

HOLD (Unchanged)

Change in Numbers

TP: Bt 159.00 (From: Bt 161.00)

Downside : 5.4%

5 OCTOBER 2022

PTT Exp & Production Pcl (PTTEP TB)

As good as it gets

We maintain our HOLD on PTTEP but trim our TP to Bt159 from Bt161 on our lower oil price assumptions. We expect limited volume growth with lower selling prices of both oil and gas products in 2023F. We also do not see PTTEP's valuation as compelling at 1.3x 2023F P/BV.



YUPAPAN POLPORNPRASERT

662-779-9110

yupapan.pol@thanachartsec.co.th

Maintaining HOLD

We maintain our HOLD call on PTTEP expecting the end of its peak earnings cycle but with oil price-cushion factors and what we see as a fair valuation level at 1.3x 2023F P/BV. *First*, we expect a soft-landing oil price outlook with the global slowdown effect being cushioned by the continued Russia-Ukraine war and potential OPEC+ production cuts. *Second*, we expect a two-quarter oil and gas price-support factor from the upcoming winter and a potential increase in sanctions on Russia. *Third*, we still expect some volume growth of 12/3/6% in 2022-24F from an increased stake in the Erawan field, where production is being ramped up. Note that in this report we cut our earnings by 8/4% in 2023-24F on our lower oil price assumptions. Our 2023F DCF-based 12-month TP is lowered to Bt159 (from Bt161).

Lowering our oil price forecasts

While we maintain our 2022F forecast of USD101/bbl, we cut our Brent oil price assumptions by USD5/bbl to USD85/80 over 2023-24F and keep our long-term assumption of USD75/bbl. This is to reflect the weaker demand outlook due to the global slowdown. Despite our cuts, our forecasts still reflect our view of elevated oil prices compared to the pre-COVID level. We expect the global slowdown impact to be cushioned by sanctions on Russia and output management by OPEC+.

Lower average gas price

We expect PTTEP's gas selling price (72% of 2022F volume) to drop 4% y-y to USD6.1/mmbtu in 2023F due to a fall in the high-sulfur fuel oil (HSFO) market price and a higher mix of lower-priced gas output. Note that PTTEP's domestic gas price formula is one-third linked to the HSFO price with a six-to-nine-month lag, one-third to inflation, and one-third to the baht vs. the US dollar. Although inflation is higher and the baht is weaker against the US dollar, the HSFO price has fallen by 12% YTD, or 40% from its peak in April this year. A higher global refinery run rate to boost diesel output is creating a glut of HSFO. Meanwhile, Russia also diverted its HSFO into other markets given less demand from European customers. As for product mix, around 10/30% of PTTEP's 2022-23F output comes from new production-sharing contracts (PSC), where the gas price is around 40% lower for than the old concession contracts.

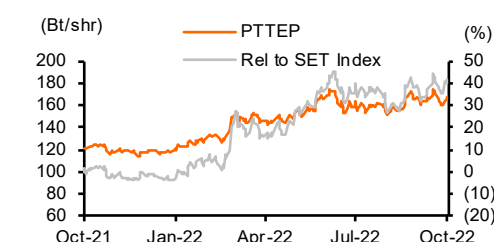
Unexciting 3Q22F profit on the cards

We estimate PTTEP's 3Q22F reported profit at Bt17.8bn, up 87% y-y but down 13% q-q. Core profit should also be down 19% q-q as the 2% increase in sales volume is offset by a 2% q-q selling price drop. We also look for unit cost to increase by 11% q-q to USD31/ BOE due to exploration well write-off amount USD30m.

COMPANY VALUATION

Y/E Dec (Bt m)	2021A	2022F	2023F	2024F
Sales	219,068	325,642	286,245	290,693
Net profit	38,864	67,694	65,879	62,045
Consensus NP	—	69,962	69,407	62,649
Diff frm cons (%)	—	(3.2)	(5.1)	(1.0)
Norm profit	43,989	77,873	65,879	62,045
Prev. Norm profit	—	79,157	71,439	64,914
Chg frm prev (%)	—	(1.6)	(7.8)	(4.4)
Norm EPS (Bt)	11.1	19.6	16.6	15.6
Norm EPS grw (%)	105.6	77.0	(15.4)	(5.8)
Norm PE (x)	15.2	8.6	10.1	10.7
EV/EBITDA (x)	4.5	3.0	3.4	3.4
P/BV (x)	1.6	1.4	1.3	1.2
Div yield (%)	3.0	3.6	4.2	4.2
ROE (%)	11.4	17.5	13.4	11.7
Net D/E (%)	7.2	12.1	9.2	8.9

PRICE PERFORMANCE



COMPANY INFORMATION

Price as of 5-Oct-22 (Bt)	168.00
Market Cap (US\$ m)	17,830.7
Listed Shares (m shares)	3,970.0
Free Float (%)	34.7
Avg Daily Turnover (US\$ m)	62.7
12M Price H/L (Bt)	174.50/113.50
Sector	Energy
Major Shareholder	PTT Pcl 63.79%

Sources: Bloomberg, Company data, Thanachart estimates

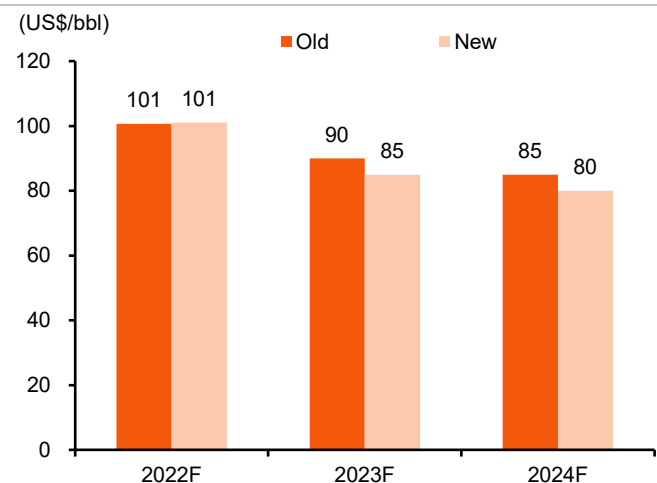
ESG Summary Report P9

Lowering our oil-price forecasts

Higher oil prices have weighed on demand

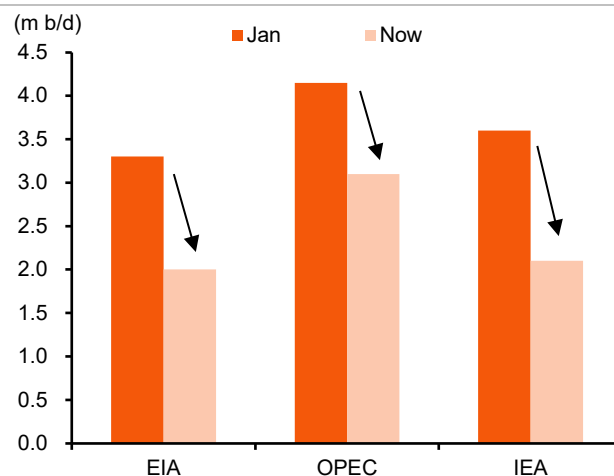
While we maintain our 2022F forecast of USD101/bbl, we cut our Brent oil price assumptions by USD5/bbl to USD85/80 over 2023-24F and keep our long-term assumption of USD75/bbl. A potential reduction in OPEC production is likely to support crude-oil prices in the short term, but recession fears are likely to be the most important factor for prices over the remainder of the year. A continued deterioration of demand in Europe and Asia as well as rising interest rates are key factors pressuring oil prices. The International Energy Agency (IEA) forecasts oil demand growth of 2m b/d in 2023, which is a similar level to 2022. Some 35% of demand growth in 2023F is coming from China but this could disappoint if the country's Zero-COVID policy is not lifted.

Ex 1: Our Brent Oil Price Forecasts



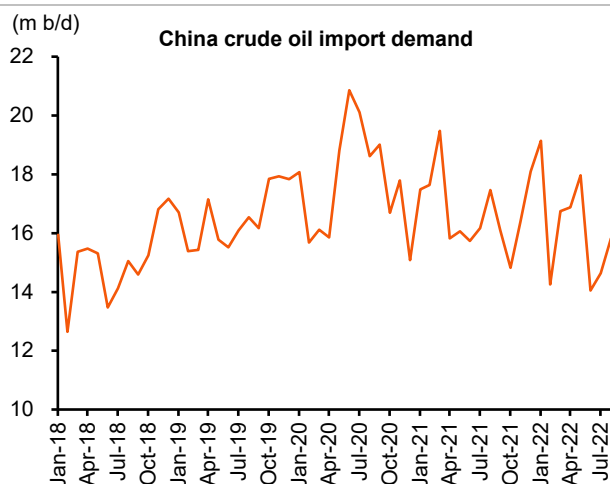
Source: Thanachart estimates

Ex 2: Global Oil Demand Growth Forecasts (2022F)



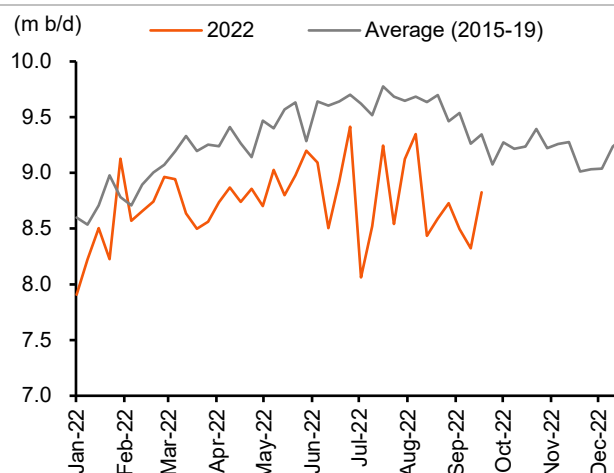
Sources: EIA, IEA, OPEC

Ex 3: Chinese Oil Demand Falling On Zero-COVID Policy



Source: Bloomberg

Ex 4: US Gasoline Demand Below Average

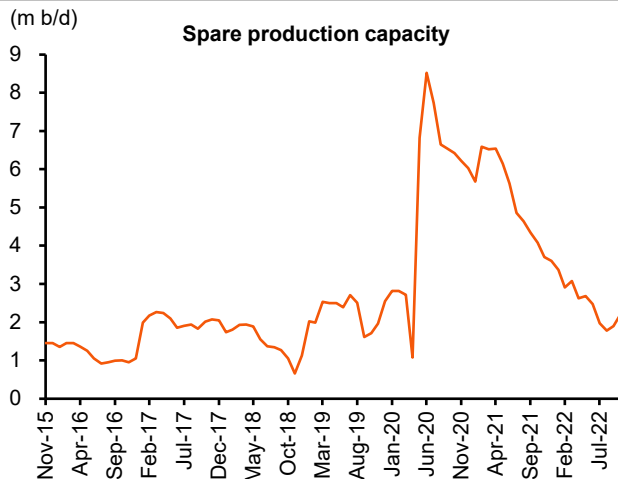


Source: IEA

**But supply threat provides
a floor to oil prices**

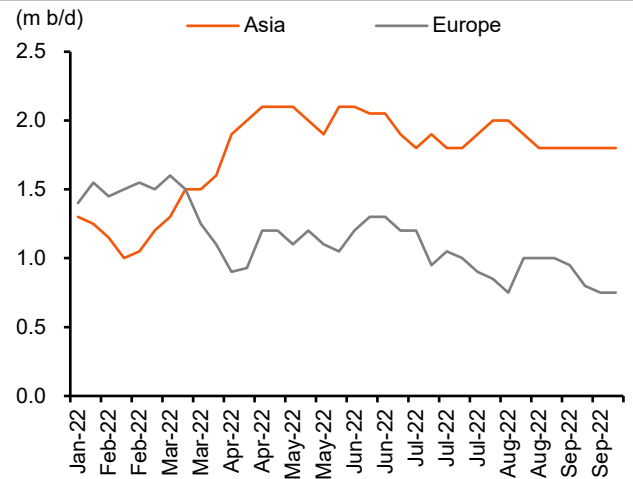
However, we expect the impact of the global slowdown to be cushioned by sanctions on Russia and output management by OPEC+. The OPEC+ may be considering a production cut of up to 2m bpd. Meanwhile, European sanctions on Russia crude oil imports are scheduled to become fully effective in December this year and will likely lead to lower supply in the market. Russia has ramped up oil shipments to Asia since the conflict in Ukraine started, but it already hit plateau which means that Asia has already reach it limit to take up additional Russia crude. Meanwhile, Europe still import diesel from Russia around 700k b/d, although it's down from 1.5m b/d during pre-war level.

Ex 5: OPEC's Spare Capacity



Source: Bloomberg

Ex 6: Russian Crude Oil Export



Source: Bloomberg

**We cut 2023-24F profits by
8/4% as we lower our oil
price assumptions**

Given our lower oil and gas price forecasts, we have cut our earnings estimates in 2023-24F by 8% and 4%, respectively. We also raise our volume projections by 3.7/7.2% over 2023-24F as we factor in PTTEP's additional stake of 40% in the Erawan field. However, we also raise our unit cost assumptions to reflect higher-than-expected expenses related to ramping up Erawan production over 2022-24F.

With our lower profit forecasts, our DCF-based 12-month TP, using a 2023F base year, falls to Bt159/share from Bt161. However, because the share price already looks like it has reflected the higher oil prices, we maintain our HOLD rating on PTTEP. Note that we do not view PTTEP's valuation as attractive as the current price already implies 8.6x and 10.1x PE multiples in 2022-23F.

Ex 7: Key Earnings And Assumption Changes

	2019	2020	2021	2022F	2023F	2024F
Normalized profit (Bt m)						
- New	48,844	21,397	43,989	77,873	65,879	62,045
- Old				79,157	71,439	64,914
- Change (%)				(1.6)	(7.8)	(4.4)
Reported profit (Bt m)						
- New	48,803	22,664	38,864	67,694	65,879	62,045
- Old				70,997	71,439	64,914
- Change (%)				(4.7)	(7.8)	(4.4)
Volume ('000 bpd)						
- New	351	354	416	465	480	507
- Old				467	463	473
- Change (%)				(0.5)	3.7	7.2
Brent oil (USD/bbl)						
- New	64	42	69	101	85	80
- Old				101	90	85
- Change (%)				0.3	(5.6)	(5.9)
Gas price (USD/mmbtu)						
- New	6.9	6.3	5.7	6.3	6.1	5.9
- Old				6.4	6.3	6.0
- Change (%)				(1.3)	(3.2)	(1.7)
Unit cost (USD/BOE)						
- New	30	29	27	29	28	28
- Old				29	27	28
- Change (%)				(2.5)	0.6	(1.1)

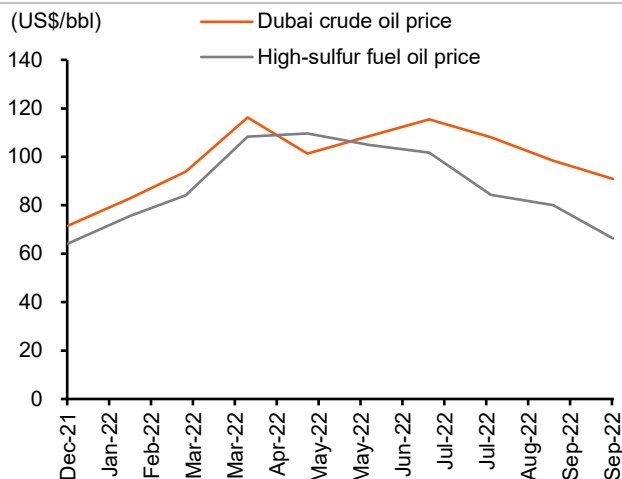
Sources: Company data, Thanachart estimates

Lower average gas price

PTTEP's gas price may not be as strong as the crude oil price suggests

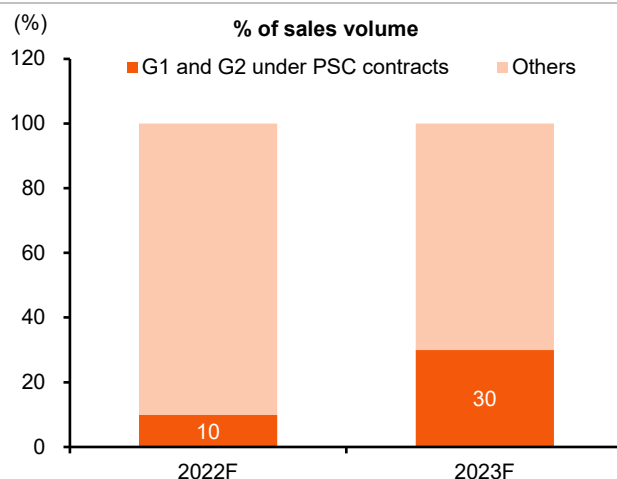
PTTEP's gas price may not be as strong as the crude oil price suggests. We expect PTTEP's gas selling price (72% of 2022F volume) to drop by 4% y-y to USD6.1/mmbtu in 2023F. This is due to i) a collapse in the high-sulfur fuel oil price (HSFO). About 70% of PTTEP's gas selling price is linked to the HSFO price with a six-to-nine-month lag time. ii) A higher mix of lower-priced contracts. We estimate that around 10/30% of PTTEP's 2022-23F output comes from new production-sharing contracts (PSC), where the gas price is around 40% lower than in the old concession contracts.

Ex 8: 50% Of PTTEP's Volume Linked To HSFO Price



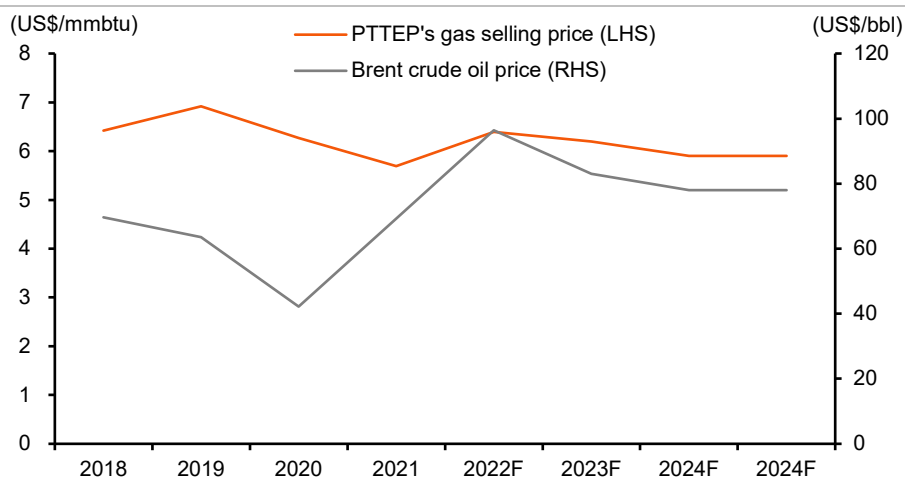
Source: Bloomberg

Ex 9: Higher Mix Of Lower-Priced Gas Output In 2023F



Source: Thanachart estimates

Ex 10: We Expect PTTEP To See Lower Gas Selling Prices In 2023F



Sources: Bloomberg, Company data, Thanachart estimates

Unexciting 3Q22F outlook on the cards

We expect core profit to be flat q-q in 3Q22F

We estimate PTTEP's reported profit to check in at Bt17.8bn in 3Q22F, up 87% y-y and but down 13% q-q. We consider this unexciting as we assume the growth comes from a hedging loss reversal to a gain of Bt2.7bn. This would be offset by a potential asset impairment amount of Bt3bn for its Brazil investment. We project core profit to increase by 65% y-y due to a higher average selling price but down 19% q-q on higher unit cost and a 2% q-q decline in the selling price. We expect PTTEP's average selling price to come down marginally by 3% q-q to USD54.5/BOE on the back of a lower liquid selling price being offset by higher gas prices. Meanwhile, costs should increase by 12% q-q to USD31/BOE due to exploration well write off. We foresee volume missing the target by 1% and rising by only 2% q-q to 476,000 barrels per day as a result of a 14-day unplanned shutdown of the Zawtika field.

Ex 11: 3Q22F Results Preview

P&L (Btm)	3Q21	2Q22	3Q22F	(q-q%)	(y-y%)
Total revenue	58,295	83,088	85,142		2
Total cost	(37,248)	(42,228)	(50,247)		19
Operating profit	21,047	40,861	34,894		(15)
Non-operating items					
Other non-op income	343	1,675	601		
Interest income	114	192	192		
Equity income	228	445	445		
Other non-op	(165)	(1,368)	(230)		
EBT	20,291	41,642	37,596		(10)
Income tax	(10,692)	(21,042)	(18,067)		(14)
Net profit	9,545	20,600	17,837		(13)
Key operating items					
Sale volume (boed)	417,167	465,459	476,000		2
Gas price (US\$/mmbtu)	5.76	6.10	6.30		3
Average selling price (USD/bbl)	44	56	54.5		(3)
Unit cost (US\$/BOE)	29	28	31		12

Sources: Company data, Thanachart estimates

Ex 12: 12-month DCF-based TP Calculation, Using A Base Year Of 2023F

(Bt m)	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F	2031F	2032F	2033F	Terminal Value
EBITDA	210,289	211,034	195,196	206,036	195,953	186,375	177,275	168,630	160,418	152,616	145,204	
Free cash flow	40,138	31,150	33,234	57,027	58,384	60,655	61,857	68,446	70,067	71,634	73,127	935,177
PV of free cash flow	33,763	24,023	23,504	36,207	33,849	32,104	29,896	30,208	28,237	25,155	23,349	298,602
Risk-free rate (%)	2.5											
Market risk premium (%)	8.0											
Beta	1.0											
Wacc (%)	9.0											
Terminal growth (%)	2.0											
Enterprise value	660,549											
Net debt	29,871											
Minority interest	0											
Equity value	630,677											
# of shares	3,970											
Equity value / share	159											

Sources: Company data, Thanachart estimates

Valuation Comparison

Ex 13: Comparison With Regional Peers

Company	Code	Country	EPS Growth		— PE —		— P/BV —		EV/EBITDA		Div. Yield		— ROE —	
			22F	23F	22F	23F	22F	23F	22F	23F	22F	23F	22F	23F
			(%)	(%)	(x)	(x)	(x)	(x)	(x)	(x)	(%)	(%)	(%)	(%)
<u>Refining & Marketing</u>														
Ampol	ALD AU	Australia	132.4	(23.0)	8.3	10.8	1.9	1.9	6.3	7.0	7.2	5.5	26.1	17.5
BPCL	BPCL IN	India	(0.3)	(38.0)	6.7	10.8	1.2	1.2	7.5	9.9	8.2	3.9	18.8	10.4
HPCL	HPCL IN	India	(12.6)	(86.3)	4.7	34.5	0.7	0.8	6.7	15.4	8.0	4.8	17.2	0.1
IOCL	IOCL IN	India	65.7	(58.6)	2.5	6.0	0.5	0.7	5.0	6.6	17.1	7.9	19.3	10.0
Reliance Industries	RIL IN	India	31.2	26.9	26.5	20.9	2.1	1.9	16.9	13.0	0.3	0.4	8.0	9.5
SK Energy	096770 KS	S.Korea	na	(35.3)	4.4	6.8	0.7	0.6	3.7	4.9	2.1	2.4	16.0	8.9
S-OIL	010950 KS	S.Korea	99.1	(36.3)	3.3	5.2	1.1	0.9	2.9	4.4	9.0	5.7	35.4	19.4
Petron	PCOR PM	Philippines	0.0	na	15.2	na	1.0	na	7.8	na	3.9	na	6.8	na
Formosa Petrochemical	6505 TT	Taiwan	3.2	(23.2)	14.5	18.8	2.1	2.1	9.7	11.6	4.2	4.1	13.6	11.1
Bangchak *	BCP TB	Thailand	116.4	(34.9)	4.2	6.4	0.7	0.7	3.0	4.6	6.0	4.0	17.5	10.5
ESSO (Thailand) *	ESSO TB	Thailand	724.9	(31.1)	4.4	6.4	1.4	1.4	3.3	4.9	16.3	5.6	41.0	22.2
IRPC Pcl *	IRPC TB	Thailand	(70.7)	489.1	55.3	9.4	0.7	0.7	12.1	7.0	4.9	5.3	1.3	7.3
PTT Oil And Retail *	OR TB *	Thailand	19.1	7.0	23.8	22.2	2.9	2.6	12.9	11.8	1.2	1.3	12.5	12.3
PTG Pcl *	PTG TB	Thailand	50.7	19.3	17.6	14.8	3.0	2.7	7.7	6.6	2.8	3.4	17.7	19.0
PTT Global Chemicals *	PTTGC TB	Thailand	7.4	(21.9)	6.2	7.9	0.6	0.6	7.1	7.1	6.0	5.2	9.5	7.3
Star Petroleum Refining *	SPRC TB	Thailand	835.9	(39.5)	4.3	7.1	1.1	1.1	2.6	3.8	10.6	4.1	28.5	15.0
SUSCO Pcl	SUSCO TB	Thailand	64.0	12.2	13.1	11.7	1.2	1.2	6.9	5.9	4.6	5.1	9.7	10.5
Thai Oil *	TOP TB	Thailand	450.0	(54.1)	3.5	7.7	0.7	0.7	5.1	9.8	5.7	4.4	22.0	9.0
Average			148.0	4.3	12.1	12.2	1.3	1.3	7.1	7.9	6.6	4.3	17.8	11.7
<u>Integrated oils</u>														
PetroChina	857 HK	China	45.0	(13.3)	4.6	5.3	0.5	0.4	2.9	2.9	10.5	8.9	9.8	7.9
Sinopec	386 HK	China	1.0	0.2	5.8	5.8	0.5	0.5	3.8	3.6	11.3	11.0	9.3	8.8
Total	FP	France	144.7	(16.9)	na	na	na	na	na	na	na	na	26.4	19.8
Eni	ENI IM	Italy	na	(24.4)	3.2	4.2	0.8	0.7	1.9	2.1	7.5	7.7	25.4	15.7
Repsol	REP SM	Spain	155.2	(22.3)	3.2	4.1	0.7	0.6	1.9	2.3	5.3	5.6	21.8	13.7
Chevron Texaco	CVX US	USA	118.2	(8.6)	8.4	9.2	2.0	1.8	4.7	5.0	3.6	3.8	23.5	18.6
Exxon Mobil	XOM US	USA	139.7	(15.6)	7.6	9.0	2.1	1.9	4.3	5.0	3.7	3.9	28.5	20.1
Conoco Philips	COP US	USA	150.1	(8.6)	7.7	8.4	2.9	2.4	4.2	4.6	1.6	1.9	40.2	27.9
PTT Pcl *	PTT TB	Thailand	(5.0)	4.4	11.7	11.2	0.9	0.9	4.4	4.2	5.8	5.8	8.2	8.3
Average			93.6	(11.7)	6.5	7.1	1.3	1.2	3.5	3.7	6.2	6.1	21.5	15.6
<u>Exploration and Production</u>														
Santos	STO AU	Australia	105.1	(11.9)	9.1	10.3	1.7	1.5	3.4	3.8	2.6	3.2	19.1	14.1
Woodside	WDS AU	Australia	131.2	(9.6)	9.5	10.5	1.9	1.9	3.8	3.4	7.8	6.6	25.4	22.0
Suncor Energy	SU US	Canada	na	(10.4)	3.4	3.8	1.0	0.9	3.0	3.3	5.7	6.2	31.4	22.3
ONGC	ONGC IN	India	na	14.4	3.9	3.4	0.7	0.6	3.6	3.1	9.4	10.4	18.6	17.4
RIL	RIL IN	India	31.2	26.9	26.5	20.9	2.1	1.9	16.9	13.0	0.3	0.4	8.0	9.5
Apache	APA US	USA	121.7	16.2	4.3	3.7	12.4	5.5	2.6	2.5	1.4	1.9	18.3	na
Devon Energy	DVN US	USA	170.2	8.5	7.6	7.0	4.0	3.2	4.8	4.5	1.0	1.3	58.1	47.9
PTTEP *	PTTEP TB	Thailand	77.0	(15.4)	8.6	10.1	1.4	1.3	3.0	3.4	3.6	4.2	17.5	13.4
Average			106.1	2.3	9.1	8.7	3.1	2.1	5.2	4.6	4.0	4.3	24.5	20.9

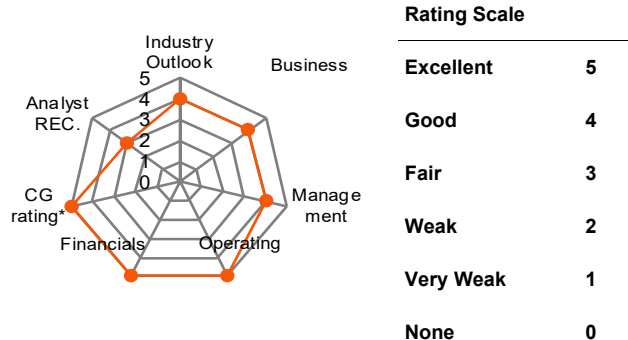
Sources: Bloomberg, * Thanachart estimates
Based on 5 October 2022 closing prices

COMPANY DESCRIPTION

PTT Exploration and Production (PTTEP) is a pure upstream exploration and production (E&P) company with production of c.300,000 barrels of oil equivalent (boe) per day. Some 70% of its production is natural gas and almost all of its production comes from fields in Thailand and other Southeast Asian countries. It has proven and probable reserves of 2,123m boe with a reserve life of 11.7 years. PTTEP is the upstream arm of PTT Pcl (PTT TB, Bt34.50, BUY), which owns 65% of PTTEP.

Source: Thanachart

COMPANY RATING



Source: Thanachart; *CG Rating

THANACHART'S SWOT ANALYSIS

S — Strength

- The parent company PTT is the country's sole gas buyer and PTTEP's biggest client.
- Secured off-take agreements limit downside risks to production volume.

O — Opportunity

- Significant resources on its balance sheet are still undeveloped.
- Potential investment overseas or expansion into new businesses.

W — Weakness

- Reserves in the Gulf of Thailand are being depleted with a reserve life index of only eight years.
- Limited experience and a lack of technical skills in running operations abroad compared to major international peers.

T — Threat

- Threat of low-cost LNG imports.
- Potential impairment risk on overseas business.
- Competition from international peers for projects abroad.
- Political and regulatory risks concerning its concessions, especially those about to expire.
- Overpaying for acquisitions, leading to a lower ROI.

CONSENSUS COMPARISON

	Consensus	Thanachart	Diff
Target price (Bt)	180.04	159.00	-12%
Net profit 22F (Bt m)	69,962	67,694	-3%
Net profit 23F (Bt m)	69,407	65,879	-5%
Consensus REC	BUY: 20	HOLD: 7	SELL: 1

HOW ARE WE DIFFERENT FROM THE STREET?

- Our 2023F net profit estimate is 5% below the Bloomberg consensus number, which we attribute mainly to us having a lower oil price assumption.
- Our DCF-based TP is also below the Street's, likely due to our lower oil price assumptions from 2023F onward.

Sources: Bloomberg consensus, Thanachart estimates

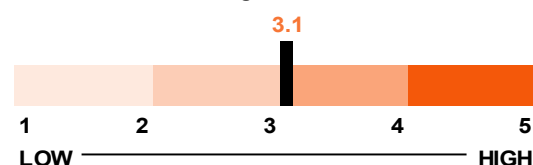
RISKS TO OUR INVESTMENT CASE

- The key downside risk to our call would come from lower oil and/or gas prices.
- A secondary downside risk would be higher-than-expected operating costs.
- An upside risk would be if high oil prices are sustained for longer than we currently forecast. This could be driven by a complete ban on purchases of Russian crude oil.

Source: Thanachart

PTTEP is PTT's oil and gas exploration arm. Its oil and gas product mix is around 30:70 with gas emitting less carbon than oil. Despite its business nature of emitting large amounts of greenhouse gas, our ESG score for PTTEP is decent at 3.1 due to the company's strong commitment with clear targets to achieve improvements in ESG issues. PTTEP also plans to diversify into non-E&P businesses.

Thanachart ESG Rating



	SETTHSI Index	THSI Index	DJSI Index	MSCI (CCC-AAA)	Arabesque S-Ray (0-100)	Refinitiv (0-100)	S&P Global (0-100)	Moody's (0-100)	CG Rating (0-5)
PTTEP	YES	YES	YES	A	57.57	62.15	78.59	43.0	5.0

Sources: SETTRADE, SETTHSI Index, Thailand Sustainability Investment (THSI), The Dow Jones Industrial Average (DJSI), MSCI ESG Research LLC, Arabesque S-Ray®, Refinitiv ESG Information, S&P Global Market Intelligence, Moody's ESG Solutions, Thai IOD (CG rating)
Note: Please see third party on "term of use" toward the back of this report.

Factors

Our Comments

ENVIRONMENT

- Environmental Policies & Guidelines
- Energy Management
- Carbon Management
- Water Management
- Waste Management

- PTTEP released 5.1m tonnes of CO₂ equivalent in 2021, up 25% from 2018's level due to new project acquisitions. However, its carbon emission intensity fell 11% to 224kg/BOE (barrel of oil equivalent) of CO₂ from 2018's level. We believe the reduction was due to hydrocarbon recovery and energy efficiency improvements. PTTEP's carbon emission intensity is below the Thai energy sector's average of 280kg/BOE due to 70% of its sales volume being gas which emits less carbon than oil.
- PTTEP targets to achieve net zero greenhouse gas (GHG) emissions by 2050. Its medium-term goal is to cut GHG intensity by 30% by 2030 and 50% by 2040 from 2020's level. The company has also expressed an interest in investing in non-E&P businesses with the aim of reducing carbon emissions.
- PTTEP is the first company in Thailand to have laid out a plan for capex to invest in Carbon Capture and Storage (CCS), an important move toward decarbonization. That said, it is also continuing with its capex plan for its core E&P business. Its capex plan is USD16bn over 2022-26, of which USD490-500m is for ESG-related projects.

SOCIAL

- Human Rights
- Staff Management
- Health & Safety
- Product Safety & Quality
- Social Responsibility

- PTTEP's human rights policy is aligned with international human rights standards. The company also provides training programs to prepare its employees for rapid changes in the business environment.
- For production safety, PTTEP delivers an above-average performance level against the average rate of the International Association of Oil and Gas Producers (IOGP).
- PTTEP allocates a part of its budget to engage in community activities and services. The company has 145 social development projects in four areas – basic needs, education, environment and culture.

GOVERNANCE &
SUSTAINABILITY

- Board
- Ethics & Transparency
- Business Sustainability
- Risk Management
- Innovation

- PTTEP's board comprises 15 directors who possess a range of expertise and an appropriate mix of skills suitable for the E&P industry, in our view. There are 10 independent directors and two female directors.
- PTTEP is in a net-cash position with strong cashflow generation. Although it has a high customer concentration (it mainly sells gas to its parent PTT, Thailand's sole gas buyer), the selling price is market-based and linked to oil prices.
- As for business sustainability, PTTEP faces the risk of long-term depletion of domestic energy resources. The company is aiming to diversify into new non-E&P businesses to tackle this issue. Those businesses so far include its AI and Robotics Venture and renewable power business.

Source: Thanachart

INCOME STATEMENT

FY ending Dec (Bt m)	2020A	2021A	2022F	2023F	2024F
Sales	160,401	219,068	325,642	286,245	290,693
Cost of sales	106,143	121,020	153,243	142,402	151,706
Gross profit	54,258	98,048	172,399	143,844	138,987
% gross margin	33.8%	44.8%	52.9%	50.3%	47.8%
Selling & administration expenses	9,754	11,416	16,384	17,345	18,320
Operating profit	44,503	86,631	156,015	126,499	120,666
% operating margin	27.7%	39.5%	47.9%	44.2%	41.5%
Depreciation & amortization	65,250	69,192	82,158	83,790	90,368
EBITDA	109,753	155,824	238,173	210,289	211,034
% EBITDA margin	68.4%	71.1%	73.1%	73.5%	72.6%
Non-operating income	2,306	4,869	3,941	1,706	1,858
Non-operating expenses	0	0	0	0	0
Interest expense	(7,956)	(6,472)	(9,140)	(8,725)	(10,015)
Pre-tax profit	38,854	85,029	150,817	119,480	112,509
Income tax	18,764	41,528	74,630	53,901	50,764
After-tax profit	20,090	43,500	76,187	65,579	61,745
% net margin	12.5%	19.9%	23.4%	22.9%	21.2%
Shares in affiliates' Earnings	1,307	489	1,686	300	300
Minority interests	0	0	0	0	0
Extraordinary items	1,267	(5,125)	(10,179)	0	0
NET PROFIT	22,664	38,864	67,694	65,879	62,045
Normalized profit	21,397	43,989	77,873	65,879	62,045
EPS (Bt)	5.7	9.8	17.1	16.6	15.6
Normalized EPS (Bt)	5.4	11.1	19.6	16.6	15.6

We expect 2022F EBITDA to peak, driven by a short-term oil price spike

BALANCE SHEET

FY ending Dec (Bt m)	2020A	2021A	2022F	2023F	2024F
ASSETS:					
Current assets:	152,716	139,584	167,074	188,635	220,518
Cash & cash equivalent	114,261	85,528	90,000	120,000	150,000
Account receivables	23,752	33,430	49,693	43,681	44,360
Inventories	10,156	14,069	17,633	16,386	17,457
Others	4,547	6,557	9,747	8,568	8,701
Investments & loans	15,774	15,795	15,815	15,836	15,857
Net fixed assets	295,491	380,307	410,744	445,149	482,426
Other assets	211,656	247,850	316,294	290,992	293,849
Total assets	675,637	783,536	909,927	940,613	1,012,649
LIABILITIES:					
Current liabilities:	56,257	104,502	109,370	92,501	109,307
Account payables	26,844	36,660	46,421	43,137	45,955
Bank overdraft & ST loans	0	12,738	0	0	0
Current LT debt	4,069	0	15,840	6,684	19,800
Others current liabilities	25,344	55,105	47,109	42,681	43,551
Total LT debt	102,878	102,661	131,307	160,413	178,947
Others LT liabilities	162,091	161,022	196,123	174,498	176,939
Total liabilities	321,226	368,186	436,800	427,412	465,192
Minority interest	0	0	0	0	0
Preferreds shares	0	0	0	0	0
Paid-up capital	3,970	3,970	3,970	3,970	3,970
Share premium	105,418	105,418	105,418	105,418	105,418
Warrants	0	0	0	0	0
Surplus	(21,049)	18,955	30,873	30,873	30,873
Retained earnings	266,073	287,007	332,866	372,940	407,195
Shareholders' equity	354,411	415,350	473,127	513,201	547,456
Liabilities & equity	675,637	783,536	909,927	940,613	1,012,649

Sources: Company data, Thanachart estimates

PTTEP generates strong cash flows, which lead to a robust balance sheet

CASH FLOW STATEMENT

FY ending Dec (Bt m)	2020A	2021A	2022F	2023F	2024F
Earnings before tax	38,854	85,029	150,817	119,480	112,509
Tax paid	(29,624)	(30,528)	(65,956)	(56,334)	(51,166)
Depreciation & amortization	65,250	69,192	82,158	83,790	90,368
Chg In working capital	3,691	(3,775)	(10,067)	3,975	1,069
Chg In other CA & CL / minorities	14,082	15,904	(18,173)	(516)	1,439
Cash flow from operations	92,254	135,822	138,779	150,395	154,220
Capex	(39,239)	(154,009)	(112,595)	(118,195)	(127,645)
Right of use	(14,501)	(2,867)	0	0	0
ST loans & investments	0	0	0	0	0
LT loans & investments	480	(21)	(21)	(21)	(21)
Adj for asset revaluation	0	0	0	0	0
Chg In other assets & liabilities	5,074	(36,873)	(43,102)	3,675	(415)
Cash flow from investments	(48,186)	(193,769)	(155,717)	(114,540)	(128,081)
Debt financing	4,352	7,139	31,328	19,950	31,650
Capital increase	0	(0)	0	0	0
Dividends paid	(20,986)	(19,325)	(21,835)	(25,805)	(27,790)
Warrants & other surplus	(4,326)	41,400	11,918	0	0
Cash flow from financing	(20,960)	29,214	21,411	(5,855)	3,860
Free cash flow	53,015	(18,187)	26,184	32,200	26,575

PTTEP continues to generate high cash flows from operations

VALUATION

FY ending Dec	2020A	2021A	2022F	2023F	2024F
Normalized PE (x)	31.2	15.2	8.6	10.1	10.7
Normalized PE - at target price (x)	29.5	14.3	8.1	9.6	10.2
PE (x)	29.4	17.2	9.9	10.1	10.7
PE - at target price (x)	27.9	16.2	9.3	9.6	10.2
EV/EBITDA (x)	6.0	4.5	3.0	3.4	3.4
EV/EBITDA - at target price (x)	5.7	4.2	2.9	3.2	3.2
P/BV (x)	1.9	1.6	1.4	1.3	1.2
P/BV - at target price (x)	1.8	1.5	1.3	1.2	1.2
P/CFO (x)	7.2	4.9	4.8	4.4	4.3
Price/sales (x)	4.2	3.0	2.0	2.3	2.3
Dividend yield (%)	2.5	3.0	3.6	4.2	4.2
FCF Yield (%)	7.9	(2.7)	3.9	4.8	4.0
(Bt)					
Normalized EPS	5.4	11.1	19.6	16.6	15.6
EPS	5.7	9.8	17.1	16.6	15.6
DPS	4.3	5.0	6.0	7.0	7.0
BV/share	89.3	104.6	119.2	129.3	137.9
CFO/share	23.2	34.2	35.0	37.9	38.8
FCF/share	13.4	(4.6)	6.6	8.1	6.7

Sources: Company data, Thanachart estimates

At 1.3x 2023F P/BV, we do not see PTTEP's valuation as attractive

FINANCIAL RATIOS

FY ending Dec	2020A	2021A	2022F	2023F	2024F
Growth Rate					
Sales (%)	(16.0)	36.6	48.6	(12.1)	1.6
Net profit (%)	(53.6)	71.5	74.2	(2.7)	(5.8)
EPS (%)	(53.6)	71.5	74.2	(2.7)	(5.8)
Normalized profit (%)	(56.2)	105.6	77.0	(15.4)	(5.8)
Normalized EPS (%)	(56.2)	105.6	77.0	(15.4)	(5.8)
Dividend payout ratio (%)	74.4	51.1	35.2	42.2	44.8
Operating performance					
Gross margin (%)	33.8	44.8	52.9	50.3	47.8
Operating margin (%)	27.7	39.5	47.9	44.2	41.5
EBITDA margin (%)	68.4	71.1	73.1	73.5	72.6
Net margin (%)	12.5	19.9	23.4	22.9	21.2
D/E (incl. minor) (x)	0.3	0.3	0.3	0.3	0.4
Net D/E (incl. minor) (x)	(0.0)	0.1	0.1	0.1	0.1
Interest coverage - EBIT (x)	5.6	13.4	17.1	14.5	12.0
Interest coverage - EBITDA (x)	13.8	24.1	26.1	24.1	21.1
ROA - using norm profit (%)	3.2	6.0	9.2	7.1	6.4
ROE - using norm profit (%)	6.0	11.4	17.5	13.4	11.7
DuPont					
ROE - using after tax profit (%)	5.6	11.3	17.1	13.3	11.6
- asset turnover (x)	0.2	0.3	0.4	0.3	0.3
- operating margin (%)	29.2	41.8	49.1	44.8	42.1
- leverage (x)	1.9	1.9	1.9	1.9	1.8
- interest burden (%)	83.0	92.9	94.3	93.2	91.8
- tax burden (%)	51.7	51.2	50.5	54.9	54.9
WACC (%)	9.0	9.0	9.0	9.0	9.0
ROIC (%)	6.2	12.8	17.7	13.1	11.8
NOPAT (Bt m)	23,011	44,320	78,813	69,431	66,222
invested capital (Bt m)	347,097	445,221	530,274	560,298	596,203

Sources: Company data, Thanachart estimates

We see room for ROE improvement on higher gearing and margin expansion

ESG Information - Third Party Terms

www.Settrade.com

SETTRADE: You acknowledge that the use of data, information or service displayed and/or contained in this website may require third party's data, content or software which is subject to the terms of third party provider. By accessing and/or using of such certain data, you acknowledge and agree to comply with and be bound by the applicable third party terms specified below.

ESG Scores by Third Party data from www.SETTRADE.com

1. MSCI (CCC- AAA)
2. Arabesque S-Ray (0-100)
3. Refinitiv (0-100)
4. S&P Global (0-100)
5. Moody's ESG Solutions (0-100)

SET THSI Index (SETTHSI)

Nowadays, long-term investment tends to be more focused on sustainable companies. The financial statement performance and the consideration in environmental, social and governance (ESG) perspective are keys aspects for analysis.

SET has created a Thailand Sustainability Investment (THSI) list since 2015 for using as an alternative investment in the high performance ESG stocks for investors while, supporting the sustainable Thai companies. SET defines the sustainable companies as the companies that embrace risk management, supply chain management and innovations together with responsibility for environmental, social and governance aspects

As a result, SET has created the SETTHSI for the purpose of indicating the price of these sustainable companies that pass the market capital size and liquidity criteria.

Arabesque S-Ray®

The S-Ray data here is published with a 3 month delay. For the latest data, please contact sray@arabesque.com

Arabesque S-Ray® is a service (the "Service") provided by Arabesque S-Ray GmbH ("Arabesque S-Ray") and its branch and subsidiary companies. Arabesque S-Ray is a limited liability company (Gesellschaft mit beschränkter Haftung) incorporated in Frankfurt am Main and organized under the laws of Germany with registered number HRB 113087 in the commercial register of the local court with its seat and business address at Zeppelinallee 15, 60325 Frankfurt am Main, Germany. The Service is unconnected to any of the asset management activities conducted within the wider group of Arabesque companies, and is not investment advice or a solicitation or an offer to buy any security or instrument or to participate in investment services. RELIANCE - Arabesque S-Ray makes no representation or warranty, express or implied, as to the accuracy or completeness of the information contained herein, and accepts no liability for any loss, of whatever kind, howsoever arising, in relation thereto, and nothing contained herein should be relied upon. ENQUIRIES - Any enquiries in respect of this document should be addressed to Arabesque S-Ray.

Arabesque S-Ray® - The ESG Score, ranging from 0 to 100, identifies sustainable companies that are better positioned to outperform over the long run, based on the principles of financial materiality. That is, when computing the ESG Score of a company, the algorithm will only use information that significantly helps explain future risk-adjusted performance. Materiality is applied by overweighting features with higher materiality and rebalancing these weights on a rolling quarterly basis to stay up-to-date

MSCI ESG Research LLC

"Certain information @2021 MSCI ESG Research LLC. Reproduced by permission"

"Although [User ENTITY NAME's] information providers, including without limitation, MSCI ESG Research LLC and its affiliates (the "ESG Parties"), obtain information (the "Information") from sources they consider reliable, none of the ESG Parties warrants or guarantees the originality, accuracy and/or completeness, of any data herein and expressly disclaim all express or implied warranties, including those of merchantability and fitness for a particular purpose. The Information may only be used for your internal use, may not be reproduced or disseminated in any form and may not be used as a basis for, or a component of, any financial instruments or products or indices. Further, none of the Information can in and of itself be used to determine which securities to buy or sell or when to buy or sell them. None of the ESG Parties shall have any liability for any errors or omissions in connection with any data herein, or any liability for any direct, indirect, special, punitive, consequential or any other damages (including lost profits) even if notified of the possibility of such damages."

Score range	Description
CCC - B	LAGGARD: A company lagging its industry based on its high exposure and failure to manage significant ESG risks
BB - BBB - A	AVERAGE : A company with a mixed or unexceptional track record of managing the most significant ESG risks and opportunities relative to industry peers
AA - AAA	LEADER: A company leading its industry in managing the most significant ESG risks and opportunities

The Dow Jones Sustainability Indices (DJSI)

The Dow Jones Sustainability Indices (DJSI) are a family of best-in-class benchmarks for investors who have recognized that sustainable business practices are critical to generating long-term shareholder value and who wish to reflect their sustainability convictions in their investment portfolios. The family was launched in 1999 as the first global sustainability benchmark and tracks the stock performance of the world's leading companies in terms of economic, environmental and social criteria. Created jointly by S&P Dow Jones Indices and SAM, the DJSI combine the experience of an established index provider with the expertise of a specialist in Sustainable Investing to select the most sustainable companies from across 61 industries. The indices serve as benchmarks for investors who integrate sustainability considerations into their portfolios, and provide an effective engagement platform for investors who wish to encourage companies to improve their corporate sustainability practices.

S&P Global Market Intelligence

Copyright © 2021, S&P Global Market Intelligence (and its affiliates as applicable). Reproduction of any information, opinions, views, data or material, including ratings ("Content") in any form is prohibited except with the prior written permission of the relevant party. Such party, its affiliates and suppliers ("Content Providers") do not guarantee the accuracy, adequacy, completeness, timeliness or availability of any Content and are not responsible for any errors or omissions (negligent or otherwise), regardless of the cause, or for the results obtained from the use of such Content. In no event shall Content Providers be liable for any damages, costs, expenses, legal fees, or losses (including lost income or lost profit and opportunity costs) in connection with any use of the Content. A reference to a particular investment or security, a rating or any observation concerning an investment that is part of the Content is not a recommendation to buy, sell or hold such investment or security, does not address the suitability of an investment or security and should not be relied on as investment advice. Credit ratings are statements of opinions and are not statements of fact.

ESG risk combines the concepts of management and exposure to arrive at an absolute assessment of ESG risk. We identify five categories of ESG risk severity that could impact a company's enterprise value

Moody's ESG Solutions

© 2022 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates (collectively, "MOODY'S"). All rights reserved.

CREDIT RATINGS ISSUED BY MOODY'S CREDIT RATINGS AFFILIATES ARE THEIR CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MATERIALS, PRODUCTS, SERVICES AND INFORMATION PUBLISHED BY MOODY'S (COLLECTIVELY, "PUBLICATIONS") MAY INCLUDE SUCH CURRENT OPINIONS. MOODY'S DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL FINANCIAL OBLIGATIONS AS THEY COME DUE AND ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT OR IMPAIRMENT. SEE APPLICABLE MOODY'S RATING SYMBOLS AND DEFINITIONS PUBLICATION FOR INFORMATION ON THE TYPES OF CONTRACTUAL FINANCIAL OBLIGATIONS ADDRESSED BY MOODY'S CREDIT RATINGS. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS, NON-CREDIT ASSESSMENTS ("ASSESSMENTS"), AND OTHER OPINIONS INCLUDED IN MOODY'S PUBLICATIONS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. MOODY'S PUBLICATIONS MAY ALSO INCLUDE QUANTITATIVE MODEL-BASED ESTIMATES OF CREDIT RISK AND RELATED OPINIONS OR COMMENTARY PUBLISHED BY MOODY'S ANALYTICS, INC. AND/OR ITS AFFILIATES. MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS DO NOT COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. MOODY'S ISSUES ITS CREDIT RATINGS, ASSESSMENTS AND OTHER OPINIONS AND PUBLISHES ITS PUBLICATIONS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, MAKE ITS OWN STUDY AND EVALUATION OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS, AND PUBLICATIONS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS OR PUBLICATIONS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER.

ALL INFORMATION CONTAINED HEREIN IS PROTECTED BY LAW, INCLUDING BUT NOT LIMITED TO, COPYRIGHT LAW, AND NONE OF SUCH INFORMATION MAY BE COPIED OR OTHERWISE REPRODUCED, REPACKAGED, FURTHER TRANSMITTED, TRANSFERRED, DISSEMINATED, REDISTRIBUTED OR RESOLD, OR STORED FOR SUBSEQUENT USE FOR ANY SUCH PURPOSE, IN WHOLE OR IN PART, IN ANY FORM OR MANNER OR BY ANY MEANS WHATSOEVER, BY ANY PERSON WITHOUT MOODY'S PRIOR WRITTEN CONSENT.

MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS ARE NOT INTENDED FOR USE BY ANY PERSON AS A BENCHMARK AS THAT TERM IS DEFINED FOR REGULATORY PURPOSES AND MUST NOT BE USED IN ANY WAY THAT COULD RESULT IN THEM BEING CONSIDERED A BENCHMARK.

All information contained herein is obtained by MOODY'S from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. MOODY'S adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources MOODY'S considers to be reliable including, when appropriate, independent third-party sources. However, MOODY'S is not an auditor and cannot in every instance independently verify or validate information received in the rating process or in preparing its Publications.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers is advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by MOODY'S.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, including but not limited to by any negligence (but excluding fraud, willful misconduct or any other type of liability that, for the avoidance of doubt, by law cannot be excluded) on the part of, or any contingency within or beyond the control of, MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY CREDIT RATING, ASSESSMENT, OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY MOODY'S IN ANY FORM OR MANNER WHATSOEVER.

Moody's Investors Service, Inc., a wholly-owned credit rating agency subsidiary of Moody's Corporation ("MCO"), hereby discloses that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by Moody's Investors Service, Inc. have, prior to assignment of any credit rating, agreed to pay to Moody's Investors Service, Inc. for credit ratings opinions and services rendered by it fees ranging from \$1,000 to approximately \$5,000,000. MCO and Moody's Investors Service also maintain policies and procedures to address the independence of Moody's Investors Service credit ratings and credit rating processes. Information regarding certain affiliations that may exist between directors of MCO and rated entities, and between entities who hold credit ratings from Moody's Investors Service and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted annually at www.moody.com under the heading "Investor Relations — Corporate Governance — Director and Shareholder Affiliation Policy."

Additional terms for Australia only: Any publication into Australia of this document is pursuant to the Australian Financial Services License of MOODY'S affiliate, Moody's Investors Service Pty Limited ABN 61 003 399 657AFSL 336969 and/or Moody's Analytics Australia Pty Ltd ABN 94 105 136 972 AFSL 383569 (as applicable). This document is intended to be provided only to "wholesale clients" within the meaning of section 761G of the Corporations Act 2001. By continuing to access this document from within Australia, you represent to MOODY'S that you are, or are accessing the document as a representative of, a "wholesale client" and that neither you nor the entity you represent will directly or indirectly disseminate this document or its contents to "retail clients" within the meaning of section 761G of the Corporations Act 2001. MOODY'S credit rating is an opinion as to the creditworthiness of a debt obligation of the issuer, not on the equity securities of the issuer or any form of security that is available to retail investors.

Additional terms for Japan only: Moody's Japan K.K. ("MJKK") is a wholly-owned credit rating agency subsidiary of Moody's Group Japan G.K., which is wholly-owned by Moody's Overseas Holdings Inc., a wholly-owned subsidiary of MCO. Moody's SF Japan K.K. ("MSFJ") is a wholly-owned credit rating agency subsidiary of MJKK. MSFJ is not a Nationally Recognized Statistical Rating Organization ("NRSRO"). Therefore, credit ratings assigned by MSFJ are Non-NRSRO Credit Ratings. Non-NRSRO Credit Ratings are assigned by an entity that is not a NRSRO and, consequently, the rated obligation will not qualify for certain types of treatment under U.S. laws. MJKK and MSFJ are credit rating agencies registered with the Japan Financial Services Agency and their registration numbers are FSA Commissioner (Ratings) No. 2 and 3 respectively.

Additional terms for Hong Kong only: Any Second Party Opinion or other opinion that falls within the definition of "advising on securities" under the Hong Kong Securities and Futures Ordinance ("SFO") is issued by Vigeo Eiris Hong Kong Limited, a company licensed by the Hong Kong Securities and Futures Commission to carry out the regulated activity of advising on securities in Hong Kong. This Second Party Opinion or other opinion that falls within the definition of "advising on securities" under the SFO is intended for distribution only to "professional investors" as defined in the SFO and the Hong Kong Securities and Futures (Professional Investors) Rules. This Second Party Opinion or other opinion must not be distributed to or used by persons who are not professional investors.

MJKK or MSFJ (as applicable) hereby disclose that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by MJKK or MSFJ (as applicable) have, prior to assignment of any credit rating, agreed to pay to MJKK or MSFJ (as applicable) for credit ratings opinions and services rendered by it fees ranging from JPY125,000 to approximately JPY550,000,000.

MJKK and MSFJ also maintain policies and procedures to address Japanese regulatory requirements.

Refinitiv ESG

These Terms of Use govern your access or use of the ESG information and materials on the Refinitiv website and any AI powered voice assistance software ("Refinitiv ESG Information"). 2020© Refinitiv. All rights reserved. Refinitiv ESG Information is proprietary to Refinitiv Limited and/or its affiliates ("Refinitiv").

The Refinitiv ESG Information is for general informational and non-commercial purposes only. Reproduction, redistribution or any other form of copying or transmission of the Refinitiv ESG Information is prohibited without Refinitiv's prior written consent.

All warranties, conditions and other terms implied by statute or common law including, without limitation, warranties or other terms as to suitability, merchantability, satisfactory quality and fitness for a particular purpose, are excluded to the maximum extent permitted by applicable laws. The Refinitiv ESG Information is provided "as is" and Refinitiv makes no express or implied warranties, representations or guarantees concerning the accuracy, completeness or currency of the information in this service or the underlying Third Party Sources (as defined below). You assume sole responsibility and entire risk as to the suitability and results obtained from your use of the Refinitiv ESG Information.

The Refinitiv ESG Information does not amount to financial, legal or other professional advice, nor does it constitute: (a) an offer to purchase shares in the funds referred to; or (b) a recommendation relating to the sale and purchase of instruments; or (c) a recommendation to take any particular legal, compliance and/or risk management decision. Investors should remember that past performance is not a guarantee of future results.

The Refinitiv ESG Information will not be used to construct or calculate and index or a benchmark, used to create any derivative works or used for commercial purposes. Refinitiv's disclaimer in respect of Benchmark Regulations applies to the Refinitiv ESG Information.

No responsibility or liability is accepted by Refinitiv its affiliates, officers, employees or agents (whether for negligence or otherwise) in respect of the Refinitiv ESG Information, or for any inaccuracies, omissions, mistakes, delays or errors in the computation and compilation of the Refinitiv ESG Information (and Refinitiv shall not be obliged to advise any person of any error therein). For the avoidance of doubt, in no event will Refinitiv have any liability for any direct, indirect, special, punitive, consequential or any other damages (including lost profits) relating to any use of the Refinitiv ESG Information.

You agree to indemnify, defend and hold harmless Refinitiv from and against any claims, losses, damages, liabilities, costs and expenses, including, without limitation, reasonable legal and experts' fees and costs, as incurred, arising in any manner out of your use of, or inability to use, any Information contained on the Refinitiv web site or obtained via any AI powered voice assistance software.

You represent to us that you are lawfully able to enter into these Terms of Use. If you are accepting these Terms of Use for and on behalf of an entity such as the company you work for, you represent to us that you have legal authority to bind that entity.

By accepting these Terms of Use you are also expressly agreeing to the following Refinitiv's website Terms of Use.

Refinitiv ESG scores are derived from third party publicly available sources ("Third Party Sources") and are formulated on the basis of Refinitiv own transparent and objectively applied methodology. Refinitiv's ESG Information methodology can be accessed [here](#).

Score range	Description	
0 to 25	First Quartile	Scores within this range indicates poor relative ESG performance and insufficient degree of transparency in reporting material ESG data publicly.
> 25 to 50	Second Quartile	Scores within this range indicates satisfactory relative ESG performance and moderate degree of transparency in reporting material ESG data publicly.
> 50 to 75	Third Quartile	Scores within this range indicates good relative ESG performance and above average degree of transparency in reporting material ESG data publicly.
> 75 to 100	Fourth Quartile	Score within this range indicates excellent relative ESG performance and high degree of transparency in reporting material ESG data publicly.

CG Report : by Thai Institute of Directors Association (Thai IOD), Established in December 1999, the Thai IOD is a membership organization that strives to promote professionalism in directorship. The Thai IOD offers directors certification and professional development courses, provides a variety of seminars, forums and networking events, and conducts research on board governance issues and practices. Membership comprises board members from companies ranging from large publicly listed companies to small private firms.



General Disclaimers And Disclosures:

This report is prepared and issued by Thanachart Securities Public Company Limited (TNS) as a resource only for clients of TNS, Thanachart Capital Public Company Limited (TCAP) and its group companies. Copyright © Thanachart Securities Public Company Limited. All rights reserved. The report may not be reproduced in whole or in part or delivered to other persons without our written consent.

This report is prepared by analysts who are employed by the research department of TNS. While the information is from sources believed to be reliable, neither the information nor the forecasts shall be taken as a representation or warranty for which TNS or TCAP or its group companies or any of their employees incur any responsibility. This report is provided to you for informational purposes only and it is not, and is not to be construed as, an offer or an invitation to make an offer to sell or buy any securities. Neither TNS, TCAP nor its group companies accept any liability whatsoever for any direct or consequential loss arising from any use of this report or its contents.

The information and opinions contained herein have been compiled or arrived at from sources believed reliable. However, TNS, TCAP and its group companies make no representation or warranty, express or implied, as to their accuracy or completeness. Expressions of opinion herein are subject to change without notice. The use of any information, forecasts and opinions contained in this report shall be at the sole discretion and risk of the user.

TNS, TCAP and its group companies perform and seek to perform business with companies covered in this report. TNS, TCAP, its group companies, their employees and directors may have positions and financial interest in securities mentioned in this report. TNS, TCAP or its group companies may from time to time perform investment banking or other services for, or solicit investment banking or other business from, any entity mentioned in this report. Therefore, investors should be aware of conflict of interest that may affect the objectivity of this report.

Note: Thanachart Securities Public Company Limited act as a Market Maker and Derivative Warrants Issuer. At present, TNS has issued 99 Derivative Warrants which are ADVANC16C2301A, ADVANC16C2210A, ADVANC16C2211A, AMATA16C2212A, AMAT16C2209A, AOT16C2212A, AOT16C2209A, BANPU16C2302A, BANPU16C2212A, BANPU16C2210A, BBL16C2212A, BCH16C2211A, BH16C2212B, BH16C2212A, BGRIM16C2301A, BGRIM16C2212A, BGRI16C2209A, BLA16C2212A, BLA16C2209A, BTS16C2301A, CBG16C2301B, CBG16C2301A, CBG16C2210A, CENTEL16C2209A, COM716C2209A, COM716C2211A, COM716C2211B, COM716C2211C, CPALL16C2211A, CPN16C2301A, DTAC16C2212A, DOHOME16C2301A, EA16C2209A, EA16C2211A, ESSO16C2209A, ESSO16C2209B, FORTH16C2211A, GPSC16C2301A, GPSC16C2209A, GULF16C2302A, GULF16C2301A, GULF16C2210A, GUNKUL16C2301A, GUNK16C2209A, HANA16C2301A, HANA16C2209A, HANA16C2211A, IVL16C2301A, IVL16C2212A, IVL16C2209A, IVL16C2211A, JMART16C2210A, JMART16C2211A, JMT16C2210A, JMT16C2211A, KBANK16C2302A, KBANK16C2301A, KBAN16C2209A, KBANK16C2211A, KCE16C2301B, KCE16C2301A, KCE16C2209A, KCE16C2211A, KTC16C2211A, KTC16C2209A, MINT16C2301A, MINT16C2211A, MTC16C2301A, MTC16C2212A, MTC16C2209A, PSL16C2212A, PTG16C2211A, PTG16C2209A, PTTEP16C2212A, PTTE16C2209A, RBF16C2209A, SAWAD16C2211A, S5016C2209A, S5016P2209A, SAWA16C2209A, SCB16C2301A, SCB16C2211A, SCGP16C2212A, SET5016C2212B, SET5016P2212A, SET5016C2209B, SET5016C2212A, SET5016P2209B, SINGER16C2212A, SPRC16C2212A, SPRC16C2209A, STEC16C2209A, TIDLOR16C2212A, TOP16C2211A, TRUE16C2212A, TTA16C2211A, TU16C2210A, VGI16C2301A, WHA16C2209A (underlying securities are (ADVANC, AMATA, AOT, BANPU, BBL, BCH, BGRIM, BH, BLA, BTS, CBG, CENTEL, COM7, CPALL, CPN, DOHOME, DTAC, EA, ESSO, FORTH, GPSC, GULF, GUNKUL, HANA, IVL, JMART, JMT, KBANK, KCE, KTC, MINT, MTC, PSL, PTG, PTTEP, RBF, SAWAD, SCB, SET50, SCGP, SINGER, SPRC, STEC, TIDLOR, TOP, TRUE, TTA, TU, VGI, WHA). before making investment decisions.

Note: Our major shareholder TCAP (Thanachart Capital Pcl) which holding 50.96% of Thanachart Securities and also TCAP holding 100% of Thanachart SPV1 Co. Ltd. TCAP and Thanachart SPV1 Co. Ltd has stake in THANI for 60% and being the major shareholder of THANI.

Note: Thanachart Capital Public Company Limited (TCAP), TMBThanachart Bank Public Company Limited (TTB), are related companies to Thanachart Securities Public Company Limited (TNS). Thanachart Securities Pcl is a subsidiary of Thanachart Capital Pcl (TCAP) which holds 23% of the shareholding in TMBThanachart Bank Pcl.

Thanachart Capital Public Company Limited (TCAP), Ratchthani Leasing Public Company Limited (THANI), MBK PUBLIC COMPANY LIMITED (MBK) and PATUM RICE MILL AND GRANARY PUBLIC COMPANY LIMITED (PRG) are related companies to Thanachart Securities Public Company Limited (TNS) . Since TNS covers those securities in research report, consequently TNS incurs conflicts of interest.

Disclosure of Interest of Thanachart Securities

Investment Banking Relationship

Within the preceding 12 months, Thanachart Securities has lead-managed public offerings and/or secondary offerings (excluding straight bonds) of the securities of the following companies: The One Enterprise Pcl. (ONEE TB)

Recommendation Structure:

Recommendations are based on absolute upside or downside, which is the difference between the target price and the current market price. If the upside is 10% or more, the recommendation is BUY. If the downside is 10% or more, the recommendation is SELL. For stocks where the upside or downside is less than 10%, the recommendation is HOLD. Unless otherwise specified, these recommendations are set with a 12-month horizon. Thus, it is possible that future price volatility may cause a temporary mismatch between upside/downside for a stock based on the market price and the formal recommendation.

For sectors, an "Overweight" sector weighting is used when we have BUYs on majority of the stocks under our coverage by market cap. "Underweight" is used when we have SELLs on majority of the stocks we cover by market cap. "Neutral" is used when there are relatively equal weightings of BUYs and SELLs.

Thanachart Securities Pcl.

Research Team

18 Floor, MBK Tower

444 Phayathai Road, Pathumwan Road, Bangkok 10330

Tel: 662 - 779-9119

Email: thanachart.res@thanachartsec.co.th

Pimpaka Nichgaroon, CFA

Head of Research

Tel: 662-779-9199

pimpaka.nic@thanachartsec.co.th

Pattarawan Wangmingmat

Senior Technical Analyst

Tel: 662-779-9105

pattarawan.wan@thanachartsec.co.th

Phannarai Tiypittayarut

Property, Retail

Tel: 662-779-9109

phannarai.von@thanachartsec.co.th

Sarachada Sornsong

Bank, Finance

Tel: 662-779-9106

sarachada.sor@thanachartsec.co.th

Witchanan Tambamroong

Technical Analyst

Tel: 662-779-9123

witchanan.tam@thanachartsec.co.th

Adisak Phupiphathirungul, CFA

Retail Market Strategy

Tel: 662-779-9120

adisak.phu@thanachartsec.co.th

Nuttapop Prasitsuksant

Telecom, Utilities

Tel: 662-483-8296

nuttapop.pra@thanachartsec.co.th

Rata Limsuthiwanpoom

Auto, Industrial Estate, Media, Prop. Fund

Tel: 662-483-8297

rata.lim@thanachartsec.co.th

Siriporn Arunothai

Small Cap, Healthcare, Hotel

Tel: 662-779-9113

siriporn.aru@thanachartsec.co.th

Sittichet Rungrassameeaphat

Analyst, Quantitative

Tel: 662-483-8303

sittichet.run@thanachartsec.co.th

Chak Reungsinpinya

Strategy, Insurance, Paper

Tel: 662-779-9104

chak.reu@thanachartsec.co.th

Pattadol Bunnak

Electronics, Food & Beverage, Shipping

Tel: 662-483-8298

pattadol.bun@thanachartsec.co.th

Saksid Phadthanarak

Construction, Transportation

Tel: 662-779-9112

saksid.pha@thanachartsec.co.th

Yupapan Polpornprasert

Energy, Petrochemical

Tel: 662-779-9110

yupapan.pol@thanachartsec.co.th

Thaloengsak Kucharoenpaisan

Analyst, Retail Market

Tel: 662-483-8304

thaloengsak.kuc@thanachartsec.co.th