

**Research Plans
&
Statement of Budget
FY 2012**

March 2012

Central Research Institute of Electric Power Industry

Contents

Research Plans in FY2012

	Page No.
On Preparation of FY2012 Research Plans and Statement of Budget ····	1
Overview of FY2012 Business Activities ···········	3
Research Activities ···········	6
I. Research plans ···········	6
II. Research promotion ···········	13
Administration ···········	17
Workforce ···········	20

Statement of Budget

Budget Compilation ···········	23
Budget ···········	25

Research Plans

On Preparation of FY2012 Research Plans and Statement of Budget

The Great East Japan Earthquake and the Fukushima Daiichi nuclear disaster has wrought severe damage on Japan's economy and society. To ensure a speedy recovery from this point requires a new energy supply/demand structure for Japan that is both flexible and robust and the redevelopment of a mechanism that can continuously support this structure. In addition, society is scrutinizing the electric power industry more rigorously now, demanding not only a stable supply of power, but also cost-cutting, the restoration of the public's trust in the safety of nuclear power, and adaptations in the face of reforms in the electric power industry's system going forward.

With a strong awareness of this situation, CRIEPI is expanding its research activities as a key research institute for advanced learning in the electric power industry, in line with its mission to continue sharing and providing research results resting on scientific objectivity with the electric power industry and the public. Specifically, we are addressing issues that emerged with changes in the electric power industry and society after the earthquake, issues that must be resolved to support the stable power supply, and issues that must be resolved to build a foundation for the future supply and demand of electricity. Research related to earthquake recovery and reconstruction, such as addressing the Fukushima Daiichi nuclear disaster, will remain our highest priority as we work to resolve problems as soon as possible.

At the same time, it is essential that we enhance our research capacity without fail to achieve these goals. Accordingly, we will establish a research base that will facilitate effective and efficient research and strengthen our basic research capacity, and steadily build and expand "knowledge" networks both in Japan and overseas.

In addition, in fiscal 2012 we plan to become a general incorporated foundation and will go even further in independently pursuing research activities, including the aforementioned initiatives, in line with the spirit behind the reformation of the public interest corporation system. In particular, it is even more essential now that CRIEPI continually generate high value-added results, given the limited research funds now that the electric power industry faces such harsh conditions. This means that we must transition to a strong research system that is adapted to these new conditions. Accordingly, we will concentrate on carefully selected research issues and take measures to ensure the quality of our results despite funding cuts, while at the same time steadily reducing operating costs and personnel costs. Moreover, we will remain accountable for our activities overall by implementing external reviews and evaluations of research value, thus earning the trust of the electric power industry and society.

Under this plan, all CRIEPI employees will work together on these business activities, contributing to the electric power industry and society.

Overview of FY2012 Business Activities

Research Activities

<Research Plans>

CRIEPI aspires to resolve the issues that emerged following the Great East Japan Earthquake and the nuclear power plant accident and the issues that demand a new response from the electric power industry and develop a more flexible and robust energy supply/demand structure and the mechanism to support it. Accordingly, we thoroughly reviewed the relative priority of our research subjects and in fiscal 2011 we revised the pillars of our research, which lay out the medium-term direction of our research.

In fiscal 2012, CRIEPI will pursue research under the three research pillars described below in the three new research subject categories of priority subjects, priority subjects with limited terms and basic technology subjects. Priority subjects and priority subjects with limited terms that are highly inter-related will be grouped together in “subject groups” as we endeavor to produce and disseminate effective results by incorporating a wide range of technologies.

In addition, we will contribute to the prompt resolution of the urgent issues facing the electric power industry, such as the research to support the recovery from disaster, by continuing to allocate our research resources to priority areas, utilizing our accumulated knowledge and pursuing research in affiliation with all research centers.

- (1) Initiatives to establish optimal risk management will include recommending energy and environmental policies, nuclear power plant safety, radiation risks, nuclear fuel cycle and backend technologies and natural disaster reduction on transmission and distribution facilities . These initiatives will help to reduce the risks involved with the stable supply of electricity and facilitate its management.
- (2) Initiatives to further improve facility operations and maintenance technologies include nuclear power plant maintenance, construction, operation and maintenance of power generation facilities, operation and maintenance support for electric power transmission and distribution facilities, to provide technical support for the stable power supply, the responsibility of the electric power industry.
- (3) Initiatives to develop a supply/demand infrastructure for next-generation electric power system include, next-generation thermal power technologies, next-generation power grid technologies, and electrification and energy- saving technologies, and will make contributions to further enhance the efficiency of electricity supply and electricity use, ensure energy security, and realize energy conservation and low carbonization.

<Research Promotion>

In pursuing our research, we will focus our efforts as follows.

- Steadily pursuing research related to the disaster recovery recognizing the shift from short-term issues to medium- to long-term issues as the recovery and reconstruction progresses
- Making the transition to a strong research system that can produce high-value results despite falling research funding and maintaining and strengthening our research capacity and problem-solving capacity
- Strengthening initiatives that accurately identify the needs of the electric power industry and society

Administration and Workforce

We will pursue appropriate operations and take steps to maintain and expand our research institute with a strong awareness of the harsh business environment affecting CRIEPI and the public's scrutiny. We will continue to monitor changes in the business environment and consider and carry out countermeasures tailored to these changes.

- Thorough cost-cutting corresponding to changes in the business environment and sound and rigorous administration
- Establish a research laboratories to strengthen our research foundation
- Attract more recognition and better evaluations from the public by strategically disclosing high-quality results
- Reduce personnel costs and curb the total workforce, while pursuing measures to hire, train and utilize personnel appropriately

Income and Expenditure Budget

The budget for CRIEPI operations was increased by 1.03 billion yen over the previous fiscal year to 33.3 billion yen in fiscal 2012.

Revenue from donations, which accounts for most of CRIEPI's revenue is expected to amount to 27 billion yen, its lowest level in the past 20 years.

As a result, we will strive even harder to reduce operating costs, and have set the budget for business activity expenditures for research activities and administration at 23.7 billion yen,

down 1.65 billion yen over the previous fiscal year.

At the same time, expenditures on investing activities have been increased by 2.68 billion yen over the previous fiscal year to 9.6 billion yen so that we can continue to strengthen our research capacity and problem-solving capacity to assist with the recovery and reconstruction from the earthquake and rebuild a robust power supply system. In particular, expenditures on fixed assets, which primarily consists of research facilities, will be increased 4.08 billion yen over the previous fiscal year to 8.2 billion yen. Part of this facility investment will be covered by a 4.1 billion yen reduction in specific assets systematically set aside thus far.

Research Activities

I Research plans

CRIEPI pursues research based on the research pillars listed below, which represents the direction of our research in the medium term, and meets requests from the electric power industry and society.

<Pillars of CRIEPI's Research>

Establishment of Optimal Risk Management

CRIEPI will assess the impact of natural phenomena and socio-economic changes on the electric power industry and propose countermeasures that encompass social systems and mechanisms with the aim of reducing and managing risks to the stable supply of electric power.

Further Improvement of Facility Operations and Maintenance Technologies

We will develop more advanced operation and maintenance technology for power generating facilities and power transmission and distribution facilities in order to provide technical support for the stable supply of power, the primary responsibility of the electric power industry.

Development of a Supply/Demand Infrastructure for Next-Generation Electric Power

To prepare for future risks, CRIEPI will endeavor to minimize and overcome these risks by building a next-generation foundation that ensures greater efficiency and energy security on both the energy supply side and energy use side. We will also preemptively address issues to create an energy-saving, low carbonization society.

1. Priority subjects and priority subjects with limited terms

CRIEPI closely reviewed the research subjects it has studied thus far in its history and then narrowed these down to technologies indispensable to the electric power industry or essential in the future. Of these, CRIEPI identified 33 priority subjects into which we will channel our collective strengths as we continue, carry on and expand our research.

In addition, CRIEPI identified nine priority subjects as “priority subjects with limited terms.” These are issues that should be urgently resolved and that will make significant contributions to the electric power industry and society. We will ensure steady generation and utilization of results with strict progress management when carrying out research in these areas.

We have grouped the priority subjects and priority subjects with limited terms into 11

subject groups based on the subjects that would be enhanced by cooperation in order to ensure that research is conducted effectively. Below we outline that main research plans that support our research for each subject group.

(1) Establishment of optimal risk management

With the aim of reducing risks associated with the stable supply of electricity and streamlining management, CRIEPI recommends energy and environmental policies that can achieve social consensus into the future from a scientific and objective perspective. In addition, we are grappling with the issues of improving the safety of light water reactors and clarifying radiation risks—urgent issues for the electric power industry since the Fukushima Daiichi nuclear disaster—and are working to develop the technology needed to alleviate these risks. Moreover, in addition to research contributing to effective natural disaster countermeasures for transmission and distribution facilities, we are steadily pursuing research supporting the nuclear fuel cycle and backend technologies, such as the government and electric power industry’s radioactive waste disposal programs.

Energy and Environmental Policies

- CRIEPI proposes approaches to the electric power industry system that can achieve social consensus into the future from a scientific and objective perspective.
- We put together approaches to energy and environmental policy related to renewable energy and energy-saving technology development and strategies to popularize these technologies. We then evaluate the impact of these policies on the electric power industry’s management and society, and propose systems and policies that would help ensure energy security and resolve environmental problems.
- Regarding the reduction of greenhouse gases, CRIEPI develops numerical models that quantify changes in temperature from emissions volume and the uncertainty of these changes, and lays out rational long-term emissions pathways with their basis.

Nuclear power plant safety

- CRIEPI makes quantitative assessments of the risk of severe accidents caused by internal events and external events such as natural disasters in order to win the public’s acceptance of nuclear power generation.
- We will develop a stochastic evaluation system, leading up to the evaluation of core damage frequency, and will clarify the vulnerable points of light water reactors for which external events are the common cause.
- We will propose methods for recognizing tsunami deposits, which can determine the timing and scale of past tsunamis, and will also develop a strong shake generator

that can experimentally identify the moving function of nuclear power equipments under high acceleration to establish a safety evaluation system for natural disasters such as earthquakes and tsunami.

- We aim to establish evaluation methods of radioactive substance in the atmosphere and ocean, long-term variation of radioactive substances in the environment. The rational fire protection measures within the power plant are also aimed to be established.

Radiation risks

- We will compile data on the health effect of low dose rate radiation exposure so that the public has an proper understanding, with the aim of relieving the social radiation fears and establishing a radiation protection system with scientific basis.
- We will evaluate the health risks to human of low dose radiation exposure based on the results of researches by epidemiological studies and by identifying the mechanisms through animal experiments. Using this scientific knowledge, we will propose an rational approach to standards for radiation protection.
- These research results will be reflected in international radiation protection standards, through proactively sharing the information with the authorities and communities concerned.

Nuclear fuel cycle and backend technologies

- Given that radioactive waste disposal programs and long-term storage programs of spent nuclear fuel are crucial for the ongoing operation of light water reactors, we will develop technology to safely pursue these programs in a streamlined manner.
- We will propose testing methods to evaluate the long-term functionality of geological strata (natural barriers) and buffers using bentonite and cement materials (engineered barriers).
- CRIEPI will develop remote measurement methods by using laser irradiation for the concentration of chloride attached to surface, which causes stress corrosion cracking in metal canisters inside casks, with the aim of bringing the inexpensive and reliable concrete cask storage into practical use for spent nuclear fuel storage.

Natural disaster reduction on transmission and distribution facilities

- We will evaluate the risk of natural disasters at transmission and distribution facilities and develop risk management methods and countermeasure techniques.
- CRIEPI will develop a short-range precipitation forecast method that provides forecasts a few hours in advance incorporating dual polarization radar data to reduce meteorological disasters and speed up disaster recovery.
- We will work to raise the accuracy of prediction methods for snow accretion on

transmission lines to redress wind and snow damage at transmission facilities, and will carry out experiments and analysis to propose the optimal measures to counter snow-related damage.

- In order to reduce lightning damage of power facilities and information and communication equipment, we will clarify the relationship between lightning striking characteristics and damage through analysis of observational data taken in ultra-high structures.

(2) Further improvement of facility operations and maintenance technologies

To ensure stable electricity supply to support the recovery of Japan's economy after the earthquake, we will proactively pursue research development on technology related to the preservation and management of light water reactors, essential to their ongoing operation, as well as technology supporting the construction, operation and maintenance of thermal and hydro power generating facilities and transmission and distribution facilities.

Nuclear power plant maintenance

- In order to ensure the long-term operation of light water reactors acceptable to society, we will identify the characteristics of aging degradation resulting from long-term use of light water reactors and develop preservation and management technology to address this problem.
- We will steadily identify the mechanisms behind irradiation embrittlement in pressure vessels, and will improve the method we developed to predict embrittlement through observation of the micro-structure of highly irradiated surveillance test specimens.
- We will expand the applicable scope of the prediction code for pipe wall thinning during the gas-liquid two-phase flow previously developed to include flow accelerated corrosion.
- We will develop a method for predicting the deterioration of cable insulation in a radiation environment through well-controlled irradiation experiments in terms of environmental conditions and cable insulating materials.

Construction, operation and maintenance of power generating facilities

- We will develop technologies to support the smooth construction, operation and preservation of power generating facilities.
- We will establish a method for measuring and predicting the particulate inorganic and organic carbon components, in anticipation of stronger regulations for secondary atmospheric pollution at thermal power plants.
- We will carry out studies to evaluate the risk of bird collisions to wind turbines

toward biodiversity conservation.

- We will clarify creep fracture behavior of a girth welded section of high chromium steel pipes used for high-efficiency pulverized coal thermal power by conducting an internal pressure creep experiment with a full-scale piping test specimen of the material.
- We will build a new system integrating models on weather forecast, food, flow and deposition, and water quality predictions in order to establish a comprehensive watershed-sedimentation management technology for hydropower dams.

Operation and maintenance of transmission and distribution facilities

- We will develop technologies for operation and preservation of transmission and distribution facilities to ensure the stable supply of power with reduced costs.
- In the field of technology for disposing of large-scale power transformers contaminated with trace PCBs, we will carry out verification tests for the practical application of CRIEPI's recommended circulative cleaning and energizing cleaning technology.
- We will develop technology to strengthen the performance of asset management support tools and methods of diagnosing deterioration in aged equipment such as CV cables in order to support the preservation of transmission and distribution facilities.
- We will identify the mechanisms involved in corrosion of aged steel towers by developing fact-finding surveys and accelerated test methods.

(3) Development of a supply/demand infrastructure for next-generation electric power

We actively develop next-generation thermal power generation technology facilitating the effective use of low-grade resources and reduction of carbon dioxide emissions by raising the efficiency of power generation. Moreover, we will develop technology for next-generation grids enabling the smooth introduction of solar power and other sources of renewable energy into the power system, as well as technology that promotes the efficient use of energy and energy conservation, such as next-generation heat pumps and high-performance power semiconductors.

Developing more advanced thermal power technology

- We will develop new power generation technology with the aim of expanding the types of fuel used in coal thermal power generation, reducing CO₂ emissions and generating power more effectively.
- In our efforts to expand the types of fuel used, we will conduct experiments to

assess the impact of pulverized coal grain diameter on the combustion characteristics of bituminous coal with low pulverability.

- We will examine the use of low-grade resources by determining the basic carbonizing characteristics, spontaneous ignitions of wood pellets and other materials, as well as lignite's dehydration and basic upgrading characteristics.
- In highly efficient electric power generation, we will develop a method to assess the adaptability of various coal types as fuel, using the test data from IGCC (Integrated coal Gasification Combined Cycle) demonstration plant.
- We will develop basic O₂-CO₂ gasification technology for the highly efficient IGCC system with CO₂ capture, such as O₂-CO₂ gasification technology.

Establishing Next-generation Power Grid Technology

- We will develop basic technology for system operations, demand/supply controls and communication control from the trunk transmission power system to the demand side and will assess the feasibility of these technologies. This will enable us to build a system for the stable supply of electricity using a Japanese model of the smart grid that can handle large volumes of renewable energy and is highly efficient in utilizing energy.
- We will examine the behavior of power conditioning systems (PCS) in the event of power system faults, as well as the impact on the stability of the trunk transmission power system when large volumes of photovoltaics (PVs) are introduced.
- As well as developing security technology for next-generation communication networks, we will clarify the effectiveness of demand-response technology, taking into account the energy-saving effect.

Development of Electrification and Energy Saving Technology

- We will develop energy-saving technology to more efficiently use energy.
- Using low-GWP (global warming potential) refrigerants, we will develop industrial heat pumps and heat pumps for room heating with a low environmental impact.
- With regard to high-performance power semiconductor devices, we develop crystal growth technologies with a higher growth rate and low defect density, and will fabricate multilayer wafers of 13kV-class transistors that can be used in a high-voltage power system.
- In the development of high-performance secondary batteries, we will clarify the degradation mechanisms of batteries through non-destructive evaluation and post analysis.
- We will evaluate the energy-saving effect by reducing the required ventilation amount in electric kitchens.

- We will develop analytical tools for use in setting up battery charging infrastructure in order to popularize electric vehicles.

2. Basic Technology Subjects

Basic technology subjects are those that we address with the aim of refining the basic technology skills that are the source of solutions to issues faced by the electric power industry and strengthening our research skills in each specialty. These include field studies, the accumulation of data and knowhow generated in experiments and observations, the development, formulation and refinement of analytical methods and algorithms, and basic research to bring new ideas to life. Moreover, we accurately and promptly produce and publicize the outcome of our efforts to address the issues arising after the earthquake and Fukushima Daiichi nuclear accident.

We will designate 37 basic technology subjects in fiscal 2012 to capitalize on the strengths and specialized skills of eight laboratories with specific research fields*.

*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 and Materials Science Research Laboratory.

II. Research Promotion

1. Steady Promotion of Research related to the Disaster Recovery

- We are steadily carrying out our research related to the disaster recovery, which has been our main priority since fiscal 2011, in collaboration with all of our research laboratories, and are shifting from short-term issues to medium- and long-term issues now that the reconstruction and recovery is underway. We aim to produce highly effective results in a timely manner as a result of these endeavors so that our research can be applied in real-life situations. In our nuclear power research, we will reinforce our research initiatives designed to improve the safety of light water reactors and support their preservation, and will develop a new system to promote this research.
- We will conduct research to resolve issues related to the Fukushima Daiichi nuclear accident in close affiliation with the government and electric power industry by, for example, participating in committees on the government's and Tokyo Electric Power Corporation's medium- and long-term measures.

2. Transition to Research Structure Generating High-value Results Despite Budget Restrictions

- On the assumption that budget constraints will continue as a result of the electric power industry's harsh operating environment, we will continue to produce high-value research results by scrupulously verifying the priority of research subjects and their cost effectiveness. Specifically, we will reduce the number of experiments, compensate for fewer experiments by enhancing the sophistication of our simulation technology and expanding the application range, and carrying out more of our research internally. With these efforts to maximize our researchers' knowledge and experience, we will shift to a resilient research system adapted to reduced research funding.
- We will continue using PDCA for our research subjects and make management decisions promptly and accurately on whether to accelerate or reduce efforts in research areas or withdraw completely. These efforts are intended to ensure that research resources, such as additional resource inputs, are allocated expeditiously, and that results are steadily generated and utilized. We will adopt external evaluations and employ particularly rigorous progress management for priority subjects with limited terms, which require rapid and high-quality results.

3. Maintaining and Enhancing Research Capacity and Problem-Solving Skills

- The constant refinement of our research capacity in any environment is essential in

enhancing our value, so we will develop the research foundation that will serve as the source of impressive research skills on into the future. To this end, we are moving ahead with the construction of research bases in Yokosuka and Abiko.

- We set up large-scale research facilities to support the electric power industry's technological infrastructure and sustain and strengthen our basic research capacity. In fiscal 2012, we will establish a test facility to assess deterioration in aged CV cables, a heat pump development testing facility, and a testing facility for the advanced fuel incineration for next-generation thermal power plants. In addition, we will introduce a testing facility for the cooling limits of light-water reactor fuel and a tsunami physical simulator for use in assessing the safety of electric power equipment in the face of a tsunami.
- When allocating research resources, we will give priority to the issues facing the electric power industry that need to be resolved and issues that will sustain and strengthen our basic research capacity. In addition, we will allocate resources taking into account the diversity of our research fields to refine our research capacity as we expand in the future.
- With the aim of expanding into new research areas in light of external conditions, we will envision the future of the electric power industry and society by holding cross-cutting workshops at CRIEPI. We will also continue to seek out research subjects that should be addressed preemptively.
- We will further develop and expand our "knowledge" network, and also proactively pursue affiliations and exchanges with both Japanese and overseas universities and research institutes with impressive expertise (such as the US-based Electric Power Research Institute, Électricité de France, Japan Atomic Energy Agency, and the Marine Ecology Research Institute) in order to produce effective and advanced research results with mutually complementary scientific knowledge. In addition, we will utilize the networks we have built up in strategically presenting our results in order to enhance CRIEPI's value.

4. Reinforce Initiatives to Accurately Identify Needs of Electric Power Industry and Society

- In order to accurately identify the needs of the electric power industry and society, which changed significantly after the earthquake, we will pursue information sharing and dialogue with external committees and liaison groups. We will reflect these results in our research plans to maximize our outcomes.
- We will strengthen our affiliation with the electric power industry through joint research in the industry's field and systematic personal interaction tailored to the distinct features of our partner and their technical field by dispatching researchers, accepting visiting

researchers and holding training. As a result, we will also enhance our field applicability.

- We will quantitatively assess the cost-effectiveness of our research projects and use these results to ensure that we are accountable for our research activities both internally and externally. When carrying out these assessments, we will not only consider ways to ensure that the evaluation method is highly objective.

5. Management and Application of Intellectual Property

- We will strategically secure intellectual property related to our research results. Specifically, we will reinforce our survey of precedent R&D results in other organizations utilizing patent information and academic literature, and produce intellectual assets and secure and utilize the rights to these assets. Moreover, we will ensure thorough risk management of intellectual assets and exports from a security perspective.
- With the aim of encouraging the broad use of our intellectual assets, we will digitize our existing research reports and expand our download services for disclosed materials. In addition, we will strive to more efficiently prepare research reports so that they can be issued more quickly, and will also make our intellectual property more visible by annually publishing The Intellectual Property Report.
- We will not only promote the use of the intellectual property we have built up to promptly resolve issues in the electric power industry, but will also strive to spread technology to businesspersons working on the front lines of society through technology exchange courses and technology lectures. Moreover, we will introduce patents and software and promote their use.
- We will capitalize on our strengths as an academic research organization to participate in national and academic committees, thus contributing to the establishment of specifications, standards and technical standards for the energy and environment.

6. Promoting Funded Research

- Applying CRIEPI's fundamental research skills, we will proactively engage in research that meets the needs of the electric power industry, and will also receive government funding for research that will help to clarify issues related to the electric power industry and lead to appropriate technology policies.
- As an independent testing center, we will also facilitate the projects of the PD Center, which gives certification exams for experts of ultrasonic inspection working with nuclear power plant components, as well as the projects of the High Power Testing Laboratory, which performs short-circuit tests on electric power equipment.

7. Steady Implementation of Fundamental Activities

- We will steadily carry out the following basic activities to promote a wide range of research activities and effectively disseminate information on research activities and results.

a. Collection of Literature, Materials and Statistics

We will secure and maintain a wide range of literature, materials and statistics and collect high-quality information by, for example, collecting information utilizing our position as an academic research institute and augmenting the collections at CRIEPI's various libraries. The compiled information will be used in research activities, and also given back to society at large through publications such as research reports.

b. Establishment and Use of Mainframe

We will upgrade our mainframe installed in the Abiko Area to cope with the increasing sophistication and complexity of our research. We will use this mainframe for general purposes in research activities, and it will help in generating superior research results. Moreover, we will actively grant licenses for software, such as the mathematical simulation program that we developed, for wide use by electric power companies and manufacturers.

c. Issuance of Publications

We will gather research reports and public relations media in line with the progress made with our research issues and disclose them to society at large via our website.

Administration

1. Thorough Cost-Cutting Responding to Changes in Business Environment

- In pursuing our research activities, we will review our research subjects and change procedures in light of future income conditions, while ensuring safety and the quality of our operations. In particular, we will make strict decisions based on actual conditions on whether or not to carry out projects with high budgets or that are expected to generate costs posted in future fiscal years.
- We will ensure that we are paying competitive prices in commissions and procurement in order to further cut costs in overall operations, and will further optimize sub-contracted operations.
- While effectively utilizing CRIEPI's assets, we will streamline our fixed assets by proactively retiring and selling assets that we do not expect to use going forward, and will appropriately administer and manage assets by saving on maintenance costs.
- We will make further reductions in executive compensation in line with revenue trends and revise the annual salaries of managers on the premise of reductions at a set percentage according to relative evaluations. In addition, we will continue to take steps to reduce personnel costs on an ongoing basis by, for example, reviewing long-term policies, including social welfare costs.

2. Ensuring Sound and Rigorous Administration

- After transferring to the status of a non-profit general foundation, we will continue to strengthen governance under the new articles of incorporation and ensure sound and rigorous administration. Specifically, we will implement our compliance and the organization's risk management to enhance the effectiveness of our internal control system by revising regulations and systems as necessary to comply with legislation and social standards.
- We will complete our Plan on Expenditures for Public Benefit within the intended period. We will also address tax changes resulting from the shift to our new status.

3. Establishing Research Bases to Strengthen Research Foundation

- We are establishing a research base in the Yokosuka Area that we hope will become a research base for the energy industry, and continue to build the infrastructure such as roads, power sources and communications needed for a new and large-scale research facility. In addition, we will move ahead with our concrete plans for the new research facility and the construction of a new joint laboratory and research building to prepare for the shift from

the Komae Area.

- We will prepare a specific facility development plan to realize our future visions for our research base in Abiko Area, which is intended as a research base for nature and the environment, while adapting to changes in the operating environment.
- We will devise a plan for the shift of the research facilities in the Komae Area to the Yokosuka region, and will move ahead with preliminary preparations such as soil contamination surveys in anticipation of the systematic sale of the land after the facility transfer.
- Under this policy to focus our research divisions in these two research bases, we will review transfers and reorganization with the aim of streamlining operations in the administrative and management divisions to more effectively and efficiently administer CRIEPI.

4. Enhancing CRIEPI's Recognition and Acclaim in Society through Strategic Information Transmission

- We will strategically disseminate our research results to the public as an academic research institute. Specifically, we will issue information appropriately and in a timely manner by proactively issuing press releases and responding to requests for information from media outlets, holding briefings, introducing the forefront of our research, and publishing regular reports such as "CREIPI News", "TOPICS" and "Review" to introduce our research activities.
- We will strive to hear the requests and views of outside stakeholders by exchanging views with influential individuals and holding other public hearings. We will reflect these views in our business operations as appropriate.

5. Hiring, Educating and Utilizing Personnel as the Key to Organization's Sustainable Development

- We will establish human resource measures that will enable all staff to perform their roles to their maximum ability, with the ultimate goal being to scrupulously support each staff member. In particular, our human resource system will bolster CRIEPI's vitality with measures to raise motivation with a focus on employee assignments so that leaders in the next generation are trained.
- We will consider setting employment contract periods flexibly and a new framework with more expansive possibilities in terms of compensation and benefits as well as responsibilities and authority. This will enable CRIEPI to hire research staff on an ad-hoc basis and thus meet the increasingly diverse research development going forward.

- We will also consider introducing different employment patterns, such as part-time positions, as ancillary positions in order to diversify the ways in which office and management personnel are hired.

Workforce

The current workforce numbers approximately 840, and CRIEPI's basic policy aims to reach an equilibrium point of 800 by the end of FY2015.

Accordingly, we will keep the number of research staff unchanged in FY2012, but will gradually decrease the number of office staff to streamline office work and utilize human resource, and will also be selective in accepting other staff, such as special visiting researchers and temporary transferred researchers.

The workforce in fiscal 2012 is as follows.

(Expected as April 1, 2012)

Item	Number (people)	Percentage distribution (%)
1. Research	737 ※Including 40 visiting researchers	88.2
[Breakdown]		[100.0]
(1) Electricity	116	15.7
(2) Civil Engineering and Construction	90	12.2
(3) Mechanical	97	13.2
(4) Chemistry	73	9.9
(5) Biology	61	8.3
(6) Nuclear Engineering	47	6.4
(7) Environmental Science	43	5.8
(8) Information and Communication	40	5.4
(9) Socio-economics	49	6.7
(10) Research Support and Management	121	16.4
-----	-----	-----
2. Office work	99	11.8
Total	836	100

Appendix Table: Operations in Clause 1, Article 4 of the Articles of Incorporation and the corresponding research activities in fiscal 2012 are as follows.

Operations in Clause 1, Article 4 of the Articles of Incorporation*	Corresponding plan
(1) Research, studies and experiments on the electricity, civil engineering, environment, thermal and nuclear power, new energy and electricity applications related to energy transmission and distribution	Research activity I. Overall research plan Research activity II. Overall research promotion
(2) Research and studies on economics and legislation related to electricity	Research activity I. Overall research plan Research activity II. Overall research promotion
(3) Dissemination and utilization of output such as preparation of specifications and standards related to power technology	Research activity II. Research promotion 5, 7
(4) Other items needed to achieve objectives of a general foundation	No corresponding plans in fiscal 2012

*Note: Before the transition to the status of a non-profit general foundation, this referred to the plan for changes to the articles of incorporation.

Statement of Budget

Budget Compilation

The budget for CRIEPI operations was increased to 33.3 billion yen in fiscal 2012, up 1.03 billion yen over the previous fiscal year. The main points are as follows.

1. Operating Activities

- (1) Revenue from ordinary benefits decreased 270 million yen over the previous fiscal year to 27 billion yen.
- (2) Business revenue stood at 1.3 billion yen, down 1.09 billion yen over the previous fiscal year's budget.
 - Revenue from funded research is 900 million yen, down 900 million yen over the previous fiscal year's budget, as a result of an expected decrease in nationally funded research.
 - Other business revenue, including revenue from joint research and revenue from subsidies, decreased 190 million yen over the previous fiscal year's budget to 400 million yen.
- (3) Other revenue decreased 10 million yen over the previous fiscal year's budget, to 100 million yen.
- (4) Business activity expenditures were down 1.65 billion yen over the previous fiscal year's budget to 23.7 billion yen.
 - Business expenditures were down 1.63 billion yen over the previous fiscal year's budget to 21.96 billion yen as a result of cuts in costs as CRIEPI focused on carefully selected research topics.
 - Management expenditures amounted to 1.74 billion yen, down 20 million yen compared to the previous fiscal year's budget, as cost cutting offset increases such as the reinforcement of an internal control system.

2. Investing Activities

(1) Revenue from investing activities was up 3.34 billion yen over the previous fiscal year to 4.15 billion yen, including 4.1 billion yen in the liquidation of special assets reserved for the acquisition of a testing facility for the advanced fuel incineration for next-generation thermal power plants, an increase of 3.4 billion yen over the previous fiscal year's budget.

(2) Expenditures on investing activities increased 2.68 billion yen to 9.6 billion yen. This included

- 1.4 billion yen in expenditures to acquire special assets for the establishment of a research base in the Yokosuka Area, a 1.4 billion yen decrease over the previous fiscal year's budget.
- Expenditures to acquire fixed assets increased by 4.08 billion yen over the previous fiscal year, to 8.2 billion yen. This included the expansion and updating of large-scale mainframe computers, testing facilities for heat pump development and electric short-circuit testing facilities.

3. Financing Activities

There were no revenues or expenditures for financing activities.

Budget

The fiscal 2012 budget, compiled based on the above, is as follows.

Fiscal 2012 Budget for Revenues and Expenditures From April 1, 2012 through March 31, 2013

(Unit: Million yen)

	Budget	Revised budget to previous year	Up and down (Δdown)	Remarks
I. Revenue and expenditure in business activity				
1. Business activity income				
(1)Base property operation income	-	-	-	
(2)Benefit income				
Current benefit income	27,000	27,270	Δ270	
(3)Business income	1,300	2,390	Δ1,090	
Funded research business income	(900)	(1,800)	(Δ900)	
Other business income	(400)	(590)	(Δ190)	
(4)Other income	100	110	Δ10	
Business activity income total	28,400	29,770	Δ1,370	
2. Business activity expenditure				
(1)Business expenditure	21,960	23,590	Δ1,630	
Personnel expenditure	(9,920)	(10,020)	(Δ100)	
Payment of expense	(12,040)	(13,570)	(Δ1,530)	
(2)Management charge expenditure	1,740	1,760	Δ20	
Personnel expenditure	(980)	(980)	(-)	
Payment of expense	(760)	(780)	(Δ20)	
Business activity expenditure total	23,700	25,350	Δ1,650	
Difference between revenue and expenditure in business activity	4,700	4,420	280	
II. Revenue and expenditure in investing activity				
1. Investing activity income				
(1) Special asset virement income				
Special asset virement income to acquire research facilities	4,100	700	3,400	
(2)Long-term advance payment diversion expenditure	50	110	Δ60	
Investment activity income total	4,150	810	3,340	
2. Investing activity expenditure				
(1)Special asset acquiring expenditure				
Special asset acquiring expenditure to acquire research facilities	1,400	2,800	Δ1,400	
(2)Fixed asset acquiring expenditure	8,200	4,120	4,080	
Investment activity total	9,600	6,920	2,680	
Difference between revenue and Expenditure in investing activity	Δ5,450	Δ6,110	660	
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	Δ750	Δ1,690	940	
Difference between revenue and Expenditure in the previous balance brought forward	750	1,690	Δ940	
Difference between revenue and Expenditure of balance carried forward	-	-	-	

Note: 1. The borrowing limit was 1,000 million yen.
2. Liabilities will amount to 3,700 million yen in fiscal 2013 and 500 million yen in fiscal 2014.