Nuclear Power Plants to Support A Long Term Energy Security

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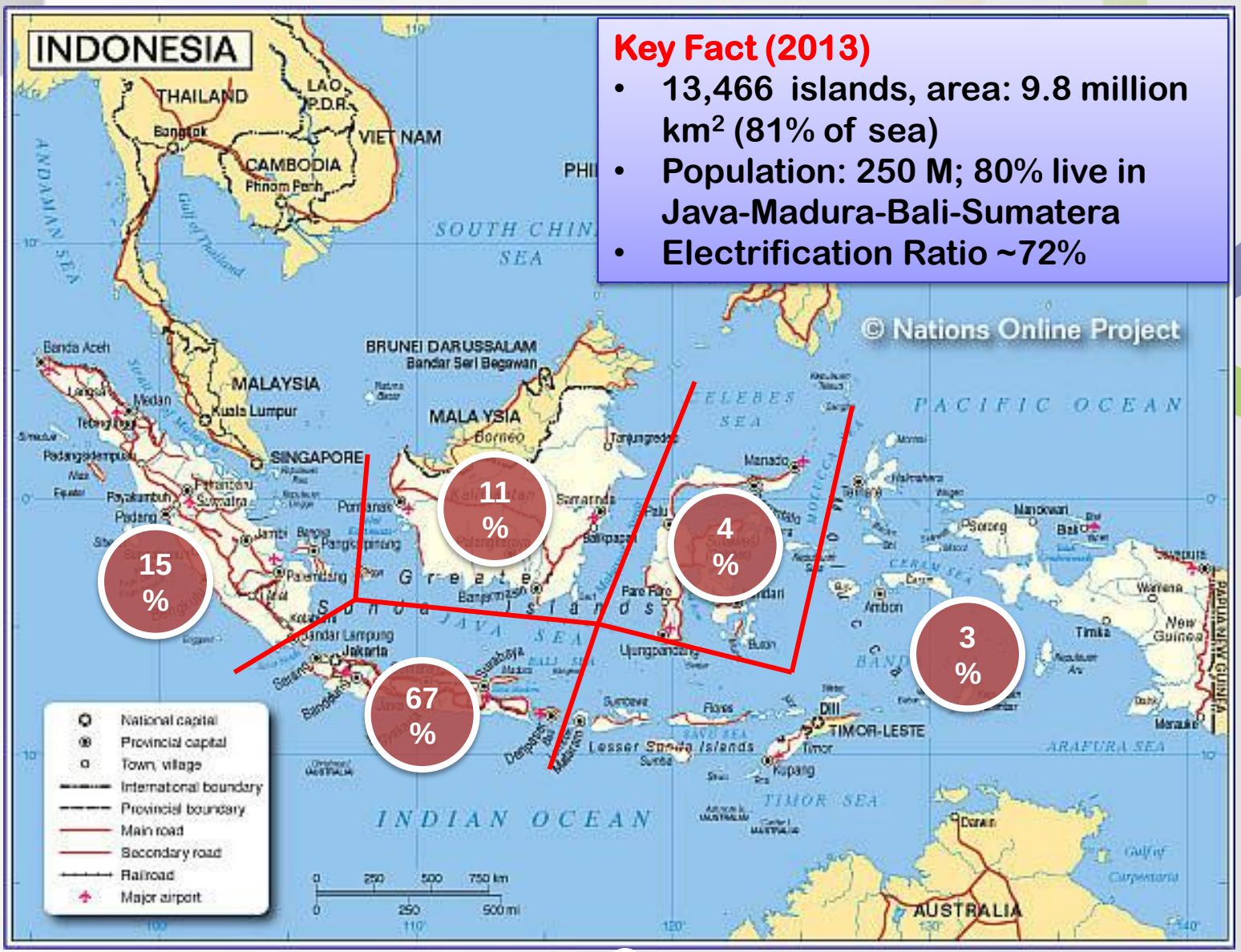
Scope of Presentation

- National Energy Policy 2014 (KEN)
- Nuclear Power Development Plan
- Conclusions.

Distribution of Energy Consumption



Key Fact (2013)

- 13,466 islands, area: 9.8 million km^2 (81% of sea)
- Population: 250 M; 80% live in Java-Madura-Bali-Sumatera
- Electrification Ratio ~72%

Distribution of Energy Consumption

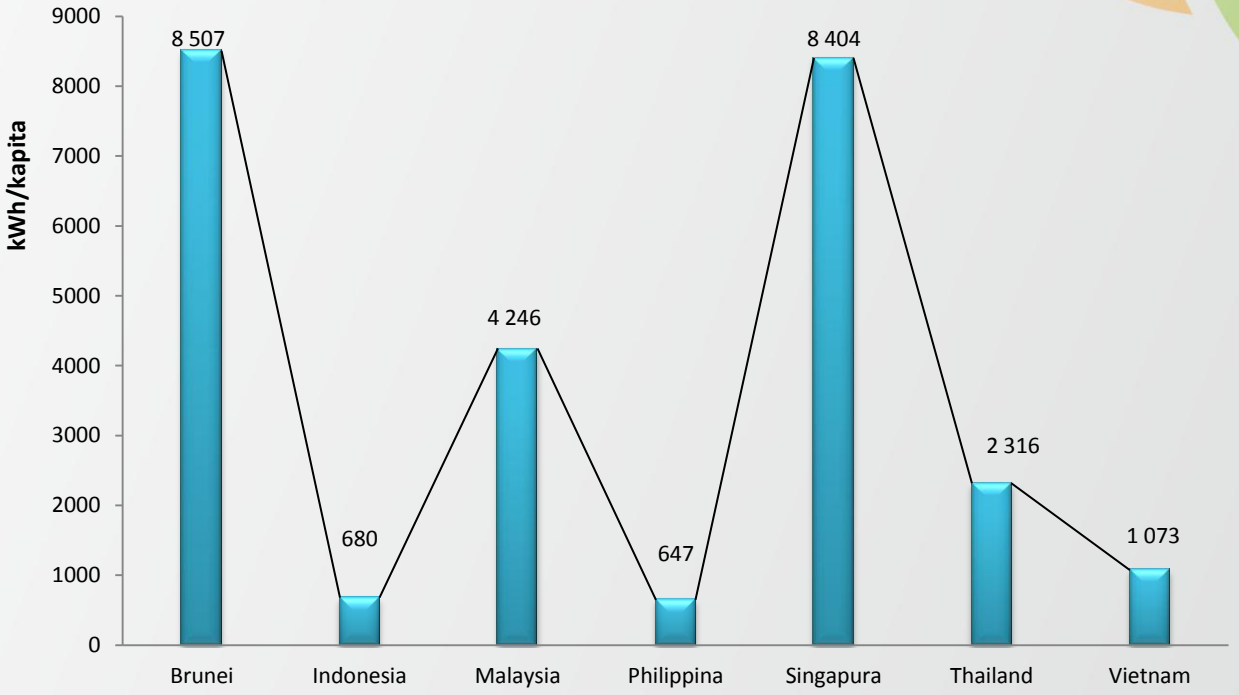
National Energy Policy

Indonesia Electricity Infrastructure (2013)

- Total Population : 250 Million
- Electricity Generation : 170 TWh
- GDP/capita : USD 3,500
- Generation Plant Cap. : 47,128 MW
- Electricity Consumption : 680 kWh/capita

Electricity Consumption per Capita 2013

The electricity consumption per capita of Indonesia still lower than other ASEAN countries (Brunei, Singapore, Malaysia, Vietnam, and Thailand).



Sumber: Bank Dunia, 2013

National Energy Policy (KEN)

Main Policy

- Energy availability to meet national energy demand
- Priority of energy development
- Utilization of energy resources,
- National energy reserves

Supporting Policy

- Conservation and Diversification of Energy;
- Environment and Safety;
- Price, Subsidy, and Energy Incentive;
- Infrastructure, energy accessibility for public and industry;
- Research and development for energy; and
- Institutional strenghtening.

National Energy Policy (KEN)

Goal of Energy Policy:

To realize energy independence and security for supporting sustainable national development.

Energy Problems:

- Decreasing of National Oil Production and becoming oil importer;
- Fossil fuel is dominant in the energy system;
- Energy subsidy is still high;
- Less energy infrastructure development;
- Utilization of new and renewable energy (NRE) require improvement of infrastructure, while the new National Energy Policy (Government Regulation no 79/2014) targeting that by 2025 NRE contribute 23%.

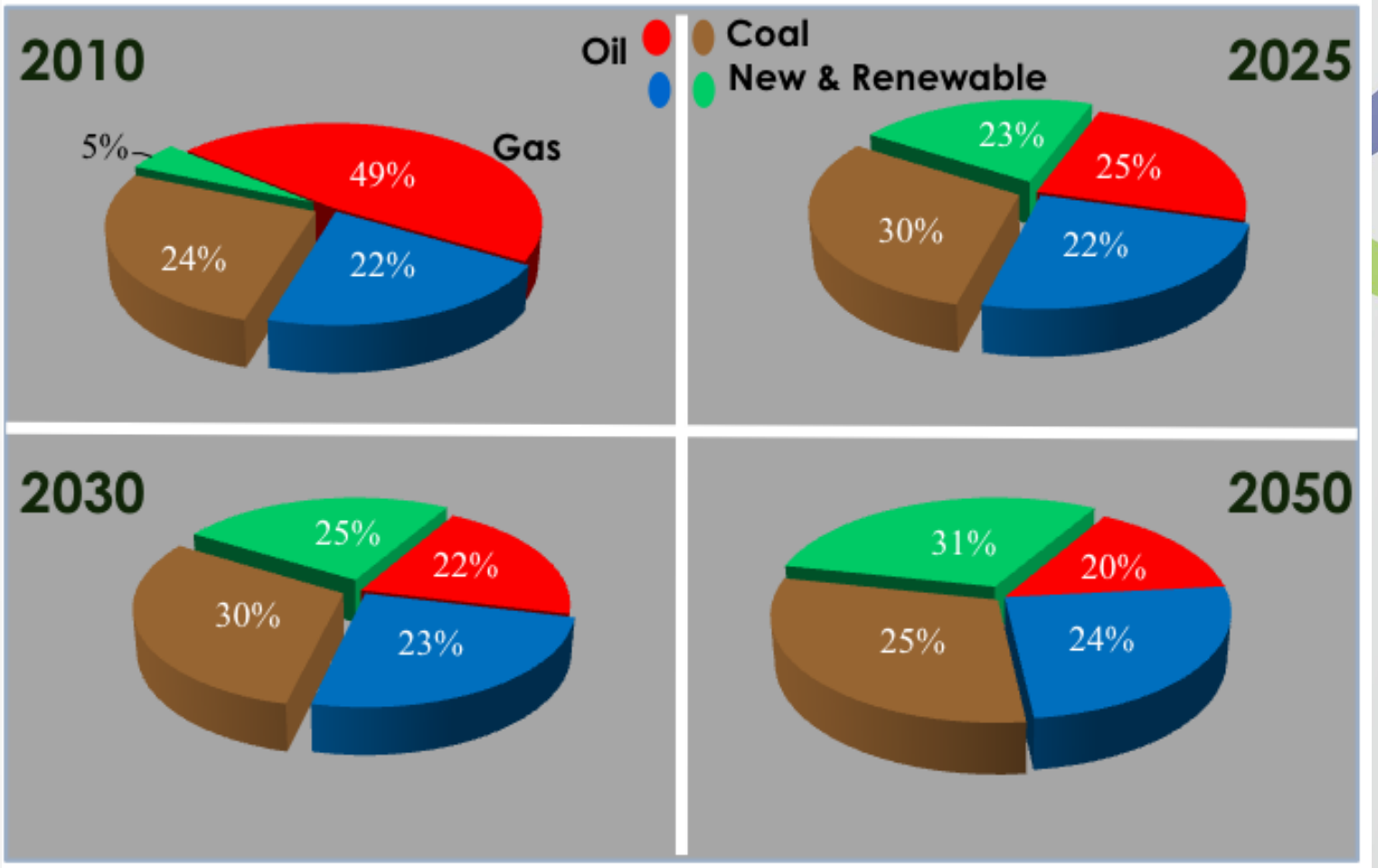
Electricity Need of Indonesia till 2050

Projection of Electricity Need (NEP/KEN)

DESCRIPTION	UNIT	YEAR						
		2010	2015	2020	2025	2030	2040	2050
ELECTRICITY CONSUMPTION								
High Scenario	TWh	148	245	397	628	933	1680	2710
Low Scenario	TWh	148	208	341	511	733	1330	2100
Per capita (high scenario)	kWh	620	980	1521	2316	3332	5619	8827
Per capita (low scenario)	kWh	620	832	1308	1886	2618	4448	6840
Growth (low scenario)	%	7	7.1	10.4	8.4	7.5	6.1	4.7
Elasticity		1.06	0.89	1.30	1.05	1.00	0.9	0.7
GENERATION CAPACITY								
High Scenario	GW	35	58	92	145	203	340	550
Low Scenario	GW	35	49	79	115	159	270	430
AVERAGE UTILISATION								
High Scenario	Hours	4722	4731	4791	4805	5065	5435	5420
Low Scenario	Hours	4722	4754	4834	4977	5157	5468	5470

National Energy Policy (2014)

Energy Mix Projection



Note: Nuclear is categorized into the new energy

The Electricity Need of Indonesia till 2030

Indonesia will need at least 200 T Rp. (US$16.48 B) in new investments a year in order to meet its long-term demand for power, which is expected to double to 10,000 megawatts (MW) a year within the next 15 years, said Former Vice Minister of Energy and Mineral Resources (October 3, 2014).

The additional power supply needed by Indonesia to support its economic growth was projected to reach 5,700 MW a year until 2022.

Starting from 2022, the annual additional power supply needed would double to 10,000 MW per year until 2030, as the growth in demand after 2022 will be far higher.

New Government Commitment

***New President Speech* (Asia Pasific Economic Cooperation (APEC) Economic Leaders' Meeting at Beijing, 10 Nov 2014) :**

- Oil Fuel subsidies totaling more than $ 30 billion per year will be transferred to productive activity, instead of consumptive activities, , for providing of agricultural fertilizers and seeds, irrigation and dam construction, railway and road construction (not only in Java), **electricity infrastructure,** sea toll, seaports, airports, ship engines, refrigeration to preserve marine fishing product,…
- The main problem for investments is Permit/licensing and land acquisition issues. President Jokowi committed to resolve licensing/ permit issues through reform of the licensing service and will be monitored directly by President and He will push the governor and the mayor to solve the problem which has been the main obstacle for investment (including electricity infrastructure)

President Jokowi targeting the construction of power plants amounted to 35,000 MW in the next 5 years

SUDIRMAN SAID

MoEMR

- **We need investment and open any country who want to work together, to meet the target of 35,000 MW power plant in the next 5 years**

- **The formation of the Task Force to anticipate the electricity crisis in Indonesia, which is predicted to occur the next few years**
    - simplify the procedure, trim permissions and documents

13 November 2014:
Jarman, DG of Electicity (13 November 2014) revealed that the NPP is greatly needed in the foreseeable future. However, the construction of nuclear power plants should be built in the right location. He was projecting NPP in 2025 is needed to address the needs of electricity increased significantly
The presence of nuclear power plants is important to address the needs of electricity
"If we look at the 2025 estimate we need nuclear power plants. At least the required capacity is 5 thousand MW," Jarman said in Jakarta, Thursday (11/13/2014)

Legal Basis and referrence for NPP Development Plan:

- Act Number 17 Year 2007 on National Long Term Development Planning,
- National Energy Policy 2014 (GR 79/2014)
- Indonesia Energy Outlook 2013 (BPPT);
- White book for Indonesia Energy 2014 (UGM);
- Indonesia Nuclear Energy Outlook (2014).

Nuclear Power Development Plan

Indonesia has thousands of islands, the following considerations are taken into account:

- **Nuclear electricity for regions with high population density and existing grids: LARGE NPPs, and**

- **Nuclear electricity/heat co-generation for regions rich of natural resources, so that, SMRs with or without co-generation application need to be used.**

Nuclear Energy Projection (MW)/INEO 2014

Year	Jamali Grid	Sumatera	Kalimantan	Other Islands	Total
2013	-	-	-	-	-
⋮	-	-	-	-	-
2027	2,000	-	-	-	2,000
2028	2,000	-	-	-	2,000
2029	2,000	-	-	-	2,000
2030	2,000	-	-	-	2,000
2031	2,000	2,000	100	-	4,100
2032	2,000	2,000	100	-	4,100
2033	2,000	2,000	100	-	4,100
2034	2,000	2,000	100	-	4,100
2035	2,000	2,000	200	-	4,200
2036	4,000	2,000	200	-	6,200
2037	4,000	2,000	200	-	6,200
2038	4,000	2,000	200	-	6,200
2039	4,000	2,000	200	-	6,200
2040	4,000	4,000	200	-	8,200
2041	6,000	4,000	400	35	10,435
3042	6,000	4,000	400	35	10,435
2043	6,000	4,000	400	35	10,435
2044	6,000	4,000	400	35	10,435
2045	6,000	6,000	400	35	12,435
2046	8,000	6,000	600	70	14,670
2047	10,000	8,000	600	70	18,670
2048	12,000	8,000	600	70	20,670
2049	12,000	8,000	600	140	20,740
2050	12,000	8,000	800	140	20,940

Stakeholders Involvement:

1.MoEMR, MoRT & HE, BAPETEN, BATAN, MoFA, MoForestry and Environment, BAPPENAS, Mo-Finance, Local Government, Mo-Industry, Mo-State Owned Company, PT PLN/Utility Company, etc.

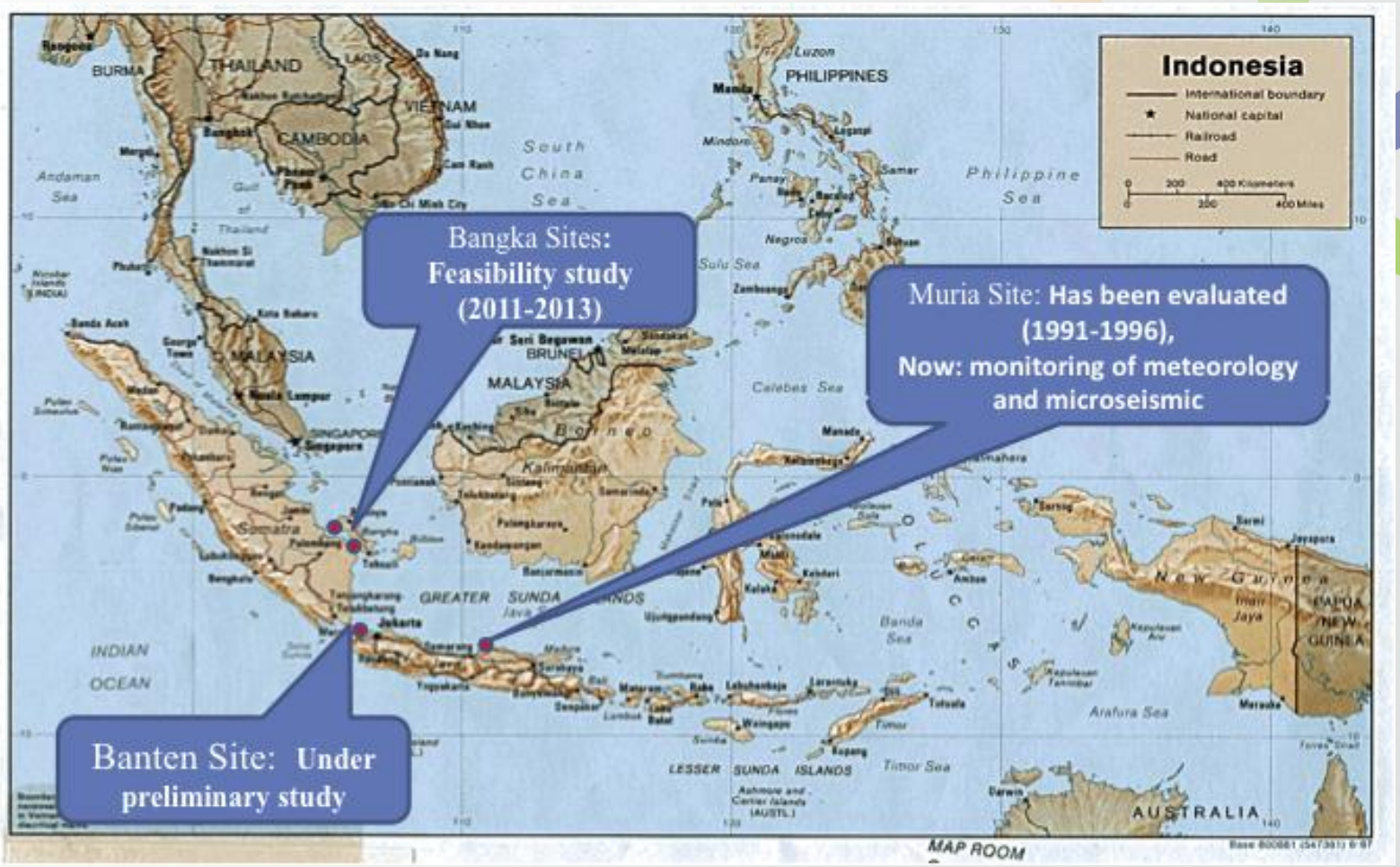
2.The establishment of NEPIO (Nuclear Energy Program Implementation Organization is in progress and expected to be established this year;

3. MEMR requested to provide “The White Paper on the Acceleration to build 5000 MW of NPP in Bangka-Belitung in 2014-2024”.

4. Some regional government strongly request NPP development: East Kalimantan , West Kalimantan, Batam Authority, East Belitung Regency

Nuclear Power Development Plan

Site Studies Status



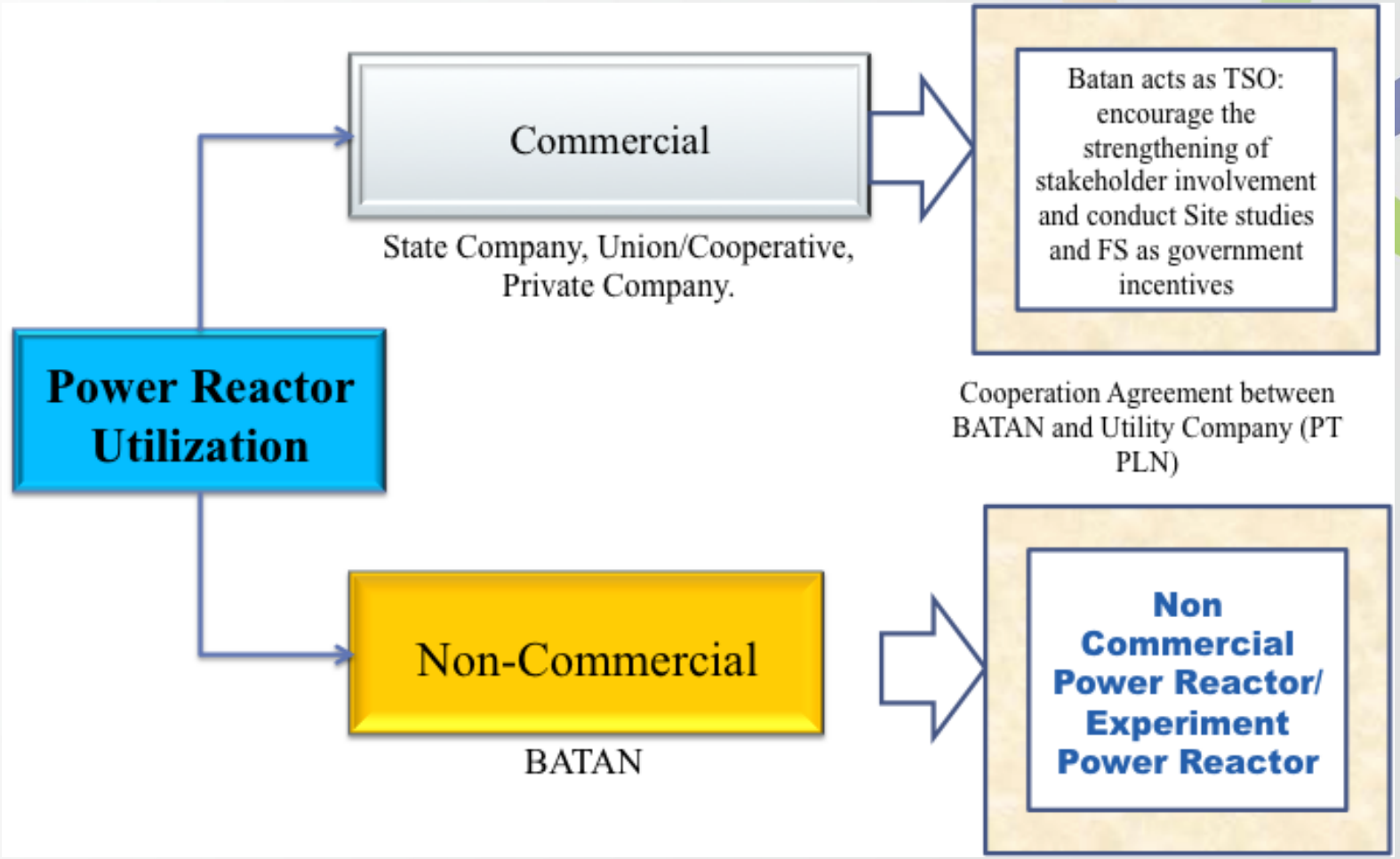
Location of Large NPPs and NPP Technology Option

Based on Discussion with the Commission of Earthquake Indonesia and the results of FS:

- Best candidate sites of NPPs in Eastern part of Sumatera and Western part of Kalimantan;
- East Kalimantan and North Java to be good candidate sites for NPPs;
- Babel candidate sites are ready for 10,000 MW;
- Technology of Gen. III+ will be applied;

Nuclear Power Development Plan

Non-Commercial Experimental or Demonstration Power Reactor (Act 10/1997 and Gov. Regulation No. 2 (2014)



EPR, SMR and HTRs in Indonesia

Objectives to construct Indonesia-Experimental Power Reactor (I-EPR) and HTRs/SMRs/LWRs:

- I-EPR to be operated by BATAN commences from 2021/2022;
- To demonstrate a small power NPP safely, and for the development of co-generation, it will couple with laboratory facilities for desalination, hydrogen production, liquefaction/gasification of coal or other installations requiring heat processes;
- To improve the ability to master technology of NPPs for deployment of larger power NPPs in the future;
- To develop R&D for NPPs and its supporting facilities as well as providing human resources;
- To enhance public acceptance and trust on NPP operation;
- SMRs and HTRs best developed in areas rich of natural resources but deficit of electricity, small grid capacity, and low fossil fuel reserves.

Conclusions

- The use of electricity nuclear-based to be main support of sustainable energy security and mitigation of climate change,
- Based on the IAEA recommendation, the Country is ready to enter the Phase of Project Decision Making (2009),
- Indonesia is making best effort to prepare the national documents to support the acceleration of large-power NPPs construction.

Conclusions

- New Gevenrment has committed to develop electricity infrastructure
- The cooperation with vendor countries is necessary to develop national capacity building in nuclear technology,
- The enhancement of promotion of NPP is believed to strengthen public acceptance and trust on NPPs operation in the country.

Thank For Your Kind Attention

Cảm ơn sự quan tâm của bạn