



**PEMANDU**  
PERFORMANCE MANAGEMENT AND DELIVERY UNIT



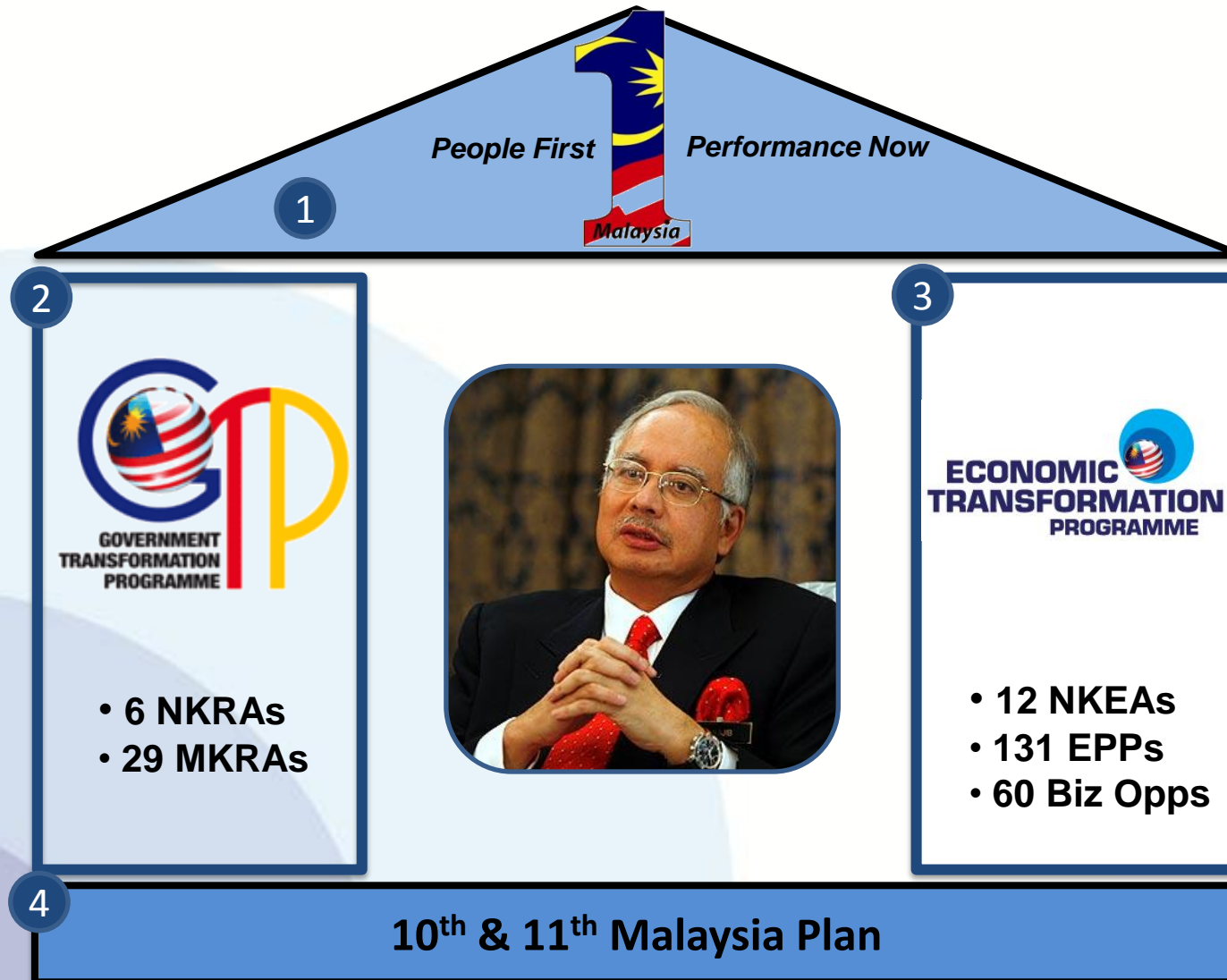
# Fuelling Transformation

**International Energy Regulatory Forum**  
**11 October 2011**

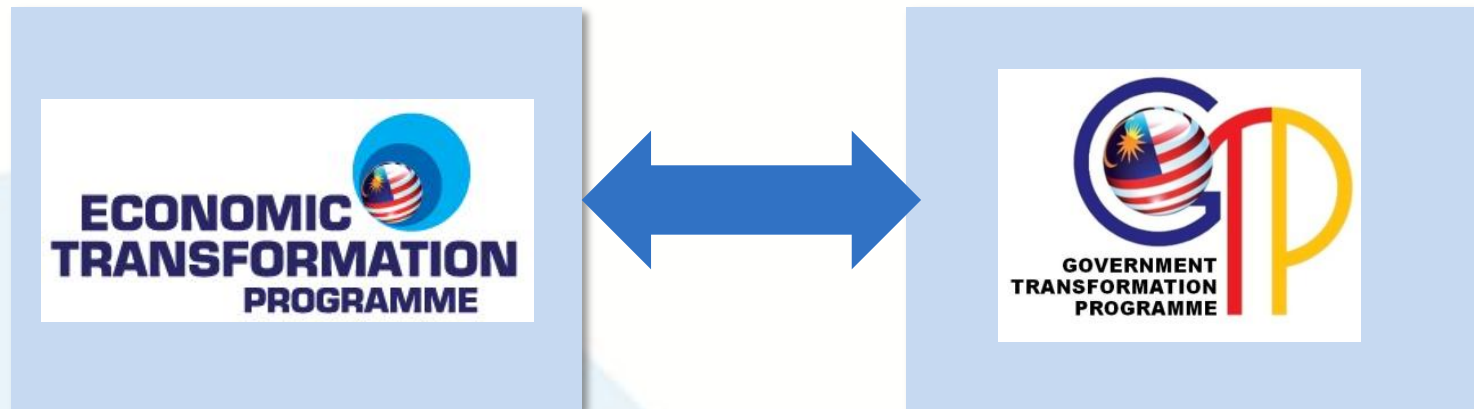
**Dr Mohd Emir Mavani**  
**Director, NKEA Oil, Gas & Energy (OGE) & Financial Services (FS),**  
**PEMANDU**



# PM introduced 4 strategic thrusts towards developed nation status



# The Connection



- Grow the economy
- **Increase** revenue
- Increase job / income

- **Spend** the revenue based on rakyat needs
- **Distribute** the revenue (RBI & LIH)

*We must do both*

# Focus:

## 12 National Key Economic Areas (NKEAs)



# Overview of ETP

## Gross National Income (GNI)

- US\$15,000 (RM48,000) per capita GNI
- USD 523 billion (RM1.7 trillion) GNI
- 6% GDP growth per annum

## Transformational Actions

- 12 NKEAs
- 131 EPPs
- 60 BOs
- 51 policy measures / 6 SRI clusters



## Jobs

- 31.6 million population
- 3.3 million additional jobs

## Investment

- USD 444 billion (RM1.4 trillion) investment
- 92% private, 8% public investment
- 73% domestic, 27% foreign direct investment

# **Economic Transformation Programme:**

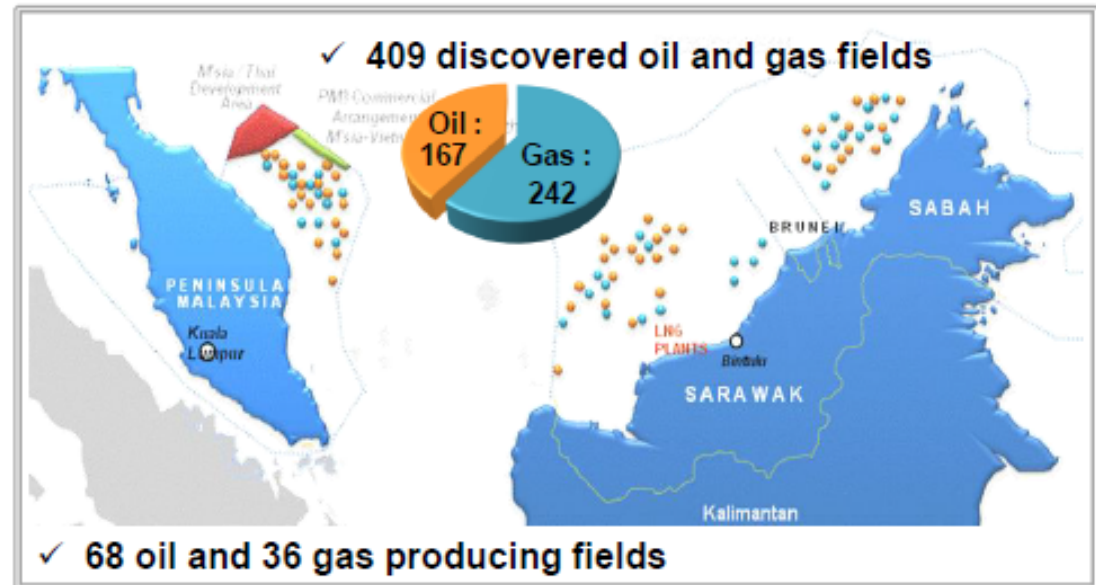
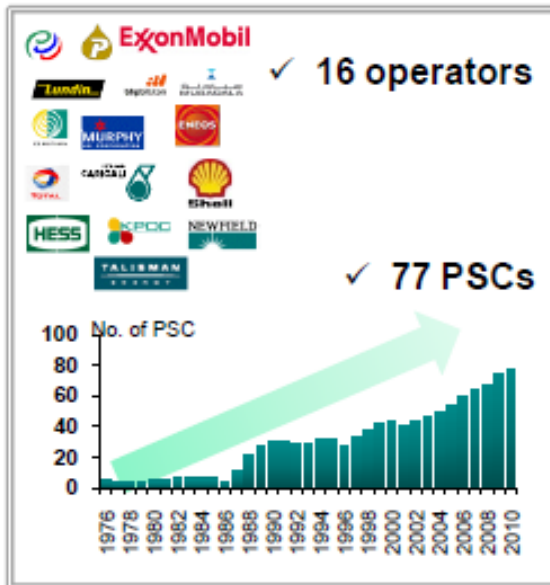
## **Oil, Gas and Energy National Key Economic Area**

# Economic Transformation in Oil & Gas Sector

- Specific projects have been identified to intensify Exploration & Production.
- Increased activity provides an opportunity to realize Malaysia as regional Oil & Gas hub.



# An Established Oil & Gas Industry



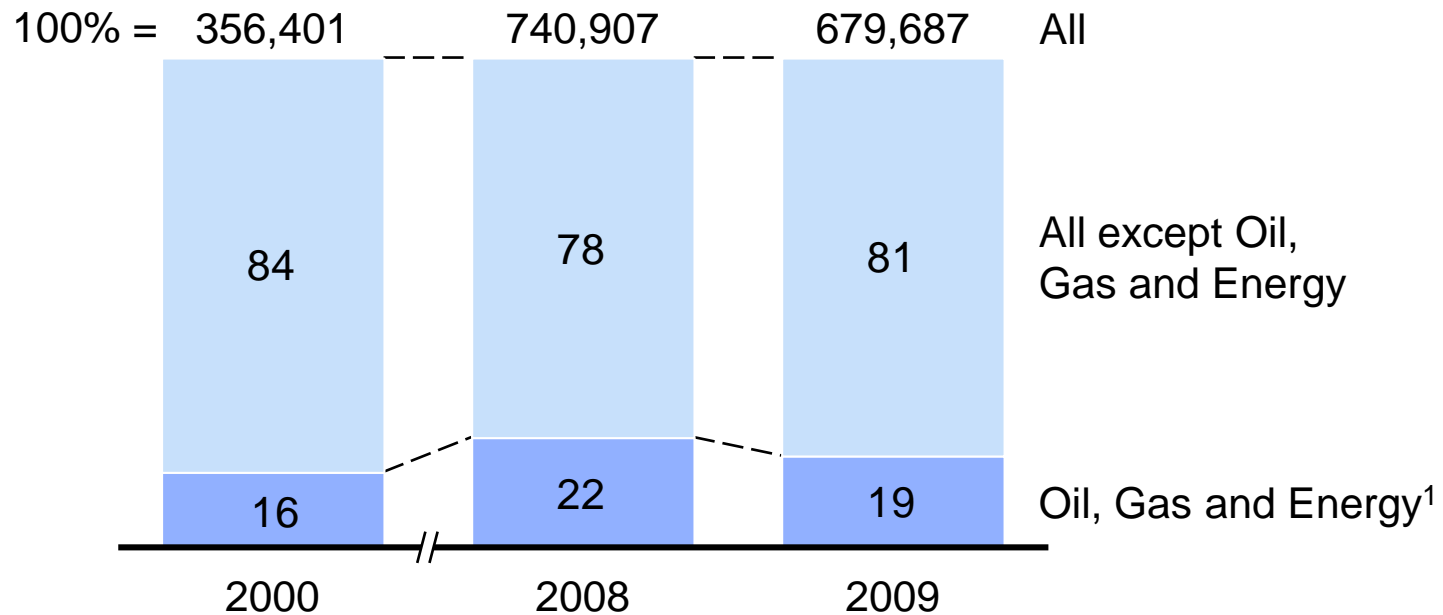
Malaysia Crude Oil and Condensates and Gas Resources (as of 1.1.2010)		Resources life
Gas Resources: 14.76 billion boe (88.59 Tscf)		GAS: 38
Oil Resources: 5.80 billion bbls		OIL: 24
✓ Malaysia's crude oil and gas resources stood at 21 billion boe		



# Oil, Gas and Energy have always played a central role in the Malaysian economy

## Gross domestic product

RM million, percent



### Key sector drivers

- Oil & gas production/ prices
- Complementary growth of downstream value added

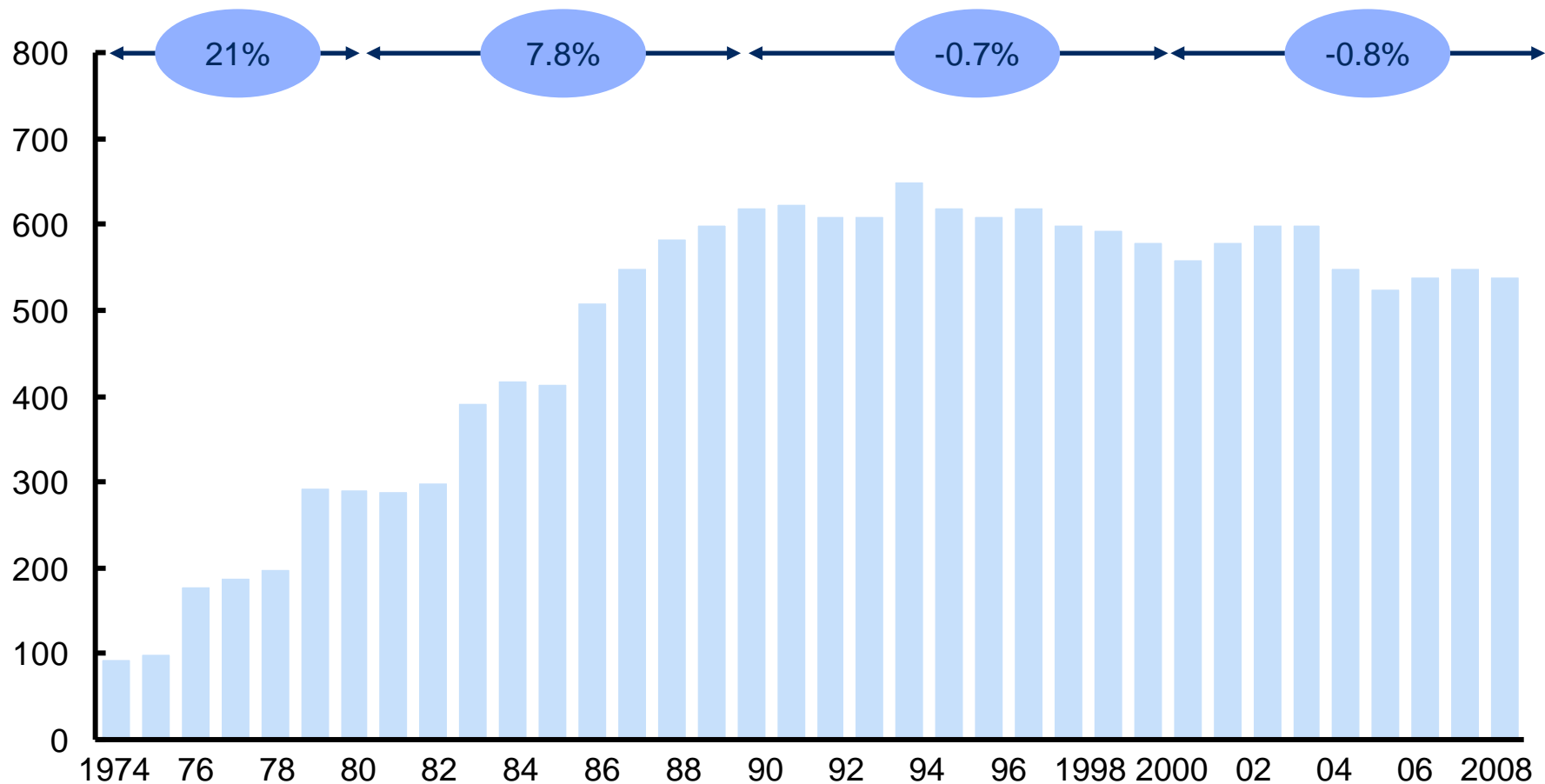
<sup>1</sup> Includes Crude petroleum and Natural Gas production and Refined petroleum products

# However, sustaining production is challenging...

Malaysian Oil production 1974-2009

kbd

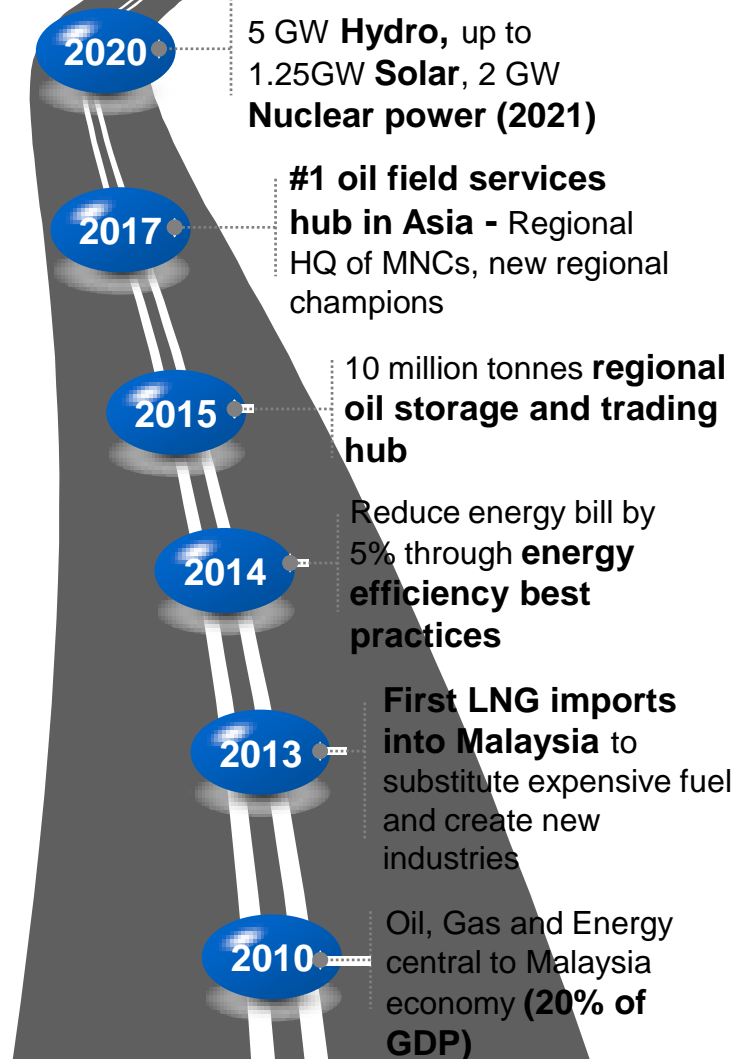
CAGR



# Growth via 3-pronged approach...



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



# 6 Areas of Focus

## 1. Sustaining Oil and Gas Production

*EPP 1,2,3 to optimise exploration, development and production activities*

## 2. Enhancing downstream growth

*EPP 4,5 to take advantage of growth opportunities and improve oil and gas supply*

## 3. Making Malaysia the regional hub for oil field services

*EPP 6,7,8 to position Malaysia as the OFSE hub of Asia*

## 4. Malaysian Petroleum Resources Corporation (MPRC)

*Highlight MPRC, which focuses on growing the services side of the O&G sector, and to encourage MNCs to situate regional offices in Malaysia*

## 5. Human capital development

*Addressing the human capital shortfall and increasing talent to attract MNCs*

## 6. Oil-trading

*With 10 million cubic meter onshore storage, opportunity to grow oil trading.*

# 1 Enhanced oil recovery



**Tertiary recovery (Enhanced Oil Recovery) requires 'additional' external energy**

Depleting oil field...



Reduced production

EOR rejuvenates the field... and adds production



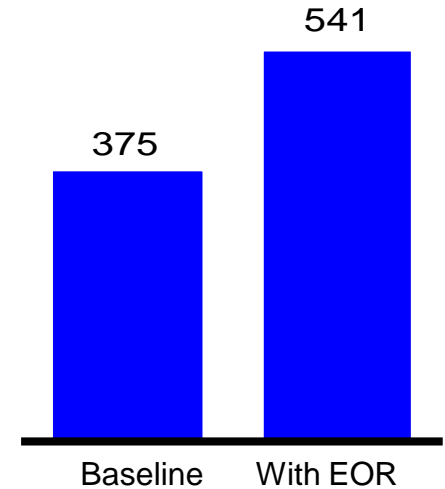
What it takes to make it happen...

- **Enhancement of fiscal terms to attract investment in EOR**
- **Niche players to undertake EOR projects**
- **Innovative solutions to reduce the development (CAPEX) and operational (OPEX) costs**

Impact (kbd 2020)

Make-up CAPEX  
**USD12.4 Billion**

Incr. CAPEX  
**USD9.1 Billion**



Make-up GNI  
**USD3.2 Billion**

Incr. GNI  
**USD2.1 Billion**

# 2 Developing Small Fields



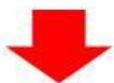
Field with Reserve < 30 MMSTB



Single field



Conventional development



Clustering concept



New technology  
New fiscal terms



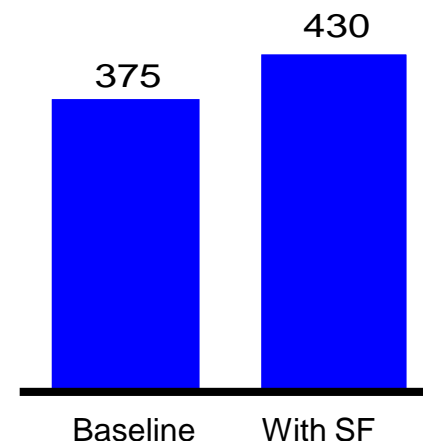
What it takes to make it happen...

- Enhancement of fiscal terms or new petroleum arrangements to attract investment (PITA)
- Risk Sharing Contract (RSC)
- Niche players to undertake SF development
- Innovative solutions to reduce costs
  - New technologies and best practices
  - Clustering approach for economies of scale
  - Sharing of facilities to limit risk

Impact (kbd 2020)

Make-up CAPEX  
**USD2.8 Billion**

Incr. CAPEX  
**USD1.4 Billion**



Make-up GNI  
**USD1.1 Billion**

Incr. GNI  
**USD0.6 Billion**



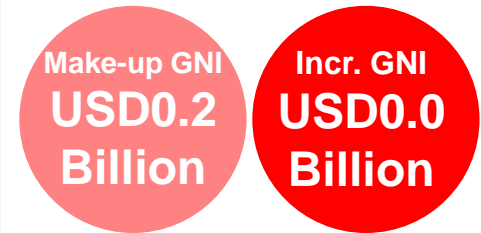
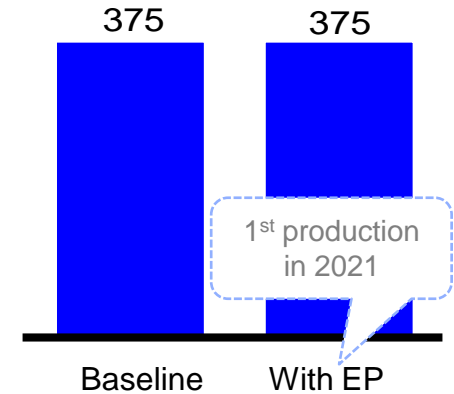
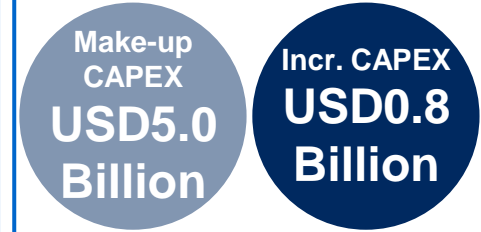
Discovery of remaining oil fields at a faster pace



What it takes to make it happen...

- Enhancement of Production Sharing Contract terms and/ or introduction of new Petroleum Arrangement to attract additional exploration investments
- Existing adequate remaining potential as Malaysian reservoirs are in a 'matured' stage

Impact (kbd 2020)



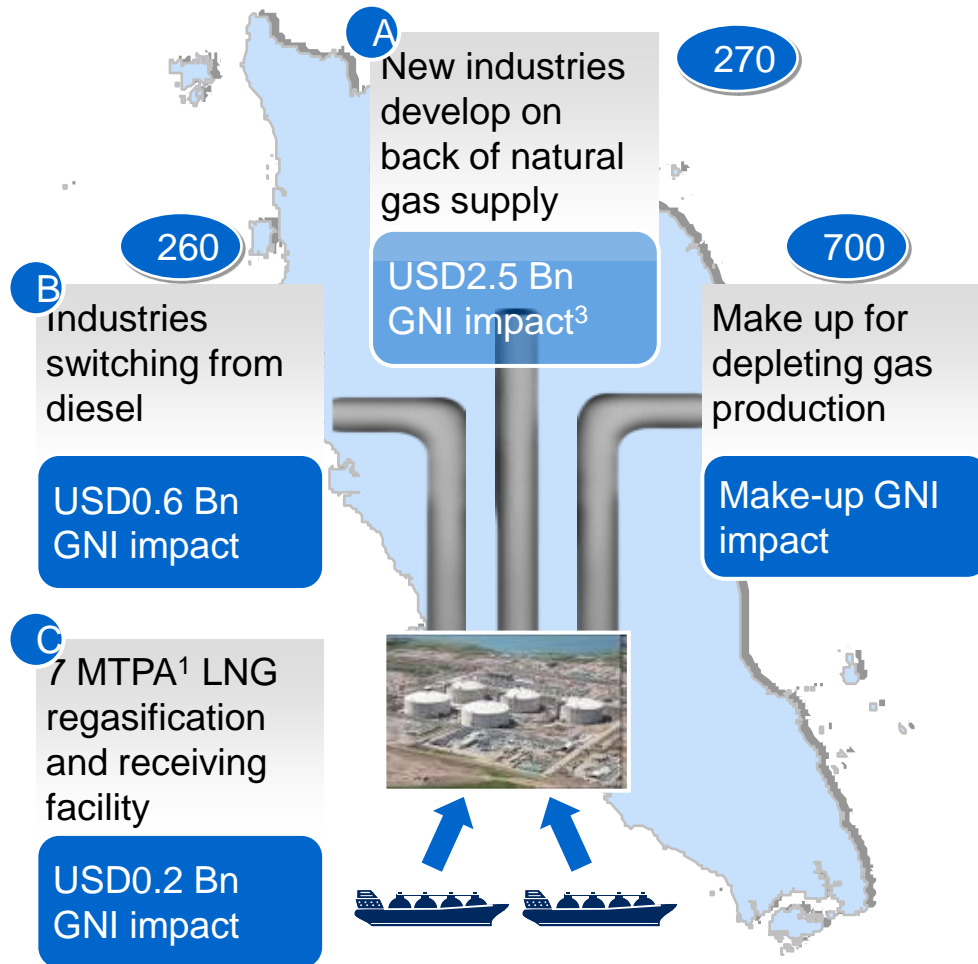
# 4 Unlocking Latent Gas Demand

DOWN-  
STREAM



mmscfd

2020 Total new jobs:  
~27,000<sup>3</sup>



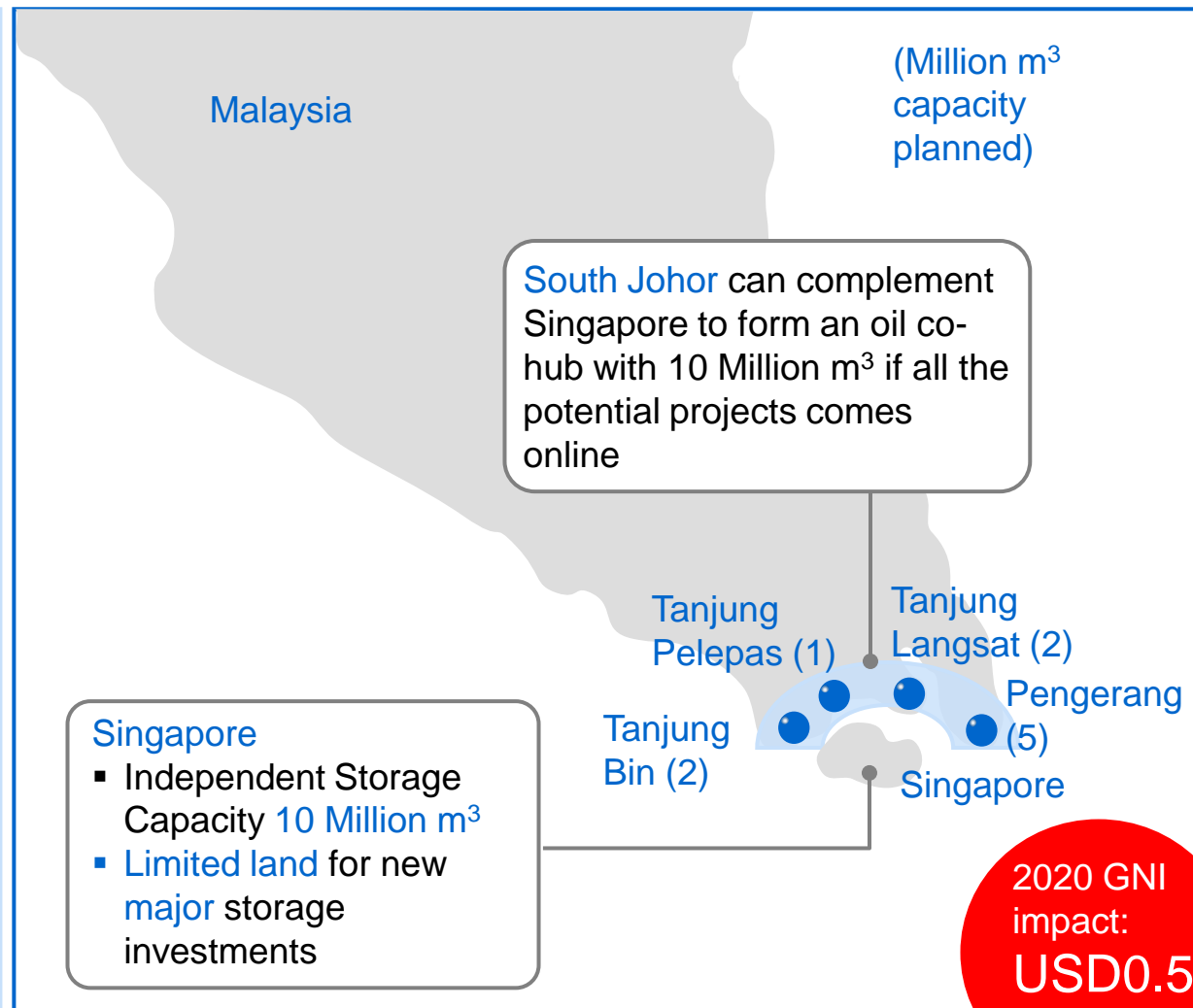
2020 GNI impact:  
**USD0.8<sup>2</sup>**  
Billion





2020 Total  
new jobs:  
800

- There is a demand to build storage capacity for the region
- To complement Singapore, the only major independent terminal and storage facility in South East Asia
- Potential for building an oil trading business, future development of downstream industry including refinery and oil based petrochemical complex, and LNG regas terminal



2020 GNI  
impact:  
**USD0.5**  
Billion<sup>1</sup>

<sup>1</sup> Pilot project terminal GNI only, excludes derived GNI from petrochemical or other developments

# Becoming the # 1 Asian hub for Oil Field Services



ILLUSTRATIVE

2020 Total new jobs: 40,000



2020 GNI impact: USD4.5 Billion

Houston

Aberdeen

Stavanger

## What it takes to make it happen

- Attract major international OFSE companies to bring a sizeable share of their global operations to Malaysia
- Build regional champions
  - Rationalize fabricators
  - JVs with world class players



# 9 Energy efficiency

- 1 Leading by example
- 2 New appliances
- 3 Co-gene-ration
- 4 Building insulation
- 5 Transport efficiency

Energy reduction potential



GNI impact

~USD1.0 Billion

~USD1.6 Billion

~USD0.4 Billion

~USD0.4 Billion

~USD1.0 Billion

Encourage adoption of energy efficient practices (e.g. increase air-conditioning by 1°C)

Encourage usage of high efficiency appliances (5-star refrigerators, air-conditioners or lamps)

Incentivise industrial users and utilities to adopt co-generation for optimised energy use

Improve building insulation to reduce energy used in cooling

Widespread usage of energy efficient vehicles with newer Internal Combustion Engine (ICE) or hybrid engines

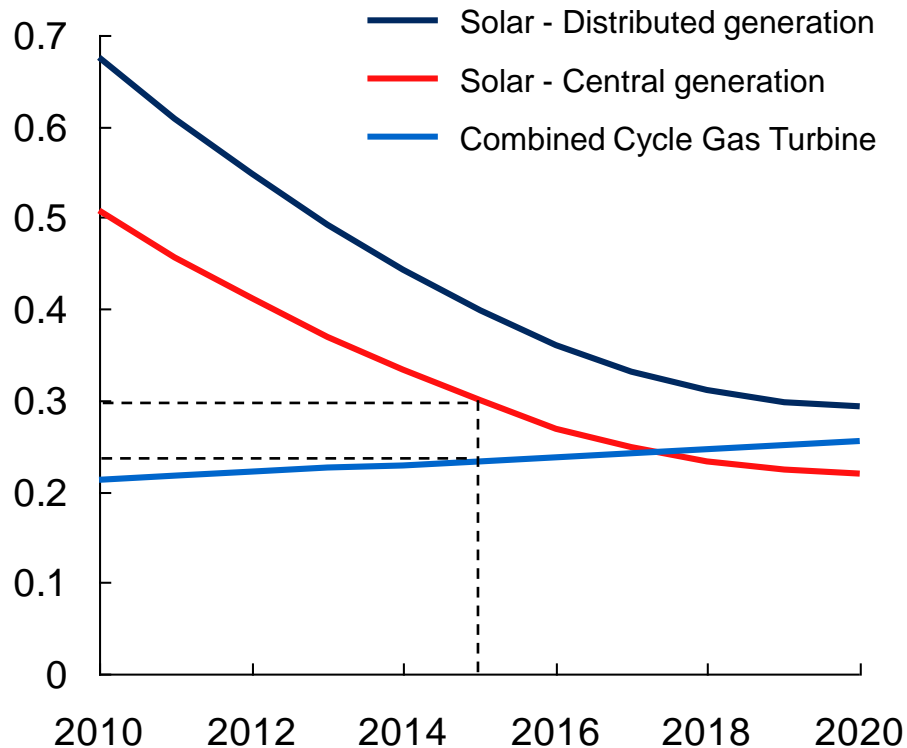
## What it takes to make it happen

- **Government to lead by example:** Energy efficient practices across ministries and departments
- **Funding** to incentivise adoption of energy efficient appliances or vehicles
- **Reduction of energy subsidies** to push consumers to save energy
- **Regulatory changes** to support and promote energy efficiency initiatives

2020 GNI impact:  
**RM14.08 Billion**

# 10 Solar capacity build-up

Full cost<sup>1</sup> of solar generation vs gas  
Levelised cost of energy, USD/kWh



## Additional benefits from implementing solar...

Enhance energy independence



GNI USD Bn

NA

Fulfil "Green" Agenda



NA

Increase energy security



NA

Increase employment



0.1

Catalyse local manufacturing and FDI



~6.9<sup>5</sup>

1 Full cost, including CAPEX (LCE)

2 Assumptions for CCGT gas power generation: WACC 7.6%, CAPEX USD1000/KWe, plant efficiency 53%, gas price USD/mmbtu 8 in 2010 to 9.8 by 2020, O&M cost of 5USD/Mwh load factor 85%

3 Assumptions for centrally generated solar: WACC 7.6% CAPEX 2812USD/Kw falling at 10% until 2016, then by 8%, 6%, 4% and 3% from 2017 to 2020, O&M 1% of CAPEX, lifetime: 20 years, hours utilization 1,300/year

4 Assumptions for centrally generated solar: WACC 7.6% CAPEX 3,750USD/Kw falling at 10% until 2016, then by 8%, 6%, 4% and 3% from 2017 to 2020 O&M 2% of CAPEX, lifetime: 20 years, hours utilization 1,300/year

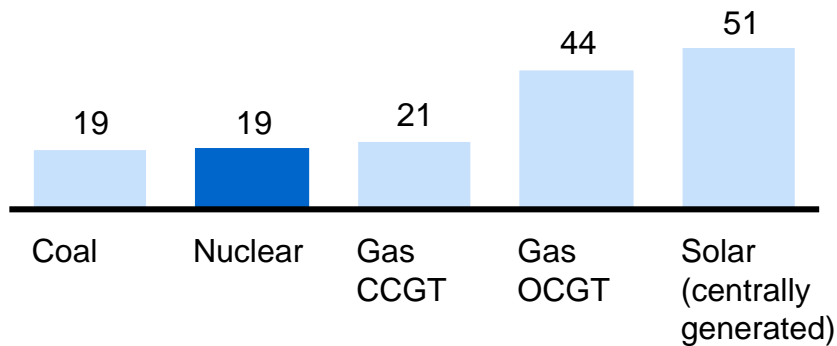
5 GNI impact taken into account in the Electronics and Electrical NKEA Lab

SOURCE: OGE NKEA Lab

If developed, nuclear would be cost competitive but it takes 10-11 years to build

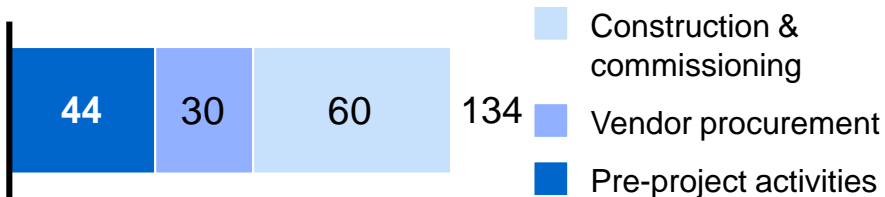
### Comparative cost of energy & CO<sub>2</sub> emission indicator

Levelised cost of energy, RM sen/kWh



### Fastest timeline supported by all stakeholders

Months



This requires for the government to start today with the preparatory phase

### Public education



- Promote public acceptance

### Int'l governance



- Sign/ratify relevant treaties & conventions

### Regulatory context



- Put in place detailed regulations

### Plant Site Acquisition



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

2020 Total new jobs:  
**2,600**

**Assumptions:** General: WACC 7.6%, 1USD = RM3.2

Coal: CAPEX USD1530/kWe, plant efficiency 46%, coal cost 5 USD/mmbtu, O&M cost of 6.16USD/MWh, load factor 85%

Gas CCGT: CAPEX USD1000/kWe, plant efficiency 53%, gas price 8 USD/mmbtu, O&M cost of 5USD/MWh load factor 85%

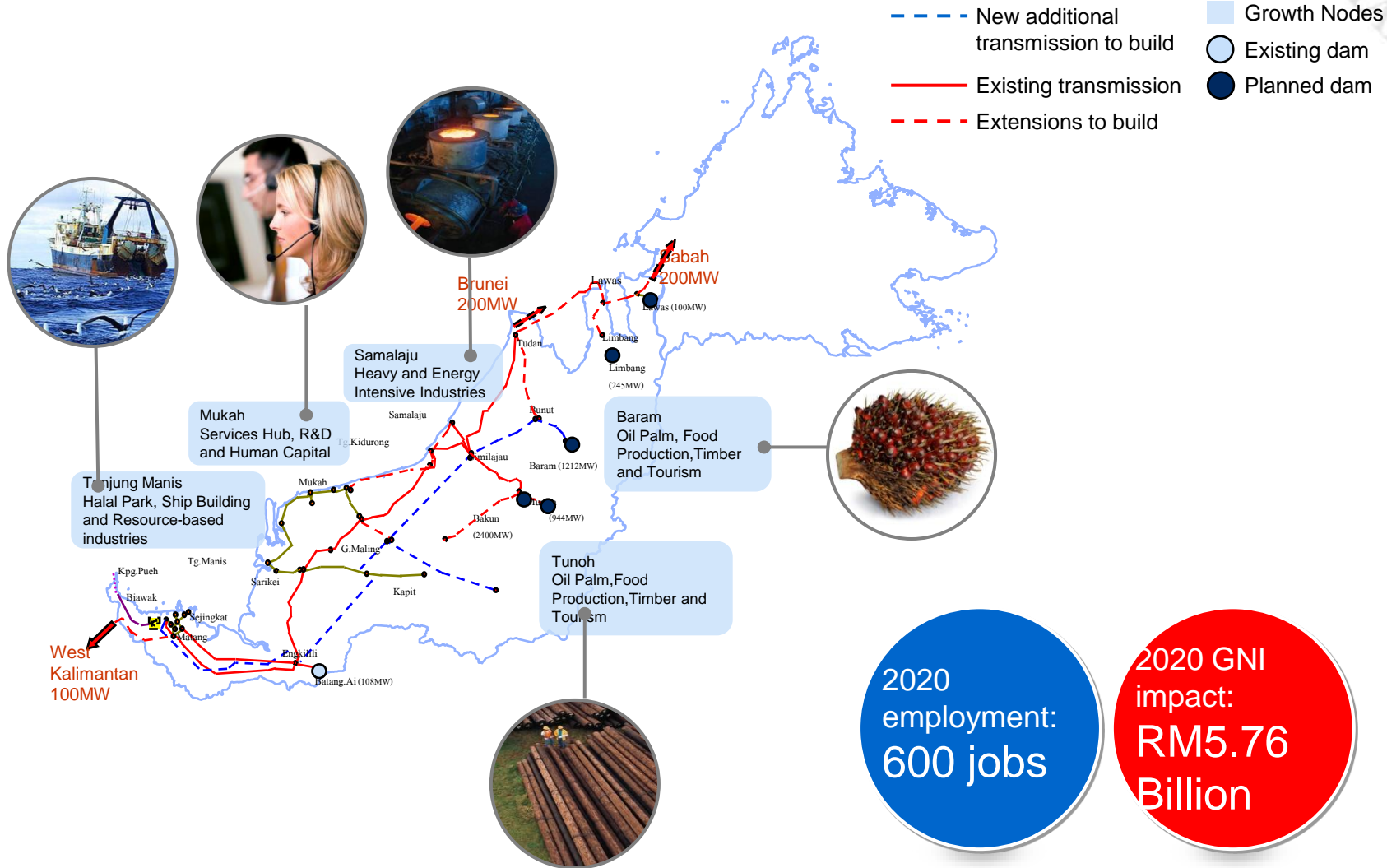
Gas OCGT: CAPEX USD700/kWe, plant efficiency 30%, gas price 8 USD/mmbtu, O&M cost of 5USD/MWh load factor 15%

Solar centrally generated : CAPEX 2812USD/Kw O&M 1% of CAPEX, lifetime: 20 years, hours utilization 1,300/year

SOURCE: OGE lab; TNB data; IAEA data

# 12 Big hydro powers industrial growth in Sarawak

ILLUSTRATIVE



2020 employment: 600 jobs

2020 GNI impact: RM5.76 Billion

*For more info*   [www.pemandu.gov.my/etp](http://www.pemandu.gov.my/etp)

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