Research Plans
FY2010

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Central Research Institute of Electric Power Industry

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Basic Policy

Recent Japan's social circumstances have shown signs of recovery but actually entered the transient period in which the structure is greatly fluctuating, under long-term stagnation of the economy, the uncertain international effort for low carbon society and the review of traditional policies, thus enforcing unstable aspect.

On the other hand, along with maturated economic society, the electric power facilities as one of the social infrastructures and its supporting power technology are required to maintain steadily.

Under these circumstances, CRIEPI is required to steadily respond urgent and important future subjects against which the electric power industry and the society will face.

As a result, we will promote the business activity based on the following basis.

1. For the subjects that the electric power industry should resolve in the future no matter how social changes drastically, we will steadily promote and deepen the technical development for resolution. For the prospective subjects prepared for environmental changes and those expecting technical break through for future development, we will promote researches considering priority carefully checking alternatives.

2. We will apply the PDCA cycle to continuously improve the entire business activity. Upon research promotion, we will introduce an highly effective system using collaboration with external organization for proper research subjects, and will effectively announce acquires achievements applying mass media and other resources.

3. We will further make an effort to ensure transparency in the business operation and social reliability and establish business activity foundation such as constructing infrastructures at Yokosuka area aiming at localizing of the hardware research at both sides of demand and supply on the electric power and energy technology and planning of application at each area.

Research Activities

I. Research Plans

Aiming at “ensuring energy security and response to global environment issues”, CRIEPI define “nuclear technology”, “stable electric power supply technology” and “environment and energy utilization technology” as three basic principles. CRIEPI has conducted technical development at the supply sides for measures of the highly aged power supplying facilities and high effective electric power generation as well as technical development leading to low carbonization at the entire society through high effective energy utilization at demand sides, biomass utilization, use of renewable energy and others.

In FY2010, we will focus on the following research items.

- Among subjects required for the electric power industry at the present as well as in the future, we will continuously conduct researches on plant life management research of light water reactors as a general project to inject research resources preferentially. Furthermore, we will steadily conduct research on operation and maintenance of electricity supply facilities such as snow damage measures of transmission facilities.
- To prepare massive integration of the distributed generation such as photovoltaic power generation possibly affecting an electricity grid in the future, we will accelerate related research including impact assessment on not only the distribution systems but also entire electric power gird.
- We will be actively engaged in research contributing to future electrification and energy saving through technical breakthrough typically included in low power loss semiconductor, high performance heat pump, highly safety total solid lithium battery.

1. Project subjects

For subjects with high expectation in the electric power industry and society and those which should acquire timely accomplishment and application, we will define the project subjects (37 subjects) to promote research in comprehensive strength. Major implementation items are as follows.

(1) Nuclear technology

For nuclear technology supporting foundation of the stable power supply into the future as well as playing an important role in the global warming measures, we will steadily promote researches on plant life management research of light water reactors, nuclear fuel cycle backend research project support, improvement of seismic reliability, next generation reactor and advanced fuel cycle technology, and radiation safety.

Plant life management research of light water reactors: For rationalized and highly reliable operation of the reactors long operated over 30 to 40 years, we will continuously promote researches on clarification of irradiation-induced

embrittlement mechanism under high irradiation environment, stress corrosion cracking (SCC) propagation mechanism of component and piping, and thinning mechanism of vapor and liquid two phase flow piping, and will also conduct seismic assessment for the thinned piping, development of non-destructive inspection method of SCC, and cable deterioration assessment.

Nuclear fuel cycle backend research project support: Aiming at practical application of the concrete cask expected as the next generation storage system of spent fuel (recycled fuel), we will conduct verification test related to reduction of welding residual stress of metal canister. In addition, we will intensively conduct researches to clarify alteration mechanism of deterioration for cementitious barrier materials and bentonite barrier materials in the environment of sub-surface disposal for LLW and researches related to highly barrier performance assessment technology and facility inspection technology.

Improvement of seismic reliability: Focusing on reduction of uncertainty at evaluation of input seismic motion, we will extract an index to represent the segment-coupling rupture in long active fault system based on geological and geophysical survey on the fault zone. We will study strong-motion evaluation method and seismic hazard analysis method on the basis on these results. We will also systematize the methods of modeling velocity structure and damping at the deep underground affecting seismic amplification characteristics which is important in the seismic safety assessment.

Next generation reactor and advanced fuel cycle technology: In the FBR cycle practical research development promoted by the national government and the power industry, we will steadily promote researches on fabrication of metallic fuel pin for irradiation test, dry reprocessing elemental technique, component development at the engineering scale for FY2010 national level research development assessment for metallic fuel cycle positioned as a future optional technology.

Radiation safety: Aiming at optimization of the radiation protection standard based on scientific data, we will promote accumulating data relating to low dose rate radiation effect and clarification and verification of mechanisms of the effect. We will actively disclose information on the findings and data to reflect them to the standards.

(2) Technology for the stable electric power supply

We will integrally develop rationalized technologies on diagnosis, operation, and maintenance for aged facilities from the electric power generation to the electric power distribution to ensure electric power long-term stable supply and those on expansion and high efficient operation of fuel types for the thermal power generation as well as effective use of resources , and CO_2 reduction.

Maintenance and operation management of electric power transmission and distribution facilities: To establish proper operation methods of fast-increasing

highly aged transmission and distribution facilities, we will assess applicability of deterioration diagnosis technology to the real power network. We will also investigate the failure phenomena based on the field data and evaluate the effect of new power apparatus improved against wind, snow and salt damage. In addition, we will upgrade by applying the space damage detection information to the developed disaster recovery support system of the power distribution facilities. We will also research on simplified measurement methods of low concentration PCB in insulation oil of power transformers as well as conventional instrumental methods.

Maintenance and operation of electric power generating facilities: To respond creep damage incidents occurring at the welded joint in high chrome steel piping applied at the high efficiency coal fired thermal plants, we will develop and demonstrate a high accuracy damage assessment system. For the seismic performance assessment of highly aged dam, we will construct a behavior assessment method of the dam body considering propagating deterioration of concrete materials.

Next generation thermal power technology: For stable resource reservation and its effective use for the thermal power generation, and reduction of CO_2 emission, we will clarify the performance of coal gasifier at co-gasification of low rank coal in the Integrated coal Gasification Combined Cycle (IGCC), the performance of low load combustion with raised mixing ratio of the sub-bituminous coal at the pulverized coal power plant, and the performance of co-combustion, gasification and carbonization of the waste biomass. We will also study feasibility of high efficiency thermal power generation system with CO2 capture at the full-scale model combining an O_2-CO_2 blown gasifier and an closed gas turbine by oxygen combustion.

(3) Environment and energy utilization technology

We will actively promote technical development to realize the low carbon society in the future including the environmental research centering on impact assessment and adaptation support for global warming; electrification and energy saving technology contributing to the effective energy utilization at demand sides and improvement of living environment; next generation grid technology for acceleration of smooth introduction of distributed generation to the electric power system.

Global warming projection and impact assessment: To obtain the scientific knowledge for the global warming as a discussion basis of CO_2 emission reduction, we will steadily promote mid-and-long term global warming prediction at a global basis using a global system model. Aiming at climate change prediction after 20 to 30 years at regional level in Japan, we will conduct recurrence calculation of the past actual climate data to verify the prediction method.

Electrification and energy conservation technologies: Aiming at acceleration of electrification and reduction of CO_2 emission due to energy saving effort, we will promote the performance assessment of business-use electrified kitchen and technical

development to expand an applying scope of the heat pump and will challenge to lower crystal defect density and to achieve higher production speed of silicon carbide (SiC) single crystal film expected to reduce loss of power semiconductor. And we will be engaged in assessment of applicability of carbon type negative electrode to all-solid-state lithium polymer battery as a high safety battery technology.

Next generation grid technology: To respond massive integration of the distributed generation such as photovoltaic power generation, we will conduct demonstration of the coordinated operation and control of demand and supply side equipment in the power distribution system and assessment of influence on demand and supply balance of large penetration of PVs in the power system. We will be engaged in assessment of the fundamental performance of the information and communication infrastructure essential for the next generation grid.

In the "energy technical strategy" by providing future vision that the preventing climate change, the economy, and energy security and methods of strategy and policy in technology development and dissemination, we will construct the vision scenario of the low carbon society realization through electrification, the alternative scenario based on analysis of risk factors in the vision scenario, and promoting energy saving to analyze effects on the energy utility and society.

2. Base technology subjects

For the base technology as a key resource to solve problems, applying and developing feature and specialty of eight professional laboratories*, we will determine base technical subjects (35 subjects) including succeeding and maintaining technology, developing technology, technology required for new research extension such as high energy utilization at demand sides to establish and elevate the base technology focusing to the future.

3. Research promotion method

(1) Exerting comprehensive strength

In research promotion, we will try to deliver an integral power by applying horizontal promotion system through linkage of professional institutes having fundamental technology necessary for issue resolution. To acquire high quality and timely achievement, we will promote researches under deep collaboration with the electric power industry and proper commutation with domestic and overseas research institute and organization.

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, Material Science Research Laboratory.

(2) Establishment of outcome management

From planning of researches to application of their achievements, we will establish the outcome management by conducting PDCA of research from the viewpoint of maximization of propagation effect (outcome) to the electric power industry and society.

(3) Promotion of funded research

Applying CRIEPI's base technology, we will actively promote research responding to the business demand in the electric power industry and will selectively receive research from the national government for subjects related to the electric power industry. We will promote the PD center project for engineer's qualification of ultrasonic flaw detection for nuclear power plant components and high-power testing laboratory for a short-circuit test of the electric power components.

(4) Systematic introduction and renewal of large scale research facilities

We will introduce large scale research facilities to support fundamental technology of the power industry according to the program.

In FY2010, we will promote to introduce "light water reactor transient phenomena research facility" for test researches on the statistical safety assessment method focusing on advanced utilization research related to future light water reactors and will improve "impulse current generating equipment" to promote smoothly test researches using the large capacity power short circuit test facility.

II. Management and application of intellectual property

As a research institute contribute to the electric power industry and society, we will ensure the intellectual properties as accomplishments of research activity to widely apply in the proper management.

(1) Visualization of intellectual property

To accelerate applying achievements, we will promote visualization of intellectual properties and active information transmission through publication of an intellectual property report, digitalization of all past research reports, and expansion of download service of research reports.

(2) Promotion of technical succession and transfer activity

To directly apply knowledge accumulated in CRIEPI to field sites such as the power industry, we will promote technology succession activity by technology exchange

courses and technology lectures. Through application of technology transfer organizations, introduction of achievements at a forums organized by CRIEPI, and participation to external exhibitions, we will promote active technology transfer to business organizations including the power industry.

(3) Contribution to rules and standards formulation

Applying features as an academic research institute, we will contribute to formulation of various rules, standards, and technical guidelines (maintenance and control standards for nuclear components, etc.) related to energy and environment through joining to various committees held by the government and academic societies.

Business Management

To strongly promote research activity, we will establish the management system quickly responding to changes of the times and will apply effectively limited management resources.

(1) Formulation of application framework at each area and facility construction

On the basis of the master plan for the land application at Yokosuka area, we will preferentially establish an infrastructure including the research electric power to investigate its application plan using features at each area. In particular, for land at Komae area after transferring research facilities to Yokosuka area we will continuously investigate its applying policy based on the viewpoint of effective resource utilization.

(2) Succession of cost reduction and effective resource application

To focus on introduction of large research facilities and maintenance of Yokosuka area for new research evolution, we will regularly check cost reduction upon entire business activity than ever before. We will also streamline resource by sellout of vacant lot in recreation facility and retirement of inactive research facilities to effectively apply resource through efficient use of space after removal of facilities.

(3) Personnel planned application

The number of personnel increased by reemployment system of temporary employee along with obligation for continuous employment until 65 years old. Despite of the fact, we will maintain the total number of present personnel to maintain and improve manpower through basically strengthening present personnel ability.

For personnel engaged in research works, we will add and satisfy personnel required from both sides of start-up of new research items and continuous technology maintenance. For targets requiring accomplishment in the short period, we will apply external personnel by employing contract researchers with a time limit.

For personnel engaged in office works, we will respond present reduction through rationalization and employing streamlined business style.

(4) Information transmission of research achievement and increase in visibility

In addition to policy and technical presentation traditionally through forum, symposium, and website and timely information transmission for research achievement, we will newly issue periodical publication to raise further visibility for CRIEPI's research and development power. As a social educational activity on energy and environmental issues, we will hold lecture presentation and participate external events.

(5) Response to innovation in public-service corporation system

Providing for the shift to new corporation, we will continuously assess operational reality for new public-service corporation system to proceed with the preparations through formulation of an draft article of incorporation and review of internal control system.

Workforce

Workforce in FY2010 is as follows.

(Expected as of April 1, 2010)

Item	Numbers	Percentage distribution (%)
1. Research	731	88.7 [100.0]
(Breakdown)		
(1) Electricity	117	16.0
(2) Civil engineering and construction	90	12.3
(3) Mechanical	88	12.1
(4) Chemistry	77	10.5
(5) Biology	58	7.9
(6) Nuclear engineering	52	7.1
(7) Environment science	47	6.4
(8) Information & communication	40	5.5
(9) Socioeconomics	44	6.0
(10) Research support & management	118	16.2
2. Office duties	93	11.3
Total	824	100

Statement of Budget

Budget Compilation

Business scale in FY2010 was determined to 33,240 million yen down 2,940 million yen to the previous fiscal year. Major points are as follows.

1. Revenue and expenditure in business activity

(1) Ordinary benefit revenue was determined to 27,200 million yen down 3,800 million yen to the previous fiscal year budget.

(2) Business revenue was determined to 3,260 million yen up 870 million yen to the previous fiscal year budget.

- Funded research business revenue was determined mainly from government-funded research to be 2,280 million yen up 470 million yen to the previous fiscal year budget (definitive term at beginning of FY2010.)
- Other business revenue including subsidy from the government and others was determined to 980 million yen up 400 million yen

(3) Other income was 110 million yen down 30 million yen to the previous fiscal year budget.

(4) Business activity expenditure was determined to 25,640 million yen down 970 million yen to the previous fiscal year budget.

- Business expenditure was determined to 23,990 million yen down 560 million yen to the previous fiscal year budget resulting from effort of expenditure reduction regardless active approach to aim at new research development.
- Management expenditure was determined to 1,650 million yen down 410 million yen to the previous fiscal year budget resulting from effort of expenditure reduction.

2. Revenue and expenditure in investing activity

(1) Revenue of investing activity was determined to 1,930 million yen including 1,000 million yen by virement of special assets to acquire research facilities accumulated for “high-power short-circuit testing facility” and 700 million yen by sellout of welfare assets.

(2) Expenditure of investing activity was determined to 7,600 million yen including 4,900 million yen for “light water reactor transient phenomenon research facility” to ensure research competitive force, 1,100 million yen for land purchase at Yokosuka area, 1,100 million yen of special asset accumulation for Yokosuka area infrastructure improvement.

3. Revenue and expenditure in financial activity

There is no revenue and expenditure in financial activity.

Budget

The Budget in FY2010 arranged above is as follows.

FY2010 Revenue and Expenditure Budget
From April 1 in 2010 to March 31 in 2011

(Unit: one million yen)

	Budget	Revised budget to previous year	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	27,200	31,000	△3,800	
(3) Business income	3,260	2,390	870	
Funded research business income	(2,280)	(1,810)	(470)	
Other business income	(980)	(580)	(400)	
(4) Other income	110	140	△30	
Business activity income total	30,570	33,530	△2,960	
2. Business activity expenditure				
(1) Business expenditure	23,990	24,550	△560	
Personnel expenditure	(9,420)	(9,880)	(△460)	
Payment of expense	(14,570)	(14,670)	(△100)	
(2) Management charge expenditure	1,650	2,060	△410	
Personnel expenditure	(880)	(1,220)	(△340)	
Payment of expense	(770)	(840)	(△70)	
Business activity expenditure total	25,640	26,610	△970	
Difference between revenue and expenditure in business activity	4,930	6,920	△1,990	
II. Revenue and expenditure in investing activity				
1. Investing activity income				
(1) Special asset virement income				
Special asset virement income to acquire research facilities	1,000	1,300	△300	
(2) Fixed asset acquiring expenditure	700	500	200	
(3) Long-term advance payment diversion expenditure	230	230	-	
Investment activity income total	1,930	2,030	△100	
2. Investing activity expenditure				
(1) Special asset acquiring expenditure				
Special asset acquiring expenditure to acquire research facilities	1,100	1,800	△700	
(2) Fixed asset acquiring expenditure	6,500	7,770	△1,270	
Investing activity expenditure total	7,600	9,570	△1,970	
Difference between revenue and expenditure in investing activity	△5,670	△7,540	1,870	
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	△740	△620	△120	
Difference between revenue and expenditure in the previous balance brought forward	740	620	120	
Difference between revenue and expenditure of balance carried forward	-	-	-	

Note:1. Borrowing limit was 200 million yen.
Note:2. Debt burden is 3,500 million yen in FY2011.
Debt burden is 1,000 million yen in FY2012.