OIL & GAS TECHNOLOGY

Chapter 1: Introduction to Oil and Gas Industry

by
Siti Noraishah Ismail
Faculty of Chemical & Natural Resources Engineering (FKKSA)
snoraishah@ump.edu.my

CC BY NC SA

Chapter Description

- Aims
  - This course introduces the overview of upstream, midstream and downstream operation, petroleum formation and also history of oil & gas in Malaysia.

- Expected Outcomes
  - Explain fundamental knowledge of upstream, midstream and downstream activities.
  - Relate the history of the petroleum industry to what is happening in Malaysia and globally

- References
  - Håvard Devold, 2013, Oil and gas production handbook: An introduction to oil and gas production, transport, refining and petrochemical industry, ABB ATPA Oil and Gas.

CC BY NC SA

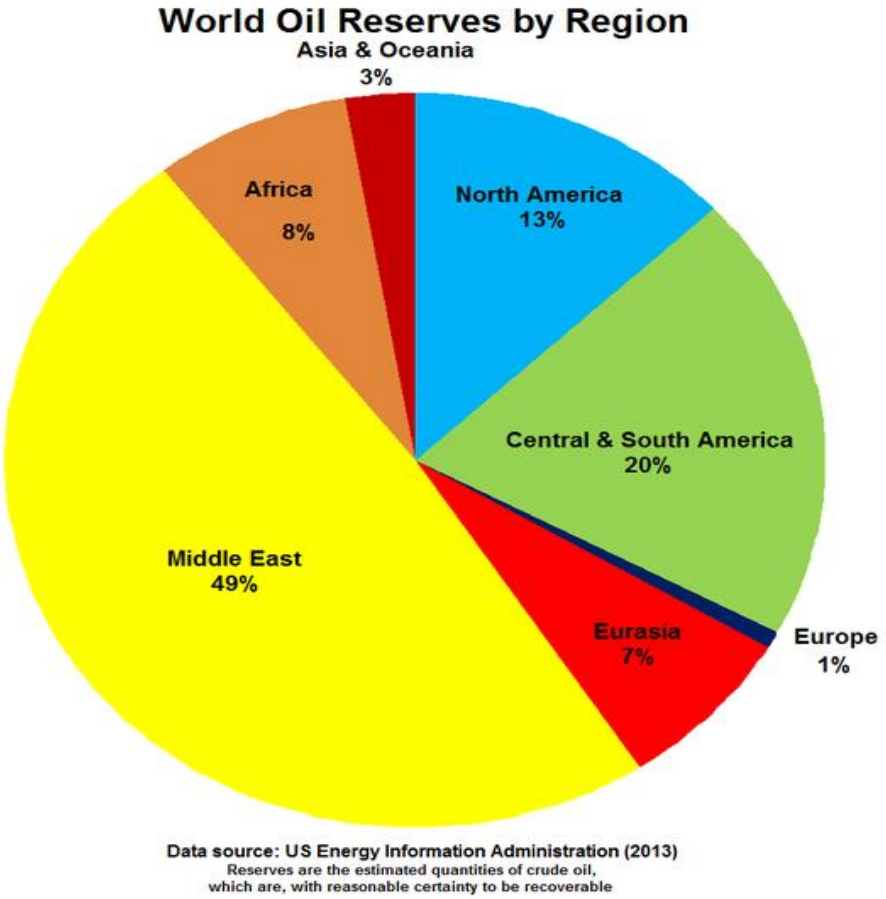
Let's start!

cc BY NC SA

Content

Introduction to O&G Industry by Siti Noraishah

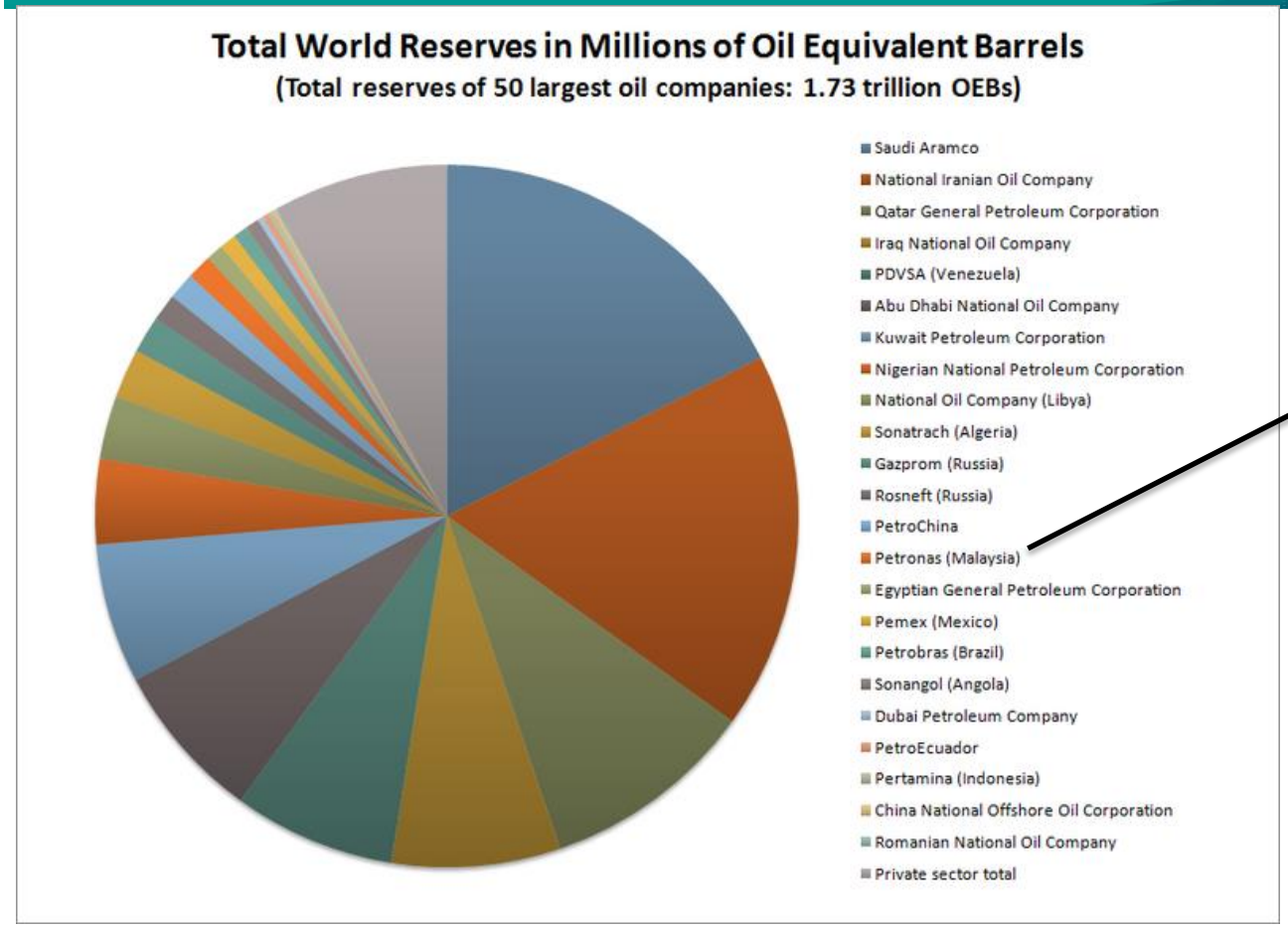
1.1 Introduction to Total Oil World Reserves



Source:
https://commons.wikimedia.org/wiki/File:World_Oil_Reserves_by_Region.PNG

CC BY NC SA

continue…. 50 largest Oil Companies



Malaysia

- PM: Malay Basin
- Sarawak Basin
- Sabah Basin

More than half of total Malaysian oil production currently comes from the **Tapis field** in the offshore Malay basin, of which 83% volume is crude oil*.

Source: https://commons.wikimedia.org/wiki/File:Reservespie.png

CC BY NC SA

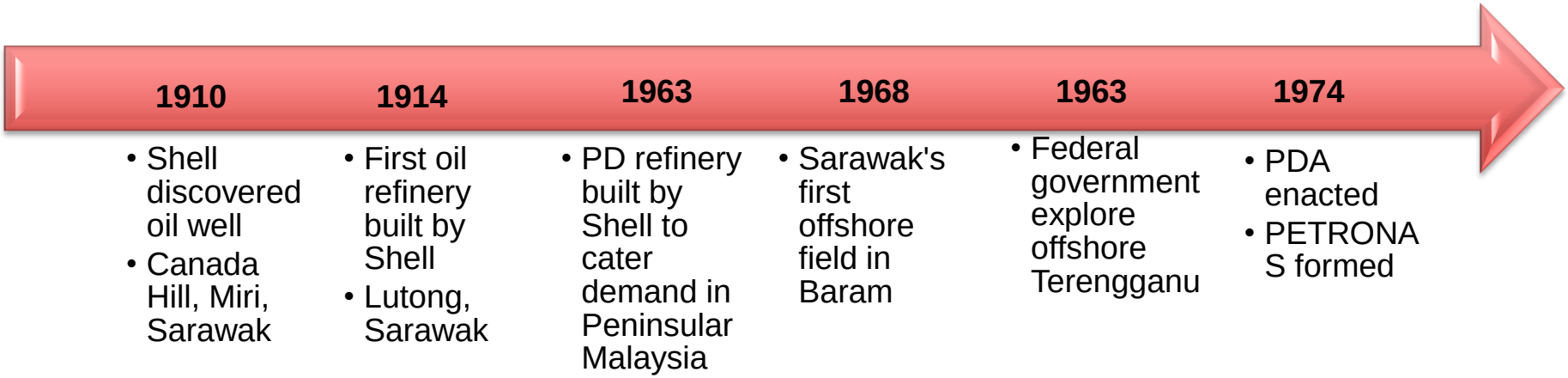
1.2 History & Evolution of Oil & Gas in Malaysia

- The first discovery of oil well which situated at Canada Hill in Miri, Sarawak (1910)
- By 1910, Shell's Miri No. 1 began producing at about 80,000 Barrels per day
- Shut down of their production in October 1972

Source: https://upload.wikimedia.org/wikipedia/commons/5/58/Grand_Old_Lady_Miri_Malaysia.jpg

CC BY NC SA

1.2 History of Oil and Gas in Malaysia



CC BY NC SA

1.2 History of Oil and Gas in Malaysia

1950s

- Most oil exploration-inshore

1962

- Oil discovered offshore Sarawak
- Since then, almost all oil exploration done offshore

1960s-1970s

- Oil exploration was mostly done by MNOCs
- MNOC: Multinational companies, eg: Shell

1968

- 1st offshore field, June 1968
- West Lutong Oilfield

1973

- 19 oildfields in Malaysia

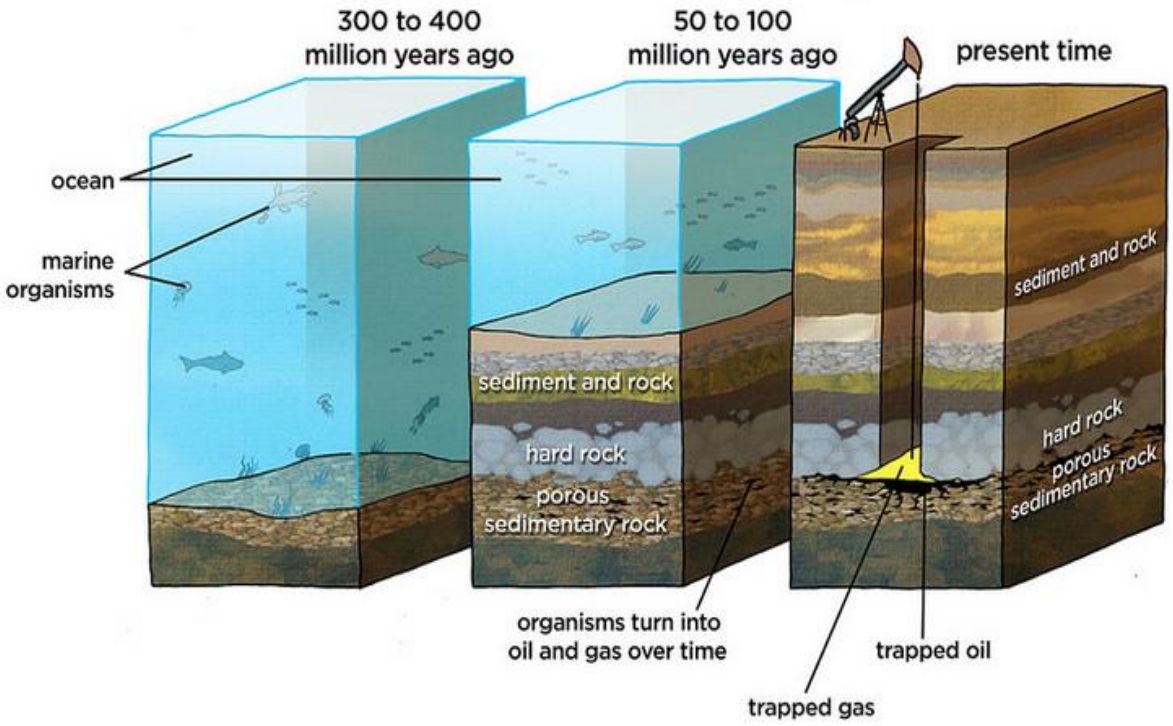
1974

- Enactment of PDA
- Development of PETRONAS

PETRONAS

CC BY NC SA

1.3 Petroleum Formation



Animals and plants died at the bottom of the ocean and buried under layers of sedimentary rock

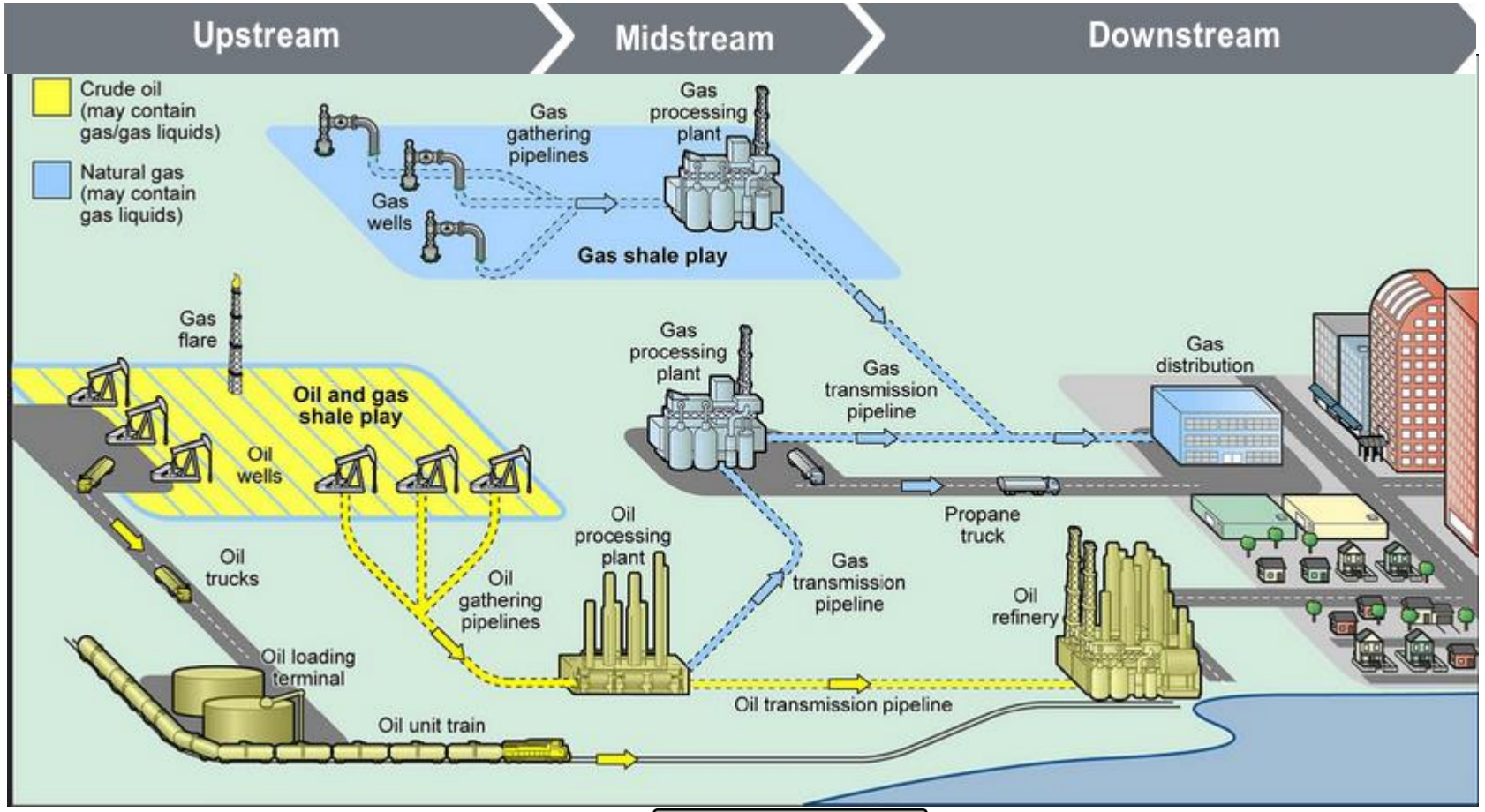
Over the time, heat & pressure "cooked" the organic material

Drilling through layers of sand, silt and rock to discover viable petroleum accumulation.

Source: https://www.flickr.com/photos/121935927@N06/13598599604

CC BY NC SA

1.4 Overview of O&G Value Chain



Source: https://www.flickr.com/photos/usgao/15340360702

CC BY NC SA

Introduction to O&G Industry by Siti Noraishah

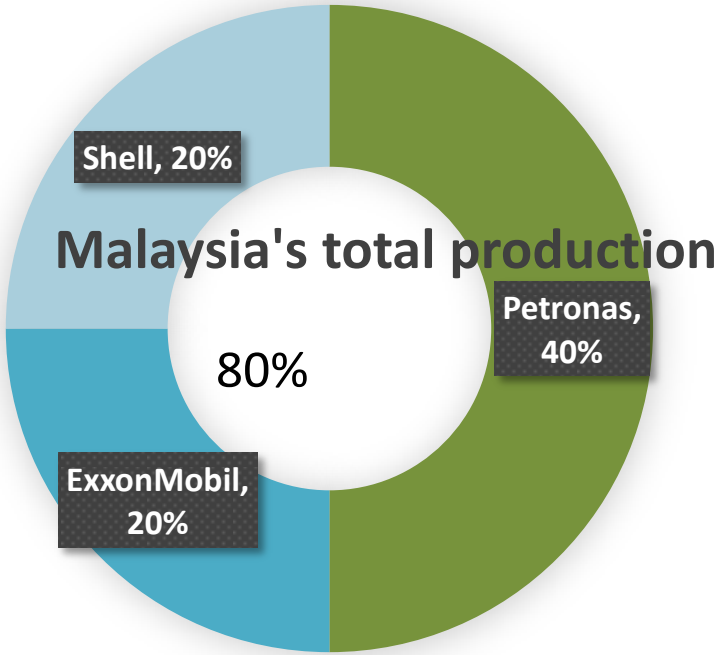
1.4 E&P Project Life Cycle

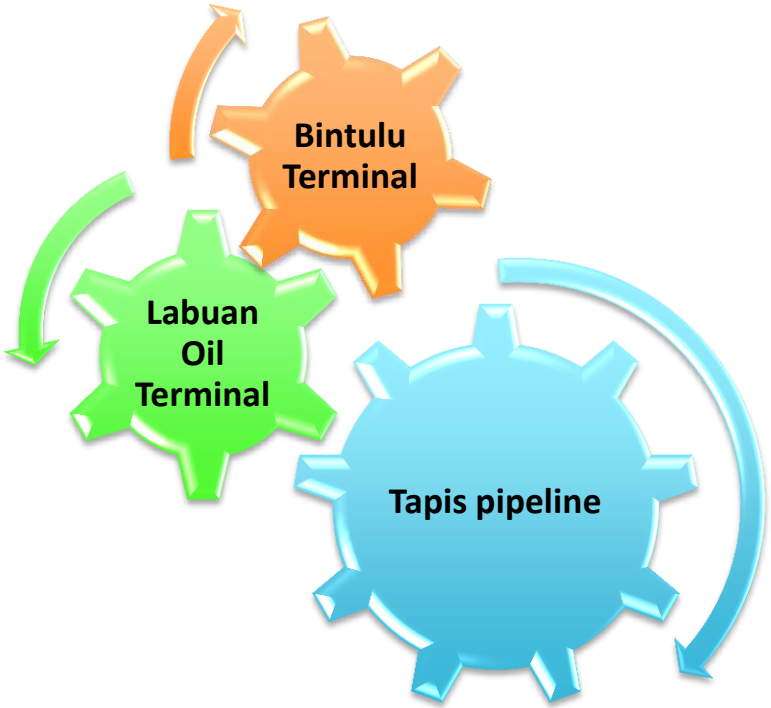
E&P consists of;

- **Exploration phase-** usually 5 years initial assessment and surveying field that has high possibility to produce oil/gas well
- **Appraisal phase-** usually 3-5 years . To complete appraisal of discoveries and assess remaining potential (success case)
- **Development phase-** 20-25 years can extend further depending on lease renewals and field life
- **Production phase-** 20-25 years can extend further depending on lease renewals and field life
- **Abandonment phase** – after 35-40 years of production

CC BY NC SA

1.5 Malaysia: Industry value chain



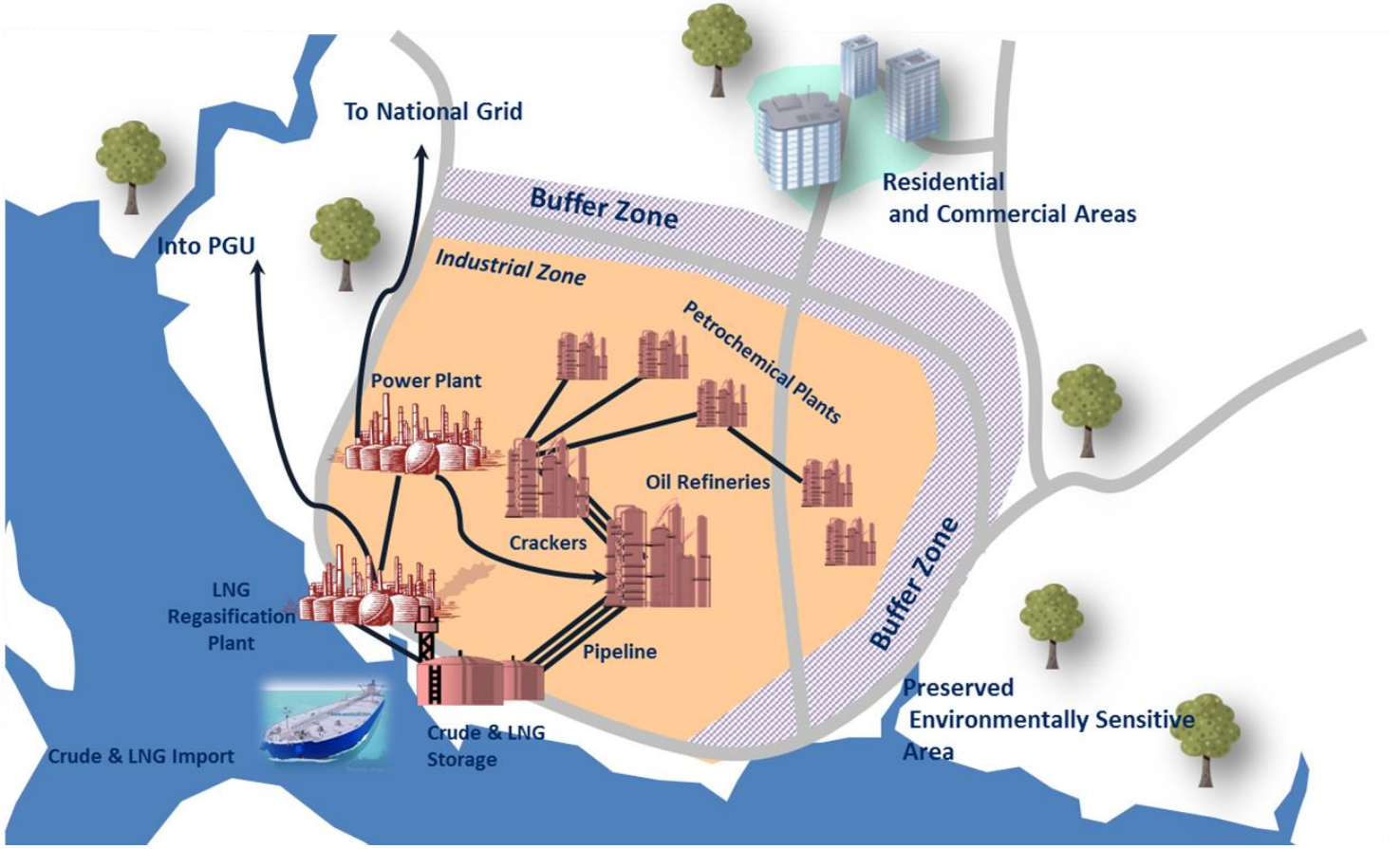


Malaysia Downstream: 5 oil refineries about **588,000 barrels** per day (b/d) in refining capacity at the start of 2015.*

*Source: *BMI* Malaysia Oil & Gas Report Q1 2016

CC BY NC SA

1.5 Malaysia: Industry value chain (Example: Pengerang Integrated Petroleum Complex)



Source: https://en.wikipedia.org/wiki/Pengerang_Integrated_Petroleum_Complex

CC BY NC SA

1.6 Petronas and the Government

PETRONAS

- **PDA 1974:**

Entire ownership of Nation's petroleum resources is vested to PETRONAS.

- **PSC 1975:**

Contractor handles all exploration risks, production and development costs

its agreed share of production resulting from this effort.

100th active PSC by Petronas (2013)

Concession Agreement:
Oil Company & State government

1976 PSC:
Convert concession system to PSC

1985 PSC:
Attract other oil companies besides SHELL & ESSO

Deepwater PSC:
Target for big player with deepwater experience

Revenue over cost (R/C):

Attract new foreign investment through smart partnership concept

CC BY NC SA

1.7 Conclusion

- Overview of upstream, midstream and downstream operation, petroleum formation and also history of oil & gas in Malaysia are presented in this chapter.
- In Malaysia, petroleum and natural gas are obtained from the oil wells located offshore Terengganu, Sabah and Sarawak.
- More than 95% of the total energy used in Malaysia is obtained from the fossil fuels.
- PSC system where it was adopted by Petronas at the outset, in order to monitor the activities of petroleum and to learn and obtain capabilities from the other operator

CC BY NC SA

THANK YOU.

CC BY NC SA

Authors Information

Credit to the authors:
Siti Noraishah Ismail

CC BY NC SA