

Intellectual Property Report 2008 Edition

Central Research Institute of Electric Power Industry

Summary

1. Introduction

Central Research Institute of Electric Power Industry (CRIEPI) is a Japanese research institute authorized as nonprofit foundation conducting diverse research activities relating to the electric power industry since its establishment in 1951. CRIEPI actively promotes the creation, protection, and utilization of intellectual properties (Intellectual Creation Cycle) for the purpose of “maximizing Outcomes” defined as the social, economic, and academic impact of the research activities on the electric power industry, Japanese society and the global society.

The purpose of this report is to visualize activities related to Intellectual Creation Cycle and the outcome created by CRIEPI in fiscal 2008.

2. Intellectual property strategies for outcome creation

- Basic concept
 - CRIEPI applies “Outcome Management Methods” to the planning and execution of research projects and to Intellectual Creation Cycle in order to maximize outcome provided to the electric utilities and the public. CRIEPI gives careful attentions to the process of outcome creation in selecting research themes, management of intellectual properties, cooperating with stakeholders, execution of intellectual property rights, and determining the method and timing for publications.
- In order to produce the best outcome, CRIEPI promotes the utilization of the research results and intellectual properties through the following procedures
 - Research results are made known to the public by the publication of reports, research papers and other materials
 - Joint development of patents, software, etc; and licensing.
 - Funding research or providing consultation
 - Hosting technical seminars
 - Contribution to establishment of standards and regulations
 - Proposing policies at government sponsored councils
 - Administering authentication tests
 - Disseminating information at international symposiums and other forums
 - Disseminating information to the public
- Intellectual property strategies for outcome creation in fiscal 2008 include the following
 - CRIEPI began posting the CRIEPI Reports on its homepage making it available to the public for downloading free of charge to promote broad public use of the Institute's research results, and to enlarge outcome.
 - CRIEPI established the management system for security trade control in accordance with the Foreign Exchange and Trade Law to protect the misuse of outcome, such as a diversion to military use and to enhance appropriately the promotion of the international utilization of the intellectual properties too.
 - Over the past three years, CRIEPI has performed case studies to assess the impact of outcome has had on selected outcome (recorded in Fiscal 2005 - 2007 Intellectual Property Reports). In fiscal 2008, know-how of outcome evaluation with examples of current case studies were summarized and provided Institute’s staff personnel as a training manual to advance outcome creation.

3. Business operation outline

- Outline of research activities

- CRIEPI's comprehensive research program focuses on the five research principles of nuclear technology, advanced maintenance technology, environmental and innovative technology, optimum energy utilization technology, and social and business risk management. Ensuring energy security and countermeasures against global environmental problems are given the highest priority as CRIEPI's overriding mission.
- Research organization
 - CRIEPI strives to serve the electric utilities and society through research programs conducted by eight laboratories each with its own area of expertise.
- Scale of operations
 - Operational expenditures for fiscal 2008 totaled 33,830 million yen.
- Human resources : Status of human resources in fiscal 2008 is as follows
 - Number of staff personnel: 789 (Lab workers: 694, Office workers: 95)
 - Doctoral degree holders: 344
 - Executives and regular workers awarded academic prizes: 44
- Research collaboration and exchange programs
 - Number of joint research projects: 167 (electric utilities 14, manufacturers 24, national laboratories and associations 39, universities 60, overseas 30)
 - Promotion of joint research, information exchange and personnel exchanges with overseas research institutes

4. Creation of intellectual properties

- Research publications: 488 research reports and 137 commissioned reports
- Academic research papers: 1,682
- Patents: 125 applications filed; 49 registered
- Software: 97 registered

5. Utilization of intellectual properties

- CRIEPI report: 84,749 volumes of reports were distributed and 36,111 were downloaded from the Internet free of charge (July 2008 to March 2009).
- Research papers: 21,079 citations from the 3,317 research papers published between 1981 and 2008.
- Patent and know-how: 9 items were newly licensed.
- Software: 306 items were granted permission for use.
- Standards and regulations: Contributed to the establishment of 57 publications by governmental and academic societies.
- Commissioned research projects and consulting activities: 510 for the electric utilities, 53 for the government and public organizations, and 38 for general enterprises
- Qualification tests: 30 commissioned tests for large-capacity short circuit and 5 qualification tests for PD certification
- Seminars and training programs: 21 courses for electric utilities (530 participants) and 3 courses for general enterprises (317 participants).
- International symposiums: "The Role and Challenges of Electricity R&D towards a Low-Carbon Society" was held jointly by four institutions from the USA, Europe and China. 460 participants from utility companies, government agencies, manufacturers and universities.
- Public relations: Publication of the Annual Research Report in 2008FY and 6 CRIEPI NEWS releases. Mass media coverage included 752 published articles.

6. Topics for outcome creation

- Selected examples of recent creation of outcome
 - CRIEPI developed a new software program entitled "Human Performance Incidents Analysis Tool –Human Factors Research Center (HINT-HFC Ver. 2.0)" which was employed by each electric utility to conduct a factor analysis on human error and to assist in the analysis of measures related to errors, thereby contributing to a reduction in the number of human errors.
 - CRIEPI played a central role in compiling a summary of technical reports by the Japan Society of Civil Engineers on low-level radioactive-waste, and depth allowances for the disposal of

materials with comparatively higher radioactive levels. Results of the summary study are included in standards published by the Atomic Energy Society of Japan.

- CRIEPI collaborated with the Kansai Electric Power and Sumika Chemical Analysis Service in developing the commercial biosensor "Cadmiale" which effectively measures cadmium levels in soils and in brown rice. The product was certified by the Tokyo Metropolitan Government as a simplified measurement method for cadmium in soils.
- CRIEPI's ISO-IEC17025 certified high-power test station performed 65 short circuit tests over a period of 125 days. The test station also performs activities for the improvement of short circuit test technology and maintenance of rules and standards in cooperation with domestic and overseas test and research institutions.
- Business of ESICAT Japan LLP in SiC epitaxial wafers licensed by CRIEPI was taken over to Showa Denko K.K. to facilitate the expected expansion of the market. This move will allow the development of a substantial production system for SiC power semiconductors utilizing technologies of CRIEPI.
- Current and future activities
 - Trial application is underway at six electric utilities for CRIEPI's recently developed software program "Electric cable workload reduction system" which applies image-recognition technique to reduce the time required for visual inspection of transmission lines to about 1/3.
 - A proposal was made to further develop Demand area power system technology utilizing power electronics equipment and information communication. An empirical study conducted at CRIEPI's full-scale Demand area power system test facility has already successfully identified the influences dispersed power systems have on the power distribution system.
 - Development is underway on metallic fuel fast breeder and dry type reprocessing technology. The government approved this technology as its second choice for the next cycle of fast breeder development.
 - A method for digitalization of uncertainties for the safety assessment of radioactive waste disposal was developed following hearings attended by specialists in the field. This method is being applied by academic organizations in investigations of sub-surface disposal to be included in their standards.
 - CRIEPI developed an in-situ triaxial test method for rock masses that is capable of simultaneously assessing strength and deformation characteristics of a rock bed at the site using a single specimen. The method has already been applied at a power facility construction site.
 - CRIEPI is developing a passive type MR damper that is capable of achieving a high level of vibration suppression, does not require a power supply and is maintenance-free. A prototype was designed and produced using newly developed MR fluid analysis codes.
 - An analysis code, NuWiCC-ST, to assess the volume incoming sea salt particles was developed. 21 volumes were licensed to four electric utilities and have been used effectively in assessing corrosion of power facilities due to salt pollution.
 - A method to survey and assess ecological systems utilizing DNA technology of wild life was developed. This was applied to an environmental assessment for a power generation plant expansion plan and contributed to quantitative assessment of the ecological system.
 - Technology for the immediate measurement of the concentration of chlorine contained in concrete by laser irradiation was developed. Contribution to reduction in facility maintenance costs and safety improvement is expected.
 - CRIEPI developed the software program entitled Facility maintenance plan establishment support program to support asset management of electric power distribution facilities and used the program effectively in establishing plans at the electric utilities.
 - CRIEPI applied surface modification technology to develop low-corona noise spiral wire treated with oxidized titanium photocatalyst and nano-technology for suppressing corona noise and wind noise. The material has been introduced to electric utilities to be employed for transmission lines.
 - The In-furnace blending method for coal mixing used by pulverized coal firing power generation plants has been shown to produce remarkable reduction in NOx and unburned matters in ash by modifying the coal supply method. Contribution to reduction in environmental loads and in operating costs is expected.
 - CRIEPI developed a database built from a geographic information system and high-efficiency gasification power generation system to achieve efficient utilization of biomass resources. The data base is currently utilized by electric utilities and local governments.

- CRIEPI developed a SCC (Stress Corrosion Cracking) test method in simulated environment of light water reactor start up. This method is designed to clarify the SCC susceptibility against the hydrogen peroxide concentration during reactor start up and will thus contribute to the safety of nuclear power plants.