Summary Report

The Fourth Forum for Nuclear Cooperation in Asia

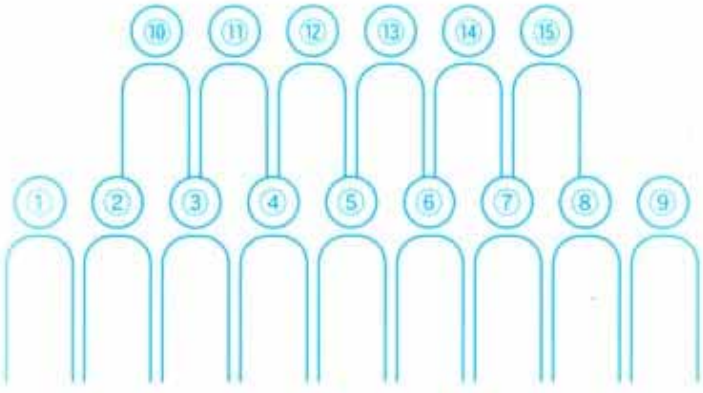
December2-3,2003 at Nago,Okinawa,JAPAN

Sponsored by

Atomic Energy Commission of Japan

In Commemoration of The Fourth FNCA Meeting

Ministers and Delegates at Bankoku Shinryokan
Nago City, Okinawa (The Venue of G-8 Summit 2000)



① Dr.Ashwin Sasongko(Indonesia)
② The Honourable Dato' Law Hieng Ding(Malaysia)
③ H.E.Dr.Ho-Koon Park(Korea)
④ H.E.Mr.Toshimitsu Motegi(Japan)
⑤ Mr.Hirotaka Makino(Japan)
⑥ H.E.Mr.Zhang Huazhu(China)
⑦ Honorable Dr.Estrella Fagela Alabastro(The Philippines)
⑧ H.E.Mr.Hoang Van Huay(Viet Nam)
⑨ Dr.Ronald Francis Cameron(Australia)
⑩ Dr.Sueo Machi(Japan)
⑪ Mr.Yoichi Fuji-ie(Japan)
⑫ Ms.Noriko Kimoto(Japan)
⑬ Mr.Tetsuya Endo(Japan)
⑭ Mr.Tetsuo Takeuchi(Japan)
⑮ Mr.Pathom Yamkate(Thailand)

Opening Address
by H.E.Mr. Toshimitsu Motegi
Minister of State for Science and
Technology Policy

Welcome Remarks
by Mr. Hirotaka Makino
Vice Governor of Okinawa Prefecture

Place : Bankoku Shinryokan

●Australia

●China

Participants From the FNCA Countries

●Indonesia

●The Philippines

●Thailand

●Korea

●Viet Nam

●Malaysia

Closing Remarks by Mr. Yoichi Fuji-ie
Chairman, Atomic Energy Commission of Japan

Discussion

Reception

Welcome Remarks by Mr.Keiichi Inamine
Governor of Okinawa Prefecture

Technical Visit

Fruit Fly Eradication Facility

Okinawa Islands had been suffering from the outbreak of pestilent fruit flies for years.
By the irradiation program with Co-60, the flies were eradicated successfully by 1993.

Seawater Desalination Plant

To meet increasing water demand with limited water sources in Okinawa Islands, the plant was completed in 1997. It produces 40,000m³ of pure water/day and this capacity ranks the top of Oriental World.

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1. Ministerial Level Meeting (MM)

2. Senior Officials Meeting (SOM)

1. Ministerial Level Meeting (MM)

Chairperson's Summary of the Fourth Meeting of The Forum for Nuclear Cooperation in Asia

1. The Fourth Meeting of the Forum for Nuclear Cooperation in Asia (FNCA) was held in Nago City, Okinawa, Japan on December 2 and 3, 2003 under the basic theme " Nuclear Energy for the Future of Mankind and the Globe" with the participation of Ministers and Senior Officials, responsible for the peaceful nuclear research, development and utilization from nine Asian countries, i.e., Australia, the People's Republic of China, Indonesia, Japan, the Republic of Korea, Malaysia, the Philippines, Thailand and Viet Nam. The meeting arranged technical tour to the fruit fly eradication facility and the seawater desalination plant, etc. on December 4.

   The Fourth FNCA Ministerial Level Meeting began with the opening address by H.E. Mr. Toshimitsu Motegi, Minister of State for Science and Technology Policy, followed by the welcome remarks by Mr. Hirotaka Makino, Vice-Governor of Okinawa Prefecture. Prof. Youichi Fuji-ie, Chairman of Atomic Energy Commission (AEC) of Japan chaired the Meeting.

2. At the Round Table Discussion, the representatives of the FNCA countries expressed their views and made comments on two topics, namely: " Enhancement of Socio-Economic Impact of Radiation and Radioisotope Application" and " Sustainable Development and Nuclear Energy".

   (1) For discussion of the first topic, H.E. Dr. Estrella Alabastro, Secretary of Science and Technology (DOST) of the Philippines, took the role of moderator, and H.E. Dato' Seri Law Hieng Ding, Minister of Science, Technology and Environment (MOSTE) of Malaysia, as the leadoff speaker, introduced the important role of nuclear technology in improving the quality of life of people. The presentations, discussion and suggestions are summarized as follows:

   a. There was a general agreement among participants on the importance of applications of radiation, radioisotopes and nuclear technology in the fields of health, agriculture, industry and preservation of the environment, including water and air quality.

   b. It was emphasized that the linkage between research and development institutions and end users is important. Research and development institutions and relevant organizations should be business friendly.

   c. To improve the linkage, FNCA has instituted open seminars. The FNCA

member countries are encouraged to make plans for open seminars in conjunction with project workshops and meetings.

d. For the effective application of radiation and nuclear technology, information to the public is vitally important. Nuclear research institutes have an important role in information dissemination.

e. Harmonization of project activities between FNCA and RCA (IAEA) was strongly recommended.

(2) During the second half of the Round Table Discussion, Mr. Tetsuya Endo, Vice-Chairman of Atomic Energy Commission of Japan, was the moderator as well as the leadoff speaker. He drew attention to the essential role of nuclear energy to modern society, especially in the fields of power and radiation use.

The discussion and conclusion are summarized as:

a. It is expected that demand for energy and electricity will increase in the FNCA countries due to economic and population growth. In order to meet the increasing demand for energy, nuclear energy is a feasible option in most countries of the FNCA.

b. In this connection, it is noted that linkage between sustainable development and nuclear energy exists in those countries, and nuclear energy should not be excluded from CDM in the second commitment period starting from 2013.

c. The proposal to create a new panel on "Role of Nuclear Energy for Sustainable Development in Asia" was endorsed, and it is hoped that the report can be submitted promptly.

d. The relationship between sustainable development and applications of radiation, radioisotopes and nuclear technology was confirmed.

3. Mr. Soichi Nagamatsu, Deputy Director General for Science and Technology Policy of the Cabinet Office of Japan reported on the progress of FNCA activities and the summary of the Senior Officials Meeting (SOM) that was held the previous day. The delegates expressed their appreciation for the tangible progress of activities, and endorsed the future plan. The SOM Summary Report was duly adopted at the Ministerial Level Meeting.

Following the suggestion at the Third FNCA Meeting in Seoul, high level discussion on the "Human Resources Development (HRD) Strategy for Nuclear Science, Technology and Applications" took place at the SOM, and a summary was reported by Dr. Sueo Machi, FNCA Coordinator of Japan.

4. In Session 3, the country reports on "Nuclear Research and Development Policy of the Country and FNCA Activities" were presented by delegates. The first part was chaired by Prof. Fuji-ie of Japan, and the latter part was chaired by H.E. Mr. Hoang Van Huay, Vice-Minister of Science and Technology (MOST) of Viet Nam.

The reports covered various endeavors of peaceful nuclear programs in each country including the latest progress of nuclear research and development, together with recent policy developments. After reviewing FNCA activities in the previous years, the participating countries expressed appreciation for the tangible progress of activities, and paid attention to the future cooperation within the FNCA framework. All delegates reiterated the importance of cooperation among the FNCA countries following the FNCA's goals set by the member countries for the benefits of a better life in a more comfortable environment.

5. In concluding the Session, Prof. Fuji-ie of Japan introduced the chairperson's summary, including the venue of the Seventh FNCA Meeting in 2006. The representative of Viet Nam proposed that the 5th FNCA Meeting be held in autumn 2004 in Viet Nam.

Program of the Fourth Forum for Nuclear Cooperation in Asia (4th FNCA Meeting)

Date: December 2-3, 2003
Place: Summit Hall of Bankoku Shinryokan, Nago City, Okinawa Prefecture, Japan
Sponsored by: Atomic Energy Commission (AEC) of Japan
Supported by: Ministry of Education, Culture, Sports, Science and Technology (MEXT), and Okinawa Prefecture
In Cooperation with: Japan Atomic Industrial Forum, Inc. (JAIF)
Basic Theme: "Nuclear Energy for Future of Mankind and the Globe"
Working Language: English
* Simultaneous interpretation of Japanese-English is also made.

Monday, December 1

Arrival of Delegations

Tuesday, December 2 **Senior Officials Meeting (SOM)**

8:30 - 9:00 **Registration**

9:00 - 9:15 **Opening**

- Opening Address
  Mr. Soichi Nagamatsu
  Deputy Director General for Science and Technology Policy
  Cabinet Office
- Self-Introduction of the Participants

Moderator for Morning Sessions:
Dr. In-Soon Chang
President, Korea Atomic Energy Research Institute (KAERI)

9:15 - 9:45 **Item 1:**

Report on the Fourth FNCA Coordinators Meeting (CM) and Progress of FNCA Activities

- Reporter: Dr. Sueo Machi, FNCA Coordinator of Japan
- Q&A

9:45 - 10:30 **Item 2: Management and Operation of FNCA Activities**

a. New Activities:
- Nuclear Medicine:
  Representative of Malaysia
  Q&A
- Sustainable Development and Nuclear Energy:
  Dr. Sueo Machi, FNCA Coordinator of Japan
  Q&A

b. The Others including Venue of the Seventh FNCA Meeting

10:30 - 12:30 **Item 3: Special Session:**
High Level Discussion on Human Resources Development (HRD) Strategy for Nuclear Science, Technology and Applications
- Lead-off Speaker: Dr.Sueo Machi, FNCA Coordinator of Japan
- Discussion

12:30 - 13:45 **Lunch**
< at Café-terrace >

Moderator for Afternoon Sessions:
Prof. Vuong Huu Tan, Chairman, Vietnam Atomic Energy Commission (VAEC)

13:45 - 16:00 **Item 4: Preliminary Talks on Round Table Discussion of Ministerial Level Meeting (MM)**

13:45-14:45 (1) Enhancement of Socio-Economic Impact of Radiation and Radioisotope Application
- Lead-off Speaker: Dr. Sueo Machi, FNCA Coordinator of Japan
- Viewpoint of Each Country

14:45-15:00 < Break >

15:00 -16:00 (2) Sustainable Development and Nuclear Energy
- Lead-off Speaker: Mr. Soichi Nagamatsu
  Deputy Director General for Science and Technology Policy, Cabinet Office
- Viewpoint of Each Country

16:00 -16:30 < Break >

16:30 -17:15 **Item 5: Adoption of Summary Report**

- Drafter of the Summary Report:
  Japan with help of Two Moderators of Dr. Chang and Prof.Tan
- Adoption of the Summary Report
- Closing Address
  Mr. Soichi Nagamatsu
  Deputy Director General for Science and Technology Policy
  Cabinet Office

Welcome Reception and Dinner hosted by H.E. Mr. Toshimitsu Motegi
Minister of State for Science and Technology Policy

18:30-20:30 < Welcome Reception: at Ocean Hall>
with Attraction of Traditional Entertainment

19:10- < Dinner for Head Delegates: at Café Terrace>

Wednesday, December 3 **Ministerial Level Meeting (MM)**

9:00 - 9:40 **Registration**

Chairman of the Meeting: Prof. Yoichi Fuji-ie
Chairman, Atomic Energy Commission (AEC) of Japan

9:40 - 10:00 **Opening Session**

- Opening Address
  H.E. Mr. Toshimitsu Motegi
  Minster of State for Science and Technology Policy
- Welcome Remarks
  H.E. Mr. Keiichi Inamine
  Governor of Okinawa Prefecture

<Taking Commemorative Photo>

10:00 - 10:10 < Break >

10:10 -12:40 **Session 1: Round Table Discussion**

10:10 –11:20 **Topic 1：Enhancement of Socio-Economic Impact of Radiation and Radioisotope Application**

Moderator:
H.E. Dr. Estrella F. Alabastro
Secretary, Department of Science and Technology (DOST)
The Philippines
Lead-off Speaker:
H.E. Dato' Seri Law Hieng Ding
Minister of Science, Technology and Environment (MOSTE) Malaysia
Discussion
Summing-up

11:20-11:30 < Break >

11:30-12:40 **Topic 2：Sustainable Development and Nuclear Energy**
Moderator and Lead-off Speaker:
Mr. Tetsuya Endo
Vice Chairman, Atomic Energy Commission (AEC) of Japan
Discussion
Summing-up

12:40-13:40 **Buffet Lunch hosted by Prof. Yoichi Fuji-ie**
Chairman, Atomic Energy Commission (AEC) of Japan
at Ocean Hall

13:40-14:10 **Session 2:**
Progress of FNCA Activities and the Report from the Senior Officials Meeting (SOM)

13:40-14:00 Progress of FNCA Activities and the Report from the Senior Officials Meeting (SOM)
Reporter: Mr. Soichi Nagamatsu
Deputy Director General for Science and Technology Policy, Cabinet Office
Q&A

14:00-14:10 Report of High Level Discussion on Human Resources Development (HRD) Strategy
Reporter: Dr. Sueo Machi, FNCA Coordinator of Japan

Q&A

14:10-14:30 < Break >

14:30-16:30 **Session 3: Country Report Presentation**

Theme：Nuclear Research and Development Policy of the Country and FNCA Activities

（10 minutes per each country x 9 countries + Q&A time）

14:30-15:30 **＜Viet Nam, Thailand, the Philippines, Malaysia and Korea＞**

Chair: Prof.Yoichi Fuji-ie
Chairman, Atomic Energy Commission (AEC) of Japan

14:30-14:40 Viet Nam
H.E. Mr. Hoang Van Huay
Vice Minister, Ministry of Science and Technology (MOST)

14:40-14:50 Thailand
Mr. Pathom Yamkate
Secretary General, Office of Atoms for Peace (OAP)

14:50-15:00 The Philippines
H.E. Dr. Estrella F. Alabastro
Secretary, Department of Science and Technology (DOST)

15:00-15:10 Malaysia
H.E. Dato' Seri Law Hieng Ding
Minister, Ministry of Science, Technology and Environment (MOSTE)

15:10-15:20 Korea
H.E. Dr. Ho-Koon Park
Minister, Ministry of Science and Technology (MOST)

15:20-15:30 Q&A on the five country reports

15:30-15:40 < Break >

15:40-16:30 **＜Japan, Indonesia, China, and Australia＞**

Chair: H.E. Mr. Hoang Van Huay
Vice-Minister, Ministry of Science and Technology (MOST) of Viet Nam

15:40-15:50 Japan
Prof. Yoichi Fuji-ie
Chairman, Atomic Energy Commission (AEC) of Japan

15:50-16:00 Indonesia
Dr. Ashwin Sasongko
Secretary, Ministry of Research and Technology

16:00-16:10 China
H.E. Mr. Zhang Huazhu
Chairman, China Nuclear Energy Authority (CAEA)

16:10-16:20 Australia
Dr. Ronald Francis Cameron
Acting Executive Director
Australian Nuclear Science and Technology Organization (ANSTO)
16:20-16:30 Q&A on the four country reports

16:30-16:40 < Break >

16:40-17:10 **Wrap-up Session**
- Chairperson's Summary
  Prof. Yoichi Fuji-ie, Chairman of the 4th FNCA Meeting
- Announcement of the 5th FNCA Meeting
  Representative of Viet Nam
- Closing Remarks
  Prof.Yoichi Fuji-ie
  Chairman, Atomic Energy Commission (AEC) of Japan

17:20-17:50 **Press Conference**
at Sunset Lounge

Thursday, December 4

a. Option A: Technical Visits

<Model Course>

9:00 Lv. Busena Terrace Hotel
10:00-11:30 Seawater Desalination Plant
12:30-13:20 Lunch
13:30-15:00 Shuri-jo Castle
15:10-16:30 Fruit Fly Eradication Facility
Stay at Okinawa Miyako Hotel in Naha City

b. Option B: Leave Okinawa

List of the Participants in the Fourth Forum for Nuclear Cooperation in Asia

* FNCA Coordinator

Australia

Dr. Ronald Francis Cameron*	Acting Executive Director Australian Nuclear Science and Technology Organisation (ANSTO)

China

H.E. Mr. Zhang Huazhu	Chairman China Atomic Energy Authority (CAEA)
Mr. Zhang Jing	Director General Department of International Cooperation China Atomic Energy Authority (CAEA)
Mr. Li Xiang*	Deputy Director Division of nuclear affairs and international organizations, Department of International Cooperation China Atomic Energy Authority (CAEA)
Mr. Lu Xiaoming	Secretary of Chairman China Atomic Energy Authority (CAEA)
Ms. Zhang Shaoping	Interpreter China Atomic Energy Authority (CAEA)

Indonesia

Dr. Ashwin Sasongko	Secretary Ministry of Research and Technology
Dr. Soedyartomo Soentono	Chairman National Nuclear Energy Agency (BATAN)
Dr. Hudi Hastowo*	Deputy Chairman Development of Nuclear Technology and Energy National Nuclear Energy Agency (BATAN)

Japan

H.E. Mr. Toshimitsu MOTEGI	Minister of State for Science and Technology Policy
Mr. Yoichi FUJI-IE	Chairman Atomic Energy Commission (AEC)
Mr. Tetsuya ENDO	Vice-Chairman Atomic Energy Commission (AEC)
Ms. Noriko KIMOTO	Commissioner Atomic Energy Commission (AEC)
Mr. Tetsuo TAKEUCHI	Commissioner Atomic Energy Commission (AEC)
Dr. Sueo MACHI*	Senior Managing Director Asia Cooperation Center Japan Atomic Industrial Forum INC. (JAIF)
Mr. Soichi NAGAMATSU	Deputy Director General for Science and Technology Policy Cabinet Office (CAO)
Mr. Nobuo FUJISHIMA	Director for Atomic Energy Cabinet Office (CAO)
Mr. Masanori SHINANO	Director for International Nuclear Cooperation Atomic Energy Division, Research and Development Bureau Ministry of Education, Culture, Sports, Science and Technology (MEXT)
Mr. Keiichi INAMINE	Governor of Okinawa Prefecture
Mr. Hirotaka MAKINO	Vice Governor of Okinawa Prefecture

Korea

H.E.Dr. Ho-Koon Park	Minister Ministry of Science and Technology (MOST)
Dr. Chung-Won Cho	Director General Atomic Energy Bureau Ministry of Science and Technology (MOST)

Dr. Jong-Bae Choi	Director Atomic Energy International Cooperation Division, Atomic Energy Bureau Ministry of Science and Technology (MOST)
Mr. Guk-Hee Yoo	Deputy Director Atomic Energy International Cooperation Division, Atomic Energy Bureau Ministry of Science and Technology (MOST)
Mr. Sung-Soo Kim	Secretary Ministry of Science and Technology (MOST)
Dr. In-Soon Chang	President Korea Atomic Energy Research Institute (KAERI)
Dr. Dae-Joong Kim	President & CEO Doosan Heavy Industries & Construction Co., Ltd.
Dr. Kyong-Won Han	Director Nuclear Training Center Korea Atomic Energy Research Institute (KAERI)
Mr. Tae-Woo Kim	Senior Vice President Nuclear Power Plant Business Group Doosan Heavy Industries & Construction Co., Ltd.
Dr. Byung-Joo Min	Principal Researcher Integrated Safety Assessment Division Korea Atomic Energy Research Institute (KAERI)
Dr. Kyoung-Pyo Kim	Principal Researcher Korea Atomic Energy Research Institute (KAERI)

Malaysia

The Honourable Dato' Law Hieng Ding	Minister of Science, Technology and the Environment
Dato' Dr. Ahmad Sobri Bin Haji Hashim	Director General Malaysian Institute for Nuclear Technology Research (MINT)

Dr. Daud Bin Mohamad	Deputy Director General Malaysian Institute for Nuclear Technology Research (MINT)
Mr. Jini Watt	Principal Private Secretary Ministry of Science, Technology and the Environment

The Philippines

Honorable Dr. Estrella Fagela Alabastro	Minister Department of Science and Technology (DOST)
Dr. Alumanda Molina Dela Rosa*	Director Philippine Nuclear Research Institute (PNRI)
Dr. Corazon Bernido	Head of Nuclear Training Unit Nuclear Services and Training Division Philippine Nuclear Research Institute (PNRI)

Thailand

Mr. Pathom Yamkate*	Secretary-General Office of Atoms for Peace (OAP)
Ms. Jindarom Chvajarernpun	Senior Nuclear Chemist Bureau of Atomic Energy Administration Office of Atoms for Peace (OAP)

Viet Nam

H.E. Mr. Hoang Van Huay	Vice-Minister Ministry of Science and Technology (MOST)
Prof. Vuong Huu Tan*	Chairman Vietnam Atomic Energy Commission (VAEC)
Mr. Le Doan Phac	Deputy Director Department of international Relations and Planning Vietnam Atomic Energy Commission (VAEC)

1-1 OPENING SESSION

1-1-1 Opening address

by
H.E. Mr. Toshimitsu Motegi
Minister of State for Science and Technology Policy

Introduction

Thank you for your introduction. I would like to take this opportunity to make a few remarks to mark the beginning of this fourth ministerial level meeting of the Forum for Nuclear Cooperation in Asia.

First, I would like to begin by offering my heartfelt thanks to everyone from Australia, China, Indonesia, Korea, Malaysia, the Philippines, Thailand, and Vietnam for your participation.

Current meeting

Nuclear energy is important to the progress of medicine through the use of irradiation technologies, to the development of farming and other industries, and as a means of contributing to stable supplies of the electrical power needed for future economic development. The theme of the forum this year is "Nuclear Energy for Future of Mankind and the Globe."

Established with the objective of promoting the smooth development and use of nuclear energy in Asia, the FNCA serves as a forum for the exchange of ideas and cooperation in technological development, and its work has been particularly meaningful in this regard.

This current meeting has been scheduled to serve as a forum for the frank discussion of issues related to the two main themes of this meeting between those responsible for nuclear energy policies in their respective nations: "Enhancement of the Socio-economic Impact of Nuclear Technology Applications" and "Sustainable Development and Nuclear Energy."

The use of nuclear energy technologies

Nuclear energy technologies have been put to use in a wide variety of fields, and it is expected that these technologies will open up new worlds of possibilities in terms of progress in medical technologies and improvements in the quality of industrial products. I believe that the increased use of isotopes and irradiation technologies which

is one of the main themes of this meeting is particularly important as something capable of having a major economic impact and bringing prosperity to our people.

For example, here in Okinawa, in dealing with the damage cause by melon flies on mangoes, goyas, and other melon crops, we have been successful in eradicating melon flies by irradiating pupae with gamma rays to render them sterile. This has made it possible for people throughout Japan to enjoy Okinawa's fruits.

I believe that the work being performed by the FNCA is extremely important as a means of putting nuclear technology to work in agriculture and other industries.

The development and use of nuclear energy and sustainable development

Nuclear energy is also important in the field of power use as well. In October of this year, "The Basic Plan for Energy Supply and Demand," was approved by the cabinet of Japan. In Japan, which is not blessed with oil, coal, or other domestic energy resources, the expectations for the generation of electrical power through nuclear energy are great, and "The Basic Plan for Energy Supply and Demand" identifies nuclear energy as a key power source on the basic assumption that safety can be ensured, and we intend to continue to work to establish nuclear fuel cycle which makes efficient use of nuclear power.

While sustainable development is an issue common to all nations in international society in the twenty-first century, I believe that there are many approaches which may be taken to ensure such development which vary depending on national conditions and energy conditions in each country. I would like to see this meeting serve as a forum in which we may exchange views with everyone here concerning the role nuclear power has to play in the energy sources and issues related to its use. I also firmly hope that this meeting will serve as a starting point leading to sustainable development in Asia.

Conclusion

Okinawa, where this meeting of the FNCA is now being held, is steadily continuing to develop as a center of international exchange in the Asian and Pacific regions, and plans call for the founding of an Institute of Science and Technology here in Okinawa which will serve as a model for universities in the twenty-first century. The opportunity to greet all of you here will serve as a great encouragement to us in the future.

Finally, I would like to express my sincerest wishes that in addition to this meeting serving as a forum for lively and active discussion, the cooperative efforts which come out of this meeting help contribute to the development of nuclear energy in all of the participating nations and bring prosperity to the citizens of all our nations.

Thank you.

1-1-2 Welcome Remarks

by
Mr. Keiichi Inamine
Governor of Okinawa Prefecture

Your excellency Toshimitsu Motegi, Minister of State in charge of Japan's Science and Technology Policy, Yoichi Fujiie, Chairman of Atomic Energy Commission, distinguished delegations from Australia, China, Indonesia, Korea, Malaysia, the Philippines, Thailand, and Vietnam, I would like to express a heartfelt greeting to all of you for traveling such long distances to be here today. Welcome to Okinawa !

On the occasion of this opening ceremony of the 4th Forum for Nuclear Cooperation in Asia・Ministerial-Level-Meeting, on behalf of the citizens of Okinawa Prefecture, I would like to say few words.

Since serving as the venue for the Year 2000 G-8 Summit Kyushu-Okinawa Conference of Heads of State, Okinawa has worked closely with the national government of Japan to draw international conferences and events to our islands.

The Ministerial Level Meeting, is within the framework of cooperation in peaceful uses of nuclear energy in the Asian region, and we are particularly gratified that your conference is convening here. I would like to take this opportunity to express our deep appreciation to all the people who worked to make the Okinawa venue possible.

Within the development of the Asian region where nuclear energy plays an important role, the nine Asian countries participating in the forum today, are conducting many projects within eight fields including utilization of research reactors, radiation to agriculture, radiation for medical use, public information of nuclear energy and human resources development and new projects. These areas of study are greatly significant to the cooperation of the regions represented here today.

Through the technical tour many of you will be able to see how, due to the outbreak of pestilent fruit flies that live on gourds, water melon, and other fruits and vegetables, Okinawa Prefecture decided to draw up a plan to eradicate the fruit flies by using the radiation method of Sterile Insect Technique (SIT). By using this method, we were able to successfully eradicate all the fruit flies from the prefecture by 1993.

Due to the successful eradication, we were able to ship subtropical regional special

products, such as gourds, vegetables and tropical fruits, to the mainland central market and by utilizing our special characteristic subtropical climate, we are developing agricultural products. Since Okinawa is known as an island of longevity throughout Japan, Goya (bitter melon) is one ingredient that people of Okinawa use habitually.

Okinawa Prefecture together with the cooperation of the International Atomic Energy Agency, are aiding in technology support to various countries by using the Sterile Insect Technique (SIT) for the control of insect pests.

I think holding this international forum here, in Okinawa, has great significance.

Also, I truly hope and have the expectation that through this international forum, all participants will devote themselves to research and to having lively and meaningful discussions for the further promotion of peaceful uses of nuclear energy, and achieve great results from this.

I hope you will take this opportunity to learn more about Okinawa's unique history and culture since Okinawa Prefecture, the only of Japan's Prefectures to be located in a subtropical climate with a rich natural environment, conducted trade and exchange with China and Southeast Asian countries to develop highly traditional arts and a unique culture of its own.

In closing, I would like to offer my sincere prayers for the great success of this forum, your health and many accomplishments in your future endeavors. Thank you very much.

1-2 SESSION 1

1-2-1 Enhancement of Socio-Economic Impact of Nuclear Technology Application
(Lead-Off Comments)

by
The Honourable Dato' Law Hieng Ding
Minister of Science, Technology and the Environment

1. Let me share with you our thought and experiences on the utilization of nuclear technology in various fields in Malaysia that has contributed to the significant impact on our socio-economics development. As a policy objective, we should maximise the utilisation and advancement of nuclear science and technology as a tool for sustaining economic development, the improvement of quality of life and well-being of the country. Nuclear technology alone may not be sufficient to achieve that objective, so it should be integrated with other related and conventional technologies.

2. In addition the nuclear technologies must be relevant to the needs of the end users and provide high values to them. Therefore nuclear knowledge which is normally acquired and developed by the nuclear research institution should be transformed into products, processes, services or solutions that add value across every industry for maximum socio-economic benefit. On top of that we have to ensure the utilization of nuclear technology is well accepted and accords emphasis towards approaches that are in conformity with sustainable developmental goals including alignment with societal norms and ethics.

3. Dissemination of technology is also vital in creating the infrastructure and environment within which the needs of the technology and end-users can work together for mutual benefit. For maximum effectiveness, the private sector and end-users have to be encouraged to look into the long term benefit through direct participation in the technology project, whilst the research institution has to reorient its activities in line with the end-users needs. The participation of end-users from the very beginning in the project is very essential that will also provide ownership to them for the later utilization of the technology.

4. For the application of nuclear technology to be effective, there must be in place a comprehensive technology transfer programme to the end-users. This is not only to ensure the protection of the intellectual property by the research organization but it is also to ensure that the end-users will have the back up support and continuous technical assistance in the implementation of the technology transfer programme.

5. To encourage the development and establishment of the industry especially the small and medium scale industries utilizing nuclear technology in the country, initiatives such as incubator and techno-entrepreneurship programmes should be established at the nuclear research institutions so that specific nuclear technologies could be further developed from the laboratory scale to the semi commercial scale before they are finally commercialised.

1-2-2 Sustainable Development and Nuclear Energy (Lead-Off Comments)

by
Mr. Tetsuya Endo
Vice-Chairman
Atomic Energy Commission

Introduction

Sustainable development requires energy. When energy is used, there are effects on the environment. Those effects vary with the type of energy selected, but, in any case, it is easier to preach the three E's – Economic growth, Energy security and Environmental protection – than it is to achieve them simultaneously in practice. With that in mind, I want to talk about sustainable development and nuclear energy.

Economic Growth in Asia

Many Asian countries have good economic fundamentals and will continue to enjoy economic growth. Populations are increasing, too, although not as much as in Africa. Both factors – growth and population – make higher energy demand inevitable in Asia. Air pollution in large cities, and the need for adequate supplies of food and water, may all be problems in the future.

Energy Issues and Nuclear Energy

Yet as energy demand grows unavoidably, most Asian countries – except for a lucky few oil producers – are highly dependent on oil from the Middle East. Most experts agree that, in the medium term, the oil supply situation will become tight.

Japan is not blessed with energy resources and has a very large economy. Without nuclear power, its energy self-sufficiency would be only 4%. Nuclear generation is essential for our energy security. Fifty-two nuclear reactors currently provide nearly 35% of Japan's total generated electricity.

In Korea, 18 reactors provide almost 40%. In China, several more nuclear power stations have gone into service since last year, and there are now eight in operation.

Vietnam, too, is working toward introduction of nuclear generation, and currently is at the stage of a Pre-Feasibility Study and is expected to proceed to a Feasibility Study soon. I understand that construction of nuclear power stations is under consideration in Indonesia as well.

At the same time, of course, further efforts should be made toward developing renewable energies, including wind power, solar power and biomass. These should

prove particularly useful in the role of smaller, dispersed power sources for remote areas.

In any case, the energy supply-and-demand outlook for a particular country will depend greatly on the energy resources of that country and geopolitical conditions. How the country sees its own energy supply-and-demand situation in the medium term will be a major determinant when discussing the relationship between sustainable development and nuclear energy.

Environmental Issues and Nuclear Energy

The world faces many global environmental issues. One is the problem of global warming, resulting from, among other things, energy consumption. The Kyoto Protocol obliges industrially advanced nations to reduce greenhouse gases – the primary cause of global warming – by an average 5.2% from their 1990 levels during the First Commitment Period, 2008 through 2012. In the process of negotiations on implementing the Kyoto Protocol, however, the relationship between sustainable development and nuclear energy was regrettably not acknowledged at the COP6, and nuclear energy was excluded from Clean Development Mechanisms – CDM's – under the Protocol. Let me add that, in the final phase of COP6, Japan was completely isolated on this issue. Next week in Milano, the nations of the world will hold COP9. Depending on what CDM-project-recipient nations want to do, it may be important again to try to include nuclear energy in the Second Commitment Period, beginning in 2013.

As I already suggested, when energy consumption and population increase, various environmental problems can arise, too. At the FNCA, projects related to those environmental problems are under way. One seeks to develop radio-activation analysis technology for suspended dust particles in the air. This will allow better analysis of air pollution and help in the development of environmental policy. Another project involves improving crop varieties, including soybeans, through mutation breeding by radiation. Still another aims to increase harvests with new, environmentally friendly bio-fertilizers.

Each of these efforts will be useful in providing food for the increasing populations of the future. They also demonstrate that the links between sustainable development and nuclear energy are not limited to electricity generation.

Conditions for Peaceful Nuclear Use

So we see that nuclear energy is not just a high-density source of electricity that emits no carbon dioxide in the generation process; there are great benefits available in the uses of radiation as well. At the same time, the use of nuclear energy is accompanied by challenges related to safety, nuclear proliferation, treatment and disposal of radioactive waste, and public acceptance.

Meeting those challenges requires the utmost effort with the maximum care. That, in turn, means human resources – sufficient numbers of knowledgeable professionals in nuclear-power and radiation-related fields. Here, too, cooperation among nations can be extremely useful – in addition to the efforts nations must make on their own. The FNCA provides an effective framework for various projects in this area as well.

Closing

I have touched today on a few points in the relationship between sustainable development and nuclear energy. But I think different countries may have somewhat different interpretations, depending on their own circumstances. This is only natural, and looking from different angles can yield varied approaches. This topic is now under consideration as a new FNCA cooperation. In that context, I hope my comments might serve as a reference in the roundtable discussion.

1-3 SESSION 2

1-3-1 Report of the 4th FNCA Senior Officials Meeting

by
Mr. Souichi Nagamatsu
Deputy Director General for Science and Technology Policy
Cabinet Office

1. The 4th Senior Officials Meeting was held on December 2, 2003 with the participation of 17 senior officials from 9 FNCA countries. Major agenda items were:
   (1) Report on the Fourth FNCA Coordinators Meeting (CM) and Progress of FNCA Activities
   (2) Management and Operation of FNCA Activities (New Activities)
   (3) Human Resources Development (HRD) Strategy for Nuclear Science, Technology and Applications
   (4) Preliminary Talks on Round Table Discussion of Ministerial Level Meeting (MM)

2. For agenda item (1), the conclusion of the 4th FNCA Coordinators Meeting and the highlights of project achievements in 2003 and future plans were reported by Dr. Machi, the FNCA Coordinator of Japan. The report (attachment-1) was endorsed by the meeting. Remarkable and visible progress of projects was commended by the meeting.

   In the field of research reactor application, it was particularly noted that the first demonstration plant of automatic loading of Mo-99 adsorbed PZC will be installed in BATAN, Indonesia in Dec. 2003.

   In the field of agriculture, development of drought tolerant mutant varieties of soybean and sorghum are being successfully implemented through exchange of mutant seeds between participating countries. For the project on Biofertilizer, Viet Nam has demonstrated remarkable results in a field test for peanuts.

   In the field of nuclear safety, the project on "Safety Culture of Research Reactor" started a peer review activity with the Dalat reactor of Viet Nam, providing useful comments. For management of the technologically enhanced naturally occurring radioactive materials (TENORM), an expert mission visited the relevant sites in Viet Nam and Malaysia in 2003 recommending some points for improvement.

For the project on "Public Information for Nuclear Energy", two Open Seminars were held in Viet Nam with 200 participants in conjunction with a Project Leaders Meeting. The Regional Speakers Bureau (RSB) sent one speaker each to Malaysia and Thailand for the large conferences.

In the project on "Electron Accelerator Application" the demonstration of the thin film irradiation to produce wound dressings was conducted in the MINT, Malaysia.

3. For agenda item (2) a project on "Application and Usage of Position Emission Tomography (PET), Cyclotron and Radioisotope in Medicine " was proposed by the Government of Malaysia (attachment-2), and a panel on "Sustainable Development and Nuclear Energy in Asia" was proposed by the Government of Japan (attachment-3). The former proposal was strongly supported by all FNCA countries. The meeting endorsed the proposal and suggested that the 5th Coordinators Meeting discuss a specific work plan and other relevant technical issues. The second proposal was highly appreciated by all FNCA countries including Australia, Malaysia and Thailand, which presently have no plans to construct nuclear power plants. Since this proposal had been approved by the 4th Coordinators Meeting in March 2003, it was agreed that the first meeting of the panel will be held early in the FY 2004.

4. For agenda item (3), the SOM recognized that the HRD is most important for sustainable development of nuclear science and technology. The Conclusions and recommendations from the item were agreed as in attachment 4 to be reported to the Ministerial Level Meeting on December 3, 2003.

5. For agenda item (4), preliminary presentations and exchange of views on two specific topics for the Ministerial Level Round Table Discussion on December 3 were made.

6. It was agreed that the 7th FNCA Meeting in 2006 would be held in Malaysia. The Philippines offered to host the 9th FNCA Meeting in 2008.

Attachment 1

Progress Report on FNCA Activities in 2003

by
Dr. Sueo Machi
FNCA Coordinator of Japan

1. The Fourth FNCA Coordinators Meeting (CM), March 5-7, 2003, Naha-Shi, Okinawa, Japan
   (1) The progress and future directions of FNCA projects in the eight fields were reviewed, and their mid-term work plans were approved. The Meeting agreed to the proposed venues for Workshops / Project Leaders Meetings in FY 2003 under the FNCA framework.
   (2) In follow-up actions to the Third FNCA Meeting, three projects were proposed on "Sustainable Development and Nuclear Energy in Asia", "Marine Environmental Pollution Research and Monitoring using Nuclear and Nuclear-related Analytical Techniques and FNCA Database", and "Maintenance Network of Nuclear Medical Instrumentation".
      a. The Meeting approved the implementation of "Sustainable Development and Nuclear Energy in Asia" project subject to availability of funds.
      b. For the proposal on "Marine Environmental Pollution Research and Monitoring using Nuclear and Nuclear-related Analytical Techniques and FNCA Database", it was endorsed to be implemented within the on-going project on "Neutron Activation Analysis".
      c. For "Maintenance Network of Nuclear Medical Instrumentation", a survey on the condition of gamma cameras in terms of operation and maintenance was recommended in order to formulate a project work plan, before FNCA approves this proposal.
   (3) The Meeting dealt with "Strategy for Human Resources Development" to note the necessity of cooperation with other parallel initiatives being made on this subject, in other international organizations.
   (4) Importance of strengthening linkage with end-users of technologies was recognized to achieve socio-economic development. FNCA Coordinators were encouraged to support project leaders in their efforts to cooperate with end-users. In this respect, it was suggested that Open Lectures be conducted in conjunction with the Workshops.

(5) The Meeting recognized importance of strengthening the partnership in FNCA activities and increased government support, such as funding for projects carried out in each country, and the recognition of FNCA activities as part of the national programs was recommended.

(6) It was recommended that at the national level, linkages between FNCA Coordinators and Project Leaders be enhanced.

2. Highlights of FNCA Project Activities

(1) Tc-99m Generator Production

New projects on "Tc-99m Generator Production" using Mo-99 produced by (n, γ) reaction and Poly-Zirconium Compound (PZC) adsorbent have remarkable progress in design of production system in Japan and Indonesia. The demonstration of manual production was made in BATAN at the Workshop in 2003. A larger scale automatic plant for loading Mo-99 adsorbed PZC will be installed in BATAN, Indonesia in December 2003. The demonstration of the plant operation will be performed during the next Workshop in January 2004. BATAN-Kaken Joint Patent on the PZC based Tc-99m generator and Mo-99 loading machine has been already applied in Japan (Oct. 31, 2002) and Indonesia (Feb. 24, 2003).

Future plans:

1) Quality assurance test of the Mo-PZC loaded column in Indonesia.
2) Loading plant installation in FNCA countries with the technical support of Japan in 2004 and 2005.

(2) Neutron Activation Analysis (NAA) for Monitoring Airborne Particulates

The particulate samples were collected in each country using common filters provided by Japan, in urban and rural areas to be analyzed by the NAA. The monitoring are being continued and the compiled report will be published in the 1st quarter of 2004. "Ko- method", which improves efficiency of NAA to be affordable in measurement of large number of environmental samples is being developed by the collaboration of the Chinese, Vietnamese and Japanese experts.

Future plans:

1) Pollution monitoring data of airborne particulates in urban and rural areas in FNCA countries will be compiled in 2004
2) Ko-method of NAA should be established in collaboration with IAEA in 2004
3) Results of NAA measurements of airborne particulates should be used for the planning of environmental control of FNCA countries. In this regard the coordination with ministry responsible for environmental control should be strengthening.

4) The proposal of Viet Nam to monitor pollution of sea water in coast will be implemented by the measurement of sediment and/or biota in the sea coast using NAA after 2004.

(3) Neutron Scattering

The project on "Neutron Scattering" is focusing on application of the small angle neutron scattering (SANS) for studying structure of natural polymers produced in the FNCA countries. In 2003 one scientist from Thailand and one from the Philippines have studied the structure of the modified natural rubber and carrageenan, respectively in Japan in collaboration with the University of Tokyo, Kyoto University and JAERI. Structure of industrial polymers was also studied.

Future plans:

1) Expert meeting on the project will be held in Indonesia in 2004 to discuss the specific applications of SANS which meet industrial research needs and common interests of FNCA countries.
2) The study on the structure of natural and industrial polymers will be continued in 2004.

(4) Mutation Breeding

The project on "Mutation Breeding" has started a new specific activity in 2002 with participation of China, Indonesia, the Philippines and Viet Nam to develop new varieties of the drought-tolerant sorghum and soybean, and activity of insect-resistant orchid in 2003 with participation of Indonesia, Malaysia and Thailand. Experimental materials of soybean, sorghum and orchid have been exchanged between the participating countries. Better mutant variety of sorghum has been developed in Indonesia. Malaysia and Indonesia are about to join "soybean" activity in 2003.

Future plans:

1) Selection of better mutant varieties of sorghum, soybean and orchid will be continued and intermediate results will be reviewed in 2004.
2) Mutation breeding for disease resistant banana will be started by Indonesia, Malaysia, the Philippines and Viet Nam in 2004.
3) In order to increase kinds of mutant, the utilization of the ion accelerator of JAERI may be facilitated by the FNCA Coordinator of Japan responding the specific request of FNCA countries.

(5) Biofertilizer

The 1st Workshop of the project on "Biofertilizer" has formulated the work plan in 2002 and 2003 including the field demonstration in participating countries to

show impacts of the biofertilizer. The 2nd Workshop in Viet Nam was jointly organized with JSPS Research Project of Biofertilizer with participation of the IAEA and ICRISAT experts. Field demonstration of biofertilizer (Rhizobia) for peanuts in Viet Nam was successful. The strategy for extension of biofertilizer was formulated in each country.

Future plans:

1) Strategic demonstration of biofertilizer application in less-fertile soil in 2004 and 2005
2) Pilot production of biofertilizer using radiation sterilization of carriers in 2004 and 2005
3) Support of IAEA for measurement of N_2 fixing using N-15

(6) Radiation Oncology

The project on the radiation therapy of uterine cervix cancer has achieved remarkable progress. The clinical study on radiation therapy using the standard protocol “CERVIX-I” in FNCA participating countries. This treatment regimen produced a favorable outcome, with the 5 year overall survival and local tumor control rates for stage IIIB patients being 52.5% and 81.5% respectively. These results were comparable with or somewhat superior to those of the American and European series. The guidebook on the treatment protocol "CERVIX-I" has been published in 2002 for radiation oncologist. In conjunction with the FNCA Workshop, the Open Lecture on "Radiation Therapy" was presented for 150 audiences in 2003 in Tokyo. A clinical study on chemo-radiotherapy for advanced uterine cervix cancer has been conducted since 2003.

Future plans:

1) The clinical test on chemo-radiotherapy for advanced uterine cervix cancer will be fully implemented in 2004.
2) The clinical study on chemo-radiotherapy for nasopharyngeal cancer also will be preliminarily studied in 2004.
3) Activities on QA/QC of radiation therapy in 2004

(7) Public Information (PI) for Nuclear Energy

In this area, a joint cross-national survey on "radiation" was carried out in seven FNCA countries. In each country, a total of 1,100 male and female high-school students served as respondents. The results of the survey are expected to serve for improving the strategy for effective communications.

Under the FNCA Regional Speakers Bureau Activity, three speakers were sent to the ICN'02 in Malaysia in 2002 and one speaker to the NuTech 03 in Thailand.

In conjunction with Project Leaders Meeting in Viet Nam in 2003, two Open

Seminars were held on "Public Information Strategies for Developing Nuclear Power" in Hanoi and "Application on Radiation Technology in Industry". More than 200 local specialists attended the both seminars.

Future plans:

1) In order to enhance communications with mass media, national seminars will be organized in each country in 2004, where the FNCA will facilitate (provide) necessary means (experts).
2) The possibility for the FNCA to train nuclear communicators will be explored also in 2004.
3) It is proposed that FNCA's Web-site (http://www.fnca.jp/english/) should be improved by more active participation of all FNCA countries by increasing the two-way traffic of information in 2004.
4) It is recommended that the next PL meeting will be held in Thailand in 2004 in conjunction with an Open Seminar on "Research Reactor Application for Science and Industry".

(8) Radioactive Waste Management (RWM)

The Task Group for the sub-project on "Spent Radiation Source Management"(SRSM) had useful visits to relevant facilities to have fruitful discussion in Indonesia and Korea in 2002. Activity report of this SRSM Task Group was published in March 2003. The consolidated report on RWM has been completed in February 2003, which contains useful updated information. It was agreed that the sub-project on "TENORM" replaces "SRSM". Expert group visited Malaysia and Viet Nam to assess the safety of TENORM (Technologically Enhanced Naturally Occurring Radioactive Materials) management in 2003.

Future plans:

1) Expert group visits to Thailand and China to assess safety of TENORM management in 2004.
2) Review of National Radiation Safety Standard status in accordance with IAEA Basic Standard
3) Characterization and classification of wastes for each FNCA country.

(9) Nuclear Safety Culture (NSC)

The self-assessment of research reactors has been conducted in each FNCA country in order to identify the areas for further improvement in fostering safety culture and management. The first peer review of safety culture for research reactor was carried out successfully in Viet Nam on the research reactor of Dalat Nuclear Research Institute in January 2003. Some useful comments and information were presented for Vietnam Atomic Energy Commission (VAEC) to

take into account for the improvement of safety culture.

Future plans:

1) Peer review of HANARO (High-flux Advanced Neutron Application Reactor of KAERI) safety culture in 2004
2) Self-assessment of safety culture in each FNCA country in accordance with IAEA Codes of Conduct
3) Review of the project outcome in the past years

(10) Human Resources Development (HRD)

The development of the common training materials in radiation protection area and introduction of e-learning system, are being progressed. The survey of basic data on HRD such as, currently available human resources and the demand to meet national program are being carried out in FNCA countries, which should be used to formulate a national strategy of HRD and the strategy of FNCA's HRD project. The matter of regional networking for research, high education and training was raised at the Workshop and the 3rd FNCA Meeting.

Future plans:

1) National HRD strategy should be drafted based on results of the survey of HRD database to be discussed at the HRD Workshop in 2004
2) Preparation of a model method for HRD strategy formulation in 2004
3) The FNCA approach to ANENT should be examined

(11) Application of Accelerators

According to the work plan at the 2nd Workshop, demonstration for liquid system was conducted by the JAERI Japan in December 2002.

The 3rd Workshop on Application of Electron Accelerators was held at Kuala Lumpur, Malaysia, where the status of utilization of electron accelerator for thin films in the participating countries was discussed and the future program was formulated. The demonstration for thin film irradiation was achieved in MINT Malaysia 2003. The Cost analysis of the low energy electron process is in progress.

Future plans:

1) Demonstration of flue gas treatment in China in 2004
2) Evaluation of radiation processing of liquid, solid, and gas samples by low energy electron accelerator

Attachment 2

Proposal from Malaysia

Topic: Application and Usage of Positron Emission Tomography (PET), Cyclotron and Radioisotope in Medicine.

Early detection of diseases is very important for the early treatment and also in the reduction of medical cost and social suffering. Nuclear medicine is making rapid and astonishing progress with the development of imaging technologies.

PET is at present making an impact and has emerged as a very important tool for diagnosis and staging/grading of diseases, evaluating the effect of treatments detection of recurrence and in the long term follow up of cancer patients in many countries. Beside oncology (cancer cases), PET has also important role in the field of neurology, cardiology and infections.

With the elucidation of the molecular mechanism of diseases, molecular imaging using PET systems will play an important role for the diagnosis and treatment of various diseases including oncology diseases.

The high specificity and sensitivity of PET has resulted in the change in the management of clinical diseases through the use of PET imaging (ref: Journal of Nuclear Medicine 2001). Already in the developed countries, the number of PET centers has increased many folds over the last 4 years.

However the clinical PET practice is far from the daily clinical use because of the lack of experts, equipment and budget in many developing countries. It is expected that PET will be widely introduced into many more countries in the near future.

Malaysia through the Ministry of Health, Ministry of Science and Environment and the Ministry of Education is expanding the field of Nuclear Medicine Services in term of infrastructure equipment, personnel, research and manpower.

The government of Malaysia is acquiring two system of PET-CT and a cyclotron by year 2004 and another system of PET-CT the following year.

It is with the above facts taken into considerations and the regional cooperation

in FNCA spirit that Malaysia is proposing a project of "Application and Usage of Positron Emission Tomography (PET), Cyclotron and Radioisotopes in Medicine."

This project consist of the following component and the agency responsible for implementation it are as specified below:

Component	Implementing Agency	Expected Implementation
Cyclotron and Radionuclide Production aspect	Ministry of Science, Technology & the Environment: Malaysian Institute for Nuclear Technology Research Ministry of Health: Kuala Lumpur Hospital	November 2004
Clinical PET-CT aspect	Ministry of Health: 1. Penang Hospital 2. Kuala Lumpur Hospital Ministry of Education: University Hospital, Petaling Jaya	June 2004
Radiation Safety Aspect QA & QC Aspect	Ministry of Science, Technology & the Environment: 1. Atomic Energy Licensing Board 2. Malaysian Institute for Nuclear Technology Research Ministry of Health: 1. Radiation Protection Division of Engineering Department. 2. Penang Hospital 3. Kuala Lumpur Hospital	June 2004

Further details and framework shall be discussed at the Senior Official (SOM) and National Coordinator (NOM) meetings.

Thank you.

Attachment 3

Proposal of FNCA Activities by Government of Japan

by
Sueo Machi
FNCA Coordinator of Japan

1. Title

Panel on "Role of Nuclear Energy for Sustainable Development in Asia"

2. Background

At the 4th FNCA Coordinators Meeting the proposal on "Sustainable Development and Nuclear Energy in Asia" was discussed and approved (Annex).

The implementation of the proposal has been subject to the availability of funds.

3. Outline of the Panel

1) Activities:
   - Long term (20 years and 50 years) energy planning(demand and supply) in each country and the region
   - Assessment of the least cost production of electricity and GHG emission in different energy mixes including nuclear in each country (major parameters: oil and gas price, economic growth)
   - Drawing regional picture of the energy demand and supply, and GHG emission
   - Issues for introduction and expansion of nuclear power in Asian countries, such as capital cost, public acceptance, human resources development, assurance of safety and waste management
   - Assessment of mitigating effect of GHG emission by nuclear power in Asia, in connection with Kyoto Protocol.
   - Assessment of non-power application of nuclear energy such as desalination of sea water and hydrogen production.

2) Outputs:
   - Regional and national picture of the energy demand and supply, and roles of nuclear energy
   - Common understanding on significance of nuclear power in Asia in terms of energy security, economic development and environment protection
   - Assessment of non-power nuclear applications.

3) Project duration of Panel:

2~3 years from 2004

4) Members of Panel:

Experts and government officials for the energy policy and environmental protection as well as nuclear energy from participating countries. FNCA Coordinator of Japan serves a member as well as secretariat.

5) Reporting:

To report to the FNCA Meeting and Coordinators Meeting.

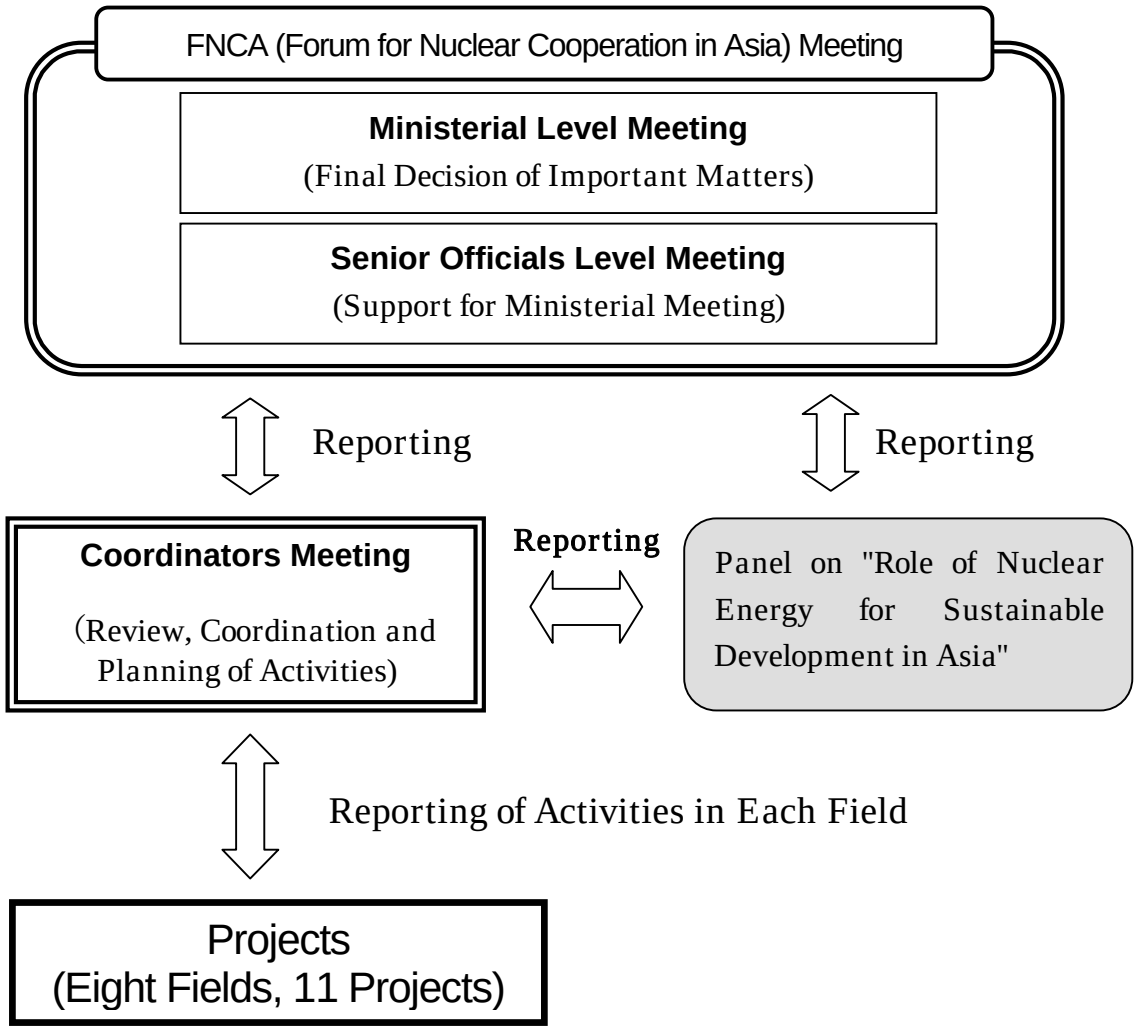
6) Implementation and work plan:

(i) Work scheme including the tools, methodology and parameters should be established by the meeting of experts from FNCA countries. Synergy with related RCA and national activities should be explored.

(ii) Assessment of national energy planning, energy mixes, GHG emission, and economics should be carried out in each country by using agreed tools and methodology.

(iii) Regional pictures should be prepared by the FNCA secretariat of Japan with Japanese experts group based on the results of each national assessment. The outcome should be discussed and agreed at the panel.

Panel on ” Role of Nuclear Energy for Sustainable Development in Asia”



Annex

Project on "Sustainable Development and Nuclear Energy in Asia"
by
Sueo Machi
FNCA Coordinator of Japan

(1) Background:

1) The Project was first proposed by Indonesia in 2001. Expert Meeting to discuss on the proposal was held in 2001 and 2002 with the participation of experts from China, Indonesia, Japan, Korea and Vietnam. The second meeting prepared the revised project proposal as attachment-1.
2) The proposal was supported by the 3rd Coordinators Meeting to be submitted to the 3rd FNCA Meeting for its endorsement. The meeting suggested that the version revised according to its comments as follows should be submitted to the 4th Coordinators Meeting for further discussion and approval. The meeting suggested that the project be focused on:
   - assessment of the least cost production of power and GHG emission from different energy mixes by using common tools and methodology.
   - regional picture of energy demand, GHG emissions and energy security.
   - economic feasibility studies of nuclear power to assess the break even points for small/medium/large reactors. (attachment-2)
3) The representatives of IAEA pointed out that the synergy could be sought with RCA activities.
4) At the Round Table Discussion, many delegates shared the view that nuclear energy can achieve 3E's: "Energy security", "Environmental protection" and "Economic growth", being one of the most important energy sources. It was also acknowledged that further studies including the proposed project could provide a firm platform for the consideration on the inclusion of nuclear energy in the CDM.

(2) Revised project proposal based on the comments by the 3rd FNCA Meeting

1) Project activities:
   - Collect data for long term (20 years and 50 years) energy planning(demand and supply) in each country.
   - Assessment of the least cost production of electricity and GHG emission in different energy mixes including nuclear in each country (major parameters: oil and gas price, economic growth)

- Drawing regional picture of the energy demand and supply, and GHG emission.
- Assessment of mitigating effect of GHG emission by nuclear power in Asia, and usefulness of CDM to introduce/expand nuclear power in Asia.

2) Project outputs:
- Recognition of significance of nuclear power in Asia in terms of energy security, economic development and environment protection.
- Regional picture of the energy demand and supply.
- Recognition of usefulness of the inclusion of nuclear power in the CDM for Asian countries.

3) Project duration:
2 years, 2 meetings per year.

4) Project implementation and work plan:
(i) Work scheme including the tools, methodology and parameters should be established by the meeting of experts from FNCA countries. Synergy with RCA related and national activities should be considered. (2003)
(ii) Assessment of national energy planning, energy mixes, GHG emission, and economics should be carried out in each country by using agreed tools and methodology. (2003, 2004)
(iii) Regional pictures should be prepared by the FNCA secretariat of Japan with Japanese experts group based on the results of each national assessment. The outcome should be discussed and agreed at the project workshop. (2004)
(Note) Experts and government officers for the energy policy and environmental protection as well as nuclear energy experts should be included in the national study team.

5) Leading countries:
Japan, Korea, China
Participating countries: All FNCA countries

6) Funds:
(i) Meetings, 4 mtgs × 25p=100 m·week: US$250,000
(ii) Activities (work for analysis), borne by each country
(iii) Analysis for regional picture and publication: US$ 30,000

Attachment 4

Conclusions and Recommendations

Item 3, Special Session on Human Resources Development (HRD) Strategy for Nuclear Science, Technology and Applications

1. HRD is recognized to be an important component for the sustainable development of nuclear science and technology applications.

2. The concern was expressed by the majority of the meeting participants that the maintenance of nuclear knowledge and experience is at risk because of declining numbers of experts due to retirement and the lack of incoming young nuclear scientists and engineers.

3. The HRD strategy should be authorized and supported by the high level government management responding to the national nuclear program as a long term commitment. Enhancement of nuclear capability to address future applications of nuclear energy should be part of the HRD strategy.

4. The setting up of a small high level task force by FNCA is desirable to discuss the strategy for HRD.

5. Regional and interregional cooperation enhance national HRD and international infrastructure of human resources. Therefore, FNCA and the exchange program for HRD sponsored by Japan should play important roles. In this context, specific collaboration of the FNCA with ANENT of IAEA should be defined in the near future with full consultation with IAEA and other relevant organizations.

6. The enhancement of nuclear knowledge is needed to promote applications of nuclear science and technology. Government and private firms are encouraged to provide special fellowships to students majoring in nuclear science and technology.

7. Training materials including e-learning materials should be efficiently produced by sharing works among FNCA countries but not overlapping relevant IAEA activities. Setting up a task force for planning and working for preparation of training materials on a work-sharing basis is desirable.

8. Analysis of the database on HRD should be completed early in 2004. The result of the analysis may be reflected in revising the HRD strategy in each country, depending on their national policy. The new revised HRD strategy based on the database analysis should be reported to the HRD Workshop in 2004. This database could be used to identify gaps between the current situation and the needs of each country.

1-4 SESSION 3

1-4-1 Country Report of Vietnam

by
Mr. Hoang Van Huay
Vice-Minister
Ministry of Science and Technology (MOST)

The year 2003 is a year of many remarkable events for research, development and uses of nuclear energy in Viet Nam.

In September 2003, the VAEC and IAEA have signed *The Country Programme Framework for Technical Co-operation between the VAEC and IAEA, period 2003-2008*. The areas for future cooperation between the VAEC and IAEA are as follows: Food Security; Energy Security; Management of National Water Resources and Supply of Clean Drinking Water; Strengthening of National Capability in Nuclear Science and Technology; Health Care; Industrial Applications of Nuclear Techniques; and Human Resources Development.

The Draft *Strategy for nuclear energy development in Viet Nam* is completed and being reviewed. The strategy has emphasized the socio-economic impact of nuclear technology to the country, as well as formulated a long-term programme for nuclear energy development of the country from now up to 2030.

Reports on *Pre-FS on the first NPP's construction in Viet Nam* and *Study and elucidation of seven aspects in relation to the nuclear power development in Viet Nam* are going to be completed. The study results concluded that in order to meet energy demand of the country, the first NPP should be put into commercial operation in Viet Nam by 2017-2020.

The National Assembly Standing Committee approved to formulate Draft Atomic Energy Law of Viet Nam. A Steering Committee was established. H.E. Minister of the MOST is appointed as the Chairman of the Committee.

During the 2003, Viet Nam has been participating in all FNCA projects. The results obtained from the FNCA cooperative activities have been making significant contributions to the enhancing of research, development and use of nuclear science and technology in Viet Nam. Below are some main activities being carried out under the FNCA framework.

1. Utilization of Research Reactor

1.1. ^{99m}TC Generator Production

Polymer Zirconium Compound (PZC) was successfully synthesized. As a result obtained several hundred grams of PZC sample of good quality and high Molybdenum adsorption capacity were prepared for 99mTc generator preparation. The comparison of the performance of synthesized PZC with that supplied by Kaken Co. (Japan) showed a coincided result on the Molybdenum adsorption performance.

A standard procedure for the preparation of PZC based 99mTc generator has been formulated and compiled by Prof. Le Van So . This procedure was issued by Dr. Sueo Machi and Dr. Tsuguo Genka and dispatched to FNCA's participants for standardization of experimental work.

An effective PZC column loading technique was successfully developed. This is called a " Cold loading technique". This technique offer an opportunity to simplify the procedure of PZC based Tc-99m generator preparation and to follow suit a commonly accepted fission 99Mo and Alumina based Tc-99m generator technology.

1.2. Application of Neutron Activation Analysis

+ The air pollution study

During 2002, the airborne particulate samples were collected using two types of polycarbonate membrane filter PM2.5 and PM2.5-10 in two typical sites of industrial (Ho Chi Minh City) and rural (Dateh) regions in the south of Viet Nam. The concentration of trace elements in the samples has been determined by the k0-NAA procedure developed in Da Lat NRI. In order to check the developed k0-NAA procedure for the airborne particulate matters, two standard reference materials (SRMs) Urban Particulate NIST-1648 and Vehicle Exhaust Particulate NIES-8 were analyzed and the obtained results have been compared and interpreted in term of deviation between experimental results and the certified values.

However, the meteorological data in the sampling site of rural region (Dateh) has not been available yet. We have contacted to the meteorological agency in Viet Nam, but it was not successful. This problem will be solved in the next year because we are initiating a new national project for investigation of air pollution in Viet Nam.

+ The QA/QC

The quality management for analytical laboratories has been implemented at the Da Lat NRI. At the moment, two typical laboratories for nuclear analytical techniques (NATs), i.e. laboratories for INAA and Environmental Research-Monitoring have been selected to aim at getting the accreditation. The procedures, techniques and instructions have been documented, however they have not yet been combined in a quality manual. The laboratories are expected to receive accreditation for their quality system for compliance with the accreditation criteria of TCVN ISO/IEC 17025 national standard (equivalent to ISO/IEC 17025

international standard) in the next two years (end of 2005).

In order to evaluate uncertainties involved in analyzing a small size of sample like airborne particulate matters, a small-sized sample was analyzed repeatedly. For this purpose, 1 mg of two SRM samples (NIST 1632C and NIES No.8) was analyzed for six times. Both of the k_0-NAA and the relative methods were applied. Also, the impurities in filter papers were evaluated.

+ The development and application of ko-NAA

The analysis of airborne particulate matters by the k_0-NAA method based-on the Ko-DALAT software has been carried out.

During 2003, the k_0-NAA method including the use of Ko-DALAT software was trained for all staffs of INAA laboratory at the Da Lat NRI. Also, through an expert mission (Mr. Ho Manh Dung) invited by MINT, the k_0-NAA methodology developed at Da Lat was introduced to the NAA laboratory in MINT (Malaysia).

+ Others

The INAA technique has been applied for determination of multi-element in various sample objects such as crude oil, base rock, human hair and sediment, etc.

Characteristics of the PGNAA facility at the Da Lat reactor have been improved.

+ Future plan on NAA

The INAA technique should be applied for the solid waste samples.

The prompt gamma-ray NAA (PGA) system should be developed and applied for the practical objects.

1.3. Neutron Beam Application and Research Reactor Operation

Research of structure-properties of water-soluble copolymer for oil field application.

Structural study of TPE on the basis of NR and Methyl-methacrylate, Polyethylene and Polypropylene.

Reactor management including fuel burn-up calculation, reactor physics and thermo-hydraulic study, as well as reactor aging management.

2. Application of Radioisotopes and Radiation for Agriculture

The activities of this FNCA project have been integrated with the IAEA Project VIE/5/014: "*Mutant rice varieties for saline acid soil tolerant",* which purpose is to further develop and extend advanced mutant varieties and mutant germplasms of rice in Viet Nam. The research activities have been being carried out at the Agricultural Genetics Institute and Cuu Long Delta Rice Research Institute.

In addition to the National training course on "Maker-assisted selection and DNA fingerprinting in rice", many training courses for extension of new varieties were held in locations, where demonstration fields for CM6, DT21, Mutant Tamthom and others have been cultivated.

Under the FNCA framework, the 2003 FNCA Workshop on Application of nuclear

technique for bio-fertilizer production was successfully organized in Viet Nam, October 2003.

For the next cycle 2005-2006, an IAEA TC Project on Enhancement of Quality and Yield of Rice Mutants in Vietnam Using Nuclear and Related Techniques has been proposed.

3. Application of Radioisotopes and Radiation for Medical Use

Recently, Viet Nam has been investing to equip modern nuclear techniques and facilities to the hospitals. It may be mentioned that, considering the significant role of nuclear medicine diagnostics and radiotherapy in the national health plans, the Government of Vietnam has approved the establishment of a Medical Hi-tech Center with the provision of the first PET-Cyclotron System in the Country. In order to support to the Center, a proposed national project on *Establishment of Cyclotron Center for medical use and development of nuclear technique application* is being formulated with the participation of the VAEC, the Tran Hung Dao hospital, Institute of Physics, Ha noi University of Technology, and Ha Noi Science University. Besides, VAEC has proposed IAEA to approve a TC project on PET-Cyclotron for the cycle 2005-2006.

At present, there are on-going projects, such as: RAS/6/035: *LDR and HDR Brachytherapy in Treating Cervical Cancer*, which is being carried out at the K-Hospital and the Oncology Center in Ho Chi Minh City and two national projects: *Concurrent Chemo-Radiotherapy for Uterine Cervix Cancer* and *Concurrent Chemo-Radiotherapy for Nasophryngcal Carcinoma*.

4. Public Information of Nuclear Energy

Having perceived the extremely important role of public information and propaganda for the public acceptance and consensus to the nuclear power development, in 2003, many PI activities have been carried out in Viet Nam.

Follow-up three exhibitions on peaceful uses of nuclear energy in 2001 and 2002, the 4th exhibition on peaceful uses of nuclear power was held in Ho Chi Minh City in April 2003 with supports of the JAIF and JCI of Japan.

October 2003, the VAEC participated in the *Viet Nam Tech Mart 2003* in Ha Noi. The VAEC pavilion had received thousands visitors. Through the exhibition, VAEC has taken a good opportunity to propagate to the public the benefits of the nuclear technique applications in the fields of agriculture, industry, health care, environment protection,...

March 2003, a delegation of Steering Committee for study on Nuclear Power Development in Viet Nam has paid a visit to the nuclear installations in Korea and Japan

September 2003, a delegation of the organizations of the Communist Party of Viet Nam (CPV) visited Japan to study nuclear power development of Japan under the

invitation of the Japan Atomic Industrial Forum, Inc. (JAIF).

October 2003, a delegation from MOST and VAEC paid a two-week scientific visit to France in order to study the nuclear power development and nuclear - related technologies of France.

The 2003 FNCA Public Information Project Leaders Meeting was held in Ha Noi and Ho Chi Minh City November 4-6, 2003. During the Meeting, the two seminars on Strategy on Public Information for Nuclear Power Development in Ha Noi and Application of Radiation Technology in Industry in Ho Chi Minh City were held successfully with participation of the policy makers, scientists, professors, students, and journalists and correspondents. The mass media, such as Viet Nam Television (VTV), Voice of Viet Nam (VOV) and newspapers informed of those events, including VTV's broadcasting of interview with Dr. Sueo Machi, FNCA Coordinator of Japan.

It is noted that the PI activities have contributed to increasing awareness of the public towards the necessity and benefit of the development and utilization of nuclear energy, especially, the introduction of nuclear power in Viet Nam.

5. Radioactive Waste Management

Institute for Technology of Radioactive and Rare Elements (ITRRE) has responsibility for treatment and management all kinds of radwaste in the North of Viet Nam. At present, about 130 tons of LLRW, including uranium ores, uranium tailing, waste from monazite processing and research activities in ITRRE accumulated from 1981, have been being treated. This activity will be completed by the end of 2003 and has been kept at the ITRRE's interim storage in Phung, Ha Tay province.

In addition, many sealed sources have been being used in industries. After their expiration, they become radioactive wastes. Statistical data on the distribution of radioactive sources in Viet Nam are as follows:

There are 739 sources distributed in 17 among 39 provinces of the country classified by fields of applications as follows:

Health care:	411 sources,	(56%)
Industries:	201 sources,	(27%)
Others:	127 sources,	(17%)

Among them only 210 sources are still in use and under close management; The remaining more than 500 sources are actually expired. They are considered radwaste and kept in stores of the users. They should be collected and managed at radwaste processing facility.

With the aim of the enhancing capability on RWM, in addition to the on-going MOST project on upgrading Phung interim storage, treatment and management for all radioactive wastes in this storage, VAEC is planning to formulate a new IAEA TC project on RWM for the cycle 2005-2006.

Implementation of the 2003 FNCA plan, from 24-29 July 2003, the TENORM Task

Group of FNCA had completed his mission in Viet Nam, the discussion on TENORM show that, some NORM/TENORM industries should be a target of radiation protection. But their origin of radioisotopes is natural. Therefore, the criteria or standard should be different from that of artificial source. Too strict regulation will cause much social and economical confusion.

The co-operation in the field of RWM was implemented through the exchanges of experiences, training personnel and the consultancy in setting-up the National Policy for RWM between Vietnamese experts and experts from IAEA, Japan, Korea and FNCA.

6. Human Resource Development

The crucial problems and obstacles on nuclear human resource development facing by Viet Nam are the shortage of nuclear manpower in terms of quantity and quality. There exist, at present, a *big gap* between scientific researcher generations.

Recognizing the vital importance of human resource development, the government of Viet Nam had assigned VAEC and IE to conduct studies to establish a policy and plan for preparation manpower for atomic energy development, in general, and the introduction of nuclear power in Viet Nam, in particular.

At present, VAEC has established cooperation with 4 universities (Ha Noi University of Technology, Ha Noi University of Science, Ho Chi Minh City University of Science, DaLat University) in the field of nuclear student training. Through the international cooperation channels (IAEA, RCA, FNCA, bilateral), every year, about 150-200 scientific researchers and nuclear administrators have been trained abroad.

VAEC is implementing a policy to recruit excellent students and give them favourable conditions for continuously studying at the oversea training centers.

From December 8-12, 2003 a Regional Asia Workshop on Management of Human Resources for NPP Operating Organizations (RAS-4-021) will be held in Ha Noi under co-sponsors of the VAEC and IAEA. 25 experts and participants from IAEA, China, Egypt, India, Korea, Pakistan, and Viet Nam will attend the Workshop. This is an important and useful event for Viet Nam - a developing country is considering to choose nuclear power.

7. Nuclear Safety Culture

Lectures on safety culture were presented in 10 training courses on radiation safety organized in the whole country with 450 participants in total.

Several meetings between regulators, contractors, reactor management and reactor users have been held to discuss aspects affected nuclear safety of Da Lat Nuclear Research Reactor (DNRR).

Studies on the social and human conditions of Viet Nam with respect to the management and operation of NPPs in the near future have been carried out.

The 6th FNCA Workshop on Nuclear Safety Culture was held in Da Lat, Viet Nam January 2003. The Workshop and Peer-Review were very useful for fostering and strengthening safety culture for Viet Nam.

In 2003, two Workshops on Nuclear Safety Culture were organized in Ha Noi under the framework of MOST's Project on Elucidation of 7 aspects related to the nuclear power development in Viet Nam.

8. Application of Electron Accelerator

Market survey on product types and quantities, which could be processed by gamma irradiator and by EB machine in the fields of industry and health care, has been being conducted by the Research and Development Center for Radiation Technology (VINAGAMMA). In addition, some studies on liquid materials processed by gamma and electron irradiation for development of some agricultural products such as plant promoters, protectors, etc. has been conducted under the cooperation between Viet Nam and Japan.

VAEC is considering a project on installation of EB machine at the VINAGAMMA. This plan is supported by IAEA through a TC Project in the cycle 2005-2006.

Conclusion

Nuclear science and technology has been playing a very important role and continuously making significant contribution to the socio-economic development of the countries in region.

We highly appreciate the very important role and significant contribution of the FNCA to the safe peaceful nuclear energy utilization in the world, as well as in the Asian region.

Viet Nam has the great honour to host the 5th FNCA Ministerial Level Meeting to be held in 2004. The Government of Viet Nam commits to give every necessary condition and closely cooperate with Japan and the other FNCA member countries, to ensure the fruitful success of the Meeting.

1-4-2 Country Report of Thailand

"Enhancement of Socio-Economic Impact of Radiation and Isotope Application and Sustainable Development and Nuclear Energy in Thailand"

by
Mr. Pathom Yamkate
Secretary-General
Office of Atoms for Peace (OAP)

Excellencies,
Distinguished Guests,
Ladies and Gentlemen;

It is a great pleasure and honor for me to be here with you all for *the Ministerial Level Meeting of the Fourth Forum for Nuclear Cooperation in Asia*. On behalf of our Minister of Science and Technology, General Chetta Thanajaro, who has been pre-occupied at home, please let me extend his apologies to you. I would also like to thank the Atomic Energy Commission of Japan for their support in organizing this meeting on such an important and timely subject: *Enhancement of Socio-Economic Impact of Radiation and Isotope Application and Sustainable Development and Nuclear Energy*; as well as their kind invitation extended to Thailand to participate in the meeting.

Excellencies, Ladies and Gentlemen;

I would like to take this opportunity to briefly present to you the efforts and progresses related to peaceful utilization of atomic energy in Thailand at the current time. Since the United Nations Conference on Environment and Development (UNCED) in 1992, the world community has increasing concerns on human safety and clean environmet, of which safe utilization of atomic energy is identified as a global issue. The International Atomic Energy Agency (IAEA) has then been working closely with its Member States, including Thailand, on upgrading of radiation protection infrastructure to ensure proper and timely implementation of its International Basic Safety Standards. The major recommendation given to Thailand was to urgently establish proper national infrastructure for radiation protection, of which regulatory authority was to be independently managed from the management of operators – users of radiation sources. In early 2001, one of the new Government's major policies was to restructure the government bureaucracy to be more efficient and better meet the needs

of major populace. The Government agreed later to separate the policy and planning, and safety and safeguards regulation functions of the Office of Atomic Energy for Peace (OAEP) from the promotional research and development functions. At the beginning of October 2002, the OAEP was renamed the Office of Atoms for Peace (OAP) and remains as a government bureaucrat. The promotional research and development functions will be re-organized to be a new public agency called Thailand Institute of Nuclear Technology (TINT). Meanwhile, this has been delayed, awaiting for the new legislation for establishing a new agency to be promulgated. At present, both organizations are managed under the same management arrangement of the OAP.

The present organization of OAP consists of the following four bureaux:

- Bureau of Atomic Energy Administration,
- Bureau of Radiation Safety Regulation,
- Bureau of Nuclear Safety Regulation, and
- Bureau of Technical Support for Safety Regulation.

In the meantime, OAP has also been assigned to temporarily manage research and development activities of the former OAEP as follows:

- Radioactive Waste Management Programme,
- Radio-isotopes Production Programme,
- Research Reactor and Nuclear Technology Operation Programme,
- Radiation and Nuclear Safety Programme,
- Irradiation for Agriculture Programme,
- Chemistry and Material Science Research Programme, and
- Physics and Advanced Technology Research Programme

Excellencies, Ladies and Gentlemen;

As most of you are aware, one of the major projects of OAP is the new Ongkharak Nuclear Research Center Establishment Project (ONRC), comprising of three major facilities, namely 10 Megawatt TRIGA research reactor, radioisotope and radiopharmaceutical production facility, and centralized radioactive waste processing and storage facility. Thailand has invested substantially amount of time and resources to this project, of which the contract was awarded to General Atomics (GA) of USA. While the contractor has undertaking its responsible works, OAP struggled long and hard in obtaining the Construction Permit (CP). So far, about 95% of detailed design of the buildings and systems has been completed. And we are now pleased to update you that the CP has been granted on 29th September. The construction of the major facilities is expected to take place in the near future. Hopefully, ONRC will be the

major research and development center for nuclear science and technology in Thailand. It will also contribute to the close cooperation on nuclear science and technology for peace and security with the international community.

Socio-Economic Impact of Radiation and Radioisotopes Application

Over 40 years, the Thai society has benefited from the safe use of radiation and radioisotopes application. This has increasingly contributed to the improvement of quality of life of the Thai people in terms of agriculture, health and medicine, industry and environment. Under the Forum for Nuclear Cooperation in Asia (FNCA), Thailand is proud that successes have been achieved in various sectors.

Research Reactor

The progresses of utilization of research reactor in Thailand are as follows:

Tc-99m generator

Thailand performed the experiments for evaluation the performance of Poly Zirconium Compound (PZC) as a column packing material for $^{99}Mo/^{99m}Tc$ generator from (n, γ) ^{99}Mo. The $^{99}Mo/^{99m}Tc$ generator using PZC material and irradiated natural molybdenum performed the satisfied result of the generator characteristics which could be developed as an alternative technology for $^{99}Mo/^{99m}Tc$ generator production.

It is strongly believed that in the near future this technology will be established and utilized under the framework of the FNCA which will benefit the countries operating small research reactors to overcome the difficulties in producing $^{99}Mo/^{99m}Tc$ generator.

Neutron Activation Analysis (NAA)

Thailand has conducted a monitoring study of urban air pollution in downtown Bangkok to support the use of nuclear related techniques for research and monitoring studies on air pollution. OAP realizes the usefulness and advantage of using Ko method for analysis of air particulate matters. However, we are not ready to follow the recommendation made by the NAA group in the last workshop in Beijing as we do not have any software program nor expertise in the method. To enable us to further participate in this project, a special support from FNCA or some other related organization, e.g. MEXT is needed. It is considered that an expert in Ko-NAA may be invited to Thailand to conduct experiments using local facilities. As a whole, the effectiveness and capability of our facility can be evaluated before any decision is made.

Neutron Scattering (NS)

Thailand, with the cooperation of Prof. Hasegawa of Kyoto University, had

prepared samples for the study of the morphology of natural rubber under strain in natural rubber-thermoplastic elastomer (NR-TPE). Twenty - one samples were sent to JAERI for the preliminary measurement using Small Angle Neutron Scattering (SANS). Deuteration of substituted polymers might be considered to increase the contrast of pattern.

Agriculture

Mutation Breeding

Mutation breeding has been the major activity in the agricultural field. New mutant varieties of Canna and Chrysanthemum were released by Kasetsart University. Dissemination of mutation technique and nuclear technology in agriculture to the public were conducted via workshops and media, such as TV, radio, newsletters and newspapers. Research works on plant mutation breeding have been carried out by collaboration of some research institutes under the "National Framework" set up by the Sub Committee on Agricultural Applications under the Thai Atomic Energy Commission for Peace. The target crops are food crops, fruit trees, aquatic plants, vegetables and ornamentals. The objective of mutant varies, depending on the specific plants. Following the success of the First Multilateral Research Program (MRP-1), Thailand will be one of the six countries participating in the Second Multilateral Research Program (MRP-2) concerning "Insect Resistance in Orchids".

Bio-fertilizer

Progress activities on bio-fertilizer in Thailand included the investigation of the beneficial microorganisms in Thailand soil on leguminous plant growing area, collection and selection of effective strains for bio-fertilizer purpose. The inoculum production techniques were studied. The research program also included the production techniques for mycorrhizal fungi by studying the suitable media and carrier and using radiation to enhance growth promotion of fungi in the media.

Medical Use

Radiation Oncology

After completing the project of radiation and radioisotopes application for medical use in radiation therapy for stage IIIB cervical cancer patients, the guidebook in radiation therapy and radiation physics for cervical cancer were established and distributed to hospitals and institutes of participating countries. The second protocol on Accelerated Hyperfractionation (AHF) for stage IIIB cervical cancer started in the year 2000 was closed at the end of 2002 and the follow-up result is being evaluated.

Public Information

To enhance public information activities for nuclear energy, Thailand has been disseminating the information to the public via various means of mass communication. OAP has hired consultant companies as advisors for conducting the public relations activity starting from the year 1999 up to now. The joint survey of high school students on their understanding of radiation and its applications was also carried out. Thailand enjoys the benefit of using the information network "AsiaNNet" after it was established by FNCA. With the assistance of the FNCA and its Member States, Thailand has continued to promote the peaceful and safe uses of nuclear technology in the country.

Radioactive Waste Management

The achievement of the Spent Radiation Source (SRS) Management Task Group sub-project in Thailand (August 2001) under FNCA framework was proven mutually beneficial. The project was continued in 2002 and Indonesia and Korea were the voluntary countries. An expert from Radioactive Waste Management Division, OAP was invited to present the progress of SRS Management in Thailand and the experience from the radiological accident (spent Co-60 tele-therapy source) in the Discussion/Survey Meeting on SRS Management in Korea. As for activities related to radioactive waste management in Thailand, the code of practice and the radioactive waste management regulation were drafted and proposed to the cabinet for approval and to be promulgated as a ministerial regulation. The safety awareness in radioactive waste management in the country was improved.

Nuclear Safety Culture

The safety culture was recognized as one of the key factors to prevent nuclear and radiation accidents. All type of activities with respect to safety culture including awareness, commitment, motivation, supervision and responsibility have been seriously reviewed and being set as practices. Thailand expects to have more safety culture training to provoke individual awareness both users and operators and to prevent any incidents originated from nuclear facilities and radioactive materials.

Human-Resources Development

Strengthening human resources is an important factor for the development of nuclear technology applications. Thailand has Bilateral Agreement between OAP and JAERI on human resources development in nuclear field. Follow-up training courses on radiation protection were conducted under this agreement. Joint training courses on nuclear and radiological emergency preparedness were proposed for the extended agreement. A survey for human resources development in nuclear field was carried out in order to identify the needs and areas of development. Thailand was also pleased to host the Workshop on FNCA Human Resources Development last October.

Industrial Application

Application of Low Energy Electron Accelerator

The main subject of the year 2002 workshop is on liquid system irradiation. Although Thailand has no electron accelerator to undertake research or development on radiation technology, most of the experiment can be done by Co-60 gamma irradiation. Current status on radiation treatment of liquid samples in Thailand is in laboratory scale, market trial scale and commercial scale. The main purpose is to upgrade and add value to natural agricultural and marine originated products. Thailand participates in this project through the Bilateral Agreement between OAP and JAERI and MEXT Program. Numbers of our scientists have had opportunity to experience the use of electron accelerator at Takasaki Radiation Chemistry Research Establishment (TRCRE) in executing their experiments in comparison with gamma irradiation.

Strengthening Linkage Between National Research Sectors and End-users, Including Industry

The success of nuclear science and technology development cannot be achieved only in the laboratory. Its results should be extended to the end-users, generating productive output and outcome to the society. To enable this, linkage between various organizations should be encouraged to have very closed-link, between R&D organizations and educational institutes and industry. Also, demonstration and transfer of technology should be arranged for the potential clients or end-users to ensure them of the technology benefits in increasing the quality of their products and services.

OAP has a plan to establish a Business Development Unit (BDU) to serve as a bridge between the research and development arm of the newly established Thailand Institute of Nuclear Technology (TINT) and potential end-users. This is an important task for establishing and maintaining self-reliance and sustainability. In preparation, business planning for this unit is underway. A training course on leadership for about 50 scientists and engineers was conducted using local lecturers. Business planning and good management and marketing practices for staffs from across the technical, scientific and administrative sides will be conducted in the first quarter of 2004. The experience of the self-reliant institutes will be of great uses to institutes that have not yet achieved self-reliance. Assistance under this Forum for Nuclear Cooperation in Asia is required.

Strengthening Regional Cooperation

Clearly, appropriate mechanisms are needed to help FNCA member countries respond effectively to the growing demands of nuclear related technology application. But how quickly such mechanisms are formed and how well they perform will depend, to a large extent, on the individual circumstances of each country, its strength and weaknesses. We are gathering here to combine our diverse strengths to meet the challenges facing our region. In line with FNCA's theme, I would like to emphasize that strong partnership is vital in order to achieve the goals of "achieving stability, security and prosperity for our region" we set out amidst the rapidly changing international environment. Further strengthening effective mechanisms of cooperation, through FNCA, IAEA/RCA or Scientist Exchange Programs of Japan, will also of great help, not only to facilitate better regional cooperation and investment, but also to protect our societies against threats to their security, while preparing them to benefit fully from the sustainable development and nuclear energy.

Sustainable Development and Nuclear Energy

The reorganization of national infrastructure is considered strategic for sustainable development. The OAP's roles in policy coordination and strategic plan development for peaceful utilization of atomic energy in Thailand will be strengthened to support the development for national and international peace and security and for national socio-economic development. The single regulatory role is to be also strengthened to ensure reducing risks and increasing benefits of nuclear technology application in the country. However, further strengthening OAP's roles both on internationally accepted standards and measures are to be incorporated in management strategy of OAP. Revision of the present Atomic Energy for Peace Act (1962) is required to incorporate new major elements to facilitate flexibility and effectiveness of the Act for OAP to enforce both national compliance of the NPT regime and safe regulations in compliance with the international standards and measures set out by the IAEA.

Likewise, in terms of research and development, and utilization of nuclear technology, the new Thailand Institute of Nuclear Technology (TINT) is considered strategic. TINT will be established with corporate-like management arrangement from which its businesses are carried out with partners from both public and private sectors. The current Ministerial Policy calls for TINT to redirect its mission to support export of agricultural produce through irradiation and development of Small and Medium Enterprises (SMEs). Its main research tools are research reactors and irradiation facilities.

Nuclear Power: Utilization of atomic energy for electricity generation has been proven to be an essential source of primary energy to secure sustainable electricity production all over the world. For Thailand, as it is well recognized that energy is one of the

important factors for economic development of the country, a feasibility study of nuclear power plants was conducted years ago. As a result, the study outcome showed that it was untimely yet for Thailand to launch the nuclear power program due to inappropriate economical situation and the higher cost both for construction and operation. However, nuclear power remains an option for future energy development in Thailand and the public consent is required. In order to be prepared, OAP and the Electricity Generating Authority of Thailand (EGAT) has cooperated in launching periodically a number of PI and PA programs on nuclear related technology application as well as nuclear power to the public.

Conclusion

Excellencies, Ladies and Gentlemen;

We reaffirms the primacy of the FNCA cooperation system, and confides that it offers the potential for real gains for all societies and economies, particularly developing countries, through the reform and improvement of agriculture, health and medicine, industry and environment. Thailand gives our strong and consistent support for continuing the valuable work done under the FNCA programs.

Thank you for your attention.

1-4-3 Country Report of the Philippines

by
Honorable Dr. Estrella Fagela Alabastro
Minister
Department of Science and Technology (DOST)

Mr. Chairman
Excellencies
Distinguished Delegates
Ladies and Gentlemen:

It is a great pleasure and an honor for me to participate in the Fourth Forum for Nuclear Cooperation in Asia. On behalf of the Philippine Government, my delegation and I thank the Government of Japan for inviting us to this Forum. It gives me great pleasure to have the opportunity again to share our experience in harnessing science and technology particularly nuclear technology to uplift the lives of the general populace.

Mr. Chairman

The development agenda of the Philippine Government is strongly anchored on the goals of economic growth accompanied by social equity and ecological responsibility for the present and future generations of Filipinos.

The national science and technology policies and programs support this development agenda by addressing pressing national problems, supporting industry especially the small and medium scale enterprises (SMEs), accelerating technology transfer and utilization, supporting human resource development and S & T infrastructure, and promoting/popularizing science and technology.

The Department of Science and Technology (DOST) is giving priority to two important programs : The *Small Enterprise technology Upgrading Program or SETUP* and *Technological Innovation Commercialization Program or TECHNICOM. SETUP* is a nationwide program designed to upgrade the productivity of small and medium enterprises (SME) through technology application/upgrading. Under this

program, enterprises in the regions/provinces, whether in the agricultural, manufacturing or service sector are being provided with the appropriate technology upgrading assistance and services in an integrated manner. The socio-economic benefit accruing from this program is the development of the countryside.

TECHNICOM is designed to facilitate technological innovation enterprise spin offs. It is a holistic and comprehensive package of focused assistance to fast track the commercial scale adoption or utilization of innovations in priority areas. The program hopes to stimulate technological innovation, strengthen the R & D capacity of SMEs, increase private sector adoption and commercialization of government-initiated R & D activities, and maximize benefits from government investments in R & D activities.

Mr. Chairman

Nuclear science and technology is an important component of the national S & T system, and will continue to play a significant role in the socio-economic and technological development of the country. It has developed its niche in the priority areas of agriculture, health, biotechnology, earth and marine sciences, energy, materials science, manufacturing and process engineering and environment. Allow me to cite some developments relating to these applications.

In the agricultural sector, our Department of Agriculture has just constituted an Experts Group for the evaluation of the Commercial Use of Irradiation for Agricultural Food Products. Chaired by the Philippine Nuclear Research Institute (PNRI) , the Experts Group has been tasked initially to evaluate the commercial application of irradiation as a quarantine treatment for Philippine fruits. In the area of mutation breeding, the PNRI conducted an Open Lecture in conjunction with the Workshop of the FNCA Mutation Breeding project last September 2003. As a result of its participation in the Open lecture, one leading ornamental company in Mindanao has used our Irradiation Facility.

In the health sector, more nuclear medicine laboratories, radiotherapy centers, and tissue banks have been established in both private and government hospitals. A new medical cyclotron and PET center was inaugurated in 2001 in a private hospital, and has since served the needs of cancer patients. New radioisotopes such as Rhenium-188 are now being tested for special types of cancer with the assistance of the IAEA. Philippine participation in the FNCA Project on Radiation Oncology is facilitating the development of the best protocols in the treatment of our cancer patients, particularly those afflicted with uterine cervix cancer and nasopharyngeal cancer.

On the environment, the Philippines has led a regional effort to provide a more sensitive , faster, and cheaper assay of saxitoxin, the key toxin in harmful algal blooms. The Philippines is upscaling its procedure for the radiolabeling of the toxin. Through the use of nuclear and analytical techniques, the PNRI maintains a database on fine particulate data in Metro Manila, the first of its kind in the country, which can be used to obtain information on the major sources of pollution. Through isotope techniques, characterization of the groundwater systems was accomplished for Davao City, a city envisioned to be the premier socio-economic and tourism growth center for the whole of Mindanao. Such information could be used to provide data to decision makers and water managers for delineating watershed protection zones and undertaking preventive measures to abate drinking water quality degradation.

These are only examples of our inroads in nuclear science and technology. We will continue to promote the applications of nuclear technology in our priority areas of concern where it has the added advantage over conventional technologies.

Mr. Chairman

Trained manpower is an important element for the successful and sustainable implementation of long-term national nuclear programs. The Philippines' HRD strategy will place a strong emphasis on the following:

1) nuclear science & technology education in schools and universities (nuclear S & T for the young generation,
2) role of international cooperation,
3) new techniques for education and training,
4) preservation of expertise.

With regards to international cooperation, the Philippines reiterates its proposal for the sharing of expertise in the region, making extensive use of IT or cyberlearning. The Philippines also supports all the recommendations of the FNCA 2003 Workshop on HRD, which includes the proposal that the Scientist Exchange program of MEXT be expanded to include M.S. and Ph.D. academic programmes in the nuclear field.

Mr. Chairman

The FNCA projects which we are participating in are progressing according to the project milestones. The Philippines would like to reaffirm her strong commitment to the FNCA. In this regard, we would like to offer to host the Workshop on Radiation Oncology in 2004, and the Workshop on Nuclear Safety Culture in 2005. We would consider it our privilege to host the 9th FNCA in 2008.

In conclusion, we would like to state that we firmly believe that nuclear science and technology provide unique inputs towards providing a better quality of life for the Asia and Pacific region, especially the developing country member states. The sustainability of nuclear science and technology in the region will depend to a large extent on the open and forthright cooperation among the countries in the region. The FNCA has proven to be a mature vehicle for fostering such cooperation.

It is our hope that it will be the continuing resolve of the FNCA participating countries to contributed to its continue growth and strength.

My wishes for a successful Meeting.

1-4-4 Country Report of Malaysia

"National Science and Technology Policy for Development and Competitiveness and FNCA Activities"

by

The Honourable Dato' Law Hieng Ding
Minister of Science, Technology and the Environment

Mr. Chairman
Distinguished Delegates
Ladies and Gentlemen

1. It gives me great pleasure to congratulate you, Mr. Chairman, your colleagues and the Government of Japan for organising the fourth Forum for Nuclear Cooperation in Asia (FNCA) in Okinawa this year. On behalf of the Government of Malaysia, my delegation and I officially thank the Government of Japan for kindly inviting us to this forum. It is indeed an honour for us, and gives the opportunity to share with you our experience in the sustainable development and application of nuclear science and technology in Malaysia. Today I will share with you our experience in Science and Technology Policy for Development and Competitiveness.

Mr. Chairman

2. Today we live in a globalised world, a world that is highly competitive and increasingly becoming borderless. The changes that are taking place today demand that government and industries to be innovative and creative to improve our competitive edges. With the shift towards knowledge-based economy, the ability of a nation to continuously enhance proficiency in science, technology and innovation is becoming more important.

3. In a competitive market economy, the ability to exploit Science and Technology (S&T) is becoming strategically important and decisive for the economic performance of Malaysia. Besides playing a critical role in social, environmental and health care programmes, sustainable development and job creation, S&T is expected to transform the nation, so that it adapts to the knowledge-based economy. The rapid development of capability and capacity in S&T is therefore needed to enable the country to sustain its economic growth in the future in line with the requirement of our Vision 2020.

Mr. Chairman

4. Malaysia first introduced the Science and Technology Policy in 1986 followed by the Industrial Technology Development Action Plan in 1990. Within a span of 20 years, among other things Malaysia has successfully integrated S&T in the national development plan, strengthening out S&T infrastructure, built up human resources for S&T and establishing funding mechanism for R&D. Science and technology offers Malaysia its greatest opportunity to turn ideas and creativity into highly competitive business in the 21st. century. The Nation is at critical phase for its economic development , where sustained growth and prosperity depend on how quickly technology and innovation are applied across both the traditional and new industry such as Information and Communication Technology (ICT) and biotechnology. Proficiency in S&T is imperative if Malaysia aspires to be an advanced and affluent nation.

5. The Government has undertaken a review of the S&T Policy and has launched the Second National Science and Technology Policy and Plan of Action in June 2003. It was formulated to create a conducive environment to further spur the development of science and technology and hence Malaysia's competitiveness. The Second S&T Policy focused on strengthening research and technological capacity and capability in Malaysia with emphasis on commercialisation of research outputs, strengthening of institutional framework and management of S&T. Central to all these strategic thrusts is the need to bring government, industry , universities and public research institutions together in a synergistic partnership.

Mr. Chairman

6. The Second S&T Policy has identified seven key strategic thrusts to transform the country into knowledge-driven economy so as to maximise economic and social return. They are as follows:

- Strengthening research and technological capacity and capability
- Promoting commercialization of research outputs
- Developing human resource capacity and capability
- Promoting a culture for science, innovation and techno-entrepreneurship
- Strengthening institutional framework and management of S&T and monitoring of S&T policy implementation
- Ensuring widespread diffusion and application of technology, leading to enhanced market-driven R&D to adapt and improve technologies, and
- Building competence for specialization in key emerging technologies.

7. To support the implementation of these strategic thrusts, the government had also identified 55 action plans or specific initiatives. The implementation of the Second S&T Policy will involve a large financial outlay by the government. However, the government is committed to provide the allocation needed for such purposes.

Mr. Chairman

8. May I now turn to our regional cooperation under the FNCA framework. In this regards, let me from the very outset express our satisfaction with the steady progress and achievement made so far. Malaysia has participated in all the activities conducted under FNCA framework and has benefited in strengthening our national nuclear technology capability to enhance our socio-economic and well-being. In this respect we will continue to actively participate in FNCA programmes and activities in the future. We are very pleased that even though there were some problems affecting the region recently such as the outbreak of SARS, we still managed to carry out all the activities of the FNCA as scheduled. For Malaysia, this year we have successfully hosted two FNCA activities namely the Workshop on Application of Electron Accelerator and also receiving an expert mission from Task Force on TENORM, both of them in August. As for the future, Malaysia would like to host the FNCA Workshop on Human Resource Development next year and in 2005 to host Workshop on Mutation Breeding to coincide with the completion of the gamma green house facility for chronic irradiation at MINT. We also would like to offer Malaysia as the venue for the seventh FNCA Meeting in 2006.

Mr. Chairman

9. As the cooperation under the FNCA framework has produced some good results to benefit all the participating countries under the existing programmes, it is logical that we should explore to continue to build up from our success and cooperate in other new nuclear technology areas of common interest to the region. In this regards Malaysia would like to propose a new project on the Expansion of Nuclear Medicine Services: Medical Application and Usage of Positron Emission Tomography, Cyclotron and Radioisotopes. Malaysia is embarking on the expansion of nuclear medicine services in the country to include the use of PET and very short-lived radioisotopes and radiopharmaceuticals to enhance health care services in the country. The introduction of this programme is not only for the routine clinical use at the hospitals, but it will also include the support from nuclear research institution in the development of special radiopharmaceuticals and in ensuring the safety aspect. In addition the support from

R&D is also required to enhance the programme. We believe many countries in the region will be interested in this area of cooperation that will contribute towards enhancing the quality of life of the people and the cooperation under FNCA is best suited for the above purpose.

Mr. Chairman

10. In conclusion, I would like to express our sincere gratitude to the Government of Japan for it's tremendous effort in making the cooperation under FNCA successful. Let me assure you once again our continual support and commitment to ensure the success of the regional nuclear cooperation under the FNCA framework in the future.

Thank you for your attention.

1-4-5 Country Report of Korea

by
H.E.Dr. Ho-Koon Park
Minister
Ministry of Science and Technology (MOST)

Prof. Yoichi Fuji-ie, Chairman of Atomic Energy Commission,
H.E. Mr. Dato' Law Hieng Ding, Minister of Science, Technology and Environment, Malaysia
Her Execellency Dr. Estrella Fagela Alabastro, Minister of Science and Technology, The Philippines,
H.E. Mr. Zhang Huazhu, Chairman of China Atomic Energy Authority,
Distinguished Delegates from the FNCA Member Countries;

It is my great pleasure to attend this Fourth FNCA Ministerial Meeting here in Okinawa. I would like to express my sincere appreciation to the Government of Japan, the Japan Atomic Industrial Forum, and the Okinawa Prefecture for organizing this meeting so excellently.

Taking this opportunity, as the host of the Third FNCA Ministerial Meeting in Seoul in October 2002, I would like to thank all the FNCA Member Countries for their valuable support in leading the Third FNCA Seoul Ministerial Meeting to a successful conclusion.

At the last FNCA Meeting in Seoul, we shared our views on the necessity for nuclear knowledge preservation as a preparatory measure for inducing the second nuclear Renaissance. We formulated a high level task group for the human resources survey. We also emphasized the importance of cooperation in the areas of radiation application, research reactor training and medical technology development with benefits for a better life in Asia. Korea proposed to establish an "Asian Mutual Fund for Nuclear Liability" for securing a compensation mechanism related to the operation of nuclear power plants.

Distinguished Delegates;

Nuclear energy has been one of the most important energy option in the past, present and it will be in the future. To this end, world nuclear community is pursuing extensive global collaboration. While past nuclear technology has grown on a national basis, various atomic energy international joint development schemes are under negotiation.

Generation-IV reactor program is progressing through the International Forum (GIF) since 2001 with the participation of 10 countries from around the world. This program is preparing for a future reactor to be used as one of the major energy sources in 2030. IAEA also initiated an innovative reactor project, called INPRO (International Project on Innovative Nuclear Reactors and Fuel Cycles), which collects users' requirements for the new reactor concept and explores technology information exchange system among the IAEA's Member States. The ITER (International Thermonuclear Experimental Reactor) project for fusion energy is another challenge for all of us. It is now at the final stage of consultation for a site selection and role assignment.

Based upon the accumulation of nuclear science and technology during the past 50 years, the world expects a wide spectrum of atomic energy applications in the 21st century. They are seawater desalination, district heating, hydrogen production along with electricity production, and radiation technology (RT). Especially, the RT market is forecasted to be up to 1.2 trillion US dollars in 2010.

The scope for the utilization of radiation and radioisotope will be expanded into not only water resources management, food preservation, environmental protection and public health, but also technology fusion with the promising high-tech areas of BT, NT, IT and ST.

Distinguished Delegates;

Let me now introduce a brief overview on the atomic energy development of Korea since the 2002 meeting.

Nuclear energy has been one of the major growth engines for the Korean economy. Korea has 18 nuclear power plants in commercial operation supplying 40% of the nation's electricity. 8 more nuclear power plants will be constructed by 2015. 4 units will be the Korean Standard Nuclear Power Plants with a capacity of 1,000MWe, and 4 units will be the Advanced Power Reactor with a capacity of 1400MWe (APR1400).

In the case of small and medium sized nuclear reactors, active research efforts have been devoted to the 300MW System integrated Modular Advanced ReacTor (SMART)

program. SMART can be utilized for seawater desalination as well as power production. Its pilot plant will be commissioned by 2008. Currently, the Korea/Indonesia/IAEA tri-party cooperation project for SMART's feasibility on the Madura Island is under implementation. Korea is ready to share SMART-related technology and experience with Member States of the FNCA.

Furthermore Korea strives for expediting RT development. Currently, Electron accelerator technology for industrial wastewater purification is being commercialized. The pilot plant with a capacity of treating 1,000 tons of dye wastewater will be constructed in collaboration with the IAEA. The Korea/IAEA joint training center for electron accelerator application is to be opened to all IAEA Member States.

In the area of the safety and security of radioactive source materials, Korea has designed a tracking method using the Global Positioning System (GPS) attached to radiological source containers. We hope the FNCA Member States will join this new real time detection system against the lost radiation source materials.
Recently, Korea has enacted two new legislations to cope with the changing environment of atomic energy. The "Law on Radiation and Radioisotope", promulgated in December 2002, aims at promoting the utilization of RT.

And, the "Law on the Physical Protection of Nuclear Material and Facilities and the Measures for a Radiological Emergency", enacted in May 2003, provides a legal framework to help prevent nuclear terror and to establish a nation-wide radiological emergency management system.

Honorable Ministers and Distinguished Delegates;

Now, I would like to touch upon the future directions on atomic energy cooperation in Asia.

As I mentioned earlier, RT needs higher attention, especially, in medical diagnosis and therapy. The establishment of a stable production and distribution system of radioisotopes is an essential part for radiation utilization. In this regards, Korea proposes we consider the joint construction of a medical isotope producer (MIP) to be used exclusively for the production of radioisotopes for our common prosperity.

In our region, we are aware that every Member State has its own strong R&D area and related large-scale research facility. Korea has a 30MW multipurpose HANARO research reactor, the 1GeV Pohang Light Source Accelerator and the Korea-

Superconducting Tokamak Advanced Research (K-STAR) facility. Korea suggests the FNCA devise a Regional Resources Management Function to assist in the sharing of the large-scale research facilities in Asia. This activity will enable us to stimulate our cooperation spirit among the FNCA Member States and achieve the utmost efficiency from our regional atomic energy R&D capacity.

Last but not least, I would like to reemphasize the importance of education for the next generation. Korea hopes the "Asian Nuclear Students Interchange Program" for fostering young atomic energy specialists in our region be developed. Through this new academic network, I believe future young nuclear students in Asia will be able to study at any competent academic institution in their interested subject areas.

Distinguished Delegates;

When Korea was faced with a financial crisis several years ago, nuclear energy continued to provide us with a stable supply of electricity at a low cost. That was the major driving force behind Korea overcoming the crisis in such a short period of time. This proved to us that nuclear is a realistic energy source with the characteristic energy security.

The economic growth rate of Asia was around 6.4% in 2002. Asia is the fastest growing region in the world. Nuclear energy will surely serve as an engine putting the Asian economy on a solid foundation. Korea is very willing to share its expertise and experiences in the developing nuclear energy technologies with the other Asian countries.

With these remarks, I would like to appreciate once again the dedicated efforts of Japan in preparing this 4th meeting as a successful forum.

Thank you very much.

1-4-6 Country Report of Japan

by
H.E. Mr. Toshimitsu Motegi
Minister of State for Science and Technology Policy

Japan's Nuclear Energy Policy

Japan has consistently placed the nuclear fuel cycle at the heart of its nuclear policy – from the dawn, in fact, of its nuclear development in the 1950's. In the first Long-Term Program for Nuclear Research, Development and Utilization, issued in 1956 by the then-new Atomic Energy Commission, it was expressly stated that, "in order to establish the fuel cycle in the future, matched to the realities of the nation, Japan will endeavor to develop and improve technologies, including those for breeder reactors and nuclear fuel reprocessing." Our effort today is a continuation of one begun nearly five decades ago.

Without nuclear power, Japan's rate of energy self-sufficiency would be a mere 4%. We have virtually no natural energy resources. As a result, not only must we depend on nuclear power for our energy security; we must utilize uranium resources as fully and effectively as possible. In that sense, we view recycled nuclear fuel – plutonium – as a "quasi-domestic" energy resource.

In addition, the threat posed by global warming is now well recognized internationally. Along with other nations, we are committed to the fight against global warming, and nuclear power generation – which emits no carbon dioxide in the generation process – is, for that reason, too, an important energy source for Japan.
In October of this year, a new document, Japan's first "Basic Plan for Energy Supply and Demand," was approved by the cabinet. It positions nuclear generation as a key power source for Japan, and restates the nation's commitment to establishing the nuclear fuel cycle.

The final target in Japan's nuclear-fuel-cycle program is introduction of fast breeder reactors for the use and creation of plutonium. Because it will still take some time, however, to bring fast breeder reactors to the stage of commercial operation, we are promoting the burning of MOX fuel in light water reactors as the first step toward the fuller use of plutonium in time.

Current State of Nuclear Power Generation

Unfortunately, recent years have seen a number of mishaps, missteps and other setbacks – one after another – in Japan's nuclear power generation and fuel-cycle

programs. As a result, public confidence in all things nuclear has been severely damaged.

Starting last year and continuing, as a result of falsifications of records of self-inspections at nuclear power stations and other occurrences, the operation of a number of nuclear power reactors has been suspended pending confirmation of their safety. Those reactors have been returned to service one by one as safety has been confirmed, but overall availability factor has been reduced.

Similarly, as a result of people's distrust in MOX fuel, which arose from a falsification of data by the overseas manufacturer in 1999, Japanese utilities have yet to load it in any of their light water reactors, and that program, too, is substantially delayed. As for the fast breeder prototype reactor "Monju", because of a sodium leakage in 1995 and so on, prospects for resuming operation of the reactor remain unclear. Last January, a High Court pronounced a judgment that it was confirmed that the license for establishment of "Monju" was invalid. But the case is being appealed to the Supreme Court.

Although the circumstances are thus difficult, what is most important now is steady effort toward recovering people's confidence in nuclear power and the nuclear fuel cycle. Toward that end, the Atomic Energy Commission issued a report titled "The Nuclear Fuel Cycle" this past August, in order to promote better understanding by the nation of the fuel cycle program.

As to fast breeder reactors, the final target in our fuel-cycle effort, our present intention is to remodel "Monju" and put it back into operation. With recognition that "Monju" is, as well, an important facility for the study of fast breeder reactors, we also plan cooperative research and international exchange activities.

Similarly, the basic plan for merging two nuclear entities – the Japan Atomic Energy Research Institute and the Japan Nuclear Cycle Development Institute – was finalized last September, and includes international cooperation as a major obligation of the new, combined entity.

Nuclear Energy and the International Community

Japan's absolute commitment in its utilization of nuclear energy is to exclusively peaceful use. This is embodied in domestic policies and laws, and in international treaties and bilateral agreements by which Japan abides. Japan has a declared policy of not holding surplus plutonium – plutonium for no specific purpose. This past August, the Atomic Energy Commission – on Japan's own initiative – issued its "Basic Principles for the Utilization of Plutonium in Japan" in an attempt to further improve transparency.

In order to develop peaceful uses of nuclear energy, sustaining and strengthening the nuclear non-proliferation regime is of paramount of importance. The IAEA Additional Protocol strengthens its capabilities in inspection by enlarging the scope of information

to be provided to it, and by implementing "complementary access". In cooperation with the IAEA, Japan continues to make efforts toward the universalization of Additional Protocols. Japan requests nations represented in this forum that have not yet concluded an Additional Protocol to do so soon.

Advanced Nuclear Science and Engineering

In the area of nuclear fusion, for which expectations are high as a future energy source, the ITER Project, an international fusion energy project, is being promoted among its participants. Japan welcomes participation of China and Korea in the project this year, giving further momentum toward the international cooperation. Japan is determined to make a meaningful and significant contribution to the realization of ITER, and has proposed Rokkasho-mura, in Aomori prefecture, as an ITER site.

Under the FNCA, eleven cooperative projects in eight fields are being carried out. The positive use of radiation is something all countries are highly interested in. The FNCA projects have seen some successful results, including the establishment of a protocol for cancer therapy using radiation, and the wider use of that protocol. More projects in medicine, industry and agriculture will be implemented, their results, too, expected to be beneficial to all countries.

Under a unique FNCA project on public information, the results of an awareness survey by questionnaire on nuclear energy and radiation are now being consolidated. In Japan, we must make efforts in particular to help the younger generation understand radiation and its uses better and more accurately.

Closing

The vision of the FNCA is to contribute to the development of societies and economies through active partnerships in the region, on the basis of mutual understanding and cooperation. In Asia, conditions in each country are different, and it is necessary that cooperation among nations take those differences into account. Japan supports self-help efforts toward technological development by individual countries. In this way, each country can independently achieve its own research and development capabilities, and successful uses of nuclear science and technology.

Japan will continue to promote international cooperation in Asia through the FNCA and other frameworks.

1-4-7 Country Report of Indonesia

"Indonesian Policy on the Development and Utilization of Nuclear Energy"

by
M. Hatta Rajasa
State Minister for Research and Technology

Excellencies,
Distinguished Delegates,
Ladies and Gentlemen,

It is indeed a great pleasure and an honor for me to be invited on behalf of my country, Indonesia, to participate again in this distinguished Forum for Nuclear Co-operation in Asia. Please kindly allow me, first of all, to express my deep appreciation to the Minister of State for Science and Technology Policy of Japan, and Prof. Yoichi FUJIIE, Chairman of the Atomic Energy Commission of Japan. This fourth Forum enables me to express my views and hopes that this cooperation would be fruitful for all member countries and it certainly is for Indonesia.

Ladies and Gentlemen,

As I have mentioned last year a law regarding the National System for Research, Development, and Application of Science and Technology has been enacted by the Indonesian Parliament to be the Law no 18, 2002. This law is expected to strengthen, among others, the role of science and technology for accelerating the achievement of various objectives set by our country. The final drafts of government regulations as the derivatives of this law have been completed and are expected to be the instruments to implement the law to contribute solutions on the economic recovery. Furthermore, the Ministry of Research and Technology is now step wisely having more solid co-ordination program among research and development institutions, universities, as well as with the industries and NGOs to set the "Landmarks 2020", which are focused at the supply security of food and energy, the two most essential objects for not only survival, but also for wealth creation to sustain the development.

Ladies and Gentlemen,

Security of supply of food for the whole nation is a basic needs that should be facilitated by the Indonesian government. In this regard, the Ministry of Research and Technology Office has to establish a road-map on R & D activities to be carried out by all of the R&D institutions sinergistically. One of those activities is the application of nuclear technology in the field of agriculture, such as irradiation induced new mutants of crops, improvement of growth and quality of the ruminansia animals, and also post harvest technology utilizing irradiation techniques. These are indeed congruent with activities of the IAEA as well as FNCA.

In Indonesia, the National Nuclear Energy Agency (BATAN), in cooperation with the Ministry of Agriculture, continues to carry out research and development in agriculture joining the FNCA activities in this field, namely mutation breeding and bio-fertilizer. While continuing the research and development on the topics relating to drought tolerance sorghum and soybean mutants as well as insect resistance orchids, BATAN also continues to develop new varieties of rice. Some more candidates of the new rice varieties have been indicated. In responding to some customer taste satisfaction, three new varieties have been released in the year 2003, namely: Kahayan, Winongo and Diah-suci. It is also attempted to establish supply security of the seeds located at some provinces to enhance the supply system of the crops. In the mean time the development of various formulae of food supplements for ruminansia animals has been progressing aiming at the utilization of locally available material.

As a tropical country, Indonesia is also willing to participate in the activity related to the banana improvement, and sweet potato projects as a part of Mutation Breeding Project of FNCA for the forthcoming years.

Ladies and Gentlemen,

In the field of energy, availability and continue supply of energy is a key role to develop our industry. Although Indonesia is recognized as an energy exporter for the neighboring countries in the Asia and Pacific region, the energy source per capita is relatively small while the reserve locations are not so favorable as compared to the places of domestic demands. The Indonesian – IAEA study namely "Comprehensive Assessment of Different Energy Sources (CADES) for Electricity Generation in Indonesia" had been carried out in 2001 – 2002 shows that evident. Final Report of the Study had been submitted formally by the IAEA to the President of the Republic of Indonesia on August 6th, 2003.

The report indicates that the energy mixed strategy has to be applied in Indonesia by considering all of energy sources available in this country, including also the use of NPP for electricity generation to fulfill Java – Bali grid starting at about 2016. The total share of nuclear energy is expecting to be around 5 % of the total electricity generation in the year 2025, i.e. about 6,000 MWe. Should the Generation IV reactor

having small capacity be available with the economical features as mentioned to be the aim, introduction of the very small NPP might be realized earlier at smaller grids out side of Java Islands.

In order to realize the energy mixed strategy, a lot of works have to be done. Dissemination of this study results to other relevant institutions, Departmental as well as Ministerial Offices have been carried out to anticipate concerted efforts to overcome the problem on energy security for the next twenty years from now on. At the same time public information and education have to be performed also to all level of society in order to get better public acceptance. The use of nuclear energy as a part of the Long-term National Energy Policy now is being drafted. We expect that the consultation with Parliament on the use of NPP as stipulated by Nuclear Energy Act No. 10 year 1997, can be done by sometime next year. The pre-project activities for NPP program are carried out accordingly, such as activities relating to candidate site permit, the NPP owner establishment, etc.

As you are all aware, the utilization of NPP will certainly reduce the hazardous gas emission especially in Java Island. If the use of NPP can not be realized, the electricity should be generated by coal fired power plant, since the oil will be very expensive by then as well as scarce for electricity generation purposes. Additional used of coal to replace the amount of electricity being expected to be generated from NPP will also make some other problems on coal transportation as well as environmental effect, especially in Java Island where the land is expected also to provide food for the people living on. In this regard, Indonesia is therefore to support the CDM which should be applicable also for the NPP projects as mentioned in the Kyoto Protocol.

Ladies and Gentlemen,

R & D on the enhancement of radiation and Isotope application for medical and other industrial applications have been supported by government. In the field of medical application: cancer treatment using radiation together with the application of the nuclear medical instruments for diagnostics as well as theurapetics, and the use of radioisotopes and radiopharmaceuticals for palliative have been progressively accepted. Participation of Indonesia to the FNCA Project namely: Application of Radioisotopes and Radiation for Medical Use such as breast and nasopharyngeal cancers will thus be very beneficial for our community.

In the field of industrial application, a preliminary study on the use of electron beam machine for treatment of effluent gas from the coal power plant in Suralaya has been done in cooperation with other institution and the electricity state own company operating the plant. Other EBM utilizations for industry, such as liquid waste treatment, hardening of the surface metal, etc are also being studied. Co-operation in this field with FNCA member states is certainly welcomed.

For quite some years BATAN has been trying to develop capability relating to accelerator taking into consideration the future important roles of this machine. It is expected that this activities support the medium term program to build a demonstration accelerator to be utilized for research and development in the fields of activities to achieve the Landmarks. It is planned that by the end of this year a home made low energy electron accelerator is to be commissioned at BATAN's facility in Yogyakarta.

Our environmental quality has recently decreased significantly due to various improper development dictating us to do efforts for environment protection, among others: monitoring and controlling heavy metal air pollutant in the rural and urban area. Neutron activation analysis technique is expected to contribute on the determination of air particulate matter, mainly on the concentration of elements contained in the fine and coarse particles triggering the human health hazards. Since the marine environmental pollution has also been problem in this region, we expect in the long term program, the activity relating to "Marine Environmental Pollution Research and Monitoring Using nuclear based methods" can be considered as a common program of the FNCA.

Utilization of nuclear techniques has also been carried out in the activities relating to the development of renewable energy in Indonesia. The use of natural isotope for geothermal such as reserve calculation and management has been carried out in cooperation with other institutes. Utilization of mutation breeding techniques for "bio-oil" plants, i.e. *Yatropha curcas* L., and *Ricinus communis* L. to innovate new varieties for plant and crop producing more bio-diesel rather than utilization of crude palm oil, continues to be investigated.

In order to support all this development, Indonesia is also strengthen the nuclear licensing authority, BAPETEN (Indonesia Nuclear Control Board), to make sure that all nuclear activities in Indonesia is following safety procedure as well as other International regulation. The strengthening of BAPETEN is also important for the preparation of the NPP.

The important of availability of human resource with adequate number and qualification to support all nuclear activities mentioned previously has been taken into serious consideration by BATAN and BAPETEN. BATAN using its center for education and training continues holding the train the trainers on various courses as well as training for personnel requiring certification on various competence of nuclear technology. The polytechnique of nuclear science and technology is also improving the curiculae to satisfy the industries. Cooperation with universities as well as polytechniques has been extensified. It is still expected however that the cooperation on human resource development through FNCA will play an important role since there is a lack of expertise needed to suffis the requirement on future nuclear industry demands.

Ladies and Gentlemen,

The on going FNCA activities have been progressing as expected, i.e. the Utilization of Research Reactor covering the production of Tc-99m, neutron activation analyses, and neutron scattering; Application of Radioisotopes and Radiation for Agriculture consisting of mutation breeding, bio-fertilizer, etc; Application of Radioisotopes and Radiation for Medical Use such as breast and nasopharyngeal cancers; Public Information of Nuclear Energy; Radioactive Waste Management; Nuclear Safety Culture; Human Resources Development; and Application of Electron Accelerator.
We would like to confirm that we are ready to host the Radioactive Waste Management Workshop next week in Jakarta, and the Utilization of Research Reactor Workshop this coming January 2004 in Serpong, as well as the workshop on Mutation Breeding in June or December 2004 in Jakarta.

Excellencies,
Distinguished Delegates,
Ladies and Gentlemen,

Please allow me to conclude by expressing our strong endorsement for the FNCA and our readiness to participate fully in all of its activities. Lastly, I would like also to express our deep gratitude to our host, JAIF, on behalf of the Atomic Energy Commission of Japan and Minister of State for Science and Technology Policy of Japan for convening this fourth Meeting of the FNCA.
Thank you very much,

1-4-8 Country Report of China

by
H.E. Mr. Zhang Huazhu
Chairman
China Atomic Energy Authority (CAEA)

Distinguished Chairperson, Ladies and Gentlemen,

It is my great honor to be invited to the current FNCA Ministerial Conference. At the outset, please allow me, on behalf of the Chinese Delegation, to extend warm congratulations on the convening of the conference, and express heartfelt appreciation to the Japanese Government for supporting and organizing the conference and greetings to all representatives.

This conference provided us an opportunity for introducing to each other the nuclear energy development of respective countries and exploring cooperation. Now I would like to share my views on the following issues.

1. Development and Prospects of the International Nuclear Power Market

Nuclear power has had a history of more than 50 years ever since the American EBR-1, the first nuclear facility, generated electricity in December 1951, and USSR's first nuclear power plant began to transmit electricity to the power grid in June 1954. In the past half a century, nuclear power experienced three stages including testing and demonstration, rapid development and slowing down. The successful construction and operation of different prototype nuclear power reactors in the 1950s and the 1960s verified the feasibility of large-scale industrial development of nuclear power in terms of engineering technology, safety and economy. After that, rapid development rate of nuclear power had been maintained for more than a decade until the accidents of US's Three Mile Island nuclear power plant and the USSR's Chernobyl nuclear power plant seriously frustrated it across the world, and public acceptance became one of major obstacles. Ever since the late 1980s, nuclear power has been in slow development and was even suspended in some countries.

After the two accidents, countries adopted a series of measures in design standards and approval procedures to improve safety of nuclear power plant. As a result, the construction cycle of nuclear power plant was prolonged, investment increased and its economic competitiveness declined. The increased investment risks discouraged the

investors and effected the further development of nuclear power.

The new century, however, brought new opportunities. Though facing with considerable resistance, the US, France, Russia and other countries have shown the determination to continue the development of nuclear power. Asian countries, too, have demonstrated outstanding development momentum in this field. The rapid economic growth in Asia since the latter half of last century has presented increasing demands on power construction. The comparative shortage of primary energy in this region provides development space for nuclear power. And besides, this region has kept good record of nuclear power operation and enjoyed better public acceptance than developed European countries. Countries such as China, Japan, the Republic of Korea, India, Pakistan and Vietnam are wiling to expand their nuclear power production capacities or plan to develop nuclear power, making Asia the most eye-catching region in the world's nuclear power development.

2. Development Prospect of Nuclear Power in China

China's nuclear power development is an important part of Asia's nuclear power development. China's total installed power capacity reached 356 GW in 2002 and it is ranked the second in the world in terms of annual power output and installed capacity. As a large country with a population of 1.3 billion, China is still insufficient in electricity supply with an installed capacity per capita of 0.27 KW, ten times lower than many developed countries. The present energy mix is far from rational. The national total power generation reached 1654.2 TWH, of which the output of thermo power accounted for 81.74%, hydro power 16.6% and nuclear power a mere 1.6%. Optimizing the energy mix will be an important mission in order to meet the requirements of environmental protection and sustainable development. According to the general economic development strategy, China's GDP will redouble by 2020. The power industry needs to grow at an estimated annual rate of 5% to meet the requirements of the national economic development. The total installed power capacity shall exceed 800 GW by 2020. In addition to hydro and wind, nuclear power will take an important position in the growth as a kind of clean energy. The total installed capacity of nuclear power will reach 32,000 MW if nuclear accounts for 4% of the total by 2020. In other words, about 20 nuclear power units of 1000 MW are to be constructed. This shows that China's nuclear power is entering a new ear of development.

3. Development of Nuclear Technology Application in China

Mr. Chairperson, we have noted that "the effect of nuclear technology on social and economic development" is one of the themes of this FNCA ministerial conference. It is evident that applications of nuclear technology in fields other than power generation are making robust development, and playing increasingly important, indispensable

role in the social and economic development. In China, in the sector of industry, various radiation appliances and nuclear instruments are widely used in production, process control, non-destructive inspection, chemical analysis, resource prospecting, etc., and have yielded remarkable social and economic benefits. In agriculture, nuclear technology is playing positive roles in irradiation breeding, soil improvement, insect's sterilization, keeping food fresh, and increasing the reproductivity of livestock. Nuclear medicine, another important field of nuclear technology application, has taken a great step forward. The increasing application of nuclear medical equipment, appliances and medicine in radioactive diagnosis and radiotherapy has done contribution to the health of the mankind. Nuclear technology is also demonstrating growing importance in environmental protection and water management.

Statistics show that traditional industries with application of nuclear technology yielded an output of $2 billion in 2002, accounting for around 0.16% of GDP. Among this, the output of nuclear agriculture was $500 million, radioactive chemical products $400 million, isotope instrument $375 million, γ-ray irradiation products $690 million, and isotopes and their products $ 50 million. Nuclear technology application has become an important component of China's social and economic development. We admit, however, there is still a big gap between China and developed countries in this aspect. Materials show that the output associated to nuclear technology applications in the US and Japan respectively accounted for 5% and 2% of GDP in 1997. China still needs to further improve the application level of nuclear technology and promote its industrialization through necessary international cooperation. We wish FNCA would facilitate practical cooperation among member countries in this field to make contribution to the improvement of nuclear technology application level of this region.

Ladies and Gentlemen,

It is the common aspiration of people of the whole world to protect the environment and our globe and promote the sustainable social development. The limited reserve of fossil fuel and the environmental issues caused by its usage has aroused wide attention. The development and applications of nuclear energy, a kind of clean energy, provides practical means to settle these issues effectively, and will play its role in realizing "environmental protection and sustainable development".

Mr. Chairperson, "promoting the development and application of nuclear energy and nuclear technology in this region" is the basic principle of this Forum, to the common understanding of member countries. In the past a few years, a lot of beneficial cooperation were carried out focusing on 8 technological fields including the application of research reactors, making positive contribution to the development of nuclear energy and nuclear technology of this region. The Chinese Delegation highly commends it. We

would also like to propose the combination of cognitive and concrete aspects of the Forum, to discuss the nuclear cooperation policies and directions on the one hand, and carry out cooperation on nuclear application technology to meet the demands of nuclear technology development in this region on the other. Only through this way can FNCA gain wide recognition and support. China, along with other developing countries, is facing economic and technological challenges in energy development and environmental improvement. We wish to have wide-ranging exchange and cooperation with other Asian countries in nuclear energy development and technology applications to make due contribution to environment protection and sustainable economic development of Asia and even the whole world.

Thank you.

1-4-9 Country Report of Australia

by
Dr. Ronald Francis Cameron
Acting Executive Director
Australian Nuclear Science and Technology Organisation (ANSTO)

Your Excellencies, Distinguished delegates, ladies and gentlemen, on behalf of Australia I am pleased to contribute to this the fourth meeting of the Forum for Nuclear Cooperation in Asia, which is being hosted by the Atomic Energy Commission of Japan.

1. Recent Events Related to Nuclear Science and Technology in Australia

Through the Australian Nuclear Science and Technology Organisation (ANSTO), the Australian Government provides access to core nuclear-based facilities in Australia and overseas for the benefit of industry and the Australian research and development community. The major facility access is ANSTO's nuclear research reactor which is utilised for strategic, industrial, environmental and research purposes, and manufacture of nuclear medicines and other forms of radioisotopes. The importance of nuclear science and technology to Australia is evidenced by the Government's commitment to, and support for, the replacement research reactor (RRR) project. In 2006 the RRR is scheduled to take over from the existing HIFAR reactor, which has operated safely for 45 years at the Lucas Heights Science and Technology Centre. The budget for the RRR is $286.4 million (1997 value) and is historically the largest investment by an Australian Government for a single research facility.

In addition to the RRR, two major upgrades of ANSTO facilities were foreshadowed in the Government budget handed down in June 2003. The first project will be a new main entrance at the Lucas Heights Science and Technology Centre costing more than $10 million dollars. This is the result of a reassessment of security measures at the site. The second is the redevelopment of the Radiopharmaceutical Production Building where radioisotopes are processed for use in nuclear medicine. The changes will provide modern quality controlled chemistry laboratories, a sterilisation room, service and instrument rooms, production clean room facilities and component wash bays. Subject to parliamentary and regulatory approval, the construction will commence in late 2003 and will be completed in 2005 in time to ensure utilisation of the increased capacity of the replacement reactor.

1.1 Replacement Research Reactor

As reported at the first FNCA in Bangkok, ANSTO signed a contract in mid-2000 for the design, construction and commissioning of a 20 MW research reactor with the Argentine company INVAP S.E. which in turn has arrangements with a number of Australian engineering companies. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) issued a construction licence for the reactor on 5 April 2002 and construction commenced on 11 April 2002. It is proceeding to schedule, with the loading of fuel expected to commence in 2005 and to be complete in 2006.

The RRR will achieve neutron flux performance levels at least ten-times higher than those of HIFAR. In particular, this extra performance stems from state-of-the-art neutron guides, which will have modern "supermirror" coatings. A major emphasis is on the establishment of a suite of neutron beam instruments whose performance will be competitive with the best facilities anywhere in the world. In addition to good thermal neutron beams, there will be a large state-of-the-art liquid deuterium cold-neutron source and two thermal and two cold supermirror guides feeding a large modern guide hall, in which most of the instruments will be placed. While there will be space for up to 18 instruments, the project has funding for the following initial set of eight instruments comprising diffractometers, spectrometers, reflectometers and small angle scattering (SANS).

Seven out of the eight instruments have now been specified and designed. These will be ready for use when the reactor is fully operational in 2006. The facility will have the capacity for further expansion, including the potential for a second neutron guide hall.

The Government has endorsed it becoming a regional centre of excellence, and we are already having discussions with countries in the region on the use of the facility. In 2002, ANSTO established the Bragg Institute to build on its work in neutron scattering and the use of x-rays by forging extensive linkages between ANSTO and other national and international organisations. Further development of applications of neutron and x-ray techniques is expected to lead to increased partnerships in research and in business.

In July 2003, it was announced that a major Australian construction company, Thiess, has been selected to construct the building to house the Australian Synchrotron at the Monash University site in Victoria and would be commencing work shortly. The decision to establish the first Australian national synchrotron facility was announced in July 2001. It will be 67 metre in diameter with capacity for 30 plus beamlines. The total cost of the project is A$206 million and it is expected to be commissioned in 2007.

The Australian Synchrotron Research Program (ASRP) provides Australian researchers with access to state-of-the-art synchrotron radiation research

capabilities at overseas synchrotron light source facilities. These are the Australian National Beamline Facility (ANBF) at the Photon Factory, Tsukuba Science City, Japan, and the Advanced Photon Source, at the Argonne National Laboratory in Chicago, USA. The ASRP was funded for five years under the Major National Research Facilities program, announced in December 1995.

The ASRP maintains staff at both the Photon Factory and the APS, and provides travel and subsistence funding to Australian researchers using the facilities. Access is via a peer reviewed proposal system.

1.2 Radioactive Waste Management

Australia does not generate any high level radioactive waste.

Currently some 500 cubic metres of intermediate level waste are being stored in a variety of sites around the country. At this stage, the most appropriate way to manage this waste is to house it in a purpose-built aboveground storage facility since a geological repository for disposal cannot be justified because of the limited amount of intermediate level waste likely to be generated by Australia in the foreseeable future. The Government announced in 2000 that there would be a national search for a suitable site for the store. Because of a lack of support from some States, the Government decided that it would proceed with the search but only on Commonwealth land and for the storage of intermediate level waste generated by Commonwealth Agencies. The national store will be designed to operate for at least 50 years.

An independent, expert advisory committee, the National Store Advisory Committee, has been appointed to advise on this search. The experts have been chosen on the basis of their expertise in the fields of radiation protection, and in other disciplines relevant to the site selection study. Thus the final decision on the site for the store will be the result of a rigorous scientific assessment. Following assessment of Australian Government land around Australia, the National Store Advisory Committee has submitted a short-list of sites to the Government for further consideration. No sites in South Australia have been identified as being highly suitable for the national store. Accordingly, early in May 2003, the Government ruled out South Australia as an option. An announcement of a short-list for further investigation is expected in the next few months.

For the low-level radioactive waste, the Government has determined that there should be a single national repository. An extensive and thorough site selection process has been taking place over the past ten years. In the first phase a methodology was established for site selection. The second phase applied the methodology and identified a short list of eight regions. The third phase identified the central-north region of South Australia for further investigation and site selection studies. 18 sites were identified in June 1998. These were reduced to five and then a preferred site with two alternatives.

Before construction of the low-level radioactive waste repository can commence, the preferred site must comply with an environmental impact assessment (EIS) and radiological licensing processes. A Draft EIS was prepared and was open for public comment for three months as from July 2002. It was subsequently amended and submitted to the Minister for the Environment and Heritage. In May 2003 the Minister gave environmental approval, subject to conditions, to two possible sites in accordance with the provisions of the *Environment Protection and Biodiversity Conservation Act 1999*.

In July 2003 the Government announced its acquisition of the national repository site, Site 40a near Woomera in South Australia and its associated access route and in August 2003 the Minister for Science announced that the Government had applied to the independent regulator, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) for a facility licence to authorise the following three activities:

- to prepare Site 40a for the proposed National Radioactive Waste Repository (NRWR);
- to construct the proposed NRWR; and
- to operate the proposed NRWR.

ARPANSA is undertaking an independent peer review of this licence application and supporting documents and the International Peer Review Team comprising individuals from various Member States of the International Atomic Energy Agency (IAEA) with expertise in the storage and management of radioactive waste have been assembled to facilitate this. The review commenced in late October 2003 and it is expected to conclude in November 2003. The final report from the International Peer Review Team will be presented to the CEO of ARPANSA and will be made public shortly afterwards.

The repository is provisionally anticipated to commence operations around 2005.

The Government has indicated that it has no intention of accepting any radioactive waste from other countries for storage or disposal in Australia

2. Recent Regional Cooperation Activities under FNCA

Australia has been pleased to continue its support for FNCA activities in the areas of nuclear safety culture and radioactive waste management.

2.1 Safety Culture Workshop

The seventh Nuclear Safety Culture Workshop for 2003 is scheduled to be held in Daejeon, Korea in February 2004.

The sixth FNCA Safety Culture Workshop, which was held in Dalat, Viet Nam in January 2003, was assessed by the Australian participants as being very successful. During the workshop considerable input was provided by the representatives from

all the eight participating countries. This very active participation facilitated the achievement of the workshop's aims and objectives.

A key feature of this workshop was the production of safety status reports on specific research reactors in each country. The one-day peer review process of the Dalat Nuclear Research reactor went well and covered a lot of ground. Although this was the first such review to be undertaken under the FNCA programme and was essentially a trial process, we believe that the peer review was very successful and real and meaningful outputs were achieved. This was supported by the participants who have agreed to continue the peer review and the self-assessment reporting at the seventh workshop.

Information on the required preparations for the next workshop has been sent out to all countries. The Korean delegate has undertaken to make a proposal on possible rationalisation of the reporting indicators. The delegate from The Philippines has undertaken to make a proposal on extending the project to Radiation Safety Culture. A major focus of this workshop will be the peer review of the HANARO reactor's self-assessment report.

Australia believes that these workshops are providing a valuable opportunity for encouraging initiatives in safety culture, but some interaction with the IAEA is needed to ensure that activities in safety culture are not duplicated for the region.

2.2 Radioactive Waste Management

Australia participated in the Radioactive Waste Management (RWM) Workshop held in Korea in November 2002, Since then a draft 3-Year Work Plan has been prepared and under this it was proposed that the RWM Task Group would focus on NORM waste issues over the next 2 years (2003/2004). Australia was pleased to host the visit by the Task Group on TENORM waste between 10 and 14 February 2003. The Task Group comprised Prof. Toshiso Kosako (Japan Project Leader, RWM), Tokyo University; Prof. Takao Iida, Nagoya University; Dr, Hirokuni Yamanisi, National Institute of Fission Science; Dr. Takeshi Iimoto, Tokyo University; and, Dr. Nobuyiki Sugiura, Tokyo University, and was sponsored by MEXT. The Task Group, held preliminary discussions with a number of technical experts in Australia, including representatives from ANSTO and the New South Wales Environment Protection Agency. In addition there was a visit to the large Olympic Dam Project mining operations site at Roxby Downs, South Australia. A wide range of topics were discussed concerning NORM in the Mining Industry, including international regulations and disposal.

Australia is planning to participate in the next FNCA RWM Workshop scheduled to be held between 15 and 19 December in Jakarta, Indonesia. In addition to the Country Report, the Australian Project Leader will present papers on aspects of the disposal of LILW and the management of waste arising from decommissioning of

small to medium scale nuclear facilities.

Australia welcomes the progress achieved by the cooperation in this area and will continue to participate in the activities of the radioactive waste management workshop.

2.3 Small Angle Neutron Scattering (SANS)

Australia regrets that it is not able to participate in the Neutron Scattering Sub-workshop scheduled for held in Serpong, Indonesia in January 2004, because of the intense activity associated with the establishment of the new neutron facilities for the RRR.

As we have stated previously, we encourage the sub-workshop's initiatives to establish an effective communication system, based on group email, and a project proposal and review system as well as the focus of the activities from Small Angle Neutron Scattering (SANS) instrumentation and techniques development, to the investigation of problems of socio-economic benefit to the region

ANSTO played an advisory role in the development of the sub-workshop's regional research project. Our expertise in SANS data analysis and interpretation may be particularly relevant for the planned efforts on γ-irradiated carrageenan (food gum), water-soluble copolymers, random ionomers and blends of natural rubber and polyolefins. Such data analysis would be shared between regional groups with relevant expertise.

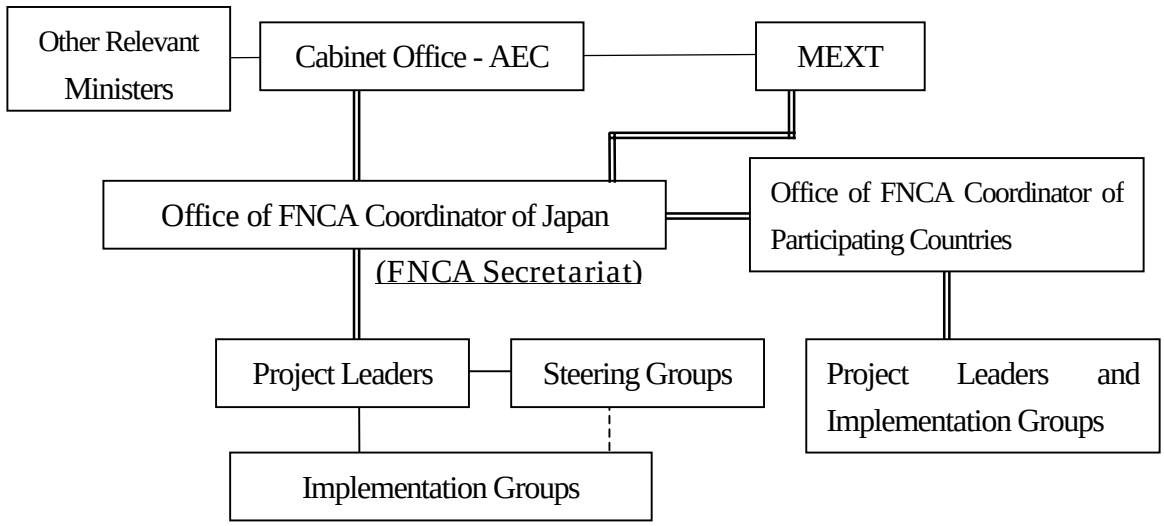
3. Conclusion

Australia has a policy of on-going support and encouragement of mutual cooperation in the utilisation of nuclear science and technology for the benefit of the region and for addressing identified regional problems. I look forward to us continuing to play an active role in the FNCA and its programme.

On behalf of Australia I again thank the Atomic Energy Commission of Japan for their efforts in facilitating this important Forum meeting,

2. Senior Official Level Meeting (SOM)

FNCA Management Scheme in Japan



Issues for Project management

- Strengthening the linkage between FNCA Coordinator of Japan as the FNCA Secretariat and each Coordinator of FNCA countries.

- Strengthening the linkage between FNCA Coordinator and Project Leaders in each country for better project management and efficient implementation.

- Setting up Implementation Group for supporting Project Leaders for project implementation in each country.

Attachment

Cooperation Activities under FNCA Framework
by
Japan Atomic Industrial Forum

There are eight fields of cooperation activities, and at present 11 projects are in progress, as shown below, in addition to Workshops or Project Leaders Meetings that are utilized for periodical exchange of data, information and experiences, and discussion on the way to operate activities has been made. New projects proposed or planned to be proposed to Workshops or Project Leaders Meetings are shown with * mark.

Field 1: Utilization of Research Reactors

1) (Project) Tc-99m Generator Production
2) (Project) Neutron Activation Analysis
3) (Project) Neutron Scattering
*(Proposed New Project) Utilization of Research Reactors

Field 2: Application of Radioisotopes and Radiation for Agriculture

<Mutation Breeding>

4) (Project) MB Drought Tolerance in Sorghum and Soybean
*(Proposed New Project) MB Insect Resistance in Orchid
*(Proposed New Project) Disease Resistance in Banana

<Bio-fertilizer>

5) (Project) Bio-fertilizer

Field 3:Application of Radioisotopes and Radiation for Medical Care

<Radiotherapy>

5) (Project) Radiotherapy for Uterine Cervix Cancer
Standardized Radiotherapy Protocol (CRERVIX-I) / Accelerated Hyper-fractionation Radiotherapy (AHF) Protocol (CERVIX-II)
*(Proposed New Project) Protocol of Chemoradiotherapy for Uterine Cervix Cancer
* As project candidates, "Protocol of Chemoradiatherapy for Nasopharyngeal" and "QA/QC Dosimetry" are being investigated.
* New project on nuclear medicine is being investigated by Malaysia.

Field 4: Public Information of Nuclear Energy

6) (Project) Joint Survey on Radiation for High School Students

Field 5: Radioactive Waste Management

7) (Project) Spent Radiation Source Management

8) (Project) Technologically Enhanced, Naturally Occurring Radioactive Materials (TENORM) Management

Field 6: Nuclear Safety Culture

9) (Project) Peer Review on Safety Culture of Research Reactors

Field 7: Human Resources Development

10) (Project) Human Resources Development Basic Data Survey

Field 8: Industrial Application

11) (Project) Application of Electron Accelerator

Proposals carried over from the 4th FNCA Coordinators Meeting

1) Marine Environmental Pollution Research and Monitoring using Nuclear and Nuclear-related Analytical Techniques and FNCA Database

   * This proposal was recommended to merge in the NAA project.

2) Maintenance Network for Nuclear Medical Instrumentation

Strategy for Human Resources Development (HRD)

by
Sueo Machi
FNCA Coordinator of Japan

1. The project on HRD has been implemented since 1999 in FNCA framework.

2. Major activities of the HRD Project are:
   - Information exchange on training nuclear personnel
   - Exchange of training materials
   - Joint survey of basic data on HRD

3. The MEXT of Japan has been implementing the Nuclear Researchers Exchange Program for 17 years inviting about 1,200 scientists and engineers in total from Asian countries staying Japan within one year, and sending experts from Japan to these countries.

4. The 3rd FNCA Ministerial Level Meeting in Seoul recommended that a high level task group to be formed to discuss HRD strategy and the potential roles of FNCA.

5. This session of 4th SOM serves as the task group. Accordingly, the conclusion and recommendation of the session should be reported to the 4th Ministerial Level Meeting.

6. The talking points of the session were circulated to FNCA countries by the FNCA secretariat in advance for their consideration (Attachment 1).

7. The conclusion and recommendation of the FNCA Workshop of HRD in 2003 was also circulated (Attachment 2), which may be useful for the discussion.

8. Representatives speak on the talking points, and conclusion and recommendation should be prepared to submit to the Ministerial Level Meeting.

Attachment 1

Talking Points of "Strategy for Human Resources Development (HRD)" for 4th FNCA Senior Officials Meeting (SOM)

1. Human resources development (HRD) plan to meet national nuclear program in medium term

2. Issues in achieving HRD in each country, for example, lack or shortage of trainers, training facilities, etc.

3. How to solve these issues and roles of regional cooperation for the solution

4. FNCA, "Nuclear Researchers Exchange Program" of the Ministry of Education, Culture, Sports and Technology (MEXT) of Japan, and "Asian Network for Higher Education in Nuclear Technology (ANENT) of IAEA

Attachment 2

Conclusions and Recommendations for FNCA 2003 Workshop on Human Resources Development

October 8-10, 2003, Bangkok, Thailand

1. HRD is recognized to be an important component for the sustainable development of nuclear science and technology applications.

2. The concern was expressed by majority of the meeting participants that the preservation of nuclear knowledge and experience is at risk because of declining number of experts due to retirement and lack of incoming young nuclear scientists and engineers.

3. The Meeting recognized that China and Vietnam need a large increase in the number of nuclear engineers, operators, and researchers for future development of nuclear power plants, necessitating the support of FNCA countries.

4. Results of the survey on current human resources in each country will be completed in 2004. The results should be utilized for the HRD strategy of each country. The meeting recognized the importance of nuclear related associations and societies for HRD.

5. The HRD strategy should be authorized and supported by the high level management responding to the national nuclear program.

6. The FNCA members should keep close linkage with Asian Network for Higher Education in Nuclear Technology (ANENT) through active participation and complimentary contribution to it.

7. Training materials including e-learning materials should be efficiently produced by sharing works among FNCA countries. Setting up the task force for planning and working for preparation of training materials on work sharing basis is desirable.

8. It is desirable that the Nuclear Researchers Exchange Program of MEXT is expanded to cover M.S. and PhD students.

9. It is proposed to prepare a model method for HRD strategy formulation under FNCA HRD.

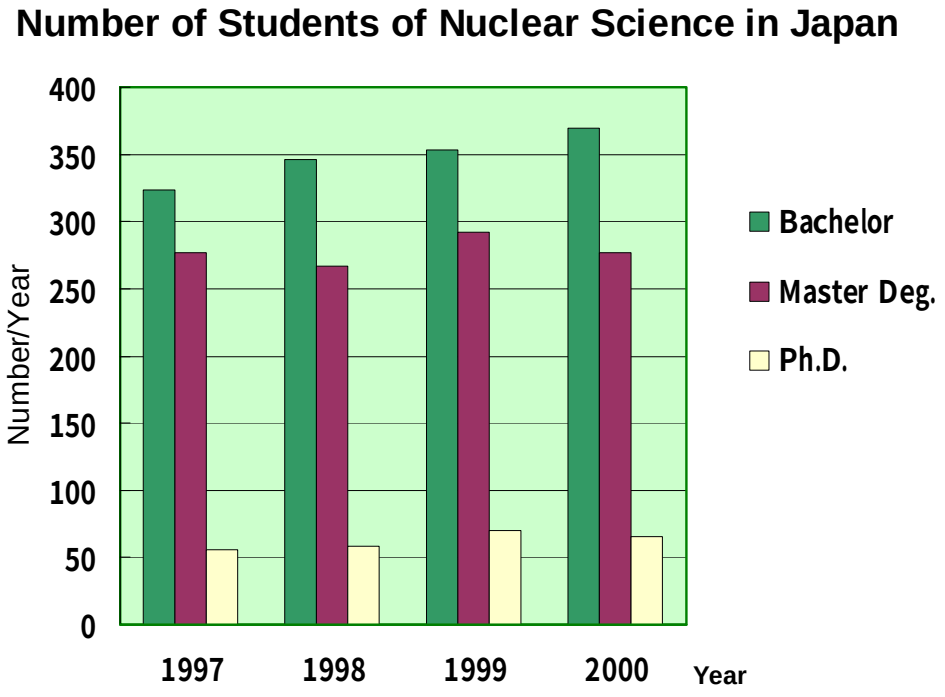
10. Analysis of database on HRD should be completed early in 2004. The result of analysis may be reflected in revising HRD strategy in each country depending on national policy. The new revised HRD strategy based on the data base analysis should be reported to the HRD Workshop in 2004.

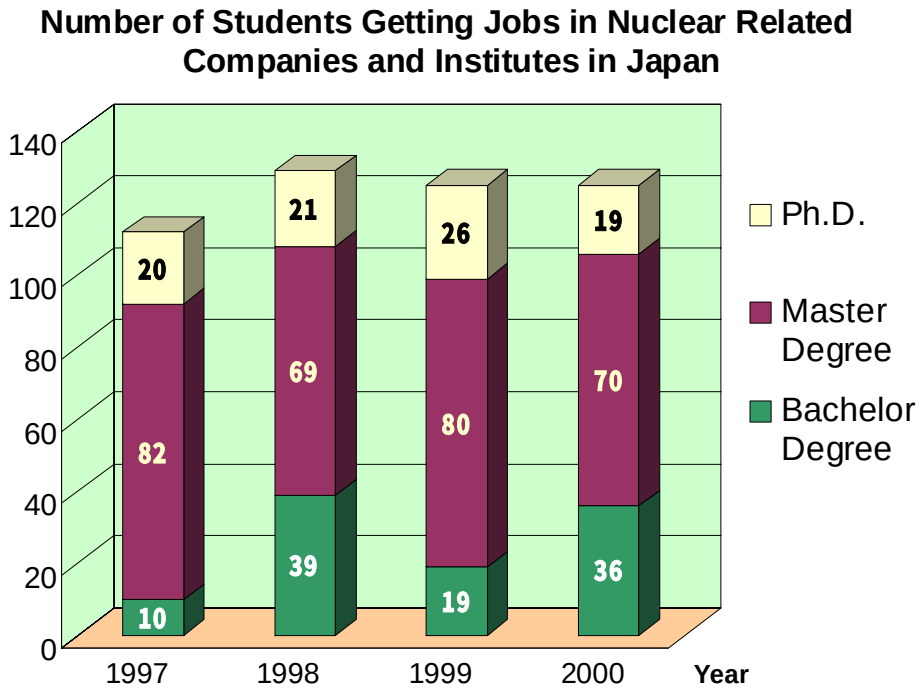
Human Resources Development Strategy for Nuclear Science, Technology and Applications in Japan

by
Sueo Machi
FNCA Coordinator of Japan

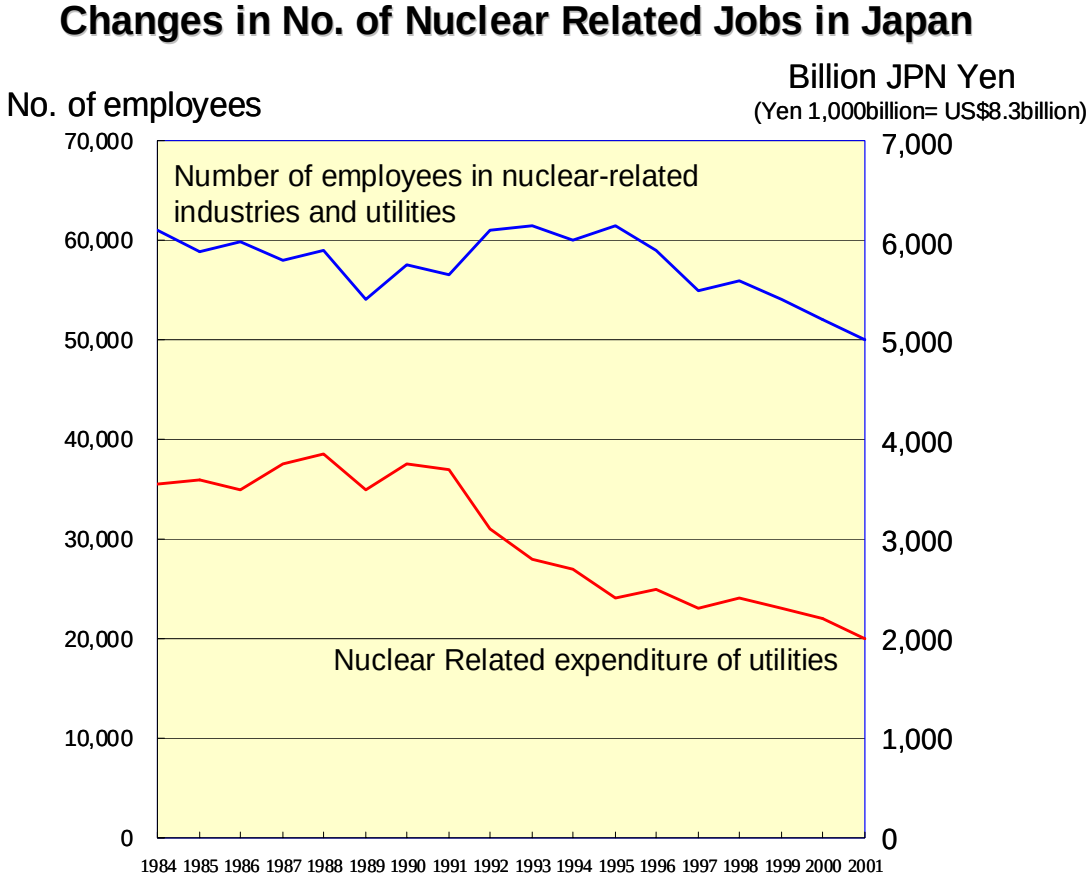
1. There is a concern on the preservation of nuclear experience and knowledge because of increased number of retired experienced nuclear engineers, and decreasing interest of young students in nuclear engineering in Japan.

2. About 600 students (370 bachelors, 220 MS. 50 Ph.D.) available every year and about 130 join nuclear related industries and institutes.
About 1/3 of MS and Ph.D. holders get jobs relevant to nuclear.





3. Number of employees in nuclear related industries and utilities has been decreasing since 1996 by 20% mainly because of the reduction of newly constructed NPP per year.



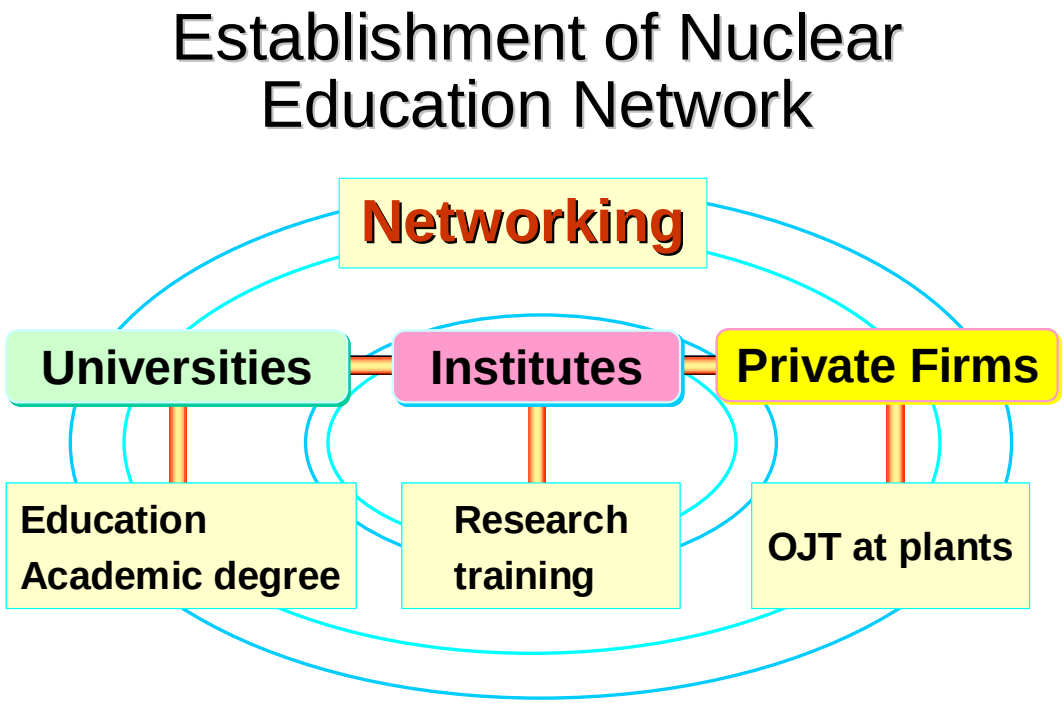
4. JAERI conducted periodical training courses in a variety of fields of nuclear science and technology to train about 1,200 Japanese scientists and engineers for a week to five months.

5. In utilities, operators of nuclear power plants are trained at their own training facilities including simulators of NPP.

6. Manufacturers of nuclear power plants train their engineers at their own training facilities and on the job.

7. To increase interests of young generations in nuclear science and technology, it is needed to better inform them that nuclear science has large potential in advanced fields such as:
- Advanced nuclear reactors and fuel cycle technology
- Hydrogen production by nuclear heat
- Accelerator applications for new materials, nano-technology and bio-science
- Transmutation of long-lived radioactive wastes
- Nuclear techniques for environmental protection

8. In order to strengthen HRD of nuclear science and technology, the nuclear education net-work is proposed to be established.



Enhancement of Socio-economic Impact of Radiation and Isotope Application

by
Sueo Machi
FNCA Coordinator of Japan

There are 800 million people who suffer from hunger and malnutrition over the world. Though the Asian region is developing at comparatively high speed, the eradication of poverty is still an important challenge.

Nuclear technique are useful for the better food supply, improved health care and environmental protection. Therefore, the FNCA gives priority to projects related to applications of nuclear techniques such as the mutation breeding for better varieties, biofertilizer for increasing the yield of legumes, radiotherapy of cancer, radiation processing to produce a variety of value added products in industry. Research reactors, which all FNCA countries own, are useful for isotope production and NAA (Neutron Activation Analysis) for environmental pollution monitoring.

These nuclear applications are being developed by FNCA projects with specific goals which are interest of the participating countries.

In order to enhance these applications, there are 2 important conditions:
(1) strengthening linkage with end users of techniques, such as agriculture, heath, environment and industry sectors,
(2) provision of necessary equipments and facilities, which are often far from sufficiency for applications of these techniques in achieving socio-economic impacts.

In this respect the SOM is requested to exchange how to solve these issues. For the 1st issue, coordination among different ministries and private sectors should be improved. For 2nd issue, more national budget and outside funds such as JICA, IAEA, World Bank, and ADB (Asian Development Bank) should be sought in each FNCA country. I like to remind you that those necessary equipment are not too expensive of which cost benefit ratio is accordingly high.