

● Development of Burden Assessment Program on Environment

A program is underdevelopment regarding a coal related Environment Burden Assessment which is planned to be implemented from FY1994 until FY2001.

I. Purpose of Development

Regarding the coal utilization such as coal fired power generation, etc., the simulation program, called “ Burden Assessment System Development Program on Environment ” has been under implementation, by which we will be able to propose an optimum, with less environmental burden, simulation program in a precise and quick way based on PC leveled convenience. This program is expected to be utilized in designing a system to improve an overall system efficiency and/or to reduce emissions of environment polluting materials, as well as, to be used in developing a new coal utilization system, depending on both the situation whether the selected system design is technically feasible or not feasible, and also the extent of the actual environmental burdens, etc.

II. Outline

1. Environmental Issues Reviewing Sub-committee

The project has been promoted by organizing the Environmental issues reviewing sub-committee chaired by Prof. Hiroshi Moritomi of Gifu University, Faculty of Engineering, Energy/Environment system studies, supported by other 6 committee members and at least one regular observer from METI. CCUJ plays its role as a secretariat.

2. Study Results in FY2000

- (1) Regarding the program development, such environmental burdens as NO_x, SO_x, dust and CO₂ (efficiency) have become soluble by calculation in constructing a simulation system for those related polluting matters, which could be called a standard system related to Pulverized combustion, Fluidized Bed combustion and Coal Gasification systems, respectively. However, some amendment has become necessary, because some calculation has once unconsciously disappeared, or become uncontrollable to terminate the calculation depending on the inputting numerical data of each related component mentioned above.
- (2) Although the database construction, necessary for the program calculation, has been accomplished to cope with those other than the standard system, some partial amendment may become required.
- (3) Program operation manual (draft) has been prepared.
- (4) Furthermore, amendment is necessary to be added for those displaying means of the calculation results, and also for the data inputting methods for each related component to allow selection of the inputting data, etc.

III. Explanation of Program Function on Environment Burden Assessment

1. Model in Case Study

For instance, let the major facilities of a coal firing power station, such as Boiler, Turbine,

Generator, deSOx /deNOx installations, Electric Precipitator (EP), etc., be connected with those transporting pipes and conveyors on the display panel to make a process flow at first. (Figure 1) Then, by using the mouse, in clicking the right side button to select, among the menu, deletion/specifications of each component machinery, etc. in hopping up manners. In this way, miscellaneous transactions can be undertaken in a quickest way.

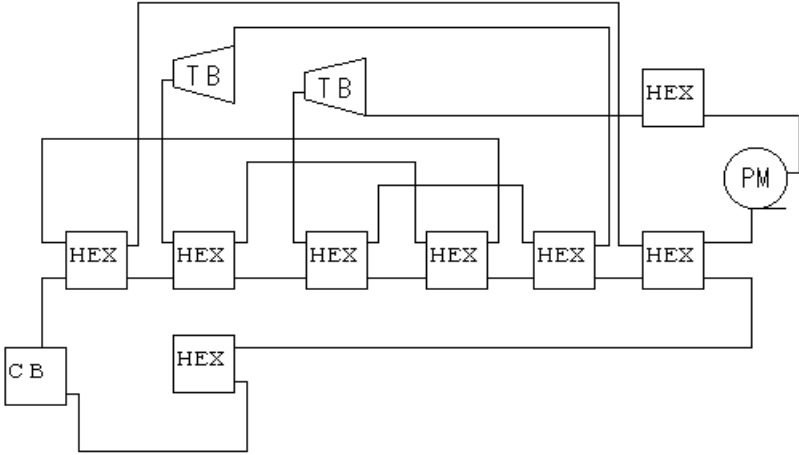


Figure 1. Process Flow Chart

The System name comes out on the title- bar of the personal computer in use, which coincides with the name of the file. Those marks of [file], [compile], [illustrate], [insertion], [calculation], [window] and [help] are in lined up on the menu bar as shown in Figure 2. On the tool bar, there is a conventional “tool bar” which contain normally displaying eye-cons, etc. such as indicating New drafting, Opening, Holding, Printing, Off-cutting, Copying, Labeling, Repositioning , Zooming ratio, etc. In addition, there is another one called “Component tool bar” which is composed of buttons to be used for inserting respective devices and machinery to the system flow directly on the displayed window.

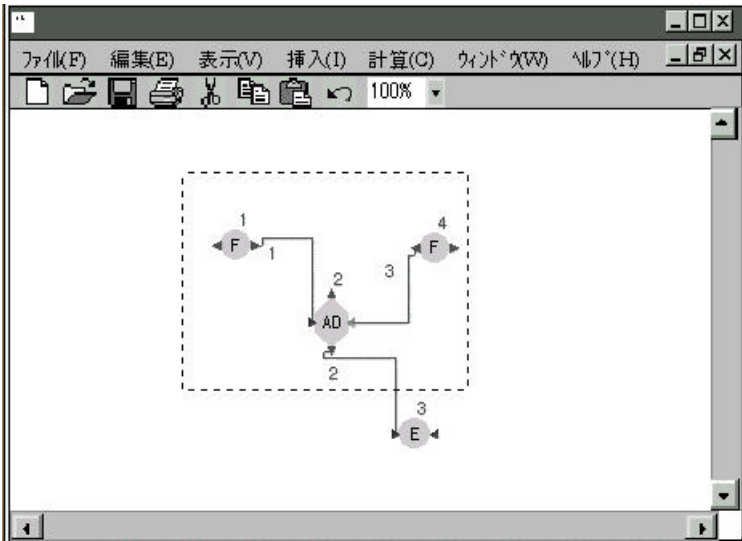


Figure 2 Window Display of the Process Flow

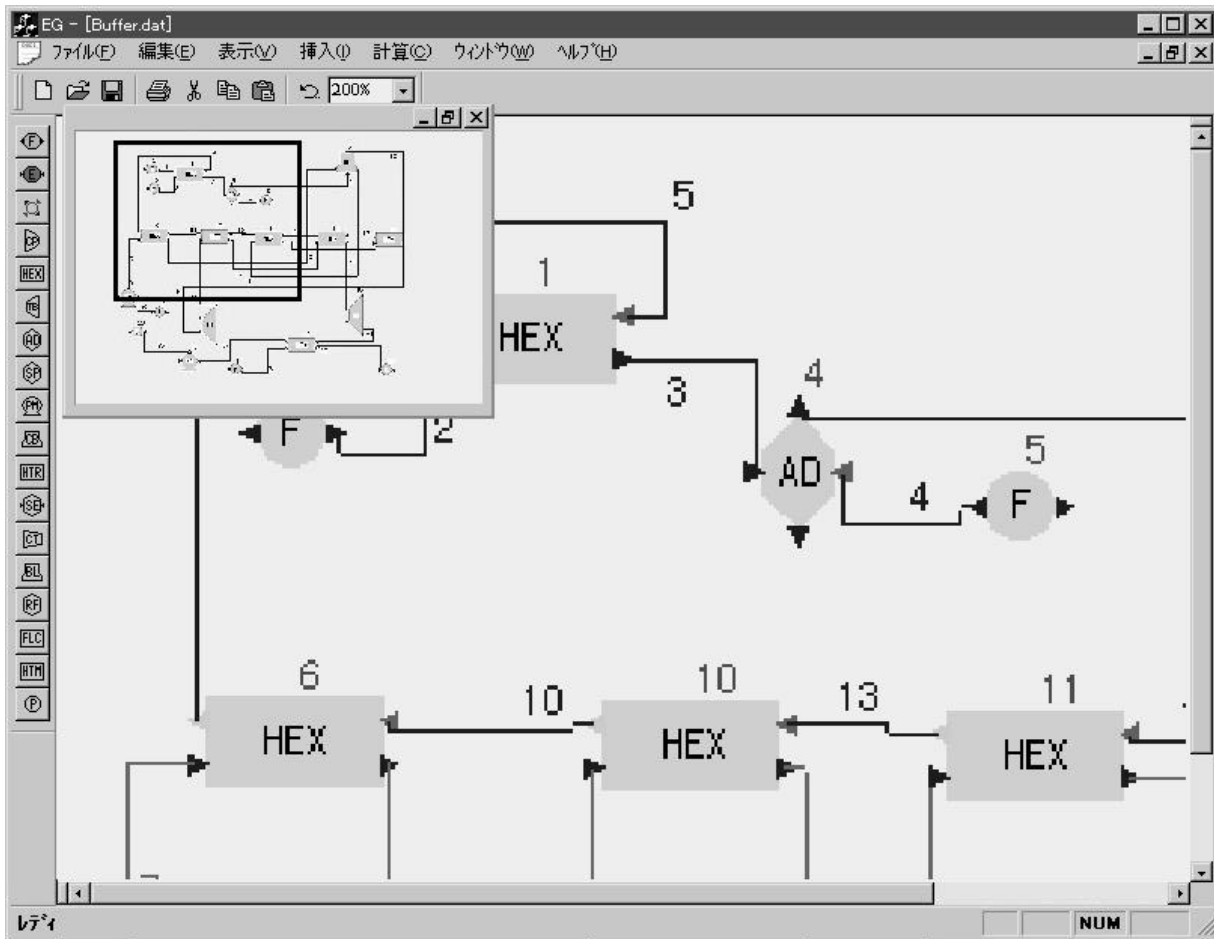


Figure 3. Diminution and Zooming on Displaying

2. Display

(1) Streaming Result Display

By setting up the items shown in the Dialogue box (Figure 4), then after selecting the illustrated constituents, if the “ OK ” is clicked, the Stream Results Window appears on the display. What appear on the Stream Results Window are such as those flow rate, temperature, enthalpy and so on of the respective constituents of the system. Installation Result Display.

(2) Plant Result Display

Losses, efficiency of plants and heat conduction area, etc. are displayed of their surveyed results, respectively.

(3) P-H Chart Diagram on Display

Pressure- Enthalpy relations are displayed in graph figures.

(4) H-S Chart Diagram on Display

The relation of Enthalpy and Entropy is shown in the attached graph.

(5) T-S diagram in illustration display

The relation between the temperature and the entropy is shown in the attached graph.



Figure 4. Stream Results in Diagram Chart

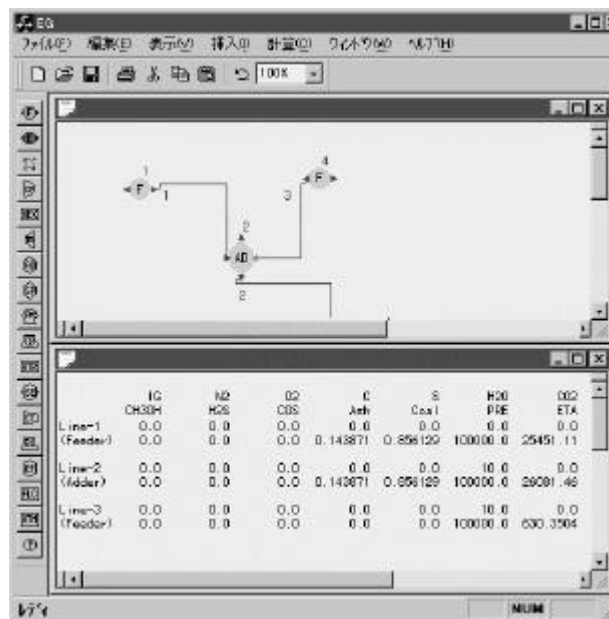


Figure 5. Calculation Results and the Process Flow