National *Energy Security Conference*

Sime Darby Convention Centre, Kuala Lumpur

MNPC
MALAYSIA NUCLEAR POWER CORPORATION

Making Nuclear Power A VALID Energy Option in Peninsular Malaysia: Pre-Project Activities spearheaded by MNPC

28 February 2012

Objectives

- WHY NUCLEAR and relevant Government decisions with respect to Nuclear Power Development (COD post-2020)
- Status of Nuclear Power Programme in some countries
- "Deploying Nuclear Energy for Power Generation" is one of Entry Point Projects (EPP No. 11, OGE Sector) in Economic Transformation Programme Report (25 Oct 2010)
- Pre-Project Activities spearheaded by Malaysia Nuclear Power Corporation (MNPC), as NEPIO and **tentative** Nuclear timeline

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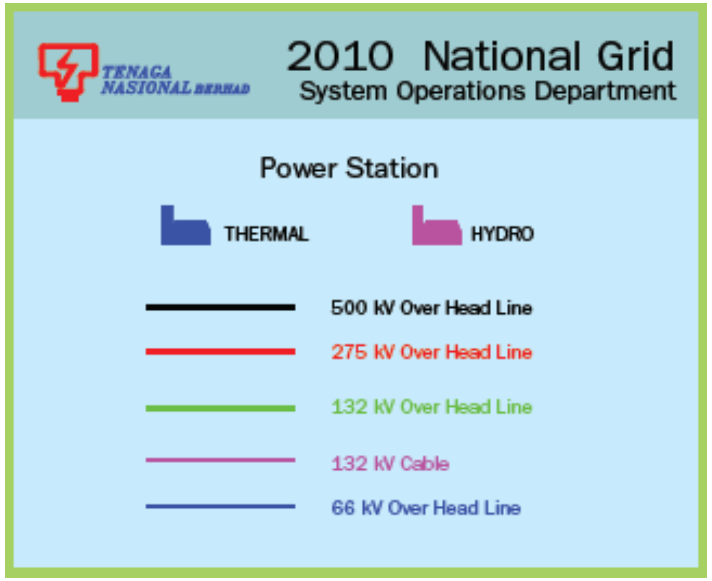
PENINSULAR MALAYSIA POWER GRID



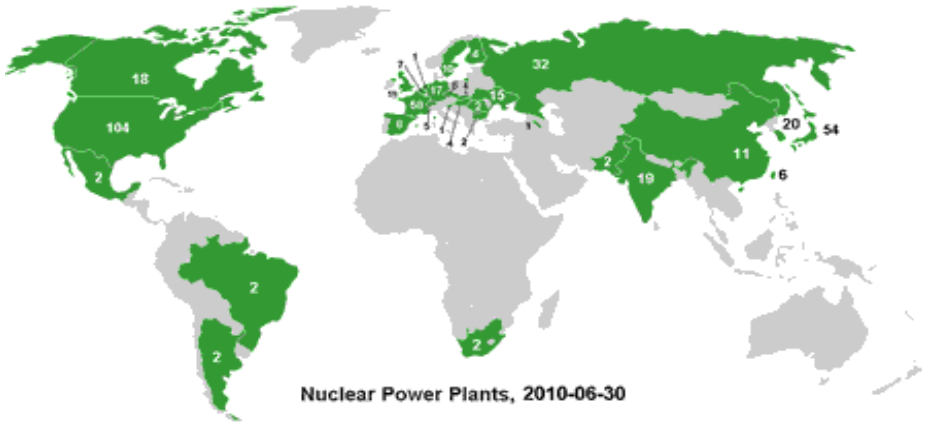
Peninsular Malaysia Power Grid can support NPPs of 1,000 MWe nominal capacity, post-2020

COD of 1st 1,000 MWe Coal Power Plant expected in Manjung, Perak in 2015

Source: Tenaga Nasional Berhad (TNB)

Nuclear Power Reactors

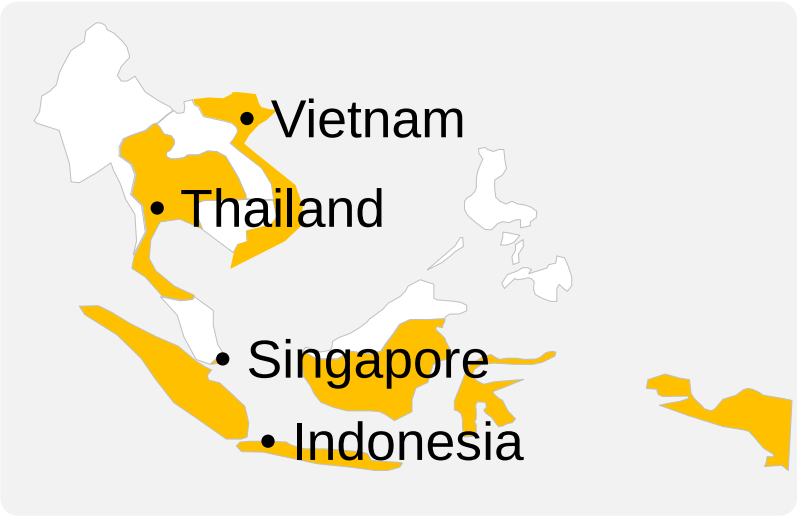
Worldwide



- *Nuclear Power Countries : 30*
- *Units Operating: 443 Units*
- *Under Construction: 59 Units*
- *Capacity: 375,000 MWe*

Source: World Nuclear Association, 1st April 2011

South East Asia



Reactors Proposed :

- *Vietnam: 4 units (1st COD 2020)*
- *Thailand: 5 units (1st COD 2020 - deferred)*
- *Indonesia: 4 units*
- *Singapore: Pre-FS*

Source: World Nuclear News

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Singapore's Statement

- *Fukushima crisis **would not derail*** Singapore's pre-feasibility study *on nuclear energy, as it needed to assess safety risks associated with the technology, but any decision on its use remained far away.*

- *SEA neighbours such as Indonesia, Malaysia, Thailand and Vietnam have announced plans for nuclear energy*

- *"Therefore, even if we do not proceed with nuclear energy for Singapore, we need to **understand its implications for the region**, and for Singapore," Iswaran said.*

- *"Even with the completion of the pre-feasibility study, we will still be **a long way from making any decisions** on nuclear energy for Singapore."*

S. Iswaran

Senior Minister of State for Trade, Industry and Education

Speaking to Singapore's Parliament,

April 11th 2011

Status of Nuclear Programme in Selected Countries (1)

Vietnam

- The Pre-FS for the 1st NPP in Vietnam and Power Sector Development Master Plan up to 2025 was approved by the Government, showing planned nuclear power capacity will reach **4,000 MW in 2025** with the 1st Unit COD in **2020.**
- The first NPP of **2x 1,000 MW** will be built in cooperation with **Russia** and the second NPP of **2x 1,000 MW** will be built in cooperation with **Japan**
- Russia will provide the **fuel** and **take it back for reprocessing ,** thus solving all the issues of nuclear and radiation safety related to the handling of used nuclear fuel in the territory of Vietnam.
- Project **Infrastructure for Construction**, **Public Relation Center** and **HRD** started in 2010 to support Vietnam nuclear power program.

- *Vietnam-Japan agreement in Sept 2011 to carry out Feasibility Study of 2nd NPP project in Vietnam at a cost of Yen 2 billion or USD 25 million*

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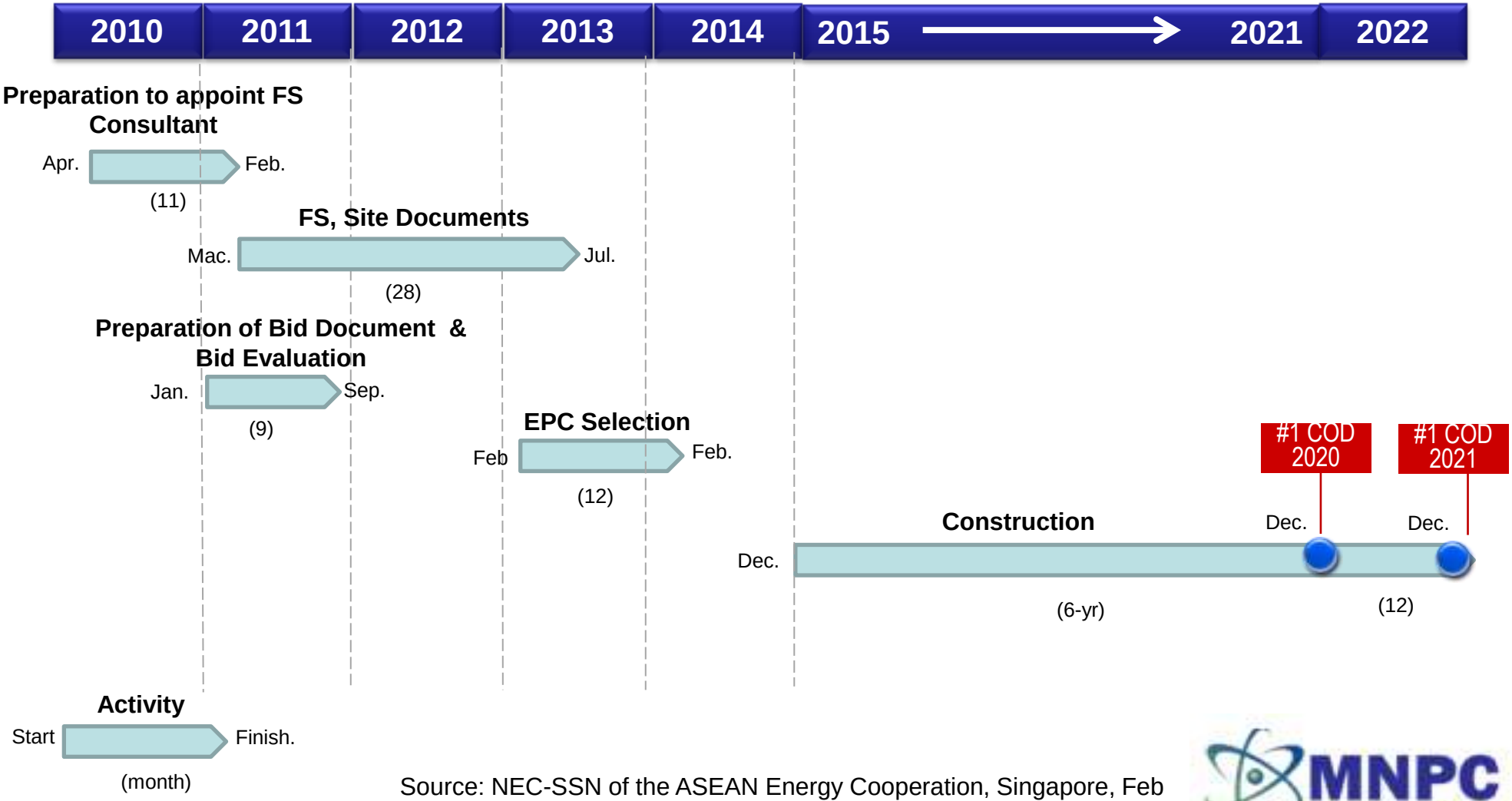
Source: World Nuclear News

Status of Nuclear Programme in Selected Countries (2)

Vietnam Milestone for the First NPP



Source: NEC-SSN of the ASEAN Energy Cooperation, Singapore, Feb 2011

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Status of Nuclear Programme in Selected Countries (3)

Thailand

- Thailand's Power Development Plant 2010 was approved by The Cabinet with the construction of **5x1000 MWe NPP** and in operation from **2020 to 2028.**
- The Cabinet also approved the setup of Nuclear Power Program Development Office (NPPDO) and Nuclear Power Infrastructure Establishment Cooperation Committee (NPIECC) as a **NEPIO** - key steering committee for program cooperation among related government agencies.
- Feasibility study of Nuclear Power Plant are well conducted by EGAT with clear results:

Siting	• Preliminary Site Selection for NPP was prepared in accordance with IAEA • Five (5) candidate sites were scored and selected from 17 potential sites and based on criteria, the candidate sites are limited to 3 preferable sites.
Technology	• LWR is preferable, BWR/PWR has not been d & 1000-1400 MWe range is feasible.
Funding & Economics	• 3 ownership options were analyzed. • 100% corporate funding provides lowest tariff. • Potential sources of financing agents were identified. • Nuclear liability study will be reviewed

Deferred after Fukushima Tragedy

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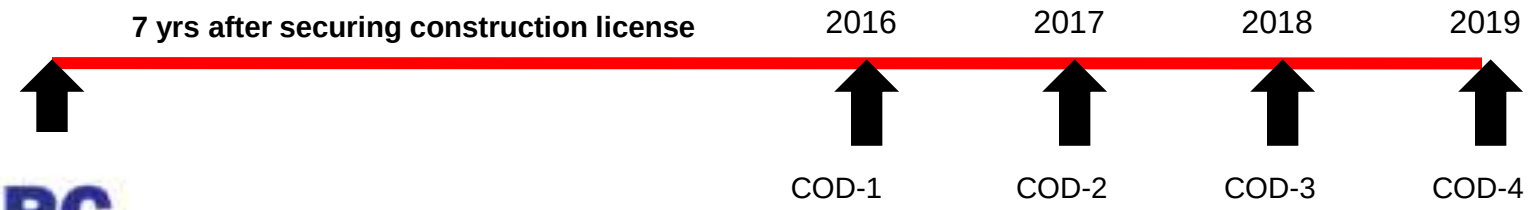
Status of Nuclear Programme in Selected Countries (4)

Turkey

- Russia will build-own-operate (BOO) first NPP at Akkuyu, Turkey.
- The project consists of construction of four (4) units of VVER 1200MWe with USD 20 billion project cost.
- Russian vendor will initially own 100% share but in the long-term, 49% of total share will be offered to Turkish investors; 51% remains in Russian hands
- TETAS (Turkish Electricity Corporation) has guaranteed to purchase a fixed quantity of the plant's output :
    - 70 % from 1st and 2nd units
    - 30% from 3rd and 4th units
    - Balance generation capacity to be sold in open market
    - Stable price at US 12.35 cents/kWh for over 15 years
- Project Timeline:

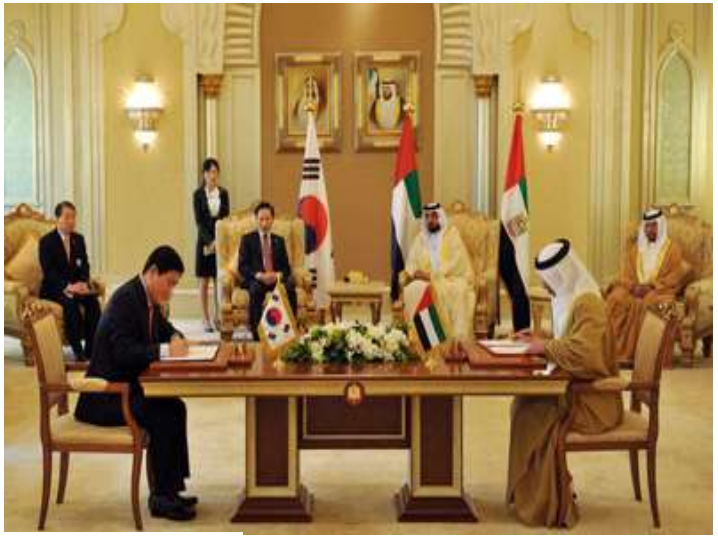


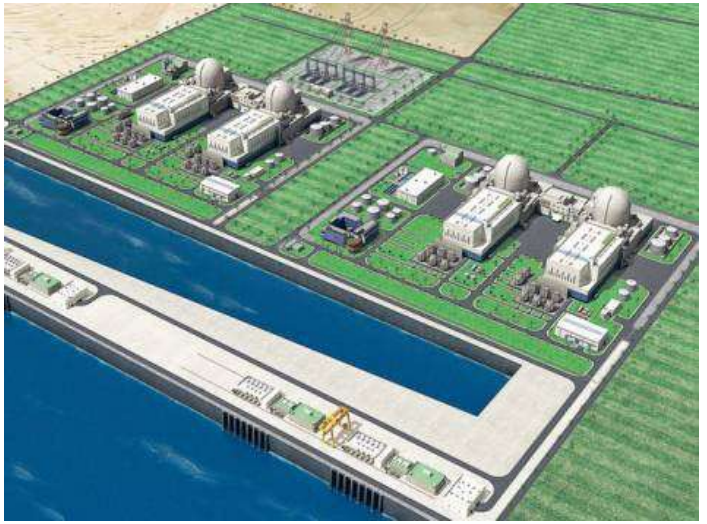
Source: World Nuclear News, May 13, 2010

Status of Nuclear Programme in Selected Countries (5)

UAE

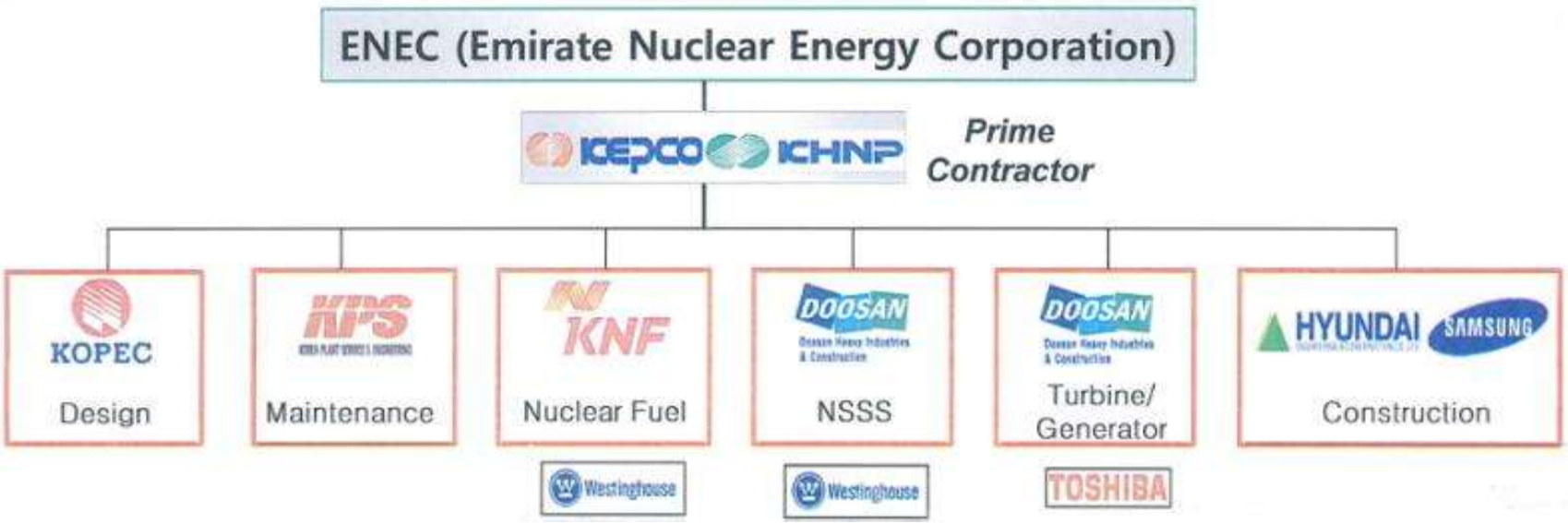
- Project Cost: USD 20 billion
- Additional USD 20 billion for O&M and fuel supply over 60 years
- Scope of works:
  - ✓ 4 Units of APR 1400 MWe
  - ✓ Design
  - ✓ Construction
  - ✓ Operation & Maintenance
- **Lightbridge** (formerly known as Thorium Power) and **CH2M Hill** were advisers for the implementation of UAE's Nuclear programme.





Source: World Nuclear News, May 13,2010

UAE's SPV- ENEC



Source: UKM-TODAI Workshop in Nuclear Power, June 2010

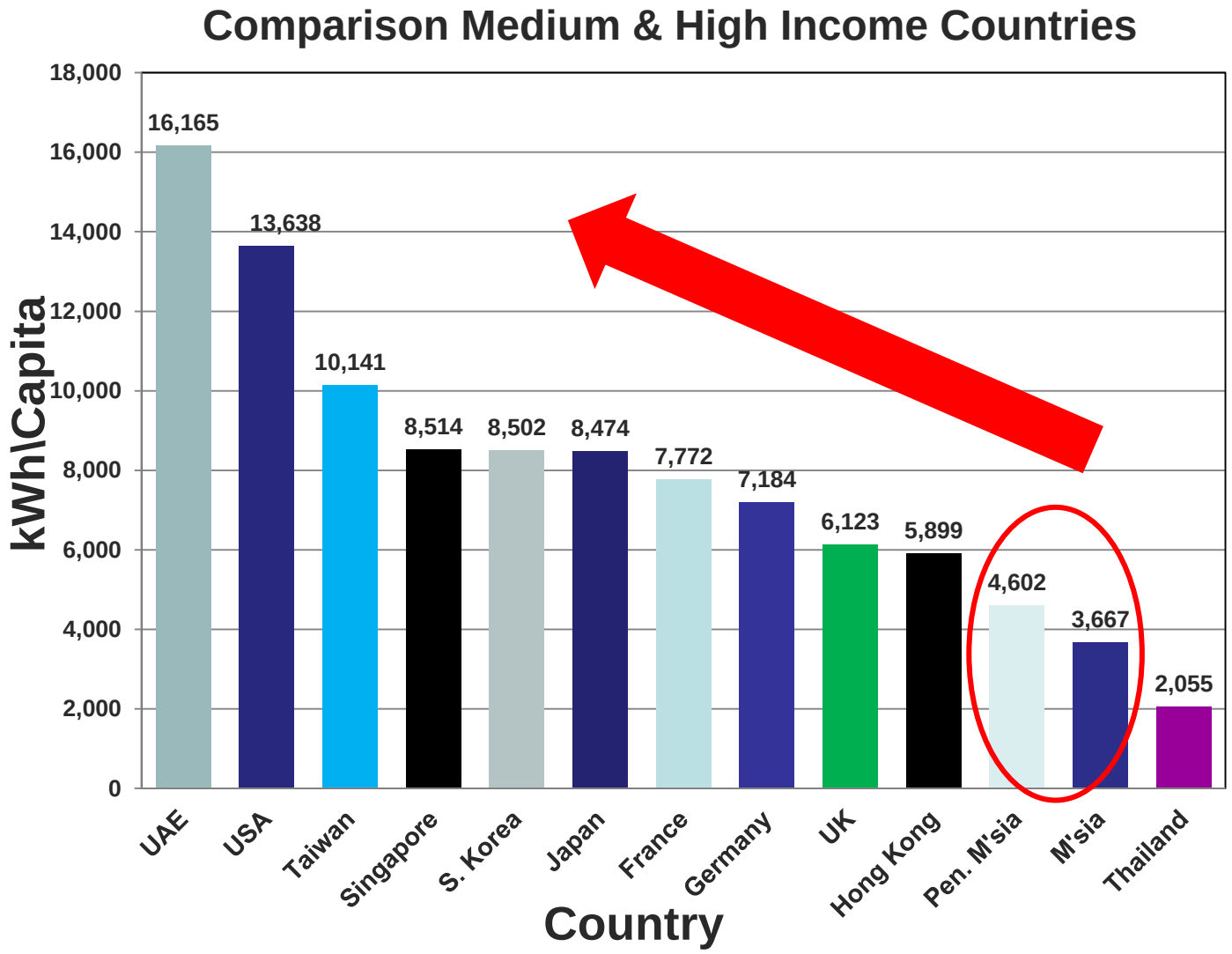
- **Emirates Nuclear Energy Corporation (ENEC)** as project owner-operator was formally established as an investment vehicle about one (1) year before major Contract Award in Dec 2009. ENEC was initially funded with **USD 100 million** to evaluate and implement nuclear power plant in UAE.
- Before ENEC was formed, **nuclear pre-project activities** were spearheaded by Abu Dhabi Water and Electric Authority (ADWEA), the TNB equivalent in UAE . **This is the role assigned to MNPC since January 2011**

1 WHY NUCLEAR & Government Decisions

Electricity to Develop a Nation

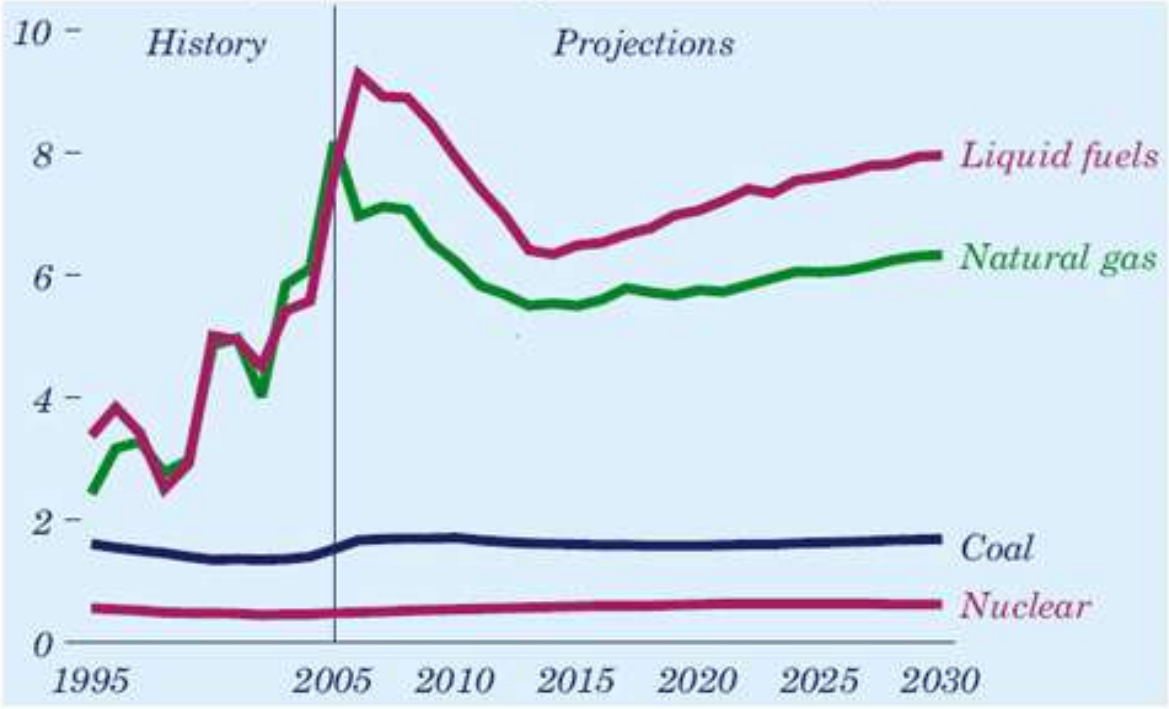
As Malaysia positions itself to be a developed nation by year 2020, its electricity usage per capita will inevitably rise from industrial, commercial & domestic consumers

We need mid to long-term plan to address this.



Future Prices of Fossil Fuels

Figure 65. Fuel prices to electricity generators, 1995-2030 (2005 dollars per million Btu)



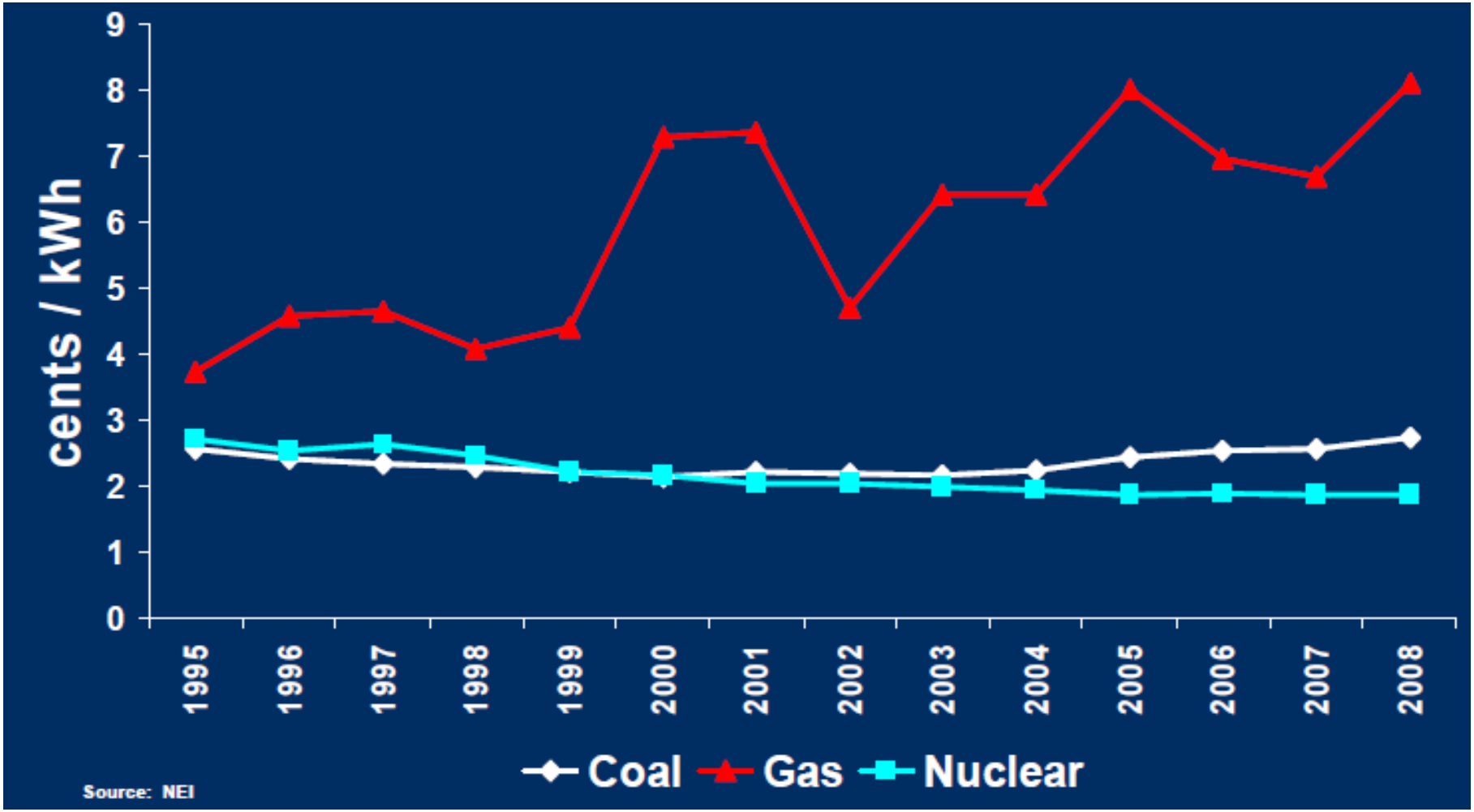
Source: EIA – US Energy Price

- *US Energy Information Administration (EIA) fuel cost projections indicated* ***coal and nuclear are stable*** *and low in the long run in the US*
- ***US has high domestic coal reserves but Malaysia imports coal***
- *Nuclear fuel cost is low and stable despite import of uranium*
- ***Situation is expected to be the same for Malaysia except for coal price***

Cost per kWh in USA

Generation Cost (US ¢/kWh)

Source: NERA Consulting, Mar. 2010

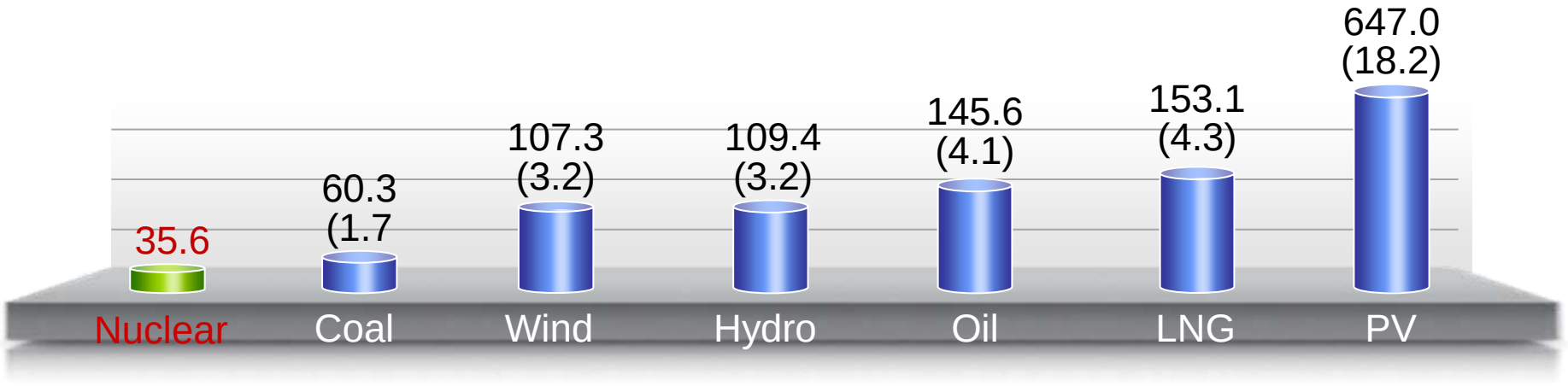


Cost Competitiveness of Nuclear Power (KRW/kWh)

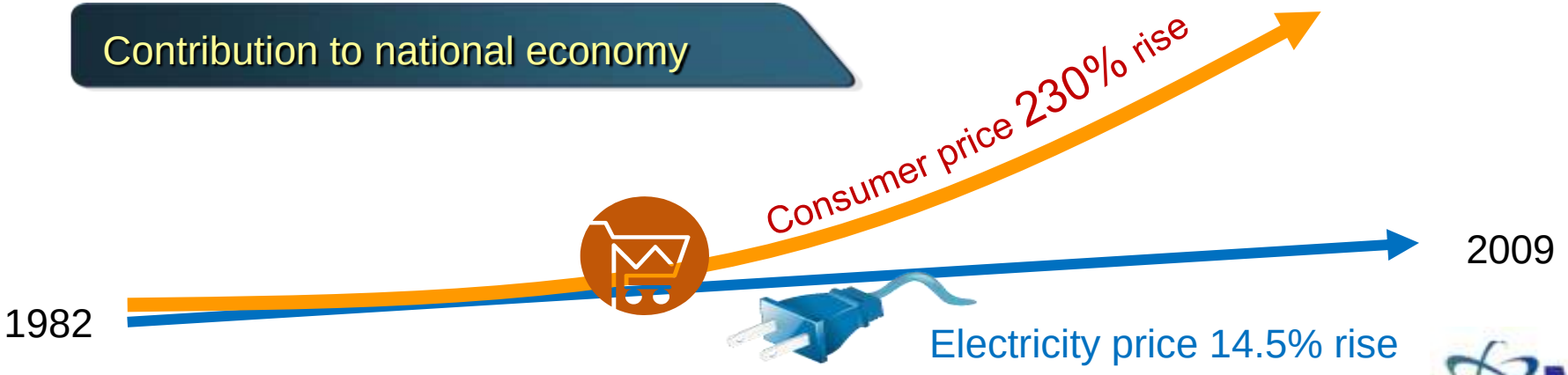
Economical efficiency

- Sales price (KRW/kWh) : Nuclear is the cheapest

(Year 2009)



Contribution to national economy



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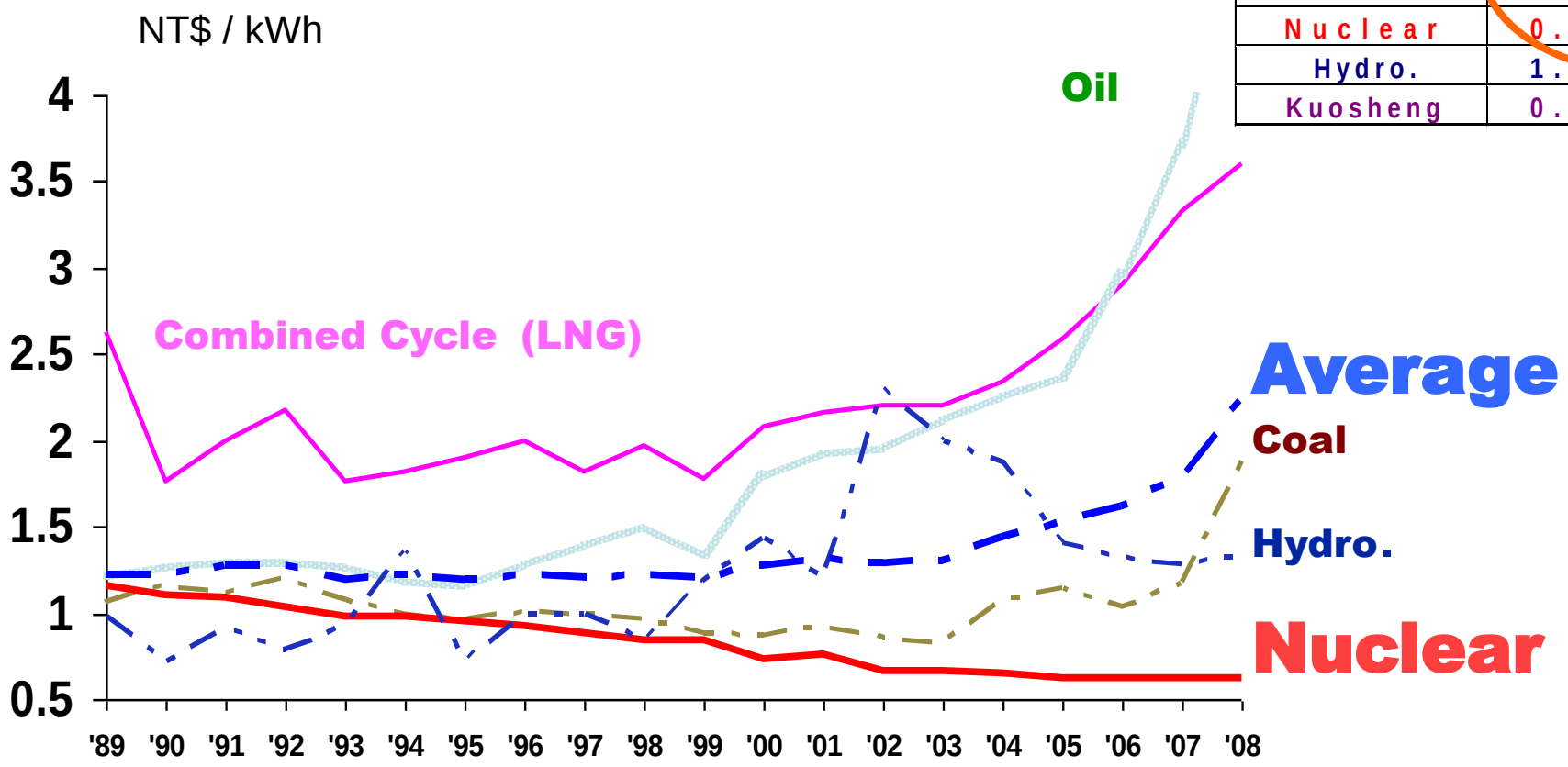
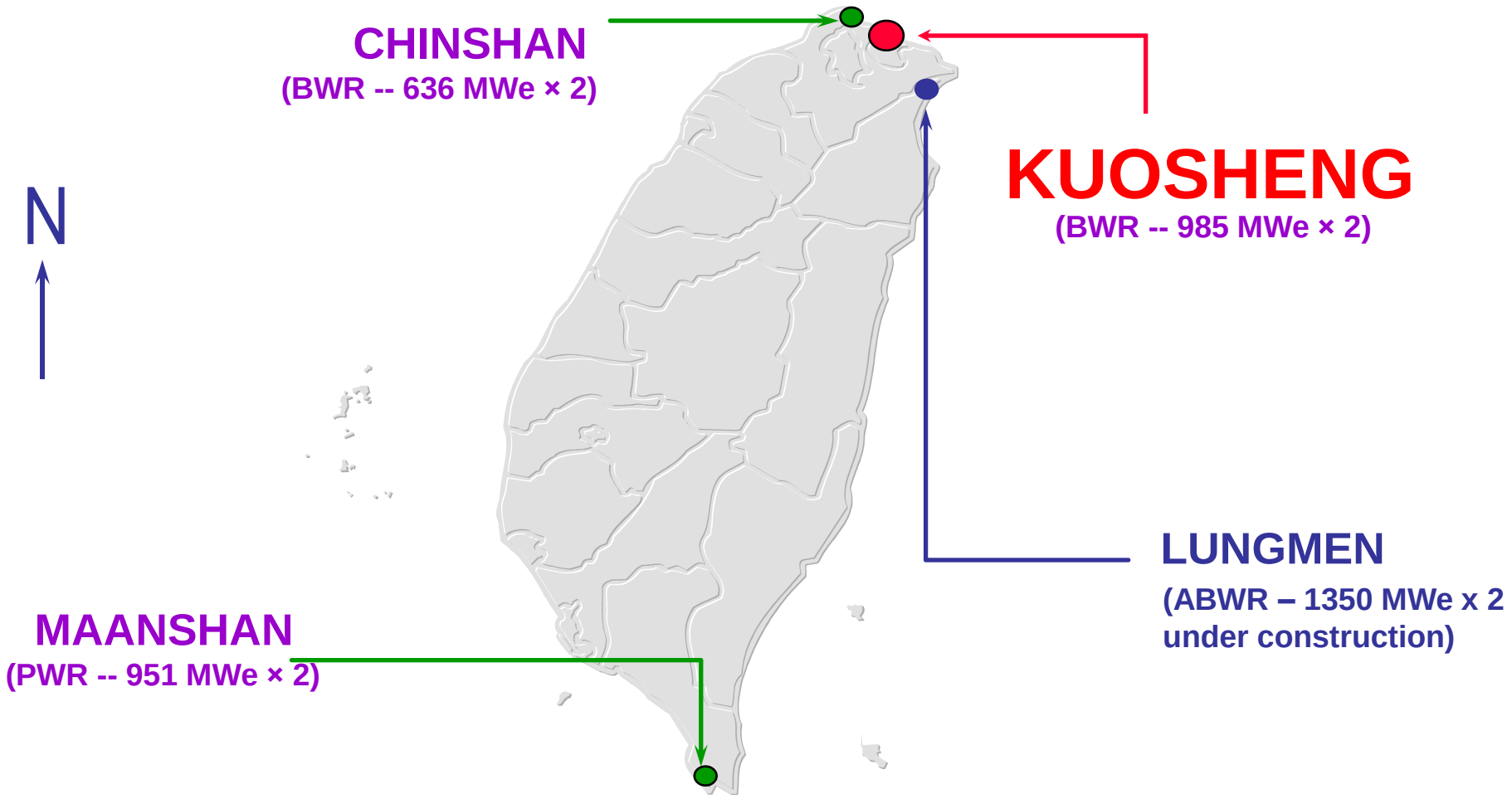
TAIPOWER, Taiwan
COST ANALYSIS
OF POWER GENERATION

Cost Analysis		
(NT$/KWH)	2008	2007
Average	2.25	1.79
Combined Cycle(LNG)	3.60	3.32
Oil	5.06	3.72
Coal	1.87	1.18
Nuclear	0.62	0.63
Hydro.	1.34	1.28
Kuosheng	0.59	0.66



Kuosheng has maintained a **low generation cost** (around **2 US cents / kWh**)

Nuclear Power Plants in Taiwan



Peninsular Malaysia is four times (4x) the size of Taiwan (island) with almost the same population size

Why Nuclear

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LONG TERM SOLUTION

1

BASE-LOAD OPTION FOR ELECTRICITY GENERATION

- ❑ Supply and price restriction of FOSSIL FUELS and HYDRO RESOURCES
- ❑ Supply restriction of "intermittent" RENEWABLE ENERGY (RE)

3 | 2 | 4

ENVIRONMENT

- ❑ Reduce GHG emissions
- ❑ Global Warming Solution

ECON COMPETITIVENESS

- ❑ Sustaining Stable Electric Tariff

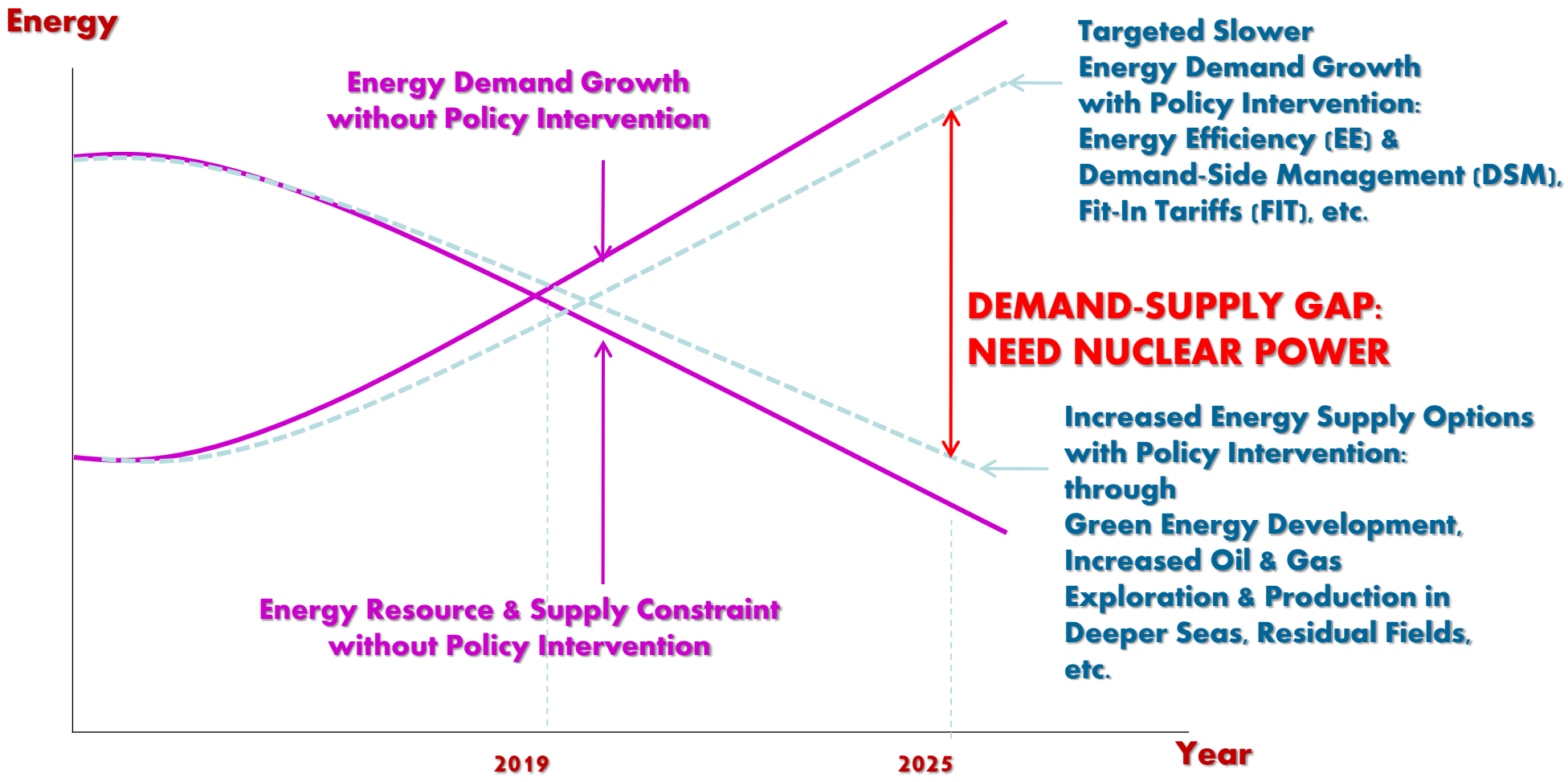
ADVANTAGES

- ❑ CHEAP fuel
- ❑ LONG Plant Lifetime
- ❑ LONG operational duration of fuel

Some Observations

- Many would agree that demand for CLEAN electricity will increase. If Electric Vehicles successfully make in-roads in future transportation sector, MORE electricity will be needed.
- Many would also agree on the need to reduce over dependence on depleting fossil fuels - diversify generation energy mix
- Some argue that Renewable Energy is the solution while others are NOT convinced that RE can provide needed LOW CARBON base-load power
- Hence, the reason to consider PROVEN Nuclear Power to meet future electricity demand in Malaysia and many parts of the world
- In Malaysia, we cannot IGNORE the benefits of Nuclear Power in future generation energy mix. We must also address PUBLIC and CONCERNS on nuclear safety, security and safeguards (3S) and radioactive waste management, among others

NEED FOR NUCLEAR POWER IN PENINSULAR MALAYSIA



Nuclear energy need to fill energy demand-supply gap together with renewable energy on supply side & energy efficiency & demand-side management.

Source: Economic Planning Unit (EPU), Prime Minister's Department, 2009

Government Decision

26 June 2009: Government agreed to

- consider nuclear energy as one of the options for electricity generation, post 2020 particularly in Peninsular Malaysia
- set up Nuclear Power Development Steering Committee (JPPKN) and three (3) Working Committees (see next slide)
- allocate RM25 million for a period of 3 years (2010 – 2012) to implement activities under JPPKN

Start of national interest in nuclear energy for POWER Generation - 2009

Malaysian NEPIO – Working Committees

NUCLEAR POWER DEVELOPMENT STEERING COMMITTEE

NUCLEAR POWER PROGRAM WORKING COMMITTEE (MNA)

- Educational Program and Public Awareness
- Human Capital Development
- Technology Assessment

NUCLEAR POWER PROJECT WORKING COMMITTEE (TNB)

- Site Identification
- Nuclear Fuel Procurement Planning
- Nuclear Power Plant Conceptual Design (including Project Management and Quality Assurance)

REGULATORY DEVELOPMENT COORDINATION WORKING COMMITTEE (AELB & ST)

- Regulation and Licensing of Electricity Generation
- Regulation and Licensing of Nuclear Power Plant

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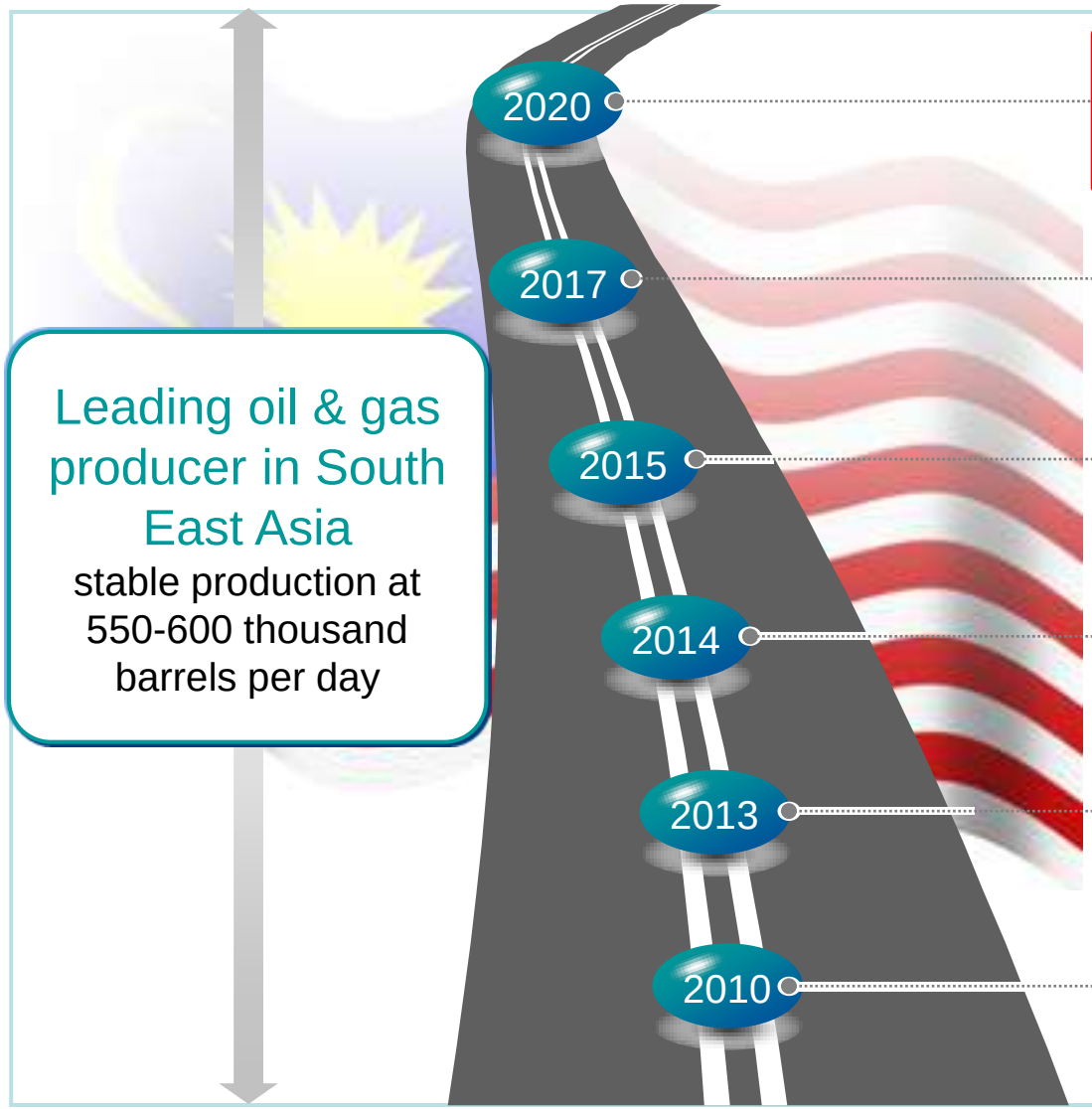
2 Economic Transformation Programme and MNPC

OGE vision in 2020: bigger, more value adding, more efficient, and more diversified

INDICATIVE ONLY



Leading oil & gas producer in South East Asia
stable production at 550-600 thousand barrels per day

5 GW Hydro, up to 1.25GW Solar,
2 GW Nuclear power

10 million tonnes regional oil storage and trading hub

#1 oil field services hub in Asia - Regional HQ of MNCs, new regional champions

Reduce energy bill by 5% through energy efficiency best practices

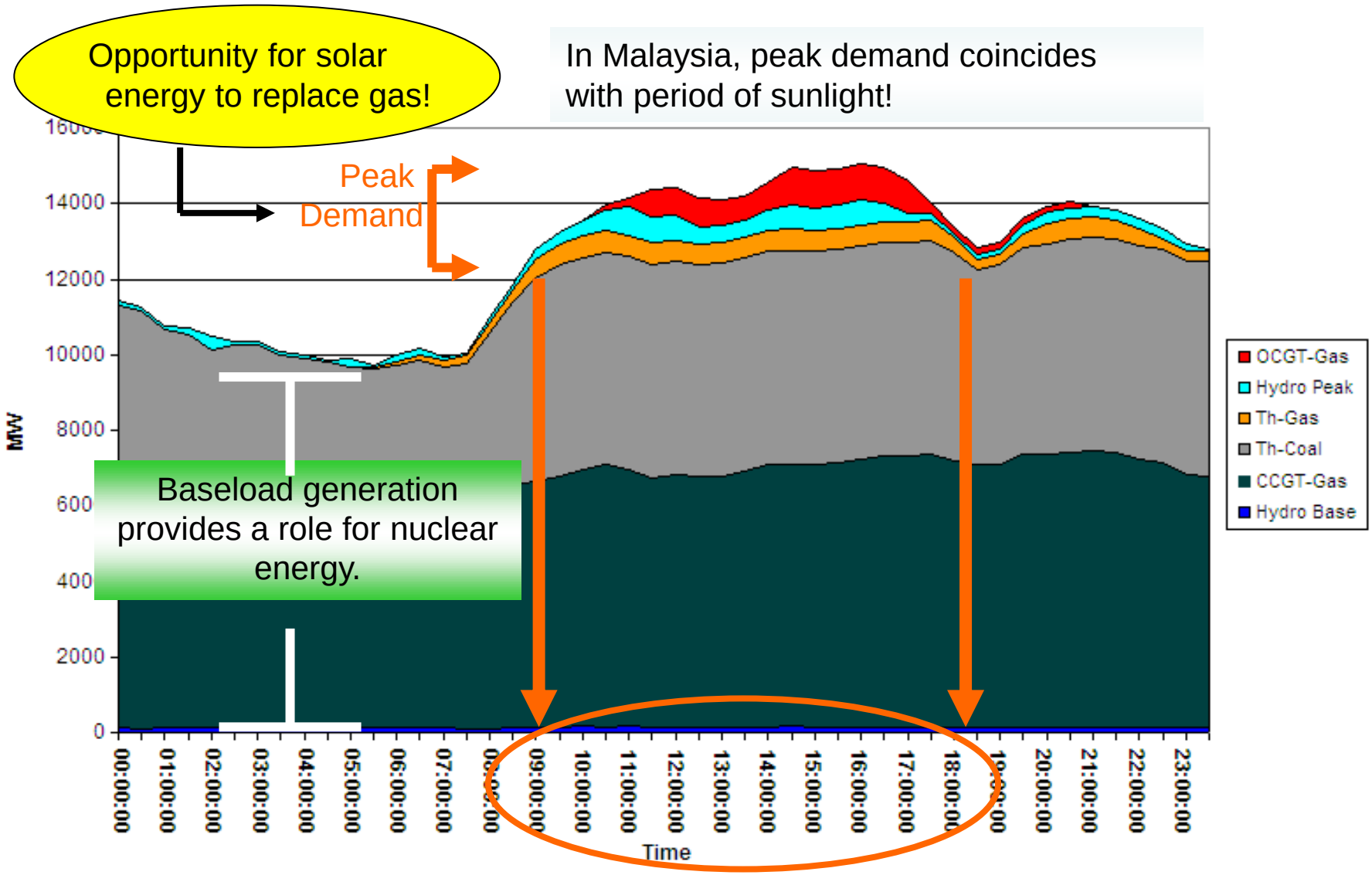
First LNG imports into Malaysia to substitute expensive fuel and create new industries

Oil, Gas and Energy central to Malaysia economy (20% of GDP)

SOURCE: OGE NKEA Lab

Solar for peak, Nuclear for baseload

Nuclear & renewable energy complement each other



ETP Report (1)

PEMANDU

ECONOMIC TRANSFORMATION PROGRAMME

MNPC

EPP 11: Deploying Nuclear Energy for Power Generation

Rationale

Malaysia is exploring the option of deploying nuclear energy in order to meet future demand and diversify the energy mix for Peninsular Malaysia. A Nuclear Power Development Steering Committee, headed by the Ministry of Energy, Green Technology and Water, was set up in June 2009 to plan and coordinate the preparatory efforts towards deploying nuclear energy for electricity generation. The committee has been tasked to conduct various studies towards preparing a Nuclear Power Infrastructure Development Plan (NPIDP), which is targetted to be ready by 2013. Prior to conducting these necessary studies, a nuclear power pre-feasibility study and initial site selection study has already been undertaken.

Actions

The Steering Committee is studying the possibility of delivering a twin-unit nuclear power plant with a total capacity of 2 gigawatts, with the first unit in operation by 2021. The plan under development lays out a development timeline of 11 to 12 years from pre-project to commissioning. The plan presents a positive case for nuclear energy in Malaysia (*Exhibit 6-17*). Firstly, if Malaysia developed nuclear energy, it would be cost-competitive, supplying the cheapest source of energy. Secondly, nuclear power is a cleaner energy than coal and gas (0 grams of carbon dioxide equivalent per kilowatt hour vs approximately 800 and 400 grams respectively).

ETP Report (2)

Funding

Building the twin unit nuclear plant is expected to require a RM21.3 billion investment up to 2020.

Enablers

In order to ensure prompt delivery, the project will be launched without delay and four critical path items must be addressed with highest priority. Firstly, there must be public acceptance of the project. Secondly, Malaysia must ratify the relevant international treaties. Thirdly, the Government must ensure that the correct regulatory framework is put in place. Finally, approvals for plan sites including from local populace must be obtained.

Impact

Construction of the nuclear power plants will have a temporary GNI impact in the construction sector, with GNI contribution of RM0.2 billion from the creation of 2,600 jobs. The jobs will include roles covering plant operation and maintenance, waste management and licensing and regulation. Once operational (post 2020), the two 1-gigawatt nuclear power plants will generate GNI amounting to RM1.8 billion per year from the electricity generated.

Economic Transformation Program

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

1	Public Acceptance 	▪Promote public acceptance	Awaits commencement of PIPA activities by KeTTHA.
2	International Governance IAEA	▪Sign/ratify relevant treaty & conventions	Signed a contract with consultant to undertake a one (1) year legal and regulatory study.
3	Regulatory context 	▪Put in place detailed regulation	
4	Nuclear Plant Site Acquisition 	▪Acquire approval for plant site ▪Obtain public support	Special briefing to the Government regarding selection of five candidate NPP coastal sites in Peninsular Malaysia. MNPC to appoint international consultant.

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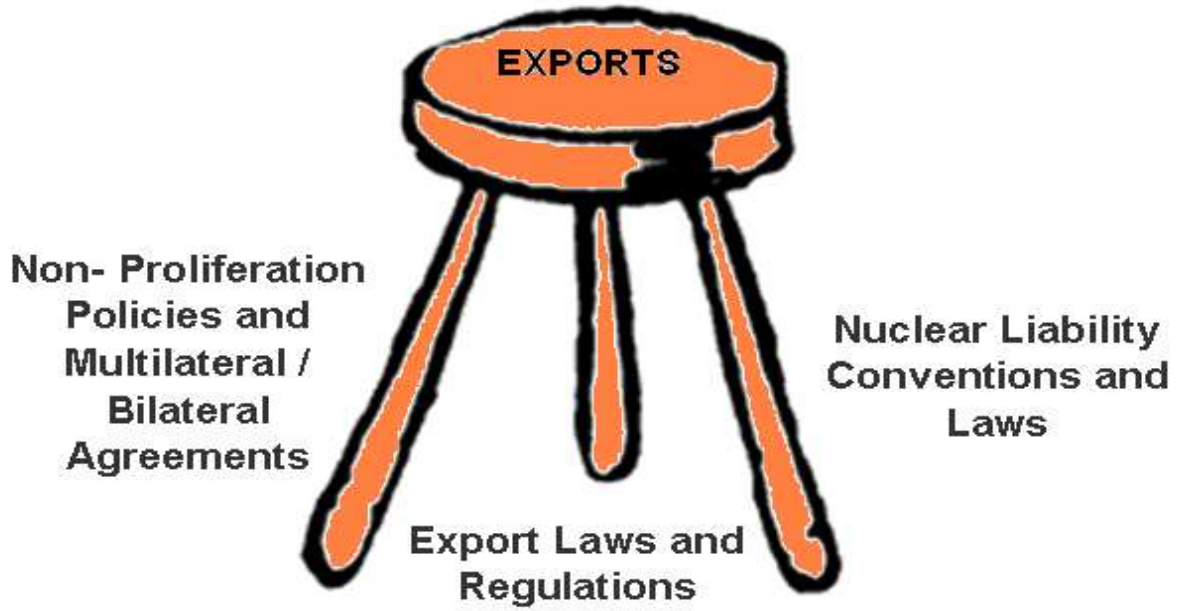
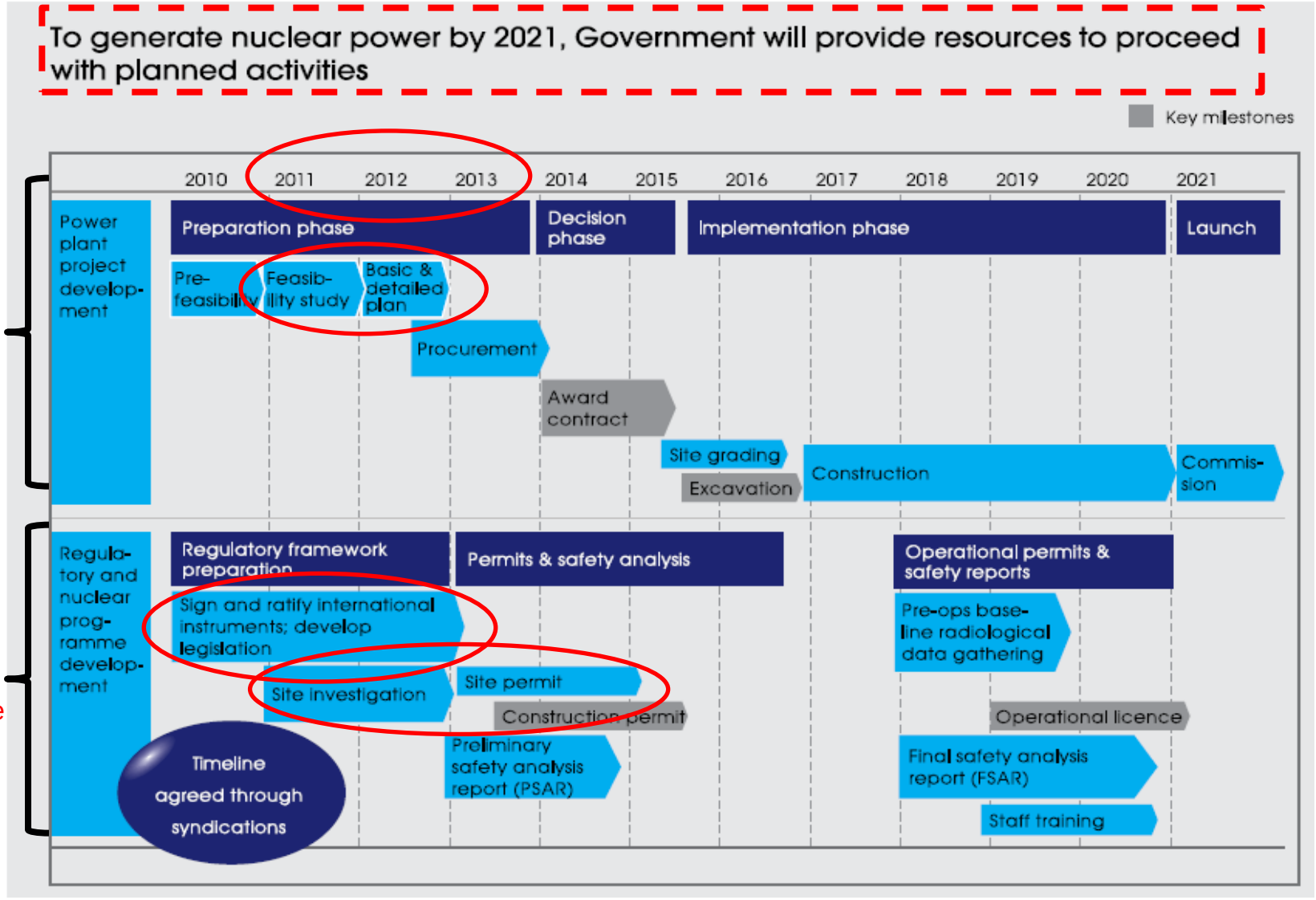
Prerequisites for U.S. Supply of Nuclear Reactors and Nuclear Fuel to Other Countries

- Ability and willingness of U.S. companies to supply materials, engineering services, components and technical data for the construction and operation of NPPs outside the U.S. depends mainly on:
  - **123 Agreements**
  - Recipient country's adherence to multilateral agreements, such as the Treaty of the Nonproliferation of Nuclear Weapons (NPT)
  - Timely issuance of U.S. export licenses and authorizations
  - Recipient country's nuclear liability laws and adherence to international nuclear liability conventions

U.S. Legal Framework for Exports of Reactors and Nuclear Fuel

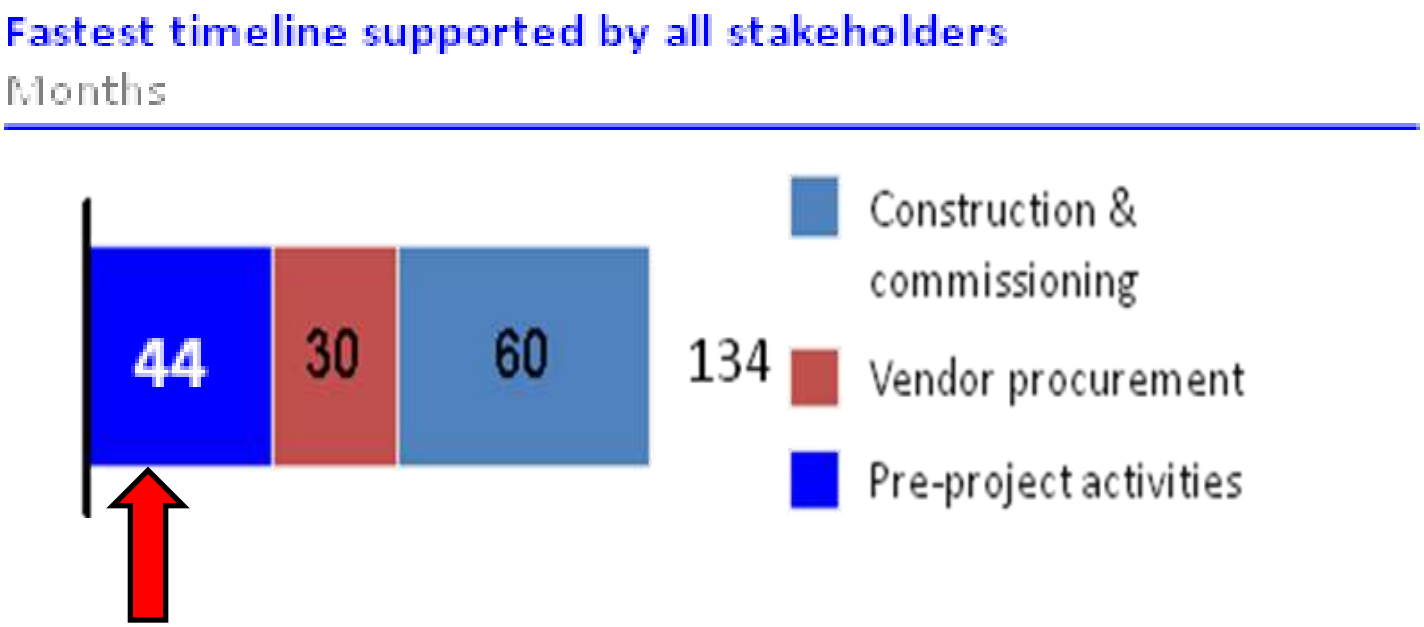


Nuclear Timeline in ETP Report (Oct 2010)



3 Nuclear Phases (2010-2021)

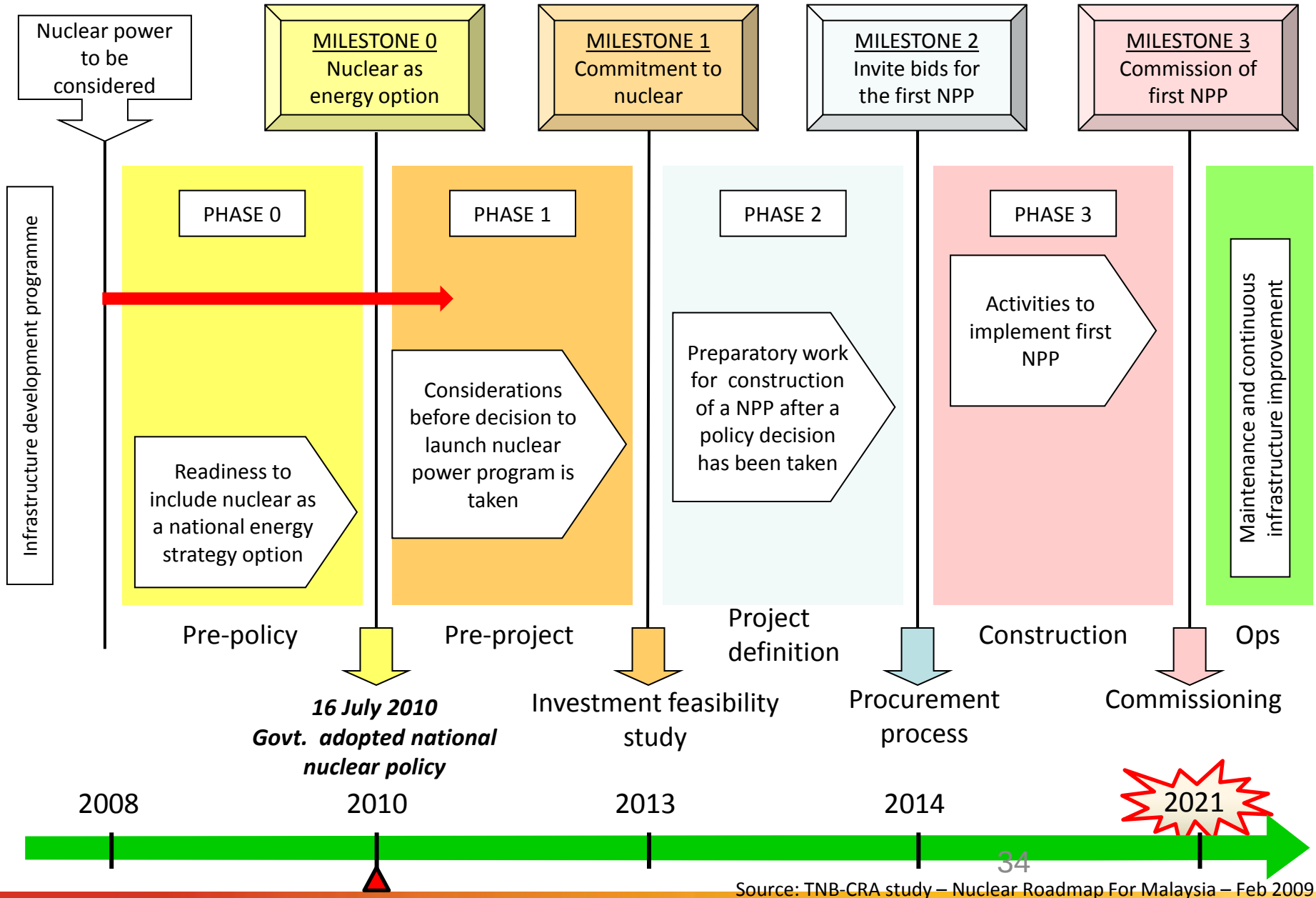
- The four (4) high priority items identified above must be completed during the pre-project phase.



Comprehensive Studies to be completed during Pre-Project Phase:

1. **Legal and Regulatory Infrastructure Study (2011-2012)**
2. **Communication Strategy and Plan (2012 – 2013)**
3. **Nuclear Power Infrastructure Development Plan (NPIDP), Feasibility Study and Site Evaluation (2012 – 2013)**

IAEA-Compliant TIMELINE



Source: TNB-CRA study – Nuclear Roadmap For Malaysia – Feb 2009

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Summary of Government Decisions

16th July 2010
Government adopted **National Nuclear Policy** for energy and non-energy applications

10th December 2010
Agreement to establish a **Nuclear Energy Programme Implementing Organisation (NEPIO)** as recommended by IAEA

NEPIO to be administered by Prime Minister's Office

GO NUCLEAR DECISION in 2013 or early 2014?

Completed Preliminary Feasibility Study and Preliminary Site Selection & Ranking
Continuing with Full Feasibility Study and Site Investigation to secure Site License.

Completion of planned Pre-project activities by MNPC by end-2013

PAST | **TODAY** | **2020**

26th June 2009
Consider nuclear energy as one of the **options** for electricity generation post-2020 in Pen. Malaysia

Allocated RM25 million for 2010-2012

25th October 2010
ETP launched

Nuclear energy identified as one of the **12 Entry Point Projects (EPP)** under Oil, Gas & Energy Sector

7th January 2011
Establishment of **MNPC as NEPIO**

MNPC will lead the NP planning based on IAEA Requirements and ETP Nuclear Timeline

ETP Oil, Gas & Energy
- 5 GW Hydro
- 1.25 GW Solar
- **2 GW Nuclear**

Objectives of MNPC

MNPC is a company limited by guarantee and not having a share capital, incorporated on 7 January 2011.

MNPC is ADMINISTERED by the Prime Minister's Department .

- To plan, spearhead and coordinate the implementation of nuclear energy development programme for Malaysia and to take the necessary action to realize the development of the first nuclear power plant in Malaysia (targeted by 2021 as per ETP Nuclear Timeline).

- To ensure the development of nuclear infrastructure for the country is in line with International Atomic Energy Agency (IAEA) guidelines covering **19 key areas** (**national position, nuclear safety, management, funding and financing, legislative framework, safeguards, regulatory framework, radiation protection, electrical grid, human resource development, stakeholder involvement, site and supporting facilities, environmental protection, emergency planning, security and physical protection, nuclear fuel cycle, radioactive waste, industrial involvement and procurement).**

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

Roles of MNPC, as NEPIO

Phase 1 Pre-Project

- NEPIO is responsible for most of the activities being undertaken.
- No of staff involved is relatively small and drawn from various government departments
- Much of the actual specialist work are performed by external experts/expert groups.
- Type of work is a mixture of policy and details – high level staff and details staff

Phase 2 Project Definition

- At the beginning of Phase 2, the NEPIO is still driving the programme
- Other key responsible organisations, including the RB and the OO organisation should be fully established and taking an increasingly active role.
- Core Project Management Team for the construction of the plant should be in place
- Early recruitment of those Operations staff with long training lead-times should begin.
- End of Phase 2, the NEPIO hands over many of its early tasks to the various responsible organisations

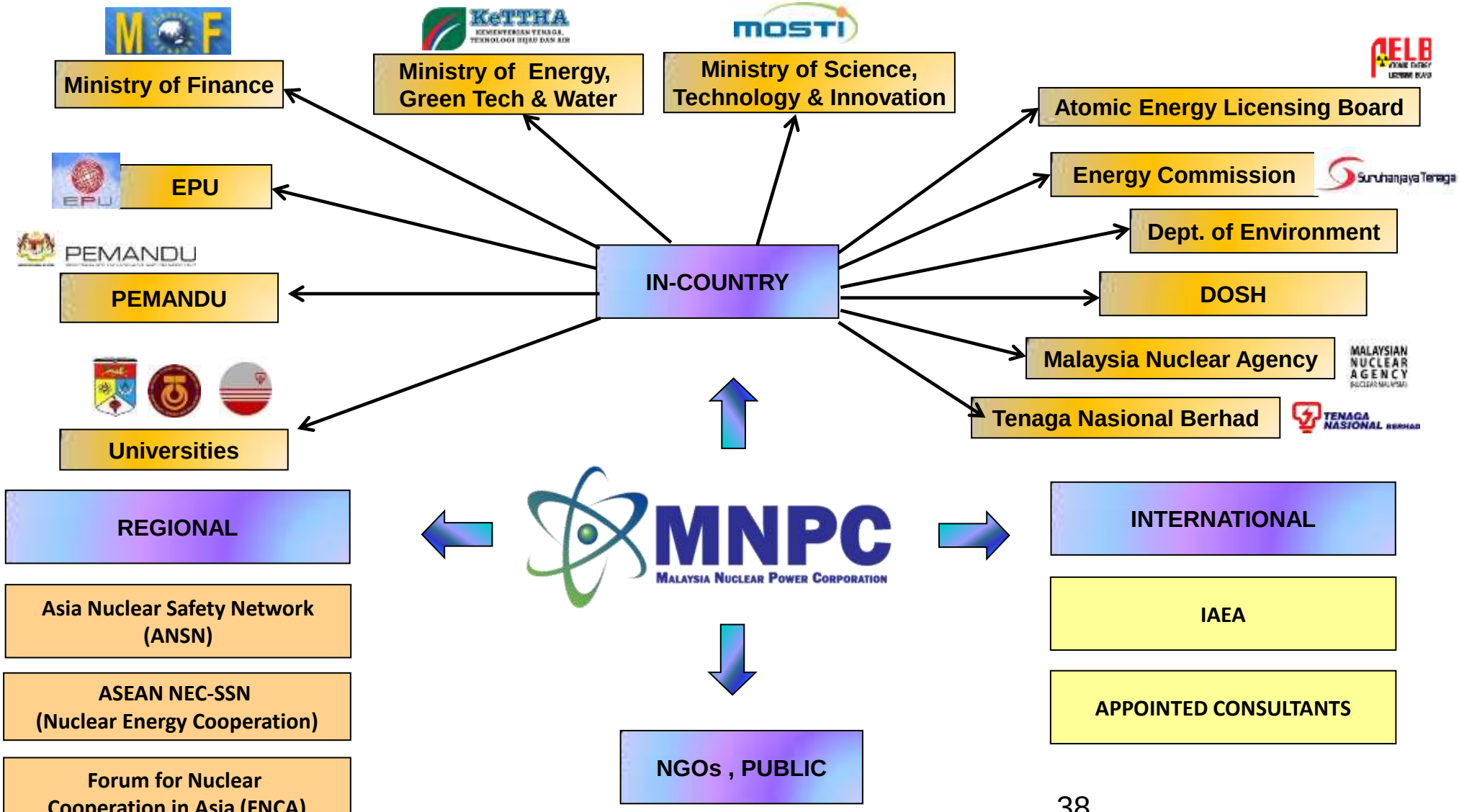
Phase 3 Construction

- By the beginning of Phase 3, the NEPIO will still have an oversight role, especially if the first NPP is part of a bigger programme,
- OO Organisation is responsible for management of NPP construction and commissioning.
- RB will be actively engaged in the licensing of the plant and overseeing construction, as appropriate.
- The OO Organisation will be actively recruiting and training its permanent plant staff

MNPC, AS NEPIO

MALAYSIA NUCLEAR POWER CORPORATION

External Collaboration



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Status and Progress of On-going Pre-Project Activities

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PEMANDU

ECONOMIC TRANSFORMATION PROGRAMME

EPP 11: Deploying Nuclear Energy for Power Generation

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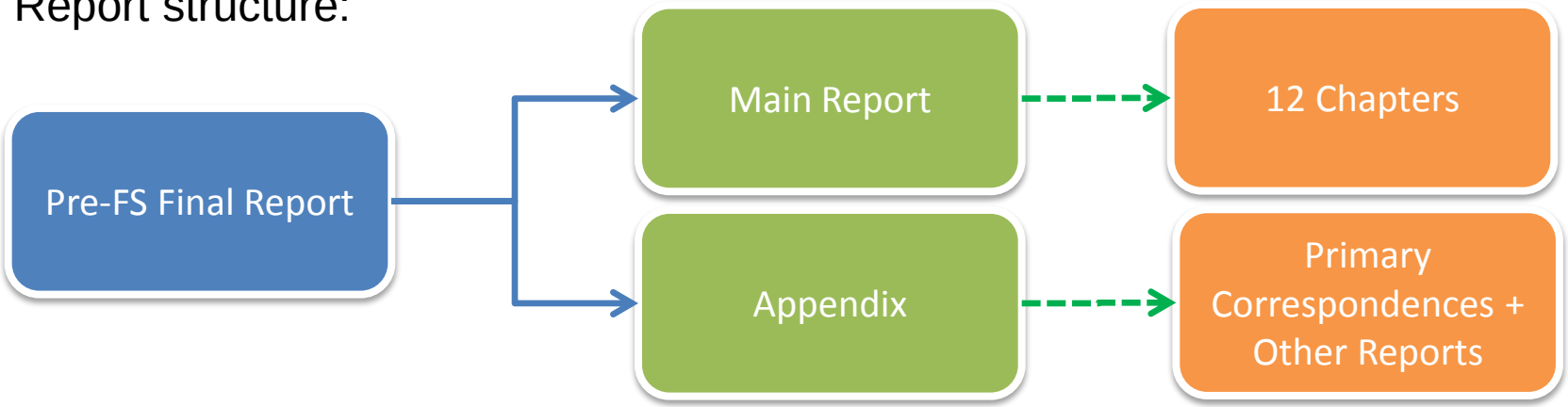
Malaysia is exploring the option of deploying nuclear energy in order to meet future demand and diversify the energy mix for Peninsular Malaysia. A Nuclear Power Development Steering Committee, headed by the Ministry of Energy, Green Technology and Water, was set up in June 2009 to plan and coordinate the preparatory efforts towards deploying nuclear energy for electricity generation. The committee has been tasked to conduct various studies towards preparing a Nuclear Power Infrastructure Development Plan (NPIDP), which is targetted to be ready by 2013. Prior to conducting these necessary studies, a nuclear power pre-feasibility study and initial site selection study has already been undertaken.

Actions

The Steering Committee is studying the possibility of delivering a twin-unit nuclear power plant with a total capacity of 2 gigawatts, with the first unit in operation by 2021. The plan under development lays out a development timeline of 11 to 12 years from pre-project to commissioning. The plan presents a positive case for nuclear energy in Malaysia (*Exhibit 6-17*). Firstly, if Malaysia developed nuclear energy, it would be cost-competitive, supplying the cheapest source of energy. Secondly, nuclear power is a cleaner energy than coal and gas (0 grams of carbon dioxide equivalent per kilowatt hour vs approximately 800 and 400 grams respectively).

Pre-Feasibility Study

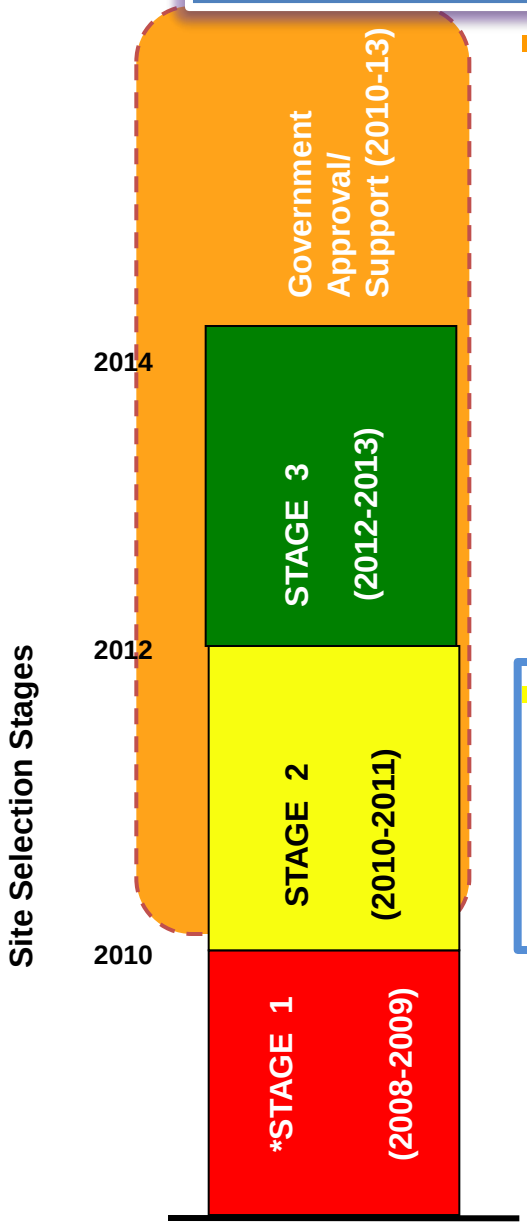
- The TNB-KEPCO Nuclear Pre-FS project was **completed** in Jun 2010 and the 3 primary objectives were met satisfactorily. Major deliverable is **Master Project Schedule.**
- This Pre-FS is the **sole contemporary study on nuclear power** in Malaysia, soon after announcement made on 04 May 2010 by YBM KeTTHA.
- A copy of Final Report was submitted to Government (EPU, EC, KeTTHA, MOSTI) on **15 July 2010.**
- Report structure:



TNB-KEPCO Joint Workshop 28-29 June 2010 @ Marriott Hotel, Putrajaya

MNPC

NPS Siting Activities (2008-2013)



Requires Government Approval/Support

- Public Acceptance Programme (2010)
- Site Selection & Licensing Procedures (2011)
- Acquisition/Gazette the Preferred/Confirmed Site (s) (2012)
- Issuance of "Class F" Site Licence on 1st NPS Site (2013)

Site Feasibility Study/Evaluation & Licensing

- Data Acquisition on 3 Candidate Sites, Evaluation on 1 Preferred Site
- Select and QUALIFY 1st NPS Site
- Site Acquisition/Gazette
- MORE On-Site Meteorological Data Acquisition
- EIA, SIA & RIA Reports on 1st NPS Site
- Apply "Class F" Site Licence on 1st NPS Site

Requires Evaluation Criteria & Procedures from Authority

Ranking & Short Listing of Preferred sites

- On the ground Site Verification & Qualification on 5 Candidate sites
- Ranking of 5 Candidate Sites
- Short Listing of 5 sites to identify **Preferred Site** and **Alternative Preferred Site**

COMPLETED IN JULY 2011

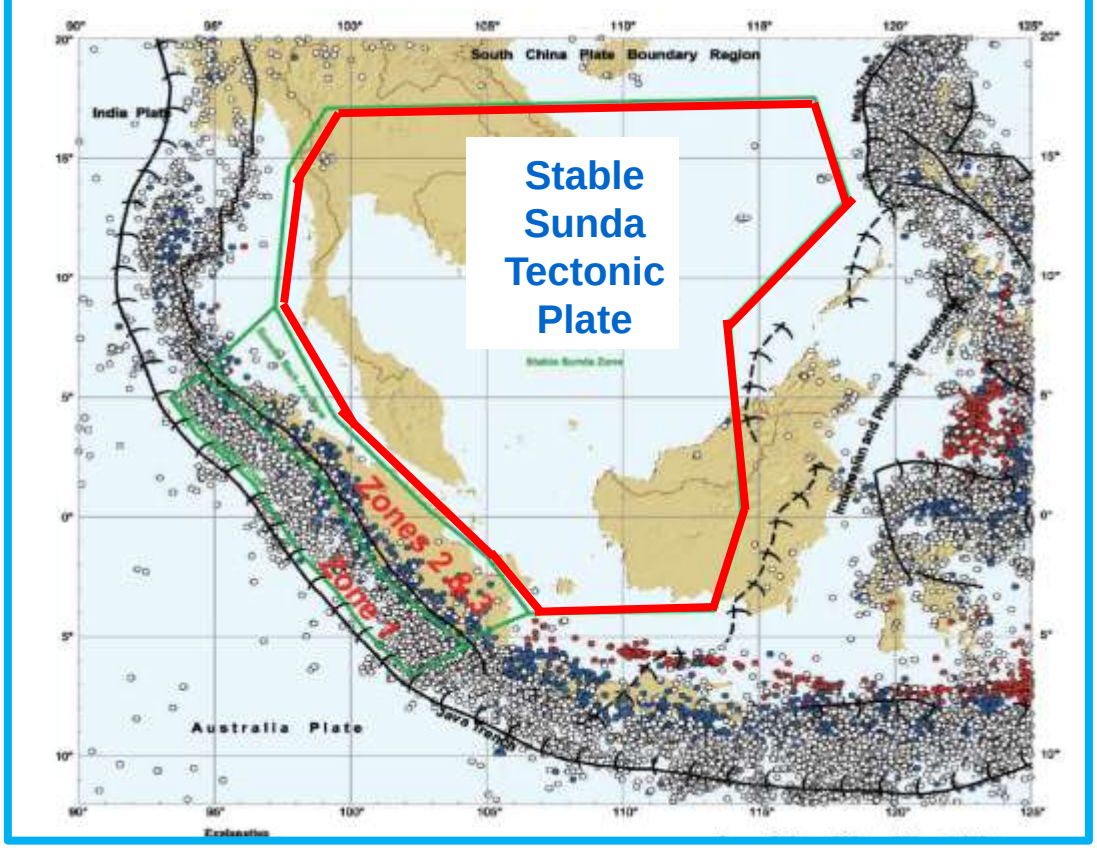
Develop NPS Siting Guidelines

- ***Nuclear Power Station (***NPS) Size & Land Requirement
- Mandatory / Rejection Criteria
- Assessment Parameters
- Weighting Factors
- Identify Potential & Candidates Sites
- Peer Review by KEPCO & IAEA

Desktop Study (COMPLETED SEPT 09)

Factors to consider in Site Selection

Earthquake Zones in South East Asia



*Petersen et al, *Probabilistic seismic hazard analysis for Sumatra, Indonesia and across the Southern Malaysian Peninsula,* Tectonophysics, Volume 390, Issues 1-4, October 2004, Pages 141-158

Site Selection Weighting Factors

Public Safety & Health (50%)
Radiation exposure, Population, Extreme natural events, Hazardous installations

Environment (20%)
Ecology, Water quality

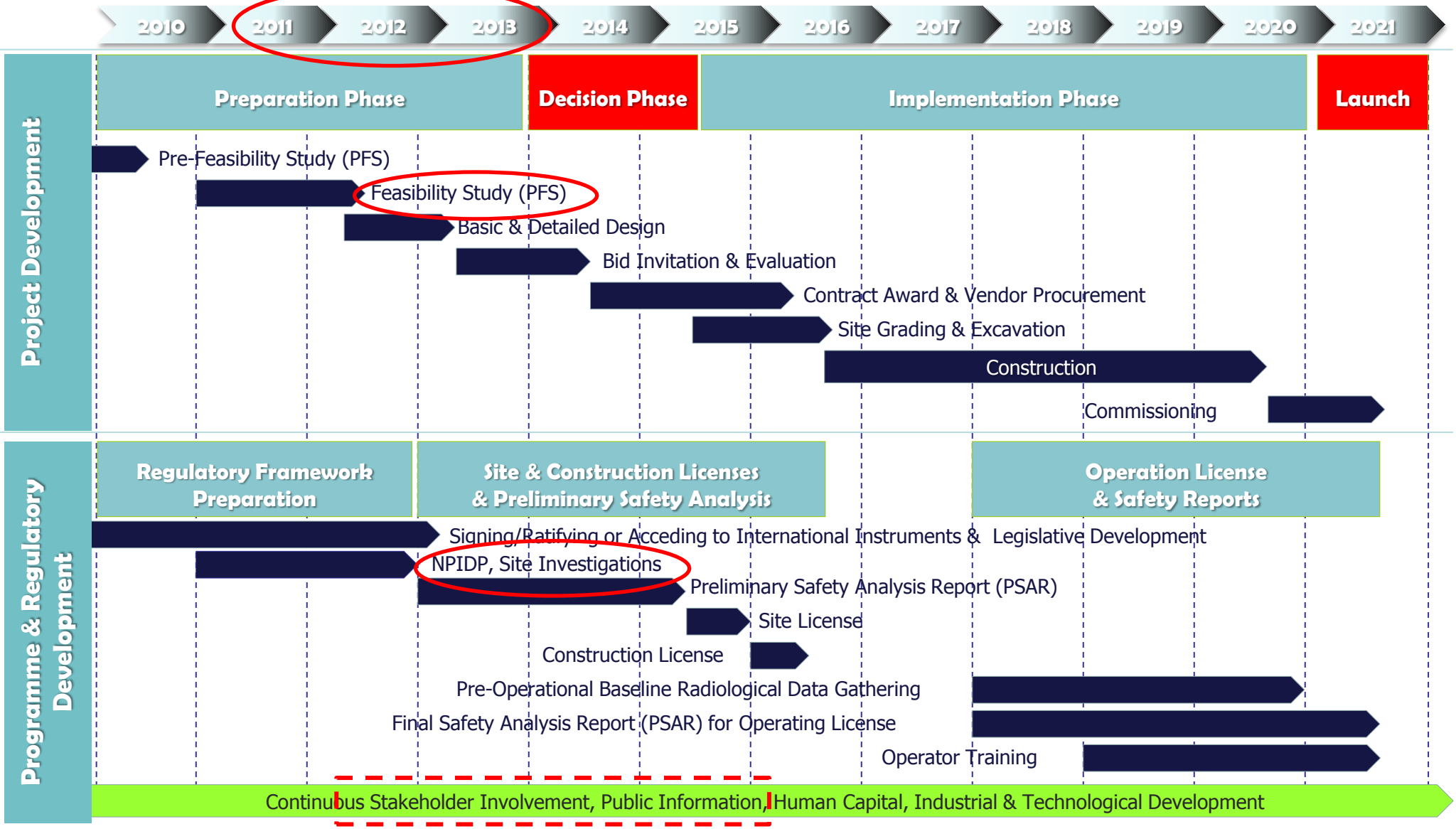
Socio-economic (15%)
Coastal resources, Land Use, Archaeology

Engineering Costs (15%)
Foundation, Accessibility, Proximity to grid, Cooling water

**Weighting factor sourced from UM study*

Preliminary Nuclear Development Timeline

COD: October 2021



KeTTHA to decide when to start PI/PA activities

Source: MNA, Workshop on Plan of Action of National Nuclear Policy, Nov. 2010

NPIDP, Site Evaluation, FS and Bid Document

- Nuclear Power Infrastructure Development Plan (NPIDP) will be prepared first – to assess Malaysia's STATE of READINESS and take appropriate actions to be "NUCLEAR READY". Status & Progress will be regularly reviewed together with the IAEA
- Site Evaluation will QUALIFY that it is SAFE to build NPP on one of three (3) candidate NPP Sites in Peninsular Malaysia after about eighteen (18) months of on-site analysis and then initiate NPP Site License application
- Feasibility Study will be carried out on the "final" selected NPP site including LESSONS LEARNED from Fukushima as well as the Reactor Technology options (PWR, BWR or PHWR)
- Finally, the Bid Document will be the basis to invite potential turn-key NPP vendors to bid if a NATIONAL decision is taken to proceed with the 1st NPP project or "GO NUCLEAR" in 2014

19 Infrastructure Issues

Issues	Milestone 1	Milestone 2	Milestone 3
National position			
Nuclear safety			
Management			
Funding and financing	Conditions	Conditions	Conditions
Legislative framework			
Safeguards			
Regulatory framework			
Radiation protection			
Electrical grid			
Human resources development			
Stakeholder involvement			
Site and supporting facilities			
Environmental protection			
Emergency planning			
Security and physical protection			
Nuclear fuel cycle			
Radioactive waste			
Industrial involvement			
Procurement			

NPIDP will assess our STATE-of-READINESS, as per IAEA 19 key infrastructure issues during Phase 1 to Phase 3 of Nuclear Power Development, as we progress to achieve 3 well-defined Milestones (12-year timeframe, 2009 - 2021):-

MILESTONE 1 (end-2013)
Ready to make a Knowledgeable Commitment to a nuclear programme

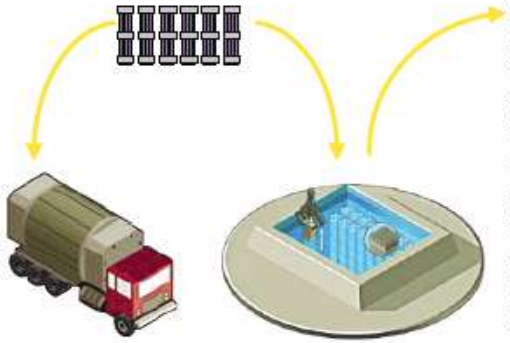
MILESTONE 2 (Q1 2014)
Ready to invite bids for the first NPP Project

MILESTONE 3 (end-2021)
Ready to Commission and Operate the First NPP

Source: IAEA NG-T-3.2 Evaluation of status of national nuclear infrastructure development, 2008

96% of used fuel is recyclable

Used fuel



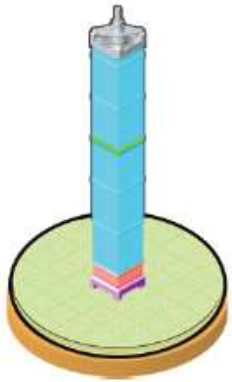
Treatment

RECYCLING
95% Uranium
1% Plutonium

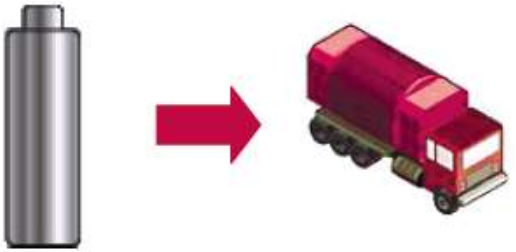
4% FINAL WASTE
Fission products
Metal cladding

Fabrication

Recycled fuel



Ultimate waste



Waste volumes from recycling in France

DIRECT DISPOSAL

UNF
Geologic Disposal*

Used fuel

~1.4 m³ / assembly
100%of activity

Volume varies depending on UNF storage canister design

17x17 PWR
463.3 kgHM/ assembly

RECYCLING

HLW/ILW-LL
Geologic Disposal*

Vitrified and compacted process and technical waste

~0.6 m³ / assembly
>99% of activity

LLW
Surface/Near Surface Disposal

Cemented waste, compacted waste

~0.6 m³ / assembly**
<1% of activity

Based on operational data from La Hague and MELOX reference plants and ANDRA disposal studies

* Volumes for wastes in geologic disposal includes the volume of the waste disposal package

**Waste generated by an 1000 tHM/yr recycling plant using current technology (La Hague and MELOX reference plants)

La Hague recycling facility

Waste processing facilities

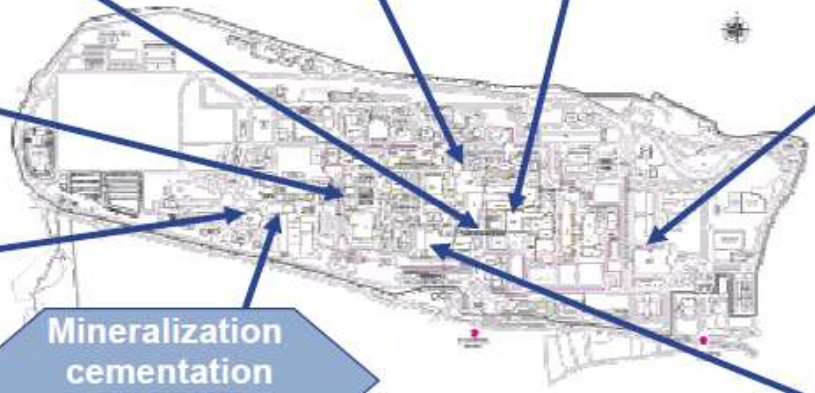
Hulls and end pieces compacting facility
ACC

Resins cementation
ACR

Centralized waste processing unit Decontamination
UCD

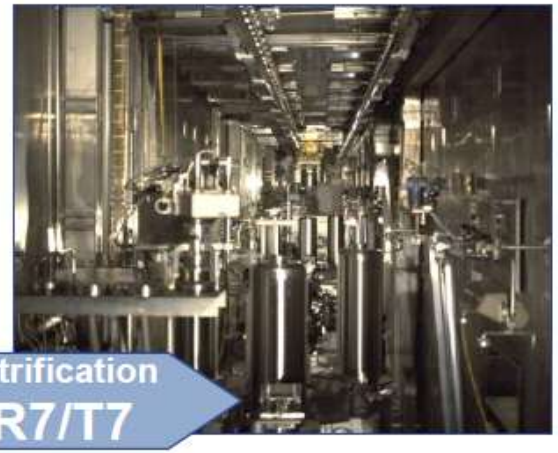
Waste sorting, Recycling, Cementation
AD2

Decontamination Recycling
AD1/BDH



Effluents filtration
STE2, STE3

Mineralization cementation
MDSB



Vitrification
R7/T7

Over 26,000 tons of used fuel treated at La Hague

As of 01/01/2011	Tonnes processed
EDF (*France*)	*16 129*
German utilities	*5 483*
Japanese utilities	*2 944*
Swiss utilities	*771*
Synatom *(Belgium)*	*671*
EPZ *(Netherlands)*	*326*
SOGIN *(Italy)*	*190*

More than 75% of the world's recycled fuel has been recycled by AREVA

New comers after Fukushima

(Source: IAEA)

	2011
New nuclear power plant under construction	-
New nuclear power plant ordered	Belarus, Turkey, UAE
Decided and started preparing Nuclear Power Infrastructure	Bangladesh, Jordan, Vietnam, Poland, Egypt, Nigeria
Active Preparation with NO Final Decision	Chile, Indonesia, Malaysia, Morocco, Thailand, Saudi Arabia
Considering nuclear programme	Albania, Algeria, Croatia, Estonia, Ghana, Kazakhstan , Kenya, Libya, Mongolia, Niger, Syria, Sudan, Tunisia, Uganda, Uruguay
Not planning, but expressed interest in considering issues	Benin, Congo, Laos, Namibia, Oman, Philippines, Sri Lanka, Qatar
Silent/No info (previously expressed interest)	Bahrain, Bolivia, Burkina Faso, Cameroon, Colombia, Cote D'Ivoire, Dominican Republic, Ecuador, El Salvador, Ethiopia, Georgia, Greece, Haiti, Israel, Jamaica, Latvia, Madagascar, Malawi, Myanmar, Peru, Singapore, Tanzania, Yemen
NPP planning or interest cancelled after Fukushima (position changed)	Kuwait, Italy, Venezuela, Senegal

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Concluding Remarks

- Malaysia aspires to become a high-income and developed nation and Peninsular Malaysia needs NUCLEAR electricity, post-2020
- Deploying Nuclear Energy for Power Generation is one of Entry Point Projects (EPP11 OGE Sector) in ETP report, launched by our YAB Prime Minister on 25 Oct 2010
- MNPC will plan, spearhead and coordinate the implementation of nuclear energy development programme for Malaysia and take the necessary action(s) to realize development of the **FIRST** nuclear power plant in Malaysia (target COD in 2021)
- Together with relevant Stakeholders, MNPC strives to ensure that Peninsular Malaysia will be "**NUCLEAR READY**" in 2014 – awaits a well-informed NATIONAL decision to GO NUCLEAR then
- Malaysia is NOT alone in actively considering Nuclear Power Option. There are other new comer countries identified by IAEA

MNPC
MALAYSIA NUCLEAR POWER CORPORATION

THANK YOU

for your kind attention

A-1-01 & A-1-03 (Level 1)
SME Technopreneur Centre 2
2260, Jalan Usahawan 1
63000 Cyberjaya
SELANGOR D.E.
EMAIL: zamzamj@mnpc.org.my
TEL:+ 603- 8319 4700
FAX:+ 603- 8319 4800

NUCLEAR – THINK GREEN