

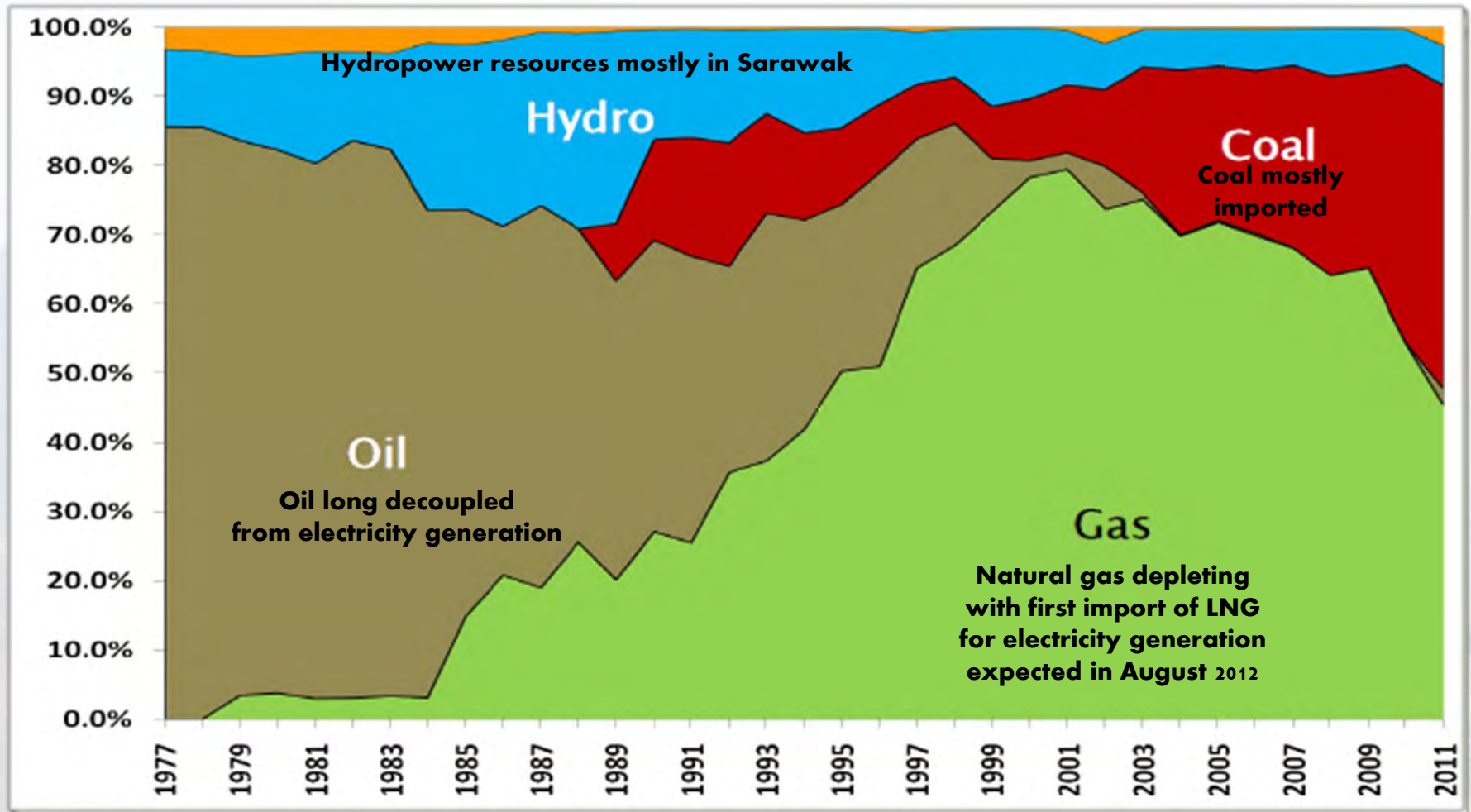


## **NUCLEAR POWER PRE-PROJECT ACTIVITIES IN MALAYSIA**

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

*26-27 March 2013*

# EVOLUTION OF GENERATION MIX BY FUEL TYPE



Mainly oil (pre-1980)



Mainly gas (2000s)



Mainly coal (post -2015?)

# NATIONAL ELECTRICITY GENERATION 2011

## 2011 in Peninsula

103,643 GWh

44.9% Gas

42.9% Coal

5.6% Hydro

3.9% Fuel Oil

2.7% Distillate

<1% Biomass

## MALAYSIA

Land Area: 329,733 sq. km.

Population: 28.3 million (2010 Census)

## 2011 in Sabah

4,984 GWh

63.0% Gas

24.0% Fuel Oil/Diesel

10.0% Hydro

3.0% Biomass

Peninsular  
Malaysia,  
89.4%

Sabah, 4.3%

Sarawak, 6.3%

Peninsular  
Malaysia

Sabah

Sarawak

## 2011 in Sarawak

7,280 GWh

46.3% Coal

44.6% Gas

5.8% Hydro

3.3% Diesel

Energy  
Sources



MULTIPLE  
GENERATORS

SINGLE GRID OPERATOR PER REGION

REGIONAL  
DISTRIBUTORS

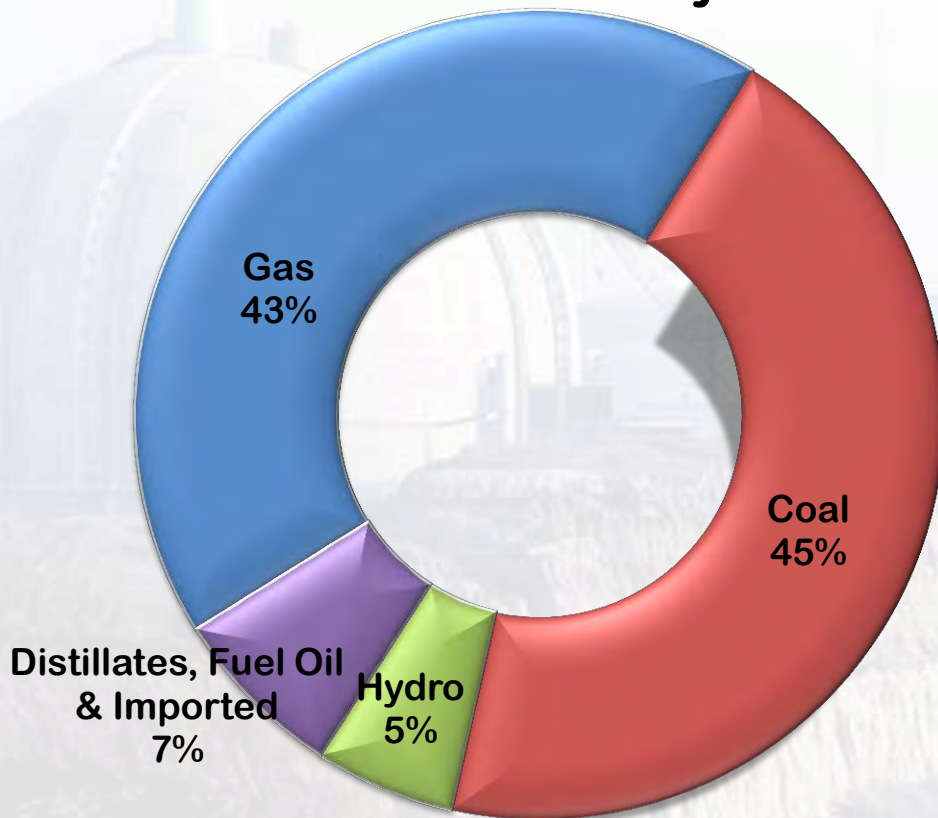
Generation

Transmission

Distribution

# CURRENT ENERGY SCENARIO & FUTURE CONCERNS

## 2011 Generation Mix for Peninsular Malaysia



- Fossil fuels currently dominate energy mix (94%)
- Need to diversify and balance energy sources for economic, environmental and energy security reasons
- Electricity generation targets from renewables (solar PV, biomass, biogas & mini-hydro): 2015 = 5%, 2020 = 9%, 2030 = 11%
- Need to explore the option of using nuclear for power generation post-2020

2011 total energy generation: 104,220 GWh

# POLICY DECISIONS TOWARDS NUCLEAR POWER DEVELOPMENT

7 Jan. 2011: Incorporation of MNPC as NEPIO

10 Dec. 2010: Decision to establish NEPIO



25 Oct. 2010:

Economic Transformation Programme (ETP) launched with nuclear power deployment included

16 July 2010:

Cabinet Decision to adopt National Nuclear Policy

10 June 2010:

New National Energy Policy incorporated in Tenth Malaysia Plan with nuclear energy as longer term option for the Peninsula.

26 June 2009: Nuclear energy adopted as one of fuel options for electricity supply post-2020, especially for the Peninsula;

10 Sept. 2008: Decision to draft National Nuclear Policy

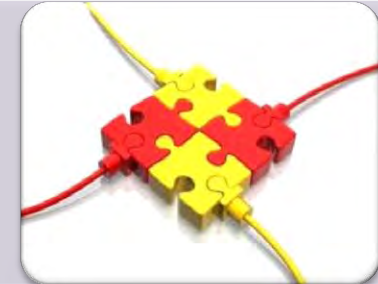
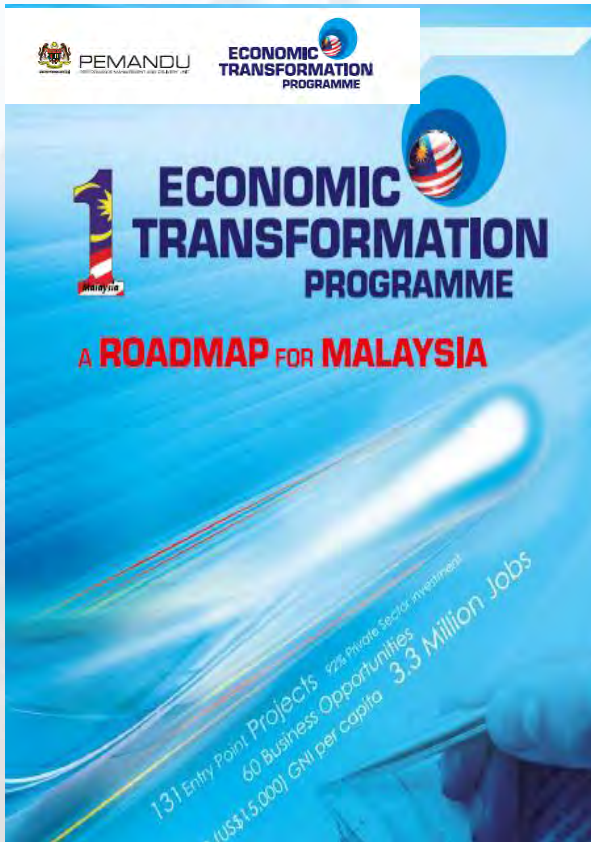
29 Aug. 2008: 2009 Budget in Parliament to explore nuclear energy and formulate new National Energy Policy



# ECONOMIC TRANSFORMATION PROGRAMME (1)

A comprehensive effort to transform Malaysia into a high-income nation by 2020

## EPP 11: Deploying Nuclear Energy for Power Generation



### RATIONALE

Exploring option of deploying nuclear energy to meet future demand and to diversify energy mix for the Peninsular

### ACTION

Study possibility of delivering a twin unit nuclear power plant with total capacity of 2000 MW post-2020

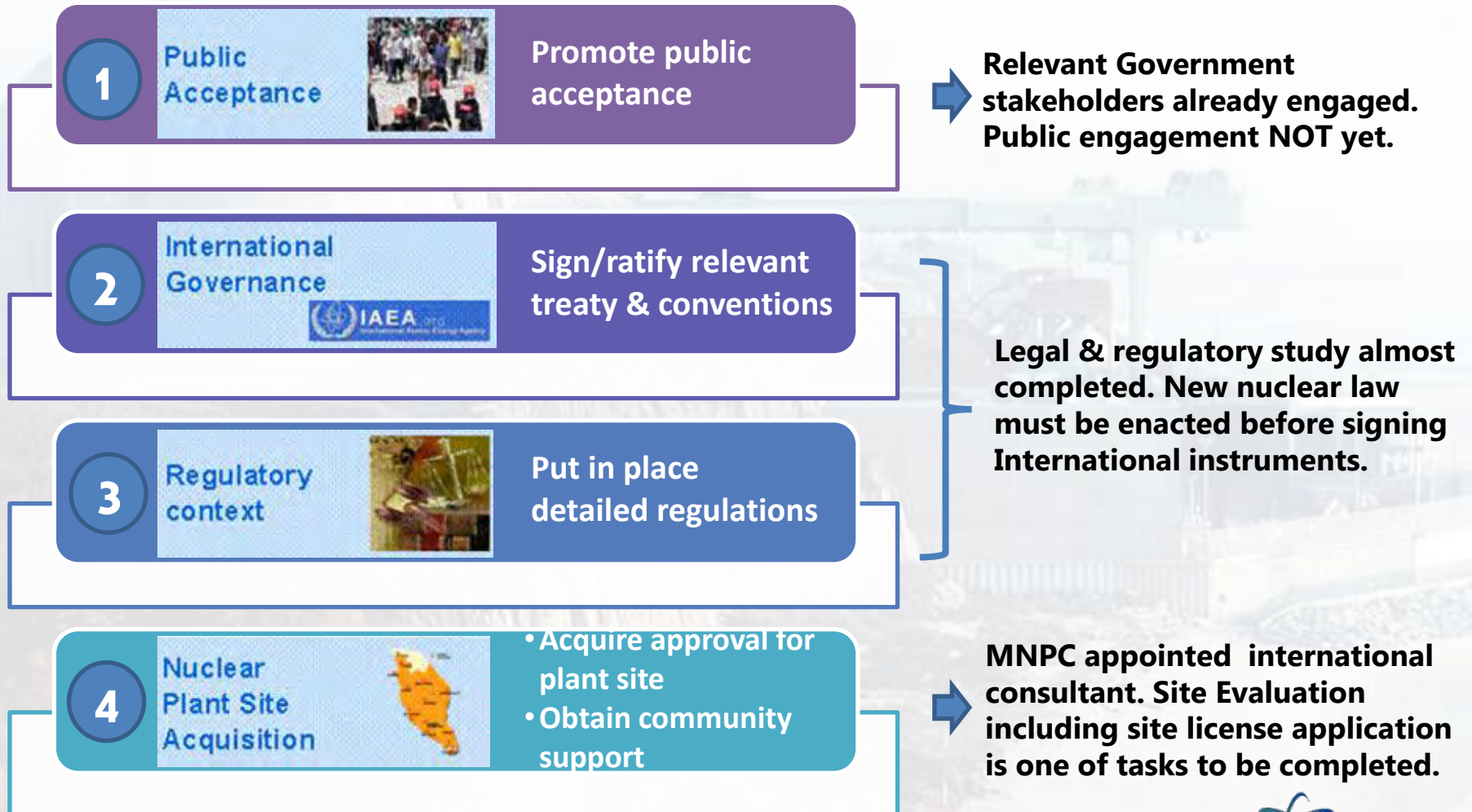
### ENABLERS

4 critical path items/enablers must be addressed with highest priority to ensure prompt delivery.

# ECONOMIC TRANSFORMATION PROGRAMME (2)

**A comprehensive effort to transform Malaysia into a high-income nation by 2020**

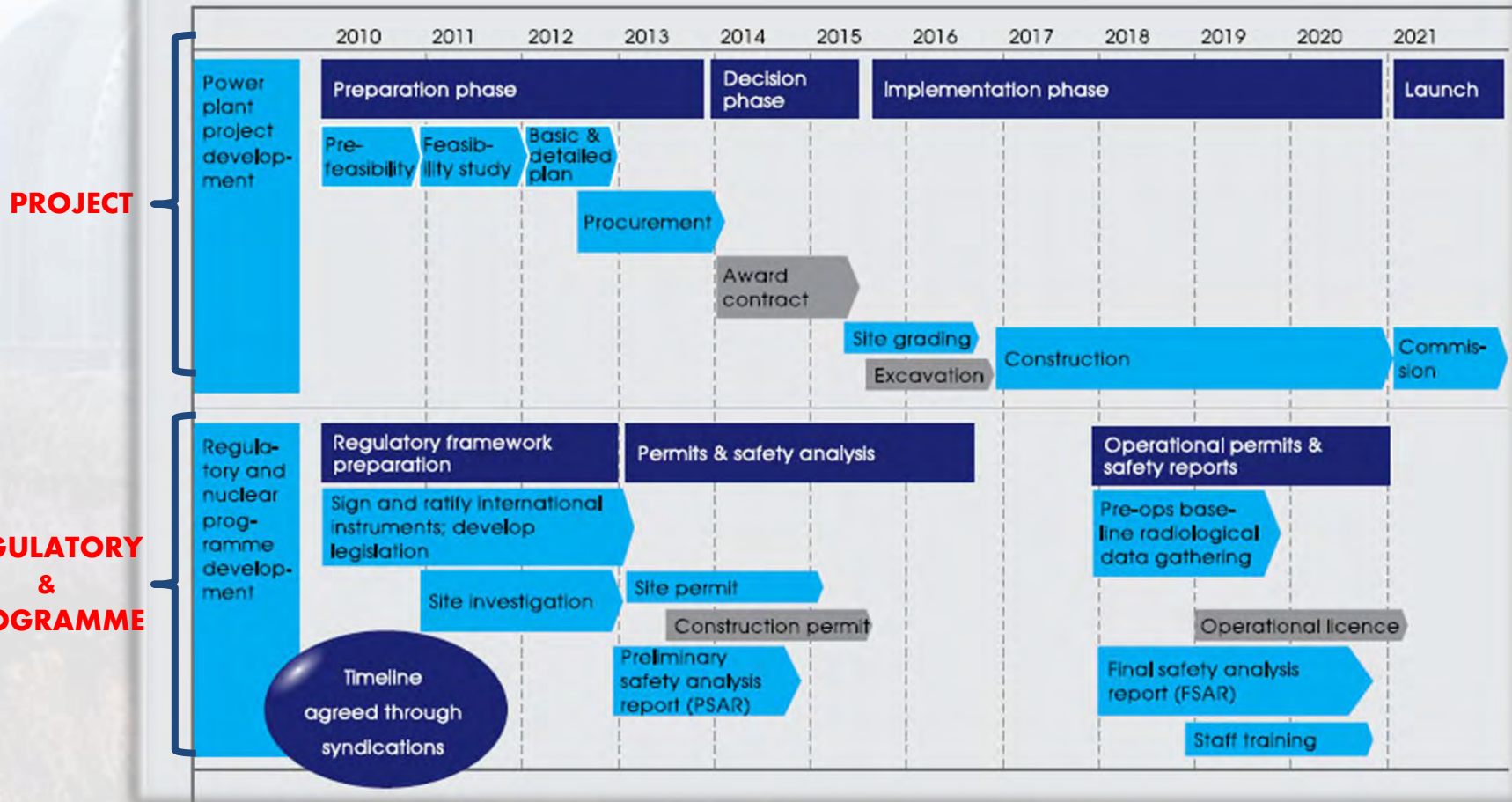
**Four (4) critical path items must be addressed with highest priority to ensure prompt delivery, which are:**



# NUCLEAR TIMELINE IN ETP REPORT

To generate nuclear power by 2021, Government will provide resources to proceed with planned activities

■ Key milestones





# MOVING FORWARD: A FULLY DEDICATED NEPIO (1)



Established on 7 January 2011

Registered under Companies Act of Malaysia, and placed under jurisdiction of the Prime Minister's Department, as a new fully dedicated NEPIO

Supersedes 2009 Nuclear Power Development Steering Committee

Officially launched by the Prime Minister to spearhead nuclear power deployment under Economic Transformation Programme (ETP) on 11 January 2011



## VISION

**Nuclear power for a sustainable high-income economy**

## MISSION

**Establishing a comprehensive groundwork for a successful, sustainable, safe, secure and peaceful national nuclear power programme within time, on budget and in a transparent manner**



# MOVING FORWARD: A FULLY DEDICATED NEPIO (2)

## STRATEGIC OBJECTIVES



To plan, spearhead and coordinate implementation of nuclear energy development programme for Malaysia and to take necessary action to realise development of first nuclear power plant in Malaysia



To ensure development of nuclear infrastructure for the country is in line with International Atomic Energy Agency (IAEA) guidelines covering 19 key infrastructure issues:

- National position
- Nuclear safety
- Management
- Funding & financing
- Legislative framework
- Safeguards
- Regulatory framework
- Radiation protection
- Electrical grid
- Human resource development
- Stakeholder involvement
- Site & supporting facilities
- Environmental protection
- Emergency planning
- Security & physical protection
- Nuclear fuel cycle
- Radioactive waste
- Industrial involvement
- Procurement



To identify company or special purpose vehicle (SPV) to be owner and/or operator of nuclear power plant

# THE ROLES OF MNPC AS A NEPIO

1

## Phase 1 (Pre-Project)

- NEPIO is responsible for most activities.
- Number of staff is relatively small and drawn from various government agencies.
- Much of the actual specialised work is performed by external experts/expert groups.
- Mixture of high-level policy work and detailed feasibility studies.

2

## Phase 2 (Project Definition)

- Start of Phase 2 - NEPIO still drives the programme.
- Other key organisations, including the Regulatory Body and the Owner/Operator should be fully established and taking an increasingly active role.
- The core project management team for the plant construction should be in place.
- Recruitment of those Operations staff with long training lead-times should begin.
- End of Phase 2 - NEPIO hands over many of its tasks to the relevant organisations.

3

## Phase 3 (Construction)

- Start of Phase 3 - NEPIO will still have an oversight role.
- Owner/Operator will be responsible for management of plant construction and commissioning.
- Regulatory Body will be actively engaged in the plant licensing and overseeing construction, as appropriate.
- Owner/Operator will be actively recruiting and training permanent staff.

# ORGANISATION STRUCTURE TO SUIT CURRENT MNPC ACTIVITIES



Additional personnel may be recruited as necessary according to progress of work

# RESPONSIBILITIES OF THE CORE UNITS

## PROGRAMME DEVELOPMENT UNIT

- **Developing the Nuclear Power Infrastructure Development Plan (NPIDP)**
- **Conducting the self-assessment of IAEA 19 Infrastructure Issues**
- **Implementing an Integrated Work Plan with the IAEA**
- **Supporting the human resource capacity development for a domestic nuclear power industry**
- **Developing strategies for stakeholder engagement & public communications**

## PROJECT DEVELOPMENT UNIT

- **Conducting Site Evaluation Studies**
- **Conducting Feasibility Studies**
- **Developing the Project Bid Documents**
- **Managing the contract with the Project Development Studies consultant**

## REGULATORY COORDINATION UNIT

- **Developing the Nuclear Power Regulatory Infrastructure Development Plan (NPRIDP)**
- **Developing the Atomic Energy Regulatory Bill, new Regulations & Guidelines**
- **Conducting a Legislation Gap Analysis**
- **Supporting initiatives for International Legal Instruments**
- **Managing the contract with the Legal & Regulatory Studies consultant**

## ATOMIC ENERGY REGULATORY BILL

- Comprehensive new law covering safety, security & safeguards, formation of a new regulatory body and the independence element of the regulatory body.

## NUCLEAR POWER REGULATORY INFRASTRUCTURE DEVELOPMENT PLAN (NPRIDP)

- Comprehensive, clear short and medium term actions, benchmarked against IAEA's 19 infrastructure issues, to be carried out by Malaysia to embark on a nuclear power programme.

## LEGISLATION GAP ANALYSIS

- Study of laws and subsidiary laws in Malaysia that may be impacted by the revision of the existing Atomic Energy Licensing Act.

## INTERNATIONAL LEGAL INSTRUMENTS

- International instruments for nuclear power deployment that Malaysia should be a party to, to demonstrate commitment to ensure nuclear safety, security and safeguards as per international governance and give confidence for vendors to supply to Malaysia.

## SUBSIDIARY REGULATIONS

- 10 subsidiary regulations to the Atomic Energy Bill

## SUBSIDIARY GUIDELINES

- 8 subsidiary guidelines to the Atomic Energy Bill

# 4-IN-1 PROJECT & PROGRAMME DEVELOPMENT STUDY

## NUCLEAR POWER INFRASTRUCTURE DEVELOPMENT PLAN (NPIDP)

- Comprehensive assessment of national capabilities, state-of-preparedness and infrastructure requirements pertinent to development of a nuclear power programme.
- National self assessment of conditions required to achieve milestones of IAEA 19 Key Nuclear Infrastructure Areas.

## FEASIBILITY STUDY

- Detailed technical, financial and economic analysis of viability of nuclear power as part of the national energy mix, including a comparison of against other sources of generation.
- Recommendations on possible nuclear reactor technologies, plant size, manpower requirements and other main technical features.

## SITE EVALUATION

- Shortlisting and evaluation of candidate sites for a possible nuclear plant in accordance to regulatory requirements and guidelines, including impact assessments for environmental, radiological, socio-economic, socio-cultural and safety aspects.

## BID DOCUMENTS

- Recommendations on bidding and contractual approach to be adopted as well as preparation of bid documents and bid evaluation methodologies to invite potential vendors for construction of a possible nuclear power plant.

## STAKEHOLDER ENGAGEMENT & PUBLIC COMMUNICATIONS

- Formulation and implementation of a communications strategy and action plan for nuclear power, incorporating a comprehensive public opinion survey.
- Continuous engagement with national and international stakeholders at all levels.

## OWNER/OPERATOR SPECIAL PURPOSE VEHICLE STUDY

- Facilitating identification and/or establishment of a Special Purpose Vehicle (SPV) that will own and/or operate the possible nuclear power plant, including manpower requirements .
- Assessing sources and methods of financing for a possible nuclear power plant project.

## NUCLEAR POWER HUMAN RESOURCE CAPACITY DEVELOPMENT

- Supporting competency development of domestic human resources required for a successful and sustainable nuclear power industry, both at a company level and also at a national scale in collaboration with academic institutions and other relevant agencies.



# PUBLIC ENGAGEMENT GOALS OVER 10-15 YEARS



**Public Participation;  
Define overall approach and strategy/policies.**



**Obtain local support at recommended site(s).**



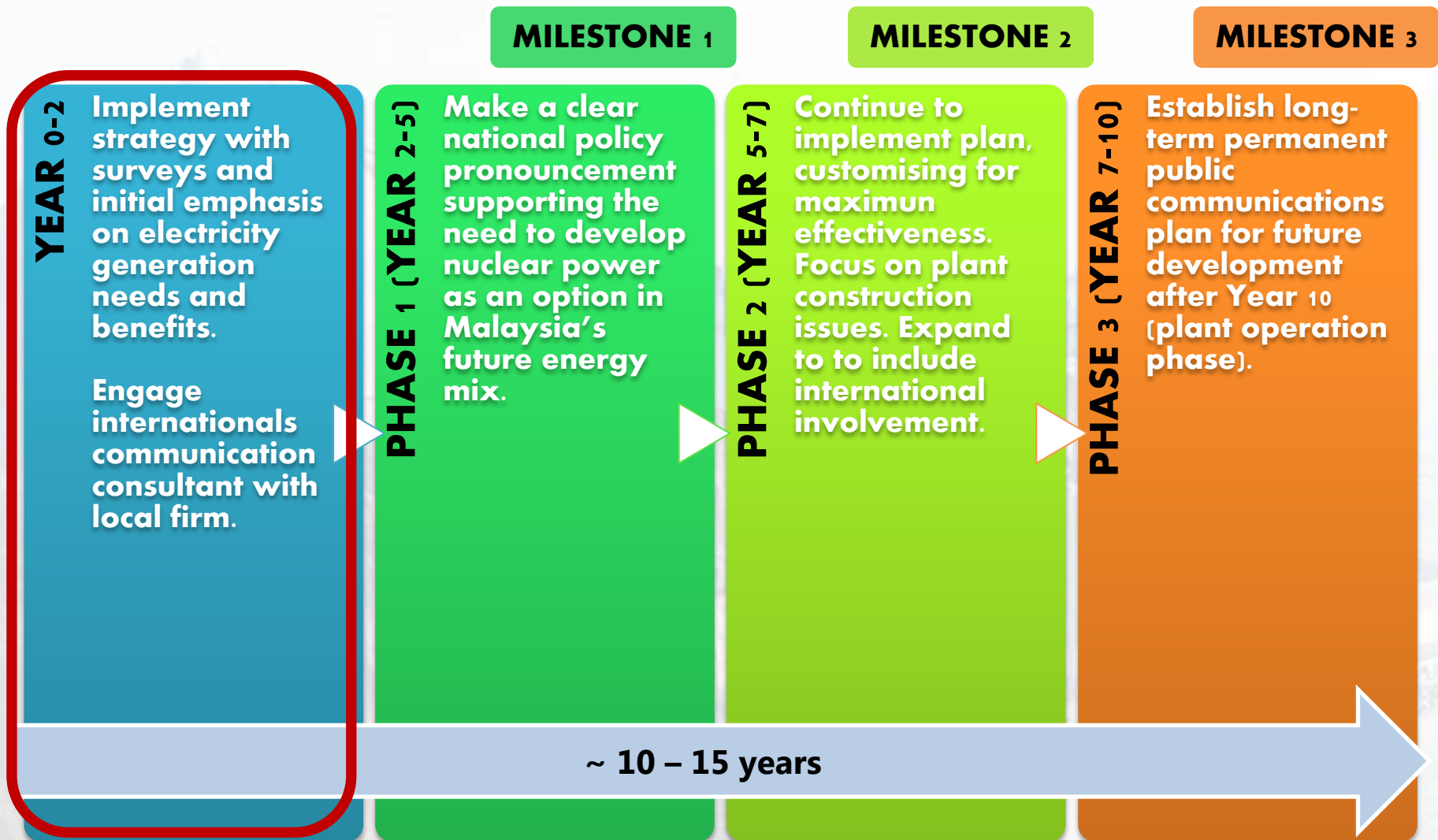
**Educate broader Malaysian population on nuclear power deployment in Malaysia's energy mix.**



**Develop Malaysian public participation infrastructure.**

**~ 10 – 15 years**

# IAEA-COMPLIANT 10-15 YEAR ROADMAP



# CHALLENGES

## CHALLENGE

## POTENTIAL RESOLUTION

### Public Acceptance



- Promote public acceptance

- Public opinion survey to identify priority segments & concerns
- Awareness projects
- Transparency in project implementation

### International Governance



- Sign/ratify relevant treaties & conventions

- Fast-track process and make government priority

### Regulatory context



- Put in place detailed regulations

- Align on international best practices
- Top-down mandate to accelerate process
- Engage foreign experts to assess site & construction permit applications

### Nuclear Plant Site Acquisition



- Acquire approval for plant sites
- Obtain public support in locality

- Public information programme
- Option for localities to bid to host nuclear plants as in Japan & Republic of Korea

### Construction timeline



- Require best-in-class timeline from vendors

- Negotiate with vendors based on timeline

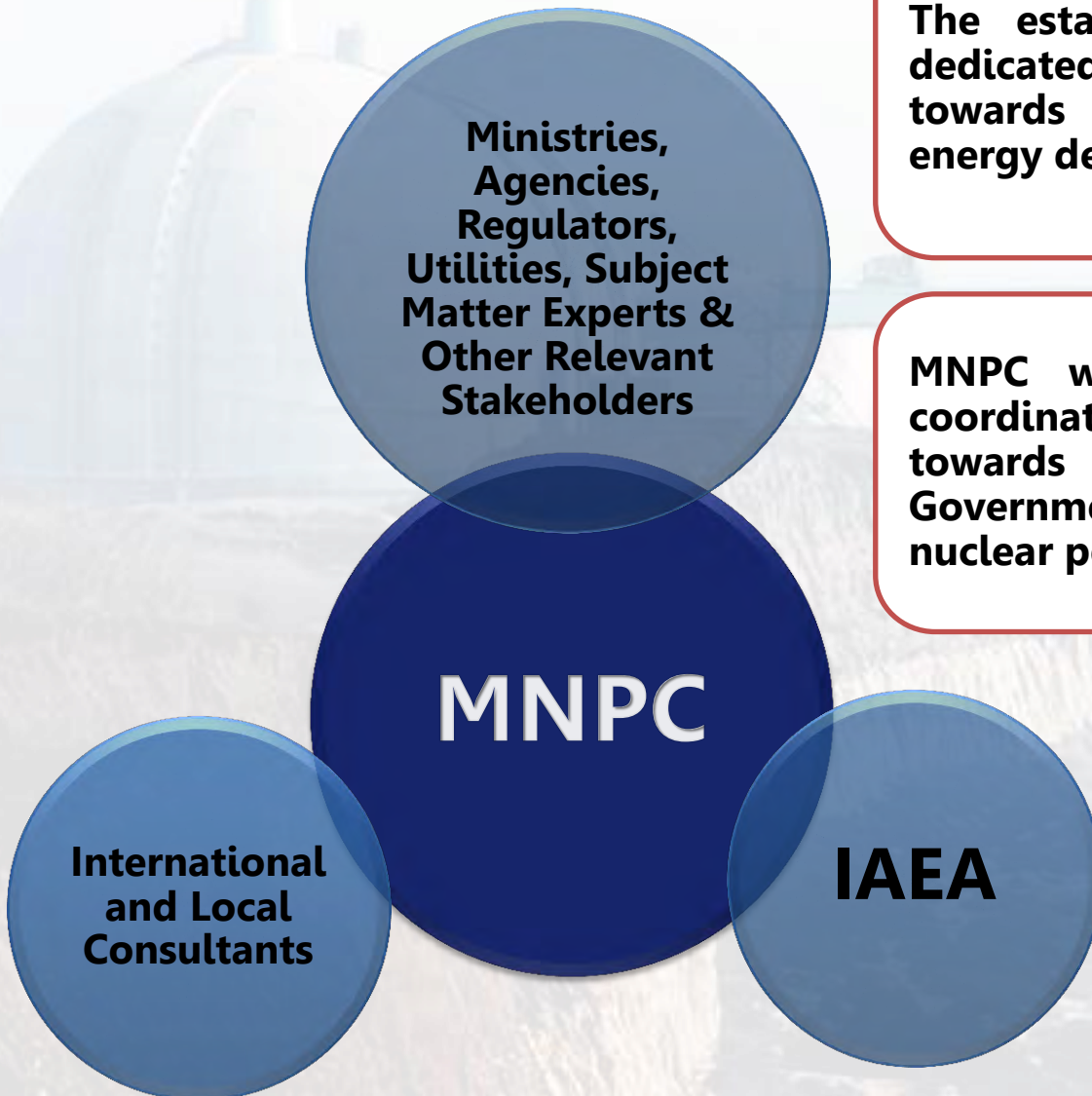
### Project Financing



- Obtain low-cost financing

- Combine low-cost & market financing (e.g. sovereign-guaranteed, foreign export credits, foreign equity, commercial loans, including Islamic financing)

# CONCLUDING REMARKS



**The establishment of MNPC as a fully dedicated NEPIO facilitates a focused drive towards the implementation of a nuclear energy development program for Malaysia.**

**MNPC will continue to spearhead and coordinate a collaborative national effort towards enabling a well-informed Government decision on the option of using nuclear power post-2020.**



*Saliza Jam*

Manager, Programme Development  
Malaysia Nuclear Power Corporation

[saliza@mnp.org.my](mailto:saliza@mnp.org.my)