

PREPARATION of VIETNAM ELECTRICITY (EVN) for THE FIRST NINH THUAN NPP PROJECTS

Fukui International Meeting on Human Resources Development for Nuclear Energy in Asia

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EVN*NPB*

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1. Introduction about EVN-EVNNPB
2. Nuclear Power Development Program in Vietnam
3. Preparation of Vietnam Electricity for Ninh Thuan NPP
4. Human resource development for NPP Projects
5. Major challenges

1. Introduction about EVN (1)

- ✓ **Establishment:** 1994 and transformed to Vietnam Electricity in 2006 as State Owned Economical Corporation
- ✓ **Location:** 18 Tran Nguyen Han Street, Ha Noi, Vietnam
- ✓ **Website:** www.evn.com
- ✓ **Employees:** total app. 100,000 employees, in which 32% graduated university or higher
- ✓ **Energy production:** EVN is Owner of 27/43 HPPs (88% capacity); 7/12 Coal fire plants (65% capacity); 3/5 Oil fire plant (57% capacity); 7/14 Combine cycle plant (42% capacity). 67.7% in total capacity of power system

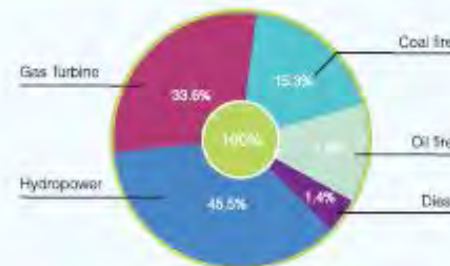
Cơ cấu sở hữu nguồn điện năm 2011
Installed capacity by ownership, 2011

Chủ sở hữu Owner	Công suất đặt Installed capacity (MW)	
Tập đoàn Điện lực Việt Nam/Vietnam Electricity (EVN)	11168	50.7%
Công ty cổ phần có phần vốn của EVN/EVN JSC.	3748	17.0%
Tập đoàn Dầu khí Việt Nam Việt Nam/Petro Vietnam	2715	12.3%
Tập đoàn Công nghiệp Than - Khoáng sản Việt Nam/Vinacomin	1046	4.8%
Nhà đầu tư nước ngoài/Foreign Developers	1986	9.0%
Nhà đầu tư trong nước khác/Other Local Developers	1366	6.2%
Tổng - Total	22029	100%



Cơ cấu nguồn điện năm 2011
Installed capacity by fuel source, 2011

Loại hình nhà máy điện Types of Power plants	Công suất đặt Installed capacity (MW)	
Thủy điện/Hydropower	10037	45.5%
Nhiệt điện than/Coal fired	3371	15.3%
Nhiệt điện dầu FO/FO oil fired	927	4.2%
Tua bin khí, chu trình hỗn hợp /Combined/open cycle gas turbine	7395	33.6%
Diesel	299	1.4%
Tổng - Total	22029	100%



1. Introduction about EVN (2)

EVN ORGANIZATION CHART

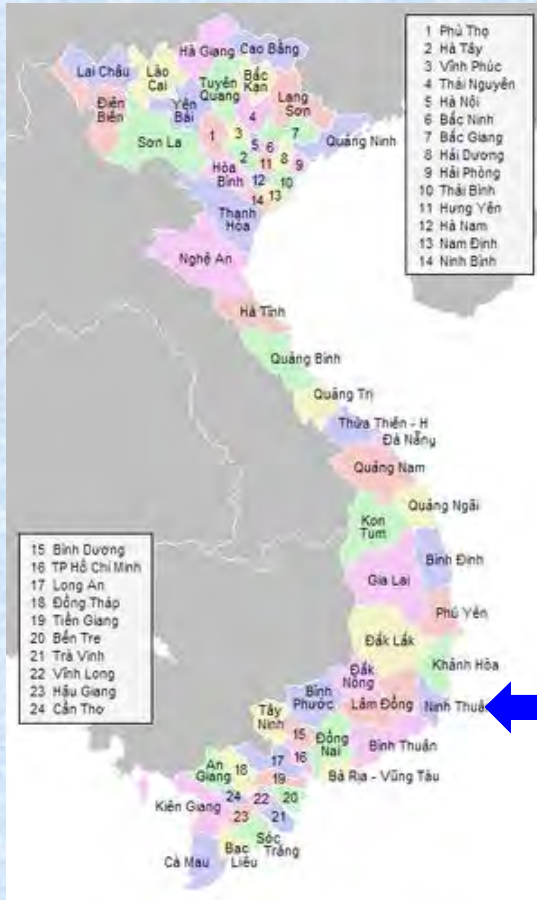


16 Dep.

Dependent Units	Dependent Units (32)	Daughter Companies	Daughter Companies (38)	Affiliates (14)
<ol style="list-style-type: none"> Hoa Binh Hydro Power Company Tri An Hydro Power Company Ialy Hydro Power Company Quang Tri Hydro Power Company Tuyen Quang Hydro Power Company Dai Ninh Hydro Power Company Buoi Kiep Hydro Power Company Se San Hydro Power Development Company Son La Binh Hydro Power Company Dong Nai Hydro Power Company Ban Ye Hydro Power Company Song Trai Hydro Power Company An Khe - Ka Nak Hydro Power Company Electric Power Trading Company National Load Dispatch Center Center of Power Electric Information EVN Building Investment and Business Management Board Nuclear Power Project Management Board 	<ol style="list-style-type: none"> Hydro Power Project Management Board No.1 Hydro Power Project Management Board No.2 Hydro Power Project Management Board No.3 Hydro Power Project Management Board No.4 Hydro Power Project Management Board No.5 Hydro Power Project Management Board No.6 Hydro Power Project Management Board No.7 Son La Hydro Power Project Management Board Song Bung 2 Hydro Power Project Management Board Song Bung 4 Hydro Power Project Management Board Thermal Power Project Management Board No.1 Thermal Power Project Management Board No.2 Thermal Power Project Management Board No.3 Vinh Tan Thermal Power Project Management Board 	<ol style="list-style-type: none"> Can Tho Thermal Power OMC Limited Phu My Thermal Power OMC Limited Thu Duc Thermal Power OMC Limited Uang Bi Thermal Power OMC Limited Trung Son Thermal Power OMC Limited Northern Power Corporation Central Power Corporation Southern Power Corporation Hanoi City Power Power Corporation Ho Chi Minh City Power Corporation National Power Transmission Corporation Central Area Electrical Mechanical JSC Thu Duc Electrical Mechanical JSC Electrical Mechanical JSC Dong Anh Electrical Equipment Manufacturing JSC Power Engineering Consulting JSC No.1 Power Engineering Consulting JSC No.2 Power Engineering Consulting JSC No.3 Power Engineering Consulting JSC No.4 	<ol style="list-style-type: none"> Thac Ma Hydro Power JSC A Vuong Hydro Power JSC Song Ba Ha Hydro Power JSC Ban Ye Hydro Power JSC Thu Ban Hydro Power JSC An Khe - Ka Nak Hydro Power JSC Se San 4 Hydro Power JSC Srepok Hydro Power JSC Dong Nai Hydro Power JSC Vinh Son - Song Hinh Hydro Power JSC Thac Ba Hydro Power JSC Da Nhim - Ham Thuan - Da Mi Hydro Power JSC Pho Lai Thermal Power JSC Ninh Binh Thermal Power JSC Bz Ra Thermal Power JSC Hai Phong Thermal Power JSC Quang Ninh Thermal Power JSC EVN Finance JSC EVN International JSC 	<ol style="list-style-type: none"> Central Hydro Power JSC Vietnam Power Development JSC Se San 3A Hydro Power Investment & Development JSC Vinh Tan 3 Energy JSC Nhan Trach 2 PV Power JSC Vietnam - Laos Power JSC An Binh Commercial Joint Stock Bank Global Insurance JSC An Binh Security JSC Saigon - Vina Real Estate JSC EVN-Land Nha Trang Real Estate JSC Central Power Real Estate JSC Vietnam Electricity Power Investment & Construction JSC Thuan Binh Wind Power JSC
	Non-Business Units (4) <ol style="list-style-type: none"> Electric Power University Hochiminh City Electric Engineering College Central Electric Engineering College Electric Vocational College 			

EVN NPB →

2. Introduction about EVNNPB (1)



- ✓ Establishment: 1, May, 2011
- ✓ Location: Phan Rang City, Ninh Thuan Province, Vietnam
- ✓ Website: www.dienhatnhan.com



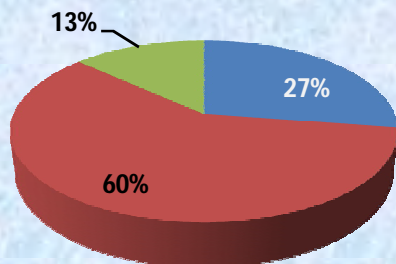
Main Tasks:

1. To manage the component Projects under Ninh Thuan NPP project owned by EVN, comprising of:
 - 1) Ninh Thuan 1 NPP;
 - 2) Ninh Thuan 2 NPP;
 - 3) Infrastructure projects for construction of Ninh Thuan NPPs;
 - 4) Operation Management and PMB Offices
 - 5) Human resource training Project for Ninh Thuan NPPs;
 - 6) Public relation center (PRC) Project
2. To prepare the generation activities for Ninh Thuan 1&2 NPPs.
3. To manage consultancy for development of FS and Design documents; executing bidding process; construction supervision and commissioning of NPPs.
4. **To manage human resource development and training activities of Ninh Thuan 1&2 NPPs.**
5. **To manage public information activities for NPPs.**



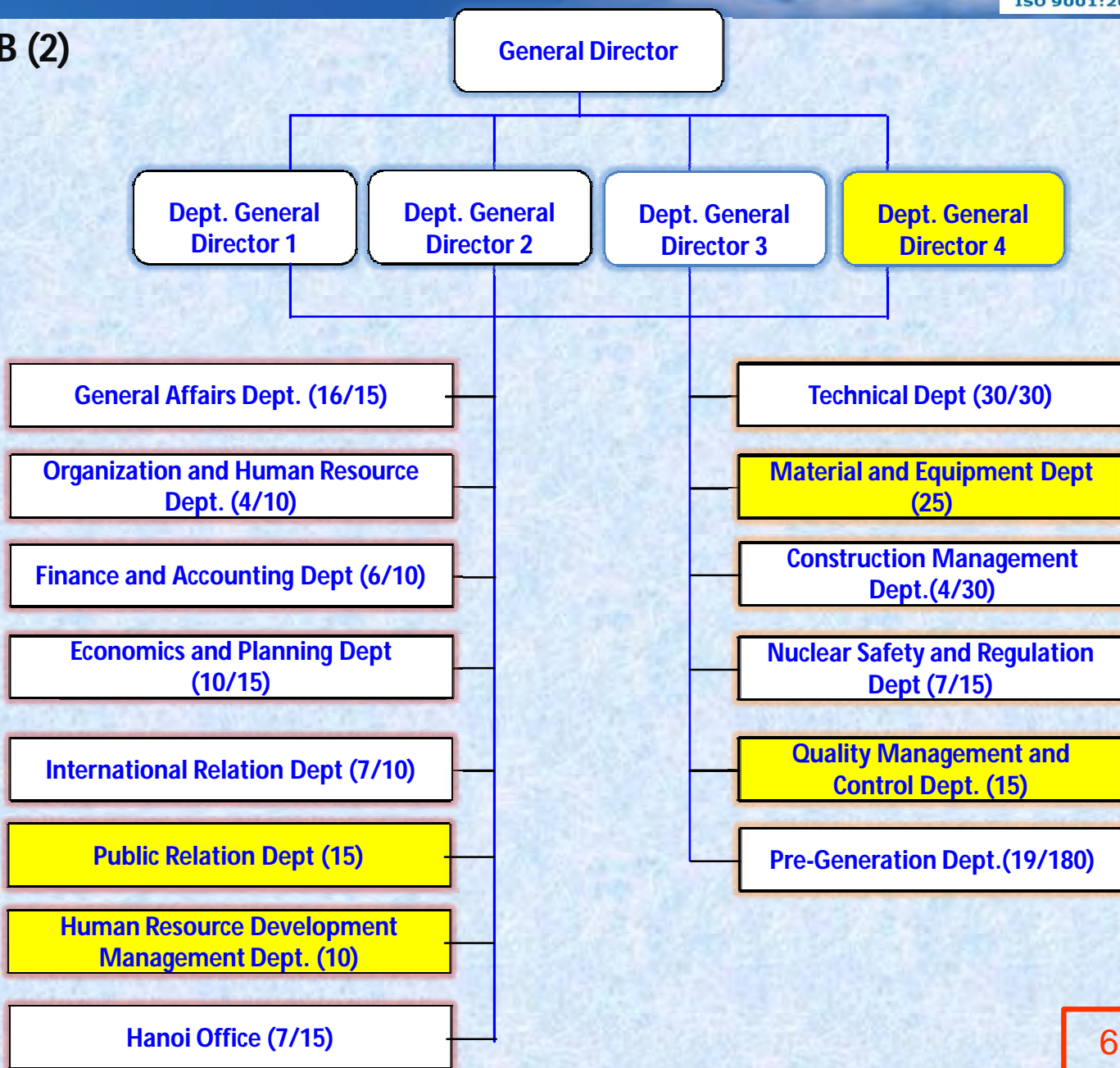
2. Introduction about EVNNPB (2)

Present Employees = 121



- Msc, Phd Degree = 33
- University graduated = 72
- Others = 16

No	Professional	Q'ty
1.	Nuclear physics	2
2.	Nuclear power plant	13
3.	Electrical	27
4.	Chemical	2
5.	Mechanical	5
6.	Civil	3
7.	Economical	15
8.	Other	54
	Total	121



2. Introduction about EVNNPB (3)

November, 16th, 2012: Certification of Quality Management System – ISO9001:2008

General Affairs Activities	2
Organization and Personnel Activities	4
Economy-Planning Activities	3
Technical Activities	3
Finance and Accounting Activities	2
International Relations Activities	2
Nuclear Safety and Regulatory Activities	2
Construction Management Activities	2
	20

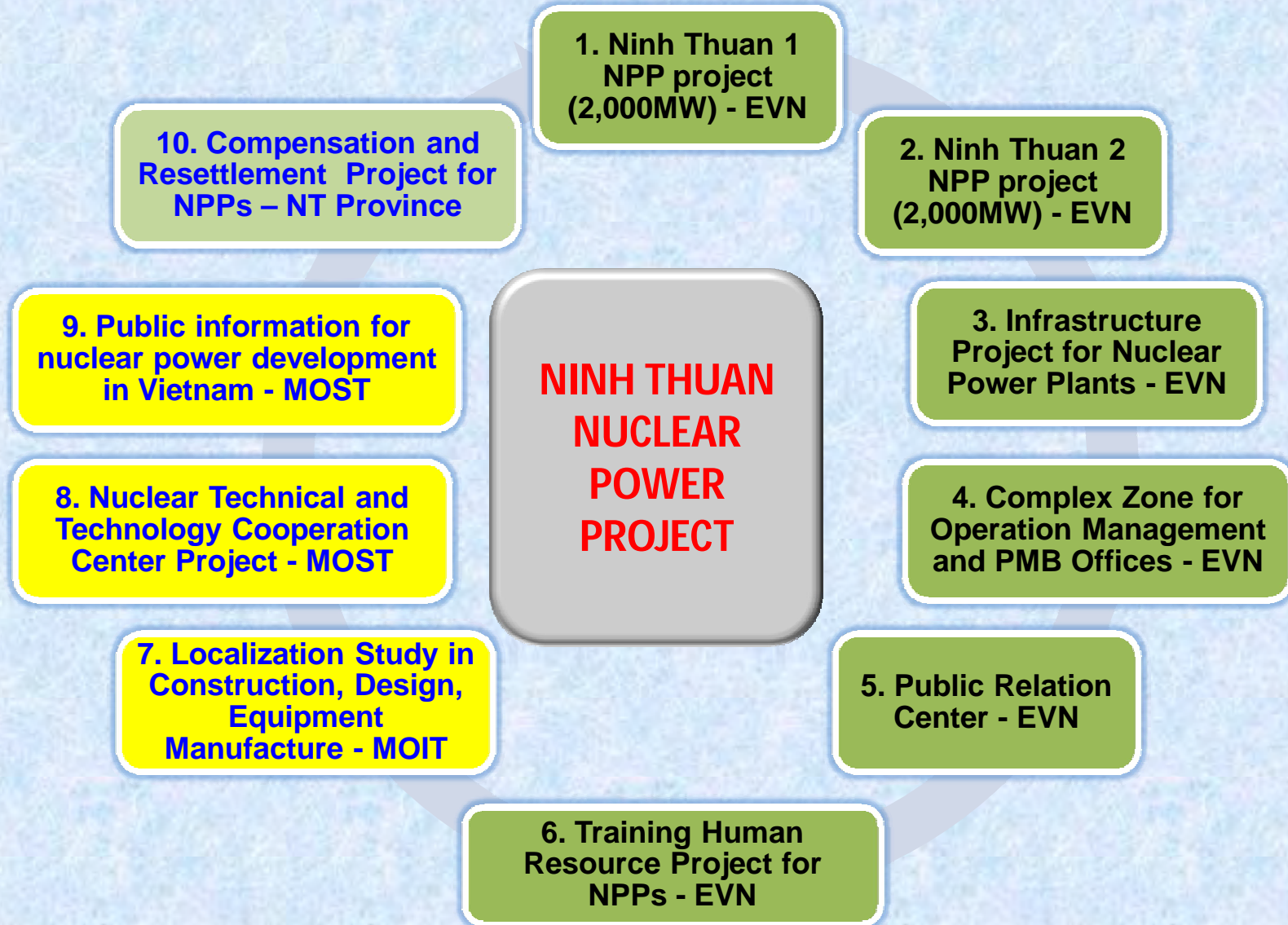
2014~2018:

Develop Project Management System – following IAEA GS-R-3

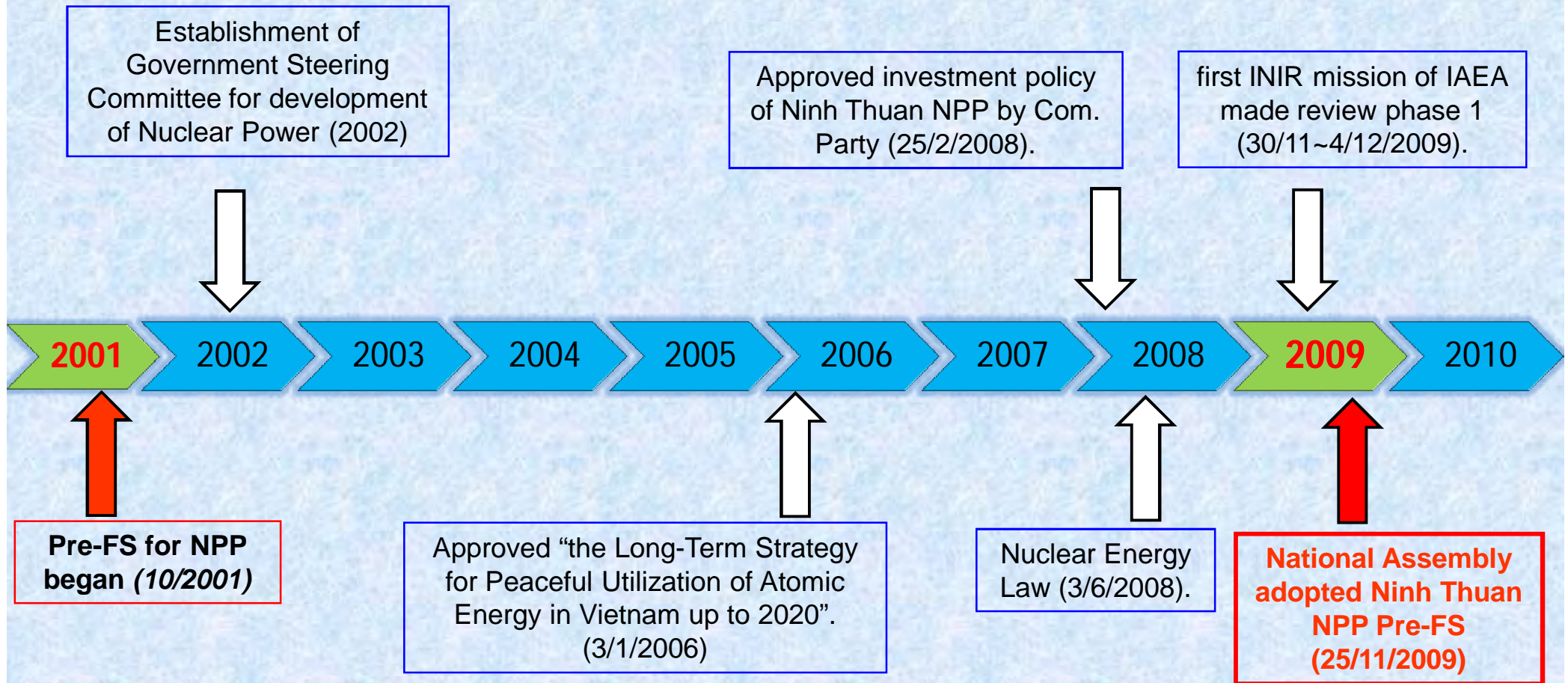
Administration Management System	6
Technical Management System	17
Financial Management System	2
	25



3. Component projects under Ninh Thuan NPP

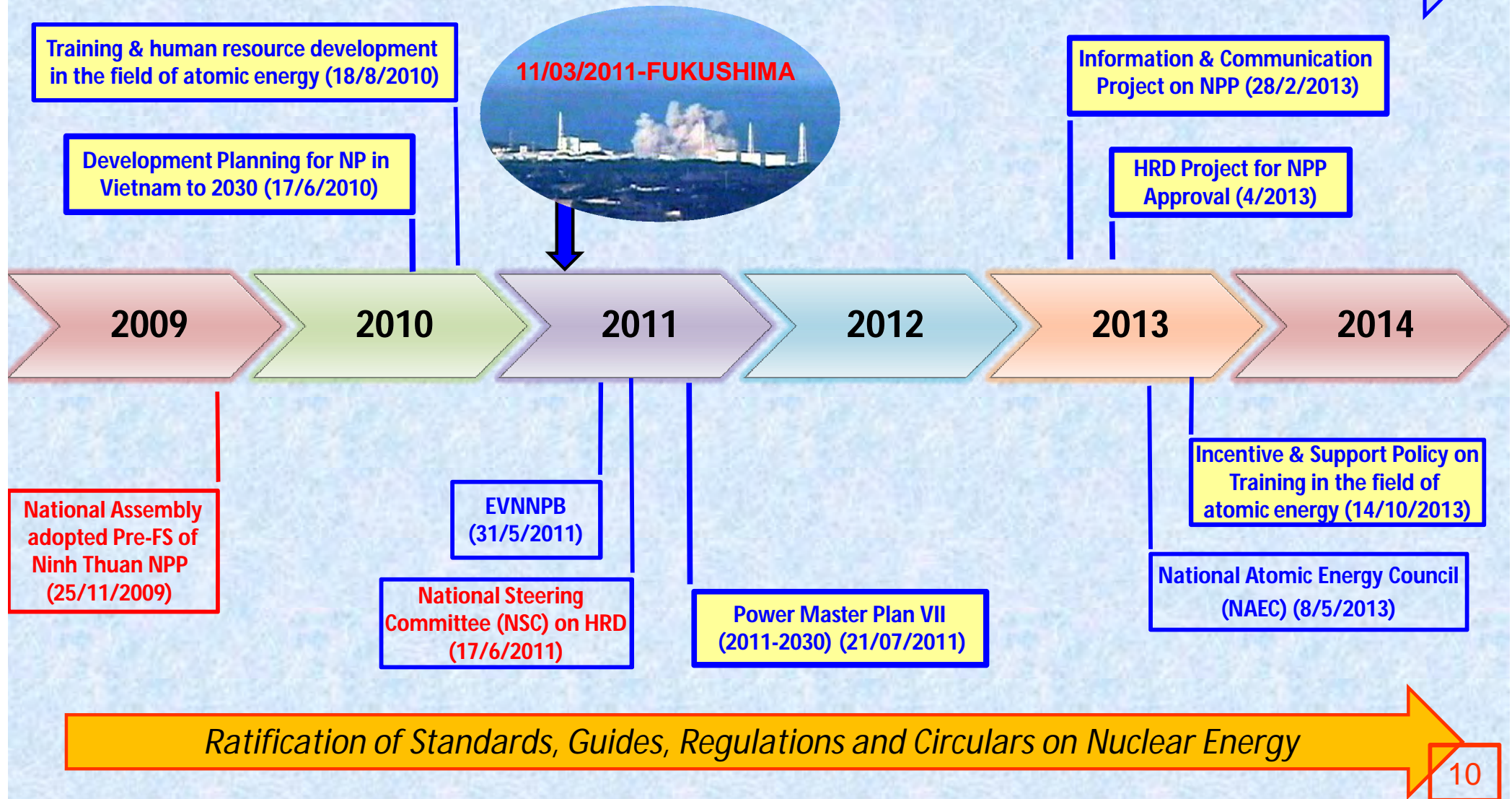


1. Preparation activities in Phase 1.



2. Preparation activities in Phase 2.

Workshops, Training, Seminars, Conferences on Nuclear Energy under supporting of IAEA, Inter. Organizations

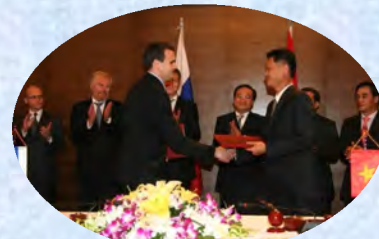




3. International Activities

Workshops, Training, Seminars, Conferences on Nuclear Energy under supporting of IAEA, Inter. Organizations

11/03/2011-FUKUSHIMA



FS&SAD for NPP1
(21/11/2011 ~ 31/12/2013)

Vietnam – France cooperation agreement to develop NPP in Vietnam (27/9/2013)



2011

2012

2013

2014



FS&SAD for NPP2
(28/09/2011 ~ 01/07/2013)

IGA with Japan for Construction of NPP2 (31/10/2011)



Vietnam – Korean cooperation agreement to develop NPP in Vietnam (9/9/2013)

INIR mission of IAEA conducted review phase 2 (5~14/12/2012).

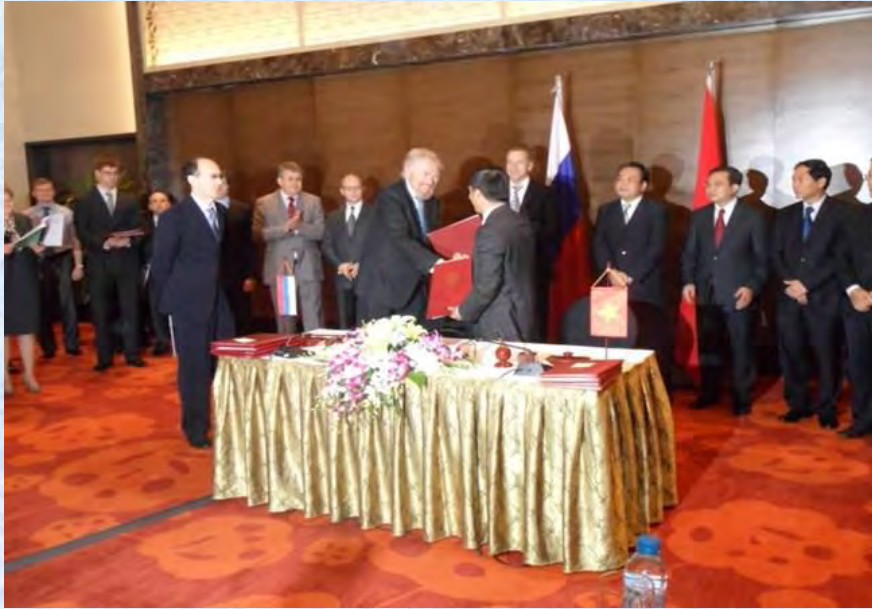


US – Vietnam agreement on Nuclear cooperation (10/10/2013)

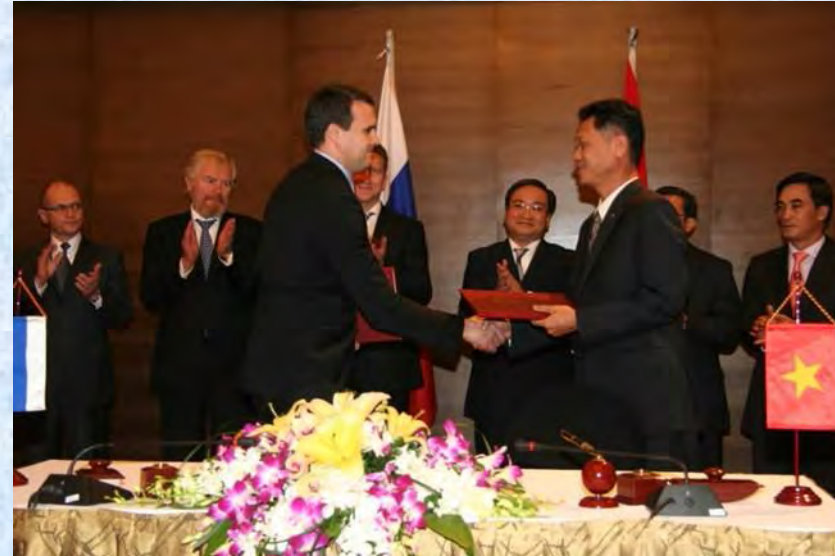
IGA with Russian for Construction of NPP1 (31/10/2010)

Ratification of Standards, Guides, Regulations and Circulars on Nuclear Energy

3. International Activities



IGA with Russia for the Construction of NPP1 (31/10/2010)



Contract signing for the development of Site Approval Dossier and FS of NPP1 & NPP2



4. Development Planning Orientation for N. Power in Vietnam to 2030 (906/QĐ-TTg-17/6/2010)

- ❑ Development of nuclear power (NP) is for peaceful purposes.
- ❑ NP development is based on State-of-the-Art, Proven Technologies and follows the long term program to formulate the Vietnam's NP Industry.
- ❑ NP development is to ensure human and environmental safety.
- ❑ Intensive international cooperation in investment and technology transfer.
- ❑ Mobilize reasonable social resources to develop successfully the NP Program.
- ❑ Construction of NPPs at the selected sites within the period in consistence with socio- economic development at each region and whole country:
 - ✓ 2020: 1st unit (1,000MW);
 - ✓ 2025: 8,000MW (7%)
 - ✓ 2030: ~15,000MW (~10%)



5. Master plan VII - Power Development (2011–2020-2030) (21/7/2011)

General goals:

- To use effectively the domestic energy resources
- To supply adequate energy with high quality and reasonable prices for social and economical development of country
- To ensure energy national security

Specific goals:

- Production and imported energy
 - ✓ 2015: 194 ~ 210 bill kWh; 2020: 330 ~ 362 bill kWh; 2030: 695 ~ 834 bill kWh
- Increase the renewable energy portion: reach 4.5% in 2020 and 6% in 2030

Power source development

Power source	Unit	2020	2030
Wind	MW	1,000	6,200
Hydro	MW	17,400	
Pump storage	MW	1,800	5,700
Nature Gas	MW	10,400 (66 bill kWh)	11,300 (73.1 bill kWh)
Coal fire	MW	36,000 (156 bill kWh)	75,000 (394 bill kWh)
Nuclear	MW	2,000	10,700 (70.5 bill kWh)
LNG	MW	2,000	6,000
Import (Laos, Cambodia, China)	MW	2,200	7,000



5. Master plan VII - Power Development (2011–2020-2030) (21/7/2011)

Structure of Power sources development

Power source	Unit	2020		2030	
		P (MW)	E (Bill kWh)	P (MW)	E (Bill kWh)
Hydro	%	23.1	19.6	11.8	9.3
Pump storage	%	2.4		3.9	
Coal fire	%	48.0	46.8	51.6	56.4
Gas fire	%	16.5	24.0	11.8	14.4
Renewable	%	5.6	4.5	9.4	6.0
Nuclear	%	1.3	2.1	6.6	10.1
Import	%	3.1	3.0	4.9	3.8
Total		100% (75,000MW)	100% (330 Bill kWh)	100% (146,800 MW)	100% (695 Bill kWh)

Power network development

Items	Unit	2011-2015	2016-2020	2021-2025	2026-2030
500kV Substation	MVA	17,100	26,750	24,400	20,400
220kV Substation	MVA	35,863	39,063	42,775	53,250
500kV Transmission line	Km	3,833	4,539	2,234	2,724
220kV Transmission line	Km	10,637	5,305	5,552	5,020

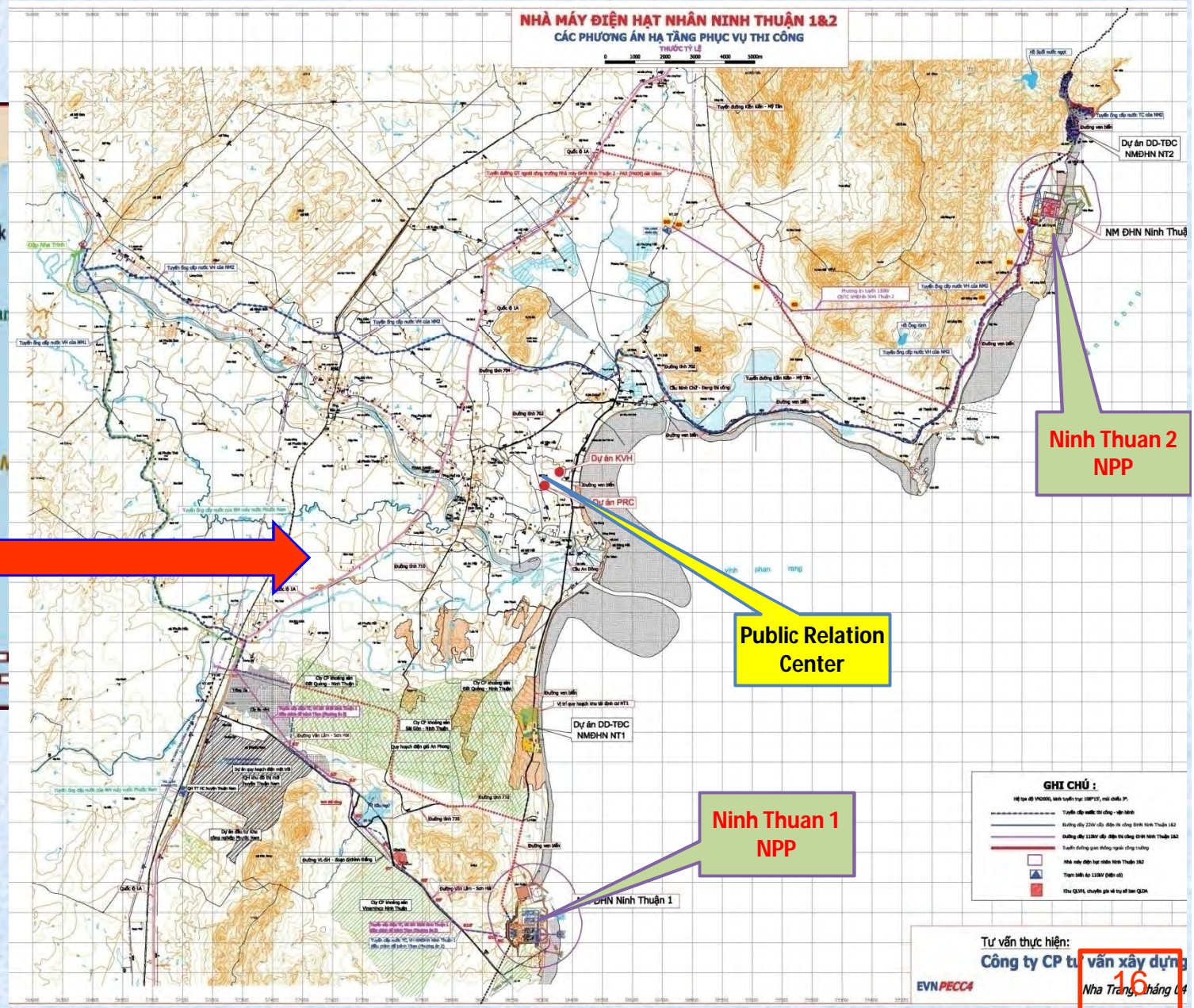


EVN NPB

3. Preparation of Vietnam Electricity for Ninh Thuan NPP (1/8)

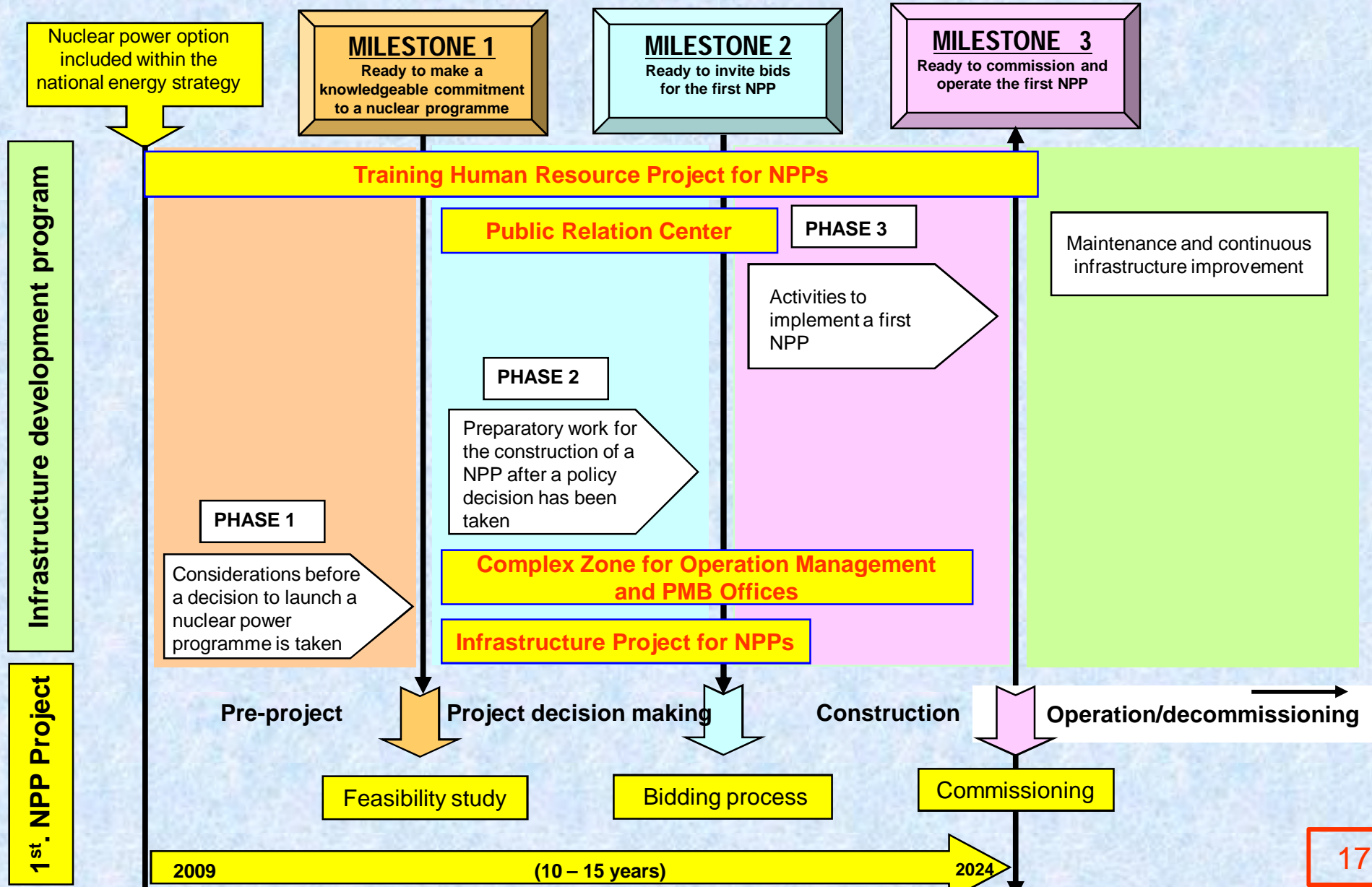


1. Project location



Tư vấn thực hiện: Công ty CP tư vấn xây dựng **PECCA** Nha Trang, tháng 04

2. General plan for Project Implementation



3. Project NPP1&2 implementation process

- 1. FS and Basic Design Documents
 - 2. Site Approval Dossier (SAD)
 - 3. EIA Report; Safe Analysis Report (SAR)
- NT1: 12/2011~12/2013; NT2: 10/2011~7/2013**
 Review: MOIT, MOST, MONRE, Committees
 FS and SAD: Approval by PM
 SAR: Approval by MOST; EIA: Approval by MONRE
NT1: 12/2014; NT2: 10/2014

- 1. Technical Design Reports & Appendixes
 - 2. Technical Design Drawings
 - 3. SAR
 - 4. Maintenance procedure
 - 5. Project Cost
 - 6. Tender Document: Approval by PM
- Technical Design Report: Approval by MOIT
 SAR: Approval by MOST

2014~2017



- Resolution No 41/2009/QH12
 (25/11/2009) adopted Ninh Thuan
 NPP investment by National
 Assembly
- 2006~11/2009**

- 1. Contract form: EPC (Contract, Training)
 - 2. Quality control: by Consultant/Owner.
 - 3. Inspection by MOC and MOST
 - 4. Construction Permit: MOST
 - 5. Construction drawings: Approval by Owner
- 2018~2023**

- 1. Operation Permit: MOIT
 - 2. Trial Operation and COD
 - 3. Operation by Vendor and Owner
- 2023~2025**

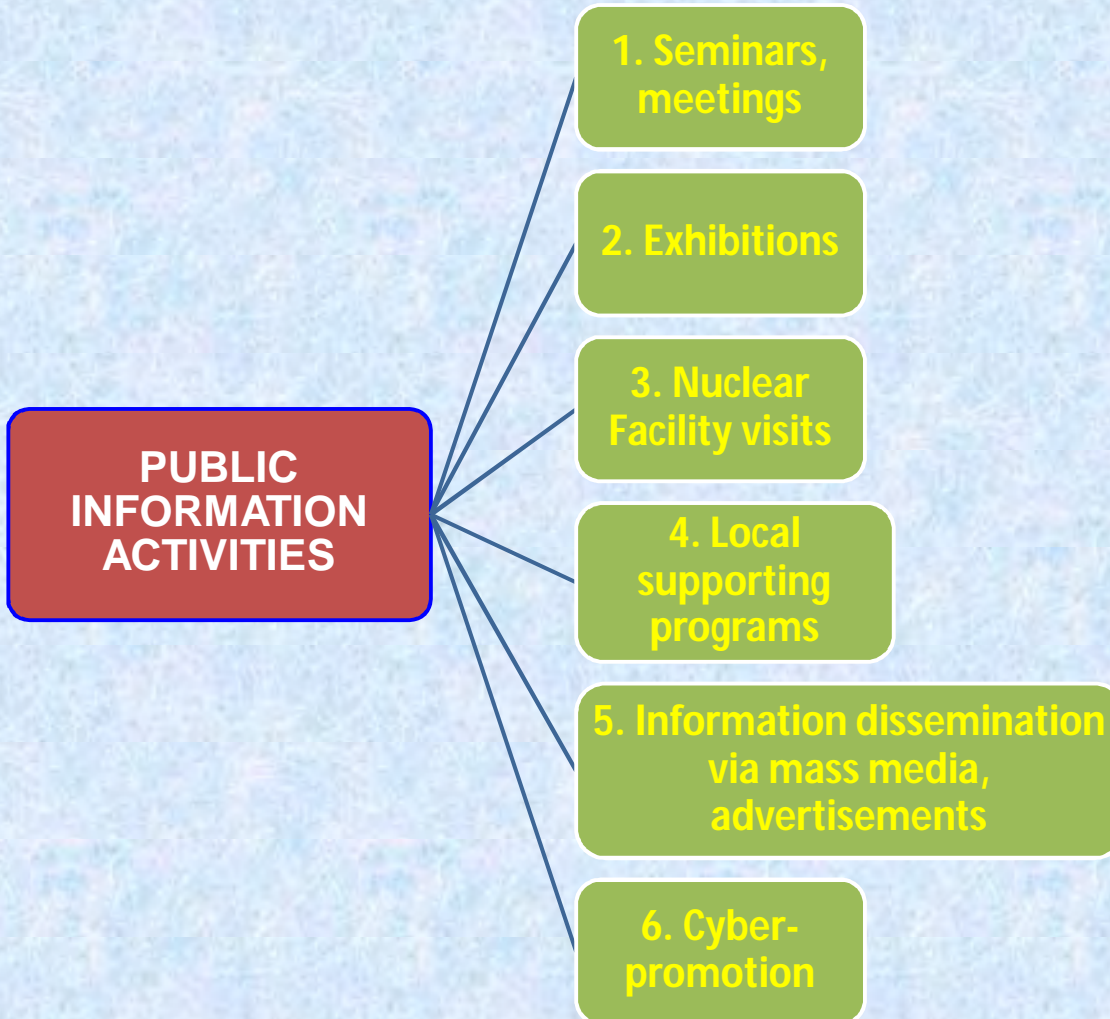
4. Participation in Development and improvement of the nuclear power infrastructure

No	Issus	Responsibility of EVN
1.	National Position	Coordination
2.	Nuclear Safety	Coordination
3.	Management	Main
4.	Funding and Financing	Coordination
5.	Legislative Framework	Coordination
6.	Safeguards	Coordination
7.	Regulatory Framework	Coordination
8.	Radiation Protection	Coordination
9.	Electrical Grid	Main
10.	Human Resources	Main for O/M

No	Issus	Responsibility of EVN
11.	Stakeholder Involvement	Coordination
12.	Site and supporting facilities	Main
13.	Environmental Protection	Main
14.	Emergency Planning	Coordination
15.	Security	Coordination
16.	Nuclear Fuel Cycle	Main
17.	Radioactive Waste	Coordination
18.	Industrial Involvement	Coordination
19.	Procurement	Main

5. Public Information and Communication Activities

1) Public Information Activities



Information & Communication (I&C) Project in Vietnam to 2020 have been approved (28th, Feb., 2013) with 3 main objectives:

1. I&C on NP program: be carried out systematically, regularly; to create long-term proper awareness, public consensus, building safety culture to contributed the success of the NP program.
2. Information &propaganda activities: ensure timely, transparent and comprehensive conducted in accordance NPP schedule.
3. To ensure consistency and guidance closely, regularly from central to local, between agency and stakeholders to ensure the openness, transparency, accuracy and timeliness to provide information, receive and respond to public opinion.

5. Public Information and Communication Activities

2) Public Relation center for Nuclear Energy

- ✓ **Project scale:** construction area ~ 3000m² in a area of 2ha .
- ✓ **Location:** My Binh ward, Phan Rang – Thap Cham City.
- ✓ **Main functions:**
 - ❑ Introduction of energy in general;
 - ❑ Introduction of energy transformation models to generate electricity;
 - ❑ Why Vietnam needs NPP?; Introduction of nuclear power development history in Vietnam;
 - ❑ Introduction of nuclear power (technology, safety, fuel cycle,...)
 - ❑ Exhibition.

Operation time: 2017



5. Public Information and Communication Activities

3) Public Information Department

Opened in Feb, 2013 at EVN NPB office with the mission to present and transmitt the following informations:

- ✓ Dalat research reactor Activities
- ✓ Power Develop. Master Plan VII (2011–2020-2030).
- ✓ Why the World and Vietnam needs NPP ?
- ✓ Nuclear program development in Vietnam up to 2030
- ✓ EVN preparation activities for 1st NPPs in Ninh Thuan
- ✓ International Cooperation in Nuclear Energy (IAEA, Russian, Japan,...)
- ✓ Ninh Thuan Social, Culture and Economical development



5. Public Information and Communication Activities

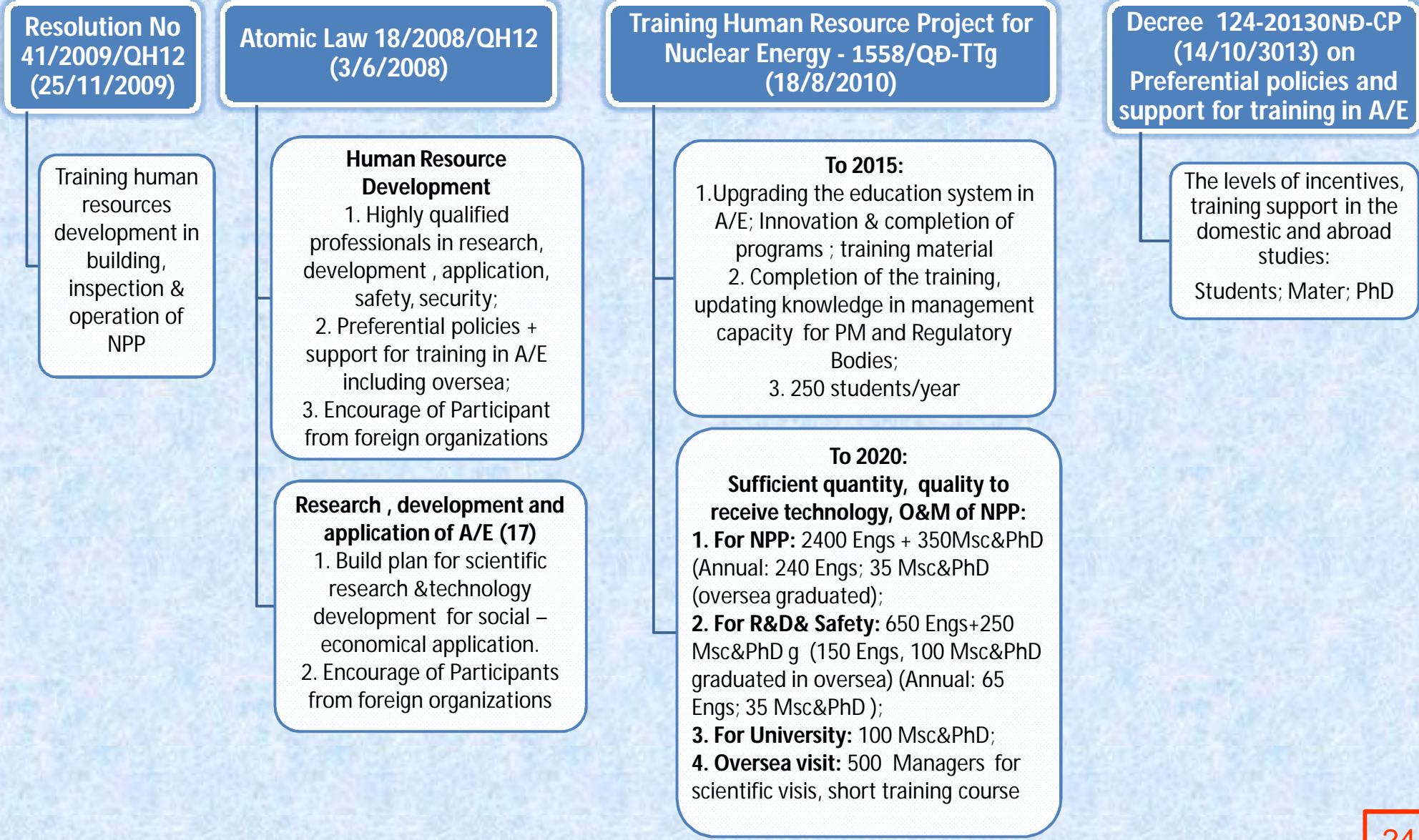
3) Public Information Department



There are hundreds turns of people from the Central, local areas as well as foreigners visited



1. Resolution No 41/2009/QH12 (25/11/2009) by National Assembly on Human Resource for Nuclear Program



2. Training Human Resource Project for NPPs (584/QD-TTg date 11/4/2013)

- ✓ Objective: EVN, EVNNPB, PECCs under EVN and Operation and maintenance staff for NPP1&2.
- ✓ Up to now: **258** students studied in Russian since 2006; in which **143** will engage to work for EVN.
24 Engineers (pre-operation staff) are training in Japan for NPP Operation

Human Resource demand for EVN

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
EVNNPB (pre-operational staff)	110	130	150 (30)	170 (50)	190 (80)	210 (130)	220 (180)	220	220	220	200	200
Ninh Thuan 1 NPP								390	790	1090	1100	1100
Ninh Thuan 2 NPP								390	790	1090	1100	1100
Total	110	130	180	220	170	340	400	1000	1800	2400	2400	2400

Required qualification

No	Qualification/Sector	Quantity (persons)/2NPP
1	Indirect functional department group.	226 x 2 (21%)
2	Direct operation group.	884 x 2 (79%)
	<i>By qualification:</i>	
	- Bachelor/ engineering degree	436 x 2
	- College/vocational school level	461 x 2
	- Unskilled workers	197 x 2
	Total	1100 x 2

2. Execution plan

1) Cooperation with Ministry of Training & Education (MOTE-Vietnam):

- 30 ~ 70 student/year dispatch to Russian Universities in NPP field → EVN will support scholarships → requirement by EVN.
- 6 Universities in Viet nam are educating annually 150 students in Nuclear Engineering



2) Cooperation with IAEA

Technical Cooperation project VIE/4/015: Nuclear Infrastructure Development (VAEA) from 2010:

- Expert Mission to review Report of “Human Resource Training Project for NPP”; Preparation of the Request for Proposal of EPC Contract; Grid – NPP Interaction; develop EIA report for NPP Project; Establishment of EVN’s siting team and working plan
- Seminars/workshops : NPP project management; IMS and Safety Culture ; NPP project funding and financing; Stakeholder involvement and PI for NP program; QA/QC for Construction of NPP; Nuclear Technology Assessment; Managing NPP Project in case of Turnkey/EPC Contract ;
- EVN experts participated in workshops/training courses on nuclear power, scientific visits in Austria, the U.S., France, South Korea, Russia, Jordan, China ...
- EVN staff has received scholarships for fellowship at the nuclear facilities in foreign countries

2. Execution plan

3) Cooperation with Japan

- With JINED:
 - ✓ MOU for Ninh Thuan 2 NPP: 29/11/2011; 25/6/2012; 06/11/2013
 - ✓ Training groups of core members for operation of Ninh Thuan 2 NPP: 24/60 Engs
- With JEPIC&WERC: project management; safety culture; public acceptant; QA/QC

4) Cooperation with ROSATOM

At CICET: core members for operation of Ninh Thuan 1 NPP (under negotiation with Rostatom)

5) Training Courses belong "Training Human Resource Project for NPPs"

- Basic knowledge of Nuclear energy:
 - ✓ For EVN NPB Engineer/EVN Experts;
 - ✓ 1500 persons; one-month Courses; 3 Courses/year;
 - ✓ Place: in Vietnam
- Project Management:
 - ✓ For EVN NPB Engineer/EVN Experts/EVN Consultant;
 - ✓ 140 persons/month; two-week Courses; 3 Courses/year.
- Nuclear Safety Engineering:
 - ✓ For EVN NPB Engineers;
 - ✓ 40 persons; three-month Courses

2. Execution plan

5) Training Courses belong "Training Human Resource Project for NPPs"

- Project and Quality Management:
 - ✓ For EVN NPB Engineers;
 - ✓ 80 persons; three-month Courses;
 - ✓ OJT at Project site in Russian and Japan
- Project Oversight:
 - ✓ For EVN NPB Engineers/EVN Consultant;
 - ✓ 20 persons; six-month Courses;
 - ✓ OJT at Project site in Russian and Japan
- Technical and Engineer for Operation and Maintenance:
 - ✓ Requirement by EVN and EVN NPB passing two-year training ;
 - ✓ 500 persons; three-month Courses;
 - ✓ OJT at Thermal Project site in Vietnam
- Foreign Language: Russian and Japanese
- Core member for for operation of Ninh Thuan 1 NPP: 200 pers for 2 year in Russian
- Core member for for operation of Ninh Thuan 2 NPP: 60 pers for 2 year in Japan
- Maintenance of NPPs: 400 pers for 3 month-course; OJT at NPP Plant

1. **Regulatory Documents (Law and Regulation/standards)**
2. **Educating and training the workforce for Project management, Project Oversight, Engineering and Operation & Maintenance**
3. **Satisfaction of Infrastructure issues for 1st NPP**
4. **Project Document Reviewing Works (Selection of TSO)**
5. **Language in Training and technology transfer**
6. **Safety Culture**
7. **Financing for Infrastructure issues and Project**



ATOMS FOR PEACE



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