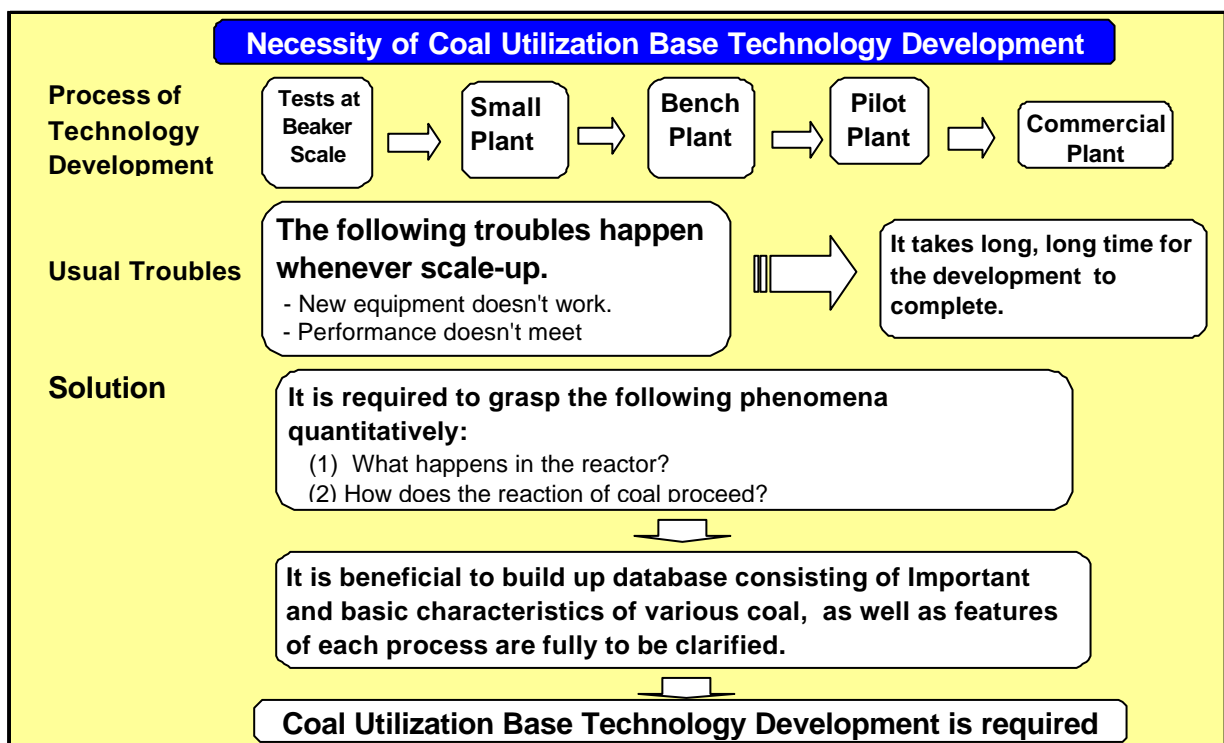


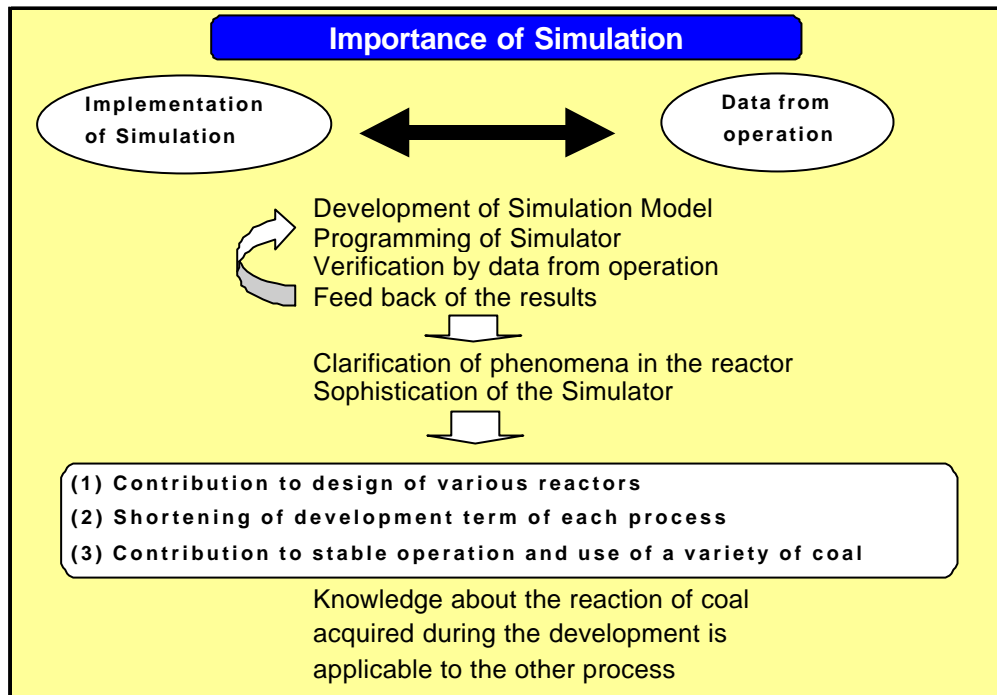
- **Entrained Bed Gasification under High Temperature and Pressure / Pressurized Fluidized Bed Combustion and Gasification**

1 . Purpose of Development

Because of the emission of environment burdening materials such as CO₂ etc. coming from coal combustion at coal firing power stations, etc., a technology development on high efficiency coal combustion has been under development in Japan. However, it has an extremely complicated range of its utilization, and then even at the same plant its actual processing performance often appears quite different time to time. Consequently, in the development of a new coal utilization technology, the lead-time required for its commercialization becomes very long in many cases. In addition, regarding behavior and reaction of the coal under high temperature and pressure, there are many unsolved matters, which would inevitably lead us to troubles during the development of the plant.

In particular, regarding the said background of behavior and reaction of the coal under high temperature and pressure, we have set the purpose of the technology development on **construction of the simulator forecasting performance, etc. in case of scale up and establishment of its related evaluation technology, as well as, compilation of a data-base regarding characteristics and individual chemical reactions of those multiple different coals, which all aim at reducing both technical and financial burdens related to the required scaling-up works** which were presumed to be encountered during technology development towards commercialization of a high efficiency coal utilization technology.





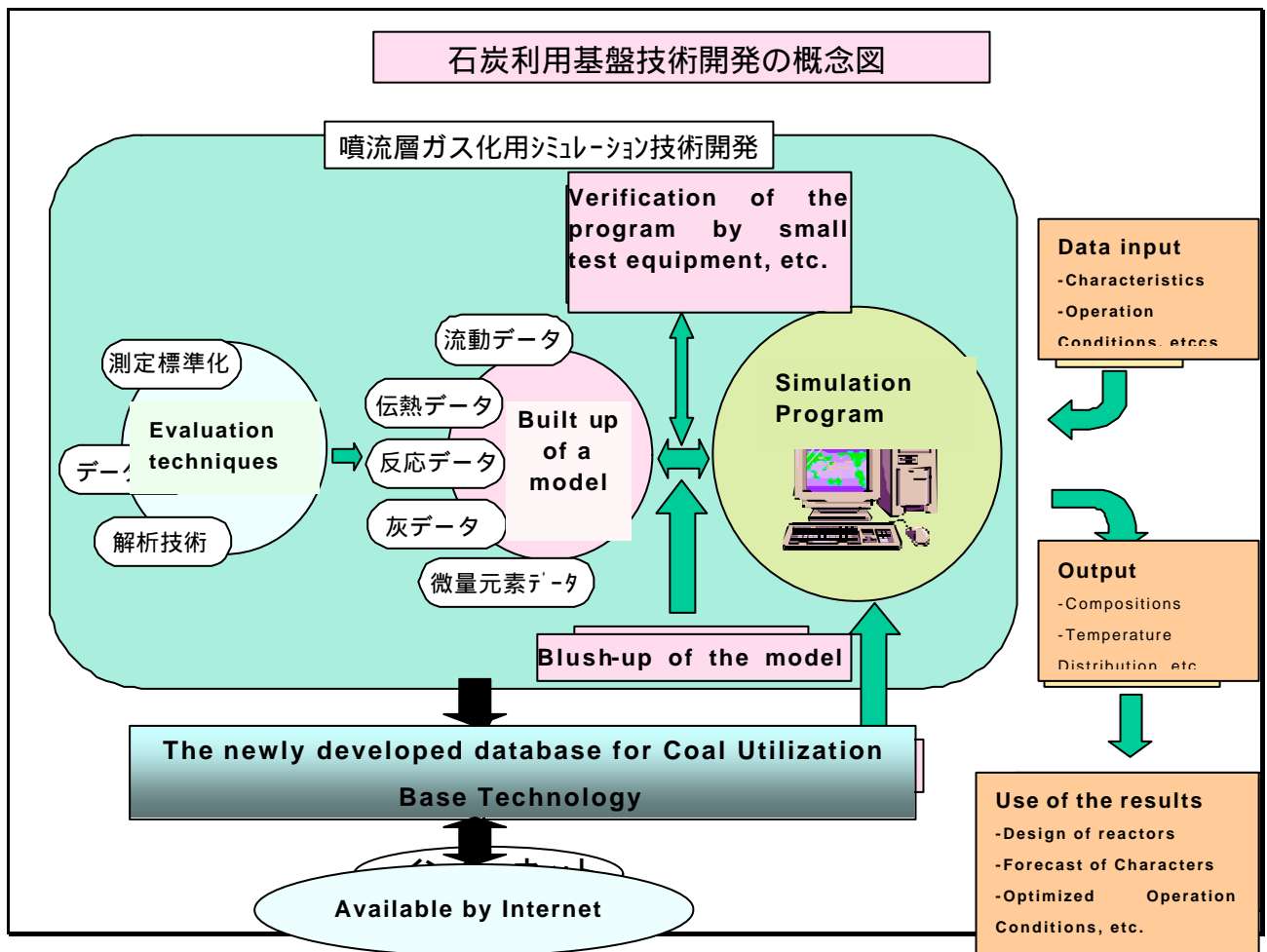
2. Content of Technology Development and Schedule of R & D

The objected processes of the technology development has been set to both an entrained bed gasification process, under high temperature and pressure, and a pressurized fluidized bed combustion • gasification process. In detail, the technical development has two phases of which the phase 1 covers survey and development of numerical models on gas flow, heat conduction and chemical reactions, etc., as well as, some coal reaction tests and their analyses which are required for the future uses of multiple quality coals. Furthermore, integration of the said models is also planned in the phase 1.

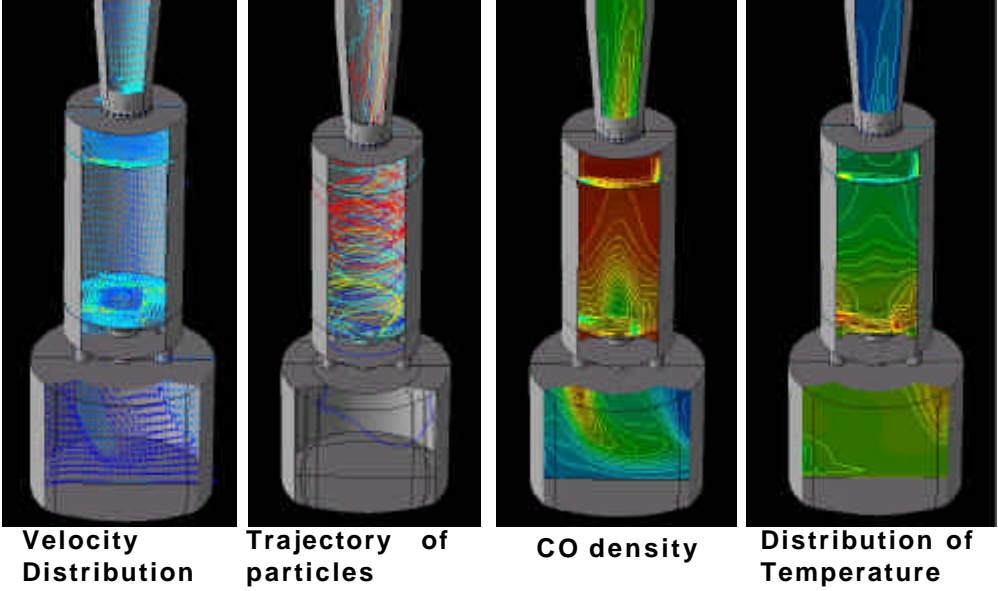
Phase 2 plans to develop a Simulation technology, which can cope with practical uses, respectively by grading up of accuracies of those various models developed up-to-now, development of heat conduction models related to the heat recovery zones, setting-in of the information into the simulator, accumulation of basic data coming from widening of the standard coal selection and, furthermore, enacting verification of those data obtained in the gasification experiments undertaken in a pilot plant scale.

	Fiscal Year (from 4/1 to 3/31)									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Phase 1										
1. R&D on Evaluation Method about effect on quality										
(1) Concept of the simulation model										
(2) Evaluation techniques for coal										
2. R&D on supporting system for high efficiency utilization										
(1) Simulator for the Entrained Bed Gasification under high temperature and pressure										
(2) Basic research on simulation for Pressurized Fluidized Bed Combustion & Gasification										
(3) Construction of Integrated Database - Collection of the selected standized coals and input of their specified data										
Phase 2										
1. R&D on Evaluation Method about effect on quality										
(1) Level-up of each Models - Reaction model - Heat transfer model in gasification furnace - Ash adherence model										
(2) Verification of the simulator - Tests using a middle size furnace - Tests using operation data of the Pilot Plant										
(3) Expansion of Integrated Database - Progress and expansion from Phase 1										

3. Concept of the R&D and Example of Analysis



**Example of data analysis
in entrained bed coal gasification furnace**



4 . Formation of the R&D

