Human Resource Development for Anticipating the 1st NPP in Indonesia

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Outline of Presentation

1. Introduction
2. Nuclear Power Development Plan
3. Human Resource Development
4. Conclusion

Introduction

Indonesia Electricity Infrastructure
(as 2013)

- Total Population : 248,818 Million
- Generation Plant : 214 Billion kWh
- GDP/capita : USD 3,500
- Generation Plant Cap. : 50,99 GWe
- Electricity Consumption : 860 kWh/capita

Introduction

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;
- Implementation of Presidential Regulation No. 5 year 2006 (target of National Energy Mix 2025) is not yet effective .

Introduction

Goal of the National Energy Policy:

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

Main Policy:

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

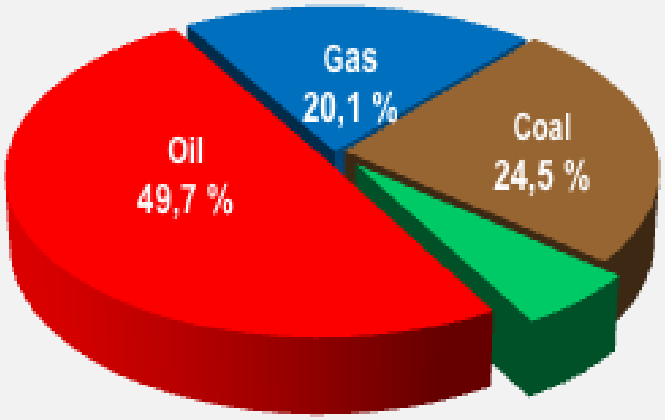
Introduction

Electricity Demand Projection

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	GWe	35	58	92	145	203	340	550
Low Scenario	GWe	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

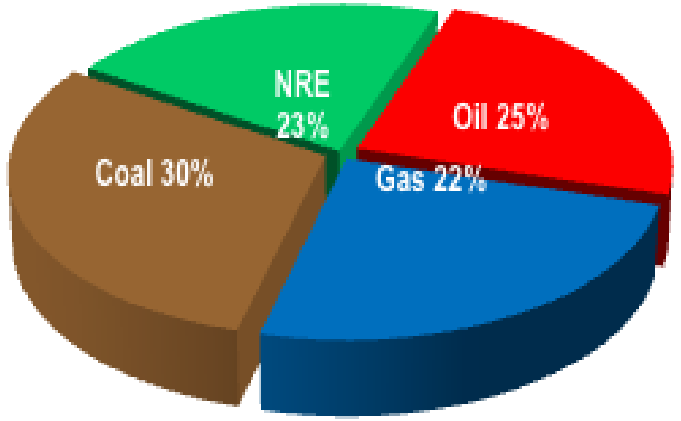
Introduction

National Energy Mix



CURRENT CONDITION

- ENERGY CONSUMPTION GROWTH AVERAGE BY 7% PER YEAR
- ENERGY ELASTICITY = 1,65.
- NON FOSSIL ENERGY SHARE (NRE) ≈ 5%



2025 TARGET (National Energy Plan/NEP DRAFT)

- ENERGY ELASTICITY < 1,
- OPTIMIZING AND INCREASING NRE SHARE ON NATIO ENERGY MIX
- ENERGY CONSERVATION, CLEAN AND EFFICIE TECHNOLOGY
- REDUCING GHG EMISSION
- **ALL RESOURCES PRIORITIZED FOR ELECTRIC GENERATION**

Nuclear Power Development Plan

Legal Basis

- Act Number 17 (2007) on National Long Term Development Plan: “Utilization of NPP is expected to be operated in 2015-2019 by considering strictly safety factor”

Nuclear Power Development Plan

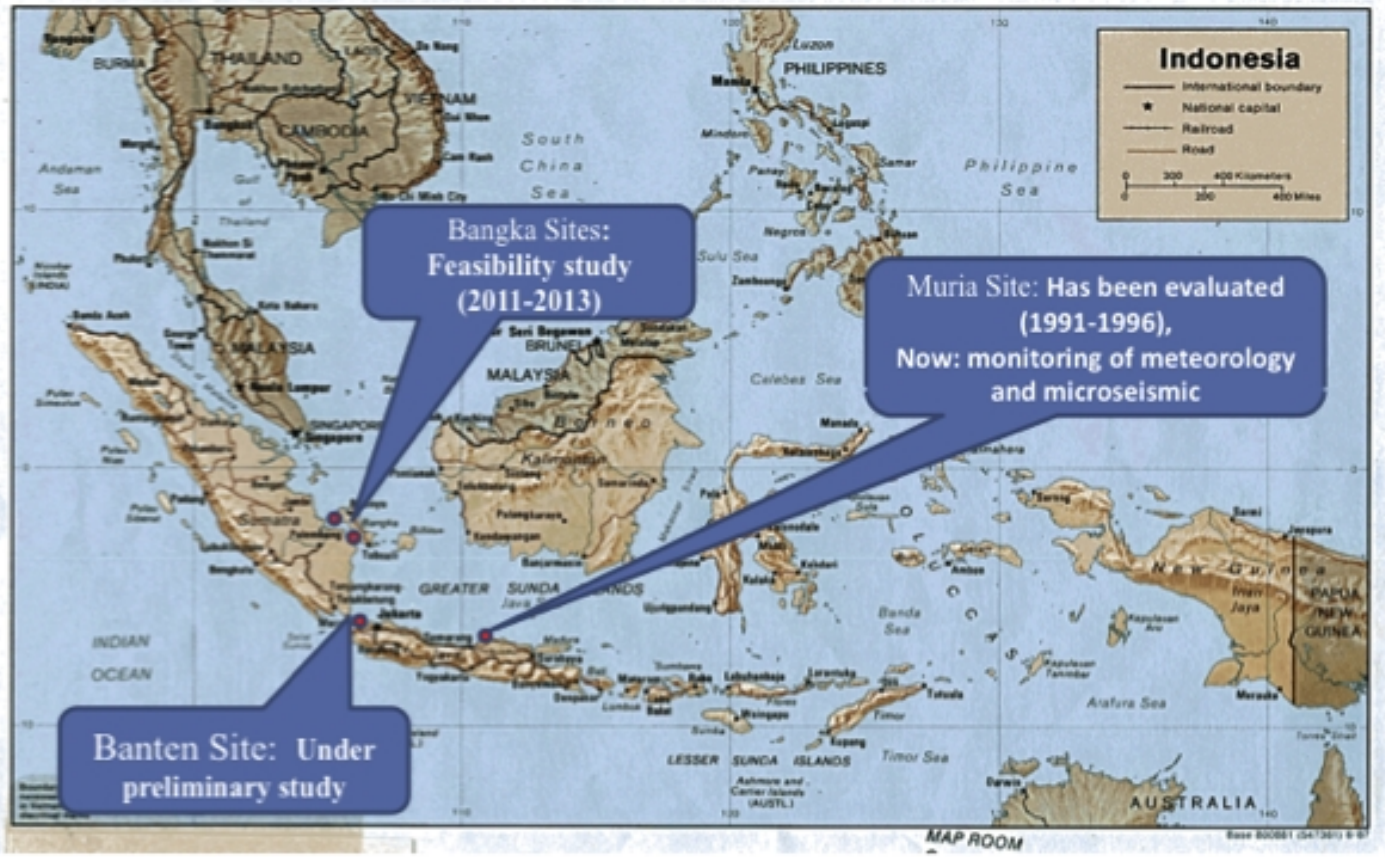
Consideration

Indonesian's unique (archipelago) conditions, it needs to deploy two types of NPP technologies:

- nuclear electricity for regions with high population density and existing grids: LARGE NPP, and
- nuclear electricity/heat co-generation for regions rich of natural resources, but the capacity of electricity grid is still not sufficient : SMR with or without co-generation application.

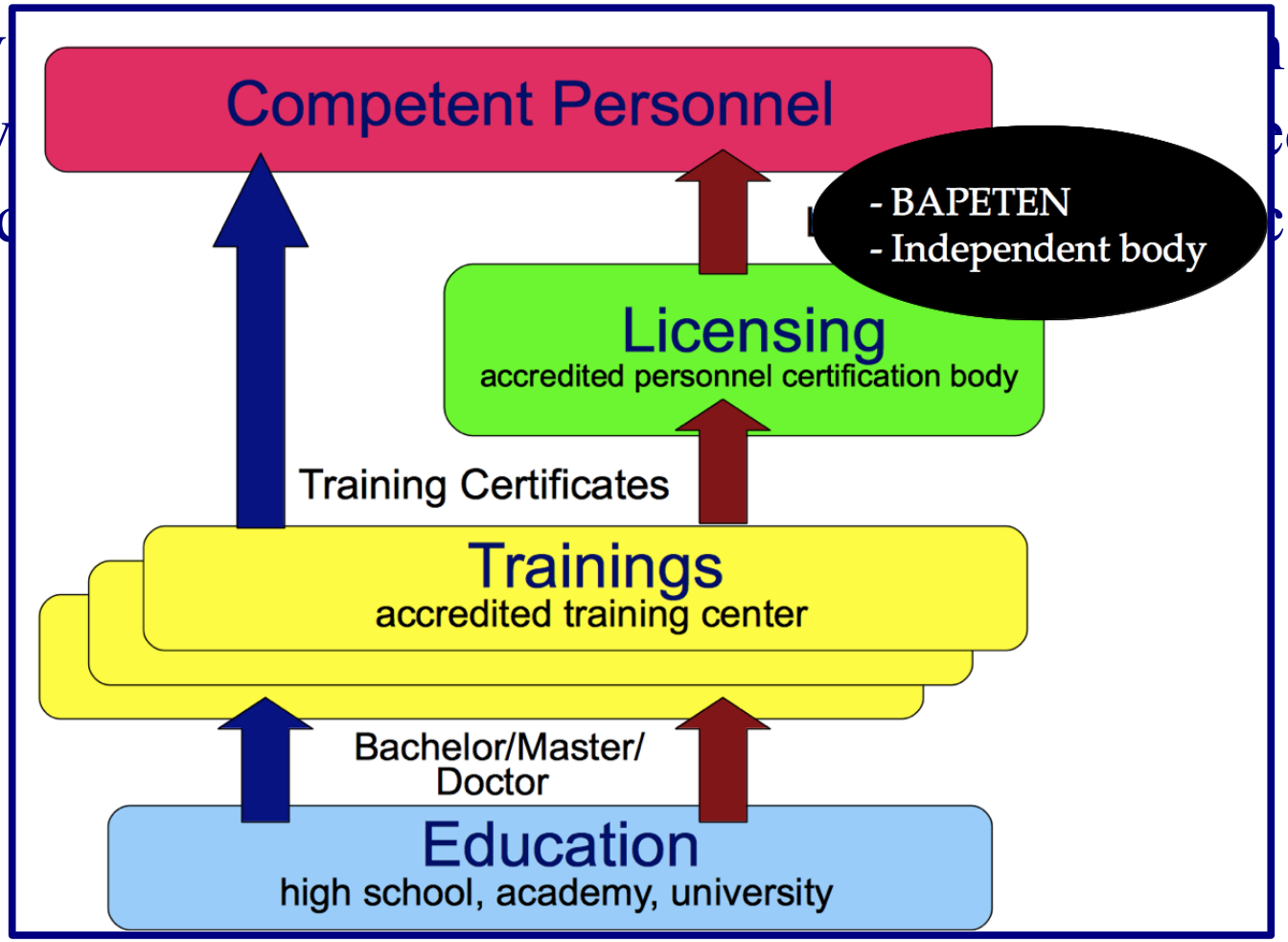
Nuclear Power Development Plan

Site Studies Status



HRD for NPP

Policy on Nuclear HRD



HRD for NPP

Formal Education in Nuclear Engineering

- University of Gajah Mada (Yogyakarta)
  - Engineering Physics Department
  - Bachelor and Master Program
- Bandung Institute of Technology
  - Physics Department
  - Master and Doctor program
- Polytechnique Institute of Nuclear Technology
  - Diploma program

HRD for NPP

Competency Development

The national team of HRD for the nuclear power plant was established on 2008, consists of some members from various institutes:

- Ministry of Energy and Mineral Resources as coordinator
- Ministry of Research and Technology
- Ministry of Manpower
- National Nuclear Energy Agency (BATAN)
- Nuclear Regulatory Body (BAPETEN)
- State Owned Electricity Company (PLN)
- Universities

HRD for NPP

Competency Development

The national team of HRD for NPP

Acitivities:

- Development of Academic Paper on “Preparation of Human Resource Development for the First Nuclear Power Plant in Indonesia”.
- Development of Personnel Competency Standard for NPP Personnel
- Development of Basic Training on Nuclear Power

HRD for NPP

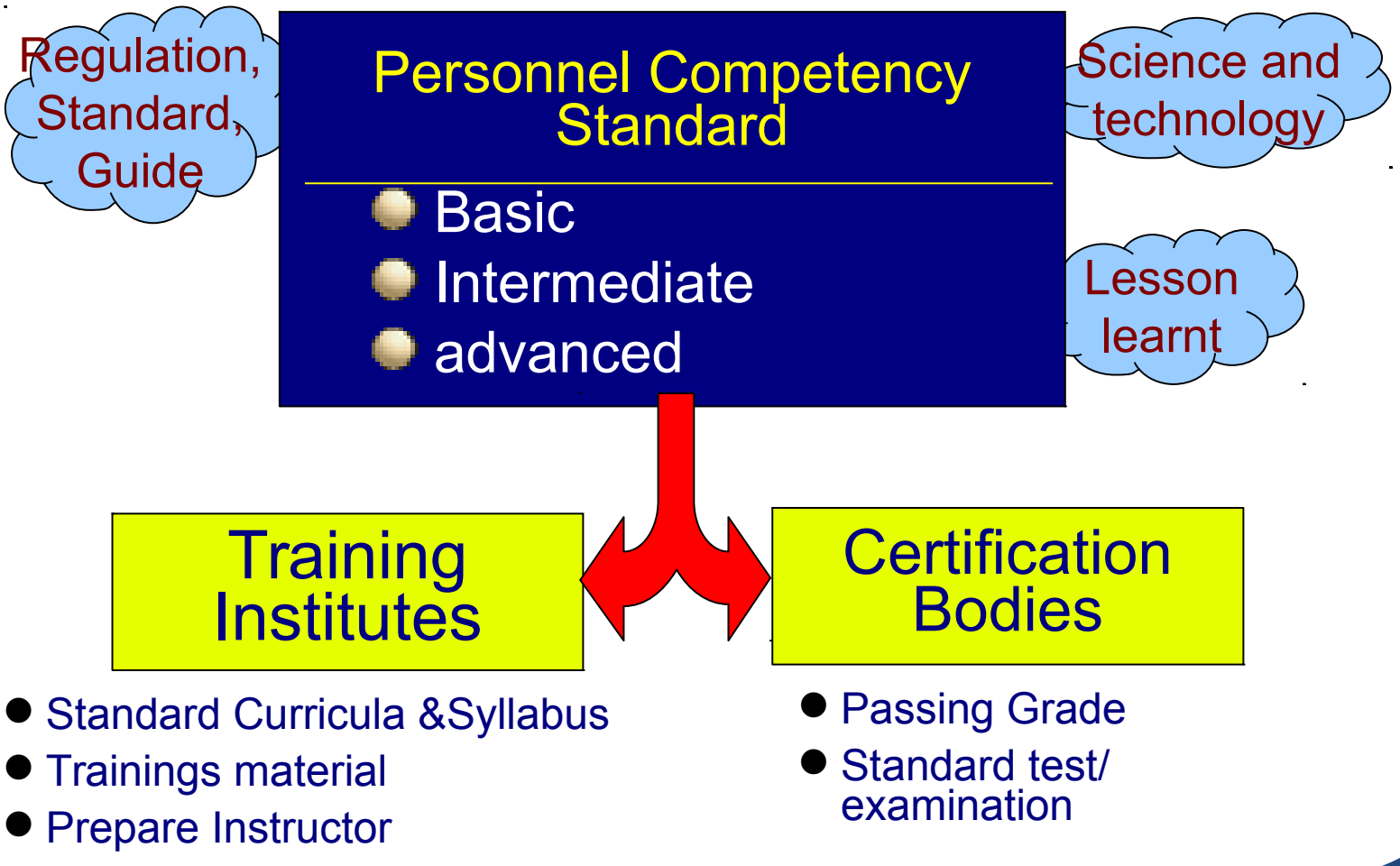
Development of Academic Paper

Based on IAEA publication, experts mission, seminars, and workshops. It consists of:

- Personnel requirements: quantitative and qualification (education, training, and experience)
- Existing infrastructure of HRD: education, training, and licensing system.
- Action Plans

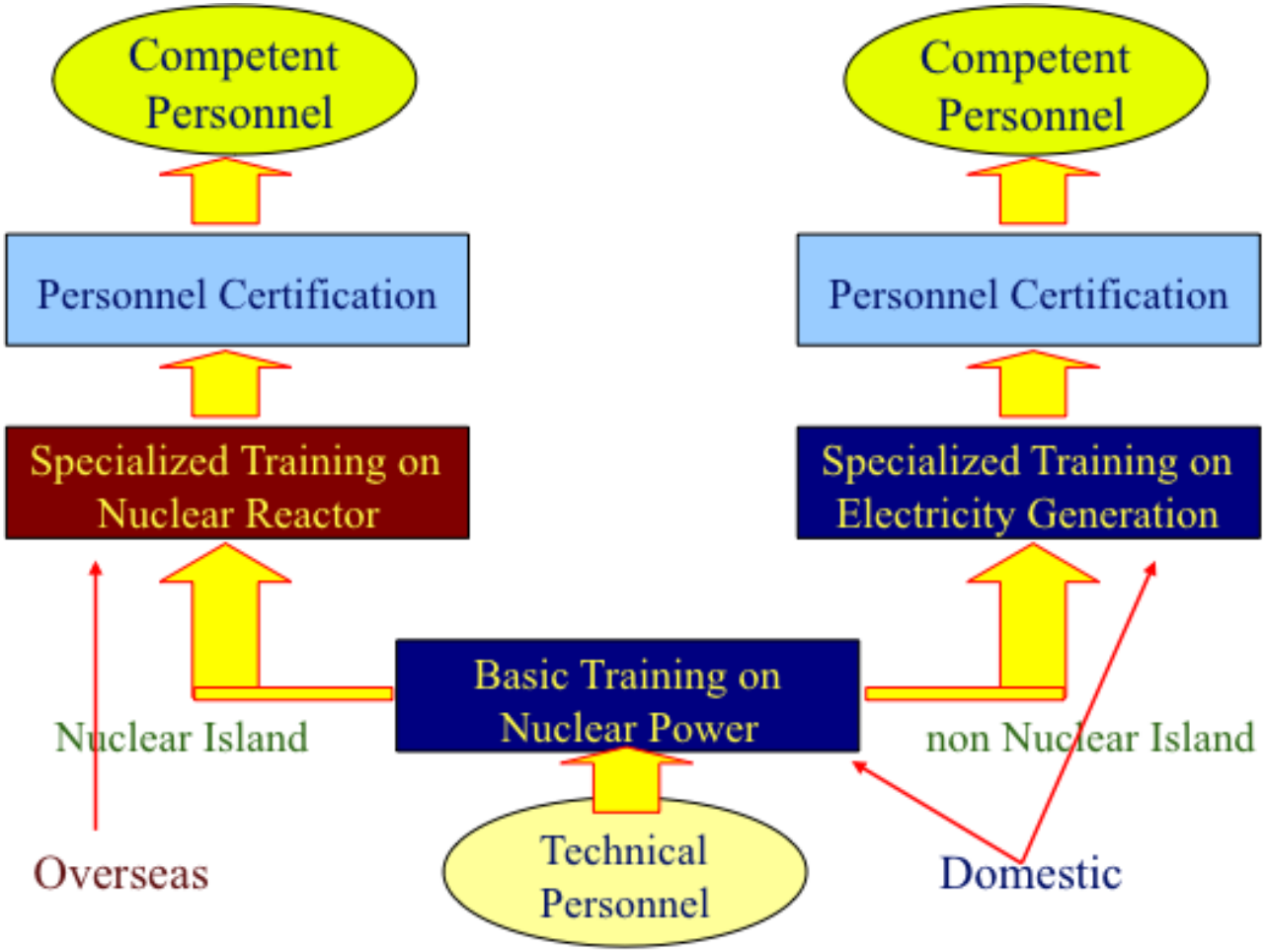
HRD for NPP

Development of Personnel Competency Standard



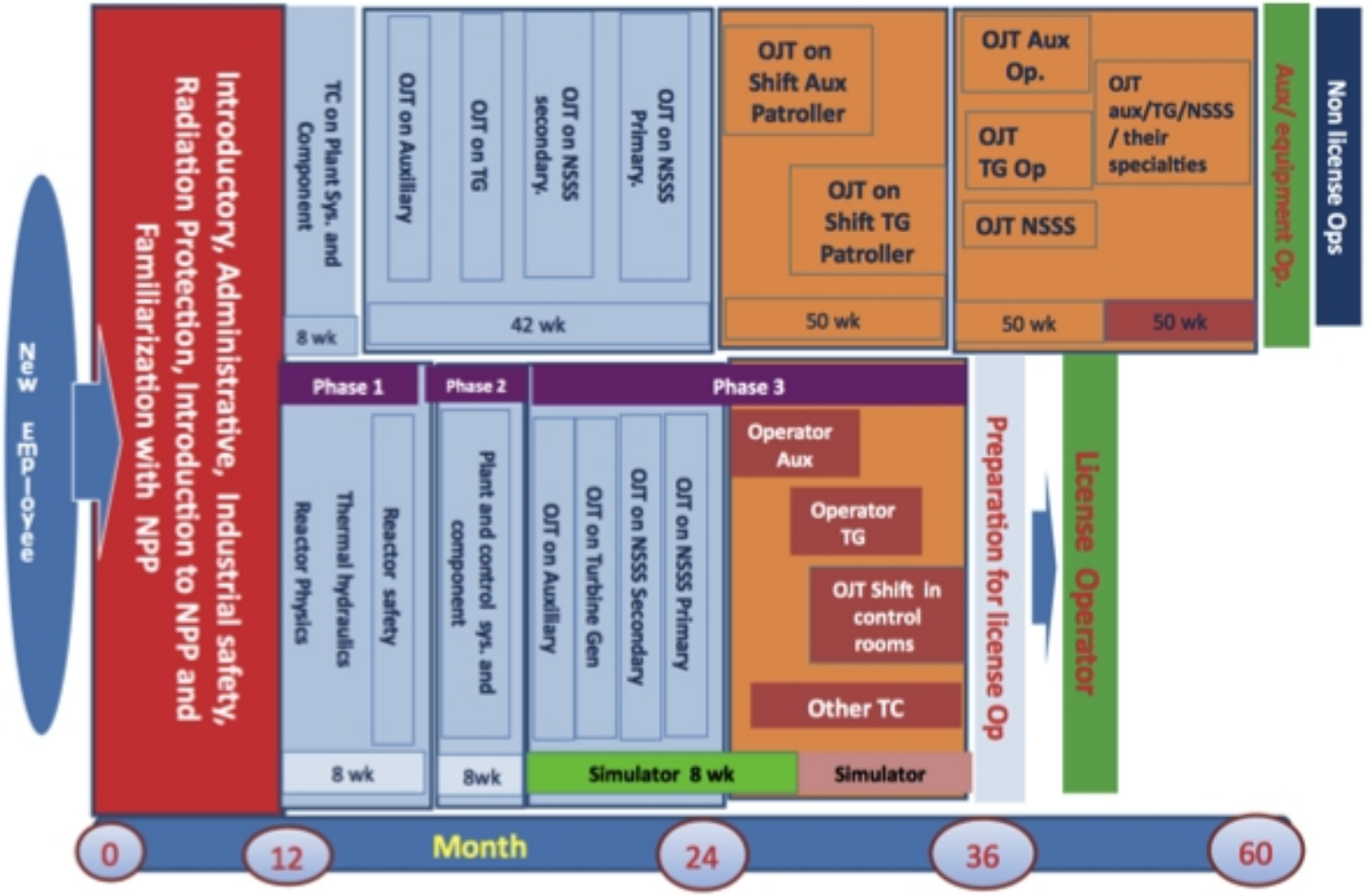
HRD for NPP

Development of Personnel Competency Standard



HRD for NPP

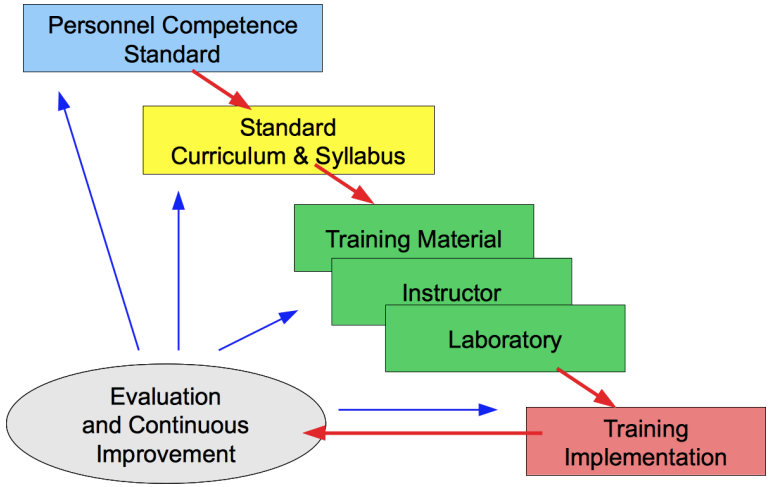
Concept of Training Scheme for NPP Personnel



HRD for NPP

Basic Training on Nuclear Power (since 2010)

- Sending instructors to attend the ToT at JAEA
- Training design and development
- Training implementation



- Nuclear Engineering & Safety I (2 weeks)
- Nuclear Engineering & Safety II (2 weeks)

HRD for NPP

International Review Mission

in order to achieve the effective, transparent and sustainable human resource development program:

- IAEA INIR (Integrated Nuclear Infrastructure Review) mission specifically on infrastructure No. 10 (Human Resource Development) in 2009.
- IAEA ETReS (Education and Training Peer Review Service in Nuclear Safety) in 2012.

Conclusion (1)

- Indonesia still consider to use nuclear energy as one of alternatives for electricity production due to the energy security and mitigation of climate change.
- Regarding to the IAEA Milestone Guideline for Introducing of NPP, Indonesia now is entering the Infrastructure Preparation for the Second Phase: "Project Decision Making".
- Indonesia is preparing and carrying out the continuation of site selection and evaluation, as well as to strengthen the public acceptance.

Conclusion (2)

- Human resource is very essential in nuclear application specifically in nuclear power program, therefore it should be prepared in order to ensure that the required competencies are fulfilled.
- Education and training for NPP personnel such as development of competency based training, and its curricula and syllabi should be implemented.
- Due to limitation of resources, International cooperation are very necessary in order to develop capacity building in nuclear power.

Thank You

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