Company, 3555 N.W. 58th Street, Oklahoma City, OK 73112 (U.S.A.)

C. H. Guernsey and Company, a utility consulting firm is providing engineering services for the grid-connected wind energy/battery storage (WEBS) project on the island of Molokai, Hawaii. Expertise is required to evaluate the utility aspects of

- Technical feasibility of the WEBS experiment;
- System and hardware design including the utility–wind turbine–battery interface and control equipment, transmission lines, and necessary inter-ties for special loads; and

- Proposed WEBS operational scenarios.

Initial data collection activities at Molokai Electric Company have been completed.

Further data collection and a preliminary dynamic study will be scheduled when MOECO's new generators and load control equipment have been fully tested.

CUSTOMER VERSUS UTILITY LOCATION, OWNERSHIP, AND CONTROL OF ELECTRICAL STORAGE

Research Triangle Institute, P.O. Box 12194, Research Triangle Park, NC 27709 (U.S.A.)

The customer-side-of-the-meter project concerns three questions:

- For grid-connected photovoltaic or wind energy systems, on which side of the meter should the battery storage be located ?
- If located on the customer's premises, who should own the battery storage, the utility or the customer ?
- If located on the customer's premises, who should control the operation of the battery, the utility or the customer ?

The preferred outcome of the study was defined as a methodology that would allow varied situations to be examined in a quantitative fashion using input parameters describing the application situations.

The methodology developed by Research Triangle Institute to address the questions of location, ownership, and control of electric storage batteries is embodied in two coupled linear programming models that allow the computation of breakeven battery life cycle costs to answer the location question and, in a simple life cycle cost formulation, to answer the ownership question. Under the modeling approach taken, the question of control of the customer battery is moot because the control perspective is that of overall system optimization including customer and utility.

Although the examples considered with the models are not diverse enough to generalize on the answers to the questions of location, ownership, and control, the evidence is clearly in the direction that location in the utility is preferred, that ownership by the utility is preferred over residential customers but not necessarily over commercial customers, and control should be exercised to minimize total system cost without regard to who exercises control.

Work on this contract was completed March 1982.