

ENERGY SITUATION AND NUCLEAR POWER DEVELOPMENT IN INDONESIA

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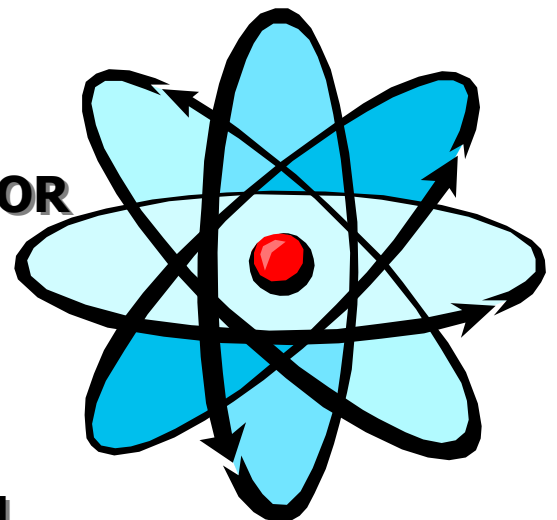
1. INTRODUCTION

1.1. Foundation Philosophy.

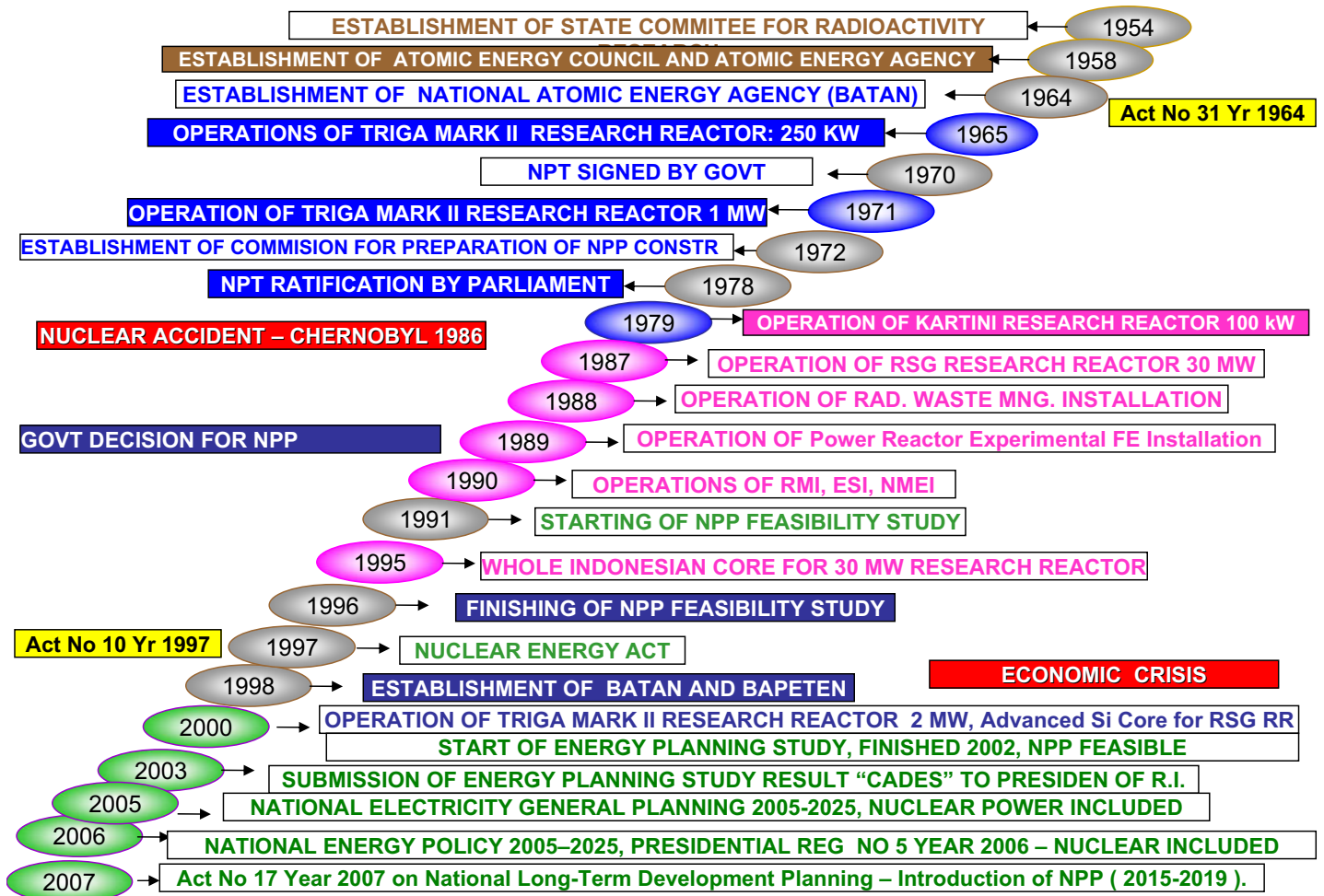
1.2. Activities Related to Nuclear Power Plant (NPP) Introduction.

1.1 FOUNDATION PHILOSOPHY

- **APPLICATION AND DEVELOPMENT IN NUCLEAR SCIENCE & TECHNOLOGY IS FOR PEACEFUL USES ONLY**
- **SAFETY & SECURITY IS THE PRIME CONSIDERATION**
- **DEMAND DRIVEN AND STAKEHOLDER SATISFACTION**



1.2. Activities Related to NPP Introduction



2. Act, Decree, Regulation & International Nuclear Arrangements

2.1. Act, Decree, Regulation relating to NPP Development in Indonesia.

2.2. Indonesian Status to the International Nuclear Arrangements.

2.1. Act, Decree, Regulation relating to NPP Development in Indonesia

- Act No. 10 Year 1997 on Nuclear Energy
- Act No. 17 Year 2007 on National Long-Term Development Planning 2005-2025.
- Act No. 30 Year 2007 on Energy
- Government Regulation No 43 Year 2006 on Licensing of Nuclear Reactor
- Presidential Regulation No 5 Year 2006 on National Energy Policy .
- National Electricity General Planning (RUKN) 2006-2026, MOEMR 2006.
- Guidance for the Application and Development of Sustainable Nuclear Energy System in Indonesia

2.2. Indonesian Status to the International Nuclear Arrangements.

No	INTERNATIONAL NUCLEAR TREATY AND CONVENTION	STATUS
1.	<ul style="list-style-type: none"> ▪Non-Proliferation Treaty (NPT) ▪Safeguard Agreement with IAEA ▪Additional Protocol to Safeguards 	<ul style="list-style-type: none"> ▪Ratified : Act No.8 / 1978 ▪Signed (Valid) ▪Signed (Valid)
2.	Convention on Physical Protection of Nuclear Material and its Amendment	Ratified : President Decree No.49 / 1986
3.	Convention on Early Notification of a Nuclear Accident	Ratified : President Decree No.81 / 1993
4.	Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	Ratified : President Decree No.82 / 1993
5.	Treaty on the South East Asia Nuclear Weapon Free Zone	Ratified : UU No.9 / 1997
6.	Convention on Nuclear Safety	Ratified : President Decree No.106 / 2001
7.	Comprehensive Nuclear Test-Ban Treaty (CTBT)	Signed 1996
8.	Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management	Signed (1997)
9.	Protocol to Amend the Vienna Convention	Signed (1997)
10.	Supplementary Compensation for Nuclear Damage	Signed (1997)
11.	Bilateral Cooperation and Supply Agreement (s)	Signed (1997)

SAFEGUARDS CONCLUSIONS :

- For 13 States (Australia, Croatia, Ghana, the Holy See, Hungary, **Indonesia**, Jordan, Monaco, New Zealand, Norway, Peru, Slovenia and Uzbekistan) having both Comprehensive Safeguards Agreement (CSA) and Additional Protocol (AP) in force, the IAEA concluded that all nuclear material had been placed under safeguards and remained in peaceful nuclear activities.
- Indonesia recognized by IAEA as the first three countries (Australia and Norway) applying CSA and AP (IAEA GC-2005).

Source : International Atomic Energy Agency

3.Current Energy Conditions

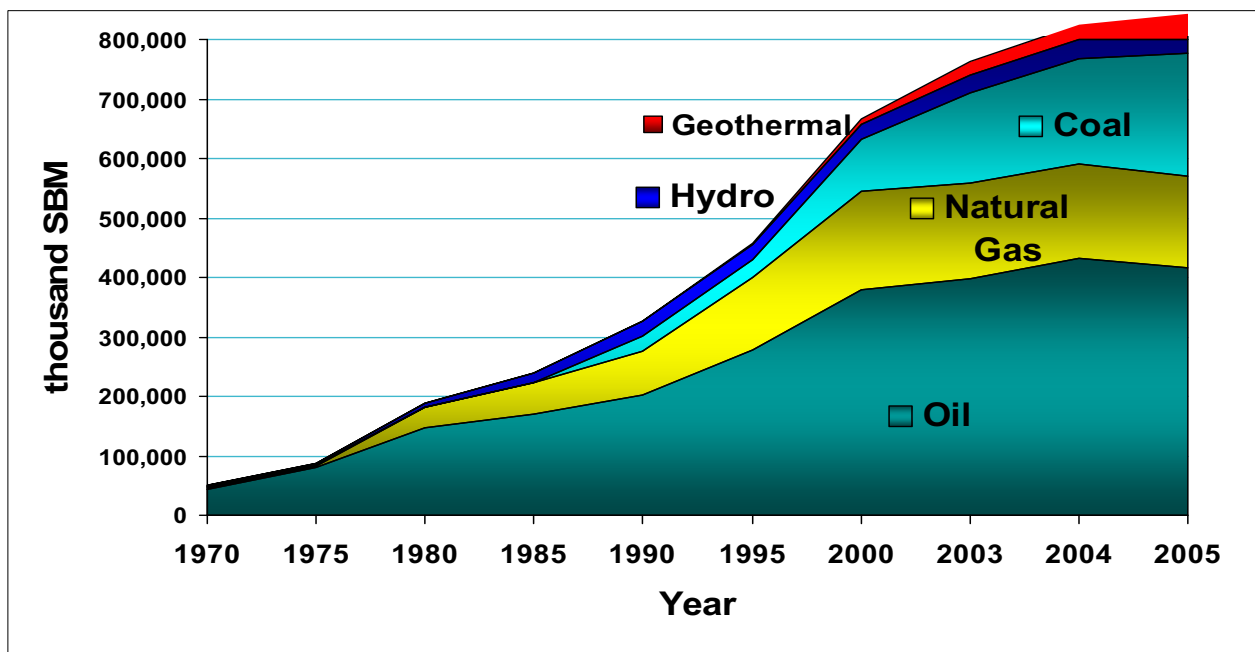
3.1 ENERGY DEVELOPMENT IN INDONESIA

	SUBJECT	THE ERA OF ENERGY RESURGENCE IN INDONESIA	
		I (1966)	II (2006)
1.	Momentum beginning	Oil dominant	Oil dependency
2.	Fiscal Influence (APBN)	50 – 75 %	25 – 35 %
3.	Primary Energy Production	Oil	Oil and energy alternative
4.	Accessibility to Energy	Oil and traditional energy	Oil and commercial energy
5.	Energy Demand Growth	Low	High
7.	Subsidy Reduction	Price policy	Substitution subsidy
8.	Sectoral Treatment	Lex Specialist	Lex Generalist
9.	Policy Priority	Supply Side Management (SSM)	Demand Side Management (DSM)
10.	Contribution to National Development	- Pro Growth - Pro Job - Pro Poor	- Pro Poor - Pro Job - Pro Growth

Source : DGEEU-MEMR

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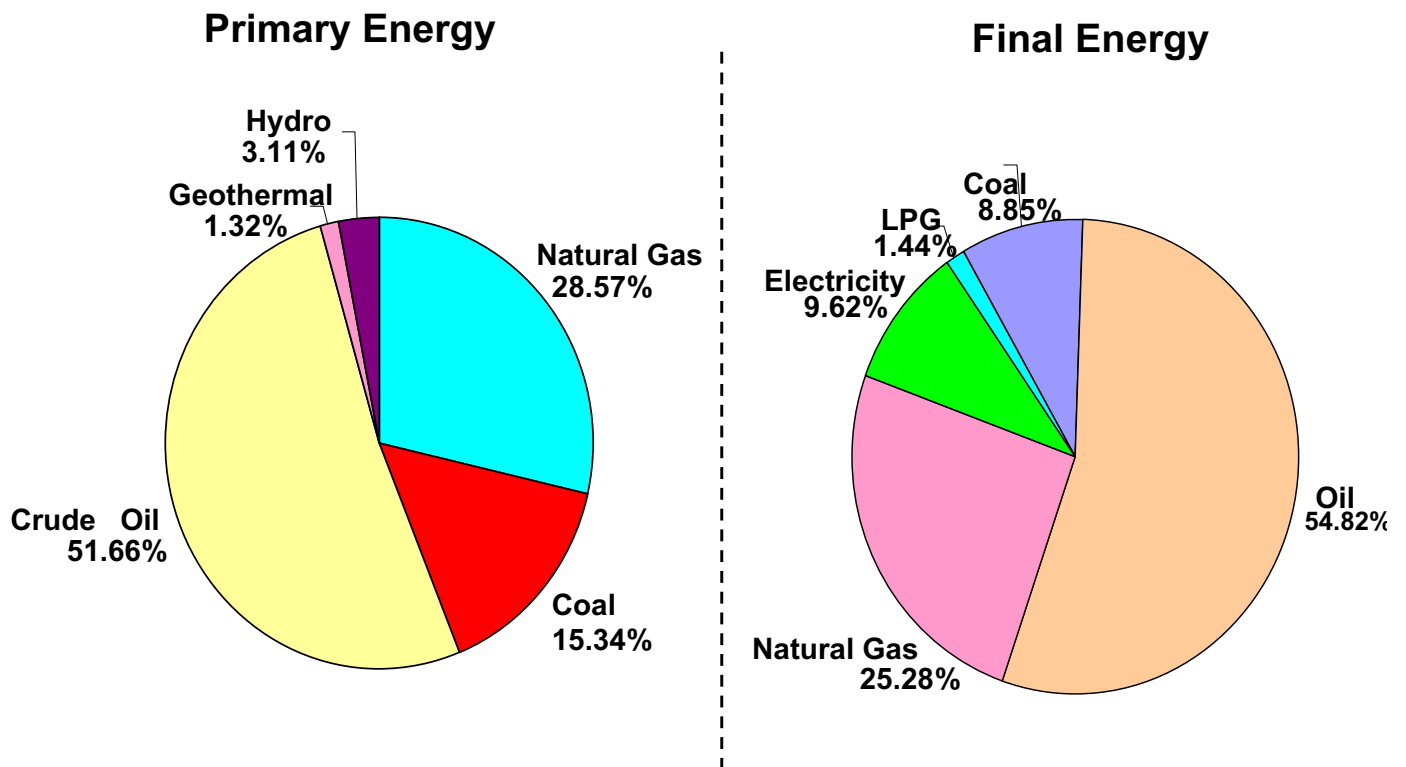
3.2 Growth of Primary Energy



The average growth of primary energy :
1970-2005 = ± 8,5 %/ annum

Source : DGEEU-MEMR

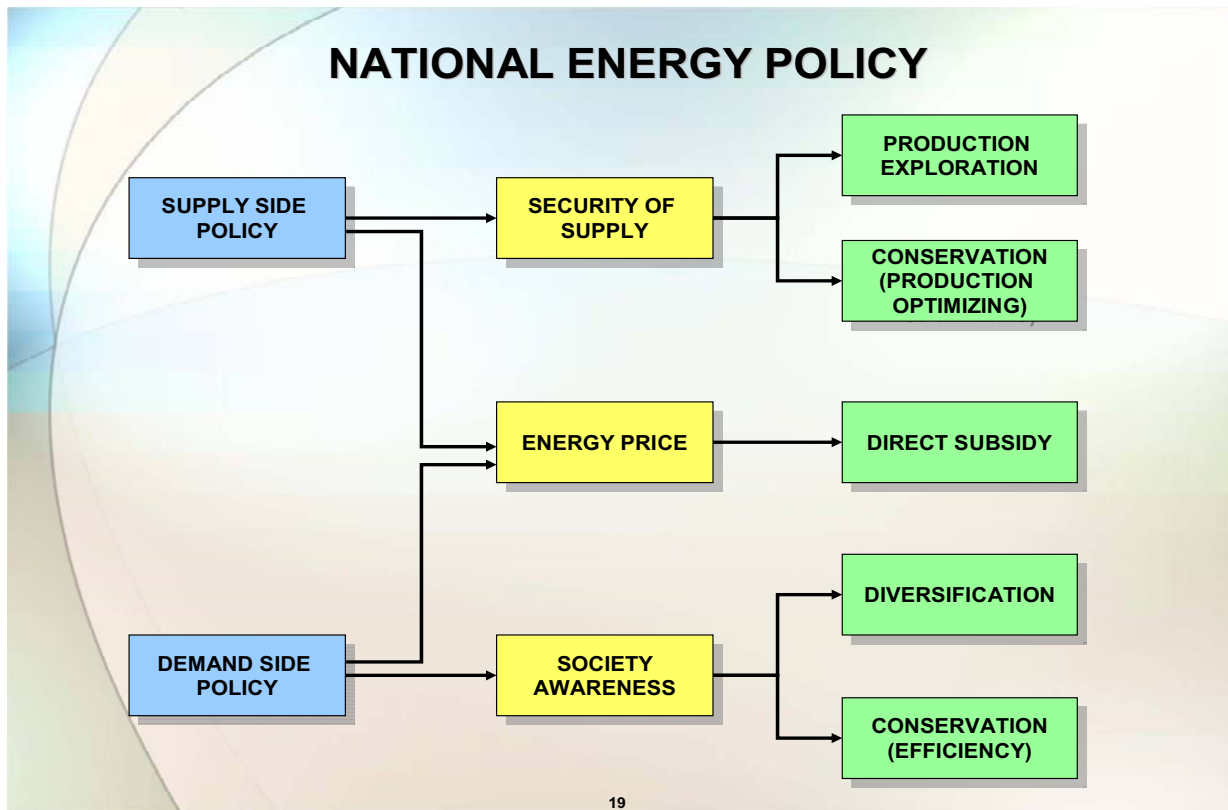
3.3. Consumption of Crude oil and Fuel Oil are High (2006)



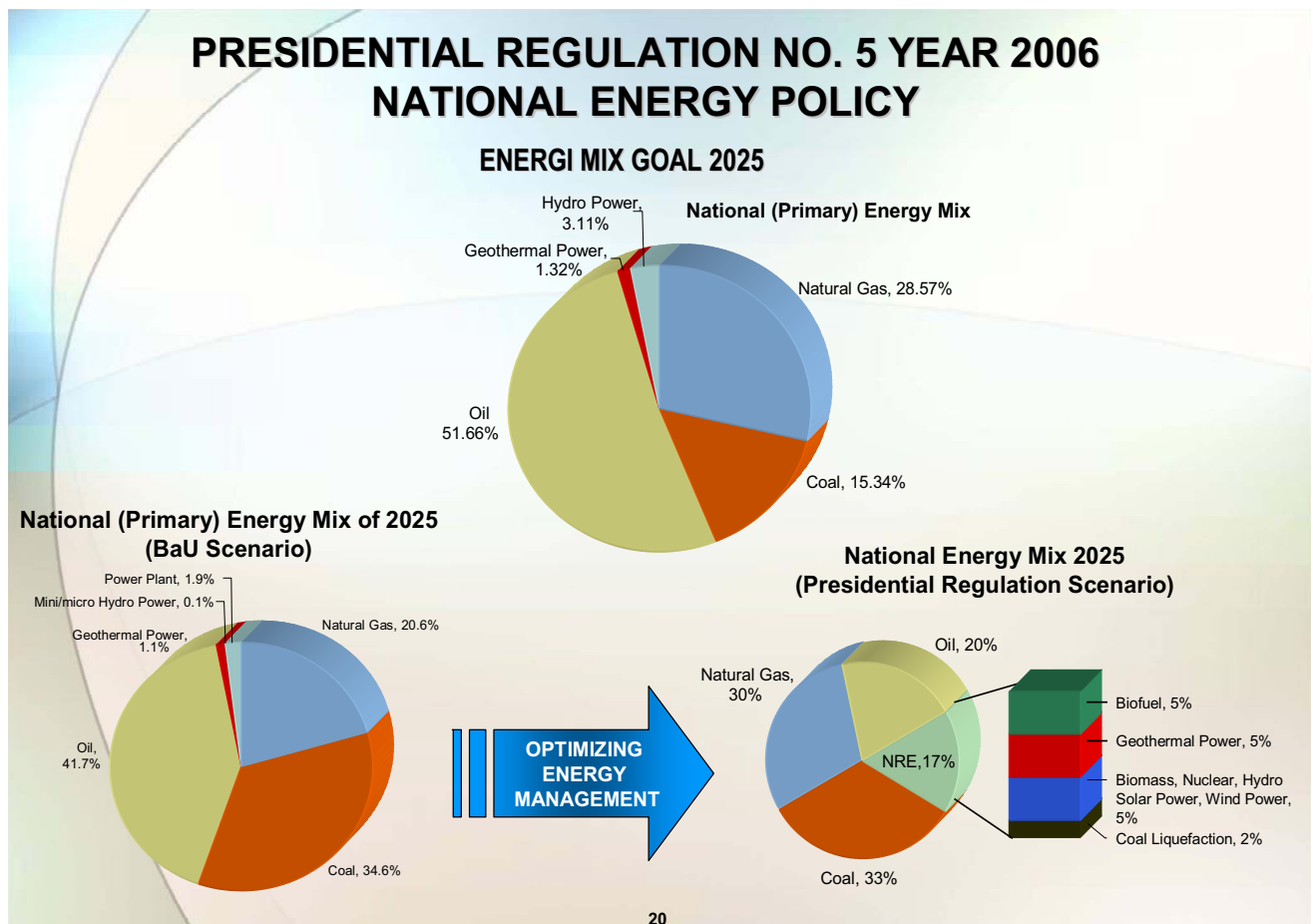
Source : DGEEU-MEMR

4. Energy Policies

4.1. National Energy Policy



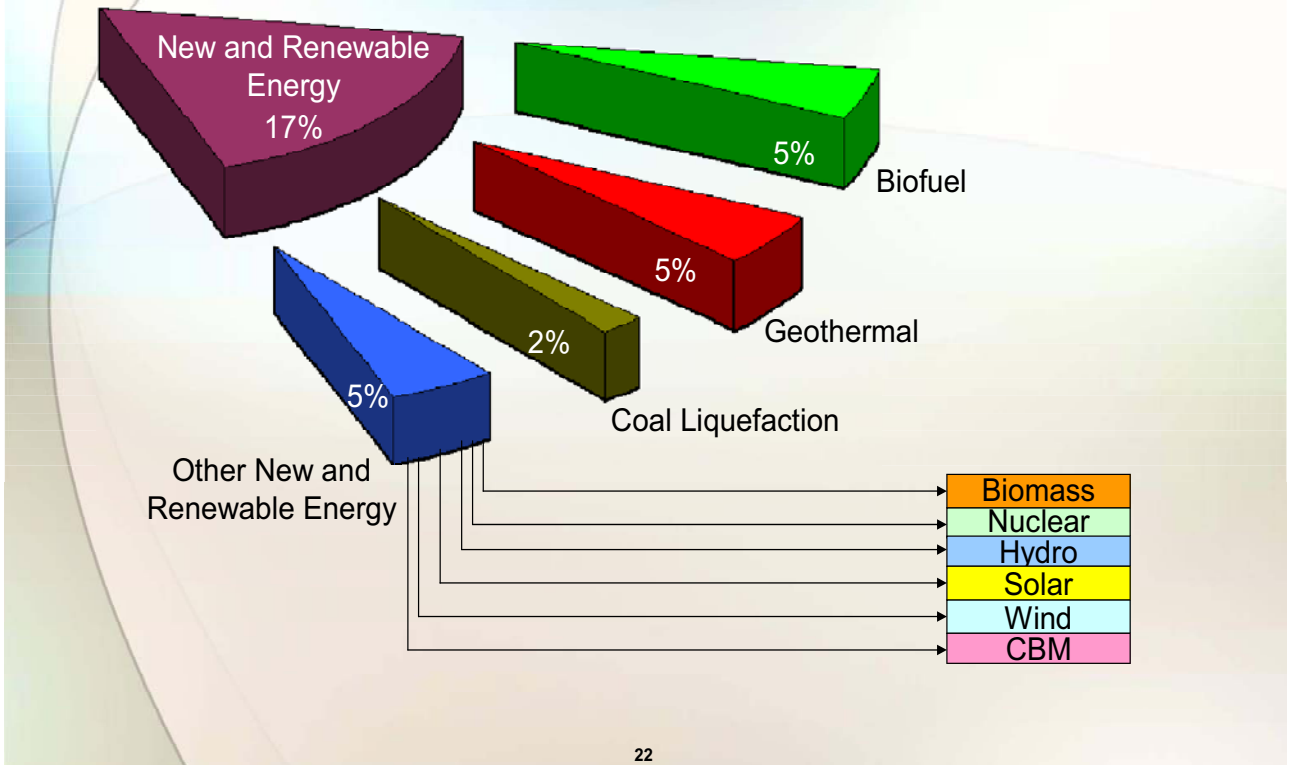
Source : DGEEU-MEMR



Source : DGEEU-MEMR

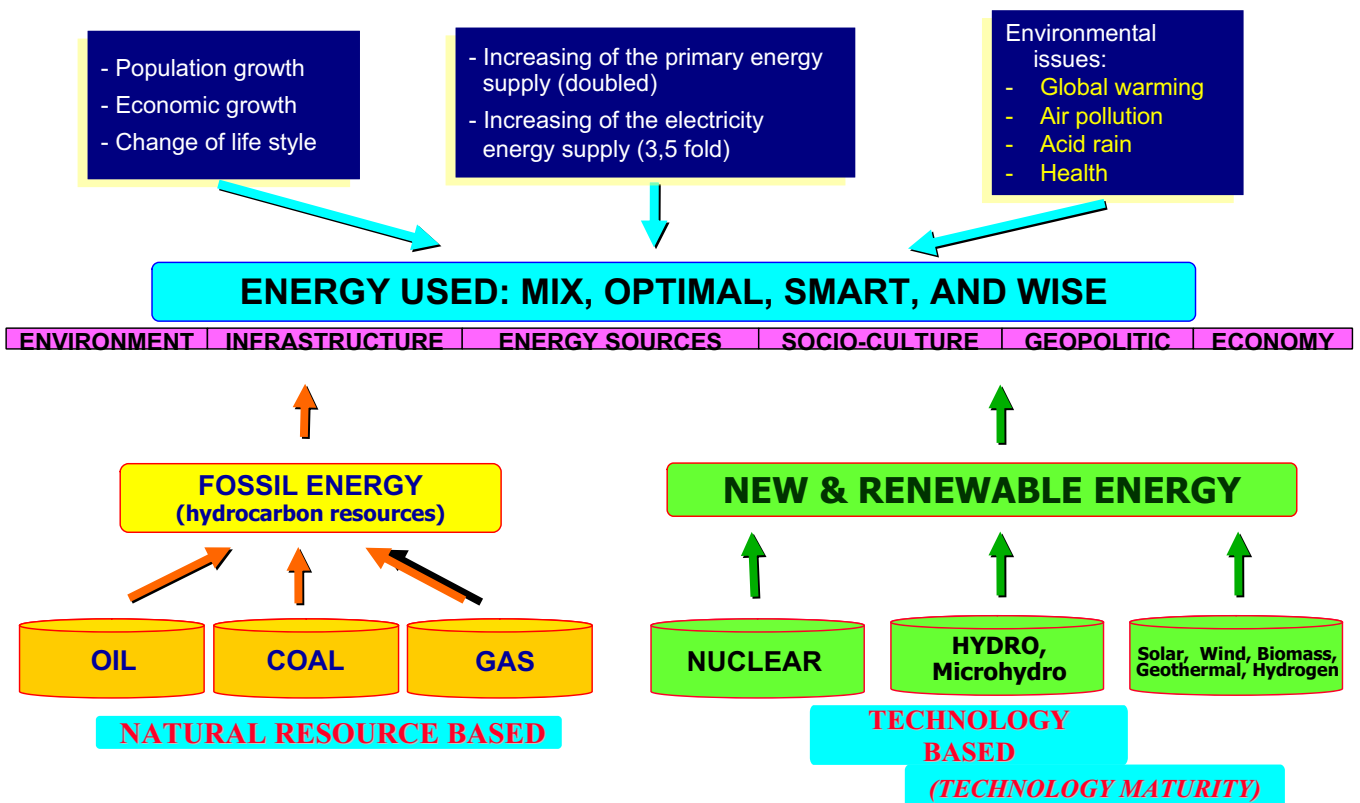
NEW AND RENEWABLE ENERGY DEVELOPMENT

(In accordance with the Presidential Regulation No. 5/2006)



Source : DGEEU-MEMR

4.2. Long-Term National Energy Planning.



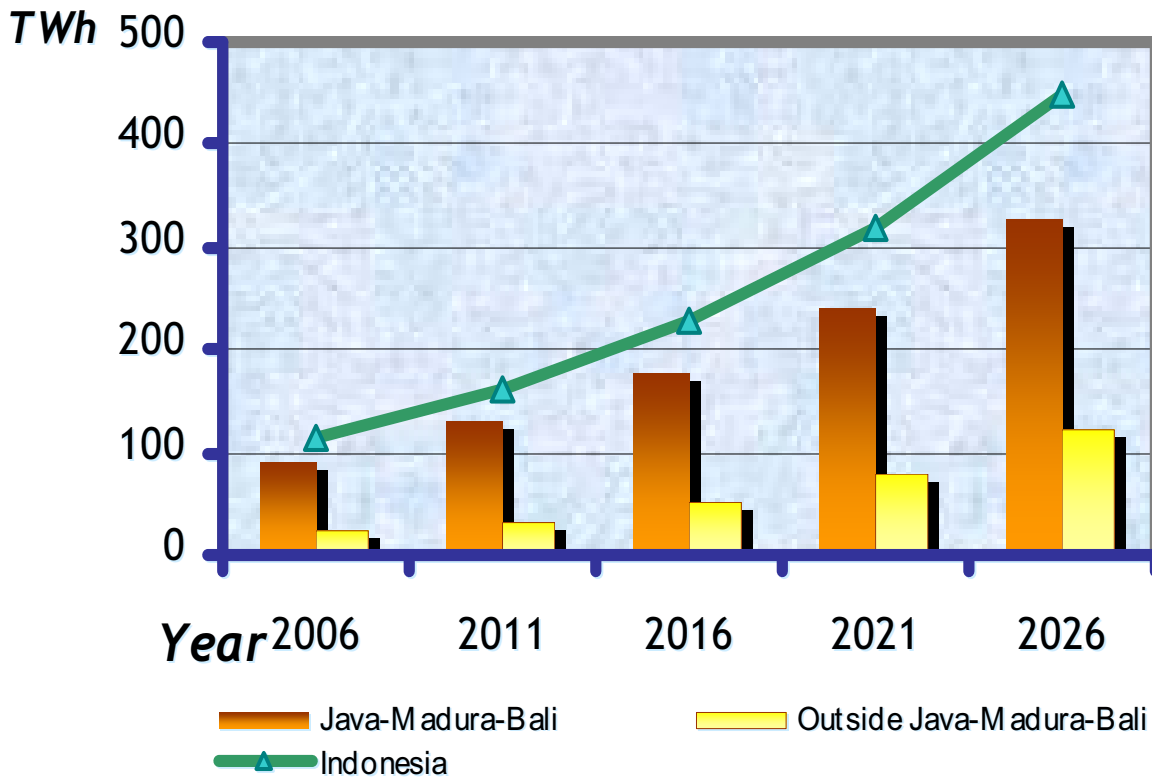
5. Issues of the Nuclear Development Program in Indonesia

- 5.1. Electricity : Current Condition and National Electricity General Planning (2006-2026).
- 5.2. Nuclear as a Option for Long Term Energy Supply.
- 5.3. Infrastructure Development Program.
- 5.4. Utilization of Nuclear technology and Activities relating to Nuclear Power Plant.
- 5.5. Current Influencing Factors.

5.1. Current Electricity Condition

- Electricity System:**
 - Interconnection: Java-Madura-Bali and most of Sumatera island;
 - The others are still isolated.
- Growth rate of demand for electricity up to 2026: 7.1 % p.a.**
- Total installed capacity 29,083 MW:**
 - PLN's : 24.887 MW (85,57%);
 - IPP's : 3.450 MW (11,86%);
 - PPU's : 746 MW (2,57%).
- Electrification ratio: 56%.**
- Village electrified ratio: 85%**
- Consumption of fuel-oil for power generation is about 24%.**
- Power plant's installed capacity from renewable energy:**
 - Geothermal : 1,032 MW
 - Hydro : 4.200 MW
 - Mini/Micro Hydro : 84 MW
 - Biomass : 445 MW
 - Solar Cell : 8 MW
 - Wind Power : 0,6 MW

Electricity Demand (Based on RUKN 2006 – 2026)



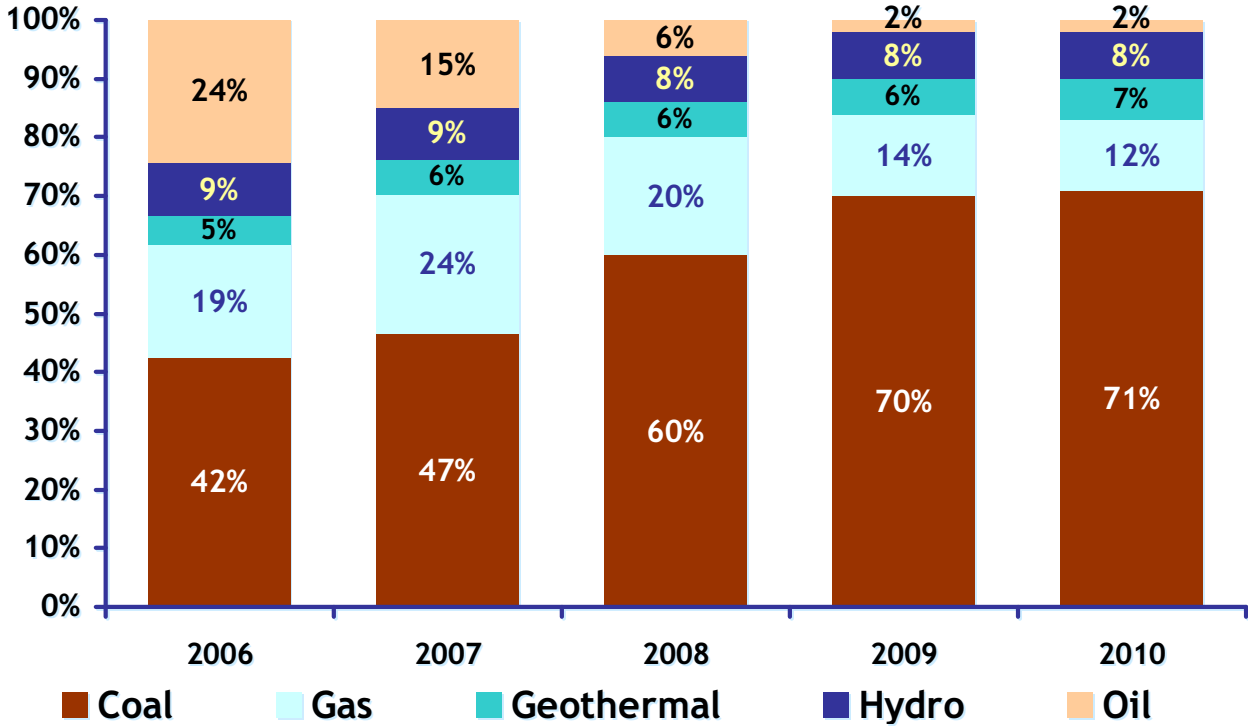
Source : DGEEU-MEMR

Electricity Demand (Based on RUKN 2006 – 2026)

Area	Description	Units	2006	2011	2016	2021	2026
Java-Madura-Bali	Demand	TWh	92	129	178	242	327
	Peak Load	GW	15	21	29	40	59
	Additional Power Plants	GW	-0.4	10	27	42	53
Outside Java-Madura-Bali	Demand	TWh	23	33	50	77	123
	Peak Load	GW	5	7	10	14	17
	Additional Power Plants	GW	0.9	5	9	16	37
Indonesia	Demand	TWh	115	162	228	319	450
	Peak Load	GW	20	28	39	54	76
	Additional Power Plants	GW	0.5	15	36	58	90

Source : DGEEU-MEMR

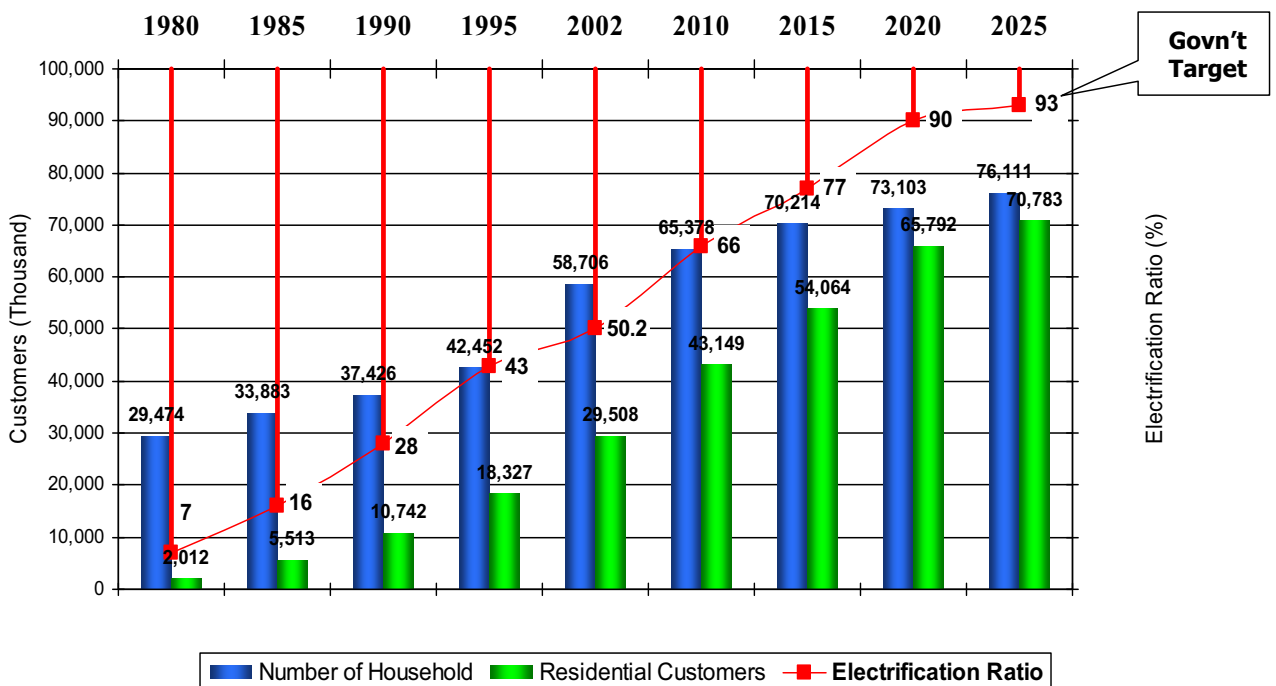
Primary Energy Share for Power Generation (Java-Madura-Bali)



Nuclear Energy is considered to be utilized gradually starting in 2017/2018, and is expected to reach 4% in 2025

Source : DGEEU-MEMR

Electrification Ratio Growth



Source : DGEEU-MEMR

5.2 Nuclear as An Option for Long Term Energy Supply

❑ Energy Diversification

- Diversify primary energy use for power generation and reduce fossil fuel dependency (esp. Oil)

❑ Energy Conservation

- Energy efficiency to reduce total domestic energy and electricity demand and increase added value

❑ Energy Security and Self Sufficiency

❑ Environmental Protection

- Reduce SO_x, NO_x and Green-House-Gases emission to support sustainable development and minimize externalities

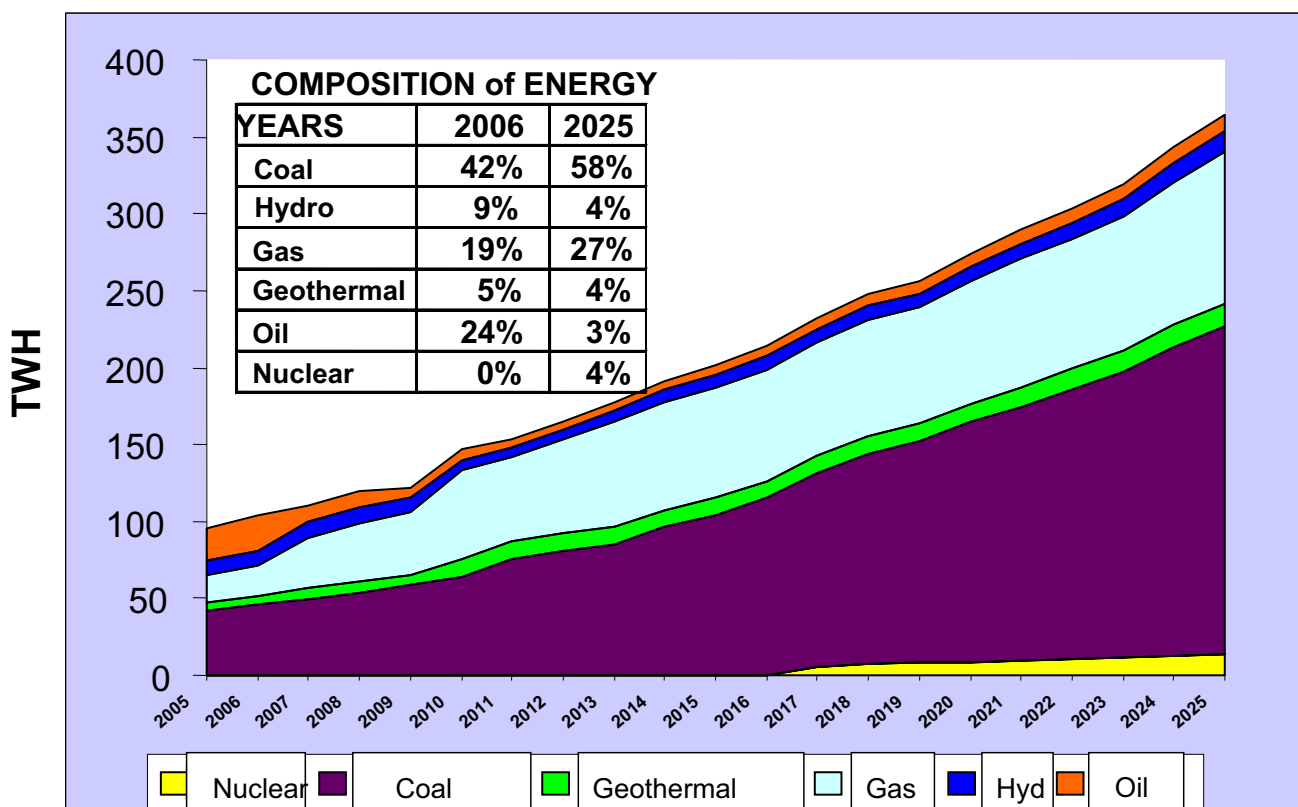
❑ Electricity Production Cost

- Reduce Electricity Production Cost

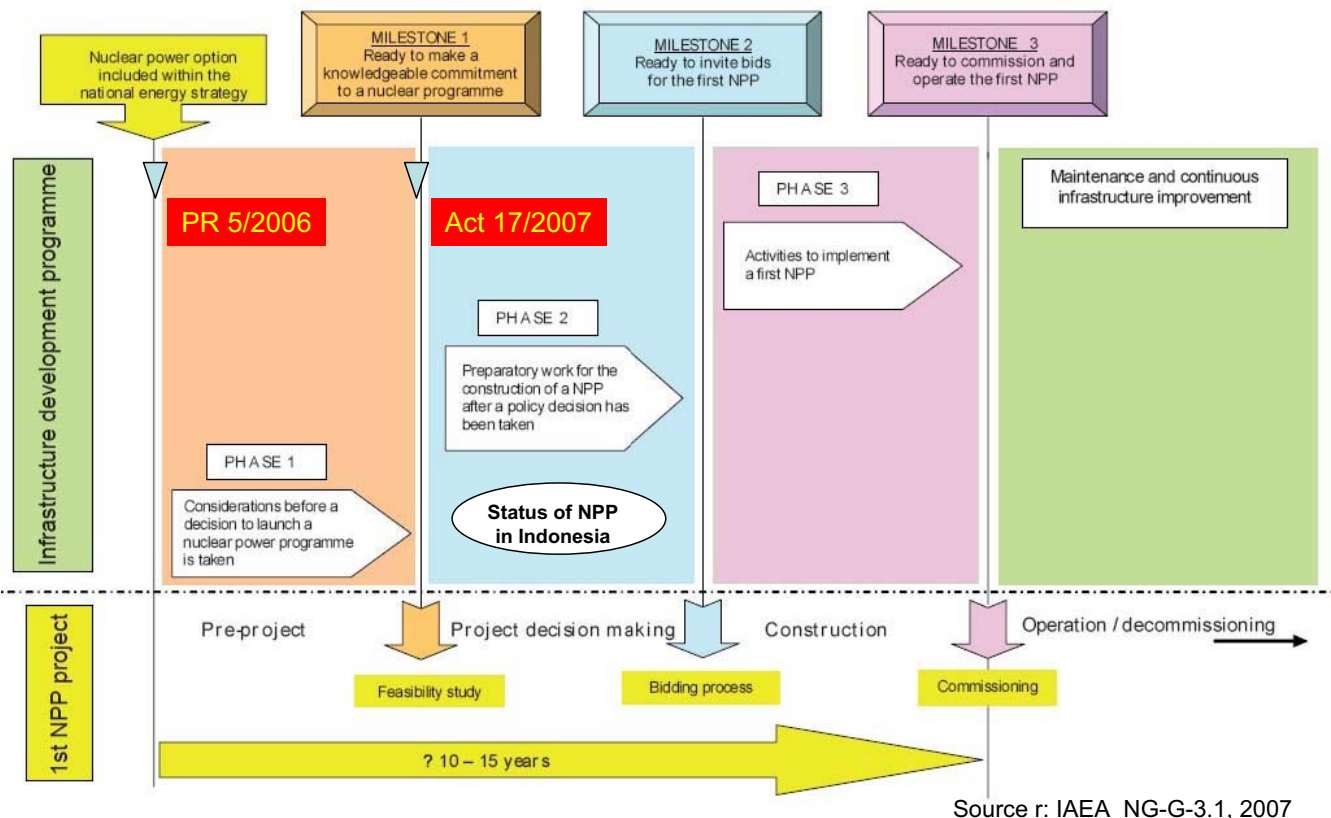
❑ Acquiring of High-Tech Power Generation

- High Tech utilization will increase national industrial capacity

ELECTRIC POWER PRODUCTION PLANNING Jawa-Madura-Bali (Jamali)



5.3 Infrastructure Development Program.



5.4. Utilization of Nuclear Technology and Activities Relating to Nuclear Power Plant.

Nuclear energy to suffice conservation, intensification, diversification and sustainability of energy supply, shall be: symbiotic and synergistic to fossil and & new renewable energy sources

- **Application of Nuclear Technology for Fossil:**
 - EOR using tracer, SO_x and NO_x treatment using Electron Beam Machine
- **Application of Nuclear Technology for Renewable Energy:**
 - Hydro, micro-hydro, and geothermal using tracer and bio-fuel (irradiation induced mutation of *Yatropha Curcas* sp, sweet sorghum), etc.
- **NPP Introduction:**
 - Planning, pre-project activities, and continuous socialization of NPP for electricity.
- **Preparation of Nuclear Fuel Supply and Future Radioactive Waste Management**
- **Study on Future NPP for Co-generation**

5.5. Current Influencing Factors.

Current influencing factors of nuclear power plant introduction are as follows:

(1) Public acceptance

Program of Socialization – Public Education & Information.
Program of Social Engineering – Community Development.

(2) Financing scheme.

The financing schemes should achieve two objectives: *minimal costs to the government and affordable electricity price.*

Based on IAEA TECDOC 1513 the possible methods of financing Nuclear Power Plant:

- *Projects Fully Financed by Government Owned Utility.*
- *Projects Fully Financed by Private Sector Utility.*
- *Project Financed by Project Financing Model*

6. Conclusion

- BATAN as a Government Institution, has led all necessary pre-project activities, and is preparing the requirement needed for owner establishment together with MOEMR.
- The introduction of NPP in Indonesia is not only to reach an optimal energy mix based on cost and environmental protection, but also to relieve the pressure arising from increasing domestic demand for oil and gas as well as to support sustainable development in Indonesia .
- Some political, economical, social and technical efforts have been done to realize the introduction of the first NPP in Indonesia. Few preparation studies, however need to be further up-dated, to conclude the objective.
- In spite of the complete, comprehensive and long-time preparation that have already been carried out, main influencing factors i.e public acceptance, and economic–financing scheme still need to be properly managed to succeed the NPP introduction in Indonesia

THANK YOU

