

**Energy Research and Development
Centralization Plan**

~Towards Self-Supporting Relationship
between Local Community and Nuclear Technology~

March 2005

Fukui Prefecture

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Chapter 1 Basic Concept

In our Prefecture, since the start of operation of Japan's first commercial nuclear power plant in 1970, fifteen (15) nuclear power plants have been installed thus far, which now are supplying about 60 percent of the electricity consumed in the Kansai Region. By so doing, we have been greatly contributing to the energy policy of Japan. It is, however, recognized now that concentration of research institutes and human-resources fostering organizations, their collaboration with local industry as well as the system to actively promote technological transfer to private companies have never been sufficient.

Nuclear power generation is the essential industry of our Prefecture. Thus, in addition to its conventional function of supplying electricity, it is quite important for us to have a firm policy to positively activate the local industry by promoting research and development activities to transfer and apply the broad technologies related with nuclear energy, taking full advantage of the features of our Prefecture, where various types of nuclear power plants are concentrated.

In the meantime, it is now strongly sought to incorporate "ensuring safety and security" of residents of our Prefecture in our Energy Research and Development Centralization (hereinafter called ERDC) Plan, following the super-heated steam spewing accident, which took place at Mihama Nuclear Power Plant Unit 3 in August 2004.

In other words, we should not confine nuclear power plants in our Prefecture as mere power production factories, but we should rather move towards making our Prefecture the center of research and development on nuclear and energy related technologies, including highly advanced medical treatment, taking advantage of the characteristic concentration of nuclear power plants.

Moreover, as Japan's stronger international contribution in the area of nuclear-related technologies is expected in various Asian countries, China in particular, where rapid expansion of nuclear utilization is expected towards the future, it is now required to create a good mechanism through which many excellent researchers and engineers will gather to our Prefecture not only from Asia but from all over the world.

This ERDC Plan was established, based on the above-mentioned basic concept and from a long-term standpoint, to make our Prefecture a comprehensive research and

development centralized region for energy with nuclear power in its core, by implementing various measures which could contribute to gaining confidence from the local people, through contribution of nuclear power for the development of our Prefecture.

In line with our basic policy, Kansai Electric Power Company Ltd. has already decided to move its Nuclear Power Division (headquarters of nuclear power) to our Prefecture, and Japan Nuclear Cycle Development Institute (JNC), which is to merge with Japan Atomic Energy Research Institute (JAERI) in October 2005 to become a new entity, also plans to enlarge its headquarters function at its Tsuruga Head Office.

Chapter 2 Organizations for Promoting the Plan

- In order to realize ERDC Plan in a steady and swift manner, it is important for the industry, Operators*, universities, the Central Government, Prefecture and municipal Governments to work together continuously, and to this end, it is necessary to define the promotion mechanism of the Plan.

(1) Establishment of “ERDC Promotion Council” (In fiscal 2005)

- In order to promote the Plan steadily and smoothly, we will first establish “ERDC Promotion Council”, based on the members of the ERDC Planning Committee, in which the industry, Operators, universities, the Central Government, Prefecture and municipal Governments are to participate, and this Council will device a promotion policy, which incorporates programs to put into practice various concrete measures.

(2) Installation of “ERDC Project Office” (In fiscal 2005)

- We will add anew promotional function for ERDC Plan to the Wakasa Wan Energy Research Center (hereafter called “WERC”), which is to serve as the driving force of promoting ERDC Plan.

For this purpose, we will install ERDC Project Office by widely recruiting human resources from outside WERC, and this ERDC Project Office will proceed with comprehensive coordination for the implementation of the Plan, in the fields of “enhancement of research and development function”, “education and exchange of human resources”, and “creating and fostering of new industries”.

- At the same time, ERDC Project Office will play an active role in public relations and public awareness activities in order to gain understanding and cooperation from the residents of the Prefecture towards the promotion of ERDC Plan.
- Moreover, in order to ensure that every measure incorporated in ERDC Plan will be implemented as programmed, we will enhance financial basis by establishing a special foundation, etc. for this purpose.

Remarks (*) “Operators” in this Plan means public utility companies (Kansai

Electric Power, Hokuriku Electric Power and Japan Atomic Power Company, hereafter collectively called “Power Operators”) together with Japan Nuclear Fuel Cycle Development Institute (which is a research and development organization). In the meantime, Japan Nuclear Fuel Cycle Development Institute (JNC) will merge with Japan Atomic Energy Research Institute (JAERI) in October 2005 and become an independent administrative corporation to be called “Japan Atomic Energy Agency (JAEA)”.

Chapter 3 Concrete Measures

1. Ensuring Safety and Security

- On August 8, 2004, at Mihama Nuclear Power Plant Unit 3, a regrettable accident involving death and injury of 11 persons took place.

The direct cause of this accident was the negligence on the part of the Operator to perform safety inspection for a long period of time, which should have been performed in accordance with regulations, but in the background of this accident, there exists the aging problem of nuclear power plants.

- Many of the nuclear power plants located in our Prefecture have already operated for a long period of time from their start of operation (i.e. many of them are already aged), and this tendency will soon spread throughout the country.

Under such circumstances, it is necessary for the Central Government and for Operators to deal with this aging problem of nuclear power plants more seriously with concrete countermeasures in mind.

- Taking into account the learned lessons from this accident, etc., it is necessary to establish a high standard medical treatment system.

Moreover, besides ensuring the safety and security of nuclear power plants, it is necessary to actively utilize nuclear-related various technologies for “the realization of the longstanding welfare of the local community”.

- To this end, from the viewpoint of responding to increased health consciousness of the residents of the Prefecture and in order to increase the level of sense of safety and confidence of the entire people of the Prefecture towards nuclear technology, it is necessary to establish a proton beam cancer treatment and research facility for the entire Prefecture.

**(1) Enhancing Countermeasures for Aging Problem and Promoting Research System
(From fiscal 2005 onward)**

- The Central Government and Operators will implement the following measures to enhance safety for nuclear power plants which have already operated for a long time from the start of operation.

① Study on enhancement of national safety surveillance system and promotion of research institution

- (i) Nuclear and Industrial Safety Agency (NISA) will establish within the Agency a new office called “Nuclear Power Plant Aging Management Office“ and also allocate its personnel to supervise and control its four Offices for Inspectors of Nuclear Safety Management located in the Prefecture, to enhance its safety surveillance system.
- (ii) The Central Government will consider promoting research system to perform safety demonstration experiments related to the nuclear power plant aging, in consultation with Japan Nuclear Energy Safety Organization (an independent administrative corporation. “JNES”) and Japan Nuclear Cycle Development Institute (“JNC”).

② Organizational enhancement of JNES

- (i) A local office will be established within the Prefecture to effectively follow safety regulations.
- (ii) When experiments and research related to nuclear safety are conducted, research centers within the Prefecture will be utilized actively.

③ Establishment of a section dealing with the aging problem within JNC

Taking the opportunity of merging with JAERI, JNC will establish a new section (an organizationally horizontal section) to study the nuclear power plant aging.

④ Enhancement of countermeasures against nuclear power plant aging by Power Operators

Based on the report to be compiled by the “Committee on Countermeasures against Nuclear Power Plant Aging” of the Central Government, power Operators will aggressively deal with the nuclear power plant aging by adopting countermeasures such as the introduction of latest inspection techniques and repair work of nuclear power plant facilities and equipment.

**(2) Developing Safety Medical Treatment System in Local Community
(From fiscal 2005 onward)**

- In order to establish a secure local safety medical treatment system, we will deal with preparing necessary doctors and transport system in cooperation with Operators, taking into account the lessons learned from the accident at Mihama Nuclear Power Plant Unit 3.
- We will also establish advanced medical facilities equipped with high technologies which are able to cope with the treatment of heat injuries and radiation exposure in cooperation with Operators.

**(3) Establishing Proton Beam-based Cancer Research and Treatment Facility
(In fiscal 2011)**

- It is necessary to establish a medical research center to promote longer healthy life by making best use of the nationally first-class results of proton beam-based cancer treatment researches, which have been conducted at WERC as well as its excellent cancer diagnosis and treatment techniques.
- To this end, we will build a new cancer medical treatment facility using proton beams, which can be widely used by the residents of the Prefecture.
And, by using this facility, we will establish a wide range joint research system for cancer treatment by various medical treatment organizations within the Prefecture. Through such research activities, we will aim at establishing an efficient system to attract excellent medical doctors to our Prefecture, not only from within Japan but also from all over the world.

2. Enhancement of Research and Development Function

- Our Prefecture has a globally unique feature in terms of the numbers and types of nuclear power plants, such as boiling water reactor (BWR), pressurized water reactor (PWR), proto type fast breeder reactor (FBR) “Monju”, and advanced thermal reactor (ATR) “Fugen”.

Moreover, there are several research institutes related to nuclear power and energy, such as JNC (in Tsuruga City), WERC (in Tsuruga City), and Institute of Nuclear Safety System (INSS) (in Mihama Town).

- Under such circumstances, securing excellent human resources to support the nuclear industry has recently been an urgent need and it has become necessary for science-related universities within the Prefecture to enhance such features.

University of Fukui established Graduate Program of Nuclear Power and Energy Safety Engineering in 2004, and Fukui University of Technology established Department for the Application of Nuclear Technology in 2005 as well.

- It is necessary for us to further enhance such research characteristics of the above universities, research institutes and public experimental research institutes and also to enhance research and development function, by establishing a joint and cooperative research structure with other universities and research institutes in the Kansai and Chukyo Regions in an organizationally horizontal manner.

**(1) Fast Breeder Reactor Research and Development Center (tentative name)
(in fiscal 2005)**

- JNC will establish “Fast Breeder Reactor Research and Development Center” (tentative name), by utilizing “Monju” and other existing facilities located around the reactor.
- JNC will aim at making this Center as a globally central point where many researchers are to gather to study fast breeder reactors and will aggressively contribute to activating the local industry through undertaking the following.

① Research and Development on FBR

JNC intends to play the leading role in the development of the Generation IV Nuclear Energy System (Gen-IV)*, by building confidence in “Monju” as a power generation plant, through establishment of sodium treatment technology and R&D on equipment inspection technique, and conducting R&D towards commercialization of a new-type reactor fuel which can extract more energy than before.

Remarks(*) : The Gen-IV of nuclear power plant is a generic concept of the next generation nuclear power plant including FBR, which the Department of Energy of the United States is aiming at commercialization around 2030.

② Deployment of research on multiple use of “Monju”

JNC will deploy R&D activities in a wide scale towards multiple use of “Monju”, such as development of hydrogen production and new material research and development, by utilizing the characteristics of FBR which can obtain higher heat source and higher energy neutron beams than the conventional light water reactors.

③ Gathering of excellent researchers

JNC will aim at becoming an international R&D center where excellent researchers will gather, by accepting researchers from all over the world, holding international

conferences including those sponsored by IAEA, and disseminating the results of researches domestically and internationally.

④ Transfer of advanced technologies to local companies

JNC will promote joint researches between universities/research institutes and companies within the Prefecture for eventual technical transfer of various types of patents and results of researches.

(2) Nuclear Reactor Decommissioning Research and Development Center (tentative name) (In fiscal 2005)

- JNC will establish a new organization called “Nuclear Reactor Decommissioning Research and Development Center” (tentative name), by making use of “Fugen”.
- In this Center, JNC will establish decommissioning techniques based on the experiences obtained from “Fugen”, and will undertake the following, with a view to creating a new industry for large scale decommissioning of commercial nuclear power plants in the future.

① R&D towards commercialization of decommissioning technologies/techniques

- (i) R&D on the treatment techniques of radioactive waste, remote robotic technologies, technologies to reuse dismantled waste, etc. will be first promoted for the decommissioning of “Fugen”.
- (ii) Operators will establish “Wakasa-district Information Liaison Meeting on Nuclear Power Plant Decommissioning”, in order to commercialize and share the information on decommissioning techniques.

② Undertakings to improve the technological level of companies within the Prefecture

- (i) Ministry of Education, Culture, Sports, Science and Technology (MEXT) will conduct “Safety Demonstration Examinations for Decommissioning of Prototype / Research Phase Reactor Facilities” by inviting private companies in the

Prefecture, aiming at demonstrating the safety of decommissioning techniques and the treatment technologies for generated waste.

- (ii) JNC will conduct joint researches with universities and research institutes within the Prefecture by utilizing “Fugen”, and hold “Seminars on Decommissioning Techniques” (tentative name) for private companies in the Prefecture.

(3) New Roles for WERC (From fiscal 2005 onward)

- WERC was established in September 1994 with a view to activating the local community by conducting research and development on nuclear power and energy-related matters. On top of that, WERC will play the role as the engine to promote ERDC Plan.
- WERC will transform to a research organization closely connected with the local community so that it can respond to the needs of the local industry, etc.
- WERC will undertake the following, to become the driving force to promote this ERDC Plan through ERDC Project Office to be established and to contribute to the sustainable development of the local community.

① R&D activities aiming at competitive products by local companies

- (i) Research structure will be transformed from the conventional basic research-oriented style to a practical and applied-research-oriented style, reflecting the results of investigation of corporate needs.
- (ii) Researches will be conducted with a view to developing concrete commercial products so that the existing industries are fostered and new industries are created.
- (iii) Technically advanced R&D (which other research institutes cannot perform) will be conducted, by making full use of the characteristics of highly advanced scientific equipment of the Center, such as the accelerator.

※ Examples of researches:

- R&D utilizing solar energy
- Development of technology to fabricate new type semi-conductor

② Utilization of facilities and equipment by companies and universities within and outside the Prefecture

Although WERC possesses the accelerator and other highly advanced measuring and analyzing equipment, which are difficult to find in other parts of the Western Japan, they have not been efficiently utilized due to difficulties in operation techniques, etc. WERC will enhance its support system so that they can be more positively utilized for joint researches with companies and universities within as well as outside the Prefecture.

③ One-stop service to companies within the Prefecture

ERDC Project Office to be established anew will establish a system where issues associated with companies within the Prefecture can be managed and solved comprehensively in a coordinated manner (One-Stop Service). Such system will aim at promoting transfer of technologies related to nuclear energy, holding technical seminars related to nuclear power which will foster human resources, and coordinating joint researches among various organizations and companies including JNC and universities.

(4) Promotion of Collaboration with Universities and Research Institutes in the Kansai and Chukyo Regions (From fiscal 2005 onward)

- ERDC Project Office will perform a coordinating function so that University of Fukui and Fukui University of Technology can enhance nuclear-energy-related researches such as evaluation of material strength for nuclear power plants, research on technologies to use radiation, and technology research on separation and analysis by laser, through use of nuclear-related facilities located within the Prefecture and collaboration with JNC, Operators and universities in the Kansai and Chukyo Regions.
- ERDC Project Office will form a conference consisting of universities and research

institutes within and outside the Prefecture including Fukui Prefectural University and Fukui National College of Technology in order to study the ways of promoting joint researches between universities/research institutes within the Prefecture and other universities in the Kansai and Chukyo Regions as well as research organizations such as Spring-8 (Hyogo Prefecture), and utilizing relevant facilities for joint projects.

3. Education and Exchange of Human Resources

- It is important to actively foster human resources needed for technological improvement, maintenance and inspection of various facilities and equipment installed at nuclear power plants for those companies that are eager to create new industries utilizing energy-related technologies and to enter the industry involved in periodic inspection and decommissioning.
- We will aim at making our Prefecture a center to foster and exchange human resources where excellent researchers and engineers not only from Asian countries (from China, in particular), where rapid expansion of nuclear power utilization is expected, but also from all over the world, taking advantage of the specific features of our Prefecture, where as many as 15 nuclear power plants are concentrated.
- It is also important to establish a nuclear education system based on the concept of horizontal cooperation among universities by cooperating with universities in the Kansai and Chukyo Regions to foster a wide range of human resources for nuclear power, taking advantage of the location of our Prefecture adjacent to these two large urban areas.
- In order to obtain correct and deep understanding of nuclear power by citizens, it is important for the Central Government to clearly define its nuclear-energy education as one of the most important pillars of the national education system. In our Prefecture, too, it is necessary to actively proceed with proper nuclear-energy education, not only at the level of colleges and universities, but also at each level of education at elementary schools, junior high schools and high schools, by closely cooperating with various levels of schools and the local community.

(1) Conducting Technical Training for Enhancing Skills of Engineers in Local Companies (From fiscal 2005 onward)

- ERDC Project Office will systematically prepare for various kinds of training systems and implement them, so that private companies within the Prefecture can expand their opportunities to create new businesses or to take part in the businesses of inspecting and repairing facilities and equipment during periodic inspection of nuclear power plants located in the Prefecture.

① Implementation of systematic professional training

- (i) By efficiently utilizing training facilities of Operators, ERDC Project Office will implement the following professional training.

- Implementation of professional training including exercises to improve technical skill, intended for engineers in the local companies.
- Holding seminars to promote understanding of nuclear- related technologies and participation in the works of nuclear power plans, intended for employers of the local companies.

- (ii) ERDC Project Office will conduct general training to deepen knowledge about the present status and characteristics of the nuclear industry, intended for engineers in the local companies.

② Roles of Operators and nuclear power plant manufacturers

- Operators will make their Nuclear Power Plant Maintenance Training Center (Takahama Town) and FBR Cycle Comprehensive Training Facility (Tsuruga City) available to the companies in the Prefecture, and also improve professional training function of these facilities in cooperation with nuclear power plant manufacturers, taking into account needs of the companies in the Prefecture.
- Operators will endeavor that the companies in the Prefecture which have improved technological capabilities through attending technological training have better chance to participate in businesses of inspection and repairs of facilities and

equipment to be conducted during periodic inspection of nuclear power plants, and that nuclear power plant manufacturers foster and support the companies technically in the Prefecture.

(2) Reinforcing System on Nuclear and Energy Education at Universities in the Prefecture (From fiscal 2004 onward)

- University of Fukui and Fukui University of Technology will undertake improvement of nuclear and energy education to foster practically skillful engineers and to reeducate the general public, by utilizing nuclear related facilities in the Prefecture as well as cooperating with JNC, Operators and universities in the Kansai and Chukyo Regions.
- To this end, the universities in the Prefecture will urge universities and research institutions in the Kansai and Chukyo Regions to participate in discussions and consider ways to reinforce nuclear and energy education system through various initiatives such as exchange of lecturers and preparation for common curriculums.
- Operators will actively cooperate in education by universities/colleges, by dispatching lecturers and also making their facilities (including to be built at Ohi Town) available to them.

(3) Enhancing Nuclear and Energy Education at Elementary, Junior High and High Schools

- We will prepare for better educational environment for teachers to provide proper nuclear and energy education more actively at each level of elementary, junior high and high schools.
- To this end, Operators will also cooperate in nuclear and energy education, by positively making available their facilities for educational purposes and dispatching researchers and engineers to schools as lecturers.

(4) International Nuclear Information and Training Center (tentative name) (In fiscal 2005)

- JNC will establish a new organization “International Nuclear Information and Training Center” (tentative name), by utilizing its FBR Training Facility.
- In this Center, JNC will provide international contribution (to Asian countries, in particular) by accepting trainees from overseas, and also train leaders and engineers on research, education and industry fields.

(5) Promotion of Accepting Overseas Trainees by the Central Government

- MEXT will implement training on safety technologies of nuclear power plants including fast breeder reactors, by inviting engineers involved in nuclear safety from Asian countries, in the Prefecture.
- METI will implement training on operation, maintenance, inspection, etc. of nuclear power plants, for nuclear related engineers from Russia, Asian countries, etc. , in the Prefecture
- JNC will implement training on the monitoring of radiation in the environment in case of emergency, by making use of the existing Overseas Engineers Training System of JICA, in the Prefecture.

(6) Inviting International Conferences

- We will promote exchange of information with researchers from the United States and European countries including France.
- In cooperation with the Central Government, we will actively invite to our Prefecture, international conferences sponsored by IAEA (International Atomic Energy Agency; Headquarters in Vienna) and OECD/NEA (Organization for Economic Cooperation and Development / Nuclear Energy Agency; Headquarters in Paris) as well as meetings and conferences of various nuclear related academic circles and institutions.
- The Central Government and the Prefecture will also jointly study possibilities of inviting international institutes into the Prefecture.

4. Creating and Fostering New Industries

- In nuclear power plants, there are many advanced technologies concentrated, such as fast neutron utilization technology, remote surveillance technology, and radiation control technology, and thus, it is essential to consider how to utilize these technologies owned by Operators and nuclear power plant manufacturers for the purpose of activating the local industry.

It is also necessary to promote participation of local companies in the businesses related to periodic inspection of nuclear power plants and also to create new industries related to large scale decommissioning measures of nuclear power plants in the future.

- With respect to the transfer of nuclear related technologies to local companies and participation of local companies in businesses related to periodic inspection and decommissioning of nuclear power plants, while WERC and JNC have been already working on these issues, there are voices that the results are not very visible. Thus, not only enhanced efforts by Operators and nuclear power plant manufacturers but also more positive involvement by local companies themselves for technical transfer, etc. are required.
- In order to promote transfer of nuclear related technologies to local companies in the future, it is necessary to establish a system to support joint researches based on the industry-academia-government collaboration, coordinated by ERDC Project Office.
- In the meantime, also with respect to the creation of new industries utilizing hitherto unused resources of the existing nuclear power plants, such as heat and radiation sources, it is necessary to conduct thorough studies by widely inviting cooperation from various fields.

(1) Building System of Technological Transfer under Industry-Academia-Government Collaboration (In fiscal 2005)

- In order to effectively proceed with transfer of energy related technologies, ERDC Project Office will undertake the following measures.

① Arrangement of technical coordinator (tentative name)

- (i) In order to promote technology transfer to local companies, “Technical Coordinator” (tentative name) will be arranged.
- (ii) Technical Coordinator will coordinate the promotion of research and development for new products based on energy related technologies, and will actively support joint researches and development of new products by local companies in the Prefecture.

② Creation of industry-academia-government network

In line with the policy of Industrial Power Strategy Headquarters of Fukui Prefecture to establish an industrial cluster, ERDC Project Office will create an industry-academia-government network for utilization of energy related technologies, in which companies and research institutes (including universities) in the Prefecture, Fukui Industrial Support Center and Operators will participate.

- In cooperation with ERDC Project Office, publicly funded experiment and research institutes such as Fukui Prefectural Industrial Technology Center as well as Fukui Industrial Support Center will be equally responsible for promoting transfer of energy related technologies to companies in the Prefecture, in accordance with the “Basic Policy for Creation of Mecca for the Most Advanced Technologies” of Industrial Power Strategy Headquarters of Fukui Prefecture.
- Operators, in cooperation with nuclear power plant manufacturers, will positively support transfer of nuclear related technologies to the local industry as well as the entry of local companies into businesses of the nuclear industry such as those related to periodic inspection and decommissioning.

(2) Creating New Industries by Utilizing Resources of Nuclear Power Plants (From fiscal 2005 onward)

- ERDC Project Office, jointly with universities and research institutes, will study possibilities of creating new industries by utilizing resources found in nuclear power plants, such as effective use of thermal discharge, by accurately comprehending technical seeds and needs of the Prefecture.

(3) Promoting Invitation of Companies

- Power Operators will actively seek to invite nuclear related companies into the Prefecture.
- The Prefecture, municipalities and Operators will work together to positively invite companies into the Prefecture, making the most of favorable industry-locating measures based on lower power rates and subsidies from the Central Government for the development of power sources.

Chapter 4. Promotion Indicators and Schedule for the Plan

- In order to realize this ERDC Plan steadily, it is necessary to establish numerical objectives as concrete as possible and that all relevant organizations do their best towards realization of the objectives on a well coordinated manner.
- From such a standpoint, we established our “ERDC Promotion Indicators” from the following viewpoints, based on which all relevant organizations will do their best in attaining the objectives.

○ **Realization of Highly Reliable Cancer Treatment**

1. The number of patients in the proton beam-based cancer treatment facility.

○ **Realization of an International Center for Research and Development**

2. The number of international conferences and academic meetings.
3. The number of researchers and trainees accepted from overseas.
4. The number of researchers engaged in nuclear and energy related fields.
5. The number of joint researches with overseas universities and research institutes.
6. The number of joint researches between the local companies in the Prefecture and universities/ research institutes within Japan.
7. The number of frequency of use of facilities and equipment installed at WERC.
8. The number of patent applications relating to nuclear and energy technologies.

○ **Participation of the Local Companies in the Prefecture in Nuclear and Energy related Industries**

9. The number of engineers of local companies participating in training programs (accumulated number).
10. The number of local companies directly participating in the businesses related to nuclear power plants, such as periodic inspection.
11. The number of local companies participating in the research and development of decommissioning technologies.

- Even after having attained the objectives, it is necessary to pursue activities on a long-term and continuous basis, by setting up new objectives.

1. ERDC Promotion Indicators

For ERDC Promotion Indicators, we adopted fiscal 2003 as the base year and established our objectives for fiscal 2009 and for fiscal 2014, namely 5 years and 10 years from the start of ERDC Plan respectively.

○ Realization of Highly Reliable Cancer Treatment

In our Prefecture, we have hospitals boasting of nationally first-class cancer diagnosis and treatment techniques. With such high techniques also in mind, we established, as the indicator to realize highly reliable cancer treatment, the following numerical objectives for the number of patients in the proton beam-based cancer treatment facility to be built in the future.

(1) Number of Patients in the Proton Beam-Based Cancer Treatment Facility

Increase in the number of patients undergoing treatment at the proton beam-based cancer treatment facility will lead to the realization of highly reliable cancer treatment for the residents of the Prefecture.

Actual Record for Fiscal 2003	For the Period from Fiscal 2009 through 2013	For the Period from Fiscal 2014
-	50 ~ 200 persons p.a.	over 200 persons p.a.

○ Realization of an International Center for Research and Development

As the indicator to make our Prefecture as an internationally recognized center for R&D by enhancing our research and development function, we established numerical objectives based on the number of researchers and trainees coming from within and outside Japan as well as the number of joint researches.

(2) Number of International Conferences and Academic Meetings

Increase in the number of international conferences and academic meetings held in our Prefecture will promote exchange of information among researchers and engineers and at the same time accelerate accumulation of research

information in our Prefecture.

Actual Record for Fiscal 2003	For the Period from Fiscal 2009 through 2013	For the Period from Fiscal 2014
6 times*	over 15 times p.a.	over 20 times p.a.

* Japan Atomic Industrial Forum 36th Annual Conference, Generation VI International Forum, FBR International Workshop (Role of Nuclear Power on a Global Scale and the Significance of FBR), Generation VI Nuclear Power System Expert Meeting, etc.

(3) Number of Researchers and Trainees from Overseas

We will endeavor to increase the number of researchers and trainees from overseas, by making the best of various systems sponsored by MEXT and METI.

Actual Record for Fiscal 2003	For the Period from Fiscal 2009 through 2013	For the Period from Fiscal 2014
26 persons*	over 40 persons p.a.	over 80 persons p.a.

* JNC (14), Kansai Electric (5), JAPC (7) [Researchers (8), Trainees (18)]

(4) Number of Researchers engaged in Nuclear and Energy Related Fields

We will endeavor to increase the number of researchers engaged in nuclear and energy related fields in the Prefecture, by initiating researches related to the nuclear power plant aging and also by stimulating nuclear related researches at universities in the Prefecture.

Actual Record for Fiscal 2003	For the Period from Fiscal 2009 through 2013	For the Period from Fiscal 2014
114 persons*	over 160 persons p.a.	over 180 persons p.a.

* JNC (44), WERC (22), INSS (48)

(5) Number of Joint Researches with Overseas Universities and Research Institutes

We will endeavor to increase the number of joint researches related to nuclear and energy between companies/universities/research institutes and overseas universities/research institutes, by taking advantage of the concentration of various types of reactors in the Prefecture.

Actual Record for Fiscal 2003	For the Period from Fiscal 2009 through 2013	For the Period from Fiscal 2014
3 cases*	over 15 cases p.a.	over 30 cases p.a.

* JNC (2), INSS (1)

(6) Number of Joint Researches between Companies in the Prefecture and Universities and Research Institutes within Japan

Through good coordination by ERDC Project Office, we will endeavor to increase the number of joint researches related to nuclear and energy between the companies in the Prefecture and universities and research institutes within Japan, which will lead to activating the industry in the Prefecture.

Actual Record for Fiscal 2003	For the Period from Fiscal 2009 through 2013	For the Period from Fiscal 2014
6 cases*	over 25 cases p.a.	over 40 cases p.a.

* WERC (2), JAPC (4)

(7) Number of Frequency of Use of Facilities and Equipment installed at WERC

We will endeavor to increase the number of frequency of use of facilities and equipment installed at WERC, by enhancing support system so that the facilities and equipment can be more positively utilized for researches by companies and universities within and outside the Prefecture.

Actual Record for Fiscal 2003	For the Period from Fiscal 2009 through 2013	For the Period from Fiscal 2014
1,420 cases*	over 2,100 cases p.a.	over 2,800 cases p.a.

* accelerator (170), measurement/analysis equipment (1,250)

(8) Number of Patent Applications Relating to Nuclear and Energy Technologies

We will endeavor to increase the number of patent applications, by promoting nuclear and energy related R&D and technical transfer studies.

Actual Record for Fiscal 2003	For the Period from Fiscal 2009 through 2013	For the Period from Fiscal 2014
17 cases*	over 30 cases p.a.	over 50 cases p.a.

* WERC (3), JNC (5), Kansai Electric Power (8), JAPC (1)

○ **Participation of Local Companies in the Prefecture in Nuclear and Energy related Industries**

As the indicator to promote participation of the local companies in nuclear and energy related industries, we established numerical objectives with respect to the number of local companies participating in businesses at nuclear power plants (such as businesses related to periodic inspection) as well as the number of engineers participating in technical training programs.

(9) Number of Engineers of Local Companies Participating in Technical Training Programs (accumulated number)

By participating in the Programs organized by ERDC Project Office, etc. aiming at improvement of technical capabilities, technical level of local companies will increase, and opportunities of their participating in the businesses at nuclear power plants, such as those involved in periodic inspection, will increase.

Actual Record for Fiscal 2003	For the Period from Fiscal 2009 through 2013	For the Period from Fiscal 2014
-	4,600 persons	8,000 persons

(10) Number of Local Companies Directly Participating in the Businesses Related to Nuclear Power Plants, such as Periodic Inspection

Through technical training programs, etc. based on this Plan, technical capabilities of local companies will increase, and as a result, the number of local companies directly participating in the businesses related to periodic inspection will increase.

Actual Record for Fiscal 2003	For the Period from Fiscal 2009 through 2013	For the Period from Fiscal 2014
-	over 15 companies p.a.	over 30 companies p.a.

(11) Number of Local Companies Participating in the R&D of Decommissioning Technologies.

By participating in the “Safety Demonstration Examinations for

Decommissioning of Prototype / Research Phase Reactor Facilities” sponsored by MEXT as well as in the joint researches with JNC towards decommissioning of commercial nuclear power plants located in the Prefecture, local companies will acquire decommissioning technologies.

Actual Record for Fiscal 2003	For the Period from Fiscal 2009 through 2013	For the Period from Fiscal 2014
-	over 20 companies p.a.	over 30 companies p.a.

2. Schedule and Responsible Organizations for ERDC Plan

Items for ERDC Plan	Responsible Entity	Schedule (fiscal year)			
		04	05	06	07 ~
<p>○ Organizations for Promoting ERDC Plan</p> <p>(1) Establishment of “ERDC Promotion Council”</p> <p>(2) Installation of “ERDC Project Office”</p>	<p>Prefecture</p> <p>WERC</p>		☆		
<p>○ Ensuring Safety and Security</p> <p>(1) Enhancing Countermeasures for Aging Problem and Promoting Research System</p> <p>① Study on enhancement of national safety surveillance system and promotion of research institution</p> <p>② Organizational enhancement of JNES</p> <p>③ Establishment of a section dealing with the aging problem within JNC</p> <p>④ Enhancement of countermeasures against nuclear power plant aging by Power Operators</p> <p>(2) Developing Safety Medical Treatment System in Local Community</p> <p>(3) Establishing Proton Beam-based Cancer Research and Treatment Facility</p>	<p>METI</p> <p>JNES</p> <p>JNC</p> <p>Power Operators</p> <p>Prefecture, Operators</p> <p>Prefecture</p>	☆	☆		
					(Start of treatment will be in fiscal 2009)

Items for ERDC Plan	Responsible Entity	Schedule (fiscal year)			
		04	05	06	07~
○ Enhancement of Research and Development Function					
(1) Fast Breeder Reactor Research and Development Center (tentative name)	JNC		☆	—	—
① R&D on FBR					
② Deployment of research on multiple use of “Monju”			☆	—	—
③ Gathering of excellent researchers					
④ Transfer of advanced technologies to Local companies					
(2) Nuclear Reactor Decommissioning Research and Development Center (tentative name)	JNC		☆	—	—
① R&D towards commercialization of decommissioning technologies					
② Undertakings to improve the technological level of companies within the Prefecture					
(3) New Roles for WERC	WERC		☆	—	—
① R&D activities aiming at competitive products by local companies			☆	—	—
② Utilization of facilities and equipment by companies and universities within and outside the Prefecture			☆	—	—
③ One-stop service to companies within the Prefecture			☆	—	—
(4) Promotion of Collaboration with Universities and Research Institutes in the Kansai and Chukyo Regions	WERC		☆	—	—

Items for ERDC Plan	Responsible Entity	Schedule (fiscal year)			
		04	05	06	07 ~
○ Education and Exchange of Human Resources					
(1) Conducting Technical Training for Enhancing Skills of Engineers in Local Companies			☆	—	—
① Implementation of systematic professional training	WERC, Chamber of Commerce and Industry		☆	—	—
② Roles of Operators and nuclear power plant manufacturers	Operators		☆	—	—
(2) Reinforcing Nuclear and Energy Education System at Universities in the Prefecture	Universities, Operators	☆	—	—	—
(3) Enhancing Nuclear and Energy Education at Elementary, Junior High and High Schools	Prefecture, Operators	—	—	—	—
(4) International Nuclear Information and Training Center (tentative name)	JNC		☆	—	—
(5) Promotion of Accepting Overseas Trainees by the Central Government	MEXT, METI, JNC	—	—	—	—
(6) Inviting International Conferences	MEXT, METI Prefecture	—	—	—	—

Items for ERDC Plan	Responsible Entity	Schedule (fiscal year)			
		04	05	06	07 ~
○ Creating and Fostering New Industries					
(1) Building System of Technological Transfer under Industry-Academia-Government Collaboration	WERC		☆	—	—
① Arrangement of technical coordinators (tentative name)			☆	—	—
② Creation of industry-academia-government network			☆	—	—
(2) Creating New Industries by Utilizing Resources of Nuclear Power Plants	WERC		☆	—	—
(3) Promoting Invitation of Companies	Prefecture, Municipalities, Operators	—	—	—	—

Remarks:

Prefecture = Fukui Prefecture

WERC = Wakasa Wan Energy Research Center;

JNES = Japan Nuclear Energy Safety Organization

JNC = Japan Nuclear Fuel Cycle Development Institute

Operators = Electric power companies (Power Operators) + JNC

MEXT = Ministry of Education, Culture, Sports, Science and Technology

METI = Ministry of Economy, Trade and Industry

Reference Materials

Reference Material 1

**Comments / Recommendations from the Residents in the Prefecture on
“Energy Research and Development Centralization Plan (Summary)”**

We requested for comments / recommendations from the residents in the Prefecture between February 7 and February 21, 2005, and obtained 112 comments and recommendations from 59 residents as per attached.

(1) On the Basic Concept

① On the Basic Concept of the Plan (General) --- 6 comments / recommendations

- It is not clear what other programs of the Prefecture this Plan is related to. It seems that the end of subsidies from the Central Government is the end of the Plan.
- I cannot visualize from this Plan any special features of our Prefecture nor specific differences compared to other areas.
- I want you (Prefectural Government) to define the position of Fukui as the leading Prefecture in the West Region (in terms of nuclear power development) more clearly, by hoisting strong pillars comparable to those of Ibaraki and Aomori Prefectures with concrete and practicable programs towards the future.
- I want you to utilize nuclear related technologies for our daily life and the industry for further development of the community, while ensuring the safety and security of nuclear power plants.
- It is necessary to create and foster industries, by utilizing resources and technologies existing at nuclear power plants, with the highest priority being always placed on the safety.
- I want you to make out such a plan that will make us feel brighter than other communities because of the existence of nuclear power plants, for the future of our children.

② On the Concerned Area of the Project --- 8 comments / recommendations

- I want you to position Tsuruga District in the center of the Plan.
- I think it necessary to make clear the exact location for the Plan. (I think it better to clearly mention “Tsuruga” as the center of the Plan, already at this stage.)
- Although there are as many as 8 nuclear power plants in Ohi County, I cannot see any concrete programs for this area in the Plan.
- I sincerely desire the local development of Takahama Town, not to mention the safety and security of nuclear power plants to be ensured.
- I think that Ohi and Takahama Districts should have better traffic access at the earliest possible time, and also that they should have nuclear power centers, in view of the fact that the nuclear industry is the core of this Prefecture and that these Districts are the actual locations for nuclear power plants.
- It is difficult to see any merit of the Plan for the inhabitants of the Prefecture as a whole, and for the residents of Reihoku in particular. It will be one of the useful ways to level off differences in provision of information and services, by using

information super highway.

- I'm afraid of the situation where Operators come to treat the locations of their nuclear power plants lightly as a result of their placing too much importance on the Plan and on the efforts to get understanding of the Prefecture and the Central Governments.
- The most important thing is that each location of nuclear power plants endeavors to build technical capabilities and reliable relations through proper coordination among the municipality, Operator and small and medium-size companies.

③ **Opponents of Nuclear Power as well as of the Promotion of the Plan**

--- 9 comments / recommendation

- I'm opposed to the Plan itself. I think that the Prefectural Government should have asked for comments from the residents of the Prefecture, before making out a blue print of the Plan in view of the fact that this kind of plan will directly affect the safety of the residents of the Prefecture and other surrounding areas.
- I want you to get also comments as to whether it is a proper way of proceeding with this Plan before deciding upon the disposal location of spent nuclear fuel and waste from reprocessing.
- As long as there are people who point out the dangerous aspects of nuclear power, I cannot support the Plan. I think it necessary for the Prefectural Government to provide with more persuasive responses on not only positive aspects but also on negative aspects.
- I want you to also study how we should decrease the number of nuclear power plants.
- We should promote energy saving in earnest. We should not promote the development of nuclear power, because it is dangerous. What is important for us is to create society where necessary energy can be covered by wind and solar energy.
- We should make our Prefecture a center to undertake R&D on natural energy, without relying upon nuclear power.
- I think it far-sighted if we are to proceed with a program to make our Prefecture a center to develop renewable energy sources rather than nuclear power.
- We should have courage of developing new energy sources rather than sticking to old dangerous energy source like nuclear power.
- I urge you to reconsider and abandon the idea of making Wakasa Bay coast area one of the centers for R&D on nuclear energy only.

(2) On the Organization for Promoting the Plan

① On the Organization for Promoting the Plan (General) ---

14 comments / recommendations

- As I cannot visualize how the Plan is to be materialized, I want you to show us more concrete pictures at the earliest time.
- If the administration is to establish a core organization to implement the Plan locally, we want to have a clear picture as to who is to do what by when.
- In order to proceed with the Plan implementation, the Prefectural Government should become the core, defining the role of each organization involved and establishing objectives to attain as a roadmap, and should actively control and support all the organizations involved in the Plan.
- I think that time schedule should be incorporated in the Plan so that the Central Government and Operators will recognize their responsibilities more seriously.
- The function of the municipality (especially the city and town of nuclear power plants located) is not well defined in the Plan.
- I think it necessary to prioritize each measure in the Plan.
- In order not to let the Plan end up as a mere concept, it is important to define the deadline for each measure and put it into practice without fail, using the so-called PDCA cycle.
- we need to have a core organization on a constant basis, and the organization (secretariat) should be located within the Prefectural Government and such arrangement should be expressly incorporated in the Plan.
- I find the idea of locating ERDC Project Office in the WERC dubious. If there will be a lot of administrative work involved, I think it better to locate it near the prefectural office.
- I wonder if the Plan was changed from centered with “Monju” to WERC.
- As far as the financial source is concerned, I think it important to depend not only on the subsidies from the Central Government based on laws on power sources but also on investments from the public sector.
- I’m concerned that the more participating organizations are involved, the more difficult it would be for the Plan to proceed with smoothly, as it may take more time for coordination and there would be more restrictions involved.
- I think the interest of the local people in nuclear power is still low. Although many different organizations are doing public relations and educational activities on nuclear power separately, I think it better to review the situation of all the educational facilities and organizations and coordinate / integrate their activities,

taking this opportunity.

- In order to move one step forward, we should review the existing laws and regulations on nuclear power. As Fukui Prefecture is now going to create a model district for nuclear power in Japan, the Prefecture should be recognized as a special district for structural reform under the law.

② On the Roles of the Prefecture --- 7 comments / recommendations

- As this is a plan of the Prefecture, I think the Prefectural Government should assume more responsibilities for implementing the Plan by leading it more actively.
- It is important for the Prefectural Government to lead the Plan independently, reflecting voices from the local residents instead of merely ordering the Central Government and Operators to do this and that.
- The Prefectural Government should move its central activities to Reinan with respect to things related to nuclear power and have functional relations with relevant organizations. In this way, local residents will be able to conceive more positive feeling of safety.
- I wish that the Prefectural Government enhances its voice towards the Central Government and Operators and supervises the entire situation from the place one step higher.
- I want you to establish a section to promote energy-related industries within “Industry and Labor Department” and position the Plan clearly as a plan not just to promote local community but to promote industries.
- I want you to create a professional core section to promote the Plan and to foster related industries within the prefectural office.
- Since the activation of the local industry should mainly be based on the self efforts of companies in the Prefecture, the Prefectural Government should give utmost support to the companies in the Prefecture so that they can participate in the Plan independently and voluntarily.

③ On the Participation by the Local People --- 7 comments / recommendations

- For the promotion of the Plan, I think there should be more room for the general public to participate in discussions, whatever the style is. I sincerely hope that the Promotion System of the Plan more open to the public.
- In order to have the purpose of the Plan well understood by the people of the Prefecture, I think it necessary for the Prefectural Government to make regular and effective appealing by making use of the mass media.

- I desire that the Prefectural Government will endeavor to create a circulatory society which is friendly to the environment, by involving the people of the Prefecture, in addition to the coordination among industry, academia and government.
- I think it necessary for the Prefectural Government to convey the concept of the ERDC Plan to the people of the Prefecture in an easily understandable way and get good understanding from them about the contribution based on the nuclear power to the development of the Prefecture.
- In order to make the distance between nuclear power and the people of the Prefecture much closer, I wonder if PR on nuclear power cannot be made towards house wives in an easily understandable way. I think it effective if women are included in the members of the Plan in order to provide women's viewpoints and make contact with PTAs of schools.
- In order to proceed with the Plan, it is necessary to obtain understanding and support from the general Prefectural people. While PR and awareness activities are also important, we need to start our efforts from the level of school education on a long-term basis.
- For the local community development, we need to get support and understanding from the local residents and for this purpose we need to have good human resources as leaders of local residents.

(3) On the Ensuring Safety and Security

① On the Ensuring Safety and Security (General) --- 9 comments / recommendations

- With respect to the improvement of systems for communication with the local people and evacuation in case of emergency, I urge you to proceed with further R&D so that different responses for different types of accidents and degrees of risks can be properly taken, referring to the reporting systems for earthquakes and tsunamis, in cooperation with the mass media.
- "Safety and Security" cannot be fostered by technical transfer to companies in the Prefecture or by neutron-beam cancer treatment. With respect to safety in particular, can only be fostered by active openness of information and education with correct knowledge.
- It is necessary to brew the feeling of safety among citizens of the Prefecture and to seek to invite new R&D organizations and industries into the Prefecture, by focusing more on R&D on safety issues.
- It is desirable to create facilities where national and prefectural citizens can coexist, by setting up a new direction towards safe and peaceful utilization of nuclear

energy, beyond the enforcement of the conventional functions.

- As the prevention of human errors is also an important aspect to ensure the safety, I want you to include the study of social psychology when you promote R&D on nuclear power.
- While promotion of high standard medical treatment system is important, I wish you to make the prevention of accidents and the absolute safety as prerequisite for such promotion.
- The promotion of technological improvement at nuclear power plants and researches to support such improvement will enhance the sense of relief and increase the number of employees engaged in nuclear power.
- I sincerely expect that R&D activities to ensure safety are promoted with emphatically.
- I cannot visualize how much responsibilities and obligations the Central Government will assume for the safety and security of the location of nuclear power plants. If the Central Government is to bear full responsibilities and obligations and when this is well understood, it will lead to the safety and security of the residents of the area.

② On the Developing Safe Medical Treatment System in Local Community

--- 3 comments / recommendations

- To promote high standard medical treatment system, it is important to effectively utilize existing local hospitals at Tsuruga, Obama and Takahama.
- Shortage of doctors at the medical treatment facilities at Reinan area is a serious problem.
- I want to have a facility for emergency radiation exposure treatment at the location of nuclear power plant sites such as “Research Centre for Radiation Emergency Medicine” of National Institute of Radiological Sciences.

③ On the Establishing Proton Beam-based Cancer Research and Treatment Facility

--- 5 comments / recommendations

- I expect to have the most advanced medical treatment center (hospital) in the world in our Prefecture, which all residents in the Prefecture can widely use and many people from other prefectures and overseas will come to observe.
- We should aim at the best hospital specialized in nuclear medical science, radiation treatment research, and training of specialized doctors.
- In order to change the image of radioactivity and nuclear power, I urge you to build

such a facility as the proton-beam medical treatment center without fail.

- I wonder if the high standard medical treatment such as neutron-beam treatment is to be conducted by WERC. Why is there no description about that point?
- I think it necessary to have a high standard medical treatment facility (of high demand) such as a proton-beam cancer treatment in Western Japan.

(4) On the Enhancement of R&D Function

① On “Fast Breeder Research and Development Center” (tentative name)

--- 8 comments / recommendations

- “The essential purpose of “Monju” should be described in the Plan.
- I think that while the initial objectives of “Monju” will be achieved in 10 years, there is no detailed discussion made as to what to do with “Monju” thereafter. Although “the development of high efficiency fuels” and “international studies” are mentioned as objectives after the lapse of 10 years, I want you to make up future prospects from a standpoint of its contribution to the establishment of nuclear fuel cycle in Japan. (Combustion experiments for minor actinides should be also important.)
- I wonder what will happen, should the fourth generation nuclear power plants be decided to be a type of reactors other than sodium-cooled fast breeder reactors.
- Together with the establishment of a new center, R&D facility on FBR should also be prepared in parallel.
- I want you to also proceed with such types of R&D as on a very small size nuclear power reactor which can be installed at individual companies or private houses, and on a fuel cycle facility where fuel manufacturing, power generation and reprocessing can be done in one place.
- I want you to proceed with researches which can be supported by the opinion of the people in the Prefecture.
- How about constructing Japan’s first comprehensive hot laboratories complex, which includes “a large scale hot laboratory” for the development of fast breeder reactors, “a hot laboratory for radioactive materials experiment” for studies of plant aging, and “a hot laboratory using radiation” needed to create an industry based on the technologies developed at Takasaki laboratory of JAERI.
- How about the idea of changing the type of reactor to no-breeding and also the name of “Monju”, and rebuilding the plant as the safest reactor in the world, based on the most advanced nuclear technologies in Japan? By doing so, the once degraded reputation will be recovered.

**② On “Nuclear Reactor Decommissioning Research and Development Center”
(tentative name) --- 2 comments / recommendations**

- The decommissioning technologies for heavy water reactors will not be very meaningful, unless the applicability of such technologies to the decommissioning of light water reactors is studied in cooperation with electric power companies,.
- Since many nuclear power plants throughout Japan will reach the time for decommissioning in the future, there will be a certain level of decommissioning demand on a constant basis. Through acquiring necessary decommissioning technologies by the companies in our Prefecture, they will work actively in this field for the entire Japan.

③ On the New Role of WERC --- 2 comments / recommendations

- The meaning of the sentence in the Plan about WERC saying “to become the engine to promote ERDC Plan is not very clear to me. “Engine” should mean that WERC will promote the Plan with its own force, but WERC doesn’t seem to have such power.
- Although WERC possesses very advanced equipment such as an accelerator and electronic microscopes, I don’t think that researches utilizing such equipment are being proceeded with steadily. We, the residents of the Prefecture, cannot perceive the results of their researches clearly.

(5) On the Education and Exchange of Human Resources

① On the Conducting Technical Training for Enhancing Skills of Engineers in Local Companies --- 1 comment / recommendation

- I think the implementation of technical training for enhancing technical skills of engineers in local companies is very important, and I hope it is materialized at the earliest time.

② On the Reinforcing System on Nuclear and Energy Education at the Universities in the Prefecture --- 5 comments / recommendations

- As an institution to foster human resources, we should establish an “International Energy University” where one can learn new energy sources, nuclear fuel cycle technologies, decommissioning technologies, etc. in a comprehensive manner, by putting together all independent energy-related centers and research laboratories such as those existing in JAERI and WERC as well as those found at each Operator.
- I want you to promote the professional education system related to nuclear energy at

Fukui Prefectural University.

- I want you to consider the feasibility of establishing an education and research facility at the Reinan District where education to foster qualified radiation handling experts, radiation administrators, etc. can be provided, by way of realizing Reinan branch school of University of Fukui or effectively utilizing the Obama Campus of Fukui Prefectural University.
- I want you to also examine the future picture of the Obama Camps of Fukui Prefectural University, such as the feasibility of creating a new department aiming at fostering human resources needed for regular inspection of nuclear power plants there.
- I wonder if we can have a scholarship system for the residents of the Prefecture who desire to work in energy-related fields in the Prefecture.

③ On the Enhancing Nuclear and Energy Education at Elementary, Junior High and High Schools --- 8 comments / recommendations

- I want you to study the possibility of providing education at high schools at Reinan District to give incentives to work in the nuclear industry or to provide professional education.
- I want you to create an educational system in the Prefecture from a long-term standpoint by which energy and environmental issues are effectively discussed and correct knowledge on nuclear power is provided, at each level of elementary, junior high and high schools.
- To foster human resources properly, I think it necessary to give adequate education not only at the level of universities, but also from the level of elementary schools and at junior high schools and high schools in particular where their future course is much affected.
- To promote research and development on nuclear power, correct understanding of nuclear and FBR in particular by the public is necessary. Thus, I expect you to conduct various measures such as enlightening and disseminating activities of nuclear power knowledge, informative seminars for teachers of elementary, junior high and high schools, and practical training sessions for high school students.
- In order to attract human resources of good quality to universities and research institutes, there should be an environment created where people have interest in and friendly feeling about energy and nuclear related issues as part of their daily life.
- I want you to examine what kind of education and enlightenment activities should

be followed in order to create an environment where people do not show extreme reactions towards nuclear power issues and look at those with composure.

- I think that junior high and high school students in this Prefecture have better chance to observe actual facilities relating to nuclear power compared with those in other prefectures. Therefore, it is necessary to foster future researchers by utilizing such chance actively.
- It should be clarified in the Plan what kind of energy and nuclear education should be give to junior high and high school students, and the Prefectural Education Committee should assume the responsibility for making the guideline.

④ On the Promotion of Accepting Overseas Trainees by the Central Government

--- 2 comments / recommendations

- In order to make trainings and seminars more attractive to Asian countries, the Prefecture should also have its own concrete concept and work positively on the Central Government and other related organizations, without entirely depending on the Japan Nuclear Cycle Development Institute.
- I wish that the facilities in the Prefecture are utilized for researches and trainings by national and overseas organizations, in good collaboration with JICA, IAEA, etc.

(6) On the Creating and Fostering New Industries

① On the Creating and Fostering New Industries(General)

--- 10 comments / recommendations

- In order to materialize the Plan, it will be necessary to promote self-reliance efforts of companies in the Prefecture, in addition to various measures to be adopted by relevant organizations.
- I want you to make more concrete planning with respect to creating and fostering of industries.
- In order to heighten challenging willingness of companies in the Prefecture, it is necessary to conduct effective PR activities about programs and systems, detailed explanation to companies by experts through their visits to individual companies and technological communication. In addition, competent persons for coordination must be placed in the right position with good footwork. Therefore, effective systems must be prepared to enable the above.
- In order to have “Technical Coordinators” to be positioned in ERDC Project Office function effectively, it is quite important to have a close relationship among industry, academia and government, under the leadership of the Prefectural

Government.

- In order to enhance technological capabilities of local small and medium-size companies, it is necessary to hold large scale seminars and technological information exchange meetings more aggressively than before.
- Because of the cost reduction efforts and the shortening of regular inspection periods of nuclear power plants, there is less and less room for local people to work in the businesses related to nuclear power. I expect that the nuclear industry is firmly established as Fukui's principal local industry, where more local people can work.
- It is important that "Monju" resumes operation at the earliest time through modification work, and that a situation is created with cooperation of the Operator where as many local companies as possible can be involved in the actual work at the reactor site.
- I want you to indicate as to what types of work will be available to small and medium-size companies.
- With respect to the promotion of inviting companies into the Prefecture, I want you to specify the types of work each local district, such as Ohi Town and Takahama Town, should undertake.
- I want you to take concrete actions rather than mere discussions. I understand that the prerequisite for the Plan is that all related industries are concentrated in one area (based on the industrialized zoning idea).

② On the Creating New Industries by Utilizing Resources of Nuclear Power Plants

--- 6 comments / recommendations

- With respect to the use of thermal discharge, it is necessary to conduct studies on industrial areas such as agriculture where relatively low energy can give large impact on production.
- I expect that active studies are to be conducted to create new industries by effective use of thermal discharge from Takahama Nuclear Power Station.
- As part of the studies related to effective use of thermal discharge from Takahama Nuclear Power Station, I want you to consider the possibility of constructing Uchiura Bay Comprehensive Ocean Research Center (tentative name) for promoting the future development of the coast area.
- I want you to pioneer fish farming projects utilizing thermal discharge from nuclear power plants, in cooperation among Fukui Prefectural University, Kansai Electric Power and fishermen.
- I want you to study the feasibility of utilizing Uchiura Bay, where Takahama

Nuclear Power Station is located, as a suitable place to utilize thermal discharge.

- I urge you to also give consideration to the development of the primary industry, which is the basis of human life.

Reference Material 2

Main Opinions from the Members of the Prefectural Assembly

(As for details, please refer to the minutes of the Regular Meeting of the Prefectural Assembly for February 2005)

(1) On the Basic Concept

- It is necessary to clearly indicate the objectives of ERDC Plan and what is sought for by this Plan.
- The name of the Plan should be “Nuclear Energy Research Development Centralization Plan”.
- It is necessary to consider to incorporate in the Plan researches on other energy sources such as wind power, solar energy and fuel cells, besides nuclear power.

(2) On the Organization for Promoting the Plan

- It is necessary to clarify the role of the Prefecture toward promoting ERDC Plan, central location of the promotional organizations and target years for each objective item.
- Taking the opportunity of setting ERDC Plan, it is necessary to publicize the usefulness and effectiveness of nuclear power.
- Concrete numerical goals (such as economic effects) should be mentioned in the ERDC Plan.

(3) On the Ensuring Safety and Security

- In order to ensure the safe feeling of residents of the Prefecture, the most important matters are active publication of information and education of correct knowledge.
- Reinen District should be the center for “Developing Safe Medical Treatment System in Local Community”.
- With respect to “Establishing Proton Beam-based Cancer Research and Treatment Facility”, it is necessary to make clear the main promotional entity, time schedule and location as promptly as possible.
- The proton beam-based cancer research and treatment facility will be the only facility our Prefecture can really be proud of.

(4) On the Enhancement of Research and Development Function

- It is necessary to describe more clearly the function of “Fast Breeder Research and

Development Center” as well as that of “Nuclear Reactor Decommissioning Research and Development Center”.

- The part of “Monju” in the “Enhancement of Research and Development Function” must more clearly be described.

(5) On the Education and Exchange of Human Resources

- We should foster future researchers, taking advantage of our Prefecture that junior high and high school students in our Prefecture can observe the actual facilities relating to nuclear power.
- The concept of “Asian Nuclear Power University” recommended at “Forum for Nuclear Cooperation in Asia” should find its position in ERDC Plan.

Reference Material 3

Current Status of Nuclear Power Plants

1. Current Status of Nuclear Power Generation in Japan

(1) Outline

- Since the start of operation of the first commercial nuclear power plant in 1966, Japan’s aggregate nuclear power generating capacity has steadily increased, and the situation as of February 28, 2005 is as summarized in the following table.
- In Fukui Prefecture, with the cease of operation of the advanced thermal reactor “Fugen” on March 29, 2003, there are currently 13 nuclear power plants (amounting to 11,285,000 kWe of generating capacity) in operation with one proto-type fast breeder reactor “Monju” (280,000 kWe) under construction and two commercial reactors (Tsuruga Unit 3 and 4 amounting to 3,076,000 kWe in total) planned for construction.
- The total generated electricity by nuclear power plants in Fukui Prefecture for fiscal 2003 was 87.9 billion kWh (slightly more than one third of Japan’s entire nuclear power generation), which is equivalent to about 12 times of the electricity consumed in fiscal 2002 within the Prefecture (7.34 billion kWh). The majority of generated electricity has been transmitted to the Kansai Region and about 60 percent of the electricity consumed in the Kansai Region has been supplied from the nuclear power plants located within Fukui Prefecture.

(2) Generating Capacity of Japan’s Nuclear Power Plants, including “Monju”

(As of February 28, 2005)

Category	Entire Japan		Fukui Prefecture	
In Operation	53 units	47,122,000 kWe	13 units	11,285,000 kWe
Under Construction	4 units	3,650,000 kWe	1 unit	280,000 kWe
Planned for Construction	6 units	8,578,000 kWe	2 units	3,076,000 kWe
Total	63 units	59,350,000 kWe	16 units	14,641,000 kWe
In Decommissioning	1 unit	(JAPCO, Tokai)	0 unit	
Planned for Decommissioning	1 unit	(JNC, Fugen)	1 unit	

2. List of Nuclear Power Plants within Fukui Prefecture

(As of February 28, 2005)

Category	Operator	Name of the Plant		Location	Reactor Type	Licensed Generating Capacity (1,000 kWe)	Cost of Construction (billion yen)	Government Decision	Construction Permit	Start of Construction	Start of Operation	
In Operation	JAPCO	Tsuruga Tsuruga	Unit 1	Myojin, Tsuruga	BWR	357	32.3	May 1965	Apr. 22, 1966	Feb. 1967	Mar. 14, 1970	
			Unit 2		PWR	1,160	388.6	Dec. 1978	Jan. 26, 1982	Mar. 1982	Feb. 17, 1987	
	KEPCO	Mihama Mihama	Unit 1	Nyu, Mihama	PWR	340	31.2	Apr. 1966	Dec. 1, 1966	Aug. 1967	Nov. 28, 1970	
			Unit 2		PWR	500	36.3	Dec. 1967	May 10, 1968	Dec. 1968	Jul. 25, 1972	
			Unit 3		PWR	826	76.8	Jun. 1971	Mar. 13, 1972	Jul., 1972	Dec. 1, 1976	
		Ohi	Ohi	Unit 1	Oshima, Ohi	PWR	1,175	184.3	Oct. 1970	Jul. 4, 1972	Oct. 1972	Mar. 27, 1979
				Unit 2		PWR	1,175	122.5	Oct. 1970	Jul. 4, 1972	Nov. 1972	Dec. 5, 1979
				Unit 3		PWR	1,180	460.0	Jan. 1985	Feb. 10, 1987	Mar. 1987	Dec. 18, 1991
				Unit 4		PWR	1,180	250.0	Jan. 1985	Feb. 10, 1987	Mar. 1987	Feb. 2, 1993
	Takahama	Takahama	Unit 1	Tanoura, Takahama	PWR	826	65.6	May 1969	Dec. 12, 1969	Apr. 1970	Nov. 14, 1974	
			Unit 2		PWR	826	60.4	May 1970	Nov. 25, 1970	Feb. 1971	Nov. 14, 1975	
			Unit 3		PWR	870	280.3	Mar. 1978	Aug. 4, 1980	Nov. 1980	Jan. 17, 1985	
			Unit 4		PWR	870	209.8	Mar. 1978	Aug. 4, 1980	Nov. 1980	Jun. 5, 1985	
Sub-Total					(13 units)	11,285	2,198.1					
Under Construction	JNC	Monju		Shiraki, Tsuruga	FBR	280	433.0	May 1982	May 27, 1983	Sep. 1985	Undecided	
	Sub-Total					(1 unit)	280	433.0				
Planned for Construction	JAPCO	Tsuruga Tsuruga	Unit 3	Myojin, Tsuruga	APWR	1,538	475.5	Aug. 2, 2002	(Applied) Mar. 30, 2004	(Expected) in 2007	(Expected) in Mar. 2014	
			Unit 4		APWR	1,538	294.5	Aug. 2, 2002	(Applied) Mar. 30, 2004	(Expected) in 2007	(Expected) in Mar. 2015	
	Sub-Total					(2 units)	3,076	770.0				
TOTAL					(16 units)	14,641	3,401.1					
Planned for Decommissioning	JNC	Fugen		Myojin, Tsuruga	ATR	165	68.5	-	Nov. 30, 1970	Aug. 1971	Mar. 20, 1979	

BWR = Boiling Water Reactor, PWR = Pressurized Water Reactor, ATR = Advanced Thermal Reactor, FBR = Fast Breeder Reactor

Remarks:

- (1) "Start of Construction" is the month in which permit for first construction plan is obtained.
- (2) The date of "Government Decision" for "Monju" is the date of approval by the Cabinet.
- (3) "Monju" reached its initial criticality on April 5, 1994 (min. criticality). The first connection to the grid was on August 29, 1995. It realized 40 percent of its rated capacity on Oct. 13, 1995.
- (4) With respect to "Monju", due to the sodium leakage accident in its secondary cooling system which took place on Dec. 8, 1995, expected dates for 75 % operation and for 100 % operation of its rated capacity and start of operation are now all undecided.
- (5) The date of "Government Decision" for Tsuruga Units 3 and 4 are those when the Minister of Economy, Trade and Industry decided to incorporate these two units in its Basic Power Sources Program of fiscal 2002.
- (6) "Fugen" ceased its operation on March 29, 2003.

Reference Material 4

Current Status of Nuclear Power Related Research Institutes in Fukui Prefecture

1. Wakasa Wan Energy Research Center (Nagatani, Tsuruga City)

- Purpose of Establishment : This foundation was established in September 1994 based on a permit obtained from the Central Government (facilities and equipment were prepared by Fukui Prefecture). The purpose of the Center is to revitalize the local area and also contribute to the development of economy as well as to the promotion of science and technology of Japan, by materializing dissemination of nuclear power and energy related scientific technologies to the local industries, through implementing nuclear power and energy related investigation, researches, engineer training and cooperation with relevant institutes in Japan and abroad.
- Main Facilities and Equipment: Accelerator system : consisting of a tandem accelerator and a proton synchrotron
 - * Maximum accelerating energy of proton : 200 MeV
 - Scientific Equipment : observation and analysis devices such as transmission electron microscope (TEM), scanning electron microscope (SEM), electron probe micro analyzer (EPMA), inductively coupled plasma mass spectrometer (ICP-MS)
- Main Research and Development : cancer treatment research based on proton beams; development of semiconductor materials; plant breeding research on buckwheat, rice plant, etc.; holding training seminars for engineers to improve technical capability.

2. Japan Nuclear Fuel Cycle Development Institute's International Technology Center (Shiraki, Tsuruga City)

- Purpose of Establishment : This Center was established in October 1998 with a view to implementing R&D, educational training, international cooperation and maintenance of technical information, related to nuclear fuel cycle.
- Main Facilities and Equipment : Simulator for operation of "Monju", FBR cycle comprehensive training facility, facility to develop various types of inspection devices.
- Main Research and Development : R&D on high efficiency fuel, R&D on various types of inspection devices, training and international cooperation to gain sodium handling and operation maintenance techniques and technologies.

3. Institute of Nuclear Safety System, Inc. (Sata, Mihama Town)

- Purpose of Establishment : This Organization was established in March 1992 to conduct researches to improve social reliability and technological safety of nuclear power plants, reflecting lessons learned from the accident of heat transmission tubing rupture of the steam generator of Mihama Nuclear Power Plant Unit 2 of KEPCO, which took place in February in 1991.
- Main Facilities and Equipment : Field emission transmission electron microscope (FE-TEM), fixed load type corrosion experiment device
- Main Research and Development :
 - <Institute of Social Research>
To study harmonious relationship between nuclear power and society from the viewpoint of social and human science.
 - Studies on human factors (prevention of human errors), studies of social awareness, energy-related researches.
 - <Institute of Nuclear Technology>
To study the safety and reliability of nuclear power generation from the viewpoint of science and technology.
 - Nuclear power information studies (collection of information on accidents, etc. in Japan and abroad); studies on potential incidents (analysis of various elements to prevent accidents / incidents from taking place, development of facilities examination technology); studies on aging (analysis of mechanism of material degradation for the purpose of ensuring the security, development of non-destructive examination technology)

Reference Material 5

Current Status of Nuclear Power Related Technical Training Organizations in Fukui Prefecture

<Training of Operating Personnel>

1. Nuclear Power Training Center Ltd. (Kutsumi, Tsuruga City)

This Training Center is to provide training of nuclear power plant operation to operators of nuclear power plants under the same conditions as in the real operating room, using three operation simulators of actual size, to improve and maintain the quality and capability of the operators.

- Main Equipment: 3 operation simulators
 - 1 for Tomari Nuclear Power Plant Unit 1 (579 MWe)
 - 1 for Takahama Nuclear Power Plant Unit 3 (870 MWe)
 - 1 for Ohi Nuclear Power Plant Unit 3 (1,180 MWe)

2. Japan Nuclear Fuel Cycle Institute's FBR Training Center (Shiraki, Tsuruga City)

This Training Center is to provide training of operation to operators of "Monju" under the same conditions as in the real operating room, using an operation simulator of actual size, to improve and maintain the quality and capability of the operators.

3. Simulators at Nuclear Power Plant Sites of Kansai Electric Power Co. (Nyu, Mihama Town; Tanoura, Takahama Town; Oshima, Ohi Town)

There are small size simulators (smaller than actual size) installed at three nuclear power plant sites (Mihama, Takahama and Ohi) of KEPCO to provide training mainly on controlling characteristics and behavior of the plant to operators as supplement educational training, and also to provide general guidance to non-operational engineers to improve their technological capability and safety awareness.

<Training of Maintenance Personnel>

1. Nuclear Power Plant Maintenance Training Center of Kansai Electric Power Co. (Suimei, Takahama Town)

This Center is to provide educational training to improve skill and capability of personnel engaged in maintenance of nuclear power plants.

- Main Facilities and Equipment: Nuclear reactor vessel, steam generator, primary coolant pump, fuel handling crane, non-destructive inspection devices, electric and instrument devices, etc.
- 2. Japan Nuclear Fuel Cycle Institute's FBR Training Center (Shiraki, Tsuruga City)**
- This Center is to provide educational training for sodium handling technique and FBR maintenance technique and improve maintenance skill and capability of personnel.
- Main Facilities and Equipment: Sodium training cell (sodium fire extinguishing drill), main circulation pump system, instrument and controlling devices.

Reference Material 6

List of the Members of the Planning Committee of Energy Research and Development Centralization Plan

(in the order of the Japanese syllabary, omit titles from names)

Name (©Chairman)	Position Title
Giichi Arima	Chairman, the Tsuruga Chamber of Commerce and Industry (from the 2nd Committee)
Yukinori Ichida	President, the Japan Atomic Power Company (from the 2nd Committee)
Noriyuki Inoue	Vice Chairman, Kansai Economic Federation
Mikio Emori	Chairman, Federation of Economic Organizations in Fukui Prefecture
Kazuhiro Kawase	Mayor, Tsuruga City
Tatuo Kawada	Vice-chair person, the Society for Environment & Energy in Fukui Prefecture
Ryunosuke Kitamura	Chairman, the Tsuruga Chamber of Commerce and Industry (until the 1st Committee)
Kazumasa Kusaka	Director-General, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry (until the 1st Committee)
Shinpei Kojima	President, University of Fukui
Nobuyori Kodaira	Director-General, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry (from the 2nd Committee)
Yasuhisa Komoda	Deputy Director-General, Regional Economic and Industrial Policy Bureau, Ministry of Economy, Trade and Industry (from the 2nd Committee)
Touichi Sakata	Director-General, Research and Development Bureau, Ministry of Education, Culture, Sports, Science and Technology
Fujio Shinki	President, Hokuriku Electric Power Company
Hideo Shingu	Director, the Wakasa Wan Energy Research Center
Yoshihiko Sumi	President, the Japan Atomic Power Company (until the 1st Committee)
Yuichi Tonozuka	President, Japan Nuclear Cycle Development Institute
Issei Nishikawa	Governor, Fukui Prefecture
Yohsaku Fuji	President and Director, the Kansai Electric Power Co.,Inc
Masanori Matsuura	Chairman, Fukui Prefectural Federation of Iron and Steel Cooperative Association
Kazumi Matsushige	Vice President, Kyoto University
© Masanobu Miyake	President, Fukui University of Technology

**List of the Members of the Working Group for the Planning Committee of
Energy Research and Development Centralization Plan**

(in the order of the Japanese syllabary, omit titles from names)

Name (◎Chairman)	Position Title
Yoshio Iijima Kuniko Urashima	Chief Executive Officer, Fukui Prefecture Senior Research Fellow, Science and Technology Foresight Centre, National Institute of Science and Technology Policy (NISTEP), Ministry of Education, Culture, Sports, Science and Technology
Sadaki Katsurada Yoshikazu Katoh	Past President, Wakasa Junior Chamber Inc. Director, Nuclear Fuel Cycle R&D Division, Research and Development Bureau, Ministry of Education, Culture, Sports, Science and Technology
Sadao Kanaya	Professor, Department of Business Administration, Faculty of Business Administration, Sakushin Gakuin University
Hajime Kiyokawa Sadanobu Kusaoke	Executive Director, Kiyokawa Plating Industry Co., Ltd Director, Electricity Infrastructure Division, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry (from the 2nd Committee)
Takeshi Saito	Director, Electricity Infrastructure Division, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry (until the 1st Committee)
Kazumitsu Shirakawa Yoshiaki Tsukamoto	Managing Director, the Japan Atomic Power Company Director, Business Environment Promotion Division, Economic and Industrial Policy Bureau, Ministry of Economy, Trade and Industry
Ikurou Tsukuda Hideo Nakamura	Managing Director, the Kansai Electric Power Co., Inc Executive Director, the Tsuruga Chamber of Commerce and Industry
Hiroyuki Nakayama Hyo Hatakeyama	President, NAKATEC CO., Ltd Director, Cooperative Research Center, Fukui University of Technology
◎ Teruo Hori Noriko Miyamoto Tutomu Yanagisawa	Assistant to President, University of Fukui Director, MIYAGEN CO., Ltd Executive Director, Japan Nuclear Cycle Development Institute
Sinichi Wanibuchi	Executive Director, Federation of Economic Organizations in Fukui Prefecture