



Importance of Development of CCS Technology and Renewable Materials

Yutaka Suzuki, Vice President

University of Hyogo

The Fourth Assessment Report of IPCC, “Climate Change 2007” states that it is very high confidence that climate change originated from human activities, using climate models (atmosphere-ocean coupled general circulation models). The major cause is CO₂ which is discharged into the atmosphere by burning of fossil fuels. CO₂ is a green house gas which accumulates in the atmosphere causing climate warming (generally called “global warming”). From the beginning of the Industrial Revolution, starting with the development of a highly fuel efficient steam engine by James Watt, we began to use large quantities of fossil fuels, and steam locomotives that symbolized the advancements of the Industrial Revolution began operating early in the 19th century. As we are now in the early stages of the 21st century, civilized society dependent on fossil fuels has created a serious problem called global warming in only a 200 year time-frame and sustainability of our society is in doubt.

The earth is constantly changing and evolving. But the timescale of change is on the order of several hundred thousand years or several million years. In the Triassic period, 200 million years ago, plants flourished and dinosaurs roamed the continents of the earth. Since that time, fossil fuels have formed. It is the ways of modern civilization that have led to the excavation of fossil fuels from underground or in seabeds and consumed large quantities of fossil fuels in a blink of an eye, as compared to the earth’s timescale and waste products of CO₂ have been discarded into the atmosphere. The result is climate warming, which is formed by the subtle energy balance between the atmosphere and ocean. Warming changes the amount of precipitation and regional patterns of precipitation and greatly affects vegetation and agricultural systems. Warming is melting glaciers and moving water from land to sea raising sea levels.

The basic principles for preventing global warming are to constrain consumption of fossil fuels, the major cause, and leave dependence on them ultimately. As energy sources to replace fossil fuels, nuclear energy and natural circulation-type renewable energies are alternatives. It is with a sense of urgency that we need to develop them in order to sustain an increasing world population and development of the global economy. The world now depends on fossil fuels for 90% of its enormous energy consumption needs, however, it is impossible to convert our energy in a short period of time (on the order of 100 years). Therefore, it has been deemed necessary to develop CCS (carbon capture and storage) technology, which separates and collects CO₂ discharged from the consumption of fossil fuels without discharge into the atmosphere and stores it in appropriate locations. As fossil fuels are also used as raw materials in large quantities, it is necessary to develop alternative natural circulation-type renewable materials.

RITE has achieved significant results in the development of CCS technology and renewable materials, which is a leading research institute not only in Japan but around the world. We expect and look forward to greater efforts in the future.