

FY 2008

**Reports on Research
Activities
Settlement of Accounts**

From April 1, 2008

To March 31, 2009

June 2009

Central Research Institute of Electric Power Industry

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Reports on Research Activities in FY2008

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Basic Management Policy

- Contributing to the electric power industry and serving the community
- Solving problems before they occur and demonstrating creativity
- Enhancing vitality and creating an upbeat, energetic workplace

Tatsu-No.2 August 12, 1980

Reports on Research Activities

FY2008

Research Activities' Outline

To achieve the CRIEPI's largest mission of "ensuring energy security and approach to the global environmental problems", we developed research activities on the basis of steady response to present and future subjects to the electric power industry, cultivation of human resources leading in the next generation, development of activity foundation responding to changes of the ages, and further application of management resources.

CRIEPI's FY 2008 income was 34.41 billion yen, including the balance brought from the previous period, and the expenditure was 33.83 billion yen. As a result, the balance of the net property at the term end was 34.6 billion yen - up 1.31 billion yen compared with the previous year.

1. As a professional group in research and development related to energy and environment, we played an comprehensive power concentrating a broad range of fundamental technology to steadily promote researches related to important subjects for the electric power industry, such as light water reactor plant life management, operation and maintenance of electric power generating facilities and electric power distribution facilities, responding to natural disaster and others.
2. Responding to realization of low carbon societies, we actively handled with future subjects in the electric power industry and societies, including CO₂ separation and capture from the thermal power plants, next generation grid technologies expected in core technology in the future power system.
3. We concluded fundamental strategy of the research activity extending to the mid-and-long term for worker's consciousness and action innovation and concluded purchasing contract of adjoining site of CRIEPI's Yokosuka district to realize new research expansion including high efficiency energy utilization technology at demand sides.
4. Responding to reformation of public-service corporation systems, we work on business, organization, and accountant design.

I. Research Activities

Aiming at the mission achievement in CRIEPI, we promoted five research pillars of “nuclear technology”, “advanced maintenance technology”, “environment and innovative technology”, “optimum energy utilization technology”, and “social and business risk management” under three year research plan since FY 2006.

In FY 2008, the final fiscal year of the three-year research plan, we concentrated our effort for steady accomplishment to handle new technical development for future low carbon societies such as the next generation technology including CO₂ separation and capture from the thermal power plants as well as a response to mass introduction of renewable energy.

On research promotion, we played the comprehensive strength through interdisciplinary promotion system with communication of eight research institutes*. In particular, we promoted the light water reactor plant life management research as urgent subjects for the electric power industry as a general project.

We also enriched large-scale research facilities supporting research activities including “light water reactor materials analysis station (first period)”, “autonomous demand area power system hybrid experimental facilities (first period)” and “site local observation system of ice and snow accretion on the power transmission lines and galloping phenomena”.

The following is an overview of major research results for the period.

1. Promoted project subjects and project subjects (Table 1)

Positioning project subjects from those with high needs in the electric power industry and societies, and requiring timely achievement and application, we conducted 11 promoted project subjects and 35 project subjects shown in Table 1 along with “five research pillars”.

(1) Nuclear technology - Supporting foundations for a stable supply -

We steadily promoted nuclear technology that has central function for global warming measures and support foundation of stable power supply in the future.

For plant life management of light water reactors, we continuously contribute to preparing the road map for the industrial world on various technical subjects related to ageing degradation to promote development of prediction, assessment, and countermeasure technology for irradiation embrittlement, degradation caused by thermal hydraulics, and stress corrosion cracking (SCC). In particular for irradiation embrittlement, we investigated

Note: Socio-economic Research Center, System Engineering Research Laboratory, Nuclear Technology Research Laboratory, Civil Engineering Research Laboratory, Environmental Science Research Laboratory, Electric Power Engineering Research Laboratory, Energy Engineering Research Laboratory, Materials Science Research Laboratory

irradiation embrittlement mechanism for pressure vessels during high neutron irradiation through microstructural observation of surveillance test specimens for pressure vessels and prepared on the master curve fracture toughness test method for the domestic pressure vessel steels.

For backend project support researches, we developed high-, low-level radioactive wastes disposal technology and recycled fuel transport and storage technology to support projects by the national government and the power industry smoothly. Among them, for the margin depth disposal of low-level radioactive wastes, research accomplishments of long-term durability for engineered barrier materials in bentonite and cementitious materials were reflected in the technical reports of the Japan Society of Civil Engineers and private standards in the Atomic Energy Society of Japan.

(2) Advanced maintenance technology - Rational operation of electric facilities -

For existing power facilities from power generation to distribution, we promoted development of rational diagnostic maintenance technology applying at the site.

For the power generating facilities, aiming at improving the damage diagnosing technology for aged components and plants, we clarified facts to detect internal creep defect at high accuracy through the tests applying phased array ultrasonic non-destructive inspection method into actual piping. For creep and fatigue damages in boiler water wall tube and balance of heat absorption and combustion in an entire boiler, we developed a program available for actual equipment diagnosis.

For power transmission and distribution facilities, we developed a deterioration estimation method of transformer insulation paper based on thermal history as an on-site diagnostic technology in order to reduce maintenance and renewal costs of the facilities without reducing network reliability for coming mass renewal period. We also developed supporting tools for maintenance and renewal planning of the facilities.

(3) Environmental and innovative technology - Sustainable use of fossil fuels and new energy -

To contribute to mitigation of climate change, we promoted researches of global warming projection, effective utilization of biomass energy, and high efficiency thermal power generating technology.

For global warming projection, we introduced a carbon cycle model into the global climate model to investigate future changes of CO₂ absorption in marine and land ecosystem. We also developed a simplified climate system model for easy study of climate change at various CO₂ emission scenarios.

For utilization of biomass energy, we developed a supporting tool available for assessment of business profitability from fuel production to power generation to clarify spontaneous heating mechanism during biomass storage.

For high accuracy prediction of thermal hydraulics phenomenon inside the gasifier which is

important to establish high efficiency and stable operation of the Integrated coal Gasification Combined Cycle (IGCC), we verified adaptability of numerical simulation method developed by CRIEPI by comparing with experimental data to sample coal for the demonstration plant.

(4) Optimum energy utilization technology - Contributing to more comfortable and enriched life -

We promoted researches on effective energy utilization technology supporting rich life and industry considering conformability and environment influence.

For low-loss SiC power semiconductor devices, through collaboration research, we developed production technology of epitaxial layers with quality and size (diameter of 3 inches) adaptable to supply to the commercial market for industrial uses. This opened a path to development and production of SiC power devices and converters.

Aiming at demonstration of “solitary aged people watching system” developed by CRIEPI, we started one-year demonstration test in Komae City. This system is intended to watch daily living conditions through analysis and prediction of use situation of electricity from electric current fluctuation generating from home appliance ON/OFF switching.

For next generation electricity grid technology started in FY 2008, as one of measures to alleviate reverse power flow to upper systems due to mass introduction of photovoltaic power generation (PV), we developed the optimum operation method for heat pump water heaters and batteries considering uncertainty of weather and hot water demand realizing consumption of PV-generated energy within consumers as far as possible.

(5) Social and business risk management - Contributing to more comfortable and safer communities -

We integrally promoted researches related to the natural disaster risk and human risk to ensure safety and security to the power generating facilities, and those related to energy policies.

For natural disaster risks, we officially started site observation for snow damage measures research in the power transmission facilities and succeeded in observation of weather conditions, snow covering situation as well as galloping behavior at electric wires to obtain variable data for countermeasure study. For power distribution facilities damaged due to earthquake, etc. we developed restoration supporting systems including a real time damage estimation system for effective recovering operation estimating damages on a real-time basis and a part of the systems is demonstrated by test operation.

To respond new guidelines of seismic design of nuclear power plants, we proposed assessment method of earthquake scale from active faults by combining optimally topographical, geological, and geophysical methods depending on target areas to reflect results to seismic safety assessment of existing power plants.

For energy policies, we studied electrification scenario concentrating to energy saving, promotion of electrification, and low carbon emission power sources for realization of low

carbon society to propose as one of the effective solutions for global environmental problems.

2. Base research subjects (Table 2)

In FY 2008, we were steadily engaged in 37 base research subjects. Applying characters and specialty of eight research institutes classified by special fields, we further enhanced fundamental technical power to cultivate next generation core technology and challenged response to future issues and advance technology.

Table 3 shows major funded research conducted in FY 2008. Table 4 indicates the number of reports and Table 5 shows the number of paper presentations. The number of reports in FY 2008 was 625 items and paper presentation domestically and overseas was 1,682 items.

**Table 1 Major Research Accomplishments in ● Promoted Project Subject (11 subjects) /
○ Project Subjects**

(1) Nuclear technology

Plant life management research of light water reactors (PLM general project)

- High accuracy prediction and its standardization of irradiation embrittlement
 - Investigated irradiation embrittlement mechanism of pressure vessel during high neutron irradiation of 6×10^{19} n/cm² by microstructural observation of surveillance test specimens and archive pressure vessel materials irradiated at test reactors.
 - Prepared standard drafts of master curve fracture toughness test adaptable for domestic pressure vessel steel.
- Comprehensive measures of degradation caused by thermal hydraulics
 - Improved assessment function of the Flow Accelerated Corrosion evaluation method by applying iron solubility and oxide film property model.
 - Confirmed adaptability of the Liquid Droplet Impingement Erosion evaluation method based on three-dimensional steam flow calculation to wall thinning location and shape prediction.
- Advanced SCC assessment method
 - Clarified the loading direction effect to crack propagation property at the weld boundary of stainless steel.
 - Clarified hydrogen peroxide influence to SCC sensitivity of stainless steel at BWR plant start-up.
- Plant life management measures
 - Comprehended the effect of evaluation of oxidation progress and the residue of antioxidant of insulating materials for assessment of deterioration property of actual cable.
 - Contributed to the FY 2009 road map for industrial world on plant life management research.

Radiation safety

- Assessment of low dose radiation effect
 - Clarified necessity of radiation protection model considering dose rate by epidemiological study for inhabitants living at high natural radiation areas in India and China, and various experiments on animals or cells.
- Rationalization of ensuring radiation safety
 - Expansion of CRIEPI's clearance level measuring devices for metal wastes to apply concrete wastes.
 - Improved explanation of safety of sub-surface disposal with engineered barriers through risk-informed safety assessment analysis applying uncertainty quantification method developed by CRIEPI.

Backend project supporting research

- High-level radioactive waste disposal
 - Concluded various element technologies from the viewpoint of area selection survey and site characteristic survey.
 - Assessed adaptability of characteristic assessment method of nuclide migration in base rock by the underground water flow assessment method and tracer experiments.
 - Collected material characteristics data of various low alkaline cements to assess adaptability as a disposal site construction material.
- Low-level radioactive water disposal
 - Experimentally clarified eluviations of engineered barrier materials (cement and bentonite) at disposal site environmental conditions and alteration characters.
 - Clarified permeability mechanism of gas generated from wastes to develop resultant stress combined analysis model.
 - Reflected research achievements related to long-term durability of bentonite and cement engineered barrier materials to technical reports to Japan Society of Civil Engineers and private standards of Atomic Energy Society of Japan.
- Transpiration and storage of recycled fuel
 - Monitored aged deterioration of concrete cask containing spent fuel stored for 15 years to ensure its integrality.
 - Developed SCC assessment method and countermeasure technology for canister materials of concrete cask.
 - Conducted the simulation test of airplane crash onto metal casks to confirm validity of confining function assessment method.

Next generation nuclear technology

- Metallic fuel cycle
 - Demonstrated complete recovery of long lived transuranics elements by dry separation technology from real high level liquid waste generated from PUREX reprocessing of spent LWR fuel.
 - Derived mass balanced data at the main process based on Pu and U tests relating to dry reprocess technology.
 - Developed structures and crucible materials with less actinide loss for cathode processor of engineering scale.

(2) Advanced maintenance technology

Advanced maintenance technology of power generating facilities

- Gas turbine hot gas path parts maintenance
 - Improved semi-automatic software tool to generate a blade numerical analysis model using geometry measuring data by X-ray CT.
 - Improved the accuracy of the numerical heat transfer fluid analysis method adaptable for estimating temperature distribution in updated blades with film cooling system and thermal barrier coating (TBC).
- Power generating plant performance diagnostics
 - Increased reliability and convenience of the thermal efficiency analysis program for power generation systems to establish its support systems.
 - Developed boiler condition diagnosis program adaptable for an actual equipment evaluating creep damage of boiler heat exchanger tubes.
 - Expanded heat pump equipment model, etc. into the program to assess energy saving in the total energy at demand side.
- Status diagnostics on power generation components
 - Verified detection accuracy of internal creep damage at weld specimen of actual piping using phased array ultrasonic nondestructive inspection method.
 - Clarified damage factors for the weld heat affected area by an internal pressure bending creep test of actual scale pipe using actual component life assessment experimental facility and structure observations of damaged specimen.

Advanced maintenance technology of power transmission and distribution facilities

- Establishment of maintenance standards for aged power facilities
 - Proposal of diagnostic methods for various power facilities including safety evaluation methods of gas insulated facilities, displacement detection methods of transformer coils, degradation estimation methods of surface coating of power facilities, etc.
 - Proposal of remote monitoring and estimation method of leakage current over polymer insulators.
- Management measures for power transmission and distribution facilities
 - Development of effect assessment model of cost reduction by appropriate transmission line reinforcement taking relief of expected outage cost and expected transmission congestion cost into account.
- Asset management of electricity grid
 - Developed supporting tools for maintenance and renewal plan balanced with plural power

apparatuses and studying support tools for leveling power apparatus renewal in power systems.

- Asset management support tools
 - Development of support tools of partial renewal plan of complicated power facility such as GIS by upgrading of the asset management support tools that were already developed in CRIEPI based on the average maintenance cost of those facilities.

(3) Environmental and innovative technology

Global warming mitigation research

- Projection and adaptation of global warming
 - Introduced the carbon cycle model into the global climate model, and developed a simplified climate system model to investigate relationship between CO₂ concentration and climate changes.
 - Constructed a statistical prediction method of atmospheric temperature, precipitation, and frequency of heavy rain at various regions in Japan using seasonal weather forecasting results and re-analysis data.
- CO₂ underground storage
 - Proposed the assessment method for possibility and possible quantity of ground storage at geological structures much located near CO₂ mass emission source in Japan.
 - Confirmed adaptability of analysis method developed by CRIEPI on CO₂ ground transfer behavior by simulation analysis to injection tests of CO₂ gas into in-situ fracture system rocks.
- High efficiency utilization of biomass energy
 - Developed support tools to assess profitability in various projects from fuel production of biomass to power generation.
 - Clarified spontaneous heating mechanism during biomass storage contributing to safe management guides for solid fuel storage such as biomass at power plants.
 - Clarified the fact that much existing process residuary biomass (squeezed oil residuum of palm and jatropha, etc.) has promise as gasified fuel.

Innovative environment technology

- Innovative environment measurement
 - Commercialized film type PCB biosensor to apply for contamination screening.
 - Developed an easy and low cost biological analysis kit for cadmium and lead in the soil.
- Coal ash environment countermeasures
 - Presented the empirical result that cement if added to landfill ash at low compounding ratio can be used as light civil engineering material, which is effective for leaching countermeasure of

trace elements.

- Demonstrated usability of soil cleaning material, developed using desulfurization gypsum and sewage sludge as main materials, in actual contaminated soil.

Next generation thermal power plant technology

- Integrated operation and evaluation system for pulverized coal combustion power generation
 - Invented the ash properties estimation method to introduce into coal adaptability assessment method for power generation.
 - Clarified corrosion speed and influence factors under high corrosive environment for sulfidation corrosion.
- Coal gasifier
 - In comparison with experimental results, we verified validity of numerical simulation results on thermal hydraulics phenomena in gasifier to sample coal for IGCC demonstration plant.
 - Clarified influence of oxygen concentration in gasifying agent to gasification performance using 3 ton/day coal gasifier.
 - As a result of trial calculation of production cost of super-light weight slag foam, we presented its superiority to market price of expanded obsidian.
- Trace element control
 - Constructed optimum sampling method of gaseous boron and selenium in exhaust gas and proposed gaseous boron measurement method for ISO standardization.
- Low cost MCFC power generating system
 - Developed 1 kW class MCFC stack with low cost materials to evaluate its output performance and behavior as a power generation system.
- Next generation IGCC system with CO₂ capture
 - Proposal of gasification reaction rate formula under high CO₂ concentration at high temperature and high pressure and clarification of the effect of CO₂ partial pressure to gasification reaction.
 - Evaluation of desulfurization performance of zinc ferrite desulfurization sorbent at high CO partial pressure condition.
 - Investigation of the improving effect (about 2% up for the fundamental system: absolute value) for the gross thermal efficiency by optimizing the system and operating conditions of combined cycle power block.

(4) Optimum energy utilization technology

End use technology

- Customer energy utilization support
 - Started the demonstration test at Komae City of “solitary aged people monitoring system” developed by CRIEPI.
 - Developed data conversion method to protect privacy contained in customer’s load pattern.
 - Clarified relation between energy saving effect and convenience (waiting time) caused by reducing the number of operating elevators.
- Evaluation of system operational performance of new Eco-cute model
 - Reflected the most advanced Eco-cute type performance evaluation test results conducted for total 100 days for establishment of the national residential energy saving standards.
- Inverter with SiC device
 - Clarified limits of efficiency increase and compactification for several kW class inverters combined with conventional Si devices.
 - Developed new all SiC inverter circuits using SiC-JFET devices.
- SiC power semiconductor
 - Developed production technology of 3-inch diameter high-quality SiC epitaxial layers through collaboration research and supplied the epitaxial layers to the industry and national projects.
 - Promoted development of a technology to obtain high-quality epitaxial layers for fabrication of large capacity SiC devices and clarified a defect control method to reduce conduction loss of the high-voltage SiC device.
- Compact secondary battery utilization
 - Completed an assessment test facility of electric power storage system combined with heat pump component for complete electrical housing.

Next generation electricity grid technology

- Demand and supply integrated operation and control
 - Developed a planning method for optimum operation cooperating with demand side appliances and utility distribution system equipment at mass introduction of photovoltaic generation.
 - Developed and demonstrated an islanding detection method of dispersed generators that can ride through system disturbances such as frequency fluctuations.
- Assessment of consumer response
 - Studied demand response (DR) value assessment method and extracted DR control measures adaptable to apply to the business consumer.
 - Estimated load reduction potential when applying DR control to offices and retail divisions in

the electrical systems.

- Next generation grid communication foundation
 - Developed the basic concept of demand area communication network available for integrated control of demand and supply.
 - Assessed time synchronization methods for wide-area control of a power system and fundamental function of the network system realizing low cost versatile control and data acquisition.
- Next generation power distribution components
 - Completed 3,900 A/cm² of critical current density by improving sintering methods of bismuth type super conductor of magnetic-shielded and current-limiting device.
 - Completed 180 kJ of short-circuited energy limit at the super conducting cylinder for magnetic shielded super conducting current limiting device at an actual size (diameter 450 mm).

(5) Social and business risk management

Risk management of electric power infrastructure (natural disaster risk)

- Earthquake scale assessment by active fault survey
 - Proposed a seismic scale assessment method and its detailed step combining optimally topographical, geological, and geophysical methods.
- Wind and snow disaster prevention assessment of electric power facilities
 - Started officially field observation on snow damage at the power transmission facility to achieve observation of digital dynamic image to the wire galloping behavior joining to the climate and snow accretion conditions.
- Ground collapse effect assessment due to earthquake
 - Integrated physical property test method, modeling method, and analysis method required in influence assessment of falling rock caused by slope failure on a nuclear facility.
- Lightning risk management
 - Clarified generation features of lightning surge voltages and distribution of surge currents using full-scale experimental facilities aiming at establishment of a lightning protection design guide book for low voltage systems of customers.
 - Clarified lightning surge characteristics of the low voltage control circuits at the power plants and substations by model experiments and verified applicability of the numerical electromagnetic analysis program (VSTL) developed by CRIEPI from comparison between the experimental results and the numerical analysis.
- Disaster recovering support of electric distribution equipment
 - Developed the disaster recovery support system of the power distribution equipment based on

sequential data processing, composing of a seismic information system and a seismic damage estimation system, and an emergency recovery process simulator.

- Maintenance management of hydropower civil engineering facilities
 - Clarified a cave-in mechanism in the ground above headrace tunnel from observation of soil moisture behavior around the cave-in.
 - Investigated damage processes and failure modes of the dam spillway facilities and developed a practical non-linear dynamic response analysis method.

Risk management of electric power infrastructure (human risk)

- Cyber security risk management framework
 - Completed guidelines for correct, convenient, and operable cyber security risk management framework to large scale IT systems.
- Human error measures and safety culture cultivation
 - Developed function and its constructing element technology of “human performance increasing management support system”.
 - Shared information through analysis of human error phenomena at domestic nuclear power plants and database construction.

Energy policy

- Japan type deregulation system measures
 - Clarified a situation of fuel cost coordination system in the United States and verified relation between fuel cost and retail rate in Europe.
- Scenario analysis for energy technical policy
 - To realize the low carbon society, we studied electrification scenario mainly composing promotion of energy saving and electrification, and utilization of low carbon emission electric power and proposed as one of promising resolutions to the global environmental problems.

Table 2 Major Research Accomplishments in Base Research Subjects

Research Field (Number of Subjects)	Major Research Accomplishments
Socio-economic Research Center	<ul style="list-style-type: none"> • Regarding various undertakings to CSR by globalized companies in Europe and the United States, we identified that promotion of social contribution brings long-term stability in corporate profit. • Evaluating the currently implemented local allocation tax system using spatial computable general equilibrium model revealed that the function of this system aiming at a budget adjustment across the local governments can lead to a loss in the economic welfare and its implementation should hence be abolished. • Analyzing the relation between technological options required for Japan-wide drastic CO₂ emission reduction and associated energy supply cost using an optimization model, we estimated benefits realized through development of those technologies.
System Engineering Research Laboratory	<ul style="list-style-type: none"> • Applied control logics improved for multi-input power system stabilizer (PSS) to respond remote system failures and verified effect of improving power transmission capability and suppressing power oscillation by the simulator experiment. • On the basis of simulation method of wind generator output developed by CRIEPI, we developed simulation model for wind farm output fluctuation. • Clarified experimentally communication quality of media (electric wave and light) fused optical fiber network as a key network collecting various information in the power fields and present its application to the demand area power system. • Developed a minimizing method of annual operation cost for water heater depending on home hot water demand and characteristics of heat pump water heater and verified its effectiveness.
Nuclear Technology Research Laboratory	<ul style="list-style-type: none"> • For fuel rod irradiated to high burnup at commercial reactors, we applied Halden test reactor to assess temperature and shape changes of pellet and cladding tube during normal and transient operations. • Development of instrumentation methods with high time and space resolution to investigate precise behavior at steam-water two-phase flow necessary for verification of The Code Scaling, Applicability and Uncertainty (CSAU) method of the existing or next generation light water reactors. • Established estimation technique (Hierarchical Bayes method) for parameter of system unavailability in Probabilistic Risk Assessment (PRA). • As a result of applying titanium surface modification (fresh green technology) with excellent wear resistance and peeling strength to the zircalloy fuel cladding tube, we confirmed that corrosion rate and hydrogen pick up rate can be controlled to less than half.
Civil Engineering Research Laboratory	<ul style="list-style-type: none"> • Developed methods to predict atmospheric and marine phenomena several days in advance, including localized heavy rain and consequential flooding as well as coastal wave and sea salt particle transport induced by strong wind. • Developed the evaluation method of structural soundness of underground reinforced concrete structures made of reinforced concrete in the water taking and discharging systems, and wind resistance reliable design method for power transmission towers based on design wind velocity classified in wind direction. • Improved the seismic hazard assessment technology and developed prediction method related to nuclear power plant housings and dam. We also developed and

	<p>improved damage detecting technology and damage identification technology at power facilities during operation and maintenance.</p> <ul style="list-style-type: none"> • Surveyed historic volcanic eruptions for ten thousand years to make hazard maps and extracted notices at low frequency disaster response such as volcanic activities from human error trouble examples.
Environmental Science Research Laboratory	<ul style="list-style-type: none"> • Conducted hood and field experiments to investigate disturbance and thermal effect to exhaust gas diffusion within urban canyon. • Experimentally clarified influences of sand accretion and turbidity caused by sediment discharged from dams on seaweed and marine fish. • Developed the scientific and rational environmental impact assessment method for terrestrial ecosystem and applied to actual ecosystem assessment at a nuclear power plant reflected in draft environmental impact statement. • Clarified that intermediate frequency magnetic fields had no acute toxic effects (20 kHz, 60 kHz) and no effects on conception ability nor embryogenesis of fetuses (20 kHz) by conducting exposure experiments using rats.
Electric Power Engineering Research Laboratory	<ul style="list-style-type: none"> • Developed fault current interrupting arcing horns effective for lightning measures at the low cost for 33 kV distribution lines by collaboration with the utilities. • Developed the instant value analysis program XTAP for the power system stably and in detail to analyze the power system including power electronics components. • Experimentally confirmed the fact that radiated electromagnetic waves caused by spark discharge generating at distribution lines insulator reduces the throughput of 2.4 GHz zone radio LAN but its impact is negligible small compared with an electronic oven. • Demonstrated the performance at chlorine concentration remote measurement by laser induced breakdown spectroscopy (LIBS) technology available for field instrument of salt damage conditions at concrete structures.
Energy Engineering Research Laboratory	<ul style="list-style-type: none"> • Developed the gas phase reaction model with phase changes for an innovative numerical simulator for thermal power generation system. • Clarified the combustion performance at the atmospheric pressure for adaptability assessment to the gas turbine for modified oil of Canadian oil sands. • Discovered the fact that volatile organic compounds (VOC) decomposing technology used for ceria catalyst can be applied for deodorizing exhaust gas to start practical application of deodorization equipment in collaboration research. • Evaluated the heat transfer basic performance of CO₂ refrigerant for high efficiency heat pump.
Materials Science Research Laboratory	<ul style="list-style-type: none"> • Achieved the highest performance of hydrogen production through water vapor electrolysis in the world using the developed cell, which can be operated by the dual modes of solid oxide electrolysis cell and solid oxide fuel cell. • Clarified life property of vapor turbine rotor materials under multiaxial creep fatigue conditions near the actual operating conditions. • The application possibility of carbon-based negative electrode to all-solid-state lithium secondary battery, that combination was previously considered to be difficult, was experimentally confirmed. • Succeeded in production of organic single crystal FET using ionic liquid with high electron transfer at the very low voltage.

Table 3 Major Funded Researches from the National Government and Others

Research Title	Consigner
FY2008 recycled fuel resource storage technical survey, etc. (Survey for long-term integrity of storage facility among long-term integrity test for intermediate storage facilities)	METI
FY2008 expenses for commission in geological disposal technical survey, etc. (Geological disposal common technical survey: boring technology-upgrading development)	METI
FY2008 expenses for commission in geological disposal technical survey, etc. (Geological disposal technical survey: ground water in rock transfer assessment upgrading development)	METI
FY2008 thermal and nuclear relating environmental review survey (Trace substance environmental affect assessment method)	METI
FY2008 research on seismic performance of electric power facilities (model tests)	METI
Technical development on dry reprocessing of oxide fuel applying electrolytic reduction method	MEXT
Research development for cathode/anode treatment of molten salt electrorefining of metallic fuel	MEXT
Research on combined influence assessment of atmospheric temperature and ozone concentration rise to productivity of wet-rice and its adaptation research (No.1)	MOE
Innovative zero emission coal gasification power generation project / Fundamental research project for innovative gasification technology / CO ₂ recovery next generation IGCC technical development	NEDO
Development of High-performance Battery System for Next-generation Vehicles (Li-EAD Project) / Fundamental Technology / Development of Fundamental Technology for High-performance Batteries for Next-generation Vehicles	NEDO
Research on Technology Development of Energy Storage System to Facilitate Interconnection of Renewable Energy to Power Grid / Development of Next-Generation Technology / Research and Development of High-Safe Lithium Secondary Batteries by Taking Account of High-Safe Electrolyte	NEDO
Research on Technology Development of Energy Storage System to Facilitate Interconnection of Renewable Energy to Power Grid / Common evaluation method development	NEDO
Strategic technical development for practical application of polymer electrolyte fuel cell / Technical development on basic and common targets / Deterioration mechanism analysis of polymer electrolyte fuel cell and development of residual life assessment method	NEDO
Technical development of solid oxide fuel cell system element / Fundamental research on durability and reliability increase / Establishment of durability assessment method	NEDO
Environment balanced production basic technical development applying microorganism function / High efficiency environment biomass processing technical development by designing of microorganism / Research development of high efficiency fixed-bed methane ferment using designed microorganism group	NEDO

Table 4 Number of Reports in FY 2008

	Socioeconomics	Environment	Customer energy services	Power delivery	Nuclear power generation	Fossil fuel power generation	New energy	Information & communication	Construction and maintenance of electric power facilities	Advanced basic technologies	Total
Research reports, etc.	66	75	24	62	92	46	13	19	77	14	488
Funded research	7	13	4	28	32	17	7	4	24	1	137
Total	73	88	28	90	124	63	20	23	101	15	625

Table 5 Number of Documents Reported in FY 2008

	Socioeconomics	Environment	Customer energy services	Power delivery	Nuclear power generation	Fossil fuel power generation	New energy	Information & communication	Construction and maintenance of electric power facilities	Advanced basic technologies	others	Total
Documents	163	275	85	270	354	124	65	35	212	88	11	1682

II. Management and Application of Intellectual Property

We promoted intellectual property management to create and reserve intellectual property as achievements of CRIEPI's research activity and widely applied our intellectual property as an effective property to the society mainly for the power industry.

1. Creation of intellectual property and promoting application by “visualization”

We promoted research activity being clearly conscious outcomes from the planning stage of research, and created and ensured original and effective intellectual property such as patents.

In order to promote “visualization” of intellectual property in CRIEPI and application to the society, we issued “intellectual property report” for representative research achievements, and started download services of research reports for the public. Many organizations and persons used these services.

Table 6 shows the number of applications and registrations of patents and software.

2. Contribution of formation of codes and standards

Through joining to various committees, we contributed to forming codes, standards, and technical guides including technical standards on transportation and storage of spent fuel and international codes in electric and electronic technical fields.

Table 7 indicates contribution to forming of main codes, standards, and technical guides.

3. Practical application promotion and contribution to technical accession

To support promotion of technical transfer activity in CRIEPI and maintenance and accession of electric power technology, we held “Techno Forum 2008”, technical exchange course and technical seminars.

We also cooperated to “Power Academy” activity for further development of electric engineering fields in the Electric Power Industry.

Table 8 shows implementation of technological tutorial courses and seminars.

4. Promotion of qualified test services

On the basis of neutrality as a public-service corporation, we conducted qualification tests of short-circuit testing services at the high electric power test facilities, and PD (performance demonstration) qualification system for the purpose of reliability improvement of non-destructive inspection at the nuclear power plants.

Table 9 shows achievements of qualification test services.

Table 6 FY 2008, Number of applications and registrations of patent, software

Type		Field										
		Socioeconomics	Environment	Customer energy services	Power delivery	Nuclear power generation	Fossil fuel power generation	New energy	Information & communication	Construction and maintenance of electric power facilities	Advanced basic technologies	Total
Patent	Application	0	19	8	19	14	26	9	11	5	14	125
	Registration	0	9	8	8	6	7	3	5	1	2	49
Software registration		6	11	8	24	9	8	4	6	19	2	97

Table 7 Contribution to Formulation of Major Codes, Standards, and Technical Guides

Rule, Standard, Technical Guideline etc.	Organizations and Groups Concerned
Discussion and formulation of ministry ordinance to enact Electricity Enterprises Law, Electricity Enterprises Law enforcement regulations, technical standards on electric facilities	Nuclear and Industrial Safety Agency
Interpretation of ministry ordinance on technical standards of design and construction methods of spent fuel storage facilities (internal regulations)	Nuclear and Industrial Safety Agency
Qualification of weld methods of spent fuel storage facilities (internal regulations)	Nuclear and Industrial Safety Agency
Revision of notifications to constitute transportation standards of radioactive materials using airplanes	Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (TS-G-1.1) (2008)	International Atomic Energy (IAEA)
Discussion and formulation of various IEC international standard codes	International Electrotechnical Commission (IEC) and Institute of Electrical Engineers of Japan (IEEJ)
Discussion and formulation of JEC “polymer type lightning arrester” codes	Institute of Electrical Engineers of Japan (IEEJ)
Discussion and revision of various JEAC, JEAG codes	Japan Electric Association (JEA)
Revision of interpretation of technical standards for electric facilities	Japan Electric Association (JEA)
Discussion and revision of linked system regulations	Japan Electric Association (JEA)
Discussion and revision of various JIS codes	Japanese Standards Association
Implementation Standard Concerning the Estimation of Parameters for Probabilistic Safety Assessment of Nuclear Power Plant:2009	Atomic Energy Society of Japan (AESJ)
Standard for Procedures of Probabilistic Safety Assessment of Nuclear Power during Shutdown State (Level 1 PSA):2009	Atomic Energy Society of Japan (AESJ)
Codes of examples of new materials for spent fuel basket in metal casks	Japan Mechanical Engineering Society
Establishment of manual for durability verification of corroded steel structures	Japan Society of Civil Engineers
Discussion of PSA peer review guidelines	Japan Nuclear Technology Institute
The 2009 edition of Anti-Seismic Water Works Facility Construction Guidelines and Principles	Japan Water Works Association

Table 8 Tutorial Courses and Seminars

Course Title
Technical basic training for electric power system analysis
Technical application training for electric system analysis
Electrical Insulation and electro-magnetic environmental technology training
Power distribution technology training
Insulation deterioration diagnostic technology training
Base and application training of EMTP
Wind load response assessment technology at power transmission facility
Commutation network technology (IP network construction and security technology application)
Civil engineering technology on sitting and construction of nuclear facility (civil works related)
Civil engineering technology on construction and maintenance of hydropower plants (civil works related)
Environment technology - 1. Atmosphere and land environment
Environment technology - 2. Water area environment
Thermal efficiency analysis technical training
Water chemistry, SCC countermeasure technology training on nuclear technology and light water reactor
Nuclear technology, structure integrity assessment technology training of nuclear component
Social and economical seminar - Energy and environment course
Social and economical seminar - Social and economical course
Social and economical seminar - Electric power management course
HF instructor - Training base (First in FY2008)
HF instructor - Training base (Second in FY2008)
HF instructor - Training application
Total 21 courses

Table 9 Accomplishments of licensed test services in FY 2008

Short-circuit test service	Number of funded researches: 30 items Total number of working days: about 60.5 days (Excluding preparation and removal periods)
PD qualification test service	Number of license tests: 5 times Total number of examinees: 7 persons, number of successful applicants, 5 persons

III. Business Management

1. Establishment of basic concept on mid-and-long term development of business activity

To construct the foundation to the future growth in CRIEPI, we completed the basic concept on new research expansion centering on the energy demand side, and research bases applying local characteristics.

To incarnate the concept, we concluded the purchase contract of neighboring restricted industrial land to expand Yokosuka area of CRIEPI as a key station of hardware research related to electric power and energy technology.

2. Cultivation of human resources to lead the next generation

(1) Human resources to open up a new age

On the basis of large change in management environment in the electric power industry, we developed conscious awareness to open up a new age through information delivery from the management to entire personnel on future research and business expansion in CRIEPI and discussion between management and various personnel layers.

For excavation of the future new subjects and research expansion, we dispatched young researchers to research organizations and universities representing each country.

(2) Human resources for cooperation with the society

To cultivate human resources as a key in research promoters and interdisciplinary research development, we actively communicate with other organizations through detachment to electric utilities and external organizations and research exchange meetings, considering career formation and competence.

3. Development of system and application of management resources responding changes of the times

(1) Promotion of social responsible management

To expand the system for internal control, we summarized basic concept for risk management to create an approach on guaranteed of exports security management.

In addition we corporate-registered to the “team minus 6%” to calculate CO₂ emission rate in the entire institutes and extended CO₂ reduction awareness campaign at each working place and family.

(2) Cost analysis and raising cost conscious

We promoted effective research by sharing information analyzing cost structures at individual business activity and ageing transition and by constructing cost consciousness.

We further reinforced researching capacity through promoting scrap and build such as removing aged experimental buildings and introducing most advanced facilities.

(3) Response to reformation of public-service corporation systems

Watching operation of new public service corporation systems enacted on December 1, 2008, we studied required business, organization, and account design.

(4) Information delivery of research achievements and timely proposal to the society

Aiming at further settlement of CRIEPI's brand contributing to the society and reliable from the society, we tried easy information delivery.

- Presenting the theme “Electric power and low carbon society - breakthrough technology at CRIEPI”, we held “energy future technical forum” at Tokyo, Nagoya, and Toyama.
- we held an international symposium at Tokyo “For realization of low carbon society - role and challenge in electric utilities R&D” at joint-hosting with research organizations in the United States, Europe, and China.

IV. Workforce

Workforce configuration as of March 31, 2009 is as follows.

Item	Numbers	Percentage Distribution (%)
1. Research	694	88.0%
[Breakdown]	* Including 32 research member with employment contract limited	[100.0]
(1) Electricity	113	16.3%
(2) Civil engineering and construction	93	13.4%
(3) Engineering	81	11.7%
(4) Chemistry	69	9.9%
(5) Biology	55	7.9%
(6) Nuclear engineering	47	6.8%
(7) Environment science	44	6.3%
(8) Information & communication	40	5.8%
(9) Socioeconomics	42	6.1%
(10) Research support control	110	15.8%
-----	-----	-----
2. Office work	95	12.0%
Total	789	100.0%

V. General Affairs

1. Executive board

Held Date	Agenda
June 5, 2008 (No. 212)	1. Approval of project reports in FY 2007 2. Approval of settlement of accounts in FY 2007
August 11, 2008 (No. 213)	1. Selection of councilor
March 12, 2009 (No. 214)	1. Revision and approval of project plans and settlement of accounts in FY2008 2. Approval of research plans in FY 2009 3. Approval of revenue and expenditure budget in FY 2009 4. Selection of councilor

2. Board of trustees

Held Date	Agenda
May 23, 2008 (No. 25)	1. Project reports in FY 2007 2. Settlement of accounts in FY 2007
August 11, 2008 (No. 26)	1. Appointment of directors
September 16, 2008 (No. 27)	1. Appointment of directors
February 20, 2009 (No. 28)	1. Revision of project plans and settlement of accounts in FY2008 2. Research plans in FY 2009 3. Revenue and expenditure budget in FY 2009

Settlement of Accounts

Outline of Settlement of Accounts

Business scale was 33.83 billion yen down to 10 million yen to the revenue and expenditure budget and net property as of FY2008 end was 34.6 billion yen up 1.31 billion yen to the previous year. Major points are as follows.

1. Financial statements

(1) Assets condition

- Total assets was 48.75 billion yen, comprising 7 million yens of fundamental assets, 6.44 billion yen of special assets, 36.22 billion yen of other fixed assets, and 6.07 billion yen of floating assets.
- Special assets comprise 770 million yen of fixed assets from financial resource of designated net assets, 30 million yen of fixed assets from financial resource of general net assets, 3.43 billion yen of special asset for accrued retirement benefits for employees, and 2.2 billion yen of special assets for research facility acquisition.

(2) Liability condition

- Total amount of liability was 14.14 billion yen, comprising fixed liability of 8.26 billion yen and current liability of 5.88 billion yen.

(3) Net property condition

- Net property was 34.6 billion yen, comprising designated net property of 780 million yen and general net property of 33.82 billion yen.
- 7 million yen in the designated net property was shifted to the fundamental assets and other 770 million yen was to special assets.
- Increase/decrease of general net property was up 1.38 billion yen, including up 1.24 billion yen in current account and up 130 million yen in nonrecurring account.
- Designated net property were 70 million yen down mainly due to depreciation and others.

2. Statement of revenues and expenses

Current income was 33.52 billion yen, and carried forward from the previous period was 890 million yen. Total income was 34.41 billion yen down 50 million yen to the budget. Current expenditure was 33.83 billion yen down 10 million yen to the budget, resulting in the difference in balance of payments transferred to the next term balance of payment was 580 million yen.

Settlement of accounts was corrected on approval of regular executive board on March 12, 2009 caused by purchase of Yokosuka area neighboring land.

(1) Balance of business activity

- Business activity income was 32.28 billion yen down 60 million yen to the budget, and business activity expenditure was 25.71 billion yen down 120 million yen to the budget. As a result, balance of business activity was 6.56 billion yen up 50 million yen to the budget.

(2) Investment activity balance

- Investment activity income was 1.23 billion yen up 20 million yen to the budget, and investment activity expenditure was 8.11 billion yen up 110 million yen to the budget.

(3) Financial activity balance

- No income and expenditure related to financial activity.

I. Financial Statements

Balance Sheet (As of March 31, 2009)

(Unit: yen)

Account	Current fiscal year	Previous fiscal year	Increase/decrease
I. Assets section			
1. Current assets			
Cash and deposit	5,161,117,918	4,418,317,423	742,800,495
Securities	4,116,395	13,059,800	△ 8,943,405
Account receivable	862,106,035	1,852,110,020	△ 990,003,985
Suspense payable	47,079,156	133,444,324	△ 86,365,168
Advance payment	5,183,895	8,610,405	△ 3,426,510
Total current assets	6,079,603,399	6,425,541,972	△ 345,938,573
2. Fixed assets			
(1) Fundamental property			
Cash and deposit	7,000,000	7,000,000	0
Total fundamental property	7,000,000	7,000,000	0
(2) Special assets			
Buildings	341,305,357	357,531,777	△ 16,226,420
Structures	1,412,564	1,642,002	△ 229,438
Machine and equipment	448,039,133	461,460,283	△ 13,421,150
Tools and furniture	16,209,700	25,963,399	△ 9,753,699
Intangible fixed asset	3,126,227	2,361,469	764,758
Special assets for retirement lump sum grants benefits package allowance	3,435,900,000	3,435,900,000	0
Special assets for research facility acquiring allowance	2,200,000,000	1,380,000,000	820,000,000
Total special assets	6,445,992,981	5,664,858,930	781,134,051
(3) Other fixed assets			
Land	4,940,509,920	4,907,396,676	33,113,244
Building	13,977,753,889	13,048,210,180	929,543,709
Structure	1,170,941,669	1,175,415,412	△ 4,473,743
Machine and equipment	11,580,192,706	10,384,634,010	1,195,558,696
Tools and furniture	2,010,750,353	1,992,256,599	18,493,754
Intangible fixed asset	1,099,199,741	1,113,529,466	△ 14,329,725
Construction in process account	828,250,000	1,776,114,920	△ 947,864,920
Long-term prepaid expenses	613,750,554	841,960,000	△ 228,209,446
Total other fixed assets	36,221,348,832	35,239,517,263	981,831,569
Total fixed assets	42,674,341,813	40,911,376,193	1,762,965,620
Total assets	48,753,945,212	47,336,918,165	1,417,027,047
II. Liability section			
1. Current liability			
Accrued liability	5,403,738,342	5,436,221,535	△ 32,483,193
Money entrusted	92,315,808	95,435,795	△ 3,119,987
Advance receipt	2,203,720	0	2,203,720
Accrued bonus	385,000,000	399,000,000	△ 14,000,000
Total current liability	5,883,257,870	5,930,657,330	△ 47,399,460
2. Fixed liabilities			
Allowance for retirement benefits for directors	482,000,000	393,000,000	89,000,000
Accrued retirement benefits for employees	7,780,000,000	7,716,000,000	64,000,000
Total fixed liabilities	8,262,000,000	8,109,000,000	153,000,000
Total liabilities	14,145,257,870	14,039,657,330	105,600,540
III. Net assets section			
1. Designated net assets			
Special benefits	686,079,855	762,574,579	△ 76,494,724
Cash subsidy	48,244,550	40,318,747	7,925,803
Cash contribution	49,100,336	53,065,604	△ 3,965,268
Total designated net assets	783,424,741	855,958,930	△ 72,534,189
(Including appropriation to fundamental property)	(7,000,000)	(7,000,000)	(0)
(Including appropriation to special assets)	(776,424,741)	(848,958,930)	(△ 72,534,189)
2. General net assets			
(Including appropriation to fundamental property)	(0)	(0)	(0)
(Including appropriation to special assets)	(2,233,668,240)	(1,380,000,000)	(853,668,240)
Total net assets	34,608,687,342	33,297,260,835	1,311,426,507
Total of liability and net assets	48,753,945,212	47,336,918,165	1,417,027,047

Net Assets Increase/Decrease Calculation Sheet

From April 1 2008 to March 31 2009

(Unit: yen)

Account	Current fiscal year	Previous fiscal year	Increase/decrease
I. General net assets increase/decrease section			
1. Current increase/decrease section			
(1) Current revenue			
[1] Benefit received			
Current benefit received	29,221,600,000	28,131,396,000	1,090,204,000
[2] Operating revenue	(2,850,524,440)	(3,714,768,204)	(Δ 864,243,764)
Funded research operating revenue	2,229,302,668	3,065,931,330	Δ 836,628,662
Other operating revenue	621,221,772	648,836,874	Δ 27,615,102
[3] Other revenue	(166,662,449)	(162,952,240)	(3,710,209)
Interest received	38,989,676	29,275,062	9,714,614
Facility usage fee received	84,412,175	85,964,289	Δ 1,552,114
Miscellaneous revenue	43,260,598	47,712,889	Δ 4,452,291
[4] Transfer from designated net assets	145,560,797	123,937,820	21,622,977
Total current revenue	32,384,347,686	32,133,054,264	251,293,422
(2) Current expenditure			
[1] Project cost			
Personnel expenditure	(9,878,378,775)	(9,543,561,336)	(334,817,439)
Salary and benefit	7,678,509,971	7,698,930,656	Δ 20,420,685
Retirement benefit expenditure	1,242,380,378	858,622,010	383,758,368
Welfare expenditure	957,488,426	986,008,670	Δ 28,520,244
Expenditure	(19,262,214,743)	(19,422,424,758)	(Δ 160,210,015)
Supplies expenses	1,827,988,795	1,841,242,321	Δ 13,253,526
Printed material expenses	525,044,022	523,797,650	1,246,372
Fuel, light, and water expenses	689,393,946	633,462,178	55,931,768
Expenses for commission	6,325,091,057	6,505,357,390	Δ 180,266,333
Collaboration research contribution	711,152,727	682,831,739	28,320,988
Repair expenses	1,251,371,611	1,365,174,878	Δ 113,803,267
Rental rate	184,548,215	189,630,893	Δ 5,082,678
Tax and public charge	96,641,301	95,282,442	1,358,859
Travel and transport expenses	852,879,653	797,475,767	55,403,886
Communication and transportation expenses	117,943,113	116,441,435	1,501,678
Other expenditure	1,470,564,353	1,385,483,838	85,080,515
Depreciation allowance	5,209,595,950	5,286,244,227	Δ 76,648,277
Subtotal of project cost	29,140,593,518	28,965,986,094	174,607,424
(2) Administrative expenses			
Personnel expenditure	(953,003,339)	(1,040,424,820)	(Δ 87,421,481)
Board members' compensation	165,648,000	168,602,000	Δ 2,954,000
Salary and benefit	549,212,000	609,135,716	Δ 59,923,716
Retirement benefit expenditure	89,217,022	95,402,440	Δ 6,185,418
Welfare expenditure	59,926,317	64,007,664	Δ 4,081,347
Allowance for retirement benefits for directors transfer	89,000,000	103,277,000	Δ 14,277,000
Expenditure	(1,041,662,426)	(1,074,811,697)	(Δ 33,149,271)
Supplies expenses	17,020,178	15,216,168	1,804,010
Printed material expenses	50,388,419	82,284,763	Δ 31,896,344
Fuel, light, and water expenses	28,885,344	31,503,477	Δ 2,618,133
Expenses for commission	284,725,221	274,604,162	10,121,059
Repair expenses	6,773,622	9,373,985	Δ 2,600,363
Rental rate	363,926,620	364,363,739	Δ 437,119
Tax and public charge	7,283,008	10,515,850	Δ 3,232,842
Travel and transport expenses	71,263,159	67,926,925	3,336,234
Communication and transportation expenses	10,416,577	12,642,898	Δ 2,226,321
Other expenditure	133,786,022	103,803,775	29,982,247
Depreciation allowance	67,194,256	102,575,955	Δ 35,381,699
Subtotal of administrative expenses	1,994,665,765	2,115,236,517	Δ 120,570,752
Total current expenditure	31,135,259,283	31,081,222,611	54,036,672
Current ordinary increase/decrease	1,249,088,403	1,051,831,653	197,256,750

2. Nonrecurring increase/decrease section			
(1) Nonrecurring profit			
[1] Gain from sale of fixed assets			
Gain from sale of land and building	25,997,144	0	25,997,144
[2] Fixed asset donated profit			
Facility donated profit	401,320,000	3,673,392	397,646,608
[3] Amount transferred from designated net property	189,854	4,612,199	△ 4,422,345
Total nonrecurring profit	427,506,998	8,285,591	419,221,407
(2) Nonrecurring expenses			
[1] Loss on sale of fixed assets			
Loss on sale of tools and furniture	0	220,384	△ 220,384
[2] Loss on retirement of fixed assets			
Loss on retirement of facilities	292,634,705	389,784,855	△ 97,150,150
Total nonrecurring expenses	292,634,705	390,005,239	△ 97,370,534
Current nonrecurring increase/decrease	134,872,293	△ 381,719,648	516,591,941
Current ordinary net asset increase/decrease	1,383,960,696	670,112,005	713,848,691
Ordinary net asset beginning balance	32,441,301,905	31,771,189,900	670,112,005
Ordinary net asset final balance	33,825,262,601	32,441,301,905	1,383,960,696
II. Designated net asset increase/decrease section			
[1] Cash subsidy received			
Subsidy received	47,838,022	7,807,790	40,030,232
[2] Fixed asset donated profit			
Facility donated profit	25,378,440	4,203,370	21,175,070
[3] Transfer to ordinary net assets	145,750,651	128,550,019	17,200,632
Current designated net assets increase/decrease	△ 72,534,189	△ 116,538,859	44,004,670
Designated net assets beginning balance	855,958,930	972,497,789	△ 116,538,859
Designated net assets final balance	783,424,741	855,958,930	△ 72,534,189
III. Net assets final balance	34,608,687,342	33,297,260,835	1,311,426,507

Notes for Financial Statements

1. Important accounting policy

(1) Assessment standard and assessment method of valuable stock certificates

For other valuable stock certificates without market price, the cost method by the moving-average method has been applied.

(2) Depreciation method of fixed assets

- For tangible fixed assets, building (excluding building attached structures) has been managed by the equal installment method, small fixtures have been by the three-year uniform extinguishment, and other tangible fixed assets including machine and equipment have been by the constant percentage method.
- Intangible fixed asset has been managed by the equal installment method.
- Lease assets from finance lease trade other than ownership transfer was calculated for the lease period of expiration years and based on the equal installment method with zero residue prices.

(3) Allowance allocating standard

Allowance for doubtful debts:

To prepare for doubtful debts including account receivable and loan receivable, uncollectible amount is individually estimated to account for allowance.

Bonus payment reserve:

To prepare for employee's bonus expense, current obligation fees of expected bonus pay are account for allowance.

Allowance for retirement benefits for directors:

To prepare for payment of directors special service bonus, estimation at the end of period is account for allowance based on the private regulation to pay allowance for retirement benefits for directors.

Accrued retirement benefits for employees:

To prepare for payment of retirement allowance and annual pension, amount deducting the pension asset amount assessed from the present value method based on future estimated retirement benefit is account for allowance. And retirement benefits for counselors are accounted for the estimation at the end of period based on the related private regulation and expressed in the combined form.

(4) Processing method of the finance lease trade other than ownership transfer before beginning of initial fiscal year applying the lease account standard

The finance lease trade other than ownership transfer concluding contract by March 31, 2008 should be account processed continuously according to the ordinary lease contract.

(5) Account processing of consumption tax, etc.

Account processing of consumption tax, etc. is controlled by the before tax method.

2. Change in important account policy

From the current period, “accounting standard for the lease trade” (business accounting standard, No. 13, revised on March 30, 2007), “application guide of accounting standard for the lease trade” (business accounting standard application guide, No. 16, revised on March 30, 2007) were applied and the financial lease trade other than ownership transfer concluded after April 1, 2008 should be processed the accounting treatment according to ordinary sales transactions.

From April 1, 2008 to the end of current period, there was no contract concluded for financial lease trade other than ownership transfer, therefore no influence occurred due to modification.

3. Increase, decrease and its balance of fundamental asset and special asset

Increase, decrease and its balance of fundamental asset and special asset are as follows.

(Unit: yen)

Subject	Balance at the end of previous period	Current increased amount	Current decreased amount	Balance at the end of current period
Fundamental asset				
Cash and deposit	7,000,000	0	0	7,000,000
Subtotal	7,000,000	0	0	7,000,000
Special asset				
Building	357,531,777	0	16,226,420	341,305,357
Structure	1,642,002	0	229,438	1,412,564
Machine and equipment	461,460,283	53,975,740	67,396,890	448,039,133
Tools and furniture	25,963,399	3,086,700	12,840,399	16,209,700
Intangible fixed asset	2,361,469	1,984,240	1,219,482	3,126,227
Special asset for accrued retirement benefits for employees	3,435,900,000	0	0	3,435,900,000
Special asset for acquiring research facility	1,380,000,000	1,800,000,000	980,000,000	2,200,000,000
Subtotal	5,664,858,930	1,859,046,680	1,077,912,629	6,445,992,981
Total	5,671,858,930	1,859,046,680	1,077,912,629	6,452,992,981

4. Breakdown of financial resources for fundamental assets and special assets

Breakdown of financial resources for fundamental assets and special assets is as follows.

(Unit: yen)

Subject	Balance at the end of current period	(Including appropriation from designated net asset)	(Including appropriation from general net asset)	(Including liability relating item)
Fundamental asset				
Cash and deposit	7,000,000	(7,000,000)	-	-
Subtotal	7,000,000	(7,000,000)	-	-
Special asset				
Building	341,305,357	(341,305,357)	-	-
Structure	1,412,564	(1,412,564)	-	-
Machine and equipment	448,039,133	(414,370,893)	(33,668,240)	-
Tools and furniture	16,209,700	(16,209,700)	-	-
Intangible fixed asset	3,126,227	(3,126,227)	-	-
Special asset for accrued retirement benefits for employees	3,435,900,000	-	-	(3,435,900,000)
Special asset for acquiring research facility	2,200,000,000	-	(2,200,000,000)	-
Subtotal	6,445,992,981	(776,424,741)	(2,233,668,240)	(3,435,900,000)
Total	6,452,992,981	(783,424,741)	(2,233,668,240)	(3,435,900,000)

5. Assets offered as collateral

No asset offered as collateral is recorded.

6. Acquisition value, accumulated depreciation and balance at the end of current period for fixed assets

Acquisition value, accumulated depreciation and balance at the end of current period for fixed assets are as follows.

(Unit: yen)

Subject	Acquisition value	Accumulated depreciation	Balance at the end of current period
Special asset	(4,348,012,185)	(3,537,919,204)	(810,092,981)
Building	753,996,762	412,691,405	341,305,357
Structure	25,095,620	23,683,056	1,412,564
Machine and equipment	3,432,466,909	2,984,427,776	448,039,133
Tools and furniture	131,963,974	115,754,274	16,209,700
Intangible fixed asset	4,488,920	1,362,693	3,126,227
Other fixed assets	(97,801,168,037)	(67,962,329,679)	(29,838,838,358)
Building	30,713,365,720	16,735,611,831	13,977,753,889
Structure	5,317,305,051	4,146,363,382	1,170,941,669
Machine and equipment	49,549,270,682	37,969,077,976	11,580,192,706
Tools and furniture	8,781,310,336	6,770,559,983	2,010,750,353
Intangible fixed asset	3,439,916,248	2,340,716,507	1,099,199,741
Total	(102,149,180,222)	(71,500,248,883)	(30,648,931,339)

7. Claimable assets, balance of allowance for doubtful debts at the end of period, and balance of claimable assets at the end of period

Claimable assets, balance of allowance for doubtful debts at the end of period, and balance of claimable assets at the end of period are as follows.

(Unit: yen)

Subject	Claimable assets	Balance of allowance for doubtful debts at the end of period	Balance of claimable assets at the end of period
Account receivable	862,106,035	0	862,106,035
Special asset for accrued retirement benefits for employees (Including housing loans and welfare loans)	46,303,131	0	46,303,131
Total	908,409,166	0	908,409,166

8. Contingent liabilities such as guarantee liabilities

A guarantee liability to employees housing loans is 2,955,732,718 yen.

9. Breakdown of held-to-maturity bond certificates and book values, actual values, and appraisal profit or loss

No held-to-maturity bond certificates are recorded.

10. Breakdown of subsidies, etc and delivers, current increase/decrease, and balance

Breakdown of subsidies, etc and delivers, current increase/decrease, and balance are as follows.

(Unit: yen)

Name of subsidies	Deliverer	Balance at the end of period	Current increase	Current decrease	Balance at the end of period	Describing division in balance sheet
• Research for the effect of forest watershed characteristics on hydro power output (I)	National Land Afforestation Promotion Organization	0	11,973,863	11,973,863	0	-
• Research for the effect of forest watershed characteristics on hydro power output (II)	National Land Afforestation Promotion Organization	0	12,613,909	12,613,909	0	-
• Subsidies of advanced technical development cost for rationalized energy application (high efficient gas turbine practical application technical development)	Ministry of Economy, Trade and Industry	0	2,568,500	2,568,500	0	-
• Assessment analysis of energy saving method as an energy effective increasing measure	Antipollution measure corporation foundation	0	1,000,000	1,000,000	0	-
• FY2008 promotion project to introduce solar energy generation system to CRIPEI Yokosuka area	New Energy and Industrial Technology Development Organization	0	19,681,750	19,681,750	0	-
Total		0	47,838,022	47,838,022	0	

11. Breakdown of transfer from designated net assets to general net assets

Breakdown of transfer from designated net assets to general net assets is as follows.

(Unit: yen)

Content	Amount of money
Transfer to balance of current account	
Depreciation allowance related on designated net asset	96,295,955
Transfer by exception from designated net asset	1,426,820
Transfer by implementation of objective business of received subsidy	47,838,022
Transfer to nonrecurring profit	
Transfer by retirement of designated net assets	189,854
Total	145,750,651

12. Trading content to related parties

No trading to related parties is recorded.

13. Important subsequent event

No important subsequent event is recorded.

14. Trading finance lease related before beginning of initial fiscal year applying the lease account standards

(1) Equivalent transaction prices, equivalent accumulated depreciation, and equivalent balance at the end of period for lease objects

(Unit: yen)

	Machine and equipment	Tools and furniture	Total
Equivalent transaction prices	148,002,000	30,879,900	178,881,900
Equivalent accumulated depreciation	111,001,500	26,389,500	137,391,000
Equivalent balance at the end of period	37,000,500	4,490,400	41,490,900

(2) Equivalent balance at the end of period of prepaid lease revenue

(Unit: yen)

	Within one year	Over one year	Total
Equivalent balance at the end of period of prepaid lease revenue	31,040,400	0	31,040,400

(3) Current paid lease revenue, equivalent depreciation

(Unit: yen)

Paid lease revenue	35,390,100
Equivalent depreciation	36,103,220

(4) Equivalent depreciation is calculated on a straight-line basis.

(5) Equivalent interest is not accounted.

15. Retirement benefit related

(1) Summary of employed retirement benefit

As a defined-benefit system, retirement pension system and termination allowance plan are employed.

(2) Retirement benefit liability and its contents

(Unit: yen)

Content	Balance at the end of period	Remarks
[1] Retirement benefit liability	△21,705,646,513	
[2] Retirement pension asset	12,127,862,950	
[3] Non-accumulated retirement benefit	△9,577,783,563	[1] + [2]
[4] Non-depreciated mathematical calculation difference	△1,797,783,563	
[5] Accrued retirement benefits for employees	△7,780,000,000	[3] – [4]

(3) Items for retirement benefit expense

(Unit: yen)

Content	Expense
[1] Working expense	1,163,405,889
[2] Interest expense	418,048,094
[3] Expectable operation benefit	△141,256,624
[4] Mathematical calculation difference depreciation	△108,599,959
Total	1,331,597,400

(4) Items for calculation bases of retirement benefit liability

[1] Period allocation method of retirement benefit expectation: Period fixed amount standard based on the working period

[2] Discount rate: 2.0%

[3] Expectable operation benefit: 1.0%

[4] Processing year of difference on mathematical calculation: Five-year constant percentage method is applied for depreciation after next year of occurrence.

Lists of Assets

As of March 31 2009

(Unit: yen)

Subject	Amount of money		Memo
I. Assets section			
1. Floating asset			
Cash and deposit			
General deposit	5,056,734,252		Mitsubishi Tokyo UFJ bank, 4,729,637,763 yen and others
Fixed deposit account	100,000,000		Tokyo Tomin Bank, Limited, 100,000,000 yen
Postal savings	4,383,666		Ordinary deposit
		5,161,117,918	
Securities		4,116,395	Open-end bond investment trust
Account receivable		862,106,035	Funded research business income and others
Suspense payment		47,079,156	Temporary payment consumption tax on construction suspense account expense and others
Advance payment		5,183,895	Research survey consignment
Total floating asset			6,079,603,399
2. Fixed asset			
(1) Fundamental property			
Case and deposit			
Fixed deposit account		7,000,000	Mizuho trust bank
Total fundamental property		7,000,000	
(2) Special asset			
Building			
Steel structure	621,962,762		Yokosuka area, short circuit test house and others
Building attached structure	132,034,000		Komae area, WANO Tokyo center, air conditioner and others
Accumulated depreciation	△ 412,691,405		
Subtotal of building		341,305,357	
Structures			
Structures	25,095,620		Yokosuka area, short circuit test house, outdoor facility and others
Accumulated depreciation	△ 23,683,056		
Subtotal of structures		1,412,564	
Machine and equipment			
Research machine and equipment	51,709,667		Air electromagnetic flaw detector and others
General machine and equipment	3,380,757,242		Large capacity short circuit test facility and others
Accumulated depreciation	△ 2,984,427,776		
Subtotal of machine and equipment		448,039,133	
Tools and furniture			
Research tools and furniture	131,963,974		Nano particle instrument laser system and others
Accumulated depreciation	△ 115,754,274		
Subtotal of tools and furniture		16,209,700	
Intangible fixed asset			
Research software	4,488,920		GIS software and others
Accumulated depreciation	△ 1,362,693		
Subtotal of intangible fixed asset		3,126,227	
Accrued retirement benefits for employees special asset			
Housing loan	19,141,131		Personnel loan
Welfare loan	27,162,000		Personnel loan
Long-term official credit deposit	399,454,070		Caution money and guarantee deposit and others
Special deposit	2,990,132,799		General deposit: Mitsubishi Tokyo UFJ bank, 40,132,799 yen
Subtotal of accrued retirement benefits for employees special asset		3,435,900,000	Fixed deposit account: Mitsubishi Tokyo UFJ bank, 2,950,000,000 yen
Research facility acquiring benefits special asset		2,200,000,000	Fixed deposit account: Mitsubishi Tokyo UFJ bank, 2,200,000,000 yen
Total special asset		6,445,992,981	
(3) Other fixed asset			
Land			
Komae area	1,858,713,231		Commercial land and welfare housing land
Abiko area	1,584,921,459		71,389.31 r
Yokosuka area	405,136,283		ditto 177,816.01 r
Akagi area	651,429,826		ditto 206,756.73 r
Others	440,309,121		ditto 1,005,572.32 r
Land subtotal		4,940,509,920	Shiobara experimental land and others 55,418.81 r

Subject	Amount of money		Memo
Building			
Reinforced concrete structure	12,315,209,572		Yokosuka area, administration building and others
Steel structure	6,194,339,951		Yokosuka area, high voltage insulation experiment building and others
Wooden structure	57,535,993		Ogatsu experiment field measuring house and others
Building attached structure	12,146,280,204		Yokosuka area, administration south building, air conditioner and others
Accumulated depreciation	△ 16,735,611,831		
Building subtotal		13,977,753,889	
Structure			
Structure	4,507,066,650		Yokosuka area, second switchgear and others
Greening facility	206,100,309		Akagi area, planting and others
Other structures	604,138,092		Yokosuka area, short circuit generator west side net, and others
Accumulated depreciation	△ 4,146,363,382		
Subtotal of structure		1,170,941,669	
Machine and equipment			
Research machine and equipment	47,155,283,932		Renewal of large capacity electric power short circuit test facility, and others
General machine and equipment	2,393,986,750		Short circuit test operation, control automatic system, and others
Accumulated depreciation	△ 37,969,077,976		
Subtotal of machine and equipment		11,580,192,706	
Tools and furniture			
Research tools and furniture	7,379,387,661		Wind speed field observation system within atmospheric boundary layer and others
General tools and furniture	986,149,309		Abiko, Yokosuka network component and others
Fixture and household furniture	341,454,704		Manual moving shelf and others
Car and vehicle	74,318,662		Elevated working vehicle and others
Accumulated depreciation	△ 6,770,559,983		
Subtotal of tools and furniture		2,010,750,353	
Intangible fixed asset			
Research software	2,345,151,653		Gasified simulation program, and others
Business software	957,331,537		ERP system and others
Facility utilization right	128,458,058		Payment for water service application, and others
Telephone right	8,975,000		Each area telephone rights
Accumulated depreciation	△ 2,340,716,507		
Subtotal of intangible fixed asset		1,099,199,741	
Building under construction		828,250,000	Deposit with acquisition of Yokosuka area neighboring land, and others
Long-term advanced payment		613,750,554	Equivalent facility construction expense in research contribution on research collaboration (coal gasification combined power demonstration plant research)
Other fixed asset total		36,221,348,832	
Fixed asset total			42,674,341,813
Asset total			48,753,945,212
II. Liability section			
1. Floating liability			
Accrued liability		5,403,738,342	Contract construction and purchased goods expense and others
Money entrusted		92,315,808	Consumption tax, inhabitant's tax and others
Advance receipt		2,203,720	Advance receipt related to next fiscal year implementation grant, and others
Accrued bonuses		385,000,000	Allowance for employee, etc. bonus
Floating liability total			5,883,257,870
2. Fixed liability			
Allowance for retirement benefits for directors		482,000,000	Allowance for retirement benefits for directors
Allowance for retirement pension benefits for employees		7,780,000,000	Allowance for retirement benefits for employees, etc.
Accrued retirement lump sum benefits for employees			
Total fixed liability			8,262,000,000
Total liability			14,145,257,870
Net asset			34,608,687,342

Cash flow calculation sheet

From April 1, 2008 to March 31, 2009

(Unit: yen)

Subject	Current year	Previous year	Increase/ decrease
I Cash flow in business activity			
1. Current period ordinary net property increase/decrease	1,383,960,696	670,112,005	713,848,691
2. Adjust amount to cash flow			
(1) Depreciation allowance	5,276,790,206	5,388,820,182	△ 112,029,976
(2) Fixed asset loss on retirement	292,634,705	389,784,855	△ 97,150,150
(3) Transferred long-term advance payment	228,209,446	132,991,000	95,218,446
(4) Loss on fixed asset sale	0	220,384	△ 220,384
(5) Profit on sale of fixed assets	△ 25,997,144	0	△ 25,997,144
(6) Facility donating profit	△ 401,320,000	△ 3,673,392	△ 397,646,608
(7) Increase/decrease in allowance for retirement benefits for directors	89,000,000	△ 20,833,000	109,833,000
(8) Increase/decrease in accrued retirement benefits for employees	64,000,000	△ 238,954,000	302,954,000
(9) Increase/decrease in accrued bonus	△ 14,000,000	△ 18,300,000	4,300,000
(10) Increase/decrease in account receivable	990,003,985	1,321,526,071	△ 331,522,086
(11) Increase/decrease in suspense payment	86,365,168	△ 11,927,902	98,293,070
(12) Increase/decrease in advance payment	3,426,510	5,347,695	△ 1,921,185
(13) Increase/decrease in accrued liability	△ 44,230,769	△ 322,789,150	278,558,381
(14) Increase/decrease in money entrusted	△ 3,119,987	1,053,675	△ 4,173,662
(15) Increase and decrease of advanced receipt	2,203,720	0	2,203,720
(16) Transferred amount from designated net property	△ 145,750,651	△ 128,550,019	△ 17,200,632
(17) Others	△ 150,000	△ 460,000	310,000
Subtotal	6,398,065,189	6,494,256,399	△ 96,191,210
3. Increase/decrease in designated net property			
(1) Subsidy income	47,838,022	7,807,790	40,030,232
Cash flow by business activity	7,829,863,907	7,172,176,194	657,687,713
II Cash flow by investment activity			
1. Investment activity income			
(1) Long-term deposit repayment income	0	30,000,000	△ 30,000,000
(2) Transferred income from research facility acquiring special asset	980,000,000	710,000,000	270,000,000
(3) Fixed asset sale income	30,228,600	160,000	30,068,600
Total investment activity income	1,010,228,600	740,160,000	270,068,600
2. Investment activity expenditure			
(1) Special asset acquiring expenditure	1,800,000,000	900,000,000	900,000,000
(2) Fixed asset acquiring expenditure (note 3)	6,306,235,417	6,700,291,962	△ 394,056,545
Total investment activity expenditure	8,106,235,417	7,600,291,962	505,943,455
Cash flow by investment activity	△ 7,096,006,817	△ 6,860,131,962	△ 235,874,855
III Cash flow by financial activity			
1. Financial activity income	0	0	0
2. Financial activity expenditure	0	0	0
Cash flow by financial activity	0	0	0
IV Difference in conversion of cash and cash equivalent	0	0	0
V Increase/decrease in cash and cash equivalent	733,857,090	312,044,232	421,812,858
VI Cash and cash equivalent balance at the beginning of a period (note 4)	4,431,377,223	4,119,332,991	312,044,232
VII Cash and cash equivalent balance at the end of a period (note 4)	5,165,234,313	4,431,377,223	733,857,090

Note: 1 Asset scope

Asset scope includes cash and cash equivalent.

2 Important non-asset trade

No important non-asset trade is reported.

3 Breakdown of fixed asset acquiring expenditure

Fixed asset acquiring expenditure	6,317,982,993
Increase/decrease in accrued liability	△ 11,747,576
Total	6,306,235,417

4 Relation between cash and cash equivalent balance at the end of a period and amount of money described in balance sheet

Subject	Beginning of current period	End of current period
Cash deposit	4,418,317,423	5,161,117,918
Securities	13,059,800	4,116,395
Cash and cash equivalent	4,431,377,223	5,165,234,313

II. Statement of Revenues and Expenses

Statement of revenues and expenses

From April 1 2008 to March 31 2009

(Unit: yen)

Subject	Budget	Account settlement	Difference	Remarks
I. Business activity balance of payments section				
1. Business activity income				
(1) Benefit income				
Current benefit income	29,220,000,000	29,221,600,000	Δ 1,600,000	
(2) Business income	2,960,000,000	2,898,362,462	61,637,538	
Funded research business income	(2,300,000,000)	(2,229,302,668)	(70,697,332)	
Other business income	(660,000,000)	(669,059,794)	(Δ 9,059,794)	
(3) Other income	170,000,000	166,512,449	3,487,551	
Total business activity income	32,350,000,000	32,286,474,911	63,525,089	
2. Business activity expenditure				
(1) Business expense expenditure	23,930,000,000	23,892,985,349	37,014,651	
Personnel expense expenditure	(9,750,000,000)	(9,840,366,556)	(Δ 90,366,556)	
Expense expenditure	(14,180,000,000)	(14,052,618,793)	(127,381,207)	
(2) Management cost expenditure	1,910,000,000	1,826,483,728	83,516,272	
Personnel expense expenditure	(890,000,000)	(852,015,558)	(37,984,442)	
Expense expenditure	(1,020,000,000)	(974,468,170)	(45,531,830)	
Total business activity expense	25,840,000,000	25,719,469,077	120,530,923	
Difference in business activity balance of payments	6,510,000,000	6,567,005,834	Δ 57,005,834	
II. Investment activity balance of payments section				
1. Investment activity income				
(1) Special asset transferred income				
Research facility acquiring special asset transferred income	980,000,000	980,000,000	0	
(2) Sale income of fixed assets	0	30,228,600	Δ 30,228,600	
(3) Long-term advance payment transferred income	230,000,000	228,209,446	1,790,554	
Total investment activity income	1,210,000,000	1,238,438,046	Δ 28,438,046	
2. Investment activity expenditure				
(1) Special asset acquiring expenditure				
Research facility acquiring special asset expenditure	1,800,000,000	1,800,000,000	0	
(2) Fixed asset acquiring expenditure	6,200,000,000	6,317,982,993	Δ 117,982,993	
Total investment activity expenditure	8,000,000,000	8,117,982,993	Δ 117,982,993	
Difference in investment activity balance of payments	Δ 6,790,000,000	Δ 6,879,544,947	89,544,947	
III. Financial activity balance of payments				
1. Financial activity income	0	0	0	
2. Financial activity expenditure	0	0	0	
Difference in financial activity balance of payments	0	0	0	
Difference in current balance of payments	Δ 280,000,000	Δ 312,539,113	32,539,113	
Difference in balance of payments transferred from previous period	900,000,000	893,884,642	6,115,358	
Difference in balance of payments transferring to next period	620,000,000	581,345,529	38,654,471	

Note for income and expenditure accounts

1. Scope of revenue

Scope of revenue includes cash and deposit, securities, account receivable, suspense payments, advanced payment and accrued liability, money entrusted, and advance receipt. Balances at the ends of previous and current periods are as shown in the following paragraph 2.

2. Breakdown of assets and liabilities included in difference in balance of payments transferred to next period

(Unit: yen)

Subject	Balance at the end of previous period	Balance at the end of current period
Cash and deposit	4,418,317,423	5,161,117,918
Securities	13,059,800	4,116,395
Account receivable	1,852,110,020	862,106,035
Suspense payments	133,444,324	47,079,156
Advanced payment	8,610,405	5,183,895
Total	6,425,541,972	6,079,603,399
Accrued liability	5,436,221,535	5,403,738,342
Money entrusted	95,435,795	92,315,808
Advance receipt	0	2,203,720
Total	5,531,657,330	5,498,257,870
Difference in balance of payments transferred to the next period	893,884,642	581,345,529

Audit Report by Third-Party Auditor

May 7, 2009

Foundation of Central Research Institute of Electric Power Industry

Administrative Director

Ryoichi Shirato

Certified public accountant, Wada Yoshihiro Office

Certified public accountant, Yoshihiro Wada

Certified public accountant, Kanbayashi Katsuaki Office

Certified public accountant, Katsuaki Kanbayashi

We audited the financial statements of the Foundation of Central Research Institute of Electric Power Industry (herein after referred to as CRIEPI) in the FY 2008 business term from April 1 2008 to March 31 2009, including balance sheets, net property increase/decrease calculation sheets, statement of cash flow, statement of flow property list and income and expenditure account statement (hereinafter referred to as “financial statements”). The responsibility to prepare these financial statements falls upon the executive board members, and our responsibility is to express an opinion on the financial statements from an independent standpoint.

We carried out the audit based on an auditing standard generally authorized to be public and acceptable in Japan. The auditing standard requires us to give reasonable assurance that no false expression is contained in financial statements. The audit is done based on audit tests to thoroughly check expressions in financial statements, including the account policy employed by the executive board members and its application method, and an assessment of estimations made by the members. We understand that reasonable basement was obtained to express our opinion as the audit result.

As the result of the audit, our opinion is as follows:

- (1) We accepted that all important points in the financial states of CRIEPI at the end of the business term in FY 2008 and net property increase/decrease and cash flow at the business term are expressed correctly in their financial statements, according to the public-service corporation accounting standard to be public and acceptable in Japan.
- (2) We accept that the income and expenditure account statement is prepared correctly based on “internal management items in the public-service corporation account” (March 23, 2005, mutual agreement at related government ministries and agencies liaison conference on guidance in public-service corporations) and expresses all important points for the balance of payments in the FY 2008 business term for CRIEPI.

Between CRIEPI and us, there is no interest to be describe based on certified public accountant law.

Audit Report

Audit Report

May 14, 2009

Foundation of Central Research Institute of Electric Power Industry

Administrative Director

Ryoichi Shirato

Foundation of Central Research Institute of Electric Power Industry

Auditor, Katsutoshi Tsukidate

Auditor, Koji Kaifu

On the basis of the provision in Article 7 on Foundation of Central Research Institute of Electric Power Industry endowment act, we audited business reports and settlement of accounts in the FY 2008 business term (balance sheet, net property increase/decrease calculation sheet, statement of cash flow, property lists, and income and expenditure account statement) to accept their appropriateness.