

Investor Presentation

Non Deal Roadshow in Hong Kong
28 June 2019



Forward-looking Information

The information, statements, forecasts and projections contained herein reflect the Company's current views with respect to future events and financial performance. These views are based on assumptions subject to various risks. No assurance is given that these future events will occur, or that the Company's assumptions are correct. Actual results may differ materially from those projected.

Petroleum Reserves Information

In this presentation, the Company discloses petroleum reserves that are not included in the Securities Exchange and Commission of Thailand (SEC) Annual Registration Statement Form 56-1 under "Supplemental Information on Petroleum Exploration and Production Activities". The reserves data contained in this presentation reflects the Company's best estimates of its reserves. While the Company periodically obtains an independent audit of a portion of its proved reserves, no independent qualified reserves evaluator or auditor was involved in the preparation of reserves data disclosed in this presentation. Unless stated otherwise, reserves are stated at the Company's gross basis.

This presentation may contain the terms "proved reserves" and "probable reserves". Unless stated otherwise, the Company adopts similar description as defined by the Society of Petroleum Engineers.

Proved Reserves - Proved reserves are defined as those quantities of petroleum which, by analysis of geological and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under current economic conditions, operating methods, and government regulations.

Probable Reserves - Probable reserves are defined as those unproved reserves which analysis of geological and engineering data suggests are more likely than not to be recoverable.

Strategy and Growth



Recent Developments



Financial Performance



Aspiration



PTTEP: the E&P Flagship of PTT Group

Plays a pivotal role in Thailand's oil and gas production



As PTT's Upstream Flagship



Government of
Thailand

63.3%¹



Thailand's national energy company

65.3%²



Credit ratings equivalent to parent and country

S&P

Moody's

TRIS

BBB+

Baa1

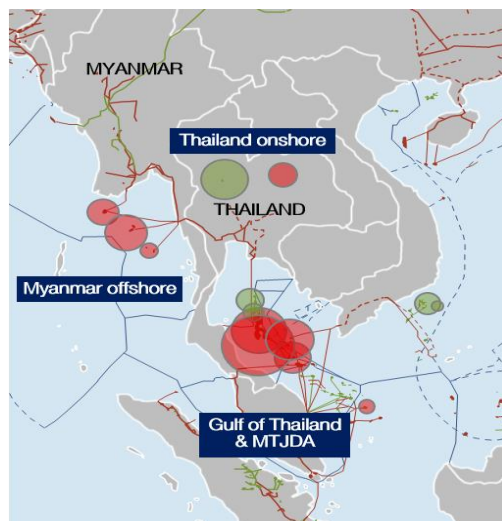
AAA

Largest oil and gas producer in
Thailand and Myanmar

Synergy with PTT's gas value chain through its dominant
position in the regional gas market

Opportunities to expand into regional investments

PTTEP's operations in SEA



○ Approx. 20 KBOED
of net sales volume

● Gas-
weighted

● Oil-
weighted

99%

of PTTEP's total
sales volume

+99%

Reliability of plants
and field facilities*

88%

of PTTEP's sales volume
sold to PTT

13 USD/
BOE

Average regional
cash cost

* of PTTEP-operated projects in Gulf of Thailand, excl. planned shutdown
All figures are as of 3M2019

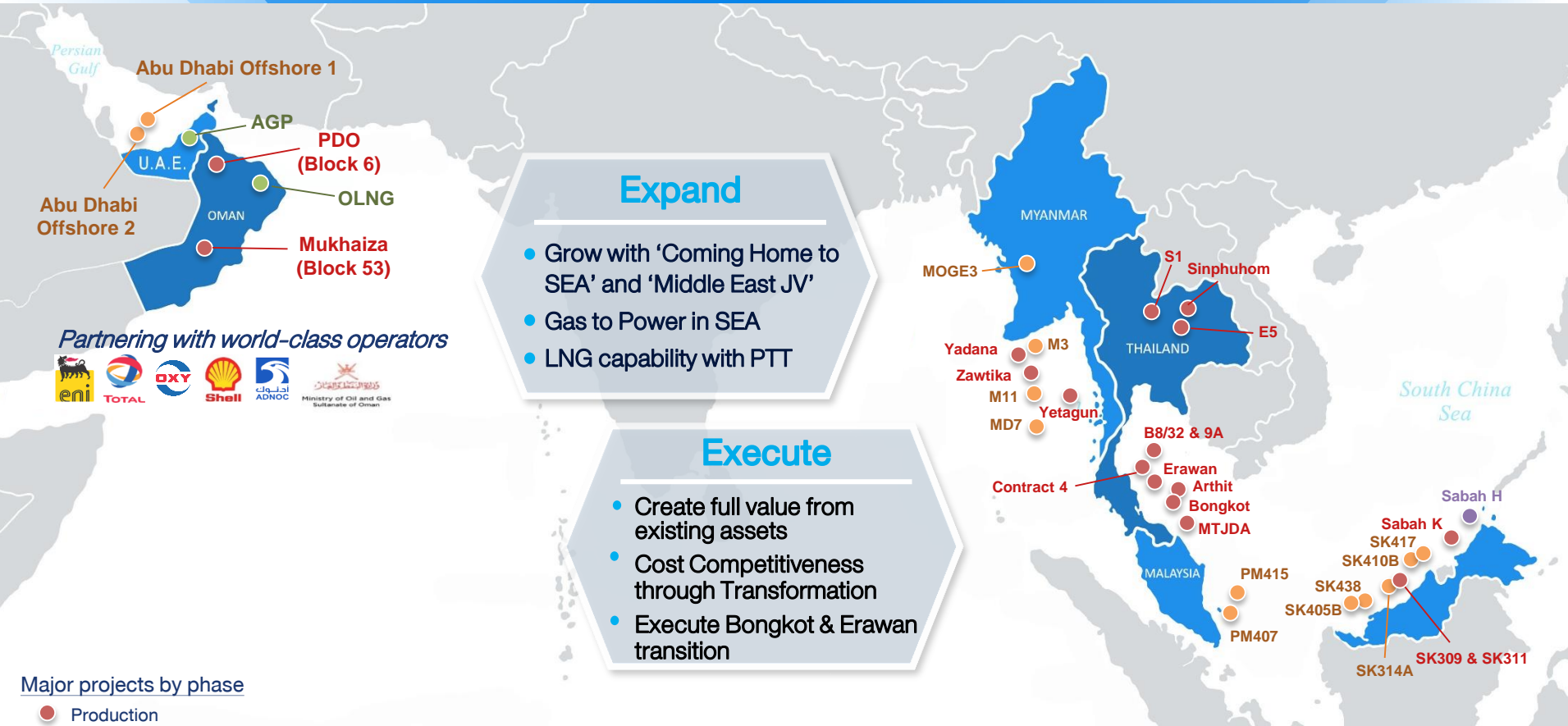
Notes:

1. 51.1% is directly held by the Government of Thailand (Ministry of Finance), with the remaining 12.2% held by the state-controlled Vayupak Fund I as of 7 March 2019

2. Ownership as of 13 February 2019

"Energy Partner of Choice"

through Competitive Performance and Innovation for Long-term Value Creation



Strategy and Growth



Recent Developments



Financial Performance



Aspiration



Recent Key Achievement

Robust performance



Q1 Performance Achievement

Operation

Resilient selling price

~ 46 \$/BOE

Strong sales volume

319 KBOED

Competitive unit cost

~29.3 \$/BOE

Financials

Healthy margin and liquidity

\$394 MM

Net income

76%

EBITDA Margin

\$943 MM

Operating Cash Flow

\$4,357 MM

Cash on hand

0.16x

Debt to equity ratio



Recent Portfolio Highlights

“Expand”

Focus growth in strategic areas : “Coming-Home” and “Strategic Alliance”



Acquired Partex Holding
in the Middle East



Acquired Murphy's assets
& awarded 2 exploration
blocks in Malaysia



Awarded 2 offshore
exploration blocks in UAE

“Execute”



The Final Investment Decision (FID) of the
Pre-Development projects

- Started development in Algeria Hassi Bir Rekaiz Project, March 2019
- Announced FID of Mozambique Area 1 Project on initial 2 trains with capacity of 12.88 MTPA, June 2019



Transition of operations efficiently

- Signed Production Sharing Contracts (PSCs) for Erawan and Bongkot fields

Acquisition of Partex

Diversified portfolio with focus on the Middle East



- PTTEP to acquire 100% of the shares in Partex Holding B.V. ("Partex") from Calouste Gulbenkian Foundation
- The total consideration of approximately USD 622 million, subject to customary net working capital and closing adjustments
- Transaction is expected to complete by the end of 2019, subjected to customary consents and regulatory approvals

"Gateway to Future Regional Investment"



Prolific Area



Strong Partnerships

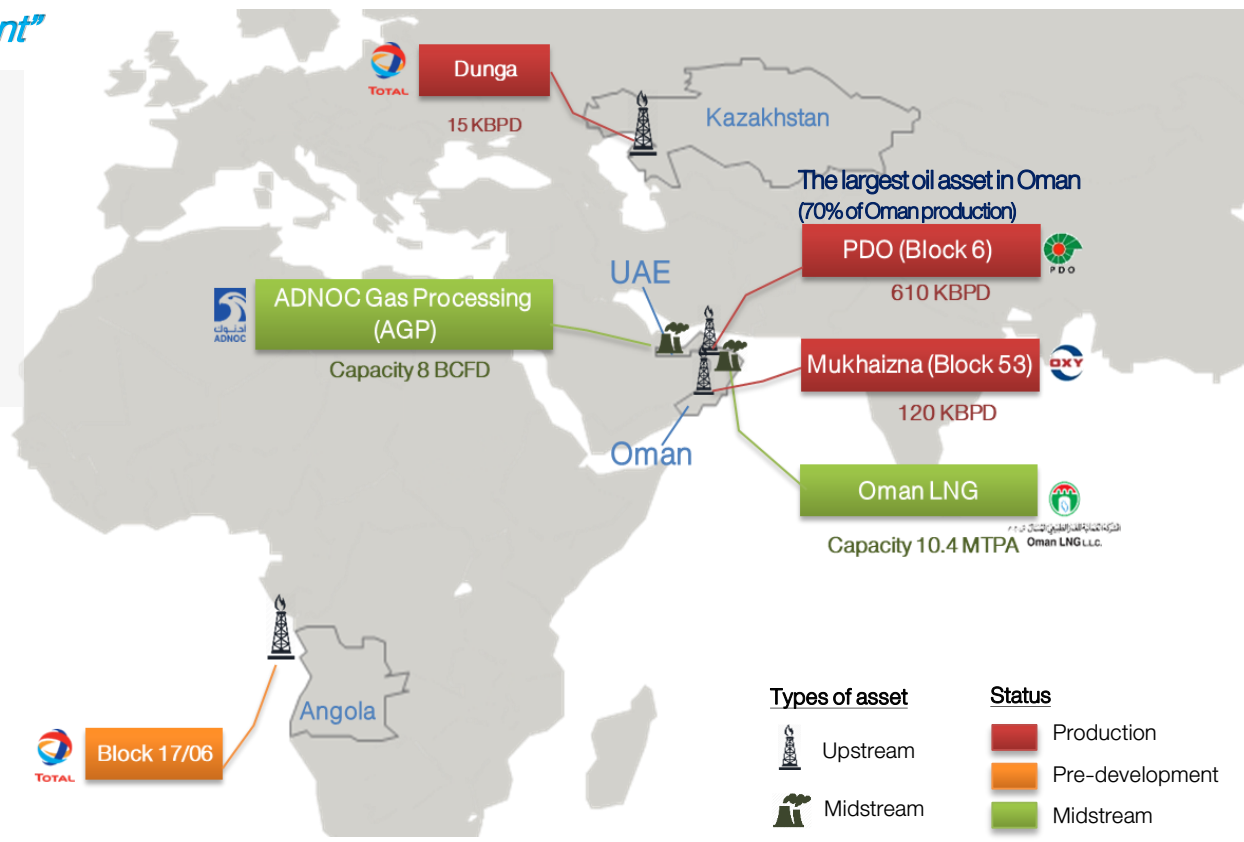


World-Class Assets



Self funded with existing production

- Sales volume +16,000 barrels/day
- 2P Add +65 million barrels



Types of asset



Upstream



Midstream

Status

Production

Pre-development

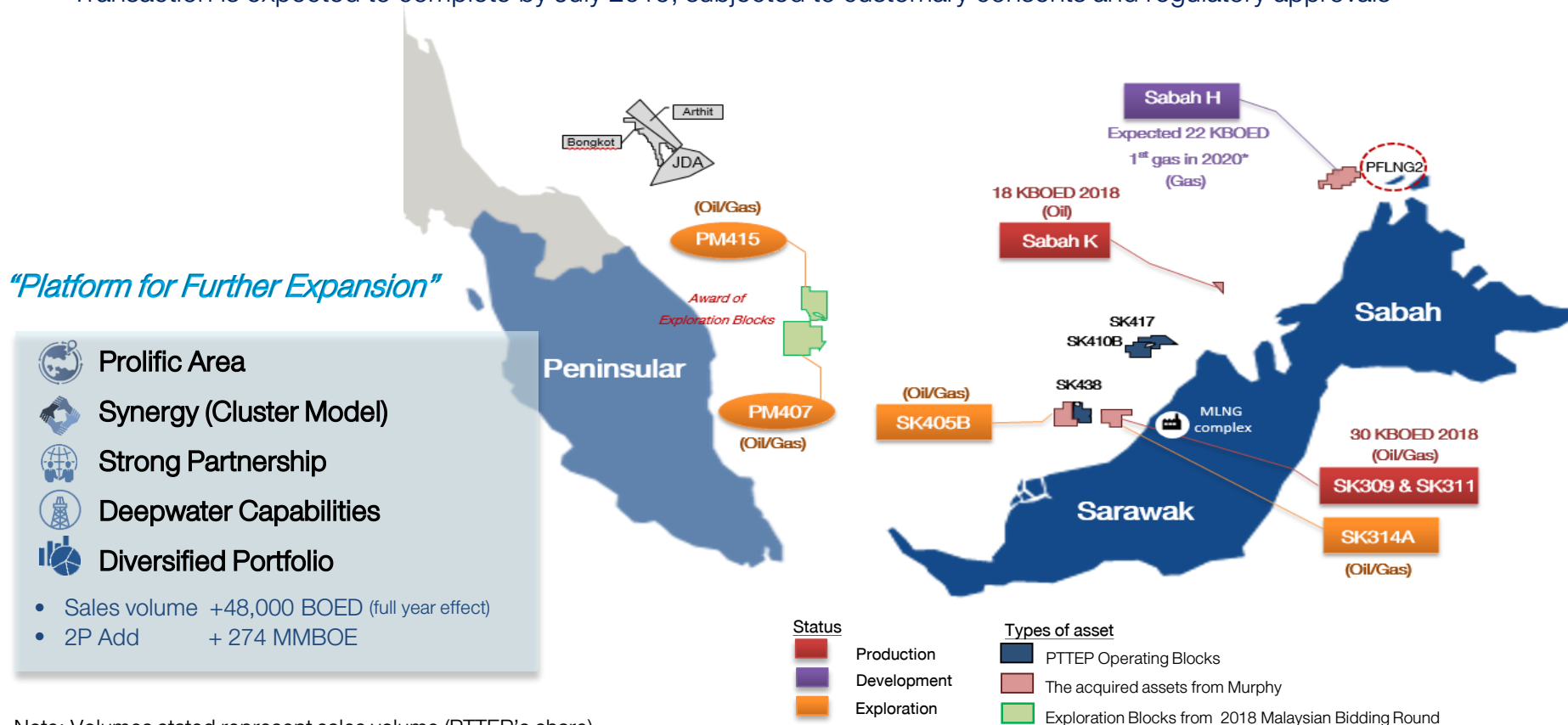
Midstream

Note: Volumes stated represent gross volumes (100%)

Acquisition of Murphy's Business in Malaysia

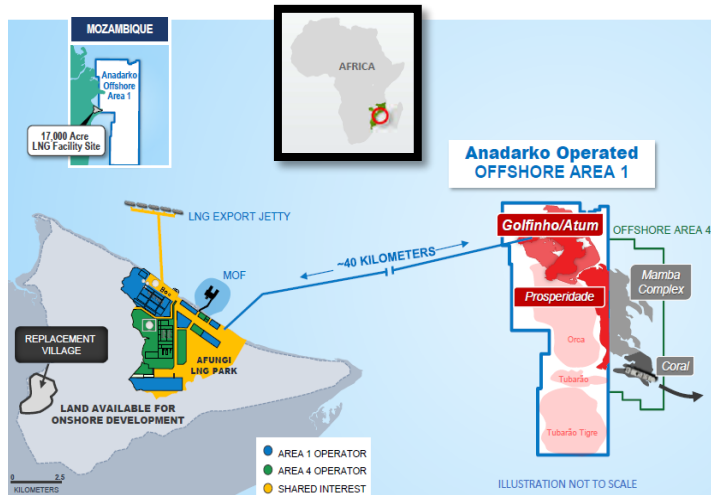
Diversified portfolio with a balance of short and long term contributions

- PTTEP to acquire 100% of the shares in Murphy Sabah Oil and Murphy Sarawak Oil from Murphy
- Total consideration of USD 2,127 million, plus up to a USD 100 million contingent payment upon certain future exploratory drilling results
- After the completion, PTTEP will assume operatorship from Murphy with the same participating interest
- Transaction is expected to complete by July 2019, subjected to customary consents and regulatory approvals



Mozambique Area 1

FID, on the Path of Unlocking Value from World Class LNG Asset



*Substantial recoverable resources of approximately **75 tcf** with scalable offshore development expending up to **50 MTPA***

Location and Cost Advantage

- Close proximity to shore
- High quality reservoirs
capable of flow up to 200 mmcf/d per well
- Access to Asian and European markets

Achievements

- ✓ Legal & Contractual Framework
- ✓ Plan of Development Approved
- ✓ Onshore & Offshore Contractors Awarded
- ✓ First Mover for the Marine Facility
- ✓ LNG SPAs ~11.1 MTPA

**FID in June 2019
with initial 2 trains of
12.88 MTPA capacity**

Way Forward

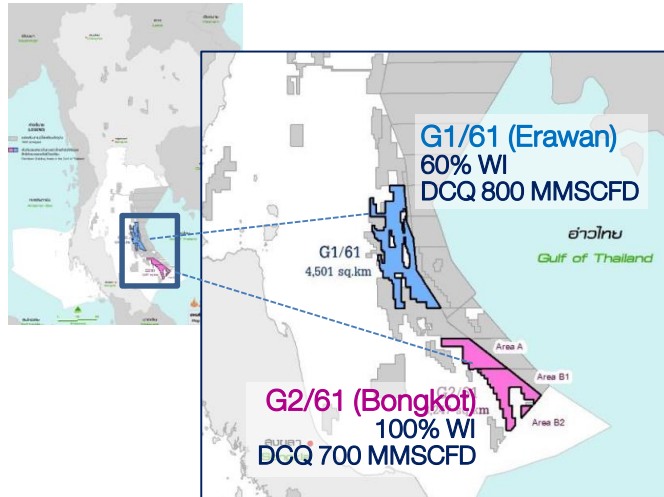
- ✓ Project Finance
(2/3 Project Financed)
- ✓ Drilling & Completion
- ✓ Onshore Construction and Offshore Installation
- ✓ Operation Readiness
- ✓ LNG Shipping

**1st Cargo
expected
2024**

Bongkot and Erawan: Thailand Champion in Domestic Gas Supply

Execute Bongkot and Erawan transition plan

To supply 2/3 of domestic gas production starting from 2022 onwards.....



Growing production and reserves profile

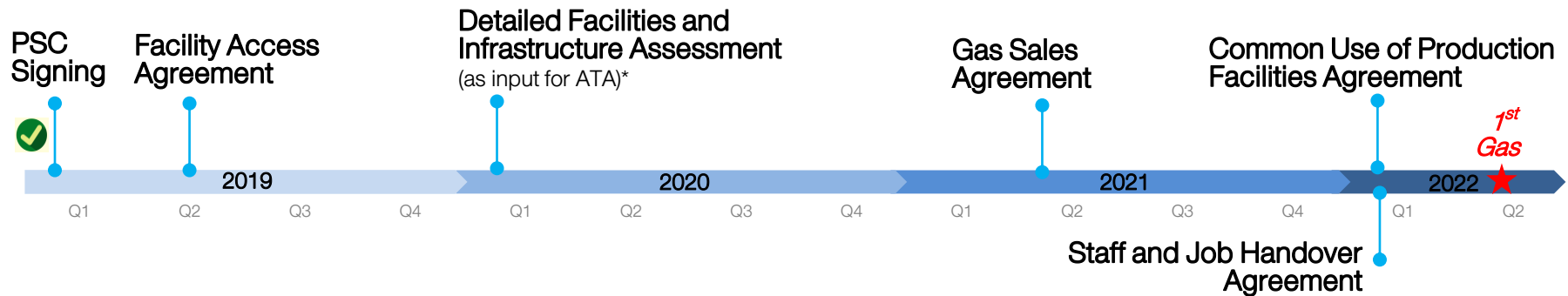
- Substantial volume boost for 10 years and beyond
- Immediate remarkable reserves addition
- Minimal risk in production profile



Generating strong cash flow

- No heavy upfront investment
- Self funding (positive net cash flow)
- Achieved target IRR with strong margin despite lower price

Concrete transition plan as an operator of G1/61 (Erawan) under PSC



***Asset Transfer Agreement (ATA):** To be agreed between current concessionaires and DMF by 2021 (1 year prior concession end)

Source : TOR

Exploration Plan in 2019

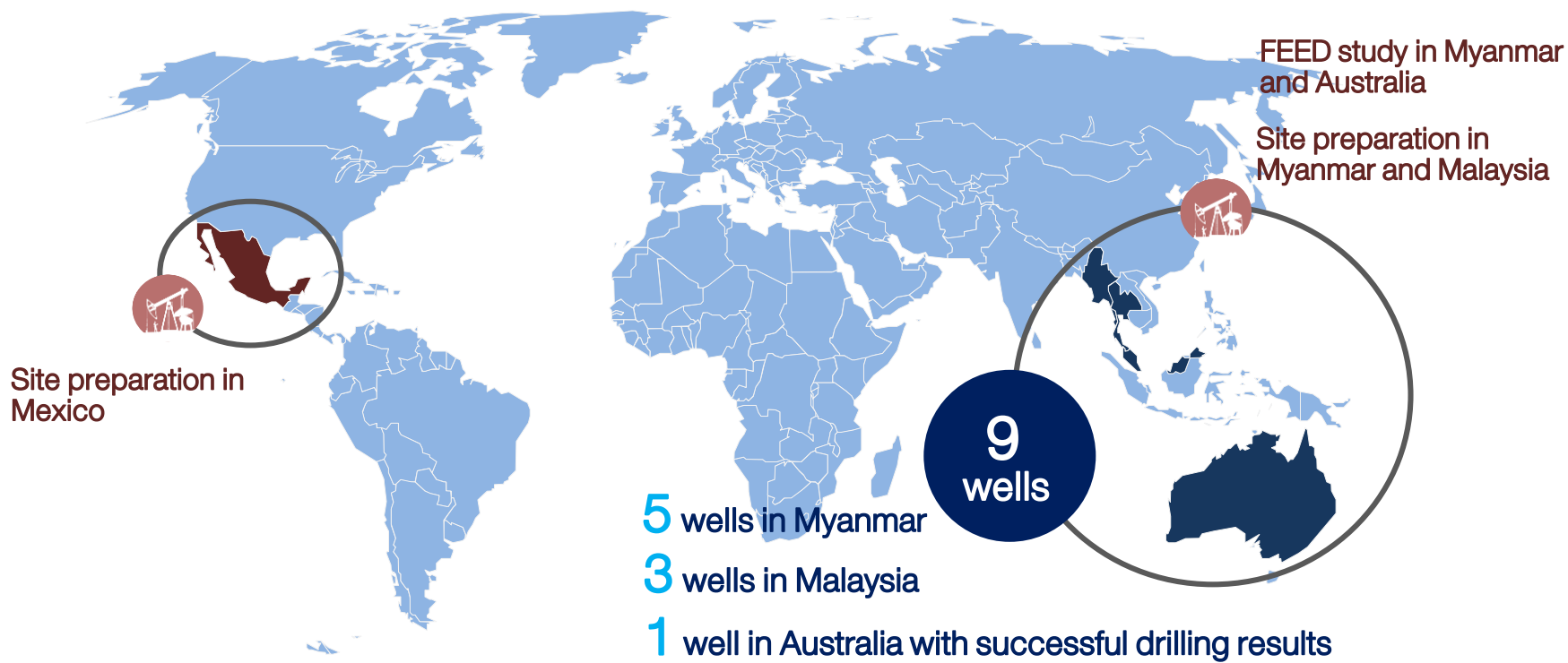
Exploration activities to accelerate resources discovery

CAPEX
191 MMUSD

2019 Budget

235
MMUSD

OPEX
44 MMUSD



Note: Excludes exploration activities of producing assets around 120 MMUSD

Strategy and Growth



Recent Developments

Financial Performance

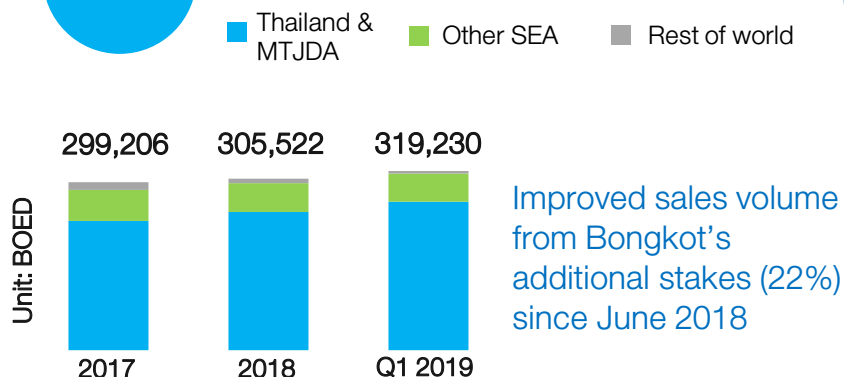


Aspiration

Q1 2019 Key Financial Performance

Delivered healthy EBITDA margin supported by cost management

Sale Volumes



Average Selling Price

Better gas price mainly driven by oil price recovery

	2017	2018	Q1 2019
Gas (\$/MMBTU)	5.59	6.42	6.92
Liquid (\$/BBL)	52.26	67.40	58.82
Weighted Avg. (\$/BOE)	39.20	46.66	46.21
Avg. Dubai (\$/BBL)	53.14	69.65	63.41
Avg. HSFO (\$/BBL) (High Sulphur Fuel Oil)	49.64	67.01	63.95
Volume Mix (Gas : Liquid)	70:30	72:28	73:27

Unit Cost

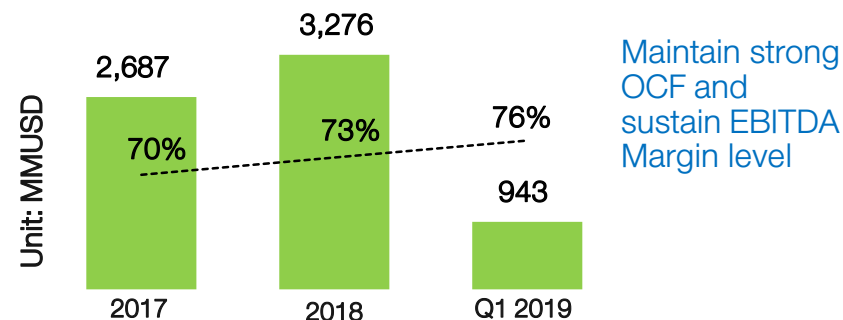
Maintained cost competitive with the First Quartile among Asian peers

Unit : \$/BOE	2017	2018	Q1 2019
Cash cost	13.94	15.11	13.34
Non-Cash cost	15.11	16.58	15.99
Unit cost	29.05	31.69*	29.33*

Note: * Exclude costs related to new business, if include, unit cost for 2018 and Q1 2019 are 31.72\$/BOE and 29.48 \$/BOE

Cash Flow

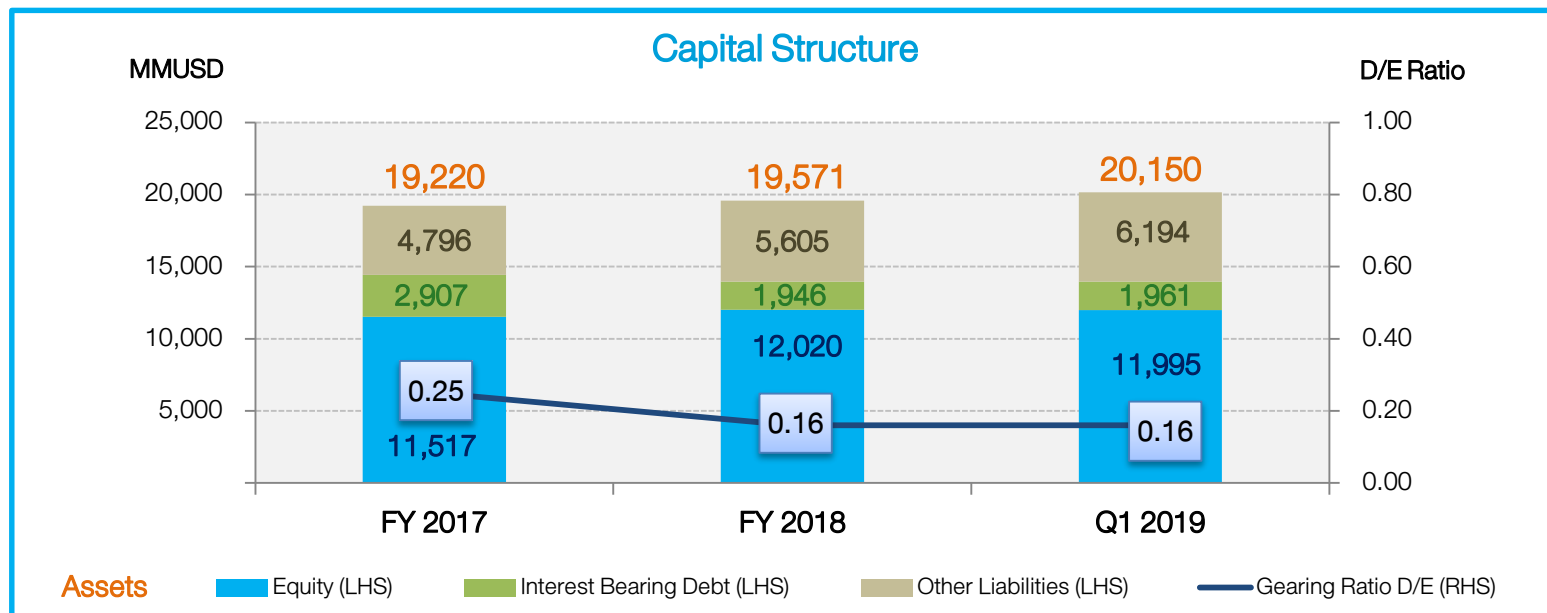
■ Operating Cash Flow* - - - EBITDA Margin



Remark: * Net of adjustment for the effect of exchange rate changes on cash and cash equivalents

Financial Position

Healthy balance sheet with low gearing

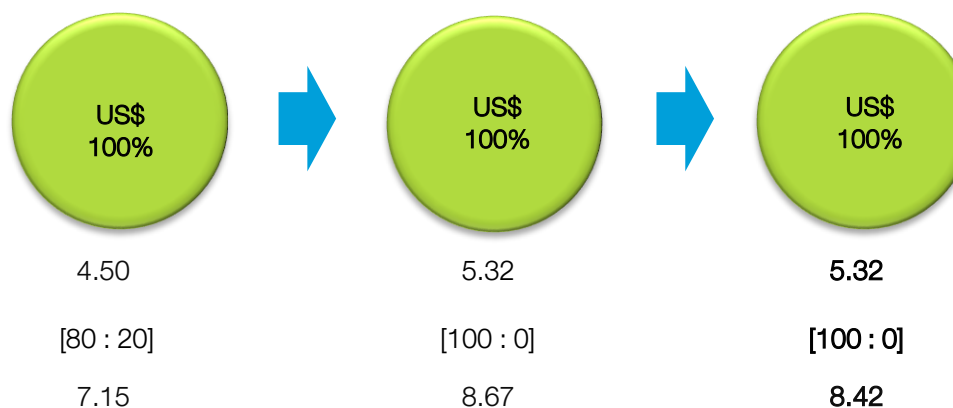


Debt Profile**

Weighted Average
Cost of Debt* (%)

[Fixed : Floating]

Average Loan Life* (Years)

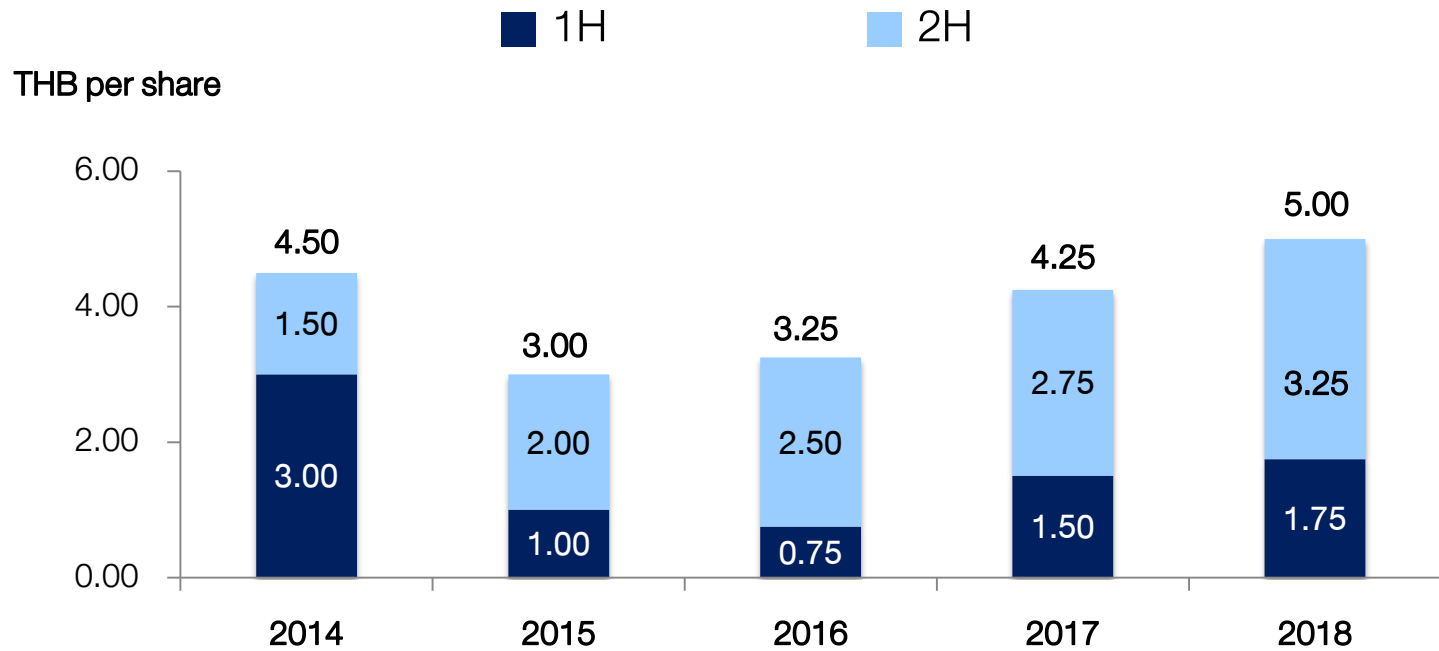


Remark: * Excludes Hybrid bonds

Dividends

Demonstrating our dividend commitment to shareholders

Dividend Payment History (Policy : No Less Than 30% of Net Income)



Payout Ratio (% of net income)	82	N/A	98	90	55
Payout Ratio (% of recurring net income)	36	47	79	64	51

2019 Guidance*

Q2 2019

FY 2019



Average Sales Volume

~ 330

~ 321



Average Gas Price**

~ 6.9

~ 6.9



Unit Cost**

~ 32

~ 31



EBITDA Margin**

FY 2019

70-75 %



Note: * Excluded Murphy and Partex acquisition

** Based on FY2019 average Dubai oil price at 66 \$/BBL

Strategy and Growth



Recent Developments

Financial Performance



Aspiration



PTTEP's Aspired Portfolio in 2030

Target for sustainable growth

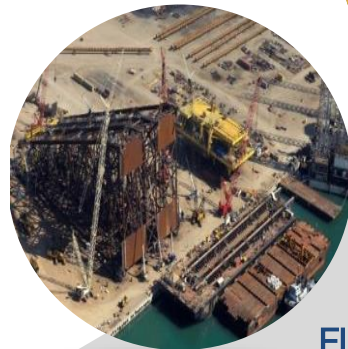
5% CAGR on Production Target

≥7 years of R/P Ratio

2030



Bongkot & Erawan under New PSCs
Acquisition of Murphy's business in Malaysia



FID Projects



Accelerating
Exploration Activities

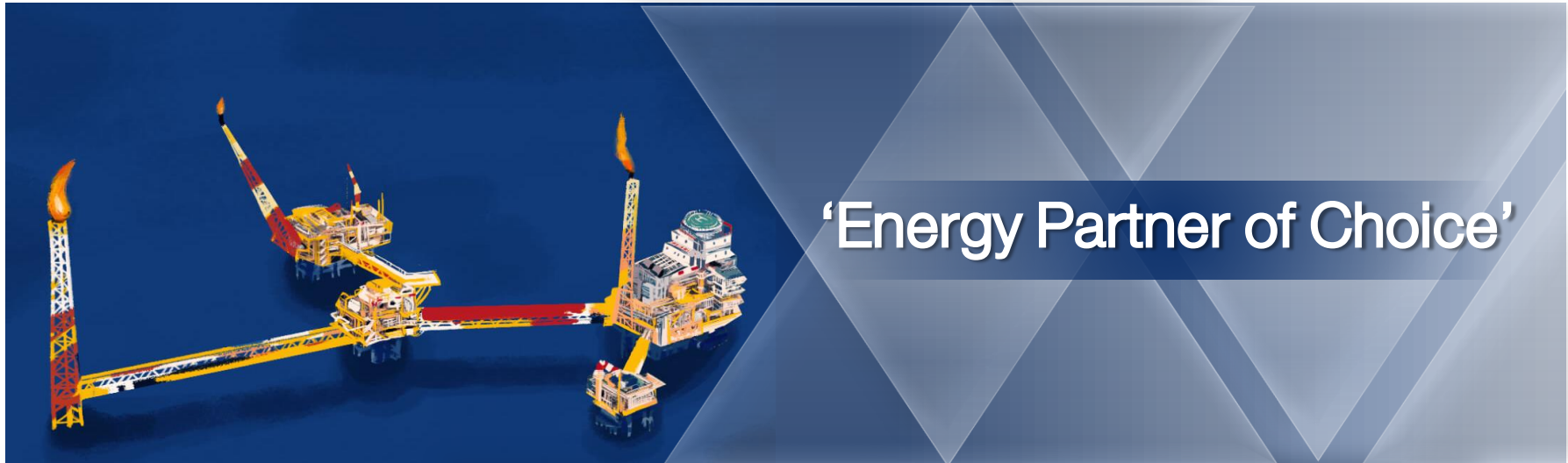


New Businesses
and Other M&As



Sustainable Development Framework

You can reach the Investor Relations team for more information and inquiry through the following channels:



<http://www.pttep.com>



IR@pttep.com

+66 2 537 4000



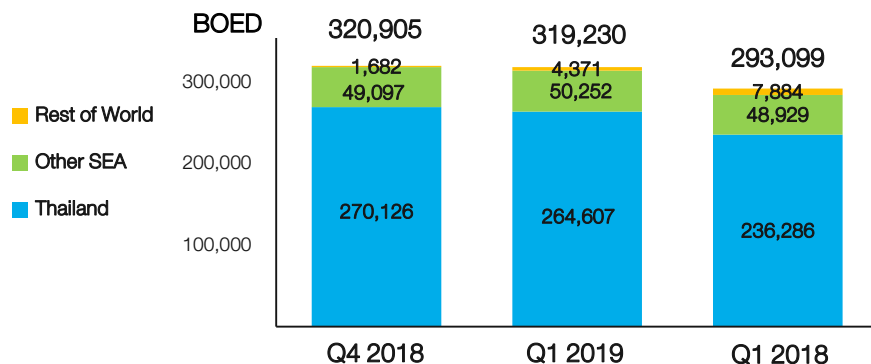


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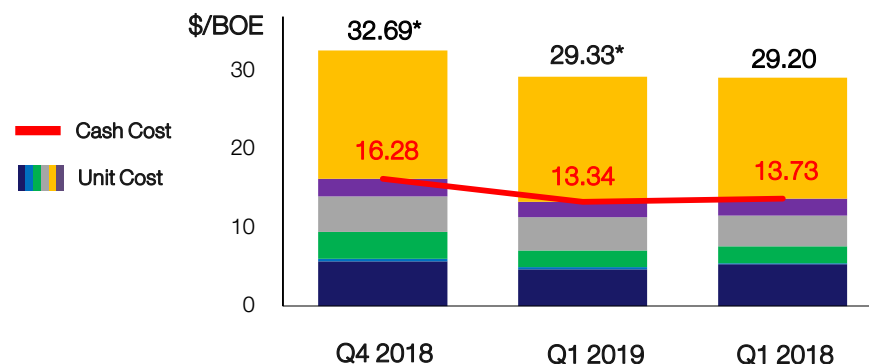
Sales Volume & Unit Cost

Strong volume with competitive cost

Sales Volume and Price



Unit Cost



Gas (\$/MMBTU)	6.90	6.92	6.07
Liquid (\$/BBL)	66.01	58.82	63.12
Weighted Avg. (\$/BOE)	47.79	46.21	44.01
Avg. Dubai (\$/BBL)	68.30	63.41	63.96
Avg. HSFO (\$/BBL)	69.63	63.95	57.64
(High Sulphur Fuel Oil)			
Volume Mix (Gas : Liquid)	74 : 26	73 : 27	72 : 28
Revenue Mix (Gas : Liquid)	64 : 36	65 : 35	59 : 41

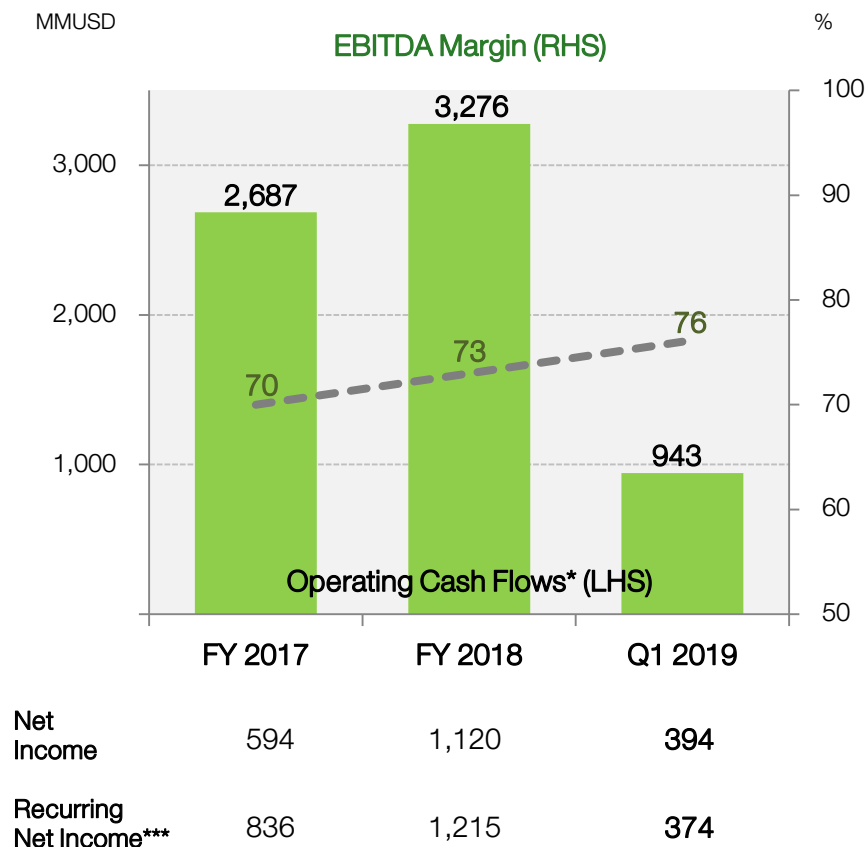
DD&A	16.41	15.99	15.47
Finance Cost	2.26	1.99	2.16
Royalties	4.53	4.25	3.94
G&A	3.46	2.11	2.18
Exploration Expenses	0.31	0.29	0.10
Operating Expenses	5.72	4.70	5.35
Lifting Cost	4.18	3.53	4.04

Note: * Exclude costs related to new business, If include unit cost for Q4/18 and Q1,19 are 32.77 \$/BOE and 29.48 \$/BOE respectively
The formulas for calculating ratios are provided in the supplementary section for your reference

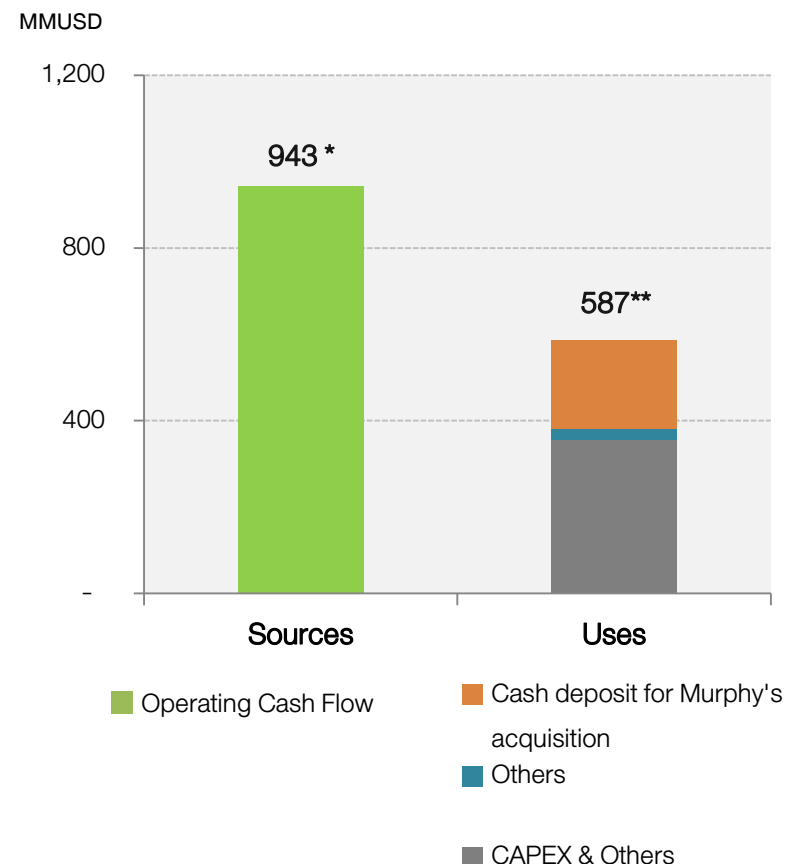
Cash Flow Performance

Robust operating cash flow

Cash Flow Performance



Source & Use of Funds in Q1 2019



Remark: * Net of adjustment for the effect of exchange rate changes on cash and cash equivalents

** Excludes cash flows for investing in short-term investments (Fixed deposit > 3 months)

*** Excludes Gain/(Loss) on FX, Deferred tax from Functional currency, Current Tax from FX Revaluation, Gain/(Loss) from Financial Instruments, Impairment Loss on Assets, and etc.

Financial Performance : Income Statement

Strong core earnings and EBITDA margin

	Q4 18	Q1 19	Q1 18
Sales and Revenue from Pipeline Transportation (MMUSD)	1,440	1,356	1,184
EBITDA (MMUSD)	1,024	1,025	879
Net Income (MMUSD)	269	394	423
Recurring Net Income (MMUSD)	283	374	304
Earning Per Share (USD)	0.07	0.10	0.10
Key Financial Ratios			
EBITDA Margin (%)	71	76	74
Return on Equity (%) (LTM)	10	9	6
Return on Capital Employed (%) (LTM)	9	8	5
Return on Equity (%) (LTM, Recurring Net Income)	10	11	8
Return on Capital Employed (%) (LTM, Recurring Net Income)	9	10	7

Note: The formulas for calculating ratios are provided in the supplementary section for your reference

Financial Performance : Balance Sheet

Healthy balance sheet with strong cash position

	YE 18	Q1 19
Total Assets (MMUSD)	19,571	20,150
- Cash & cash equivalents* (MMUSD)	4,001	4,357
Total Liabilities (MMUSD)	7,551	8,155
- Interest bearing debt (MMUSD)	1,946	1,961
Equity (MMUSD)	12,020	11,995
Key Financial Ratios		
Total Debt to Equity (X)	0.16	0.16
Net Debt* to Equity (X)	(0.17)	(0.22)
Total Debt to Capitalization (X)	0.14	0.14
Total Debt to EBITDA (X)	0.63	0.60
EBITDA Interest Coverage (X)	32	35

Credit Ratings : BBB+ (S&P), Baa1 (Moody's), AAA (TRIS)

Weighted Average Cost of Debt :** 5.32%

Average Loan Life :** 8.42 years

Note: * Cash & Cash Equivalents (Cash on hand) include Short-term Investments (Fixed deposit > 3 months)

Net Debt = Total Debt less Cash & Cash Equivalents and Short-term Investments

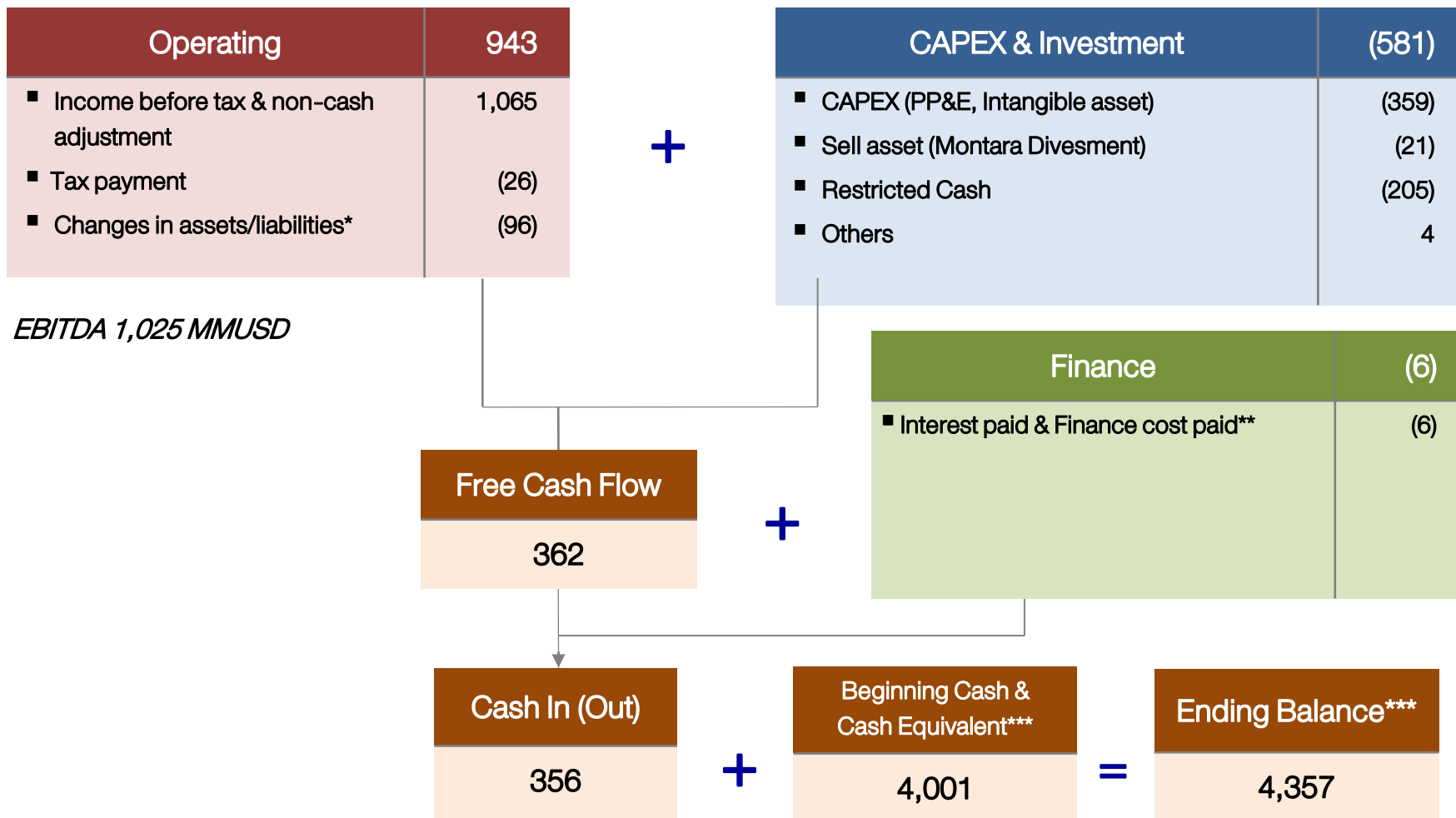
** Excludes hybrid bonds

The formulas for calculating ratios are provided in the supplementary section for your reference

Cash Flows : January – March 2019

Robust operating cash flow

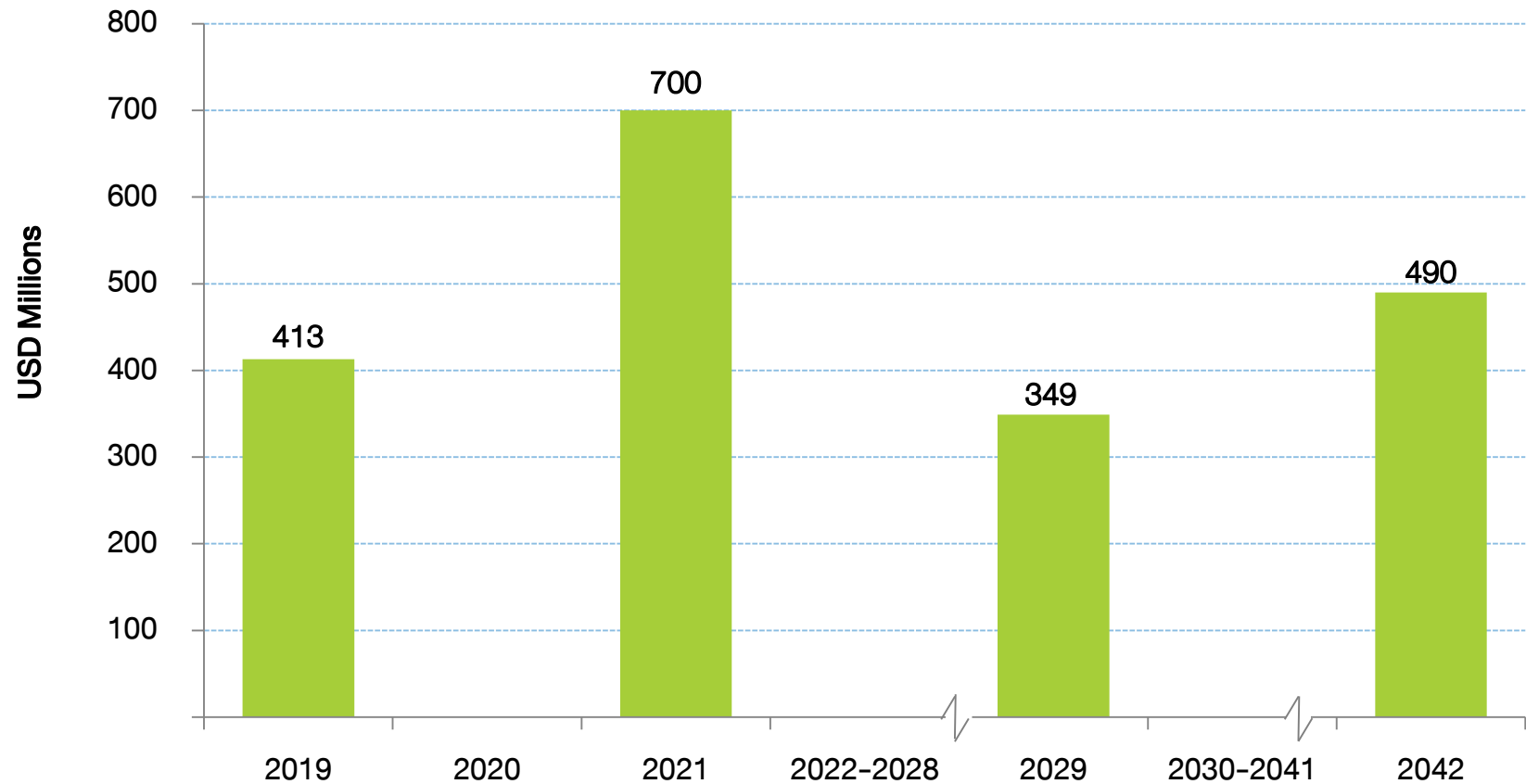
Unit : MMUSD



Note: * Net of foreign exchange rate effect

** Net of interest received

*** Include Short-term Investment (Fixed deposit > 3 months)



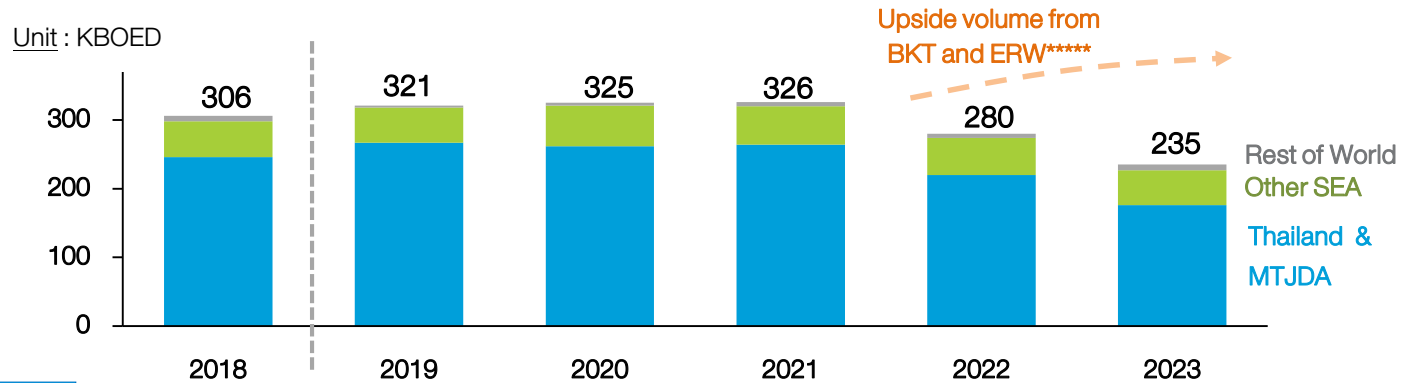
Note: Excludes Hybrid bonds

Unit: USD Millions or equivalent after cross currency swap

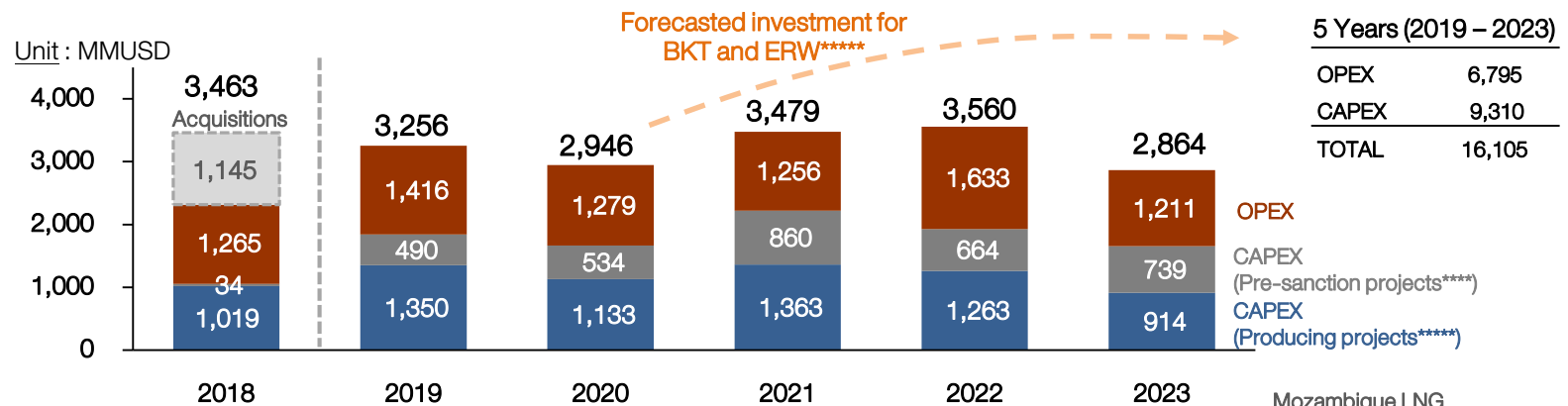
Five –Year Plan

CAPEX to support current volumes and new projects start-up

Sales Volume*



Investment*



5 Years (2019 – 2023)

OPEX	6,795
CAPEX	9,310
TOTAL	16,105

Key Project
Start-up**

Algeria HBR (phase I)
Capacity 10-13 KBPD

Southwest Vietnam
Capacity 490 MMSCFD
(~80 KBOED)

Contract 4 (Ubon)
Capacity 25-30 KBPD

Mozambique LNG
Capacity 12 MTPA
(~300KBOED)

Algeria HBR
(Full phase)
Capacity 50 KBPD

- Note:
- * Numbers shown exclude the result of bidding in GoT
 - ** Subject to FID timing
 - *** Pre-sanction projects include Mozambique LNG, Contract 4 (Ubon), Algeria HBR and Southwest Vietnam
 - **** Includes exploration and appraisal in all projects and head office CAPEX
 - ***** Subject to PSC signing

Sustainable development

Pursue long-term growth with social and environmental wellness



MEMBER OF

**Dow Jones
Sustainability Indices**

In Collaboration with RobecoSAM

2018 DJSI Listed Company

PTTEP has been selected as a member of the 2018 Dow Jones Sustainability Indices (DJSI) in the DJSI World Oil and Gas Upstream & Integrated Industry for its fifth consecutive year.



Proven business integrity

SET Sustainability Award 2018 – Outstanding Category

The Stock Exchange of Thailand (SET)

ASEAN Corporate Governance (CG) Awards

ASEAN CG Scorecard

Thailand's Strongest Adherence to Corporate Governance (ranked second)

Alpha Southeast Asia Magazine 2018



FTSE4Good

FTSE4Good Emerging Index 2018

PTTEP becomes a constituent of the FTSE4Good Emerging Index 2018 for the third consecutive year



Exemplary social contributor

Top Corporate Social Responsibility Advocates winner

The Asia Corporate Excellence & Sustainability Awards 2018

Health Promotion Category for PTTEP LKC Free Health Service Program (Free Clinic Project)

The Asia Responsible Enterprise Awards 2018

Thailand's Best Strategic Corporate Social Responsibility (ranked first)

Alpha Southeast Asia Magazine 2018

Green driver to environment

Green Leadership Category for T.M.S. Underwater Learning Site Project

The Asia Responsible Enterprise Awards 2018

The Excellent Level (G-Gold) of the Green Office Award 2017

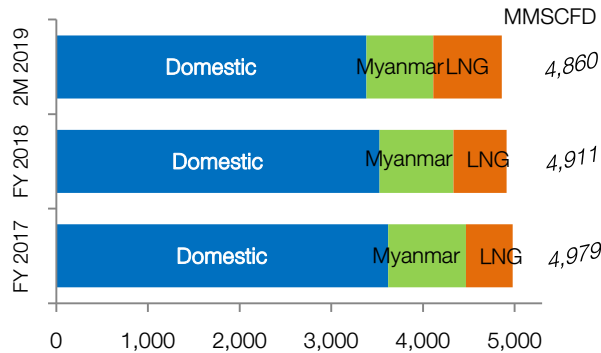
The Ministry of Natural Resources and Environment

Water A List Award

Carbon Disclosure Project (CDP)

Thailand Energy Overview

Natural Gas Supply



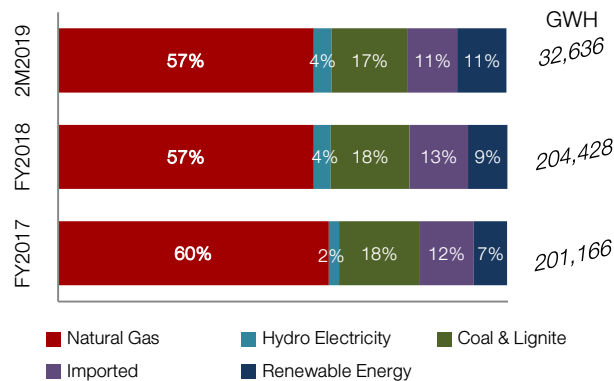
Slight decline in domestic production and Myanmar piped gas imports as a result of lower demands and growth in LNG import

Natural Gas Consumption



Source: EPPO

Electricity Generation



Exchange Rate Movement (THB/USD)



Consensus on the exchange rate mostly depends on

- Tendency on FED interest rate hike
- Trade war between the US and China
- Slowdown of the U.S and European Union economy
- Slow recovery in Tourism growth

Source: Bank of Thailand, Bloomberg
Forecast based on Bloomberg Consensus as of 3 May 2019

Thailand's Energy Value Chain

PTTEP contributes almost 1/3 of Thailand's petroleum production

2M Thailand's Oil and Gas Demand

Thailand Petroleum Production 2M2019

Midstream

Crude Oil &
Condensate

~ 1.2m BOE/D

Imports

~ 83%

Domestic ~ 17%

Natural Gas

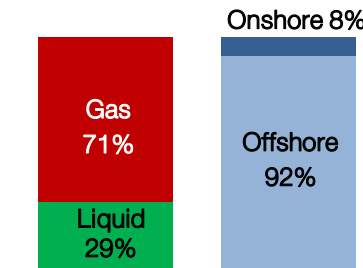
~ 0.9m BOE/D

Imports ~ 30%

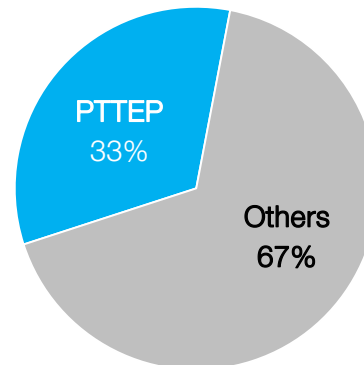
Domestic

~ 70%

% by Petroleum Type and Area



% Production by Company



Gas: operated by PTT

Transmission Pipelines
Gas Separation Plants

Oil: PTT participates through
subsidiaries

Refineries

Downstream

Petrochemicals
Oil and gas marketing

Source: Energy Policy and Planning Office (EPPO) and Department of Mineral Fuels (DMF)

Thailand's Oil and Gas Balance

Oil Balance***

Maintains stability supply through adequate refining capacity

SUPPLY

Import (83%)
1,013 KBD



Indigenous (17%)
210 KBD



Crude/
Condensate
954 KBD

Crude/
Condensate
179 KBD

Total Refining Capacity in Thailand
1,232 KBD



PTT's Associated Refineries 770 KBD (TOP, PTTGC, IRPC)

Other Refineries 462 KBD (SPRC, ESSO, BCP)

Imported
Refined
Petroleum
Products
59 KBD

Crude
Export
31 KBD

Refined
Products
1,148 KBD *

Refined
Products
208 KBD

Domestic
966 KBD **



Export
239 KBD



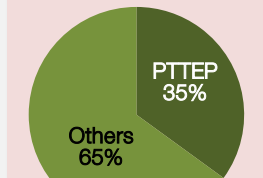
PRODUCTION

SALES

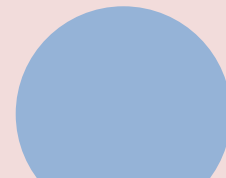
Natural Gas Balance****

Main driver of the Thailand economy

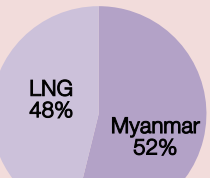
Gulf of Thailand (67%)



Onshore (2%)



Import (31%)



3,135
MMSCFD

Bypass Gas 546 MMSCFD



97
MMSCFD

Methane
1,632 MMSCFD

1,457
MMSCFD

957 MMSCFD
(20%)

Petrochemical
Feedstock
(13%)

Ethane
Propane
LPG
NGL

Industry
Household
Transportation
(7%)

LPG
NGL

Power (59%)

Industry (16%)

NGV (5%)

Source: PTT

Remark: * Refined product from refineries = 1,034 KBD, including domestic supply of LPG from GSPs and Petrochemical Plants = 111 KBD

** Not included Inventory

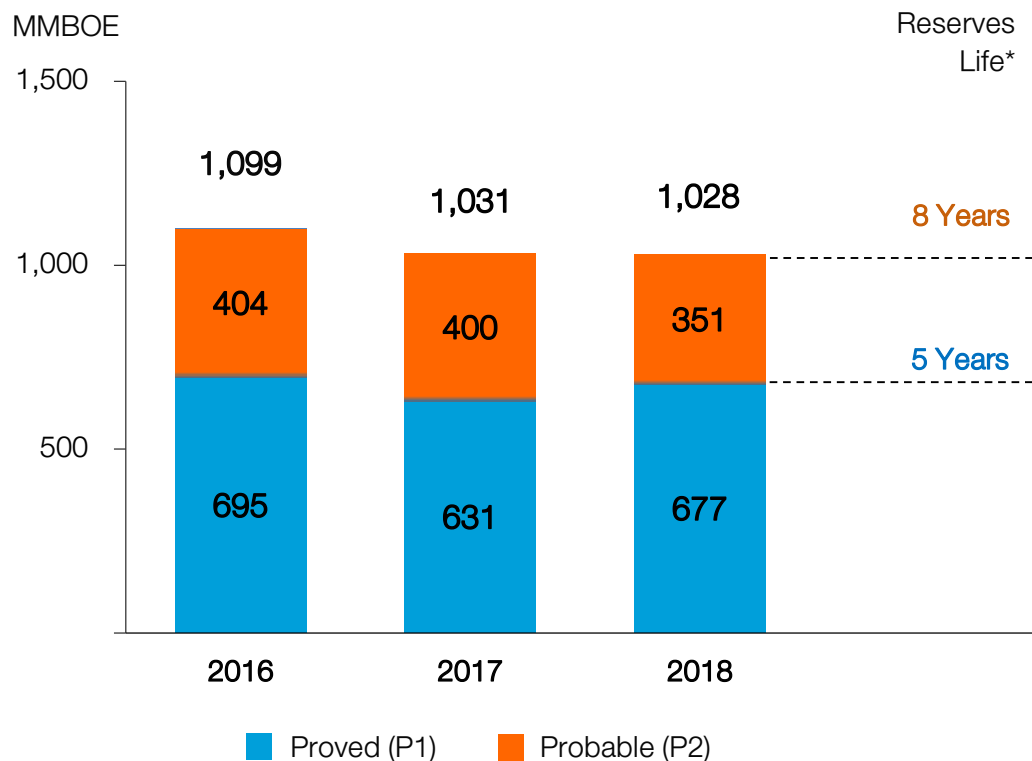
*** Information as of 11M18

**** Information as of 3M19

MMSCFD @ Heating Value 1,000 Btu/ft³

Reserves at the Year-end 2018

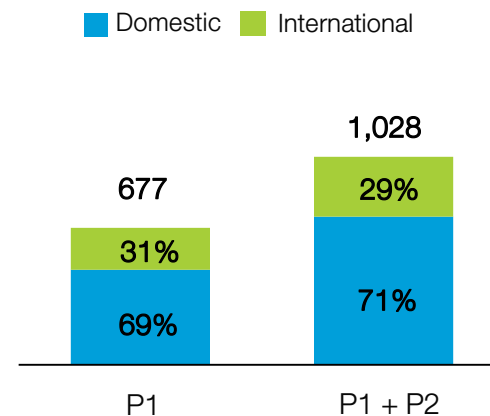
Maintained reserves life with majority of reserves base in SEA



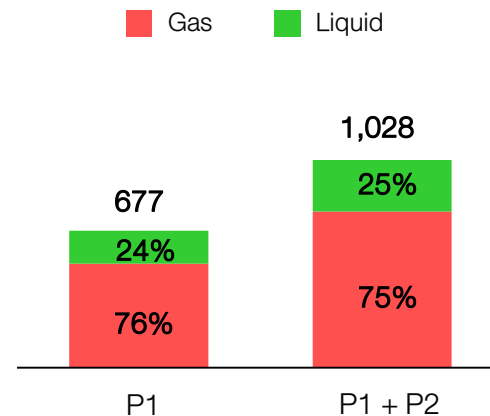
5-Year Average Proved Reserves Replacement Ratio (RRR)

2016	2017	2018
0.57x	0.58x	0.74x

2018 by Geography



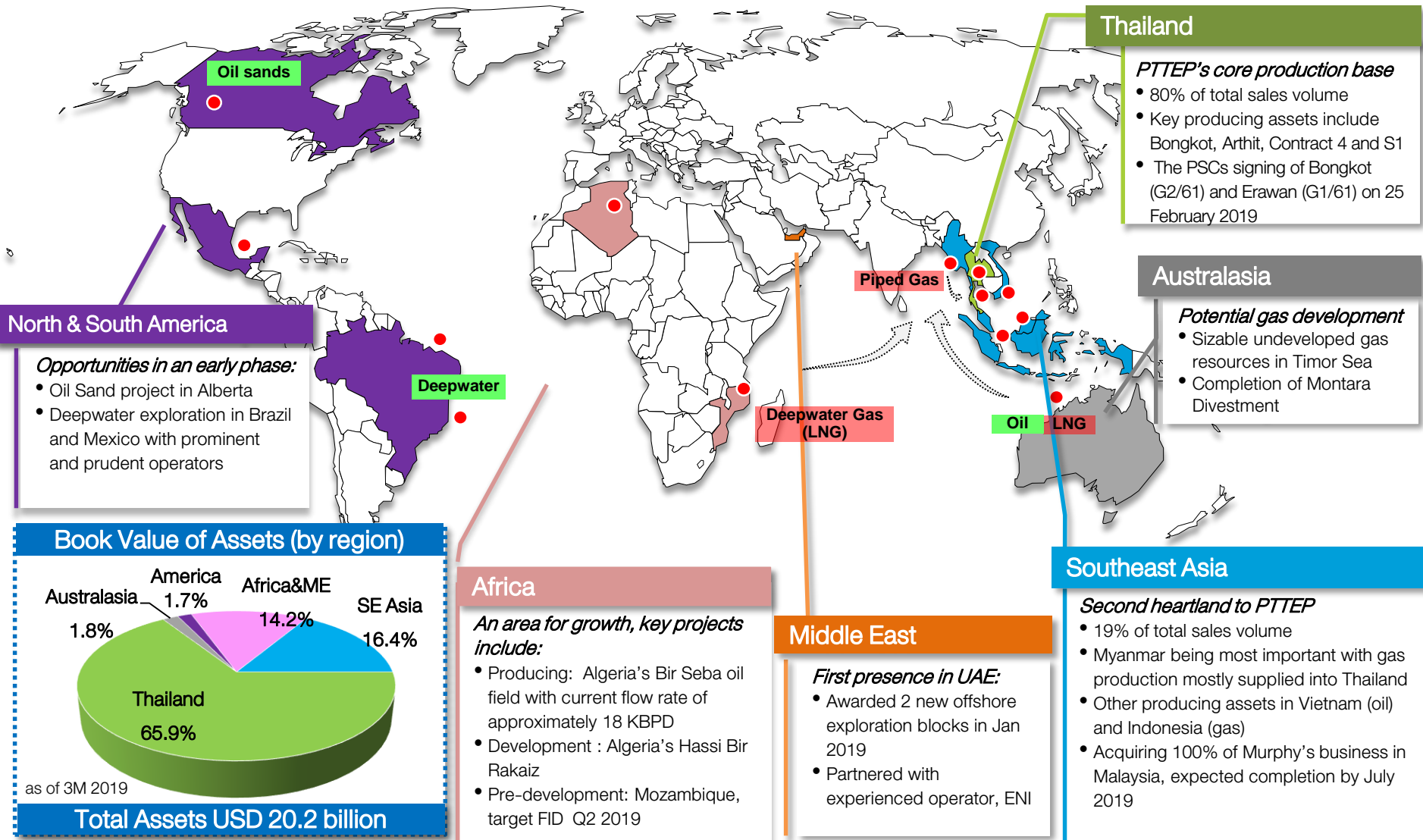
2018 by Product Type



* Based on total production of natural gas, condensate, and crude oil (including LPG) of 359 KBOED for the year ended December 31, 2018

Diversified international portfolio

Worldwide operations: 46 projects* in 12 countries



* Including G1/61 and G2/61 projects, which production starting in 2022/2023. Excluding Murphy and Partex acquisition

Thailand and other Southeast Asia

Coming home to maintain strong foundation with full expertise

Thailand

Bongkot (66.6667% WI)

- Average natural gas and condensate sales volume of 709 MMSCFD and 19 KBPD in 3M2019

S1 (100% WI)

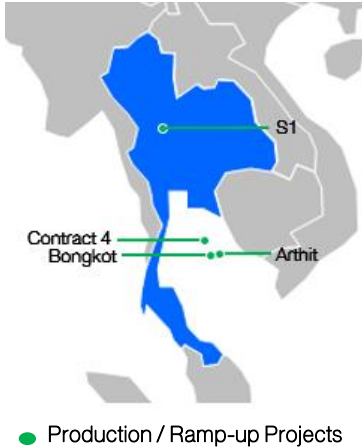
- The largest onshore crude oil production field in Thailand with 3M2019 average crude oil sales volume of 30 KBPD

Arthit (80% WI)

- Average sales volume in 3M2019 was 242 MMSCFD of natural gas and 11 KBPD of condensates

Contract 4 (60% WI)

- Average sales rate of 408 MMSCFD for natural gas and 18 KBPD for condensate in 3M2019



Myanmar



- 3 producing gas fields supplying gas to both Thailand and Myanmar: Yadana, Yetagun, and Zawtika
- Operate Zawtika project, brought online in March 2014 with current gas supply of 290 MMSCFD in 3M2019
- Significant exploration acreage both onshore and offshore in the Moattama Basin

Project Status

Producing

- Yadana (25.5% WI)
- Yetagun (19.3% WI)
- Zawtika (80% WI)

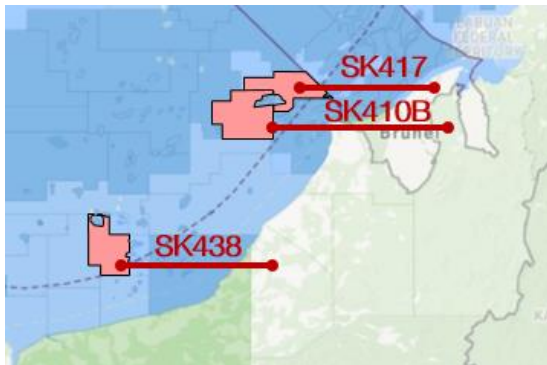
Appraisal

- M3 (80% WI)

Exploration

- MOGE 3 (75% WI)
- M11 (100% WI)
- MD-7 (50% WI)

Sarawak Basin, Malaysia



PTTEP's Block: SK410B (42.5%), SK417 (80%) and SK438 (80%) with operatorship

Location: Sarawak Basin, Malaysia

Characteristic: Shallow-water with low operational risk

Exploration Strategy:

- Expect exploration drilling activities during 2019-2021
- "Cluster Model" synergy operations within basin to optimize costs
- In place production infrastructure in nearby area

Note. WI = working interest

Summary of Terms from Bidding Result of Bongkot and Erawan and PSC Model

Price Formula

Pricing Formula: $Pr_{(y)} = Pc \times M_{(y)} \times \left(a \frac{PPI_{(y)}}{PPI} + \frac{I_{(y)}}{I} \left\{ b \frac{OM_{(y)}}{OM} + c \frac{DB_{(y)}}{DB} + d \right\} \right)$

$DB_{(y)} < 52$	$M = 0.91 + 0.11 \frac{DB_y}{52}$
$52 \leq DB_{(y)} < 100$	$M = 1.02 - 0.15 \frac{DB_y - 52}{48}$
$DB_{(y)} > 100$	$M = 0.22 + 6.44 \times \frac{1}{\sqrt{DB_y}}$

Whereas:

Pr : Gas Price
Pc : Price Constant
I : Exchange rate
PPI : Producer Price Index
OM: PPI for Oil Machinery and Tools
DB: Dubai oil price

Base year numbers (2016): PPI = 101.4167 I = 35.3 THB/USD OM = 214.88 DB = 41.27\$/BBL

$Pr_{(y)} = 116 \times M_{(y)} \times \left(0.25 \frac{PPI_{(y)}}{101.4167} + \frac{I_{(y)}}{35.3} \left\{ 0.3 \frac{OM_{(y)}}{214.88} + 0.4 \frac{DB_{(y)}}{41.27} + 0.05 \right\} \right)$

Terms

	G2/61 (Bongkot)	G1/61 (Erawan)
Price Constant	116 THB per MMBTU	116 THB per MMBTU
Contractor's Profit Split	30%	32%
Bonuses	Signature Bonus* 1,050 MMTHB Production Bonus** 1,575 MMTHB Supporting Contribution 7 MMTHB Other benefits 685 MMTHB	Signature Bonus* 1,050 MMTHB Production Bonus** 1,575 MMTHB Supporting Contribution 7 MMTHB Other benefits 35 MMTHB
Thai Employee Ratio	99%	98%
Facility Bonus***	175 MMTHB	350 MMTHB

Remark of payment terms:

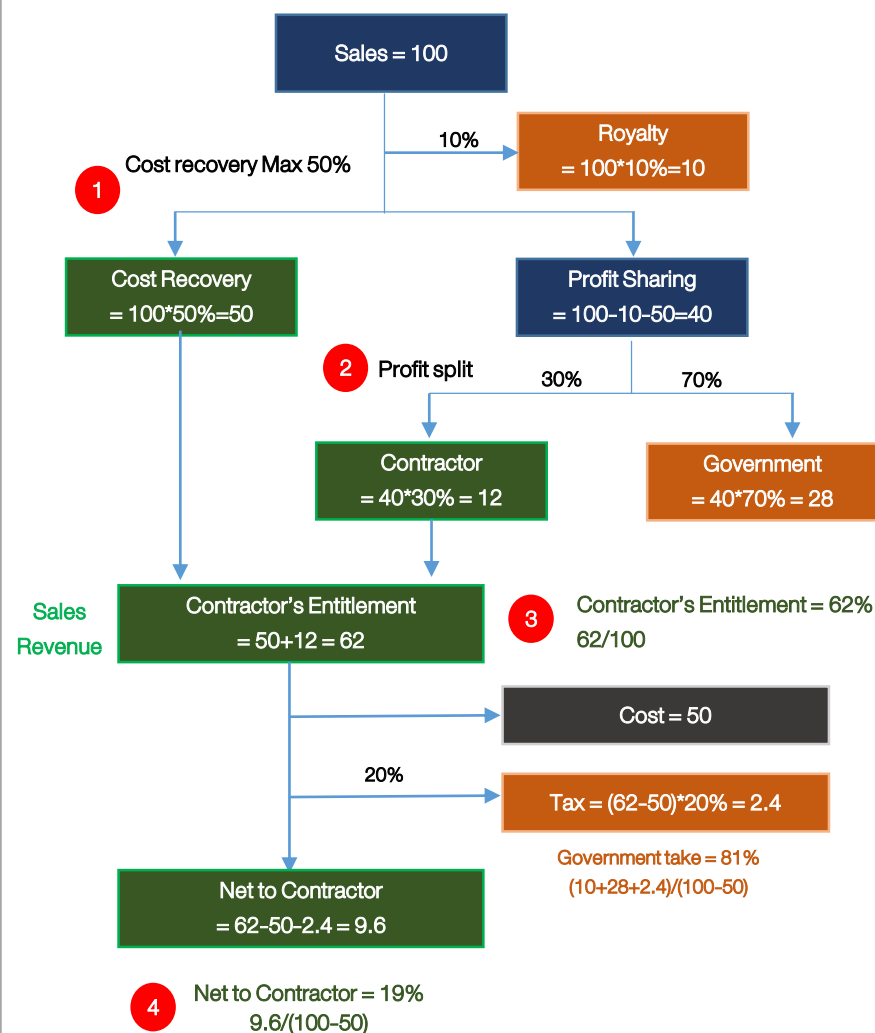
* No later than 10 working days prior to the PSC signing date

** Each time the cumulative production/sales reaches 100, 200 and 300 MMBOE

*** Equally separate into 3 payments by 24th April of every year from 2022

Source: Press release from Department of Mineral Fuels (13 December 2018) and TOR

PSC Model



*Assumption bases on field life, cost can be fully recovered

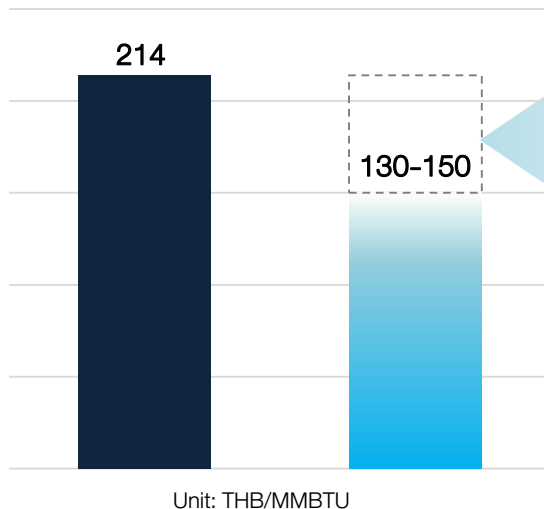
Bongkot and Erawan: Thailand Champion in Domestic Gas Supply

Achievable cost optimization to sustain target return

With new gas price, we can achieve target IRR

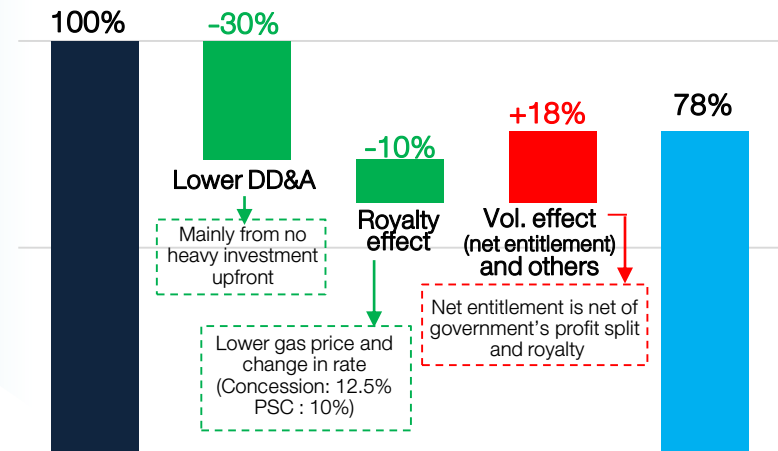
Gas price

Under Price Constant of 116 THB/MMBTU,
Gas price 130-150 THB/MMBTU (Dubai 60-80 \$/BBL)



Cost optimization

Major processing facilities already in-place. Unit cost lowered by 22% through cost synergy and optimization



Enablers of cost synergy and optimization through economy of scale and technology improvement



Wellhead Platform

- Lean design standardization
- Volume bundling & contracting strategy
- Platform topside and facility reuse



Drilling & Well

- Implement factory drilling
- Utilize drilling rig with GoT-fitted specifications
- Optimize drilling rig & service contracts across GoT



Logistics

- Synergy and optimize marine and aviation fleets across GoT
- Procurement strategy



Decommissioning

- Innovative solutions / technologies
- Economy of Scales

Acquisition of Murphy's Business: Investment Rationale (1/2)

Strategically fit and value accretive

Coming Home Strategy



Focus area with expertise in the subsurface, business and regulations aspects



Strong Partnership

Reinforce strong partnership with Petronas

Prolific Area



Malaysia as the 2nd Largest country to hold remaining resources in SEA, 6.6 bn BOE with gas as a majority, Largest LNG exporter in SEA



Deepwater Capabilities

Enhance deep water capability to support future developments

Synergy (Establish Cluster Model)



Performance enhancement via operational synergy and best practice sharing across region



Growing Platform

Build an anchor position to further expansion in SEA from over 20 years experiences in Malaysia



Diversified Portfolio

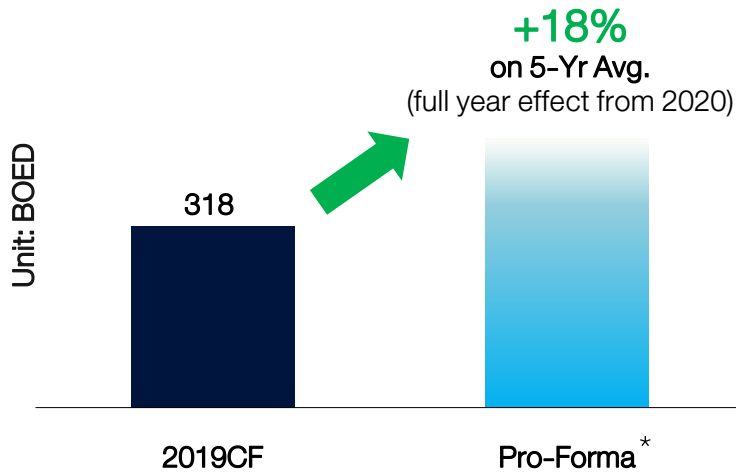
- Short and long term contributions
 - Immediate revenue stream, production, and reserves
 - Upside from promising exploration blocks
- Self-funding with cash flow generated from producing assets
- Gas supply to LNG market via MLNG and PFLNG2, not cap by domestic demand



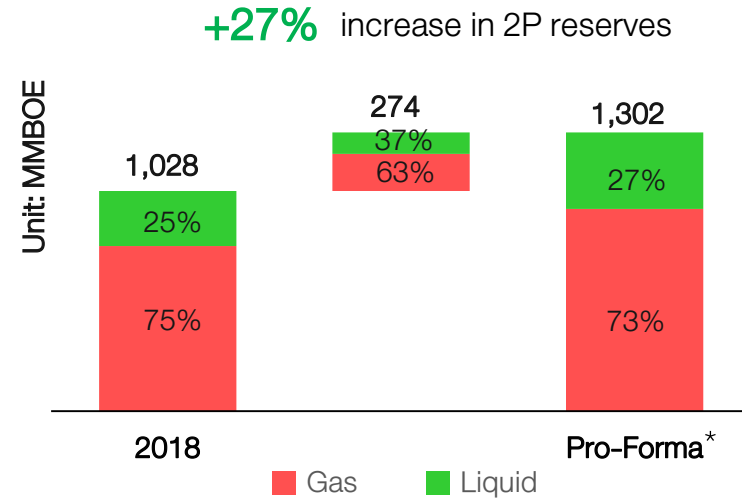
Acquisition of Murphy's Business: Contributions to PTTEP's Portfolio (2/2)

Boost financial performance with valuable human resources

Net Sales Volume



Proved and Probable Reserves (2P)



Self funding from
producing assets

Immediate cashflow
and production

EBITDA margin remains
strong at 70-75%

Valuable human resources
with experiences and
operational capabilities

*Excluding G1/61 and G2/61 project.

Other South East Asia

Expanding foothold in the region

Vietnam and Indonesia

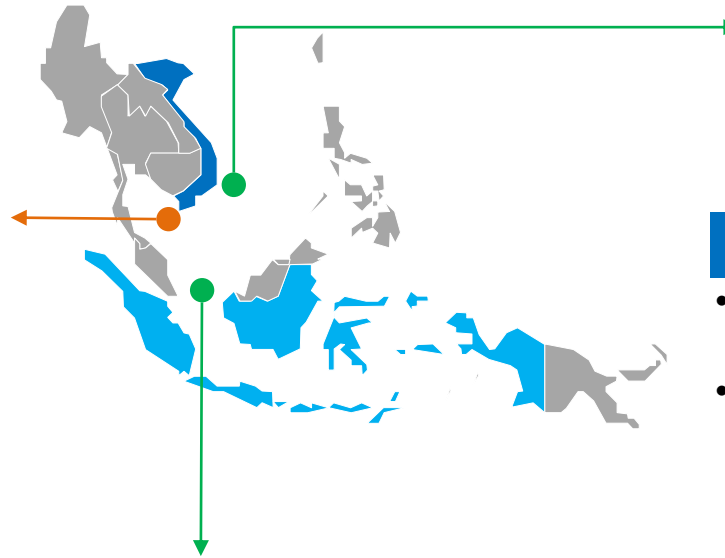


Southwest Vietnam

- Vietnam B & 48/95 (8.5% WI)
- Vietnam 52/97 (7% WI)

- Field Development Plan was approved by Government
- The project is currently in the negotiation process on commercial terms to put forward FID
- First production target by end of 2022, and ramp up to full capacity of 490 MMSCFD

- Production projects
- Pre sanction projects



Vietnam 16-1 (28.5% WI)

- Average sales volume of crude oil was 17 KBPD in 3M2019
- The project is preparing further production drilling plan aiming to maintain production plateau.

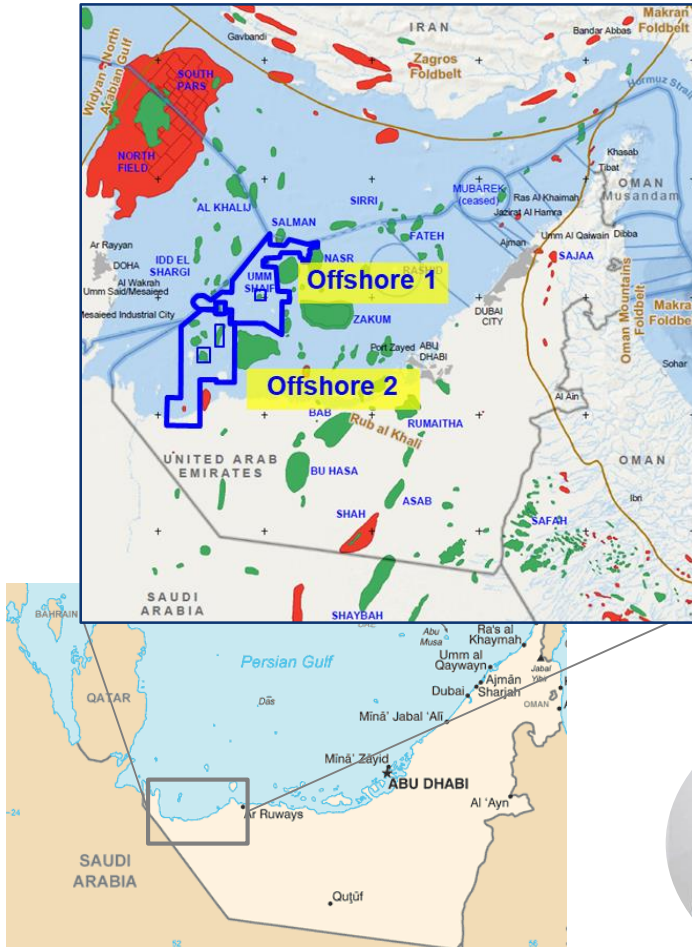


Natuna Sea A (11.5% WI)

- Average sales volume of natural gas was 226 MMSCFD in 3M2019

The Middle East : United Arab Emirates

"Partnering" to JV with prudent operators in prolific low cost area



Project Overview

PTTEP's Block	Abu Dhabi Offshore 1	Abu Dhabi Offshore 2
Location	North-west of Abu Dhabi Emirates, United Arab Emirates	
Characteristics	Shallow water	
Partners (exploration phase)	ENI 70% (Operator) PTTEP 30%	
Exploration Strategy	<ul style="list-style-type: none"> Joined hand with prudent operators UAE still has high potential prospective resources with significant sizeable discoveries 	

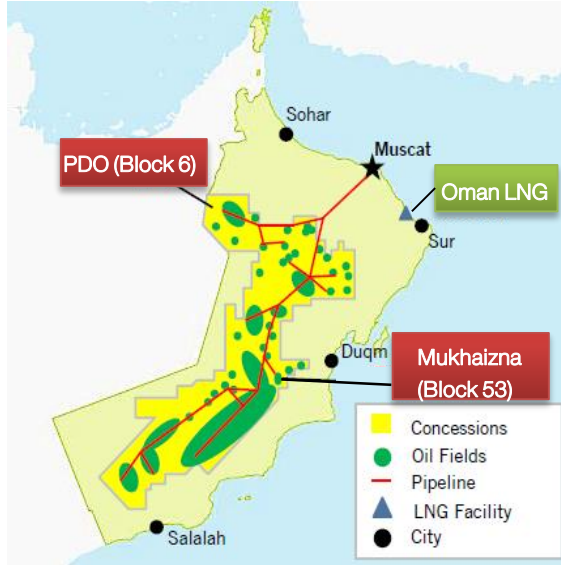


The award of Abu Dhabi Offshore Exploration Blocks 1 & 2 on 12th January 2019

Acquisition of Partex Holding B.V.

Access to the largest oil asset in Oman and world-class Midstream Complex

Oman



PDO (Block 6)

- Largest asset covering around 1/3 of the country
- Long-life asset, produced only 15% of reserves in-place
- Multi-field oil production: 610,000 BPD (70% of Oman production)
- Experienced and reputable partners



Mukhaizna (Block 53)

- Largest single onshore producing field in Oman
- Oil production: 120,000 BPD (13% of Oman production)
- Strong and experienced operator

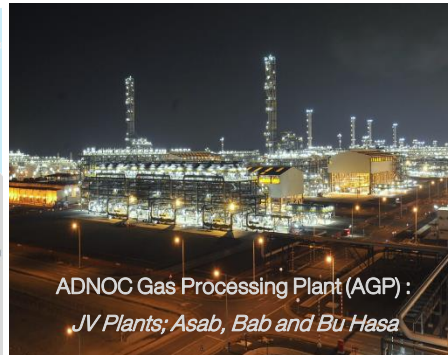
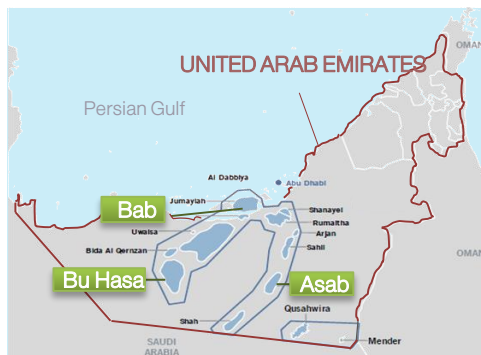


Oman LNG

- The only LNG facility in Oman
- Processing capacity 10.4 MTPA
- Contracted LNG sales to international buyers: Japan and South Korea



UAE



ADNOC Gas Processing (AGP)

- One of the largest gas processing complexes in the world (total capacity of 8 BCFD)

JV: 3 plants with capacity of 1.2 BCFD

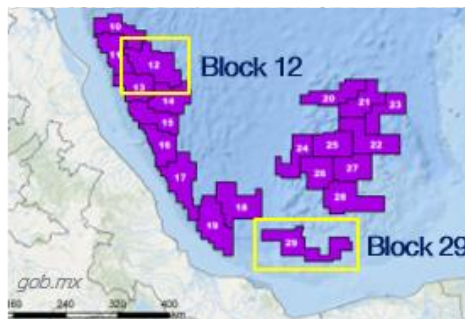
Adnoc: 2 plants with capacity of 6.9 BCFD

- Essential to Abu Dhabi and UAE's economy
- Sizeable volumes of Propane, Butane and Naphtha offtake
- Strong and experienced partners



-- Entry into high potential petroleum province at exploration phase --

Gulf of Mexico, Mexico



PTTEP's Block: Block 12 (20%) and Block 29 (16.67%), as non-operating partner

Location: Mexican Ridges Basin for Block 12 and Campeche Basin for Block 29

Characteristic: Deep-water with high petroleum potentials and attractive fiscal regime

Exploration Strategy:

- Joined hand with prudent operators being Petronas and Repsol
- Mexico still has high potential prospective resources with significant sizeable discoveries

Deep Water Brazil



Barreirinhas AP1

- Farm-in 25% from BG Group in 2014
- Operated by Shell Brasil (65% interest)
- Four offshore exploration blocks: BAR-M-215, BAR-M-217, BAR-M-252 and BAR-M-254
- Completed 3D seismic activities and is in the process of assessing the petroleum potential

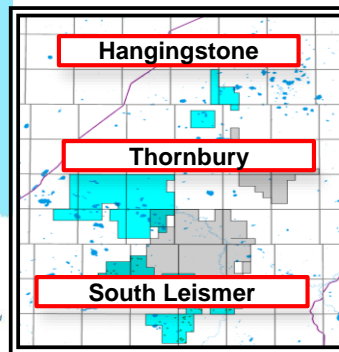
BM-ES-23

- Acquired 20% interest from Shell in Q3 2014
- Partnered with Petrobras (65%, operator) and INPEX (15%)

Canada Oil Sands



Mariana Oil Sands Project



Project Overview

- Operates 100% interest of the Thornbury, Hangingstone and South Leismer (THSL) areas (exploration and appraisal phase)
- Potential large resource base with over a billion barrel
- In Q3 2017, the Company revised the project's development plan which involves delaying the project's Final Investment Decision, to reflect results from the assessment of the industry and commercial feasibility studies

LNG Value Chain Investment : MLNG Train 9



First step into midstream LNG business in strategic area of focus

10% Investment in MLNG Train 9 by PTT Global LNG....

....continue to look for more LNG opportunities globally



MLNG Train 9 – Overview

Location	Bintulu, Sarawak, Malaysia	
Asset	Liquefaction Train 9 Tank 7	
Phase	Commercial: Jan 2017	
Capacity	3.6MTPA	
Contract Life	20 years	
Partners (subject to closing)	<div> <div>Petronas</div> <div>80%</div> </div> <div> <div>JX Nippon</div> <div>10%</div> </div> <div> <div>PTT Global LNG</div> <div>10%</div> </div>	  

Investment Rationales

- Capture opportunity from increasing LNG demand as a supplement to Thailand gas production
- Venture into midstream LNG as a mean to secure LNG supply and growth of PTT and PTTEP, as well as capture value added along with LNG value chain
- Low risk and highly market secured opportunity
 - Highly experienced operator
 - Already commenced commercial production with immediate revenue stream
- In vicinity of future upstream opportunities in focus area – offshore Sarawak

New Business Opportunities

Expand value chain, create innovation and step towards long-term sustainability

"Integrated Energy Solution"



E&P



Pipeline



Power Plant

- Enhance value of existing assets in Myanmar e.g. Zawtika, M3
- Support Myanmar pipeline infrastructure development
- Partner with Independent Power Producer (IPP)

"Cutting Edge Technology for E&P and more"



UAV



Aerial inspection service:

- Flare Tower
- Telecommunication Tower
- Tank inspection

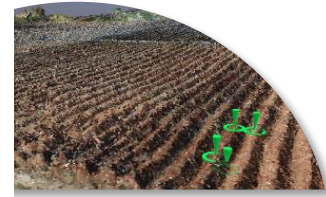
AUV



Subsea Inspection & Surveillance:

- Pipeline and structural inspection
- Geophysical survey
- Gas leak survey

Non
E&P



Focused Sectors:

- Agriculture
- Environmental
- Security

Remark: UAV is Unmanned Aerial Vehicle. AUV is Autonomous Underwater Vehicle.

Project information 1/4

Production phase: Thailand and JDA

	Project	Status*	PTTEP's Share	Partners (as March 2019)	3M2019 Average Sales Volume **		2019 Key Activities
					Gas	Oil and Other	
Production Phase							
Thailand and JDA							
1	Arthit	OP	80%	Chevron MOECO 16% 4%	242 MMSCFD	Condensate: 11 k BPD	<ul style="list-style-type: none">• Ensure gas deliverability level at DCQ***• Install wellhead platforms• Drill development wells
2	B6/27	OP	100%		-	-	
3	B8/32 & 9A		25%	Chevron MOECO KrisEnergy Palang Sophon 51.66% 16.71% 4.63% 2%	73 MMSCFD	Crude: 24 k BPD	<ul style="list-style-type: none">• Drill development wells• Perform waterflood activities
4	Bongkot	OP	66.6667%	TOTAL 33.3333%	709 MMSCFD	Condensate: 19 k BPD	<ul style="list-style-type: none">• Maintained production level as planned• Drill development wells• Awarded as a sole operator under PSC (after concession-end in 2022/2023)
5	Contract 3 (Formerly Unocal III)		5%	Chevron MOECO 71.25% 23.75%	603 MMSCFD	Crude: 20 k BPD Condensate: 16 k BPD	<ul style="list-style-type: none">• Drill development wells• Prepare for decommissioning activities• Awarded as a sole operator for Erawan field (Contract 1, 2 and 3) under PSC (after concession-end in 2022)
6	Contract 4 (Formerly Pailin)		60%	Chevron MOECO 35% 5%	408 MMSCFD	Condensate: 18 k BPD	<ul style="list-style-type: none">• Ensure gas deliverability level at DCQ***• Drill development wells• In process of pre-development of Ubon field
7	E5		20%	ExxonMobil 80%	9 MMSCFD	-	<ul style="list-style-type: none">• Ensure gas deliverability level at DCQ***
8	G4/43		21.375%	Chevron MOECO Palang Sophon 51% 21.25% 6.375%	1.5 MMSCFD	Crude: 2 k BPD	<ul style="list-style-type: none">• Drill development wells• Perform waterflood activities
9	G4/48		5%	Chevron MOECO 71.25% 23.75%	2 MMSCFD	Crude: 0.9 k BPD	<ul style="list-style-type: none">• Drill development wells
10	L53/43 & L54/43	OP	100%		-	Crude: 1.5 k BPD	<ul style="list-style-type: none">• Maintain production plateau• Perform reservoir management and waterflood activities
11	PTTEP1	OP	100%		-	Crude: 240 BPD	<ul style="list-style-type: none">• Maintain production plateau• Perform reservoir management and waterflood activities
12	S1	OP	100%		9 MMSCFD	Crude: 30 k BPD LPG: 0.2 k MT/D	<ul style="list-style-type: none">• Drill development wells• Enhance oil recovery program includes waterflood, hydraulic fracturing and artificial lift

* Status: OP = PTTEP operatorship / JOC = PTTEP joint operatorship

** Sales volume stated at 100% basis.

*** DCQ = Daily Contractual Quantity

Project information 2/4

Production phase: Overseas



	Project	Status*	PTTEP's Share	Partners <i>(as of March 2019)</i>		3M2019 Average Sales Volume **		2019 Key Activities
						Gas	Oil and Other	
Production Phase								
13	Sinphuhorm	OP	55%	Apico**** ExxonMobil	35% 10%	95 MMSCFD	Condensate: 320 BPD	<ul style="list-style-type: none">• Ensure gas deliverability• Improve recovery from infill drilling
14	L22/43	OP	100%			-	-	<ul style="list-style-type: none">• Maintain production operation
15	MTJDA	JOC	50%	Petronas-Carigali	50%	341 MMSCFD	Condensate: 10 k BPD	<ul style="list-style-type: none">• Drill exploration and development wells
Overseas								
16	Vietnam 9-2	JOC	25%	PetroVietnam SOCO	50% 25%	13 MMSCFD	Crude: 2.8 k BPD	<ul style="list-style-type: none">• Maintain production level• Perform well intervention program
17	Vietnam 16-1	JOC	28.5%	PetroVietnam SOCO OPECO	41% 28.5% 2%	5.6 MMSCFD	Crude: 17 k BPD	<ul style="list-style-type: none">• Maintain production level• Drill development wells and water injection well• Upgrade gas lift system
18	Natuna Sea A		11.5%	Premier Oil KUFPEC Petronas Pertamina	28.67% 33.33% 15% 11.5%	226 MMSCFD	Crude: 1.6 k BPD	<ul style="list-style-type: none">• Well intervention program to secure Gas Deliverability• Drill development wells
19	Yadana		25.5%	TOTAL Chevron MOGE	31.24% 28.26% 15%	798 MMSCFD	-	<ul style="list-style-type: none">• Drill infill wells• Perform 3D seismic activities• Ensure gas deliverability level at DCQ***
20	Yetagun		19.3178%	Petronas-Carigali MOGE Nippon Oil PC Myanmar (Hong Kong)	30.00140% 20.4541% 19.3178% 10.90878%	126 MMSCFD	Condensate: 2.3 k BPD	<ul style="list-style-type: none">• Maintain production level• Drill exploration and development wells• Perform 3D seismic activities
21	Zawtika (M9 & a part of M11)	OP	80%	Myanma Oil and Gas Enterprise (MOGE)	20%	290 MMSCFD	-	<ul style="list-style-type: none">• Drill 3 exploration wells• Drill development wells• Perform 3D seismic activities• Prepare to Install wellhead platforms
22	Algeria 433a & 416b (Bir Seba)	JOC	35%	PetroVietnam Sonatrach	40% 25%	-	Crude: 4.4 k BPD <i>(net entitlement)</i>	<ul style="list-style-type: none">• Drill development wells• Plan for BRS Phase 2 oil field development

* Status: OP = PTTEP operatorship / JOC = PTTEP joint operatorship

** Sales volume stated at 100% basis except for Algeria 433a & 416b

*** DCQ = Daily Contractual Quantity

**** PTTEP holds indirectly and directly 66.8% participating interest in Sinphuhorm Project. APICO also holds 100% participating interest in Block L15/43 and Block L27/43.

Project information 3/4

Exploration/Development phase

	Project	Status*	PTTEP's Share	Partners (as of March 2019)	2019 Key Activities
Exploration/Development Phase					
Thailand and JDA					
23	G9/43	OP	100%		-
24	G1/61 (Erawan)	OP	60%	MP G2 (Thailand) Limited 40%	• The PSC signing on 25 February 2019 (start production in 2022)
25	G2/61 (Bongkot)	OP	100%		• The PSC signing on 25 February 2019 (Start production in 2022 and 2023)
Overseas					
26	Myanmar M3	OP	80%	MOECO 20%	• Negotiate the commercial framework with the Myanmar government • Perform Front End Engineering Design (FEED study)
27	Myanmar M11	OP	100%		• Drill first exploration well to prove up recoverable resources
28	Myanmar MD-7	OP	50%	TOTAL 50%	• Drill first exploration well to prove up recoverable resources
29	Myanmar MOGE 3	OP	77.5%	Palang Sophon 10% MOECO 10% WinPreciousRes 2.5% ources	• Drill 3 exploration wells
30	Vietnam B & 48/95		8.5%	PVN 65.88% MOECO 25.62%	• Finalize on Commercial agreements • Finalize on Engineering Procurement Construction Installation (EPCI) bidding process
31	Vietnam 52/97		7%	PVN 73.4% MOECO 19.6%	• Finalize on Commercial agreements • Finalize on Engineering Procurement Construction Installation (EPCI) bidding process
32	Sarawak SK410B	OP	42.5%	KUFPEC 42.5% Petronas-Carigali 15%	• Drill 1 appraisal well
33	Sarawak SK417	OP	80%	Petronas-Carigali 20%	• Prepare to drill exploration and appraisal wells
34	Sarawak SK438	OP	80%	Petronas-Carigali 20%	• Drill 1 exploration well and 1 appraisal well
35	PM407	OP	55%	Petronas 45%	• Signed PSC with Petronas on 21/03/2019
36	PM415	OP	70%	Petronas 30%	

* Status: OP = PTTEP operatorship / JOC = PTTEP joint operatorship

Project information 4/4

Exploration/Development phase

	Project	Status*	PTTEP's Share	Partners (as of March 2019)	2019 Key Activities
Exploration/Development Phase					
Overseas					
37	PTTEP Australasia (PTTEP AA)	OP	90%-100% (varied by permits)		<ul style="list-style-type: none"> Completed Montara Field Divestment to Jadestone on 28 Sep 2018 Drill exploration well in AC/P54
38	Mozambique Area 1		8.5%	Anadarko, Mitsui, 26.5%, 20% ENH, ONGC 15%, 10% Beas Rovuma, Bharat 10%, 10%	<ul style="list-style-type: none"> Prepare work to support Final Investment Decision (FID) targeted in 1H 2019 including LNG marketing and finalize remaining commercial contracts together with project finance
39	Algeria Hassi Bir Rekaiz	OP	24.5%	CNOOC 24.5% Sonatrach 51%	<ul style="list-style-type: none"> Finalize on Engineering Procurement and Construction (EPC) Drill development wells
40	Mariana Oil Sands	OP	100%		<ul style="list-style-type: none"> Assess appropriated development approach
41	Barreirinhas AP1		25%	Shell Brasil 65% Mitsui E&P Brasil 10%	<ul style="list-style-type: none"> Assess petroleum potential
42	Brazil BM-ES-23		20%	Petrobras 65% INPEX 15%	<ul style="list-style-type: none"> Assess petroleum potential
43	Mexico block 12 (2.4)		20%	PC Carigali Mexico 60% Ophir Mexico 20%	<ul style="list-style-type: none"> G&G study to access petroleum potential
44	Mexico block 29 (2.4)		16.67%	Repsol Mexico 30% PC Carigali Mexico 28.33% Sierra Nevada 25%	<ul style="list-style-type: none"> G&G study to access petroleum potential
45	Abu Dhabi Offshore 1		30%	Eni Abu Dhabi 70%	<ul style="list-style-type: none"> Conduct Seismic
46	Abu Dhabi Offshore 2		30%	Eni Abu Dhabi 70%	<ul style="list-style-type: none"> Conduct Seismic and drill exploration & appraisal wells

* Status: OP = PTTEP operatorship / JOC = PTTEP joint operatorship

Projects from Murphy Malaysia Acquisition

Project Details (1/2)



	Project		Working Interest		Oi/Gas	Covering Area (km ²)	2018 Net Sales Volume
<u>Producing Phase</u>							
1	SK309 & SK311		PTTEP HKO* 59.5% (Operator) Pertamina 25.5% Petronas 15%		Oil and Gas	903.7	Oil 13,000 BPD Gas 105 MMSCFD (equivalent to 30,000 BOED)
			<u>For East Patricia field</u> PTTEP HKO* 42% (Operator) Petronas 40% Pertamina 18%			13	
2	Sabah K	Kikeh	PTTEP HKO* 56% (Operator) Petronas 20% Pertamina 24%		Oil	247	Oil 17,000 BPD Gas 6 MMSCFD (equivalent to 18,000 BOED)
		Siakap North-Petai (SNP)	Shell 24% Conoco Phillip 24% PTTEP HKO* 22.4% (Operator) Petronas 20% Pertamina 9.6%		Oil	10.5	
		Gumusut-Kakap (GK)	Shell 29.1% (Operator) Conoco Phillips 29.1% Petronas 16.8% PTTEP HKO* 6.4% Pertamina 2.7% Brunei contractors 15.9%		Oil	4	

* PTTEP's Post-acquisition positions, expected completion by the second quarter of 2019 and subject to customary consents and regulatory approvals

Projects from Murphy Malaysia Acquisition

Project Details (2/2)



	Project	Working Interest		Oi/Gas	Covering Area (km²)	2018 Net Sales Volume
Development Phase						
3	Sabah H	Rotan Field PTTEP HKO* 56% (Operator) Petronas 20% Pertamina 24%		Gas	17.6	Expected first gas in 2H 2020, ramping up to full capacity at 270 MMSCFD. Net sales volume to be 130 MMSCFD or equivalent to 22,000 BOED
		Remaining Area PTTEP HKO* 42%(Operator) Petronas 40% Pertamina 18%			2,693.8	
Exploration Phase						
4	SK314A	PTTEP HKO* 59.5% (Operator) Pertamina 25.5% Petronas 15%		Oil/Gas	1,975	N/A
5	SK405B	PTTEP HKO* 59.5% (Operator) MOECO 25.5% Petronas 15%		Oil/Gas	2,305	N/A

* PTTEP's Post-acquisition positions, expected completion by the second quarter of 2019 and subject to customary consents and regulatory approvals

Projects from Partex's Acquisition

Project Details (1/2)

	Country	Project	Working Interest	Type of Asset/ Status	2018 Total Production volume	2018 Net Sale volume
1	Sultanate of Oman	PDO (Block 6)	Government of Oman 60% Shell 34% Total 4% Partex 2% <i>PDO* (Joint Operating Company)</i>	Upstream Oil <i>Production</i>	610,000 BPD	12,200 BPD
2		Mukhaizna (Block 53)	Occidental* 47% OOCEP 20% Indian Oil 17% Mubadala 15% Partex 1%	Upstream Oil <i>Production</i>	120,000 BPD	700 BPD
3		Oman LNG	Government of Oman 51% Shell 30% Total 5.54% Korea LNG 5% Mitsubishi 2.77% Mitsui 2.77% Partex 2% Itochu 0.92% <i>OLNG* (Joint Operating Company)</i>	Midstream LNG <i>Production capacity 10.4 MTPA</i>	N/A	N/A
4	Republic of Kazakhstan	Dunga	Total* 60% OOCEP 20% Partex 20%	Upstream Oil <i>Production</i>	15,000 BPD	3,000 BPD

* Operator

Projects from Partex's Acquisition

Project Details (2/2)

	Country	Project	Working Interest		Type of Asset	2018 Total Production volume	2018 Net Sale volume
5	United Arab Emirates	AGP	ADNOC*	68%	Midstream Gas <i>Production Processing capacity 1.2 BCFD</i>	N/A	N/A
			Shell	15%			
			Total	15%			
			Partex	2%			
6	Republic of Angola	Block 17/06	Total*	30%	Upstream Oil <i>Pre-Development</i>	N/A	N/A
			Sonangol	30%			
			SSI	27.5%			
			Acrep	5%			
			Falcon Oil	5%			
			Partex	2.5%			
7	Federative Republic of Brazil	Potiguar	Partex*	50%	Upstream Oil <i>Production</i>	300 BPD	150 BPD
			Petrobras	50%			

* Operator

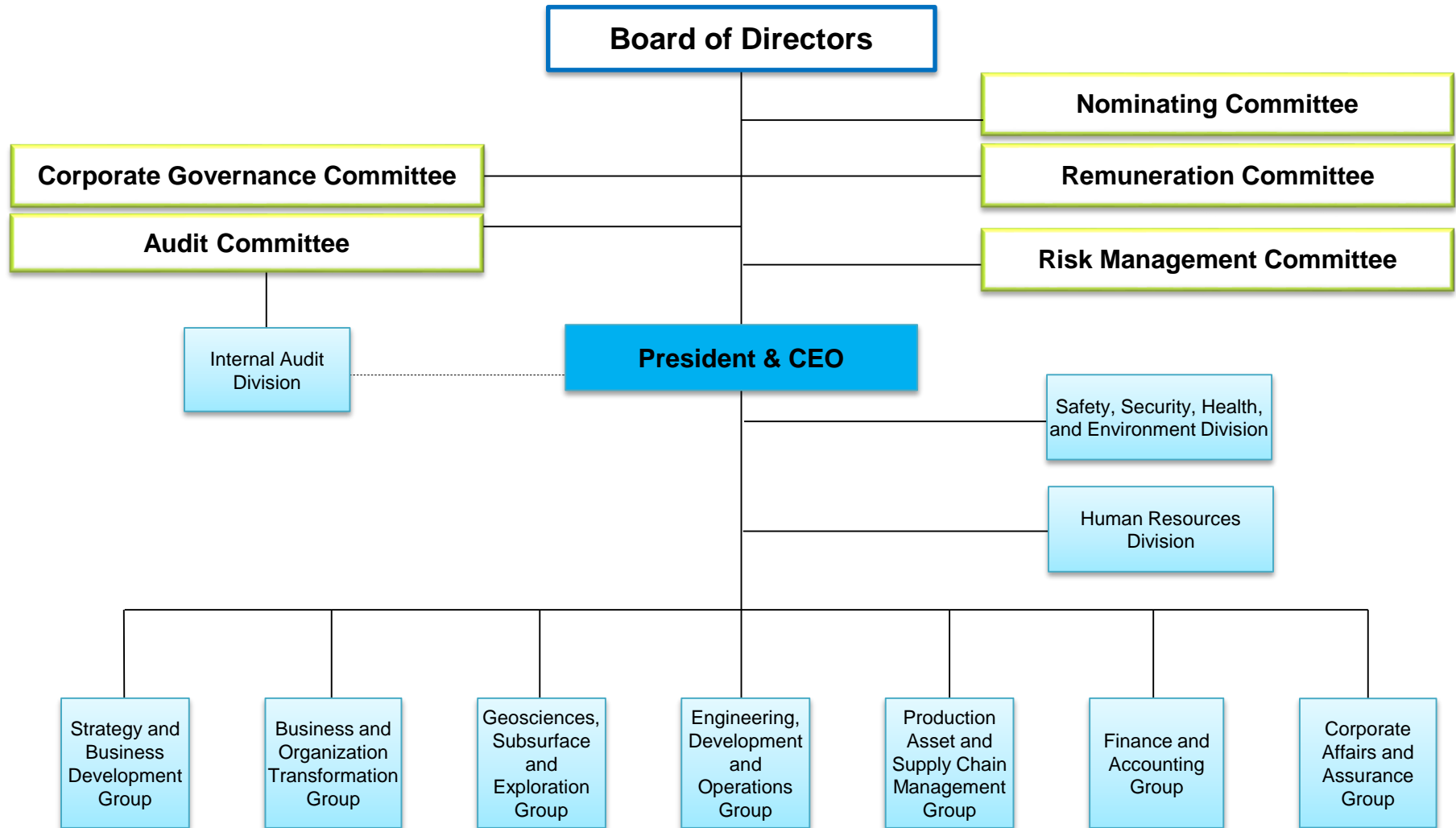
Note:

PDO: Petroleum Development Oman
 OLNG: Oman LNG L.L.C.
 OOCEP: Oman Oil Company Exploration & Production LLC
 ADNOC: Abu Dhabi National Oil Company
 SSI: Sonangol Sinopec International (SSI) Seventeen Limited

BPD: Barrel per Day
 BCFD: Billion Cubic Feet per Day
 MTPA: Million Ton per Annum

Organization structure

Ensuring transparency, integrity and good corporate governance



Ratio	Formula
Lifting Cost (\$/BOE)	$(\text{Operating Exp.} - \text{Transportation Cost} - \text{Stock Variation} - \text{Other expenses not related to lifting}) / \text{Production Volume}$
Cash Cost (\$/BOE)	$(\text{Operating Exp.} + \text{Exploration Exp.} + \text{G\&A} + \text{Royalties} + \text{Finance Cost}) / \text{Sales Volume}$
Unit Cost (\$/BOE)	$(\text{Operating Exp.} + \text{Exploration Exp.} + \text{G\&A} + \text{Royalties} + \text{Finance Cost} + \text{DD\&A}) / \text{Sales Volume}$
Reserves Replacement Ratio	$5\text{-Yr Additional Proved Reserves} / 5\text{-Yr Production Volume}$
Reserves Life Index (Year)	$\text{Proved Reserves} / \text{Production Volume}$
Success Ratio	$\text{Number of wells with petroleum discovery} / \text{Total number of exploration and appraisal wells}$
Sales Revenue	$\text{Sales} + \text{Revenue from pipeline transportation}$
EBITDA	$(\text{Sales} + \text{Revenue from pipeline transportation}) - (\text{Operating expenses} + \text{Exploration expenses} + \text{Administrative expenses} + \text{Petroleum royalties and remuneration} + \text{Management's remuneration})$
EBITDA Margin	$\text{EBITDA} / \text{Sales Revenue}$
Return on Equity	$\text{Trailing-12-month net income} / \text{Average shareholders' equity between the beginning and the end of the 12-month period}$
Return on Capital Employed	$(\text{Trailing-12-month net income} + \text{Trailing-12-month Interest Expenses \& Amortization of Bond Issuing Cost}) / (\text{Average shareholders' equity and average total debt between the beginning and the end of the 12-month period})$
Simple Effective Tax Rate	$\text{Income tax expenses} / \text{Income before income taxes}$
Total debt	$\text{Short-term loans from financial institution} + \text{Current portion of long-term debts} + \text{Bonds} + \text{Long-term loans from financial institution}$
Net debt	$\text{Total debt} - \text{Liquidity}$
Debt to Equity	$\text{Total debt} / \text{Shareholders' equity}$
Net Debt to Equity	$\text{Net debt} / \text{Shareholders' equity}$
Total Debt to Capital	$\text{Total debt} / (\text{Total debt} + \text{Shareholders' equity})$
Total Debt to EBITDA	$\text{Total debt} / \text{Trailing-12-month EBITDA}$
Net Debt to EBITDA	$\text{Net debt} / \text{Trailing-12-month EBITDA}$
EBITDA Interest Coverage Ratio	$\text{Trailing-12-month EBITDA} / \text{Trailing-12-month Interest Expenses \& Amortization of Bond Issuing Cost}$