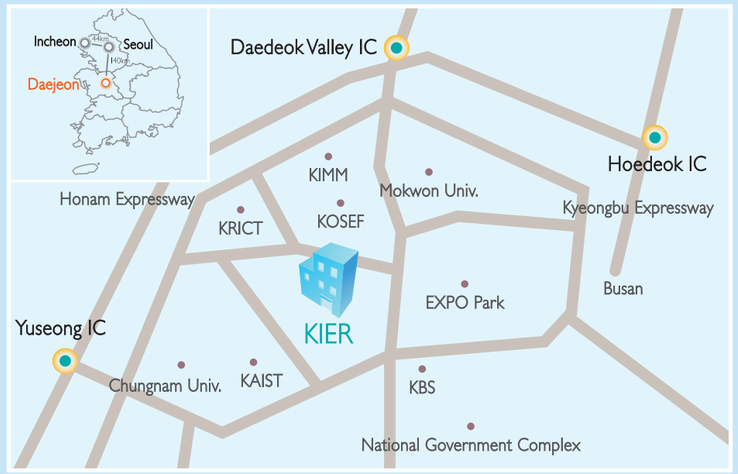
Visiting Information

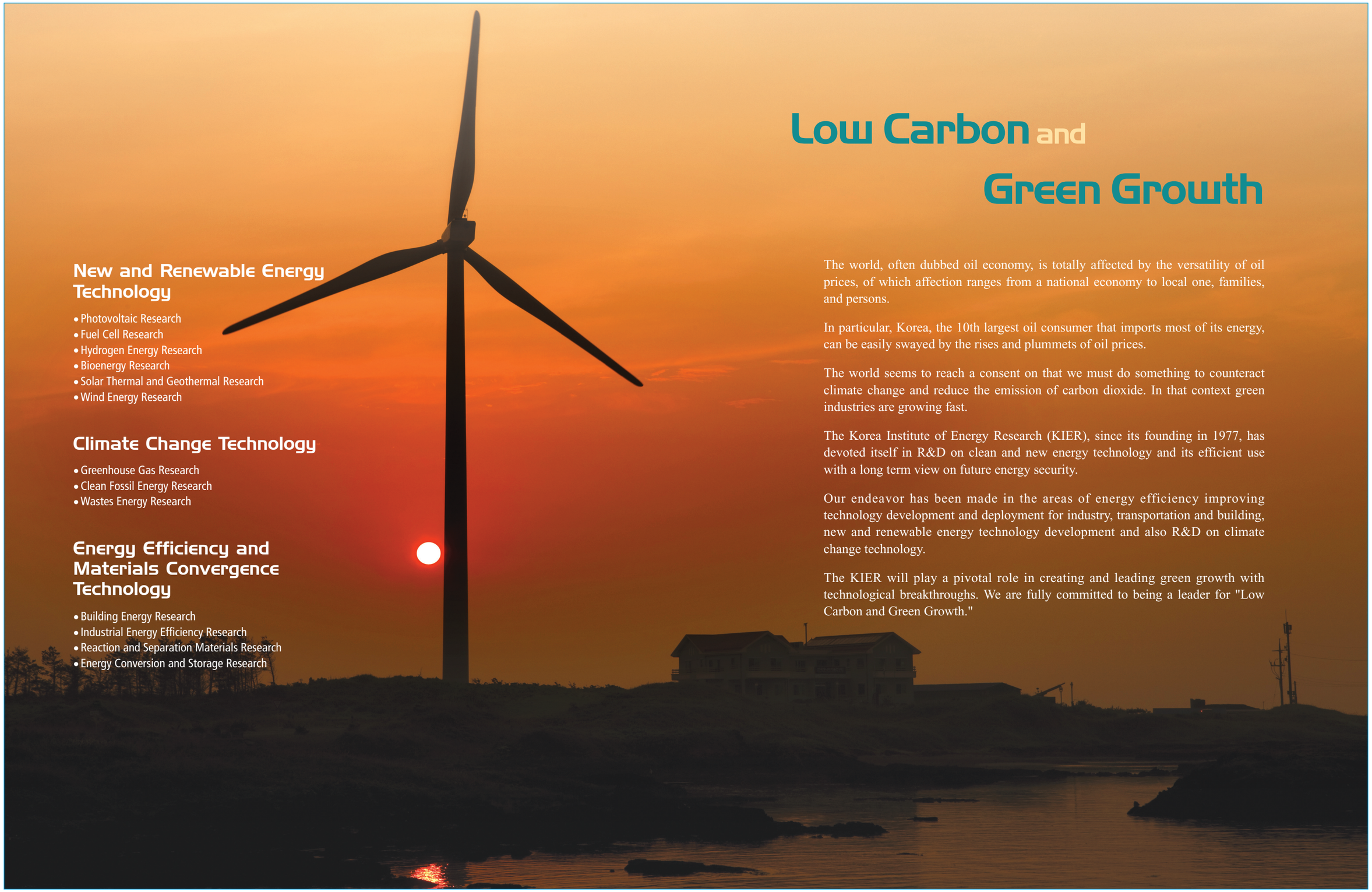
KOREA INSTITUTE OF ENERGY RESEARCH



I Address I 102 Gajeong-ro, Yuseong-gu, Daejeon 305-343
I Contact I TEL : +82-42-860-3496 FAX : +82-42-860-3191 E-mail : kimilja@kier.re.kr

KOREA INSTITUTE OF ENERGY RESEARCH

한국에너지기술연구원
KOREA INSTITUTE OF ENERGY RESEARCH



New and Renewable Energy Technology

- Photovoltaic Research
- Fuel Cell Research
- Hydrogen Energy Research
- Bioenergy Research
- Solar Thermal and Geothermal Research
- Wind Energy Research

Climate Change Technology

- Greenhouse Gas Research
- Clean Fossil Energy Research
- Wastes Energy Research

Energy Efficiency and Materials Convergence Technology

- Building Energy Research
- Industrial Energy Efficiency Research
- Reaction and Separation Materials Research
- Energy Conversion and Storage Research

Low Carbon and Green Growth

The world, often dubbed oil economy, is totally affected by the versatility of oil prices, of which affection ranges from a national economy to local one, families, and persons.

In particular, Korea, the 10th largest oil consumer that imports most of its energy, can be easily swayed by the rises and plummets of oil prices.

The world seems to reach a consent on that we must do something to counteract climate change and reduce the emission of carbon dioxide. In that context green industries are growing fast.

The Korea Institute of Energy Research (KIER), since its founding in 1977, has devoted itself in R&D on clean and new energy technology and its efficient use with a long term view on future energy security.

Our endeavor has been made in the areas of energy efficiency improving technology development and deployment for industry, transportation and building, new and renewable energy technology development and also R&D on climate change technology.

The KIER will play a pivotal role in creating and leading green growth with technological breakthroughs. We are fully committed to being a leader for "Low Carbon and Green Growth."

:: Photovoltaic Research

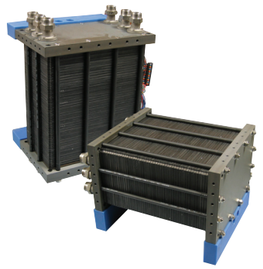
R&D on silicon solar cells, silicon thin film and CIGS thin film solar cells, dye-sensitized solar cells, PV modules, BIPV modules, PV PCS, PV systems, certification test and performance evaluation of PV components, and PV manpower training program

- R&D on silicon solar cells, PV modules and BIPV modules
- R&D on silicon thin film and CIGS thin film solar cells
- R&D on dye-sensitized solar cells
- R&D on PV power conditioning system (PCS)
- International standardization for performance test and evaluation of PV components
- R&D on diagnosis and user-oriented design of PV systems
- R&D on future-oriented mini-grids and energy supply network technologies
- PV manpower training program development
- Test and performance evaluation of solar cells materials and devices

:: Fuel Cell Research

The major goal of the Fuel Cell Research Center is to develope fuel cell core technologies for improving performance and durability and reducing cost through optimization of materials, components and systems for residential, transportational, distributed, and mobile applications

- R&D on materials, components and systems of fuel cells for cogeneration systems, electric vehicles, portable electronic devices and auxiliary power systems
- Development of core technologies of electrodes, electrolyzers and membrane-electrode assemblies to improve performance and durability
- Development of optimal design and integration schemes of fuel cell stacks and systems
- Training, education and performance evaluation of fuel cells



:: Hydrogen Energy Research

R&D on key technologies for hydrogen production via fossil fuel reforming and water splitting

- Hydrogen production system with natural gas steam reformer
- Compact fuel processor for stationary PEMFCs
- Reforming catalysts and catalytic oxidizer for MCFC
- Syngas production technology for GTL (gas to liquid)
- Catalysts for hydrogen and syngas production
- Thermochemical water-splitting for hydrogen production (SI, hybrid sulfur, solar thermochemical, thermochemical methane reforming, and other processes.)
- High performance electrolysis system for hydrogen production (PEM electrolysis, high temperature electrolysis of steam, alkaline electrolysis)
- Hydrogen storage evaluation system
- Advanced CO_2-free hydrogen production system (hybrid water-splitting process)

:: Bioenergy Research

R&D on production and utilization of various energies (methane, bio-diesel, bio-ethanol, hydrogen and synthetic gas) from biomass, including organic wastes and lignocellulosic biomass, using thermochemical and/or biological technologies

- Bio-diesel production technologies
- Biological production of hydrogen using solar energies
- Ethanol production from lignocellulosic biomass
- Biogas utilization using anaerobic co-digestion
- Gasification, pyrolysis, and combustion of biomass

:: Solar Thermal and Geothermal Research

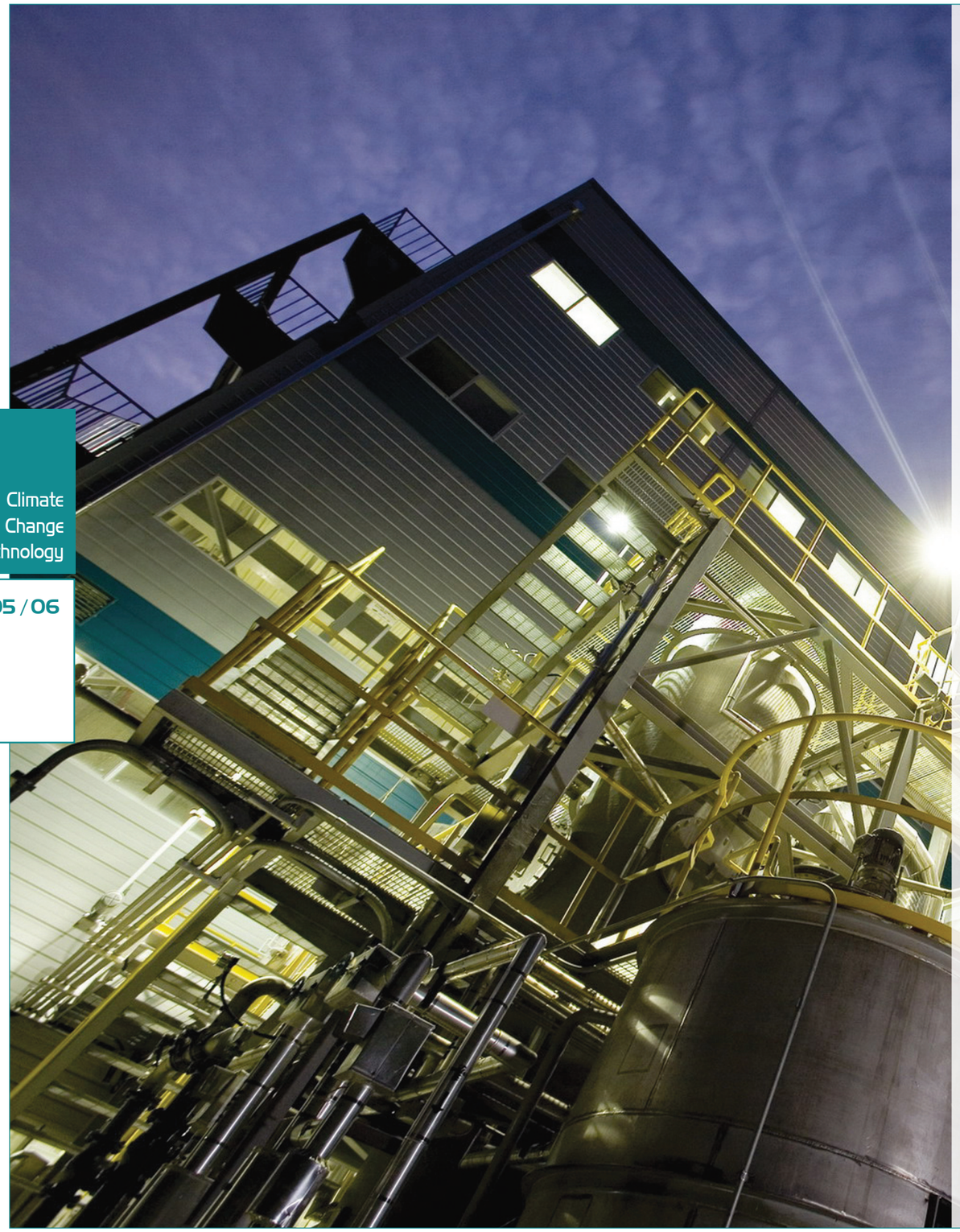
R&D on the system and key technologies of solar thermal energy, geothermal energy and hydropower

- Solar thermal system technologies & application technologies for building and industrial use
- Solar thermal power generation & solar thermochemistry
- Performance test of solar system and components
- Hydropower systems and technologies
- Geothermal and unutilized energy system technologies and heat pump technologies
- Establishing map of renewable energy sources

:: Wind Energy Research

R&D on wind turbine system and elements development, wind resource assessment, wind turbine system performance test, wind farm design & maintenance and especially offshore wind power generation demonstration

- Development of next-generation low wind speed and advanced load reduction blade technologies
- Development of wind turbine controller
- Assessment and forecasts of wind energy resources and wind farm design
- Inland and offshore wind farm performance evaluation and evaluating technology development
- Basic design and analysis of grid-connected wind turbines



:: Greenhouse Gas Research

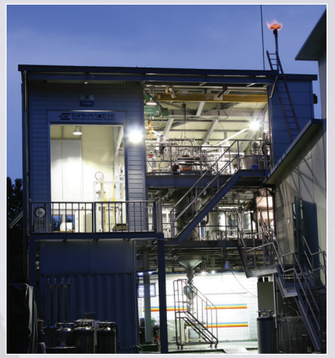
Carrying out research on capturing carbon dioxide from industries and energy-related sources for mitigating climate change. Core technologies include various types of post-combustion CO_2 capture technologies, pre-combustion CO_2 capture technologies, oxygen production technology for oxy-fuel combustion and the chemical looping combustion technology

- CO_2 capture technology from flue gases (liquid sorbent such as amine, ammonia and promoted K_2CO_3, dry sorbent, etc.)
- CO_2 capture technology from the shifted syngas (membrane, ionic liquid, dry adsorption, absorption etc.)
- High-purity oxygen production technology for oxy-fuel combustion (ion transport membrane, ceramic auto-thermal recovery, chemical looping cycle, etc.)
- GHG emission reduction technologies from various industries (chemical industry, steel making industry, cement industry, etc.)
- Establishing guidelines on country-specific GHG emission factors

:: Clean Fossil Energy Research

Clean Fossil Fuel Research Center are developing our own technologies to convert fossil fuels such as coal, natural gas and unconventional oils (oil sand and oil shale) to a cleaner form of fuel to ensure energy security of Korea

- Coal upgrading (deashing and drying) and coal gasification
- Coal gas cleaning and coal liquefaction (CTL: coal-to-liquids)
- Compact Fischer-Tropsch reaction system for gas-to-liquids (GTL) application
- Upgrading unconventional oil sources; oil sand and oil shale
- Process development of gas separation, storage and transportation using gas hydrates



:: Wastes Energy Research

Development of core technologies to produce alternative fuels through the conversion of various kinds of combustible and organic wastes into energy by environmentally friendly treatment methods

- Technologies for the pyrolysis and dechlorination of polymer wastes
- Techmologies for the preparation and cmbustion of RDF (Refuse-Derived Fuel)
- Techmologies for the conversion of organic wastes into energy and for the submerged quench incineration of toxic liquid wastes
- Technologies for the production of synthetic crude oils from non-conventional petroleum-based fuels
- Technologies for catalytic combustion and deNOx

:: Building Energy Research

R&D on energy saving technologies for buildings, including a building envelope, HVAC, control systems, and convergence technologies
R&D on highly efficient innovative lighting application using new light sources, distributed generation power and advanced power electronics
R&D on cogeneration system, energy network (DHC & CES), boiler, burner system and heat exchanger aiming at high energy efficiency and low pollutant emission

- Green building and low energy building technology
- Integrated design measures of sustainable building systems & and air conditioning system technology
- Evaluation of green buildings, building energy rating systems, window performance test, energy efficiency and performance testing of electric equipment
- High flux technology of white LED (Light Emitting Diode) light sources, integrated control and management system of distributed power generation and electricity conversion technology
- Development of high frequency electronic ballast for ceramic metal halide lamps
- Control and power conversion technology for fuel cell hybrid power systems
- Cogeneration system integration and energy network
- DHC (District Heating and Cooling) and CES (Community Energy Supply) systems
- Organic Rankine or stirling cycle based on cogeneration technology

:: Industrial Energy Efficiency Research

R&D on energy-saving heating and electricity production technology and advanced combustion technology to meet environmental challenges
R&D on green engine for car and power plant
R&D on high efficiency heat exchanger and heat conversion to utilize the waste heat from industrial processes and high efficiency combined drying system

- green engine for car and power plant fueled by biogas, syngas, H2gas
- SOFC BOP system and micro power pack
- Next generation of scale free reheating process
- Oxygen combustion technology
- Advanced combustion system technology
- High efficiency heat exchanging process based on heat transfer enhancement technology such as nanofluids
- System technology to use waste heat and heat conversion technology

:: Reaction and Separation Materials Research

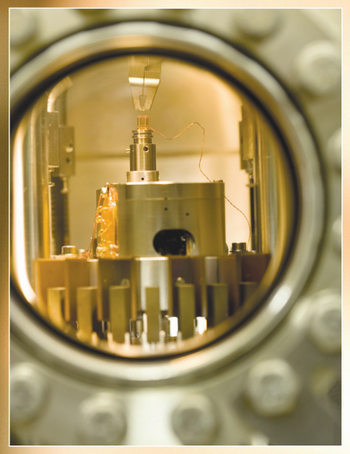
R&D on ionic conducting ceramics materials and gas and liquid separating materials
R&D on advanced chemical reaction and separation materials and technologies for realizing a new energy & environmental system

- Ionic conducting ceramic membranes for gas separation and reaction
- Ceramic candle filters for CTL and IGCC plant
- Fiber reinforced ceramic composites and Si-based energy materials
- Simultaneous chemical reaction and separation process
- Hydrogen storage materials and system
- Microwave energy process
- Inorganic membranes for CO_2, H_2 recovery and bioethanol purification
- Inorganic aerogels and hollow spheres for thermal insulation
- Environment-friendly biocomposites
- Nano-structured catalysts and reactors for catalysis

:: Energy Conversion and Storage Research

R&D on electrochemical energy storage, photo-electrochemical conversion of solar energy, electrical and electronic materials, and ribbon wafer for future energy

- Electrochemical energy storage materials and devices
- Organic/inorganic hybrid photo-electric materials and Luminescent materials & devices
- Sensors and MEMS technologies
- Development of poly-silicon and ribbon wafer for solar cells



Energy Policy Research

The Energy Policy Research Center, which boosts the central R&D institute's stature leading the national development vision of 'Low-Carbon Green-Growth', carries out the establishment of the institute's initiatives and mid and long term R&D plans, and the national energy & environment policies

- Establishment of the institute's vision and management goal & strategies
- Establishment of management strategies, mid and long term development R&D plans
- Energy policy research and analysis
- Support for national energy policies

International Cooperation

To enhance the international research capacity of KIER, the International Cooperation Team carries out the following activities: First, it supports research activities and networking with international organizations and overseas energy-related research organizations; second, it develops and fosters methods of utilization of research facilities and manpower between KIER and overseas research organizations; and third, it builds and supports the operation of overseas centers for cooperation.

- To support the activities of KIER in international organizations including IEA, APEC, IPHE, CSLF
- To support the establishment of cooperative bases with overseas energy-related research institutes
- To support researcher exchange programs

Technology Cooperation

: : Technology Transfer

The Technology Cooperation Center aims to promote dissemination of energy technology through technology transfer and commercialization of technology developed by KIER, also through business incubation for energy technology companies and the provision of training and education programs as well as the distribution of energy technology information

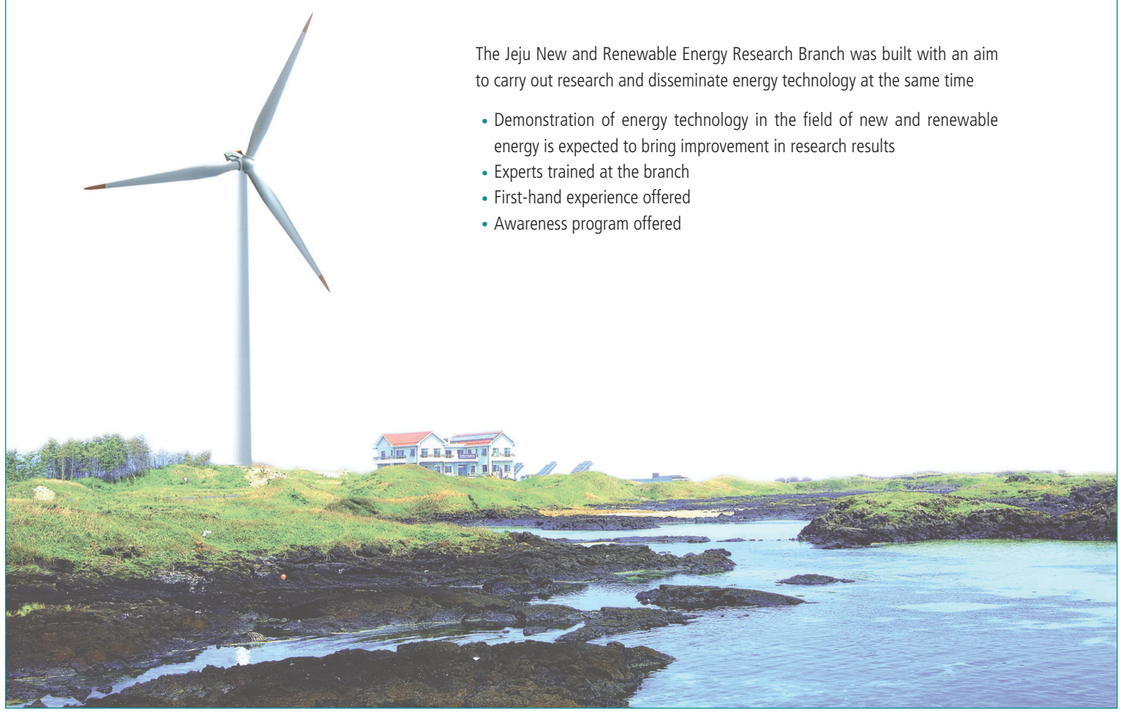
- Management of industry-academy-institution consortiums for technology development, and enhancement the competitiveness of promising small-and-medium-sized companies
- Evaluation and transfer of energy technology, consulting on local energy development plans, etc.
- Business incubation for knowledge-intensive companies in the energy technology sector
- Provision of training program to develop human resources in the energy technology sector
- Operation of an information center to disseminate information and knowledge on energy technology

: : Testing and Evaluation for Energy Technology

The Testing and Evaluation Center for Energy Technology carries out testing, inspection, analysis and evaluation of energy related equipment and technologies. It also performs Korea Laboratory Accreditation Scheme

- FE-SEM (Field-Emission Scanning Electron Microscope) analysis
- Chemical analysis and calorific value analysis of gaseous, liquid and solid fuels, and testing and analysis of heavy metals in ash
- Performance testing and evaluation on energy-related materials and technologies on energy conservation, energy environment and new and renewable energy
- Operation of the international testing laboratory accredited by KOLAS (Korea Laboratory Accreditation Scheme) and KS A ISO/IEC 17025

Jeju New and Renewable Energy Research Branch



The Jeju New and Renewable Energy Research Branch was built with an aim to carry out research and disseminate energy technology at the same time

- Demonstration of energy technology in the field of new and renewable energy is expected to bring improvement in research results
- Experts trained at the branch
- First-hand experience offered
- Awareness program offered