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Human Resource Development Program for VINATOM

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- 1) *Prerequisite*
- 2) *Objective*
- 3) *The Nuclear Energy Specialist Training (NEST)*
- 4) *Status of the Human Resource Development (HRD) Plan of VINATOM*
- 5) *Concluding Remarks*

1. Prerequisite

Nuclear power requires high quality human resources, not depending on the implementing nation/country is poor or rich

High quality human resources are key for successful implementing the nuclear power program

2. Objective



History and Plans

- Vietnam atomic energy developed since 1976
- 1984: Operation of Dalat research reactor
- 1996-2002: Study on first NPP introduction in Vietnam
- 2002-2009: Pre-Feasibility Study (Pre-FS) on construction of first NPPs
- 2011: Contracts for the Ninh Thuan 1 (NT1) and Ninh Thuan 2 (NT2) NPPs Feasibility Studies (FS)
- End of 2013: Completion of FS (NT1 and NT2)
- 2014: FS and DSA review starting

2. Objective

Human Resources Development (HRD)

Utilities: EVN/NPB = 126

Students in Russia = 169 + 90 (2013)

Trainees in Japan = 15

Regulator: VARANS - 90

Management: VAEA (MOST) – 30;
GDE (MOIT) - very few people

R&D, Consulting:

VINATOM: 810; Universities: N/A

Consultants: Few

A diagram showing three colored boxes (light blue, green, and orange) on the left, each with an arrow pointing to a central light blue circle on the right. The circle contains the text "HRD" in red. The light blue box contains information about Utilities, Students in Russia, and Trainees in Japan. The green box contains information about the Regulator and Management. The orange box contains information about R&D, Consulting, VINATOM, Universities, and Consultants.

HRD

2. Objective



Relevant tasks for the next 7-10 years

- Completion of FS (NT1 and NT2)
- Selection of nuclear technologies
- Review and assessment of FS
- Examination and review of basic designs of selected technologies (PWR, BWR, VVER)
- Technical designs (vendors)
- Supporting NPP constructions and erection
- Establishing the regulation system
- Improving R&D infrastructure and capability
- Education and training tasks

2. Objective



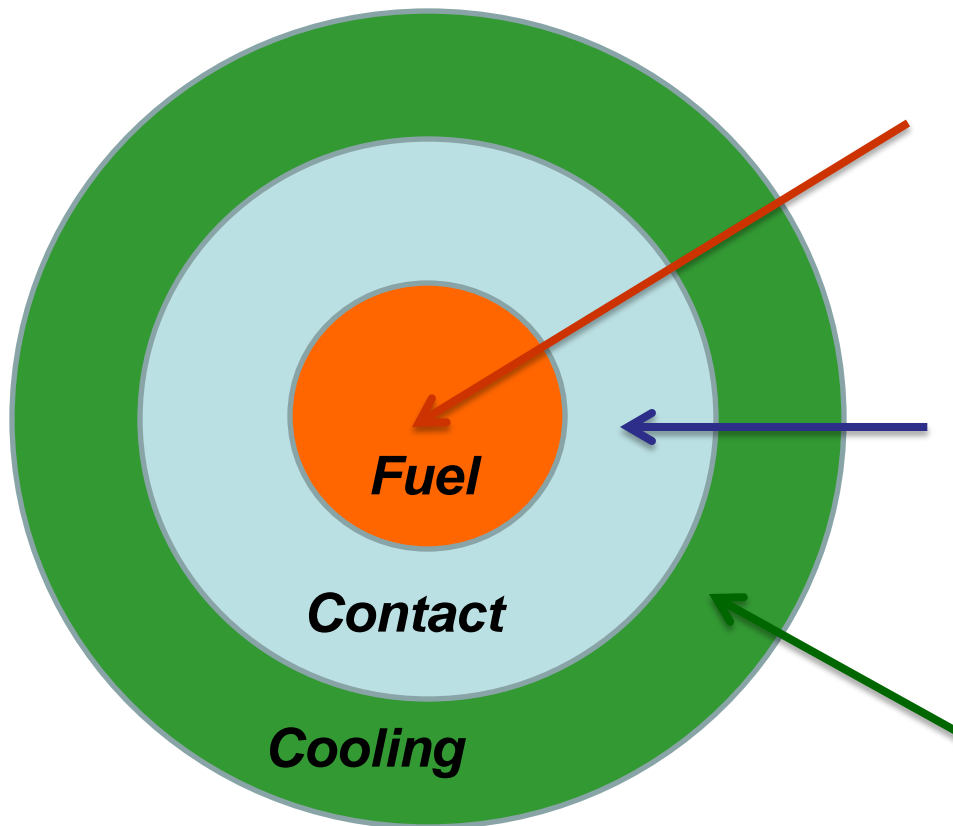
Experience in education and training

- Education system focuses on nuclear physics, nuclear technique and radiation technology
- Long term education abroad has been limited (for 20y)
- Training courses on nuclear power were mainly short courses (IAEA, Japan, Korea, other countries)
- Training has been inefficient due to:
 - *Lack of a good plan for training, lack of good trainees, courses abroads were spreading to many groups*
 - *Trainees were lack of background in nuclear power and NPPs, therefore they could not understand intricate and sophisticated problems*
 - *Lack of sufficient English*

**Vietnam needs a
good plan for start**

2. Objective

The role of VINATOM



Consulting for Vietnamese Government in the field of atomic energy, nucl. power

R&D, Technical Support Organization (TSO) for nuclear security and safety

Human resource development for atomic energy (incl. nucl. Power)

Fuel Rod Model -- FRM

3. The Nuclear Energy Specialist Training



NEST Program

- Name: Nuclear Energy Specialists Training – NEST
- The plan is focused on training of leaders for Vietnam nuclear power program
- The plan will be submitted to the Ministry of Science and Technology (MOST) and Vietnam Government
- A special national scholarship is needed to attract the best new engineers/Masters/PhD

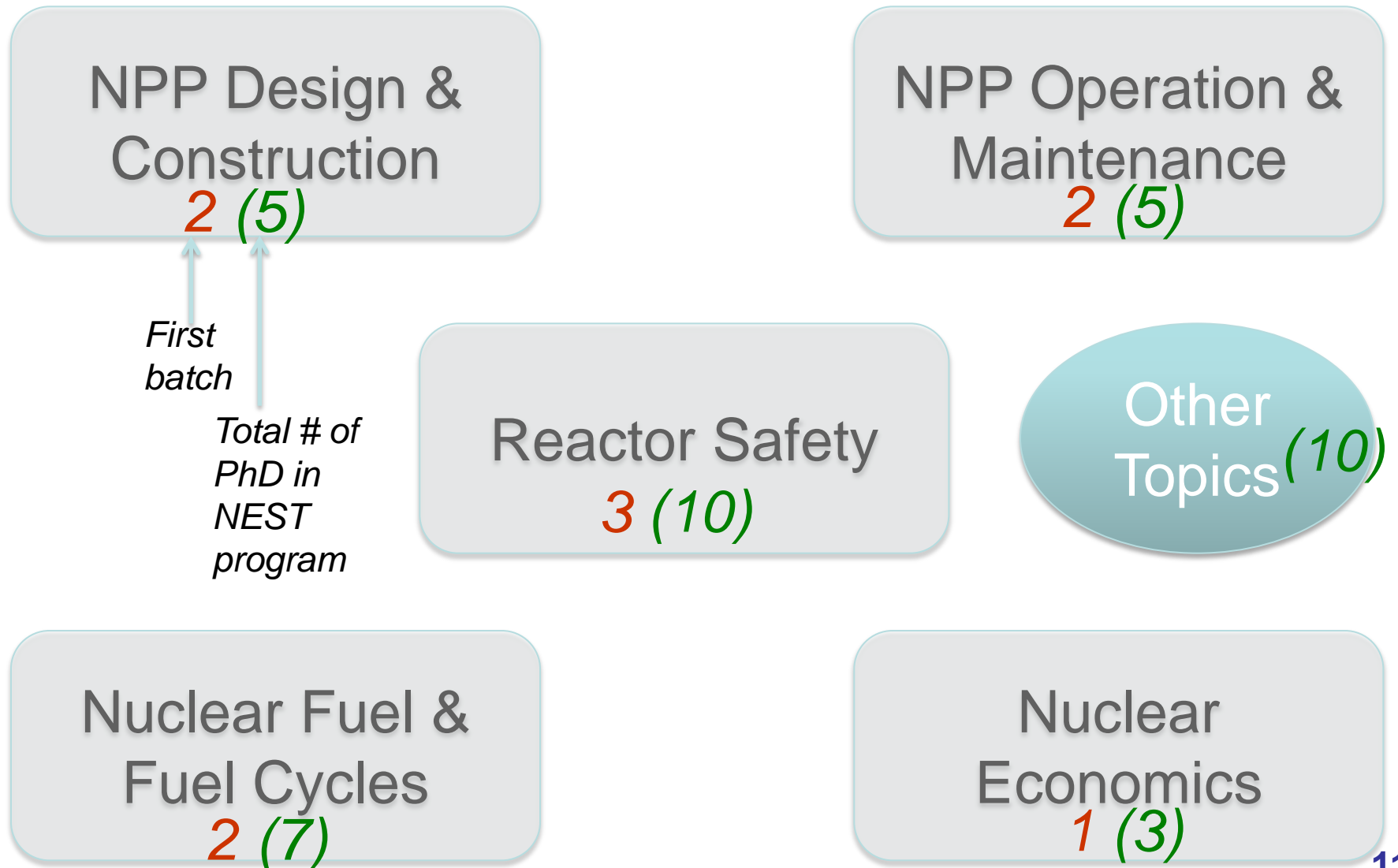
3. The Nuclear Energy Specialist Training

NEST Flowchart



* CNEST: Center for Nuclear Energy Science and Technology

3. The Nuclear Energy Specialist Training



3. The Nuclear Energy Specialist Training



	Issues/ Topics	Comment	Area
1	NPP siting and external events; evaluation of EQ and flooding	<i>All topics</i>	D&C
2	NPP construction: quality control, inspection	<i>in the first</i>	D&C
3	Digital I&C system design, performance, compatibility, reliability	<i>batch have</i>	O&M
4	HRA: Human reliability analysis (cultural factors)	<i>strong</i>	O&M
5	PSA-L1: Passive safety systems evaluation	<i>safety flavor</i>	RS
6	PSA-L2: Severe accident management	<i>even when</i>	RS
7	PSA-L3: Environmental impact and mitigation of a severe accident	<i>they are not</i>	RS
8	Nuclear fuel & irradiated materials performance and failures	<i>classified as</i>	FC
9	Fuel cycle analysis, incl. issues in nuclear proliferation and security	<i>“safety”</i>	FC
10	Energy economics, including rare event consequences		ECO

3. The Nuclear Energy Specialist Training



- Select and appoint key personnel for the project
- Establish connection to select Foreign Institutions/Professors
 - Difference: VN-mission-driven
- Establish policy instruments (credible promises), advertise
- Create VINATOM Post-Graduate Training Program (PGTP)
 - Build curriculum, teaching base (Dalat?)
 - Select lecturers, mentors, advisors
- Recruit students
 - Identify, recruit young talent at BSc, MSc, PhD levels
 - Negotiation/ Connection to VINATOM mentor
 - Training (PGTP)
- Run the PGTP (first year)
- Meanwhile: Negotiate with foreign institutions/professors
- Sending students to foreign institutions
- Follow with trainees along training and return
 - Difference: end-product-oriented!
 - Working with VINATOM group/lab on VN (defined) issue

3. The Nuclear Energy Specialist Training



BSc
(Non-NE)

BSc
(NE-related)

MSc
(Non-NE)

PhD
(Non-NE)

VINATOM Post-graduate Training
Program in Nuclear Energy S&T (NEST)

Trained personnel
(recruited to position in
VINATOM and others)

**Preparation for NE
Specialist Training
Program**

Trained personnel (back to
position for more
responsibility)

MSc. (NE)
Training

Ph.D (NE)
Training

Postdoctoral
Training

3. The Nuclear Energy Specialist Training



BSc
(Non-NE)

BSc
(NE-related)

MSc
(Non-NE)

PhD
(Non-NE)

Nuclear Energy
Fundamentals

Topical
Reading &
Course Paper

Nuclear Power
Management

Teachers:
Foreign Experts/
Professors

Teachers:
VINATOM
Experts

Teachers:
VN Retired &
Expatriates
Professors

Reactor
Physics

Dynamics
& Control

Thermal-
Hydraulics

Modeling &
Simulation

Fuels &
Materials

MSc. (NE)
Training

Ph.D (NE)
Training

Postdoctoral
Training

3. The Nuclear Energy Specialist Training



BSc
(Non-NE)

BSc
(NE-related)

MSc
(Non-NE)

PhD
(Non-NE)

Nuclear Energy
Fundamentals

Topical
Reading &
Course Paper

Nuclear Power
Management

Nuclear Reactor
Engineering
(Basics)

Nuclear Reactor
Safety
(Basics)

Nuclear Fuel
Cycles
(Basics)

Reactor
Physics

Dynamics
& Control

Thermal-
Hydraulics

Modeling &
Simulation

Fuels &
Materials

MSc. (NE)
Training

Ph.D (NE)
Training

Postdoctoral
Training

4. Status of the HRD Plan of VINATOM



Towards Solutions of the Problems (1/2)

✓ HRD:

- *Ministry of Education and Training (MOET): HRD project 1558 → Sending Master, PhD students to other countries*
- *Ministry of Science and Technology (MOST): To establish a national project for nuclear experts training (including the Nuclear Energy Specialists Training – NEST of the VINATOM)*
- *International cooperation: ROSATOM (CICET), KAERI, Japan Universities, Westinghouse etc.*

✓ OJT: Review of Safety Analysis Reports (SARs) for Ninh Thuan 1 and Ninh Thuan 2 NPP projects

✓ Step by step: Creation of the network of experts to be involved in the NEST

4. Status of the HRD Plan of VINATOM



Towards Solutions of the Problems (2/2)

- ✓ HRD for VINATOM:
 - *2012: Training courses at the CICET (4 months + 1 month)*
 - *2014: Sending to Russia 9 Master students (MEPHI, MPEI, Tomsk University), 1 PhD student (MPEI)*
 - *On the job training: Sending 5 researchers to Japanese universities, MHI (September-November 2014)*
 - *Internships to Pittsburgh Headquarter (**OJT: AP1000 safety analysis and enhanced seismic design**), and 2 Scholarships to North Carolina State University – NCSU/Raleigh (for 6 months)*
- ✓ VINATOM's researchers are involving in Review of SAR for Ninh Thuan 1 and Ninh Thuan 2 NPP projects
- ✓ CNEST: Sending researchers to Russian institutes for OJT (design of the new research reactor) -- agreed

5. Concluding Remarks



- ✓ Human resource is critical for nuclear power development in Vietnam
- ✓ The NEST plan is suggested to be implemented under VINATOM / MOST involving effectively experts and using research infrastructure of VINATOM
- ✓ Creation of good research environment for the trainees to work after study/training abroad is necessary (Center for Nuclear Science and Technology – **CNEST** project)
- ✓ *The NPPs program of Vietnam needs to attract the best people to the field, otherwise it will not be successful*

Thank you!