

## ■ Research and Development

The Shell Group is a pioneer in environmentally friendly countermeasures and new energy development. Our Central Research Laboratory—our primary research organization—works closely with the Shell Group's worldwide R&D bases, undertaking research on a wide range of themes. The solar battery business mentioned above is just one aspect of the new energy business we expect to grow into a second core business.

### Hydrogen Fuel

Hydrogen fuel promises to be an extremely clean source of energy. Fuel cells produce electricity through a chemical reaction of hydrogen with the oxygen from the air. We are working to commercialize this technology for principally automotive and home-use applications, and are making progress in our research. Since June 2003, Showa Shell has been operating the JHFC Ariake Hydrogen Station in Tokyo's Koto Ward, in collaboration with Iwatani Industries Co. as part of the Japan Hydrogen & Fuel Cell Demonstration Project. By January 18, 2007, the station had refueled a total of 2,000 vehicles, which is the largest figure among Japan's independent hydrogen stations.

Regarding fuel cells for home use, we are participating in a project to demonstrate their feasibility, and undertaking experiments with the aim of commercialization. Fuel cells for home use not only produce electricity, but also simultaneously generate heat through a co-generation system. Approximately 80% of generated energy can effectively be used. This system is expected to become widespread in the future, as it realizes energy conservation and a reduction in carbon dioxide emissions, as well as contributing to lower heating and lighting costs.



### Dispersed Power Source Business

We began cogeneration utilizing the TES (Total Energy System) in 1974. Since then, we have realized significant achievements in the dispersed power source business. We have been able to

more efficiently supply electricity than the existing electric power companies, thereby contributing to the reduction of carbon dioxide. In addition to large-scale facilities, we will also begin offering efficient and reliable cogeneration power systems for home-use and use by small businesses.



### GTL (Gas to Liquids)

GTL is a process in which the carbon and hydrogen contained in natural gas are combined to create synthetic liquid petroleum products. GTL fuel is clean and environmentally friendly, as it contains almost no sulfur, and has virtually no odor. The

Shell Group operates a GTL plant in Malaysia (the world's first commercial facility of this kind; see photo), which supplies GTL products to over 20 countries. Moreover, the Shell Group has announced plans to build a large-scale GTL plant in Qatar, slated for completion in 2009, which will further cement its lead in both GTL technology and GTL fuel supply. Trial sales of *Shell Eco Toyu* (see p.6) made with the GTL process commenced in 2002, and have gone very well.



### Natural Gas-Based Power Generation

From the viewpoint of environment protection, it is necessary to further improve energy consumption efficiency and promote energy conservation while helping retard global warming. Out of consideration for these requirements, we have established Ogishima Power

K.K. in collaboration with Tokyo Gas to explore ways to effectively and economically supply electricity from locations in close proximity to users. The authorities finished their environmental assessment process in 2006. The project is proceeding smoothly, and is scheduled to begin operation in 2009.



### Soil Remediation Business

The Company employs the NERA (Network Environment Risk Assessment) system, developed by the Shell Group, to assess environmental risks and manage soil contamination risks at service stations. Our subsidiary Shoseki

Engineering & Construction Co., Ltd. is registered as a specified assessment organization with regard to soil reclamation countermeasures. Another subsidiary, K.K. SVC Tokyo, which is authorized to undertake verification of environmental measurements, is working to develop a business as a highly reliable environmental risk assessment company.