Propelling Acid Gas Development in a Mature Environment

Driving and Enabling the Development of Contaminated Gas Resources in Sarawak from Malaysian Regulator's Perspective

Handan Ramli, PETRONAS

JOGMEC Techno Forum 2015
28-29 October 2015
Palace Hotel Tokyo

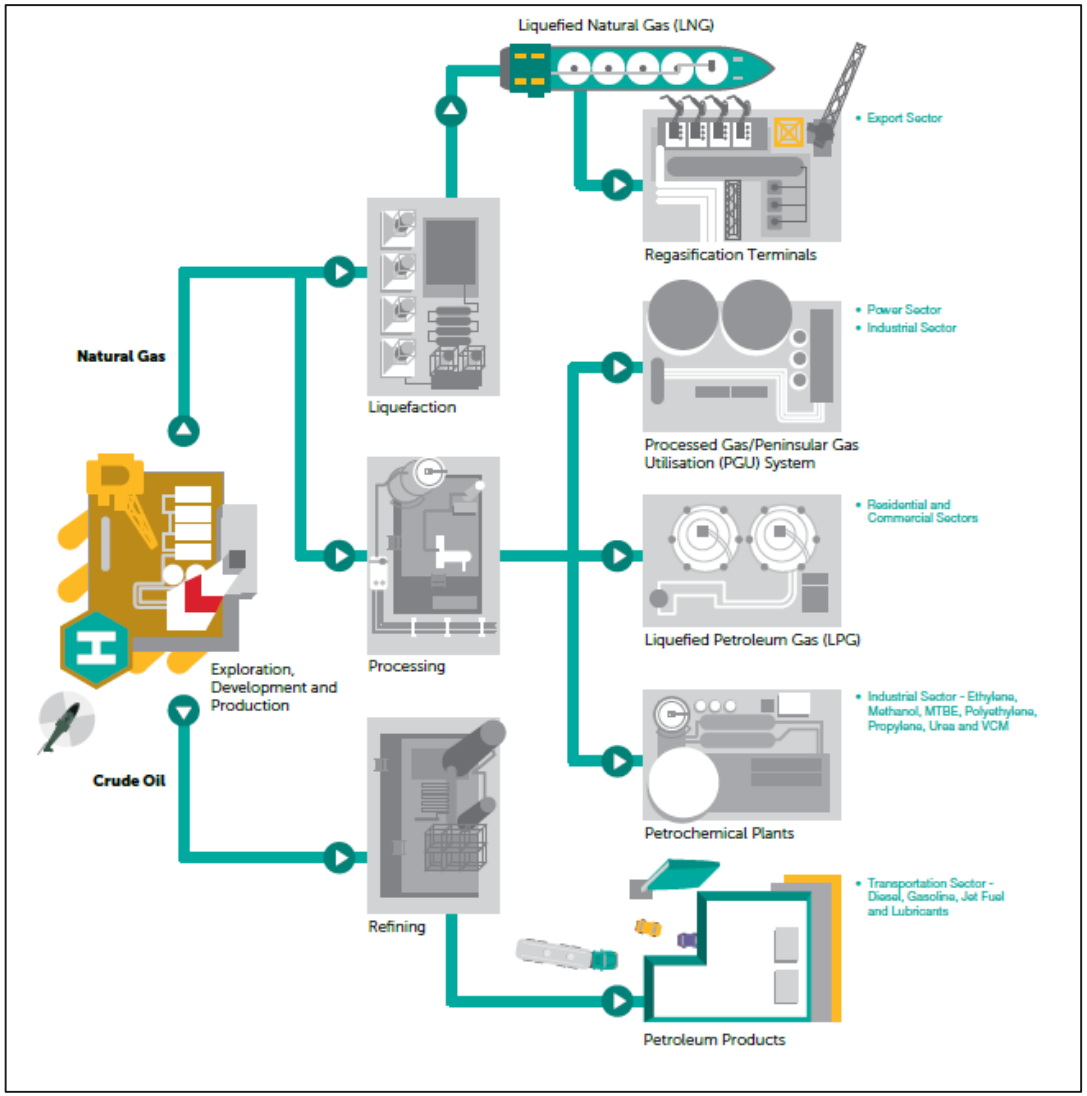
PETRONAS – Our Business

Petroliam Nasional Berhad (PETRONAS) is Malaysia's fully integrated oil and gas multinational ranked among the largest corporations on FORTUNE Global 500®.

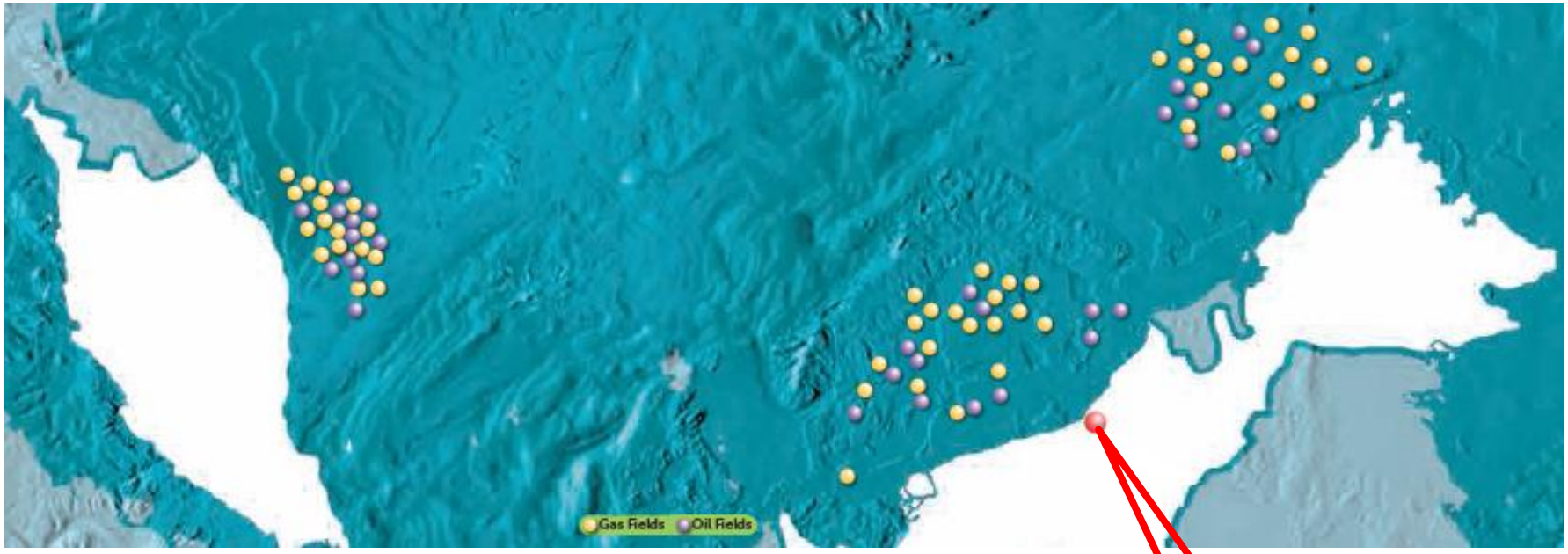
Operating our core business in the **Upstream** and **Downstream** sectors, we have a presence in **more than 60 countries** since we were first incorporated in 1974.

We are among the **top five** oil and gas companies (in terms of production) and the most profitable company in Asia.

We are steadily driving for new solutions and pushing boundaries to **develop and add value** to oil and gas resources in a manner that carefully balances **commercial, environmental** and **social** considerations.



PETRONAS practices dual roles in regulation & operation of Upstream Oil & Gas industry in Malaysia

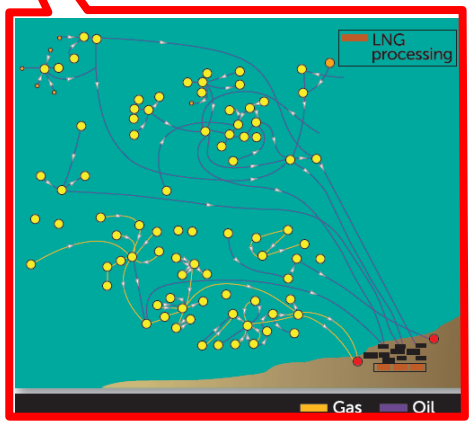


As a resource owner and host authority in Malaysia, we are responsible for the **effective management** and **sustainable development** of the country's oil and gas resource base.

As an operator, we aim to **maximise upstream value**, **sustain production** and **enhance prospectivity** of the nation's acreages.

8,467 km
pipeline

22.6 bboe
discovered resources

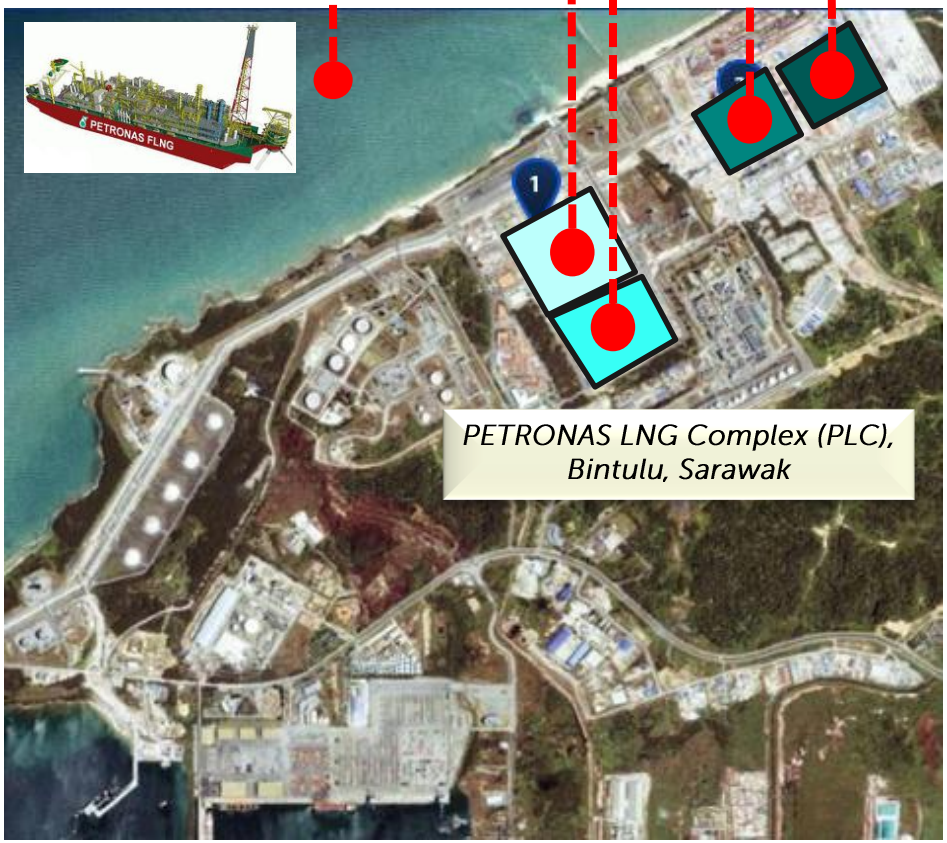


Source: PETRONAS Upstream Brochure 2014

Propelling Acid Gas Dev in a Mature Environment;
PETRONAS;
Handan Ramli

The majority of Sarawak Gas produced since 1983 are value-added through Liquefied Natural Gas (LNG) processing in PETRONAS LNG Complex (PLC) in Bintulu, Sarawak. Moving ahead, Floating LNGs will also play important role in unlocking value for stranded gas accumulations.

Floating LNGs (Offshore)
- PFLNG1 (2015) : 1.2 MTPA



MLNG Satu
- 3 LNG Trains
- Completed in 1982

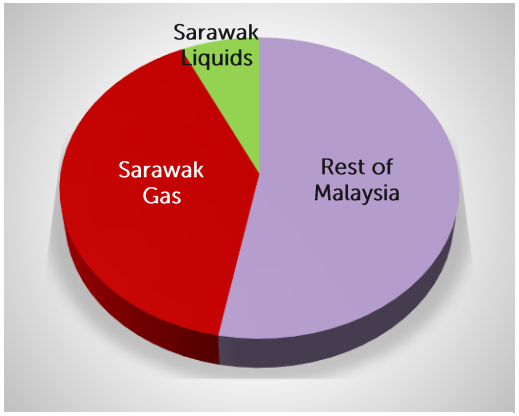
MLNG Dua
- 3 LNG Trains
- Completed in 1995

MLNG Tiga
- 2 LNG Trains
- Completed in 2003

Train 9
- RFSU in 2016

Total PLC Capacity ~29MTPA

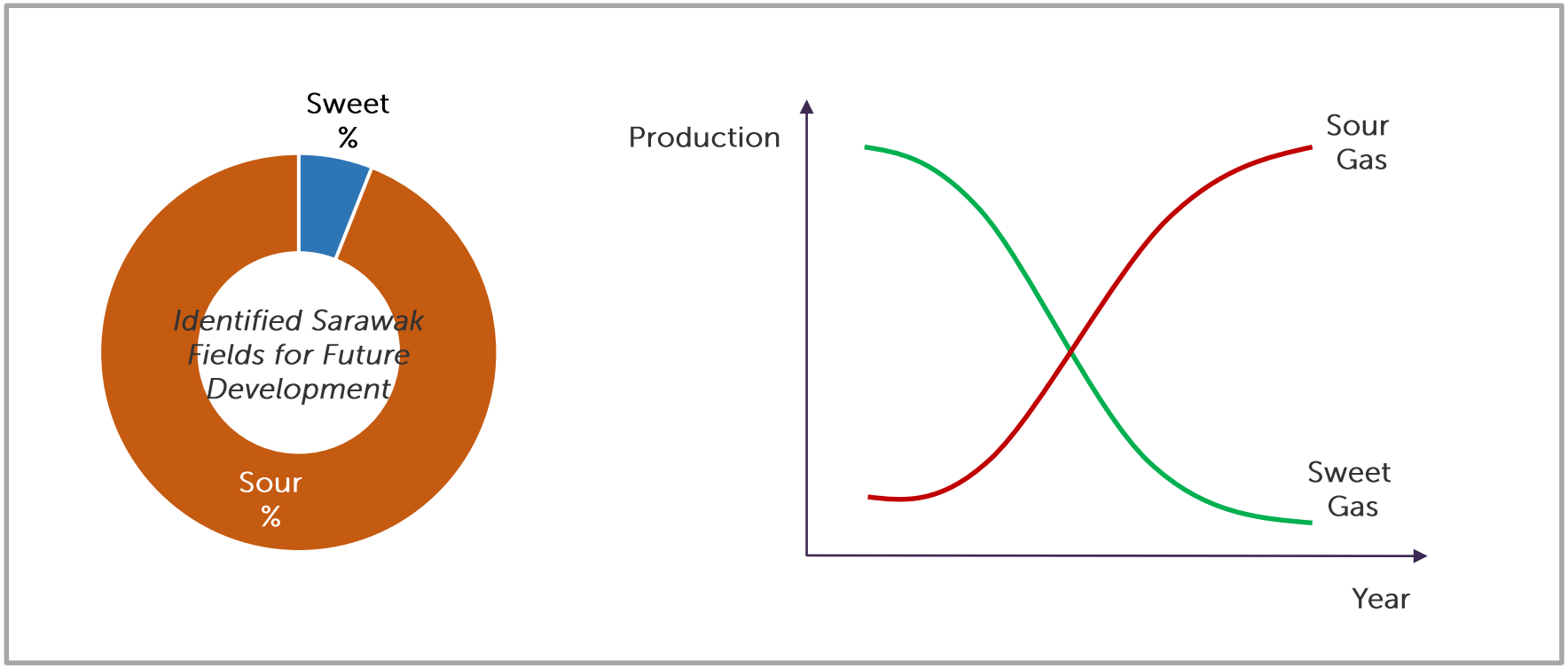
Malaysia overall production has steadily increased since PETRONAS inception in 1974, and a significant portion of the production is fueled by sustainable development of Sarawak Gas resources



Distribution of Malaysia Reserve & Contingent Resources

Propelling Acid Gas Dev in a Mature Environment;
PETRONAS;
Handan Ramli

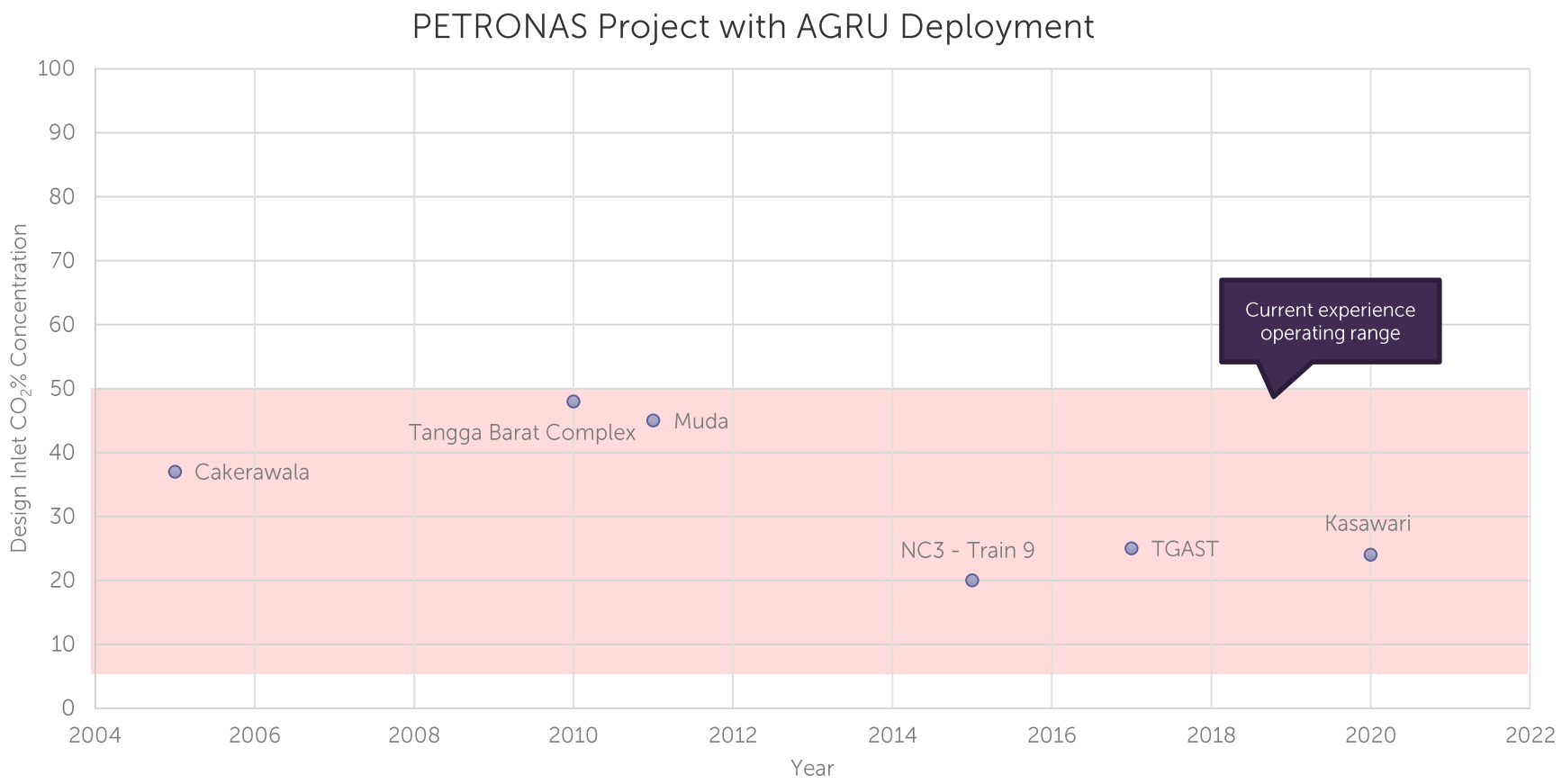
The existing sweet gas supply to PLC is declining, and strategically Sarawak gas supply will need to be supported by the sour/acid gas resources lined up for development



- Blending between sour and sweet production is the main strategy to ensure conformance to plant battery limit
- Moving forward, insufficient sweet gas will pose a challenge to sufficiently blend

Propelling Acid Gas Dev in a Mature Environment;
PETRONAS;
Handan Ramli

As an operator, PETRONAS have actively deployed offshore acid gas separation technologies to handle up to 50% CO2 in the inlet stream



Moving forward, acid gas separation and management are key enablers in sustaining & further propelling gas development in Sarawak, and Malaysia in general

Potential Key Enablers	Focus Areas
AGRU technology	• Cost consideration for offshore and onshore technologies • Increasing acid gas concentration in the fields lined up for development (≥ 50% CO_2, ≥ 400 ppm H_2S) • Operating complexity & risk management • Integration of processing capabilities for multiple contaminants (i.e. CO_2, H_2S, N_2) • Material selection
Contaminants capture, utilization & storage	• Contaminants storage, utilization vs emission (with carbon tax)

Thank You