INDONESIAN NUCLEAR POWER PROGRAMME

HUMAN RESOURCES DEVELOPMENT

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BRIEF PROFILE OF INDONESIA

GEOGRAPHY

The Republic of Indonesia is located in Southeast Asia between 6°08' north and 11°15' south latitude, and from 94°45' to 141°05' east longitude, and placed on an archipelago of about 18,000 islands astride the equator

Indonesia is a maritime country with a total area of 9.8 million square kilometers in which the sea area, including Exclusive Economic Zone, is about 81% of the total or equals to 7.9 million square kilometers, and the land area is about 1.9 million square kilometers.

POPULATION AND ECONOMICS

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Population (in million)	205.13	207.93	210.74	213.55	216.38	219.85	222.75	225.64	228.57	231.55	235.53
GDP (in Billion Rupiah)	1,390	1,443	1,505	1,577	1,657	1,751	1,847	1,963	2,082	2,177	2,253

The Indonesia's economy was plunged into **a deep recession in 1998** accompanied by rising inflation, falling exchange rate, increasing interest rates and sinking asset value. The crisis severely set the clock on the achievement of a decade of sustained high growth. During recession, ***GDP growth was contracted by less than minus 13.5%.***
By the end of 1999, national economic grew 0.79%. The economic growth was 3.83 % in 2001, 4.78% in 2003, 5.5% in 2006 and 5.5 % in 2010

ENERGY: FOSSIL AND NON FOSSIL

FOSSIL ENERGY	RESOURCES	RESERVES	PRODUCTION	RASIO RES./PROD (YEARS)
Oil	86.9 billion barrel	9.1 billion barrel*)	387 milion barrel	23
Gas	384.7 TSCF	185.8 TSCF	2.95 TSCF	62
Coal	58 billion ton	19,3 billion ton	132 million ton	146

**) including Cepu Block*

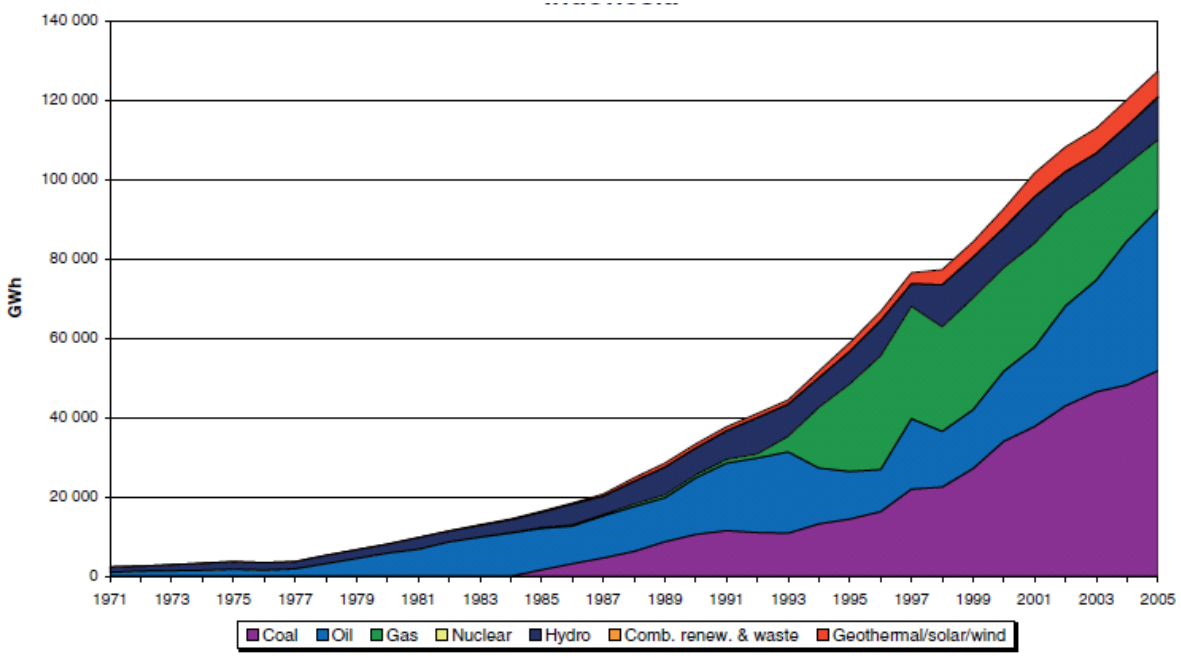
NON FOSSIL ENERGY	RESOURCES	EQUIVALENT	INSTALED CAPACITY
Hydro	845.00 million BOE	75.67 GW	4.2 GW
Geothermal	219 million BOE	27.00 GW	0.8 GW
Mini/Micro Hydro	0.45 GW	0.45 GW	0. 206 GW
Biomass	49.81 GW	49.81 GW	0.3 GW
Solar Energy	-	4.80 kWh/m^2/day	0.01 GW
Wind	9.29 GW	9.29 GW	0.0006 GW
Uranium (Nuclear)	24.112 ton		

• Just in Kalan-Kalbar Area

Source : Blueprint Management of Energy National 2006-2025, Ministry of Energy and Mineral Resource

ELECTRICITY

- Nearly 75.5% of the average electricity produced (PLN and private industry/captive power) was generated in **Java, Madura and Bali** (***JAMALI***) Integrated Electricity Grid System. The reasons were the more intensive economic development in Java and the availability of an interconnection grid.
- Outside Java, load dependency of electricity generation is neglected; no use of concepts such as base load, peak load, peak time, off-peak time is made. Rather small units of coal, oil, gas-fired steam plants, hydro power plants as drawn up in the installation schedule or in potential studies, and diesel generator set are the option.
- The past growth of electricity in Indonesia can be shown in the figure :



Total Electricity in 2010 is about 30.3 GWe with electriciy consumption of 628 kWh per capita

NATIONAL ENERGY POLICY AND ENVIRONMENT POLICY

NATIONAL ENERGY POLICY

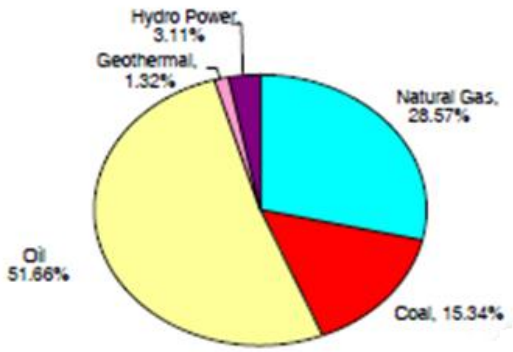
(PRESIDENTIAL DECREE NO. 5 YEAR 2006)

Target in 2025

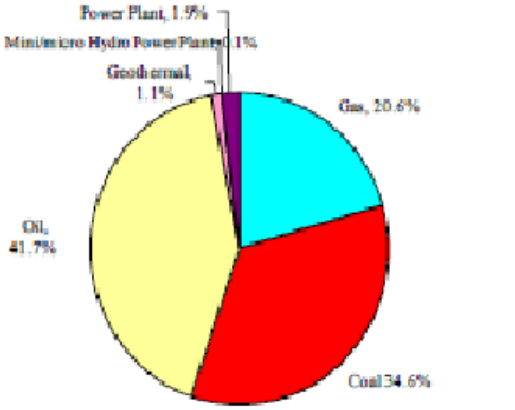
1. Less than 1 for energy elasticity
2. Optimized primary energy mix

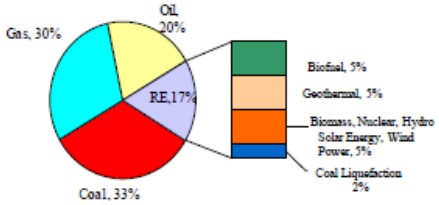
CURRENT ENERGI MIX (1 million BOE)

National (Primary) Energy Mix



National (Primary) Energy Mix of 2025 (BaU Scenario)



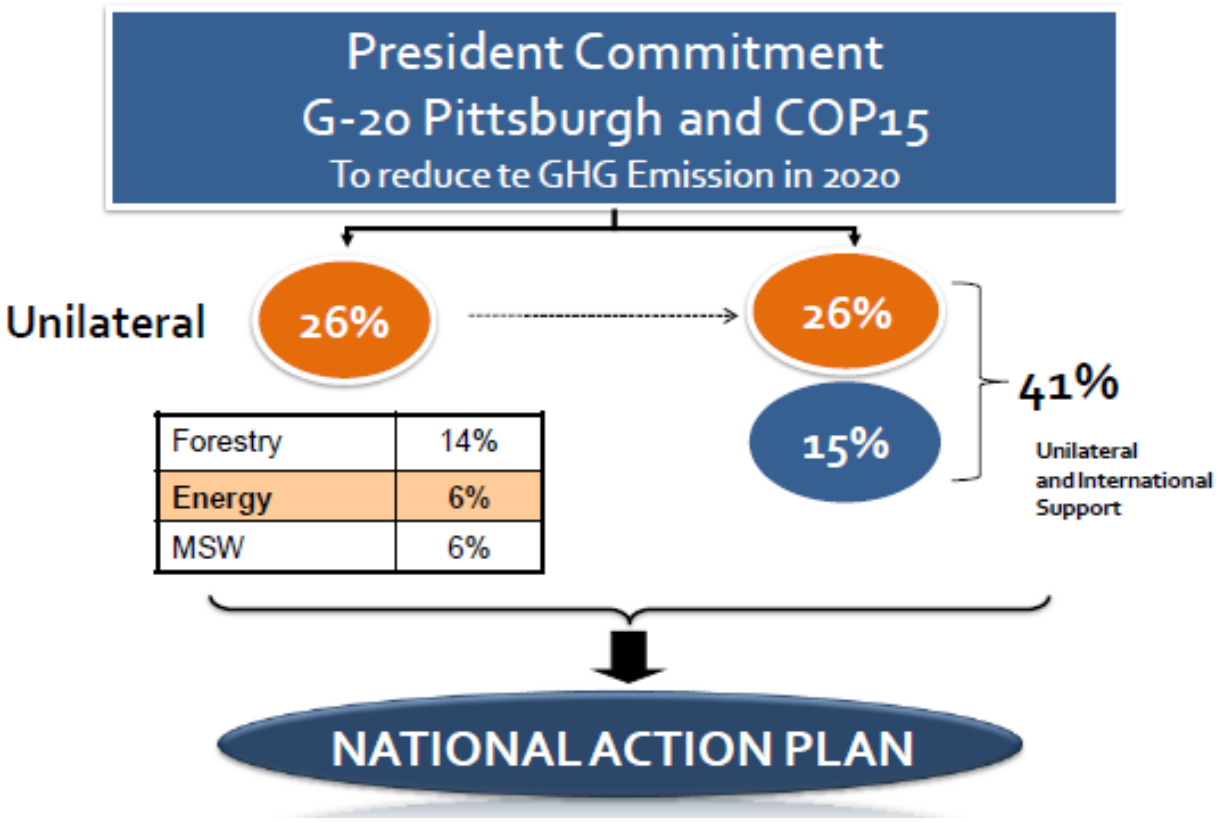


ENVIRONMENTAL POLICY

- **INTERNATIONAL CONVENTIONS ON ENVIRONMENT**
  - Indonesia has ratified the UNFCC in 1994 as **Act No. 6 / 1994**
  - Indonesia has ratified 1992 Copenhagen Amendment to the Montreal Protocol on June 23, 1998 by the **Presidential Decree No. 92/1998**.
  - House of Representative passed an act to ratify the Kyoto Protocol on June 28, 2004, wich was signed on October 19 as **Act No. 17 / 2004**.

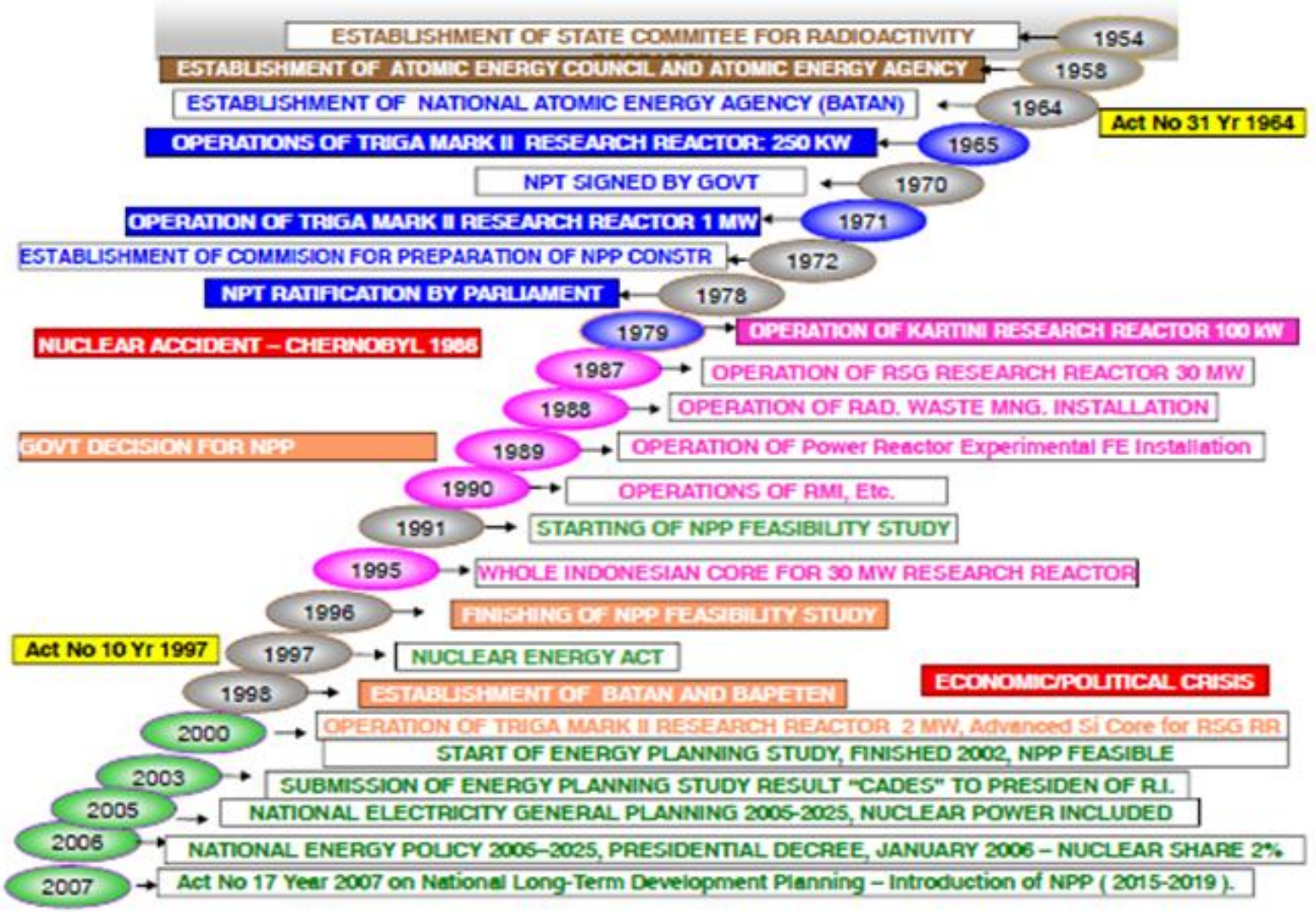
- **NATIONAL ENVIRONMENTAL POLICY**
  - "Clear commitment to protect the environment and natural resources, while simultaneously providing for continued economic development." *Statement of Environmental Policies* is provided in the Law of the Republic of Indonesia **(Act No. 23 of 1997)**

Scenario of 2020 GHG Emission Reduction



NATIONAL NUCLEAR POWER PROGRAM

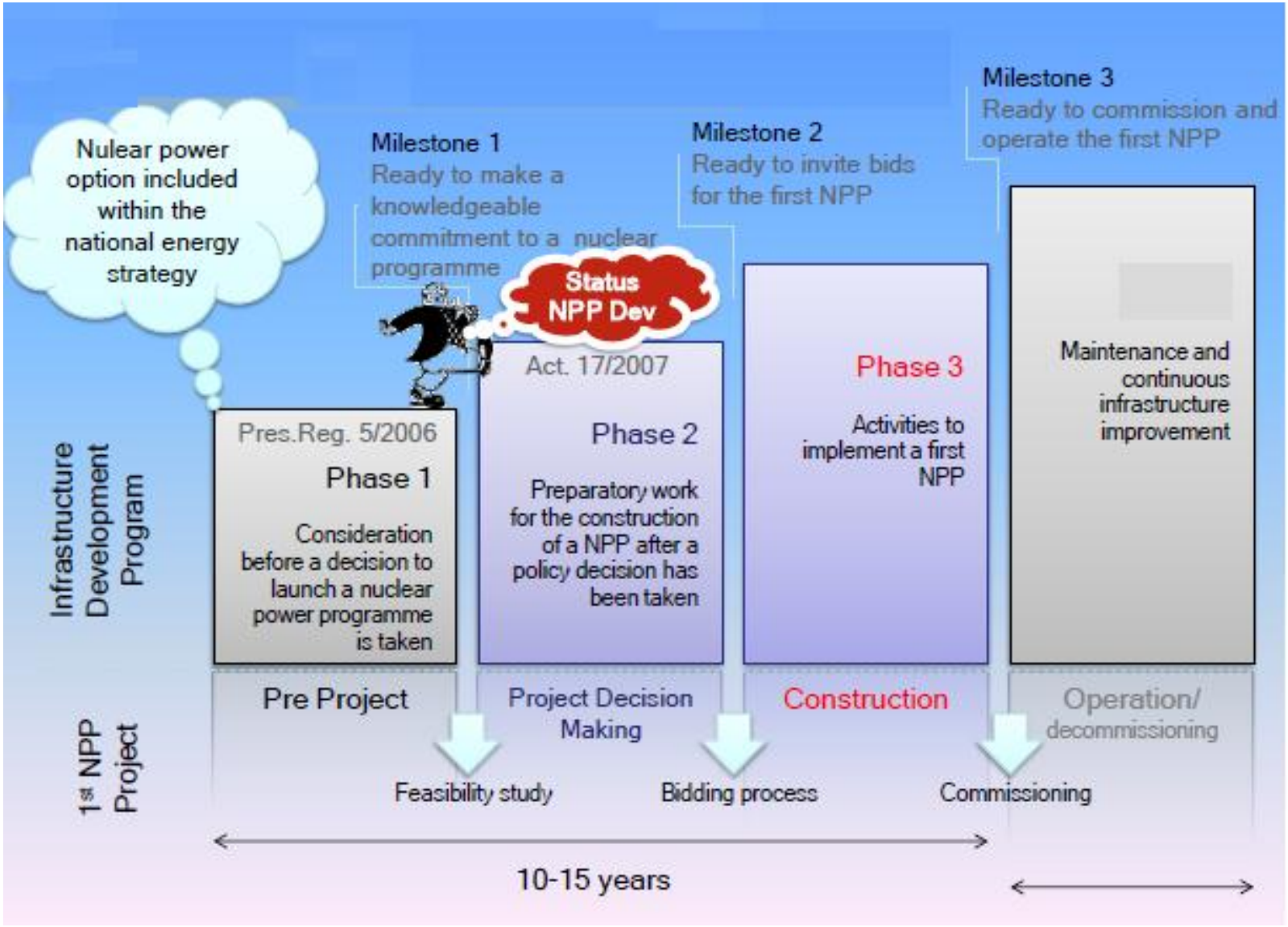
INDONESIA HAS FOR A LONG PERIOD PLANNED IN INTRODUCING NUCLEAR POWER



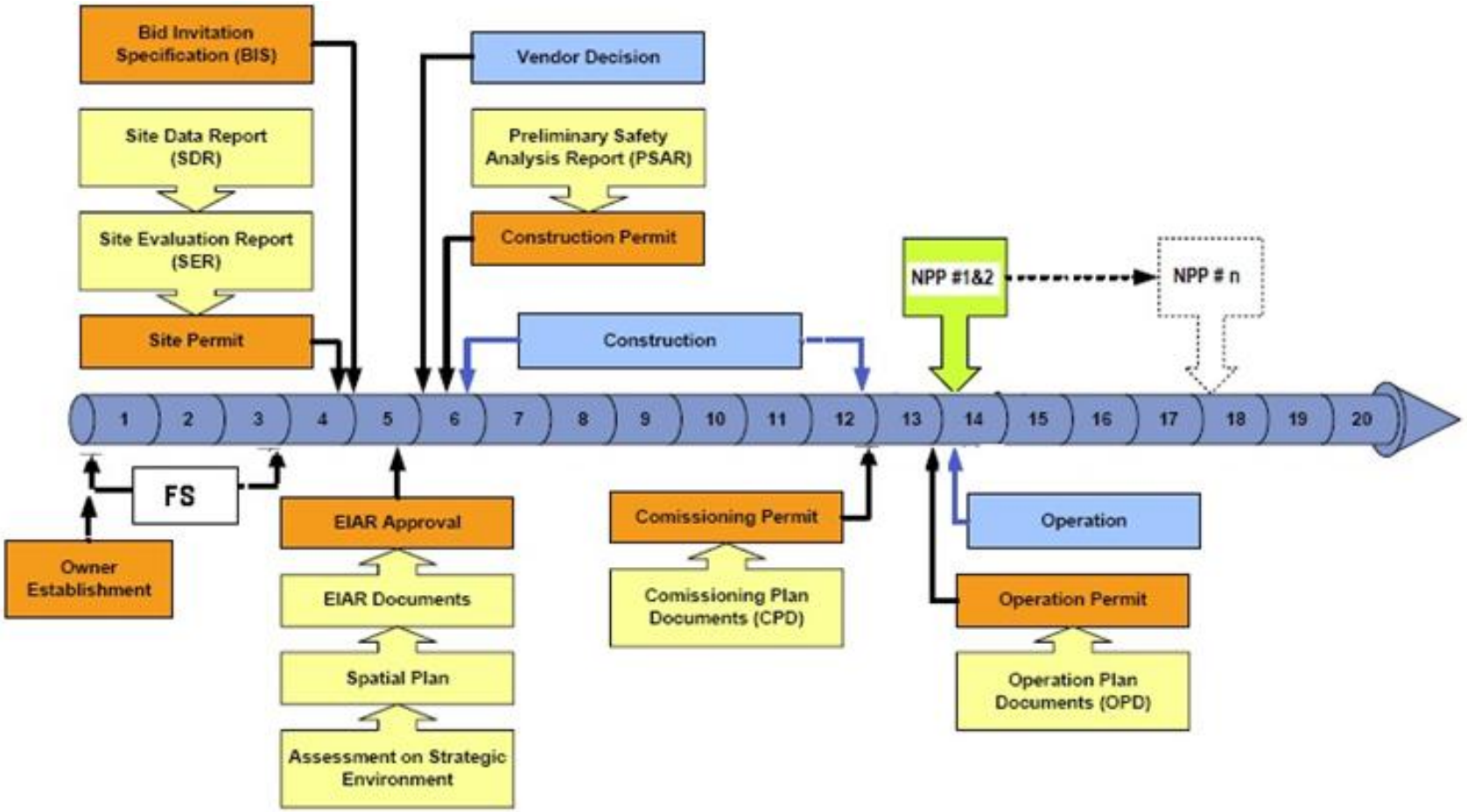
GOVERNMENT OF INDONESIA HAS PROPOSED THE NEW NATIONAL ENERGY POLICY AND PROMOTING NPP AS ONE OF BEST ALTERNATIVE ELECTRICITY SUPPLIES

2008	**National Energy Council** The National Energy Council is a national, independent, and permanent body whose main responsibilities relate to the formulation of a national energy policy. The members of the Council are: Chair : President; Deputy Chair : Vice President; Day-to-Day Chair : Minister of Energy and Mineral Resources The Members of the Council will include 7 government officials and 8 stakeholders.
2009	**Self Evaluation of National Nuclear Infrastructure and IAEA INIR Mission**
2010	• President Instruction No 1 / 2010 on NPP acceleration on the implementation of national development priorities • In September 2010, the **Directorate General of New and Renewable Energy and Energy Conservation** -Ministry of Energy and Mineral Resources was established
2011-2013	**Feasibility Study for Bangka Belitung Province.**

NATIONAL NUCLEAR INFRASTRUCTURES DEVELOPMENT PROGRAM



ROADMAP OF NPP PROJECT



NUCLEAR HUMAN RESOURCE DEVELOPMENT

INTRODUCTION

Manpower development is one of the prerequisite for the safety of nuclear facilities in the country. Recruitment of competent staff is difficult in the country, especially facing the economic and social barriers. Replacement of retiring staff and the ageing of the existing research reactors and existing work force, require great efforts from the management for establishing proper qualification and programs. From the external environment point of view, the consequential lack of interest of new professionals to engage in the nuclear fields consider to be the major national concern. *The situation is compounded by the great reduction in higher education opportunities in the field of nuclear engineering and the elimination of nuclear engineering department in many universities*.

To respond to the above situation, several major policies need to be established to provide support for the country in establishing its current nuclear implementation program and launching and embark its nuclear power programs. The objective of developing training technology is required to ensure and maintain proper and adequate levels of competencies. The training technology should ensure that staffs are aware of technological developments and new safety principles and concepts.

HUMAN RESOURCE DEVELOPMENT (HRD) STRATEGY

HRD in the national level would carefully consider the nuclear technology application in the industry and how education and training system can support the technology demand. HRD strategy would consider the science and technology demand and the safety requirement needed and recommended by regulation.

HRD strategy would consider the adequacy of the system to conduct effective program, suc h as the availlability of training management, training facility, training material, training aid and equipment, etc. It can be concluded that *a comprehensive HRD strategy is required beginning in the planning phase, construction phase until the implementation of nuclear program*.

At present, Blue print of Nuclear HRD program and concept of Nuclear Training Center (NTC) facilities are being conducted by interdepartmental organization include ***MEMR, BATAN, Department of Labour and Transmigration, BAPETEN, and Ministry of Research & Technology.***

ORGANIZATION OF NUCLEAR INSTITUTIONS

In recognition of the need to develop a viable nuclear regulatory infrastructure in order to proceed with the development of nuclear power, the government of Indonesia has issued the new basic nuclear energy act on April 1997 (**Act No. 10 of 1997**) to replace the **Act No. 31 of 1964** which have become inappropriate. In this new Act, the authority in executing and regulating nuclear energy is separated into two different institutions to guarantee the control of nuclear energy to be more credible in order to suffice the nuclear safety.

According to this new Act, Chapter II Article 3, the responsibility to promote the application of nuclear energy is vested to the "**Promotional Body**" (***National Nuclear Energy Agency [NNEA]*** or ***BATAN***) and, as stated in the Chapter II Article 4, the responsibility to regulate and control is vested to the "**Regulatory Body**" (***Nuclear Energy Control Board*** or ***BAPETEN***).

The National Nuclear Energy Agency (BATAN)

HRD in the field of nuclear energy has been carried out by BATAN for a long time. The capability of national human resources has been demonstrated in the construction and operation of three research reactors in Indonesia i.e. **Triga Mark II in Bandung in 1964**, **Kartini Reactor in Yogyakarta in 1975** and **Multipurpose Reactor of GA Siwabessy in 1987** to support the facilities in Puspiptek Area, Serpong. The education and training programme has been directed to cope with the nuclear energy utilization era and to meet the national energy needs and carried out in cooperation with related domestic and overseas research institutions.

Total manpower of BATAN is 3,088 employees, consist of 98 doctoral degree, 296 master degree, 1102 undergraduate degree and 1592 diploma.

The development programme is oriented to provide well educated and well trained personnel in the fields of research, development and application of nuclear technology, as well as to promote nuclear science and technology to the public, especially industrial society, through education and training program.

The Nuclear Energy Regulatory Agency (BAPETEN)

BAPETEN as the regulatory body in Indonesia, is implementing training program for their staffs and other institutions which need license for utilization of nuclear energy. The type of the training programme includes:

- Research reactor inspection
- Re-qualification of radiation protection worker
- Environmental Radiation Inspector
- Nuclear emergency preparedness and safeguard
- Assessor, Legal Drafting and Others

Total manpower of BAPETEN is 439 employees, consist of 10 doctoral degree, 105 master degree, 218 undergraduate degree and 106 diploma.

In 2005 and 2006, BAPETEN had cooperated with the International Atomic Energy Agency in the project titled “Preparation of Regulations, Code, Guides and Standards for a Nuclear Power Plant”. The training programmes were as follows:

- National Training on Legal Infrastructure and Site Evaluation
- National Training on Safety for Design
- Fellowship Training and Scientific Visit

Sekolah Tinggi Teknologi Nuklir (STTN) or Polytechnic Institute of Nuclear Technology (PoINT)

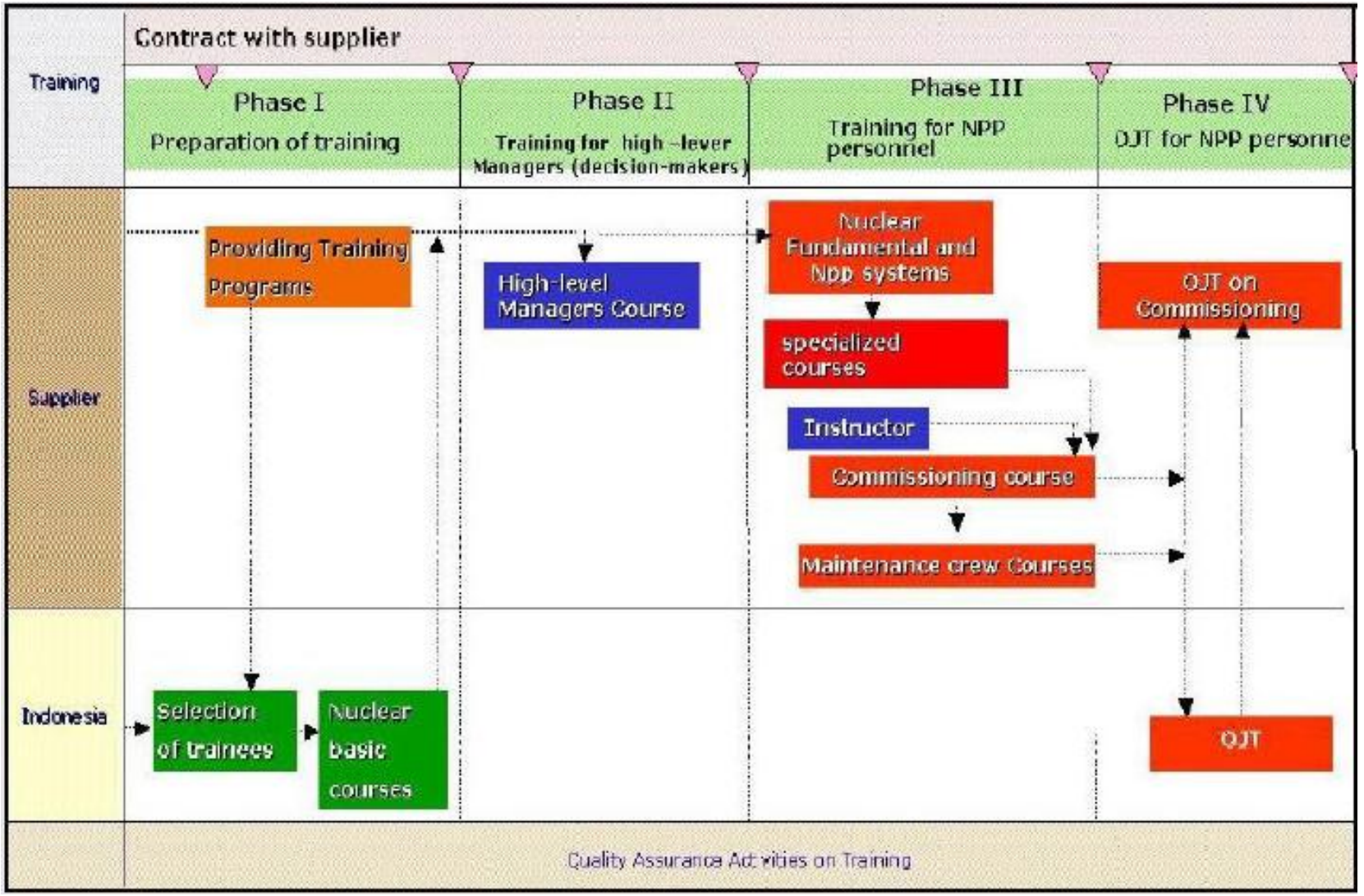
STTN (PoINT) was inaugurated in August 2001 in Yogyakarta based on the Presidential Decree No. 71, of 2001 on the establishment of STTN and accredited as a higher education institute for graduate program. STTN is an official education institute carrying out nuclear science and technology manpower development program through carefully crafted four year education.

STTN has two majors study programmes as follows:

1.Nuclear Techno-chemistry. The purpose of this major is to educate students in the field of chemical processes using nuclear technology (nuclear techno-chemistry).

2.Nuclear Techno-physics. The purpose of this major is to educate students in the field of monitoring, measuring, and controlling physical processes related to nuclear reaction and radiation.

Expected Education and Training Program in Nuclear Power Program



THANK YOU FOR YOUR ATTENTION