



Japan's Nuclear Human Resource Development(HRD) Program For Supporting Asian Countries

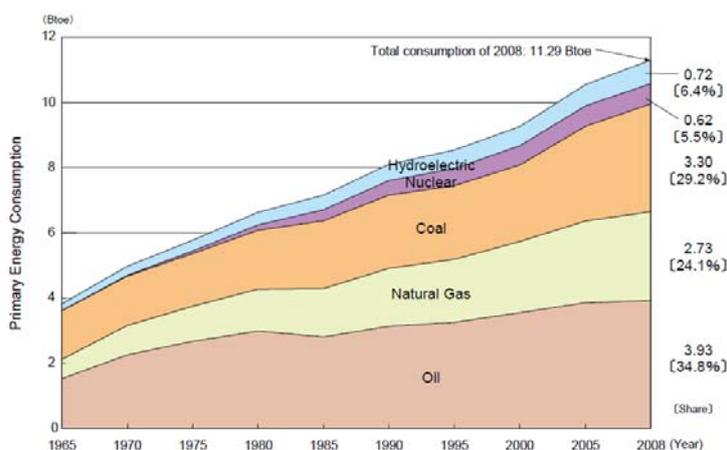
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1

The World's Primary Energy Consumption



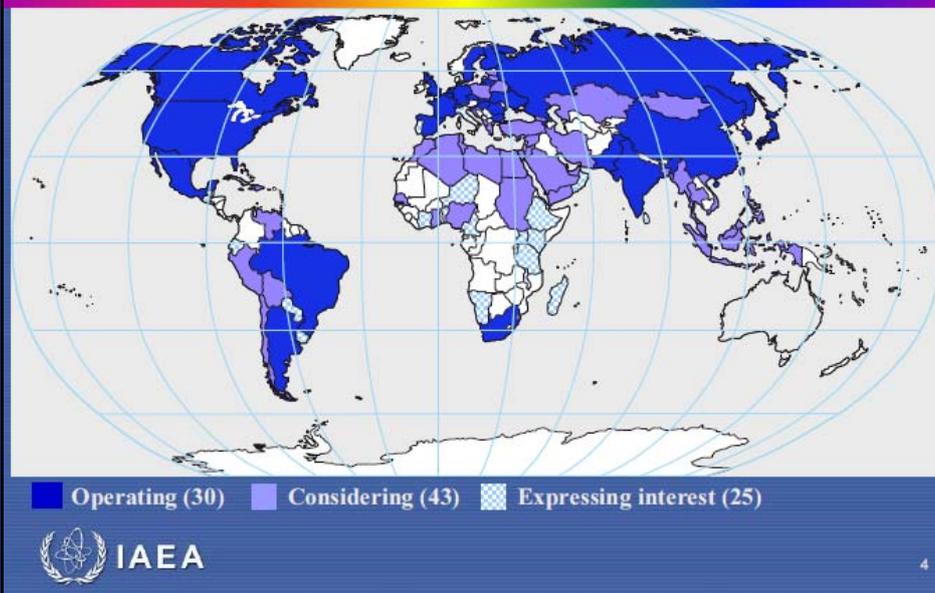
(Note) Figures may not add up to the totals due to rounding.
Btoe: billion tons of oil equivalent

1-7

Source: IEA Statistical Review of World Energy June 2009

World primary energy consumption increase continuously without end

Countries considering nuclear power



The energy consumption increases in future due to

- 1, Increase in population and
- 2, the level-up of the standard of living.

However, energy resources are limited

- 1, Oil
- 2, Natural gas.

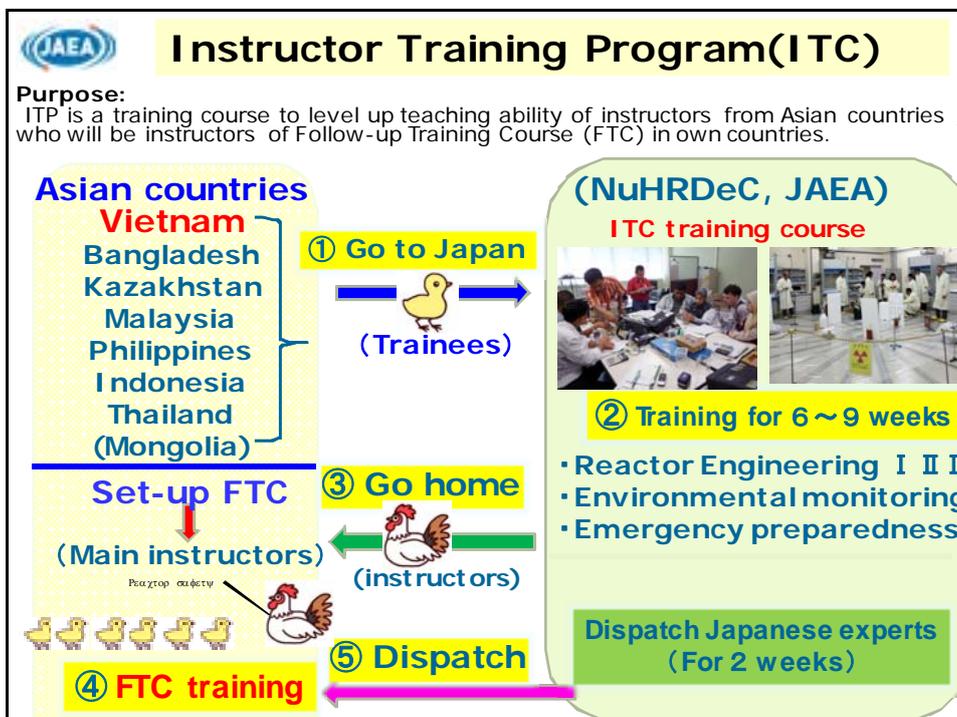
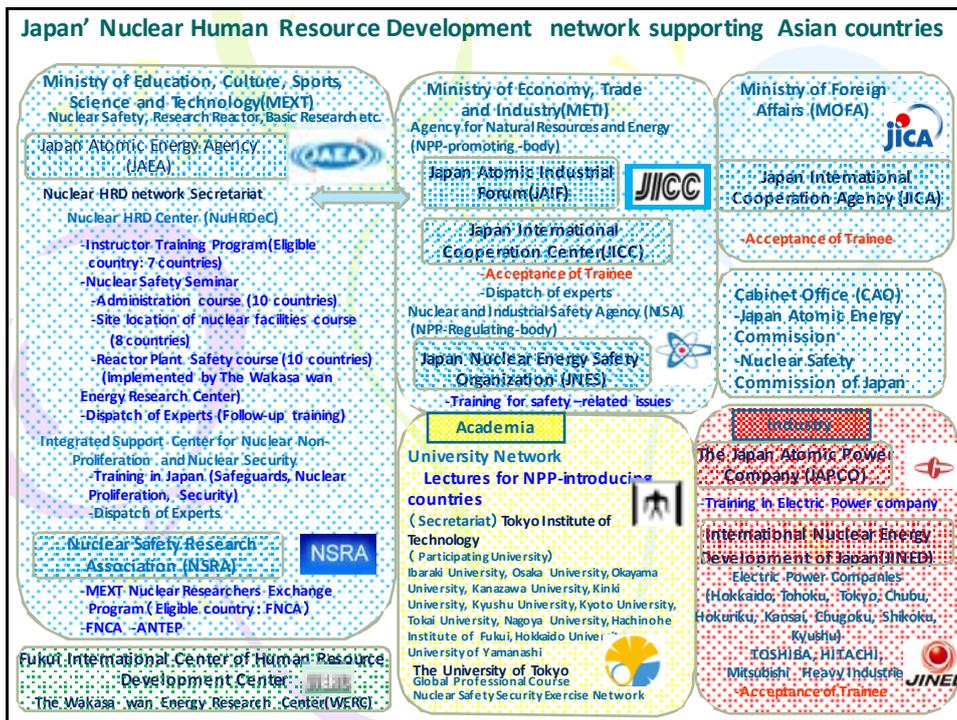
Coal is to be avoided due to Greenhouse effect.

Natural energy resources such as sun, wind etc. are unstable.

Nuclear Energy is still indispensable energy resource that satisfies the energy consumption increase.



Nuclear HRD is necessary to utilize the nuclear energy safely and effectively.





Instructor Training Program

Japan Atomic Energy Agency(JAEA)

- **Instructor Training Program (ITP)** (since 1998)

- **Training courses:**

- Environmental Radioactivity Monitoring,
 - Reactor Engineering,
 - Emergency Preparedness, etc

- **Totally about 100 lecturer-candidates trained**

- **Totally about 1700 participants in each country's training course (FTC)**



Reactor Engineering Course in Vietnam



Emergency Preparedness Course in Thailand



Reactor Engineering Course in JRR-1

7



International Training for Asian countries

- **Nuclear Plant Safety Course**

- Training for nuclear power plant safety using PWR and BWR
 - Totally about 40 participants since 2007

- **Administration Course**

- Training for administrative officers such as energy planning, regulator
 - **New course from 2010**

- **Site location Course**

- Training for site planning-related personnel
 - **Planning new course from 2011**

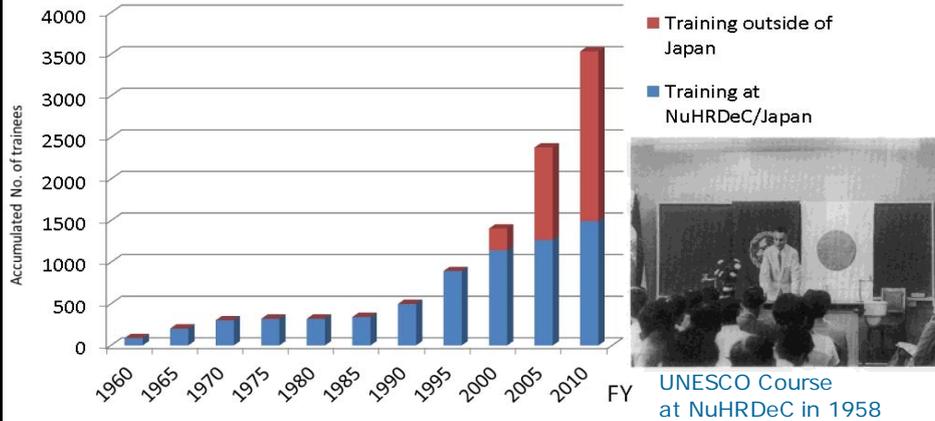


Administration Course at JAEA

7



Accumulated Number of Trainees of NuHRDeC's International Training Courses



JAPAN has contributed to human resource development in Asian countries since 1958, using Japan's knowledge and experiences in peaceful uses of nuclear energy,

Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (JAEA)

December 27, 2010 at Tokai-mura

the Center contribute to strengthening nuclear non-proliferation and security in Asian nuclear emerging countries, using Japan's knowledge and experiences in peaceful uses of nuclear energy,



One of main activities is Capacity building assistance through human resources development including training and education



Nuclear Security Course Seminar on Nuclear Security in Vietnam on October 13, 2011

Co-organized by Vietnam Agency for Radiation and Nuclear Safety (VARANS),
To discuss the overview of the international nuclear security frameworks and domestic applications in Japan, (35 participants from Ministry of Science and Technology, Foreign Affairs, Industry and Trade, Public Security, Defense, Public Security, Justice, VAEI, JAEA)



SG and SSAC Course Workshop on Additional Protocol Declaration at Vietnam

To be held in 11-12 October 2011, at Vietnam (VARANS) assisting promotion of AP ratification in Vietnam in collaboration with Nuclear Material Control Center (NMCC), Japan and IAEA, 20 participants joined the Workshop.



International Nuclear Nonproliferation Framework Course Seminar in Kazakhstan

International Nuclear Nonproliferation Framework Course Seminar in Mongol



Nuclear Security Course Regional Training Course on the Physical Protection of Nuclear Material and Facilities 17-28 October 2011

from Bangladesh, Cambodia, China, Indonesia, Jordan, ROK, Lao, Malaysia, Mongolia, Myanmar, Philippine, Thai, UAE, Vietnam



Japan contributes to strengthening nuclear non-proliferation and security in Asian countries, using Japan's knowledge and experiences in peaceful uses of nuclear energy,

MEXT Nuclear Researchers Exchange Program (Nuclear Safety Research Association (NSRA))

Purpose:

The program enables Asian researchers to obtain the state-of-the-art technical knowledge and to perform high grade research activities in Japan, for contributing to build up and to strengthen nuclear base and nuclear safety in each Asian country.

■ Invitation program

To invite Asian researchers to Japan for 3-12 months

Research subject:

- 1) Radiation Safety and Radioactive Waste
- 2) Radiation and Radioisotope Application
- 3) Research Reactor
- 4) Nuclear Administration
- 5) Others (Nuclear Power Reactor, Safeguards, etc.)

Research Organizations in Japan:

7 Research Institutes and 10 Universities

Japan Atomic Energy Agency (JAEA),

National Institute of Radiological Science (NIRS),
National Institute of Advanced Industrial Science and Technology (AIST)
Tokyo Uni., Tokyo Institute of Technology, Kyoto Uni., etc



■ Dispatch program

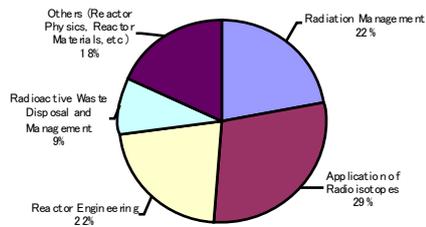
To dispatch Japanese experts to Asian Countries on Request

14

MEXT Nuclear Researchers Exchange Program

Total number of participants From FY1985 to FY2009

- Invited Asian researchers : 1517
- Dispatched Japanese experts : 628



Research Field of the Invited Researchers



High-level leading persons

Results

The invited researchers have contributed to build up and to strengthen nuclear base and nuclear safety in Asian countries. Many of them became high-level leading persons for nuclear energy development in their own countries.

A 15

Japanese University Network's Programs for Global Nuclear Education

➤ Japanese University Network is established for Global and Comprehensive Development of Nuclear Human Resource in Cooperation with 14 Universities

14 Universities;

Tokyo Institute of Technology, Ibaraki University, Osaka University, Okayama University, Kanazawa University, Kinki University, Kyushu University, Kyoto University, Tokai University, Nagoya University, Hachinohe Institute of Technology, University of Fukui, Hokkaido University, University of Yamanashi

Supported by Ministry of Education, Culture, Sport, Science and Technology, Japan(MEXT)



Lectures by Japanese Professors in Asian countries

➤ Japanese University Network supports Global Nuclear Education in Asian countries introducing Nuclear Technologies for Peaceful Use.

6

Japanese University Network's Programs for Global Nuclear Education

Japanese Professors give lectures in following countries

- Vietnam (Secretary: Osaka University)
- Malaysia (Secretary: Tokyo Institute of Technology)
- Thailand (Secretary: Kyoto University)
- Indonesia (Secretary: Tokyo Institute of Technology)
- Mongolia (Secretary: Tokyo Institute of Technology)
- Philippines (Secretary: University of Fukui)
- Saudi Arabia (Secretary: Hokkaido University)



Opening address by Prof. Dr. M.Saito In Malaysian Nuclear Agency

Special Educational Course on Nuclear Engineering for Installation, Operation and Regulation of Nuclear Power Plant
4 - 8 July 2011
Malaysian Nuclear Agency

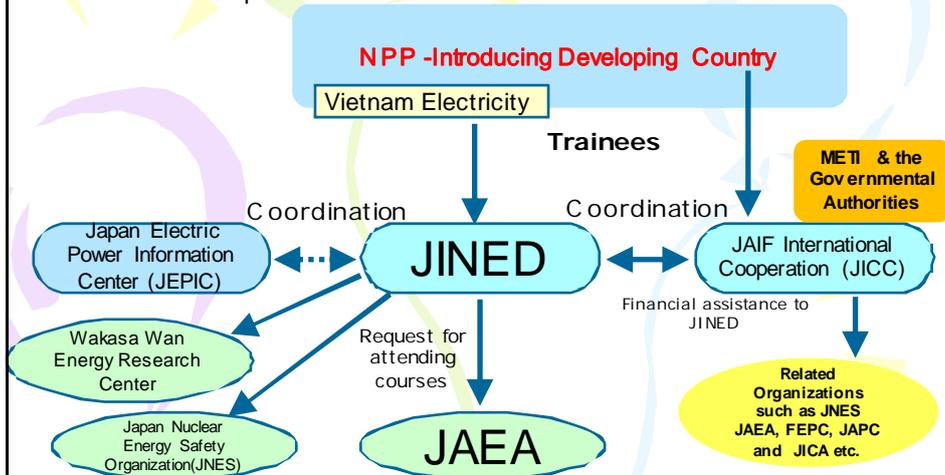


Lecture about Fukushima-daiichi Accident by Prof. Dr. M.Saito In Malaysian Nuclear Agency

Japanese Universities contribute for Nuclear Education in Asian countries through sending Japanese Profs.

NPP-related Training by JINED and JICC

JINEND and JICC support the NPP-emerging countries for human resource development



EVN : Vietnam Electricity, **JINED** : International Nuclear Energy Development of Japan, **JICC** : JAIF International Cooperation Center, **JEPIC** : Japan Electric Power Information Center, **JNES** : Japan Nuclear Energy Safety Organization, **JAEA** : Japan Atomic Energy Agency, **WERC** : Wakasa Wan Energy Research Center

Training Courses in Electric Power Company The Japan Atomic Power Company (JAPC) (1/2)

1. JICA Group Training Course

Lectures concerning introduction of nuclear power generation, Visit of nuclear power plants and plant manufacturers

Implementing partners: JEPIC and JAPC

Countries: Indonesia, Thailand, Chile, Malaysia, Philippine



At Tsuruga-3 & -4 site of JAPC



2. Vietnam EVN Training Course (METI)

Lectures concerning nuclear power construction project, Visit of NPPs and plant of manufacturers

Implementing partners: JEPIC and JAPC etc.

Country: Vietnam (EVN)



At JAPC Head Office, Tokyo

JAPC proprietary

Training Courses in Electric Power Company The Japan Atomic Power Company (JAPC) (2/2)

3. Kazakhstan Training Course (METI)

Lectures concerning LWR systems with use of JAPC compact simulator, Visit of NPP and plant manufacturers

Implementing partners: JICC and JAPC

Target Organization: Nuclear-related organization members of Kazakhstan



With compact simulator instructor at JAPC Training Center, Tokai

4. Mongolia Training Course (METI)

Lectures concerning LWR systems with use of JAPC compact simulator, Visit of NPP and plant manufacturers

Implementing partners: JICC and JAPC

Target Organization: NEA (Nuclear Energy Agency) of Mongolia



With compact simulator instructor at JAPC Training Center, Tokai

Japanese Electric Power Companies with related organizations provide practical training courses directly-relating with introduction, manufacturer, and operation of NPPs

JAPC

Cooperation framework between VARANS and JNES(1/2)

1. Drafting Safety Guidelines

Finalization will be made by the cooperation between Japan and Vietnam

2. Basic Training

- Lectures for nuclear energy, nuclear engineering, **regulation, regulatory frameworks of different foreign Countries**
- Training using Simulators (NTC, BTC)
- Facility visits to NPPs, Reactor manufacturers and Nuclear fuel fabricator



Basic Training (12th Oct. 2011, JNES Training Center at Katsuta) and the visit of Vice-Minister Tien of the MOST)

3. Consultant Workshop

Read Japanese Safety Analysis Report with JNES specialists at Vietnam

4. Research Course

Conduct hands-on training on specific technical issues (e.g. Probabilistic Safety Analysis) from December 2011

5. Specialist Course

Participate to JNES's International Projects for the 1st year. Training Course at Universities for 2nd and 3rd year

Asian Seismic Safety Training Seminar by JNES



Purpose:

Provide and Share Japanese latest knowledge and lessons learned from actual experiences with experts on seismic safety from Asian countries embarking on nuclear power, to contribute improvement of seismic safety on nuclear power generation in their countries.



Lectures and Practical Trainings:

Earthquakes, Ground motion, Active fault, Geological survey, Tsunami, Lessons learned from actual earthquakes (NCOE, TPOE etc.), Seismic safety design, Seismic safety evaluation, Simulation training of ground motion and tsunami, Seismic and Tsunami PSA, External event severe accident, Stress test, Early warning system etc.



Training Course for Chinese Regulators

- Ministry of Environmental Protection
- Lectures and Training at Nondestructive Inspection
- Training of operation with simulators of PWR
- Facility tours (NPPs, PWR Manufacturer)



JNES supports to constructing framework of safety-related issues such as safety analysis, safety guide line, regulation, seismic safety etc.



International cooperation

1. Cooperation with IAEA

- ANENT (Asian Network for Education in Nuclear Technology)
Japan participated in ANENT in Dec. 2010.
- ANSN (Asian Nuclear Safety Network)
JAEA provides teaching materials and related information.

2. FNCA Related Activities

●HRD Project

Focusing on **ANTEP (Asia Nuclear Training and Education Program)** aiming at network system for information exchange on needs and educational programs by utilizing existing nuclear training and education resources.



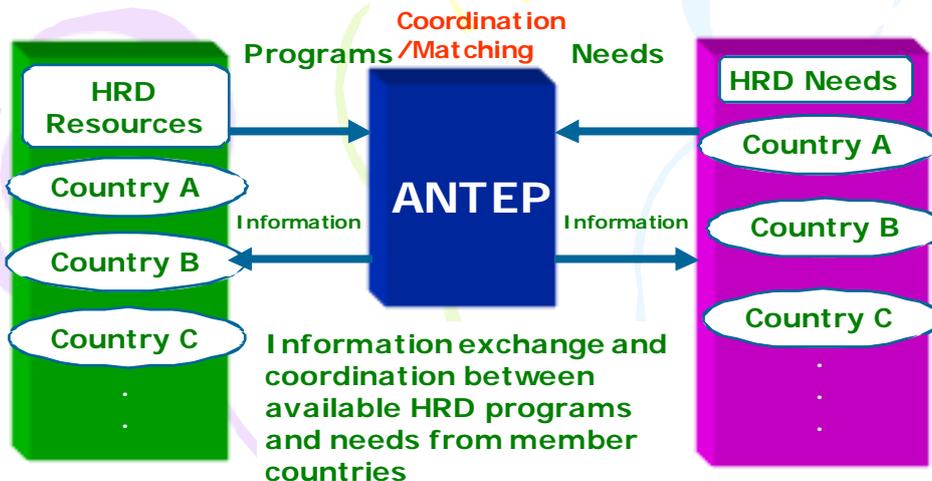
FNCA 2009 Workshop on HRD Japan



FNCA 2010 Workshop on HRD Seoul, Korea 8

Asian Nuclear Training and Education Program(ANTEP)

A NTEP is the network system proposed by Human Resources Development (HRD)project in **FNCA** activities. It provides the information of needs and available programs/courses to promote the HRD activities in FNCA member countries.





Main activities of JN-HRD Net

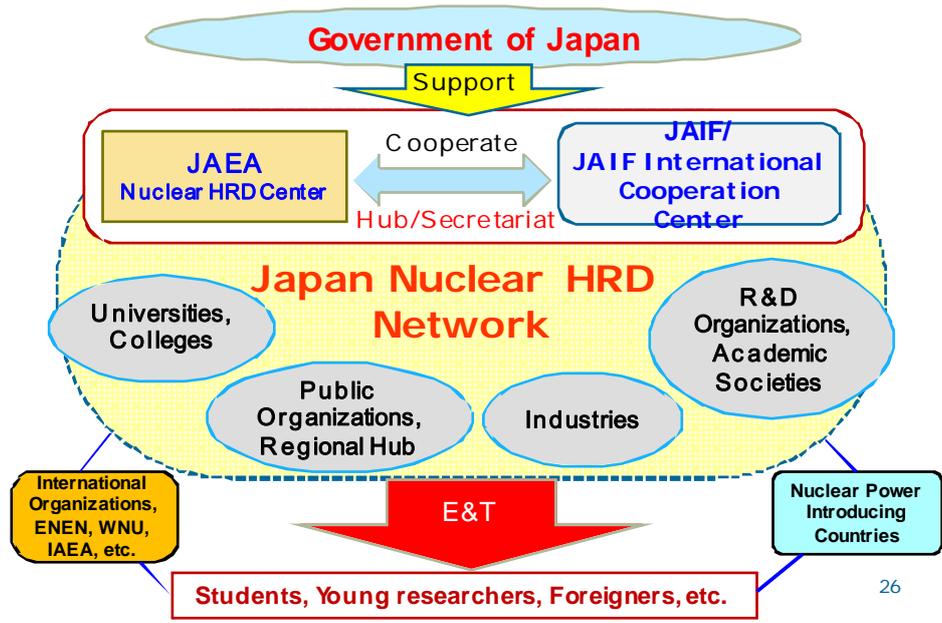
- Establishment of close collaboration with national and international HRD related organizations.
- Support to participant organization to J-HRD Network
- National and international public information on HRD
- Establishment of international network
- Planning and operation of inter-organ HRD activities
- Promotion of support and cooperation mostly for nuclear power introducing countries



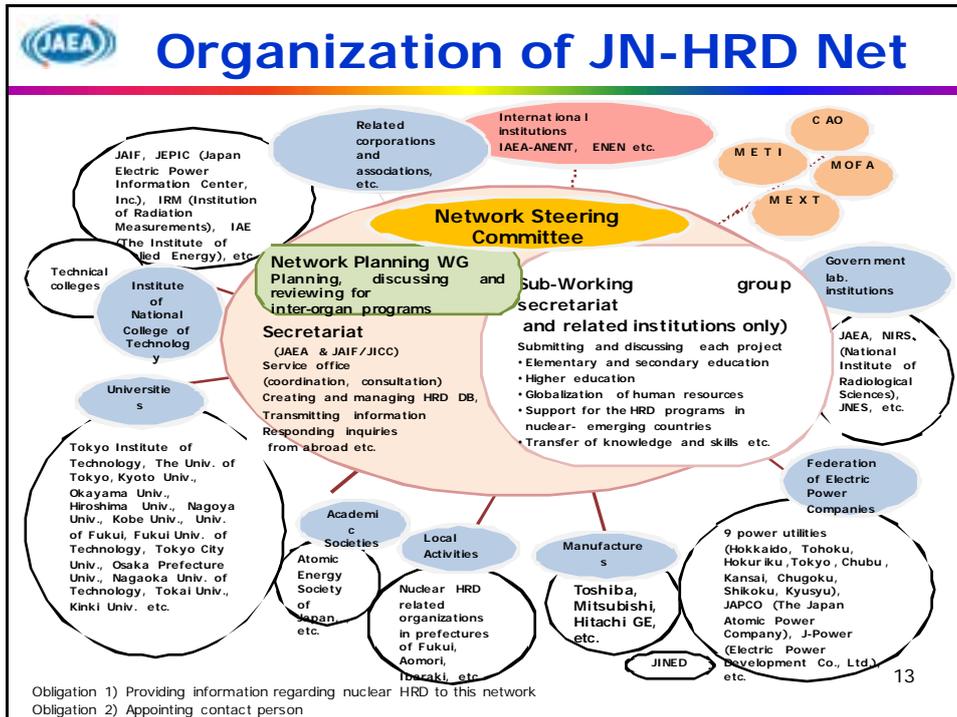
JN-HRD Net
Establishment Event
on November 19, 2010



Japan Nuclear HRD Network



26



Summary

JAEA/MEXT has contributed to human resource development in Asian countries since 1958, using Japan's knowledge and experiences in peaceful uses of nuclear energy.

JAEA contributes to strengthening nuclear non-proliferation and security in Asian countries, using Japan's knowledge and experiences in peaceful uses of nuclear energy.

MEXT Nuclear Researchers Exchange Program(NIRS) invited about 1600 Asian Researchers. The invited researchers have contributed to build up and to strengthen nuclear base and nuclear safety in their countries. Many of them became high-level leading persons for nuclear energy development in their countries.

Japanese Universities contribute for Nuclear Education in Asian countries through sending Japanese Profs.

Japanese Electric Power Companies with related organizations provide practical training courses directly-relating with introduction, manufacturer, and operation of NPPs

Japan will contribute to the introduction of safe and reliable nuclear technology of power plants for the Asian countries and allow the dissemination of Japanese technologies and know-how, such seasoned experience includes actual power plant construction, and human resource development.

**Thank you for your kind attention !
We cooperate with you for enhancing
Nuclear-HRD**



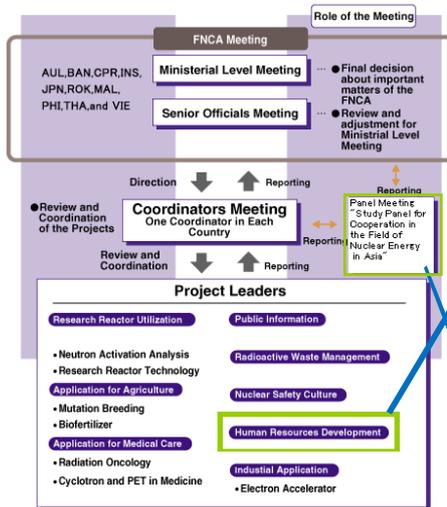
**Additional
Information**

30



FNCA (Forum for Nuclear Cooperation in Asia)

The FNCA Framework



Objective

To enhance socio-economic development through active regional partnership in the peaceful and safe utilization of nuclear technology

Participating Countries (10 countries)

Australia, Bangladesh, China, Indonesia, Japan, Korea, Malaysia, The Philippines, Thailand, Viet Nam, Kazakhstan, Mongolia

Projects

Since 1999, NuHRDeC has organized workshop to promote FNCA/HRD activities (MEXT Project)

Study Panel

"1st Study Panel for Cooperation in the Field of Nuclear Energy in Asia (2nd Phase)" hosted by CAO in October 2007

Conference on Nuclear Training and



Ten recommendations by the Council (1)

1. Enhancement of elementary and secondary education to increase students entering in science and engineering fields
2. Education and transmission of proper knowledge on nuclear, such as needs and safety
3. Enhancement of students' mind to nuclear at career options, by transferring its attraction and promises of nuclear technology, research and industries to the society, especially to young generations
4. Re-establishment and enhancement of nuclear professional education system
5. Development of international human resources



Ten recommendations by the Council (2)

6. Establishment of HRD system in response to international business for nuclear power introducing countries
7. Establishment of the mechanism of nuclear technology transfer
8. Establishment of HRD networking and hub as a central body for the coordination and control
9. Systematization and visualization of nuclear HRD of Japan
10. Establishment of central steady organization as a hub of all nuclear HRD for the promotion of strategic nuclear HRD

33