



# PROCESS ECONOMICS PROGRAM

SRI INTERNATIONAL

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## Abstract

Process Economics Program Report No. 181

### COGENERATION

(April 1987)

The revival of cogeneration in industrial plants is prompted by the high costs of energy and hastened by governmental incentives. Cogeneration can typically reduce fuel consumption by 25–35% in comparison with producing electricity and process steam in separate facilities. Among the governmental actions in the United States, the Public Utilities Regulatory Policy Acts (PURPA) of 1978 has had the greatest impact on cogenerators. It removed many institutional barriers to industrial power producers and provided numerous guarantees which permit cogenerators to interact with public utilities on financially attractive terms.

To illustrate the economics of cogeneration, we developed investment and operating costs for supplying electricity and process steam to a U.S. Gulf Coast plant producing 363 kt/yr caustic soda and 317.5 kt/yr chlorine by the membrane process. The study considered three demand capacities for electricity and process steam: (a) capacity to meet only the requirements of the caustic/chlorine plant, (b) capacity to produce excess steam for export, and (c) capacity to produce both excess electricity and excess steam for export. Each of these demands is met by three different processes:

- Natural gas-fired combined cycle process (CC)
- Integrated coal gasification combined cycle process (IGCC)
- Petroleum coke-fired atmospheric fluid bed (AFB) boiler process.

The estimated operating costs for the cogenerated electricity are 1.9 to 3¢/kWh by the CC process, 7.9 to 9.1¢/kWh by the IGCC process, and 0.41 to 2.2¢/kWh by the AFB process. The current market price of electricity to large users supplied by the Houston Lighting & Power Company averages 4¢/kWh. Comparing ROIs on the basis of discounted cash flows, the CC process is the most economically attractive; AFB ranks second. IGCC is uneconomical for industrial cogeneration because of its much higher investment and lower energy recovery from coal in comparison with the other two processes.

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Report No. 181

## **COGENERATION**

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For detailed marketing data and information, the reader is referred to one of the SRI programs specializing in marketing research. The CHEMICAL ECONOMICS HANDBOOK Program covers most major chemicals and chemical products produced in the United States and the WORLD PETROCHEMICALS Program covers major hydrocarbons and their derivatives on a worldwide basis. In addition, the SRI DIRECTORY OF CHEMICAL PRODUCERS services provide detailed lists of chemical producers by company, product, and plant for the United States and Western Europe.

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