**FY2008**

# Project Plans
# Settlement of Accounts

March 2008

Central Research Institute of Electric Power Industry

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## Project Plans



## Settlement of Accounts

Basic Project Management Policy

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

Tatsu No.2, August 12, 1980

# Project Plans

## Basic Policy

Increasing worldwide global environmental problems, Japan's electric power industry has been expected for steady global warming measures. On the other hand, there are many problems for the stable power supply balanced with global environment such as fuel procurement and utilization factor in the nuclear power industry.

Under these social situations, CRIEPI satisfies both of “ensuring energy security” and “response to global environmental problems” as a most valuable mission following FY2007 to promote research and development under the following policies.

1. As a professional organization on research of electric power and energy, we will go all out to achieve above mission responding social needs. For the purpose, we will collect broad range of fundamental technologies to deliver integral research power and steadily respond future problems in the electric power industry including innovative technical development.

2. To develop innovative technology taking in advance, we will cultivate human resources to pioneer a new age and those responsible for the next generation such as promoters engaging in integral research activities joining external research organizations.

3. For clear and efficient management, we will establish activation bases corresponding to changes of the time such as internal control. Through improvements in cost structure and management process, we will further apply management resources and respond to innovation of public-service corporation.

# Research Activities

## I. Research Plans

To achieve our most important mission, “ensuring energy security” and “response to global environmental problems”, we will suggest directional movement of technical development to reduce $CO_2$ in Japan and distribute resources depending on the level of research importance.

Under the policy, we will promote research integrally based on the “five research principles” established in FY2006, including “nuclear technology”, “advanced maintenance technology”, “environmental and innovative technology”, “optimum energy utilization technology”, and “social and business risk management.”

In FY2008, the third year of the research activity, we will concentrate our effort to achieve accomplishment and start new research including future type innovative technology to reduce $CO_2$ emission from the thermal power plants to zero and next generation grid technology expected as a core technology in the electric power industry in the future.

During research promotion, we will exert total power in cross-sectional promotion system in cooperation with eight professional research laboratories*. In particular, in the aged light water reactors research and the global warming responding research, we will integrally promote issues based on the total project established in FY2007.

### 1. Promotive project subjects and project subjects (Table 1)

For researches with high expectation in the power electric industry and society requiring timely accomplishment and application, we will position project subjects to promote research in total power along with the “five research principles”. For special important research subjects, we will distribute research resources as a promotive project subjects (promotive project subjects: 11, project subjects: 35). Major items are as follows.

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

For nuclear technology to support a stable electricity supply basement in future, we will steadily promote research such as maintenance management for aged light water reactors, radiation safety, back-end projects, and a metal fuel cycle.

In FY2008, we will develop a high accurate prediction method for irradiation embrittlement on pressure of vessel of aged light water reactors as an urgent problem in the electric power industry and will construct a deterioration prediction method caused by thermal flow to contribute to wall-thinning control of plant piping. In addition, we will clarify SCC crack propagation behavior in stainless steel weld joints.

For back-end projects support, contributing to smooth promotion of projects by national government and the electric power industry, in FY2008 we will systematize research and assessment technology aiming at selection stage at detailed survey areas in

Note:* Socie-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, Material Science Research Laboratory.

high-level radioactive waste disposal projects and will support codes and standards foundation on sub-surface disposal of low-level radioactive wastes, and will develop storage technology available for long-term and large capacity storage of spent fuels.

In addition, we will engage in assessment of biological effect caused by low dose rate radiation and metallic fuel cycling as a drastic future option.

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

To realize total cost reduction on operation and maintenance of electric facilities from power generation to transmission and distribution, we will develop facility diagnostics technology and operation and maintenance technology available at power business sites.

In advanced maintenance technology of power plant components, in FY2008 we will achieve the practical use of convenient ultrasonic non-destructive inspection method (SPOD method) contributing to improvements of diagnostic technology of the power plant components and will develop a health monitoring program of boiler tubing. We will also expand the resultant power generation system thermal efficiency analysis program into thermal supply plants and customer side components.

For transmission and distribution facilities, we will upgrade diagnostics technology of individual components such as XLPE power cables aiming at establishment of aged facilities maintenance standard and will assess adaptability of on-site deterioration diagnosis method. To support asset management, we will upgrade our supporting tools for facility maintenance and replacement planning through adding diagnostics test data and knowledge.

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

To contribute to resolution of global warming problems, we will promote integrally researches on scientific investigation of climate changes and its impact assessment and on studying of $CO_2$ reduction scenario and countermeasures to timely deliver accomplishments and related information.

In FY2008, in addition to long-term global warming prediction, we will develop a prediction method for local climate changes to accelerate well-adapted research. In addition, as a new power generation technology for low-carbon society we will study feasibility of full-scale component of carbonization gasification technology for biomass wastes. For $CO_2$ capture and storage technology(CCS) from thermal power plants, we will start fundamental research such as investigation of oxygen-$CO_2$ gasification property in the next generation IGCC system for $CO_2$ capture and will assess feasibility of underground geological storage of captured $CO_2$.

To contribute to environment conservation, we will promote research on development of new bio logical and chemical environment measurement technology and on expanding utilization of coal ash and will demonstrate performance of soil cleaner made from desulfurized gypsum and sewage sludge.

(4) Optimum energy utilization technology - Contributing to more comfortable living -

We will actively develop energy utilization technologies supporting good life and meeting comfort and environmental requirements.

In FY2008, we will make experimentally compact-type battery power storage system for all-electric housings, assess operational performance of new compact “Eco-cute” electric heat pump water heaters available for cold regions, and develop SiC semiconductor for consumer equipment and its resultant next generation high performance inverters. To support popularization of all-electric housings we will verify performance of developed indoor thermal environment design tools and acquire certification from the government.

As a core technology to support next generation electric power system in the middle of the 21 century, we will start research of next generation grid technology which enable an efficient power delivery and utilization by integrating demand and supply sides.

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

To ensure safety and security for electric facilities, we will integrally promote research on countermeasures of natural hazard such as earthquake, wind and snow, thunderstorm as well as IT hazards and on disaster recovery support.

In FY2008, we will start in full swing research of snow damage prevention of power transmission facilities to collect actual data by constructing site observation system. For power distribution facilities, we will develop a real-time earthquake disaster estimation system and a disaster recovering simulation technology. For power generation facilities, we will concentrate resources on researches to recover seismic reliability of nuclear power plants mainly for fault activity and earthquake motion assessment.

From the entire society and long-term viewpoints, to contribute to planning of reasonable energy technology developing strategy including response to global warming problems, we will construct long-term energy scenario and promote case studies of energy technology policy.

**2. Base research subjects (Table 2)**

Applying and developing feature and specialty of eight professional laboratories, we will steadily promote base research subjects (37 items) to challenge prospective and advanced technology and will establish base technologies, and cultivate next generation core technologies.

**3. Research promotion method**

(1) Three basic principles

We will correctly and promptly share information based on three basic principles (field, actual things and fact) to clarify detailed approach to the target and problem resolution for dynamic research promotion.

(2) Strengthening of basic research power

To respond quickly and adequately new subjects for changes of the times such as global environment problems, we will further enrich basic technology forming CRIEPI's research power core and resources of breakthrough. On the basis of future needs trend in the electric industry and the society, we will study direction of the professional field adequate for cultivation and strengthening of new technology and intensify the basic research power for individual professional laboratories.

(3) Promotion of funded research

We will promote research conforming to field requests to actively present research responding needs to the entire electric power industry. We will receive research from the government selecting issues related to energy and environment in the electric industry to widely deliver our accumulated research power to the society.

(4) Contribution to the formulation of rules and standards

Applying characteristics as a neutral academic research organization, we will present policy relating to energy and environment joining various councils to contribute to formation of rules, standards, and technical guides including maintenance and management standards for nuclear component.

As a reliable test organization based on neutrality, we will promote a PD center project for supersonic flaw inspection of electric power generating components and a high power testing laboratory business to conduct short-circuit test of electric power equipment.

(5) Systematic introduction and renewal of large-scale research facilities

We will systematically introduce large-scale research facilities to support electric power technology balancing budget allocation. In FY2008, we will introduce “assessment facility of electric power apparatus insulation maintenance standard” to establish maintenance standards to expand electric power apparatus life and will renew and upgrade a short-circuit generator system to ensure and maintain reliability of high power short-circuit test facility.

(6) Development of international research activity

We will promote international collaboration research for nuclear fields and another fields effective in worldwide approach such as climate changes. We will also present international development for Asia where energy demand is rapidly increasing and electric power transmission and environmental problems should be urgently resolved.

## II. Creation of intellectual property and its application measures

We will promote intellectual property management to fully create and ensure intellectual property as accomplishment of CRIEPI research activity and will apply widely our intellectual property effective for the society mainly for the electric power industry.

(1) Creation of intellectual property and promotion of its application through “visualization campaign”

Clearly supposing accomplishment outcome from the research planning stage, we will create original and valuable intellectual property such as patent to contribute to technical innovation of the electric power industry assuring and protecting intellectual property.

With “intellectual property report” for typical research accomplishment, we will promote “visualization campaign” of our intellectual property for its effective application. We will also start download service of our research reports to public users.

(2) Contribution to technical succession

Viewing application to the entire electric power industry, we will actively promote technical succession activity such as technical exchange course and technical seminar. In addition, we will cooperate with “power academy” to further develop electric engineering field extending in a position of the electric power industry.

**Table 1 ● Promotive Subjects (11 Subjects)/○ Project Subjects (35 Subjects)**

## (1) Nuclear technology

**LWR plant life management (general project)**

- ● High accurate prediction of irradiation embrittlement and its normalization
  - Study of irradiation embrittlement mechanism of pressure vessel during high irradiation
  - Preparation of standard draft for fracture toughness master curve method
- ○ Evaluation of degradation in relation to thermal-hydraulics
  - Construction of prediction method for wall-thinning rate of flow-accelerated corrosion and wall-thinning region due to liquid drop impingement erosion
  - Selection of rational assessment method by comparing various assessment methods on seismic issues of thinned pipe.
- ○ SCC evaluation method
  - Investigation of crack propagation behavior in stainless steel weld joints and dissimilar metal(nickel based alloy/low alloy steel) weld joints
- ○ Measures for aged deterioration
  - Presentation of detection method for fine material changes by material analysis using cable actually applied for aged nuclear reactor and artificially-accelerated deterioration material

**Radiation safety**

- ○ Assessment of low dose radiation effects
  - Development of new models for low dose radiation risk and rational radiation protection
- ○ Ensuring reasonable radiation safety
  - Development of a safety assessment method based on the risk-informed approach for radioactive waste disposal and radiation safety considering field applications and development of a comprehensive concept of quality assurance for every stage and component of the long-term radioactive waste disposal

**Supporting research for back-end business**

- ● High-level radioactive waste disposal
  - Summarizing and systematization of various elemental technology from the viewpoint of site selection survey and site characterization survey
  - Summarizing of application scope and its applicability limit of underground water dating technology
- ● Low-level radioactive waste disposal
  - Study of anti-alkaline deterioration of artificial barrier material, investigation of gas migration mechanism of sub-surface disposal facility material, and preparation of gas migration analysis model
- ● Transport and storage of recyclable fuels
  - Development of long-term, large capacity spent fuel storage technology for next generation and presentation of rational value of allowable design temperature
  - Development of SCC assessment method and countermeasures technology of canister materials, aircraft crash test onto metal cask and its analytical assessment

**Next generation nuclear technology**

- Metal fuel cycle
  - Development of pyroprocessing technology based on chemical demonstration of major process, assessment of mass-balancing, and conceptual design of process equipment
  - Post-irradiation test of metal fuel irradiated at Phoenix reactor and fabrication of metal fuel for Joyo reactor.

## (2) Advanced maintenance technology

**Advanced maintenance technology for power generation facilities**

- Gas turbine hot parts maintenance
  - Enhancement of semi-automatic numerical modeling software using X-ray CT image data
  - Improvement in accuracy of temperature estimate based on computational fluid dynamics analysis methods for film-cooled/ TBC coated turbine blades
- ○ Performance diagnosis of power generating plant
  - Expansion of thermal efficiency analysis program for power generation systems to demand-side systems and establishment of program user support system
  - Development of boiler tube health monitoring program
- Condition diagnostics of power generating component
  - Verification of inspection accuracy of simple ultrasonic flaw detection method (SPOD method) using an actual piping specimen
  - Verification of applicability of monitoring method or residual life assessment method by internal pressure and bending creep test of a full-scale pipe weld specimen using "full-scale component life assessment experimental facility"

**Advanced maintenance technology of electric power distribution facilities**

- Establishment of aged facilities maintenance standard
  - Extraction of necessary and effective diagnostics items and development of verification test method of renewal time
  - Upgrading diagnostics technology for aged facilities (XLPE power cable, oil-filled transformer, hydro power generator, polymer insulator, GIS, etc.)
- ○ Management measures of power distribution facilities
  - Scenario analysis of facility investment measures for realizing improvement of investment analysis method of power distribution facilities, rational forming, and effective use
  - Extraction and study of issues to construct systematic framework regarding formation, maintenance, and operation of distribution facilities under competitive environment
- ○ Asset management of electric power network
  - Evaluation of effectiveness and improvement of the prototype asset management tools which are developed to support strategic maintenance of network asset and to support replacement leveling of aged equipment based on reliability and cost of entire electric power system
- ○ Asset management support technology
  - Development and implementation of insulation assessment data to our asset management support tools to improve the performance

## (3) Environmental innovation technology

**Global warming measures relating research (general project)**

- Global warming prediction and adaptation measures
  - Successive development of global system model and study of relation between $CO_2$ emission and climate changes
  - Development of prediction method of near future local climate changes after about thirty years and study influence of domestic climate changes to the society and the power industry.
- **$CO_2$** underground geological storage
  - Assessment of feasibility for $CO_2$ underground geological storage near large emission sites in Japan
- High efficiency utilization of biomass energy
  - Study on spontaneous heat generation assessment index during biomass storage and feasibility study for carbonizing gasification power generation technology and others
  - Practical application of biomass potential database in Asian region and CDM support tools

**Innovative environment technology**

- Innovative environment measurement
  - Applicability expansion of convenient and low cost biochemical cadmium biosensor
  - Determination of design specification of online monitor for selenium in drainage water
  - Commercialization of electric culture apparatus for microorganism
- Coal ash environmental countermeasures
  - Development of leaching countermeasure technology for trace elements and development of environment safety assessment method in agricultural utilization of coal ash
  - Practical performance assessment of soil cleaning material made from desulfurization gypsum and sewage sludge

**Next generation thermal power plant technology**

- Integrated operation system in coal-fired generation
  - Addition of ash properties prediction function and sulfidation corrosion prediction function to the evaluation system of coal adaptability to power plant
  - High accurate coal total assessment method by construction of combustion simulation available for actual power plant
- Coal gasification furnace
  - Prediction of gasification performance of sampled coal for IGCC demonstration plant and verification of support system of optimum operation for gasifier
  - Clarification of high temperature gasification reaction characteristics of low-rank coal
- Trace element control
  - Control of trace element behavior considering the effect of coal property and plant operating condition
- Low-cost MCFC power generation system
  - Establishment of low-cost basic technology using 1 kW prototype MCFC system and technical and economical assessment of MCFC system

○ Next generation IGCC system with $CO_2$ capture

- Clarification of basic characteristics of oxygen-$CO_2$ gasification and optimization of gasification system by numerical analysis
- Evaluation of desulfurization performance under high CO partial pressure condition for optimum desulfurization system
- Evaluation of optimum design for IGCC total system by practical scale feasibility study

## (4) Optimum energy utilization technology

**End use technology**

○ Energy utilization support

- Verification of total performance of indoor thermal environment design tools to support popularization of all-electric housings and development of energy saving and comfortable environment design support tools for all electric commercial kitchens

○ Assessment of new type Eco-cute operation performance

- Performance assessment and actual operation assessment aiming to support development and commercial realization of new type Eco-cute at a high efficiency compact version or a high efficiency cold area version

○ SiC device applied inverter

- Clarification of efficiency increase and compactification limit of hybrid inverter through simulation study, and formulating a development plan for all SiC inverter

○ SiC power semiconductor

- Practical application of three inch diameter high purity low defect epilayer mass production technology adaptable for SiC devices for commercial equipment (600 to 1200V class)
- Development of reducing technology of epi-defect density at high speed layer producing condition with four inch equivalent area to establish forming technology of large capacity SiC devices, and demonstration of high voltage and high current SiC diode through device structure optimization

○ Compact secondary battery application

- Clarification of specification of high efficient and high convenient battery power storage system

**Next generation grid technology**

● Supply and Demand integrated operation and control

- Development of operation and control system at the power distribution level introducing Supply and Demand integration concept contributing to penetration of renewable energy power source such as photovoltaic power generation and measures to cope with environmental issue

○ Assessment of demand reaction

- Extraction of issues to apply demand response (DR) value assessment method to Japan and quantitative assessment of demand reaction at customer level using demonstration test data in the United States

○ Next generation grid communication infrastructure

- Clarification of basic concept of demand area communication network available for operation and control of demand and supply integral system
- Assessment of basic function of IP-based time synchronization used for relay and horizontally distributed module type emergency controller

○ Next generation power distribution components

- In order to introduce 6.6 kV class superconducting current limiter to the demand area power system, establishment of energy treating technology of current limiting device, and assessment of effects of introduction of superconducting current limiter to electric power system

## (5) Social and business risk management

**Risk management of power infrastructure (natural hazard risk)**

○ Earthquake magnitude evaluation by active fault investigation

- Preparation of survey recipe for earthquake magnitude evaluation based on the results of field surveys and experimental studies

○ Wind and snow disaster prevention for power facilities

- Beginning of site observation on snow damage measures of power transmission facilities and development of typhoon disaster prediction system for power distribution facilities

○ Assessment of ground collapse impact during earthquake

- Construction of physical test method, modeling method and analysis method required for impact assessment of surrounding structures damaged by slope collapse

○ Lightning risk management

- Verification and improvement of lightning risk assessment methods, proposal of low-cost measures at lightning protection design, and preparation of a lightning protection design guide book for customer's low-voltage communication systems

○ Disaster recovery support for power distribution facilities

- Construction of real-time recovery support mapping system at earthquake and preparation of guideline based on sensitivity analysis and case study using recovery simulator

○ Maintenance management of hydropower civil engineering facilities

- Development of behavior assessment method of slopes around water conveyance structures and construction of seismic performance verification method for dam spillway facilities

**Risk management of power infrastructure (artificial risk)**

○ Countermeasures for IT interfere risk

- Proposal of comprehensive measures to reduce IT related risks by integrating intrusion detecting methods for control communication systems and security measures for business systems

○ Human error measures and safety culture formation

- Presentation of prototype of "human performance increasing management support system"

**Energy policies**

○ Response to Japanese type deregulation policy

- Presentation of modality of business governance structure and research and development investment adaptable for the Japanese power industry under competitive environment

○ Scenario analysis of energy technology policy

- Study of policy modality based on long-term scenario driver and case studies on energy policies

**Table 2 Base Research Subjects (37 subjects)**

**(1) Socio-economics Research Center**
- ○ Analysis and support of electric power business
- ○ Economics and social trend analysis under decentralization
- ○ Social trust and communication measures
- ○ Energy technology assessment

**(2) System Engineering Research Laboratory**
- ○ System analysis and stability assessment
- ○ Impact assessment of wind power generation on a power system
- ○ Communication media network technology
- ○ Information technology

**(3) Nuclear Technology Research Laboratory**
- ○ Risk information technology
- ○ Construction and assessment of technical concept of innovative energy system
- ○ Technical basis for nuclear reactor system safety
- ○ Application of basic technology in nuclear
- ○ Fuel engineering and reactor physics

**(4) Civil Engineering Research Laboratory**
- ○ Geosphere environmental behavior prediction technology
- ○ Earthquake risk reduction technology
- ○ Structural performance assessment technology
- ○ Numerical fluid analysis technology

**(5) Environmental Science Research Laboratory**
- ○ Assessment of atmospheric environment
- ○ Assessment of hydrospheric environment
- ○ Biotechnology
- ○ Assessment of biological environment
- ○ Environmental risk management
- ○ Assessment of biological effect caused by electromagnetic field

**(6) Electric Power Engineering Research Laboratory**
- ○ Countermeasures for fault current
- ○ Transient phenomena and electromagnetic wave analysis
- ○ Electric power apparatus insulation for next generation
- ○ Electromagnetic environmental assessment
- ○ Laser photon science & applications for diagnosis

**(7) Energy Engineering Research Laboratory**
- ○ Operation and maintenance technology in thermal power generation
- ○ Fuel reforming and environmental protection technology
- ○ High efficiency energy conversion technology

**(8) Materials Science Research Laboratory**
- ○ Hydrogen basic technology
- ○ Structural materials evaluation
- ○ Water chemistry management
- ○ Coating evaluation
- ○ Energy conversion and storage materials technology
- ○ Micro/nano science of advanced materials
- ○ Basic physics in functional oxides

## Business Management

### 1. Cultivation of next generation human resources

(1) Human resources to pioneer a new age

We will give young researchers a chance to challenge new problems to develop their ability suitable for COE to cultivate human resources with initiative as a professional in the society. We will also cultivate researchers playing an active role in the world through joining to collaboration with overseas organization and paper presentation in international conferences.

(2) Human resources for cooperation with the society

We will promote OJT to cultivate human resources as a key man in interdisciplinary research development such as cross-sectional problem promoters. We will expand cooperation chance with other organization by external dispatching and joining to external committees.

### 2. System formation responding to changes of the times and application of management resources

(1) Promotion of social responsibility management

We will establish internal control system through legal compliance, thorough control of risk information, ensuring business efficiency and transparency, asset preservation, and safety security export.

In addition, we will participate national project “team minus 6%” to achieve Kyoto Protocol target to strengthen an approach in environment preservation and energy saving.

(2) Cost analysis and improvement of cost-consciousness

We will grasp cost structure in individual business activity by cost analysis to promote effectively research under cost-consciousness in research fields. For research facilities, we will promote a scrap and build approach by immediately removing aged facilities and those accomplished goals and by introducing most-advanced facilities reaching research power enforcement.

(3) Response to innovation of public-service corporation system

To successively contribute to the power industry and society, we will study organization and accounting structure under new system for reasonable operation.

(4) Transmission of accomplishment and timely presentation

For research accomplishments and management vision, we will transmit easy-to-access and easy-to-understand information through media and homepage.

Regarding themes with higher public concerns relating to energy and environment, we will organize “energy related future technology forum” presented at a neutral and public stance and

another lecture presentation and seminar to contribute to the society, to further settle CRIEPI brand expected from the society.

## Workforce

Workforce in FY2008 is as follows.

(Expected as of April 1 2007)

| Item | Numbers | Percent distribution (%) |
|---|---|---|
| 1. Research | 698 | 88.0 |
| (Breakdown) | | [100.0] |
| (1) Electricity | 115 | 16.5 |
| (2) Civil engineering and construction | 93 | 13.3 |
| (3) Engineering | 82 | 11.7 |
| (4) Chemistry | 70 | 10.0 |
| (5) Biology | 54 | 7.7 |
| (6) Nuclear engineering | 48 | 6.9 |
| (7) Environment science | 43 | 6.2 |
| (8) Information & communication | 40 | 5.7 |
| (9) Socioeconomics | 43 | 6.2 |
| (10) Research management | 110 | 15.8 |
| 2. Office duties | 95 | 12.0 |
| Total | 793 | 100 |

# Settlement of Accounts

## Budget Compilation

Business scale in FY2008 was determined to 33.71 billion yen down 120 million yen to the previous fiscal year. Major points are as follows.

**1. Revenue and expenditure in business activity**

(1) Ordinary benefit revenue was 28.9 billion yen up 900 million yen to the previous fiscal year budget.

(2) Business revenue

- Funded research business revenue was mainly from government-funded research to be 2.05 billion yen down 1.29 billion yen to the previous fiscal year budget (definitive term at beginning of FY2008.)
- Other business revenue was 520 million yen down 90 million yen to the previous fiscal year.

(3) Other revenue was 130 million yen same as the previous fiscal year.

(4) Business expenditure was 24.33 billion yen down 470 million yen to the previous fiscal year as a result of decrease in funded research business.

(5) Management expenditure was 1.98 billion yen down 610 million yen to the previous fiscal year.

**2. Revenue and expenditure in investigation activity**

(1) Investment activity revenue was 1.21 billion yen by diversion of special asset to acquire research facility prepared for “assessment facility of electric power apparatus insulation maintenance standard.”

(2) Special asset acquiring expenditure was 1.4 billion yen for expenditure related to renewal to “high power test facility” starting in FY2009.

(3) Fixed asset acquiring expenditure was 6 billion yen to introduce large research facilities for ensuring our competitive power.

**3. Revenue and expenditure in financial activity**

There is no revenue and expenditure in investigation activity.

# Budget

Budget in FY2008 arranged above is as follows.

FY2008 Revenue and Expenditure Budget
From April 1 in 2008 to March 31 in 2009

(Unit: one million yen)

| | Budget | Budget in FY2007 | Up and down (△ down) | Remarks |
|---|---|---|---|---|
| I. Revenue and expenditure in business activity | | | | |
| 1. Business activity income | | | | |
| (1) Base property operation income | - | - | | |
| (2) Benefit income | | | | |
| Current benefit income | 28,900 | 28,000 | 900 | |
| (3) Business income | 2,570 | 3,950 | △1,380 | |
| Funded research business income | (2,050) | (3,340) | (△1,290) | |
| Other business income | (520) | (610) | (△90) | |
| (4) Other income | 130 | 130 | 0 | |
| Business activity income total | 31,600 | 32,080 | △480 | |
| 2. Business activity expenditure | | | | |
| (1) Business expenditure | 24,330 | 24,800 | △470 | |
| Personnel expenditure | (9,750) | (9,910) | (△160) | |
| Payment of expense | (14,580) | (14,890) | (△310) | |
| (2) Management charge expenditure | 1,980 | 2,590 | △610 | |
| Personnel expenditure | (890) | (1,240) | (△350) | |
| Payment of expense | (1,090) | (1,350) | (△260) | |
| Business expenditure total | 26,310 | 27,390 | △1,080 | |
| Difference between revenue and expenditure in business activity | 5,290 | 4,690 | 600 | |
| II. Revenue and expenditure in investigation activity | | | | |
| 1. Investigation activity income | | | | |
| (1) Special asset virement income | | | 490 | |
| Special asset virement income to acquire research facilities | 980 | 1,090 | △110 | |
| (2) Long-term advance payment diversion expenditure | 230 | 210 | 20 | |
| Investment activity income total | 1,210 | 1,300 | △90 | |
| 2. Investigation activity expenditure | | | | |
| (1) Special asset acquiring expenditure | | | | |
| Special asset acquiring expenditure to acquire research facilities | 1,400 | 900 | 500 | |
| (2) Fixed asset acquiring expenditure | 6,000 | 5,500 | 500 | |
| (3) Long-term advance payment expenditure | - | 40 | △40 | |
| Investigation activity expenditure total | 7,400 | 6,440 | 960 | |
| Difference between revenue and expenditure in investigation activity | △6,190 | △5,140 | △1,050 | |
| III. Revenue and expenditure in financial activity | | | | |
| 1. Financial activity income | - | - | - | |
| 2. Financial activity expenditure | - | - | - | |
| Difference between revenue and expenditure in financial activity | - | - | - | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | Difference between revenue and expenditure in the current period | △900 | △450 | △450 | |
| | | | Difference in revenue and expenditure in the previous balance brought forward | 900 | 450 | 450 | |
| | | | Difference between revenue and expenditure of balance carried forward | - | - | - | |
| | | | | | | | |

Note:1. Borrowing limit was 200 million yen.
Note:2. Debt burden is 1.9 billion yen in FY2009.