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Thailand Energy & Chemical

ได้รับผลกระทบจากการส่งออกอีเทนและสารอนุพันธ์ของสหรัฐฯ

ปัจจุบันสหรัฐฯ เป็นผู้ส่งออกอีเทนและสารอนุพันธ์รายใหญ่ของโลก

เช่นเดียวกันกับผลกระทบของอุปทานน้ำมันและก๊าซจากชั้นหินดินดานต่อราคาน้ำมันและก๊าซโลก เราเชื่อว่าในปี 2021-23 อัตรากำไรของโอเลฟินและโพลีโอเลฟินในตลาดโลกจะถูกกำหนดโดยการส่งออกอีเทนและสารอนุพันธ์ของ สหรัฐฯ โดย EIA ได้คาดว่าการส่งออกอีเทนของสหรัฐฯ อาจแตะระดับสูงสุดเป็นประวัติการณ์ที่ 373kbpd ในปี 2021 และ 447kbpd ในปี 2022 ซึ่งจะเพิ่มกระแสการส่งออกอีเทน เอทิลีนและสารอนุพันธ์ของเอทิลีนซึ่งปรับตัวขึ้นอย่าง สม่ำเสมอมาตั้งแต่ปี 2014

การส่งออกอีเทนและเอทิลีนของสหรัฐฯ เพิ่มสูงขึ้น

อีเทนคิดเป็นกว่า 13% ของปริมาณส่งออกรวมสำหรับอีเทนและสารเคมีที่ได้จากอีเทนของสหรัฐฯ ในขณะที่การส่งออก เอทิลีนและสารอนุพันธ์ของเอทิลีนอยู่ที่ 77% ในปี 2020 ปัจจุบันสหรัฐฯ ส่งออกอีเทนไปยังประเทศต่าง ๆ หลาย ประเทศประกอบด้วยอินเดีย สหราชอาณาจักร นอร์เวย์ สวีเดน เม็กซิโก บราซิลและจีน การส่งออกดังกล่าวเริ่มในกลาง ปี 2019 และมีค่าเฉลี่ยอยู่ที่ประมาณ 20kbpd ในปี 2020 แม้ว่ามีเพียง 8 ประเทศที่นำเข้าอีเทนจากสหรัฐฯ มากกว่า 100 ประเทศนำเข้าเอทิลีนและสารอนุพันธ์เอทิลีนจากประเทศดังกล่าว ในปี 2020 สหรัฐฯ ส่งออกเอทิลีนส่วนมากไปยัง ได้หวัน (39%), จีน (36%), อินโดนีเซีย (11%), เบลเยี่ยม (8%), และโคลัมเบีย (2%)

อัตรากำไรมีความเสี่ยงขาลงจากการส่งออกของสหรัฐฯ

ผลกระทบของการส่งออกอีเทนของสหรัฐฯ ที่เพิ่มขึ้นทำให้ผู้ผลิตปิโตรเคมีโลกหวังที่จะหาประโยชน์ในด้านต้นทุนจาก การกลั่นอีเทนเพื่อผลิตเอทิลีนเพื่อพัฒนาโรงกลั่นปิโตรเคมีและระบบสาธารณูปโภคที่เกี่ยวข้องใหม่เพื่อนำเข้าและแปร รูปอีเทนของสหรัฐฯ การส่งออกของสหรัฐฯ ไปยังเอเซียและยุโรปได้เพิ่มขึ้นเกือบ 3 เท่าในช่วงดังกล่าว นอกจากนี้ในปี 2020 ภูมิภาคดังกล่าวยังคิดเป็น 42% ของส่วนแบ่งการส่งออกโพลิเอทิลีนรวมของสหรัฐฯ อีกด้วย

IVL และ IRPC เป็นหุ้นเด่นจากอัตรากำไรของ PET และ ABS ที่ดีอย่างยั่งยืน

เราเห็นว่าในช่วง 12 เดือนข้างหน้าราคาหุ้นของ IVL และ IRPC จะปรับตัวดีกว่า PTTGC และ SCC จากการเติบโต ของกำไรสุทธิที่สูงกว่าตามอัตรากำไรของผลิตภัณฑ์และปริมาณขายที่สูงขึ้น เราคาดว่า IVL และ IRPC จะได้ประโยชน์ จากการฟื้นตัวของความต้องการและอุปทานใหม่ที่มีจำกัดสำหรับ PET, MEG, MTBE, และ ABS เมื่อเทียบกับอัตรา กำไรสำหรับ PE และ PP ของ PTTGC และ SCC ที่คาดว่าลดลงตั้งแต่ 2H21 เป็นต้นไป



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บทวิเคราะห์ฉบับนี้แปลมาจากบทวิเคราะห์ของ FSSIA ฉบับวันที่ 2 กรกฎาคม 2021

Impact of rising exports of US ethane and its derivatives

In the past two months in May-Jun 2021, the margins of petrochemical products have all but declined after their peaks in 1Q21 due to the looming supply influxes that are projected to come on stream in 2H21 onward.

In particular, the margins of polyolefins, which include polyethylene (PE) and polypropylene (PP), have sharply plunged by over USD300/t, or 30% q-q, while the margins of aromatics products,0 paraxylene (PX) and benzene over naphtha, have corrected at a smaller scale than those of olefins products due to the continued strong demand for PX (polyester fibres and PET bottles) and benzene (ABS and PS) for auto parts.

Exhibit 1: Polyolefins margin plunged since Apr-21



Exhibit 2: Naphtha spread – ABS



Source: Bloomberg

Source: Bloomberg

Meanwhile, petrochemical products have continued to see strong margins in the polyester product value chain, with the integrated PET-PTA margin remaining high in Western markets (North America and Europe). This is thanks to the higher import parity costs caused by the shipping freight spikes and the high import duties, resulting in wider product margins between the Western and Asian markets.

The impact of the supply influx for PET and PTA from China should be much more manifest in Asian PET and PTA margins than for Western markets due to the impact from trade barriers and freight hikes to boost the import parity impact up by USD100-150/t.



Exhibit 3: Integrated PET-PTA margin in Asia

Source: IVL

Exhibit 4: Integrated PET-PTA margin in Western market



Source: IVL

US ethane exports and supply are key factors for global petrochem margin

Ethane is primarily used as a petrochemical feedstock for ethylene crackers and is heated to temperatures between 1,450-1,600°F to break ethane molecules down into ethylene, which will be further processed to create derivatives such as polyvinyl chloride (PVC) and ethylene glycol (EG). However, the most common process is polymerization to make PE, a common base component of plastics.

Exhibit 5: Key petrochemical feedstocks and their end products

HGL	Uses	End-use products	End-use sectors
Ethane	Petrochemical feedstock for ethylene production; power generation	Plastics; anti-freeze; detergents	Industrial
Propane	Fuel for space heating, water heating, cooking, drying, and transportation; petrochemical feedstock	Fuel for heating, cooking, and drying; plastics	Industrial (includes manufacturing and agriculture), residential, commercial, and transportation
Butanes: normal butane and isobutane	Petrochemical and petroleum refinery feedstock; motor gasoline blending	Motor gasoline; plastics; synthetic rubber; lighter fuel	Industrial and transportation
Natural gasoline (pentanes plus)	Petrochemical feedstock; additive to motor gasoline; diluent for heavy crude oil	Motor gasoline; ethanol denaturant; solvents	Industrial and transportation
Refinery olefins (ethylene, propylene, normal butylene, and isobutylene)	Intermediate feedstocks in the petrochemical industry	Plastics; artificial rubber; paints and solvents; resins	Industrial

Source: Energy Information Agency (EIA)

Ethane vs propane. Unlike ethane, most of the propane consumed globally and in the US is used as fuel, generally in areas where the supply of natural gas is limited or not available and in countries in the Northern Hemisphere where the weather is extremely cold in winter. This use is highly seasonal, with the largest consumption occurring in the fall and winter months.

Propane has two general market categories: consumer (primarily as fuel) and nonconsumer (primarily for nonfuel or feedstock uses). Propane has four major consumer uses:

- In homes, for space heating and water heating; for cooking; for drying clothes; and for fuelling gas fireplaces, barbecue grills, and backup electrical generators;
- On farms, for heating livestock housing and greenhouses, for drying crops, for pest and weed control, and for powering farm equipment and irrigation pumps;
- 3. In businesses and industry, to power forklifts, electric welders, and other equipment;
- 4. As a fuel for on-road internal combustion engine vehicles such as cars, school buses, or delivery vans and non-road vehicles such as tractors and lawn mowers.

The non-consumer market for propane is the petrochemical industry. The primary use of propane in the petrochemical industry is as a feedstock, along with ethane and naphtha, in petrochemical crackers to produce ethylene, propylene, and other olefins. Propane can also be used as a dedicated feedstock in the petrochemical industry for on-purpose propylene production. Propylene and the other olefins may be converted into a variety of products, mostly plastics and resins, and also glues, solvents, and coatings.

The blend of propane and butane, normally at 50% each, is called liquefied petroleum, which is easily transported via specifically designed vessels to ports globally. LPG can be produced from refinery plants or from the blend of propane and butane extracted from gas produced from upstream gas wells.

US ethane exports have been on the rise since 2016. Similar to the impact from the US shale oil and gas supply on the global oil and gas prices (via LNG exports from the US), we believe that in 2021-23 the global margins of olefins and polyolefins will be mostly determined by US ethane exports. According to the US Energy Information Agency (EIA), US ethane exports could reach record highs in 2021, extending the trend of consistently rising exports of ethane and associated ethylene and ethylene derivatives since 2014.

Ethane accounts for over 13% of the total volume of US exports of ethane and ethanederived chemicals, and exports of ethylene and ethylene derivatives make up the rest of the ethane value chain exports.

Ethylene exports, which had been relatively flat in 2014-18, grew by 139% between 2019 and 2020, reaching 5% of the total ethane-related chemical exports. Prior to 2020, all US ethylene exports moved through a terminal in Galena Park, Texas. In early 2020, a second, higher capacity ethylene export terminal began operations out of Morgan's Point, Texas. Both terminals are on the Houston Ship Channel.



Exhibit 6: US ethane exports by destination





Source: EIA

Source: EIA

As one of only two countries (the other is Norway) with substantial ethane production capacity and export capabilities, the US is positioned as both the largest global ethane consumer and exporter. Its ability to produce ethane at a low cost relative to other feedstocks used in the petrochemical industry has enabled US producers to produce ethylene and ethylene derivative products at a competitive cost structure, resulting in higher exports of ethane, ethylene and its derivatives.

The US produces, consumes, and exports all products within the ethane value chain, which includes ethane, ethylene, PE, and monoethylene glycol (MEG). However, the US exports of ethane began in 2014, when the first export pipelines for ethane were completed and began shipping to petrochemical plants in Canada. Since then, the US has added additional ethane export capacity, including three marine export terminals that ship cryogenically cooled ethane overseas in specially built tankers.

Exhibit 8: Dragon class 27,500 m3 liquid gas carrier for transatlantic shipments of Marcellus ethane

Dragon Class 27,500 m3 liquid gas carrier intended for transatlantic shipments of Marcellus ethane



Exhibit 9: Mariner East pipeline route



Source: EIA

Source: EIA

Beginning in 2016, US ethane exports increased due to the new capacity to ship ethane overseas to crackers in Europe. By 2018, the US was exporting to six countries that had infrastructure to import cryogenically-cooled ethane at coastal terminals connected to ethylene crackers, including India, UK, Norway, Sweden, Mexico, and Brazil.

US ethane exports to China began in mid-2019 and averaged approximately 20,000 barrels per day (bpd) through the end of 2020. In January 2021, a third export terminal began operations at Nederland, Texas, which increased US capacity for waterborne exports by 170,000bpd. In the EIA's June "Short-Term Energy Outlook" report, the EIA forecasts US ethane exports to reach 373,000bpd in 2021 and 447,000bpd in 2022.



Exhibit 10: US exports of ethane and derivatives by value

Exhibit 11: Destination share of US ethane and derivatives export



Source: EIA

Source: EIA

Exports of ethylene and derivative products are on the uptrend. The destinations of ethane and ethane-derived chemicals depend on the product. Although only eight countries import US ethane, more than 100 countries import US ethylene and ethylene derivatives. In 2020, ethylene was predominantly exported to Taiwan (39%), China (36%), Indonesia (11%), Belgium (8%), and Colombia (2%).

Canada and Mexico, which can import ethylene derivatives by land, tend to import more ethylene derivatives that way because it is less costly than waterborne exports. In addition, Canada and Mexico do not impose tariffs on imports from the US because of reciprocal free trade agreements. Combined, 31% of US PE exports went to Canada and Mexico in 2020, while 14% went to China and 6% to Brazil.

From 2015-20, US exports to Canada and Mexico, where the market has been relatively flat, have declined as a share of the total. Exports to Asia and Europe have nearly tripled over that period, and in 2020, those regions accounted for 42% of the total share of all US polyethylene exports. Exports of other ethylene derivatives to Asia have also grown, increasing 487% between 2015 and 2020 compared with 35% growth to Canada and Mexico. In 2020, Malaysia was the largest destination for these exports, accounting for 12% of the total, followed by Belgium (11%), Singapore (9%), China (8%), and Brazil (8%).

Exhibit 12: The Seri Everest, the world's largest VLEC



Exhibit 13: Current and proposed routes for US ethane exports



Source: Energy Transfer

Source: EIA

Unlike ethane and ethylene, which are exported as cryogenically refrigerated liquids on tankers from purpose-built terminals, polyethylene and other ethylene derivatives can be exported through any port or overland route capable of handling containerized traffic. The US Census Bureau reports that approximately 24% of ethylene derivatives were exported out of just two customs districts, Houston-Galveston and Laredo, which are both close to the main ethylene production areas in Texas.

Exports of ethylene-derived polyethylene and other value-added products account for a greater value share of exports than volume does. As a share of value, ethane accounts for more than 9% of the total. Polyethylene accounts for 48% of the value across the ethane export value chain and 46% of volume. Similarly, other ethylene derivatives are considered higher-valued, semi-finished products and make up the remaining 39% of the ethane export value chain despite only representing 36% of the volume.

Although ethylene derivatives make up the bulk of ethane exports by volume and by value, ethane exports as a whole are growing as global petrochemical manufacturers find ethane's low cost as a feedstock attractive for manufacturing value-added products. Until the US became a major ethane exporter in 2016, only a few countries had sufficient natural resources and midstream infrastructure to use ethane as a petrochemical feedstock.

Across most of Asia and Europe, naphtha serves as the primary petrochemical feedstock, followed by propane and normal butane. Although more expensive than ethane, these feedstocks, when processed in a petrochemical cracker, yield other products that may be more valuable than ethylene.

Specially built tankers carry exported ethane that is cryogenically cooled to -128°F so it can be transported as a liquid. The number and capacity of vessels calling on US ports is growing in step with increasing ethane export demand.

According to the America Chemistry Council, ethane, the lightest feedstock, yields the most ethylene from a cracker at about 80%, and the rest are coproducts such as methane, hydrogen, and propylene. Propane and normal butane, which are heavier, yield more propylene and butylene and about half as much ethylene compared with using ethane feedstock. Naphtha feedstock, an even heavier hydrocarbon associated more with crude oil than with natural gas, yields even less ethylene at about 32% on average.





Source: EIA

In the US, cracking ethane for ethylene production has consistently generated a higher margin, averaging 17.5 cents per pound from the beginning of 2015 through April 2021, or almost twice as high as the margin from cracking naphtha. This trend has resulted in US ethylene prices declining significantly below ethylene spot prices overseas.

Except for during the first quarter of 2021, when US ethylene production was severely curtailed due to the impact of a mid-February winter storm on the Gulf Coast, US ethylene prices have been, on average, 45% lower than ethylene prices in Western Europe and East Asia.

Even during the rapid price increases reported in 2H20, when various Covid-19 mitigation measures resulted in a strong demand for plastics and resins for consumer goods and personal protective equipment, US spot prices remained discounted relative to international ethylene prices by 38% on average. This discount has provided US manufacturers of ethylene derivatives with a long-term cost advantage that has resulted in expanding manufacturing capacity along the US Gulf Coast and in strong ethane export growth.

Impact of rising US ethane and ethylene derivative exports on chemical margins

As a result of the rising exports of US ethane and its derivatives since 2016, the global supply for ethylene and its derivatives, particularly PE, has risen markedly during 2016-20, accounting for 20-55% in the period. Thanks to its cost competitiveness, US ethane-based ethylene producers have raised their exports, increasingly gaining market share of global ethylene imports since 2016.

Exhibit 15: North America spot purified ethane price





Source: Bloomberg

Source: Bloomberg

According to the EIA, the US ethane projects currently under construction and in the commissioning phases could generate an additional 166,000bpd of ethane exports through the end of 2022, over 2020 levels. US ethane export growth beyond 2022 will depend on the long-term expectations for ethane's continuing price competitiveness relative to heavier feedstocks and the ability of US producers to extract higher volumes of ethane from the natural gas stream.

Exhibit 17: Global ethylene capacity addition by feedstock



Exhibit 18: Global ethylene supply addition vs demand growth



Source: Extracted from PTTGC's investor presentation

Source: Extracted from PTTGC's investor presentation

The impact of the rising exports of US ethane has resulted in global petrochemical manufacturers hoping to capture the cost advantage of cracking ethane to produce ethylene to develop new petrochemical crackers and the associated infrastructure to import and process ethane from the US

PE margin is feeling the pinch from US and China's rising supply. To add insult to injury, China will add a large number of new naphtha-based PE supplies in 2021-23, with the most significant amount added in 2021-22. The new PE supply influxes from the US and China in 2021-23 could result in a margin decline for PE, which has dropped by over 50% q-q to the current USD400-600/t level in 2Q21 from its peak in 1Q21.

Exhibit 19: Global PE supply and demand growth





Source: PTTGC

Source: PTTGC

The margin of high-density polyethylene (HDPE), the major PE product, over naphtha has plunged to below USD500/t in Jun-21 from the USD1,000/t level in Mar-21, thanks to the rising supplies from US exports and China. Despite the cost inflation from the rising crude oil price from USD65/bbl at end-1Q21 to USD75/bbl in Jun-21 and the strong demand, the price of HDPE has declined due to the impact of the new supplies.





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Exhibit 22: Naphtha spread – HDPE



Sources: PTTGC; FSSIA estimates

Source: Bloomberg

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Exhibit 20: Global additional PE supply by region

Similarly, the margins of two other PE – low-density polyethylene (LDPE) and linear low-density polyethylene (LLDPE) – over naphtha costs have decreased due to the new supply impact, resulting in margin squeezes for LDPE-naphtha and LLDPE-naphtha by 40% q-q in 2Q21.

Exhibit 23: Naphtha spread – LDPE



Source: Bloomberg

Source: Bloomberg

PVC margin should stay resiliently high in 2021-23. The margin of PVC, a major downstream byproduct of ethylene, has softened in 2Q21 but still remains high at above USD200/t vs its historical average of USD100/t in 2015-19. The strong demand for the construction material and automobile industries and the tighter supply due to the shutdowns of China's coal-based, acetylate-derived PVC, have further fuelled and sustained the PVC margin at a high level since 2019.

We think the PVC margin will continue to stay high in 2021-22, backed by the continued tight supply and a strong demand from the upcoming global economic reopening. Despite our projected higher PVC exports from the US, we still expect the PVC margin to remain high, as the higher US exports should be offset by the rising demand.

Exhibit 25: Prices of PVC and its feedstock



Exhibit 26: PVC price and margin

Exhibit 24: Naphtha spread – LLDPE



Source: Bloomberg

Source: Bloomberg

PP-naphtha margin to weaken in 2021-22. The margin of PP over naphtha has already weakened from its peak in Mar-21 due to the new supply influx from China and Southeast Asia, and we think those factors should continue to pressure the PP-naphtha margin in 2H21-22. However, unlike the PE-naphtha margin, we believe the PP-naphtha margin will stay healthy at over USD600/t vs USD450-500/t for PE, thanks to the stronger demand for PP used in the automobile and packaging industries and the more limited new supply than is set to come on stream in 2021-22.

Exhibit 27: Margin and price of PP vs naphtha price



Source: Bloomberg

Exhibit 29: Polypropylene supply, demand, world operating rate



Source: IRPC





Source: IRPC



Source: Bloomberg

Exhibit 28: PP-propylene margin

Exhibit 30: Polypropylene per capita consumption



Source: IRPC

Exhibit 32: Regional polypropylene net trade

Mainly export from ME to Asia



Source: IRPC

Aromatics: Benzene margin remains a key catalyst. Meanwhile, the margin of benzene and its derivatives has stayed strong in 1H21, driven by the solid demand for its downstream styrene monomer (SM)-based products, mainly for automobile parts and home electrical and electronics (E&E) appliances, or white goods.

Exhibit 33: Naphtha spread – Butadiene and SBR price





Source: Bloomberg

Exhibit 35: AP/ME benzene supply, demand, world operating rate



Source: Bloomberg

Exhibit 36: Benzene capacity

Exhibit 34: Benzene spread – Styrene



Source: TOP



Acrylonitrile butadiene styrene (ABS), a key downstream byproduct of SM and benzene for IRPC, has seen its margin jump by over 60% from its bottom at a USD1,000/t average level in 2019-20 to its USD2,400/t peak in 2Q21, and has currently softened to over USD1,800/t at end-Jun-21.

ABS provides favourable mechanical properties such as impact resistance, toughness, and rigidity when compared with other common polymers. A variety of modifications can be made to improve impact resistance, toughness, and heat resistance. The impact resistance can be amplified by increasing the proportions of polybutadiene in relation to styrene and also acrylonitrile, although this causes changes in other properties. Impact resistance does not fall off rapidly at lower temperatures. Stability under load is excellent with limited loads. Thus, by changing the proportions of its components, ABS can be prepared in different grades.

Exhibit 37: Naphtha spread – ABS





Exhibit 38: Naphtha spread – Paraxylene

Source: Bloomberg

Source: Bloomberg

ABS is derived from acrylonitrile, butadiene, and styrene. Acrylonitrile is a synthetic monomer produced from propylene and ammonia; butadiene is a petroleum hydrocarbon obtained from the C4 fraction of steam cracking; styrene monomer is made by dehydrogenation of ethyl benzene – a hydrocarbon obtained in the reaction of ethylene and benzene.

Two major categories could be ABS for extrusion and ABS for injection moulding, then high and medium impact resistance. Generally, ABS would have useful characteristics within a temperature range from $-20-80^{\circ}$ C ($-4-176^{\circ}$ F).

Exhibit 39: Lego bricks are made from ABS



Exhibit 40: Citroën Méharis are made from ABS



Source: Wikipedia

Source: Wikipedia

ABS is a thermoplastic resin, with well-balanced physical properties between hardness and toughness. It is tough, has a high impact strength, high heat and chemical resistance, and high stiffness and weather resistance, including high gloss. It is mainly used for the manufacturing of electrical parts, automotive parts, office automation, electronics appliance parts, and toys.

In addition, IRPC also produces another styrene downstream specialty chemical product, acrylonitrile styrene (AS or SAN), a copolymer of styrene and acrylonitrile. It offers significant properties such as transparency, stiffness, strength and also heat and chemical resistance, which are suitable for the production of sanitary wares, juice mixers, cosmetic cases, and lighters, according to IRPC.

Exhibit 41: AS

Exhibit 42: ABS



Source: IRPC

Source: IRPC

According to IRPC, the demand growth for ABS is projected to grow in 2021-24, rising from 9.4mtpa to 11.3mtpa in 2024. The key growth drivers for ABS demand will likely come from Northeast and Southeast Asia, led by the demand growth in China and ASEAN countries. Hence, we think the ABS-SM margin should stay high at over USD1,500/t in 2021-22 and likely stay above USD1,400/t in 2023, thanks to the strong demand and limited new supply.

Exhibit 43: 2019 ABS demand by region



Source: IRPC

Exhibit 45: ABS capacity addition by region



Source: IRPC

Exhibit 44: ABS demand by application



Source: IRPC

Exhibit 46: ABS supply, demand, world operating rate



Source: IRPC

PX margin remains weak but PET-PTA margin should be strong in 2021-22.

Despite the strong demand for the PX downstream products of PET and polyester fibres, the PX-naphtha margin has remained weak at below USD300/t since Apr-20 due to the supply influx from China. However, according to IVL, the margins of PET-PTA and PTA-PX in North America and Europe (Western market) are projected to stay high at above USD250/t in 2H21-2022, backed by stronger demand, a tight supply, and the high import parity pricing caused mainly by the rising freight costs. This should benefit IVL the most, given its large capacity in North America.

Exhibit 47: AP/ME PX supply, demand, world operating rate



Source: TOP





Exhibit 48: AP/ME effective capacity and demand growth



Source: TOP

Exhibit 50: PET and PTA margins in Western markets



Source: IVL

Source: IVL

Impact of rising US exports on Thai petrochemical companies

We see a diverging impact from the rising US exports of ethane and its derivative products on the margins and net profits of Thai petrochemical companies. While IVL and IRPC are likely to be winners, PTTGC and SCC could become losers on the higher supply of competitive ethane and ethylene derivative products in 2021-23. This would be due to their different capacity and EBITDA exposures to different product groups along the olefins value chain.

Among four key listed petrochemical companies, we believe IVL and IRPC stand as the two beneficiaries of the healthy margin outlook in the polyester and styrene value chains. On the other hand, we think PTTGC and SCC could feel the pinch from the weaker margin outlook for PE and PP, two key product groups for PTTGC and SCC. Their overall chemical net profits should be partly supported by the strong projected PVC margin.

Exhibit 51: EBITDA breakdown by business as of 2020





Exhibit 52: EBITDA breakdown by business as of 2020 (%)

Source: Company data

Source: Company data

In 1Q21, all four companies enjoyed strong petrochemical product margins, particularly PE, PP, PVC, ABS, and PET, and large inventory gains due to the USD15/bbl higher crude oil price in 1Q21. We project that in 2Q21 all four companies should still see stronger q-q EBITDA and net profits from the margin strengths of petrochemical products, including PE, PP, PVC, ABS, and PET, thanks to the strong demand growth. The impact of the new supplies in the US and China did not enter the market until Jun-21.

Exhibit 53: EBITDA breakdown by business as of 1Q21



Exhibit 54: EBITDA breakdown by business as of 1Q21 (%)



Source: Company data

Source: Company data

IVL: A key winner on the competitive ethane feedstock and high margins of ethylene derivatives in the US. Thanks to IVL's diversified asset portfolio with a large exposure to the integrated oxide and derivatives (IOD) group – the key downstream products of ethylene and ethane produced from the abundant and competitive shale gas feedstock – we project IVL to generate over 40-50% of its 2021-22E USD1.5b EBITDA from the IOD group.

IVL's key products include:

Group 1: Commodity base IOD products.

- 1) Ethylene and propylene produced from its 420ktpa ethane crackers that will start operating again after more than a six-month shutdown due to a lightning strike in 2020.
- 2) The ethylene glycol (EG) and ethylene oxide (EO) product group, which includes MEG with a capacity of 1.9mtpa.



3) Methyl tertiary-butyl ether (MTBE), a gasoline blending product, with its margin tightly linked with the gasoline price.

Group 2: Specialty IOD products with relatively stable margins.

- Surfactants, a key compound that lower the surface tension between two liquids, mostly used for detergents, wetting agents, emulsifiers, foaming agents, or dispersants.
- 2) Propylene oxide (PO) with a captive demand for the production of anti-freeze in the US market.
- Ethanolamine is used as feedstock in the production of detergents, emulsifiers, polishes, pharmaceuticals, corrosion inhibitors, and chemical intermediates. Hence, its margin is relatively stable with a captive demand.

Exhibit 55: Capacity breakdown by product



Exhibit 56: IVL's IOD group capacity in the US and Gulf of Mexico in Texas

IVL's capacity post acquisition of Huntsman's assets	Huntsman	Ethane cracker	Texas plant	Total
	(ktpa)	(ktpa)	(ktpa)	(ktpa)
Ethylene	218	420		638
Propylene	64	20		84
EG	532		300	832
EO	635		250	885
Surfactants	360			360
PO	238			238
MTBE	731			731
Ethanolamine (EOA, MEA, DEA, TEA)	181			181
Others	188			188
Total	3,147	440	550	4,137

Source: IVL

Source: IVL

Aside from the margin strengths of integrated PET-PTA in the Western market, we think IVL's net profit will be driven by the strong margins of its IOD group, particularly for the commodity products of MEG (0.55mtpa capacity) and MTBE (0.73mtpa), given the cheap feedstock of ethane and the strong demand in the US market post economic reopening after the Covid-19 pandemic subsides, possibly in 2H21.

Exhibit 57: US MEG industry integrated spread



Exhibit 58: US MTBE industry spread



Source: IVL

Source: IVL



IRPC: A winner on PP and ABS. IRPC has seen its gross integrated margin (GIM) rise on the back of the stronger margins of ABS and PP in 1Q21. PP and ABS accounted for over 50% of IRPC's core EBITDA in 1Q21 and we project that these two products will contribute an even higher proportion of core EBITDA to IRPC in 2Q21, given the higher q-q margins of both PP-naphtha and ABS-SM.

We believe ABS will be IRPC's key winning product in 2021-22, as we project the ABS-SM margin to remain high at over USD1,500/t, supported by the strong demand for automobile parts and E&E appliances. In addition, IRPC is likely to benefit the most from ABS among the three Thai petrochemical companies that produce benzene, as only IRPC has converted its upstream benzene into downstream ABS.

PTTGC should gain from the margin uptrend of phenol, while Thai Oil (TOP TB, BUY, TP THB74) could benefit from the margin strengths of linear alkyl benzene (LAB), a downstream specialty product produced from benzene. However, the benefits of PTTGC's phenol margin and TOP's LAB margin will likely be much less than IRPC's ABS margin strength, given the sharp rise in the ABS-SM margin compared to the margin rises for phenol and LAB.

Exhibit 59: Capacity comparison of benzene and derivatives

Benzene capacity	ТОР	PTTGC	IRPC	Unit
Capacity	0.26	0.70	0.14	mtpa
Production	0.25	0.60	0.14	mtpa
Internal consumption	0.04	0.42	0.14	mtpa
External sales	0.21	0.18	0.00	mtpa
Downstream capacity				
Linear Alkyl Benzene (LAB)	0.10	-	-	mtpa
Phenol	-	0.91	-	mtpa
Styrene Monomer (SM)	-	-	0.26	mtpa
Acrylonitrile Butadiene Styrene (ABS)	-	-	0.18	mtpa
Polystyrene (PS)	-	-	0.11	mtpa

Source: IRPC

PTTGC vs SCC. We believe both PTTGC and SCC will see weaker margins of PE and PP starting in 3Q21 due to the rising US exports of ethane and its derivatives and the new supply from China. Olefin products accounted for over 50% of PTTGC's EBITDA and around one-third of SCC's EBITDA in 2020.

Exhibit 60: Olefins 2 Modification Project's process flow



Exhibit 61: Feedstock comparison (PTTGC vs SCC)



Source: PTTGC

To enhance its feedstock flexibility and competitiveness and reduce the impact of the US ethane and derivatives exports, PTTGC initiated a project called the Olefins 2 Modification Project (OMP) with an investment of USD165m to effectively improve the feedstock flexibility of its existing naphtha-based capacity, namely the unit I4. Post completion of OMP in 1Q23, we estimate that it will allow PTTGC to use propane as a feedstock vs only naphtha and LPG feedstocks currently.

Exhibit 62: PTTGC's capacity breakdown by plant

Olefins plants	Capacity ('000tpa)	Product	Feedstock type
11	461	Ethylene	Gas
11	125	Propylene	Gas
Olefex I	127	Propylene	Gas
l4-1	515	Ethylene	40% Naphtha/60% Gas
14-1	310	Propylene	40% Naphtha/60% Gas
14-2	300	Ethylene	Gas
l4-2 - Debottleneck	150	Ethylene	Gas
Ethane cracker (PTTPE)	1,000	Ethylene	Gas
Olefins Reconfiguration (ORP)	750	Ethylene/Propylene	Naphtha
Total olefins	3,738		
Aromatics/Refinery	Capacity (bpd)		
AR 1 Refinery (CDU)	145,000	Petroleum	Crude
AR 2 Condensate Splitter	65,000	Petroleum/Aromatics	Condensate
AR 3 Condensate Splitter	70,000	Petroleum/Aromatics	Condensate

Source: PTTGC

Sources: PTTGC; SCC; FSSIA estimates

SCC: Near-term, timely capacity growth. In 3Q21, SCC will complete its Maptaphut Olefins Complex (MOC) olefins debottlenecking project to increase its olefins capacity by 350ktpa, comprising 300ktpa of ethylene and 50ktpa of propylene. This would raise SCC's ethylene capacity to 2.1mtpa and propylene to 1.3mtpa, reducing its currently imbalanced upstream and downstream olefins production capacity by 300ktpa, based on our estimate.

Exhibit 63:	SCC's major	chemical cap	oacity post start-up	of MOC	expansion in 3Q21

SCC capacity - Consolidated			
Chemical - Naphtha cracker	Capacity (ktpa)	% holding (%)	Equity capacity (ktpa)
Ethylene	2,100	67	1,407
Propylene	1,300	67	871
Total upstream	3,400		2,278
Chemicals - Downstream	Capacity (ktpa)	% holding (%)	Equity capacity (ktpa)
HDPE	920	100	920
LDPE + LLDPE	272	100	272
PP	720	100	720
PVC (Thailand, Indo, Vietnam)	886	100	886
Total downstream	2,798		2,798

Sources: SCC; FSSIA estimates

SCC's PE product group, which is comprised of HDPE, LDPE, LLDPE, and PVC, makes up its largest downstream chemical production capacity with a consolidated total equity capacity of 2.8mtpa vs its upstream equity capacity of 2.3mtpa. Hence, after the start-up of the MOC expansion project in 3Q21, we estimate that SCC's upstream and downstream capacities will be relatively balanced – the required upstream feedstock of olefins for the downstream 2.8mtpa is 2.4mtpa (1.9mtpa for PE and PP and 0.5mtpa for PVC-0.6ethylene for one tonne of PVC production).

Long Son Petrochemical Complex (LSP). SCC's large-scale LSP project in Vietnam, is 100%-owned by SCC and is a highly flexible feedstock chemical cracker with the capability to use up to 80% gas and 20% naphtha as feedstocks for the plant. LSP's commercial operation date is scheduled in 2023 with a near-complete integration of its upstream (1.6mtpa) and downstream (1.35mtpa) capacities.

While we are not positive on the capacity growth potential from the LSP project, given the uncertainty of the margin outlook post 2023, we think SCC should greatly benefit from its higher feedstock flexibility by using a more competitive feedstock mix between gas and naphtha. We estimate that SCC will be able to increase its capability to use gas feedstock – from the current 30% (LPG) for its MOC and Rayong Olefins Company (ROC) naphtha crackers in Thailand – by up to 67%, after the LSP and MOC debottlenecking projects are complete.

Exhibit 64: SCC's petrochemical complex in Vietnam

SCC's new Vietnam petrochemical complex	Location: Long Son Island, Baria-Vung Tau
	(USD m)
Total investment cost	5,400
Debt to equity (x)	1.50
Equity investment	2,160
Capacity	(ktpa)
Olefins	1,600
HDPE	450
LLDPE	500
PP	400
Key feedstock	(%)
Ethane	50
Propane	30
Naphtha	20
Commercial starting date	2023E

Sources: SCC; FSSIA estimates

IVL and IRPC are our top picks

Given our more positive outlook on the margins of PET, MEG, MTBE (for IVL) and ABS (IRPC) and less positive view on the margins of PE and PP, we prefer IVL and IRPC as our two top picks in the Thai petrochemical sector.

Exhibit 65: IRPC's one-year rolling forward P/BV band

Exhibit 66: IRPC's one-year rolling forward EV/EBITDA band



Sources: Bloomberg; FSSIA estimates

Sources: Bloomberg; FSSIA estimates

We think that in the next 12 months, IVL and IRPC are likely to see their share prices rerating and outperforming those of PTTGC and SCC, based on stronger net profit growth momentum for IVL and IRPC from higher product margins and rising sales volumes. We project higher utilisation rates for IVL's IOD plants in the US and IRPC's refinery plant to benefit from the demand recoveries and limited new supplies for PET, MEG, MTBE, and ABS.

Exhibit 67: IVL's one-year rolling forward P/BV band



Sources: Bloomberg; FSSIA estimates

Exhibit 68: IVL's one-year rolling forward EV/EBITDA band



Sources: Bloomberg; FSSIA estimates

For PTTGC, while we expect the company to experience some net profit growth y-y in 2H21, we think the growth momentum will decelerate h-h given the projected h-h weaker margins of PE-naphtha and PP-naphtha and the decline in the prices of PE and PP to reflect the impact of the new supplies, mainly from the US and China.

Exhibit 69: PTTGC's one-year rolling forward P/BV band





Exhibit 70: PTTGC's one-year rolling forward EV/EBITDA

Sources: Bloomberg; FSSIA estimates

Sources: Bloomberg; FSSIA estimates

band

For SCC, we think its net profit growth will continue but at a smaller growth rate than in 1H21 given the weaker margins of PP and PE, but SCC should still benefit from the margin strengths of PVC and SM and the rising earnings from its subsidiary, SCG Packaging (SCGP TB, BUY, TP THB64.5).

Exhibit 71: SCC's one-year rolling forward P/BV band



Sources: Bloomberg; FSSIA estimates

Exhibit 72: SCC's one-year rolling forward EV/EBITDA band



Sources: Bloomberg; FSSIA estimates

Exhibit 73: Peer comparisons

C	BBG	Dee	, Share	Target	llasida	, Market	3Y		PE	R(0E		PBV	EV/E	BITDA
Company	code	Rec	Price	price	Upside	Сар	CAGR	21E	22E	21E	22E	21E	22E	21E	22E
			(LCY)	(LCY)	(%)	(USD m)	(%)	(x)	(x)	(%)	(%)	(x)	(x)	(x)	(x)
THAILAND															
Indorama Ventures	IVL TB	BUY	41.25	57.00	38	7,223	38.7	20.3	16.0	8.7	10.1	1.7	1.6	9.1	8.1
Irpc Pcl	IRPC TB	BUY	3.92	5.30	35	2,498	NA	15.2	7.1	6.9	13.6	1.0	0.9	7.5	4.9
Ptt Global Chem	PTTGC TB	BUY	59.25	86.00	45	8,290	NA	13.8	10.7	6.9	9.0	0.9	1.0	9.3	8.1
Siam Cement	SCC TB	BUY	428.00	494.00	15	16,017	11.3	11.6	11.0	13.2	12.9	1.5	1.4	11.6	10.7
Eastern Polymer	EPG TB	BUY	11.00	15.50	41	961	16.8	25.3	20.2	11.3	13.3	2.8	2.6	17.6	14.9
Vinythai Public	VNT TB	NA	37.50	NA	NA	1,382	13.1	12.0	12.1	15.9	14.5	NA	NA	6.7	6.8
THAILAND avg						36,370	11.9	14.5	11.9	10.5	11.6	1.3	1.3	10.2	9.1
INDIA															
Reliance Industries	RIL IN	NA	2,097.95	NA	NA	185,155	19.7	30.4	23.7	8.5	7.7	2.3	1.9	19.3	14.1
INDIA avg						185,155	19.7	30.4	23.7	8.5	7.7	2.3	1.9	19.3	14.1
TAIWAN															
Formosa Plastics	1301 TT	NA	104.00	NA	NA	23,998	34.2	13.8	15.1	13.7	11.8	1.8	1.8	14.3	16.9
Nan Ya Plastics	1303 TT	NA	83.90	NA	NA	23,919	23.6	12.6	14.1	14.3	12.6	1.8	1.7	11.7	13.3
Formosa Chem&Fi	1326 TT	NA	85.00	NA	NA	17,886	26.0	13.4	16.1	8.2	8.0	1.4	NA	9.7	9.5
Formosa Petro	6505 TT	NA	106.00	NA	NA	37,614	82.8	24.0	24.0	12.3	12.1	3.1	3.0	15.0	15.2
TAIWAN avg						103,417	37.6	17.1	18.3	12.4	11.4	2.2	1.9	13.2	14.2
SOUTH KOREA															
Hanwha Solutions	009830 KS	NA	44,500.00	NA	NA	7,455	33.5	9.1	9.0	13.4	11.6	1.1	1.0	7.4	6.8
Lotte Chemical	011170 KS	NA	262,000.00	NA	NA	7,979	102.8	5.6	6.1	11.8	10.1	0.6	0.6	3.1	3.2
Lg Chem	051910 KS	NA	845,000.00	NA	NA	52,912	110.9	19.9	21.2	16.9	13.6	3.0	2.7	9.0	8.5
Kumho Petro	011780 KS	NA	220,000.00	NA	NA	5,844	23.1	4.1	5.4	42.2	24.8	1.5	1.2	2.9	3.6
	010060 KS	NA	122,500.00	NA	NA	2,545	NA	10.0	7.9	11.5	12.9	1.1	1.0	7.2	6.2
SOUTH KOREA avg						/6,/35	91.4	15.8	16.8	17.8	13.9	2.4	2.2	1.1	7.4
MALA I SIA		NIA	9.05	NIA	NIA	45 474	27.4	10.0	10 E	10.5	11.0	2.0	1.0	0.0	0.0
Lotto Chomical Titan		NA NA	2.70			1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 /	52.2	72	11.0	7.0	11.0	2.0	1.9	9.0	0.0
		11/4	2.19	INA	INA	16 960	32.3	15.4	16.1	121	4.2	1.9	17	1.5	9.0
MALA I SIA avg						10,300	57.5	13.4	10.1	12.1	11.2	1.0	1.7	0.5	0.0
Average (Asia)						418 636	52 7	22.5	19.8	11.5	10.2	22	19	14 4	12.2
///orage (//ora)						410,000	02.17	22.0			10.2				
US															
Eastman Chem	EMN US	NA	116.92	NA	NA	15.961	16.6	13.6	12.7	17.9	17.2	2.4	2.2	9.6	9.4
Dupont De Nem	DD US	NA	78.60	NA	NA	41,826	56.2	21.0	17.9	5.6	7.6	1.5	1.5	12.0	11.1
Celanese	CE US	NA	153.14	NA	NA	17,249	23.2	11.3	11.7	36.6	31.0	4.4	3.6	9.0	9.5
Westlake Chem	WLK US	NA	91.23	NA	NA	11,690	33.2	9.0	11.5	19.7	17.8	1.7	1.5	5.5	6.3
Ppg Industries	PPG US	NA	169.99	NA	NA	40,303	19.4	21.2	19.1	29.8	28.5	5.8	5.1	14.4	13.3
Alpek Sa De Cv	ALPEKA MM	NA	24.61	NA	NA	2,599	18.0	11.2	11.3	12.4	9.3	1.3	1.2	5.5	6.1
Avg (US)						129,629	25.4	17.6	16.1	20.2	19.3	3.4	3.0	11.3	10.8
ME/Europe															
Saudi Basic	SABIC AB	NA	121.40	NA	NA	97,107	125.1	22.2	22.6	9.6	10.5	2.1	2.0	9.9	10.0
Saudi Kayan	KAYAN AB	NA	18.66	NA	NA	7,463	NA	22.0	23.0	8.3	8.4	1.8	1.7	10.8	10.6
Yanbu National	YANSAB AB	NA	72.70	NA	NA	10,904	40.6	23.5	24.5	11.4	11.2	2.7	2.8	12.9	12.9
Industries Qatar	IQCD QD	NA	13.40	NA	NA	21,881	28.9	17.6	17.9	13.3	12.8	2.3	2.3	18.0	19.2
Basf Se	BAS GR	NA	67.35	NA	NA	73,273	70.0	13.3	13.1	12.6	12.0	1.8	1.7	7.9	7.8
Arkema	AKE FP	NA	106.70	NA	NA	9,698	22.3	15.5	14.1	9.0	9.3	1.4	1.4	7.8	7.7
Lanxess Ag	LXS GR	NA	59.28	NA	NA	6,140	37.6	14.5	12.2	10.6	11.9	1.6	1.5	7.3	6.4
Solvay Sa	SOLB BB	NA	108.70	NA	NA	13,632	(4.6)	14.6	12.9	9.5	10.9	1.6	1.6	7.5	7.0
Avg (ME/Europe)						240,098	37.6	18.2	18.2	10.9	11.1	2.0	1.9	9.9	10.0
Petrochem under cov	verage					34,988	11.9	14.0	11.5	9.9	11.0	1.3	1.3	10.0	8.9
Average (all)						788,363	43.1	20.4	18.7	12.7	12.0	2.3	2.1	12.5	11.3

Share price as of 1 Jul 2021 Sources: Bloomberg, FSSIA estimates

Corporate Governance report of Thai listed companies 2020

EXCELLE	NT LEVEL										
AAV	ADVANC	AF	AIRA	AKP	AKR	ALT	AMA	AMATA	AMATAV	ANAN	
AOT	AP	ARIP	ARROW	ASP	BAFS	BANPU	BAY	BCP	BCPG	BDMS	
BEC	BEM	BGRIM	BIZ	BKI	BLA	BOL	BPP	BRR	BTS	BWG	
CENTEL	CFRESH	CHEWA	CHO	CIMBT	СК	CKP	CM	CNT	COL	COMAN	
COTTO	CPALL	CPF	CPI	CPN	CSS	DELTA	DEMCO	DRT	DTAC	DTC	
DV8	EA	EASTW	ECF	ECL	EGCO	EPG	ETE	FNS	FPI	FPT	
FSMART	GBX	GC	GCAP	GEL	GFPT	GGC	GPSC	GRAMMY	GUNKUL	HANA	
HARN	HMPRO	ICC	ICHI	III	ILINK	INTUCH	IRPC	IVL	JKN	JSP	
JWD	К	KBANK	KCE	KKP	KSL	KTB	KTC	LANNA	LH	LHFG	
LIT	LPN	MAKRO	MALEE	MBK	MBKET	MC	MCOT	METCO	MFEC	MINT	
MONO	MOONG	MSC	MTC	NCH	NCL	NEP	NKI	NOBLE	NSI	NVD	
NYT	OISHI	ORI	OTO	PAP	PCSGH	PDJ	PG	PHOL	PLANB	PLANET	
PLAT	PORT	PPS	PR9	PREB	PRG	PRM	PSH	PSL	PTG	PTT	
PTTEP	PTTGC	PYLON	Q-CON	QH	QTC	RATCH	RS	S	S & J	SAAM	
SABINA	SAMART	SAMTEL	SAT	SC	SCB	SCC	SCCC	SCG	SCN	SDC	
SEAFCO	SEAOIL	SE-ED	SELIC	SENA	SIRI	SIS	SITHAI	SMK	SMPC	SNC	
SONIC	SORKON	SPALI	SPI	SPRC	SPVI	SSSC	SST	STA	SUSCO	SUTHA	
SVI	SYMC	SYNTEC	TACC	TASCO	TCAP	TFMAMA	THANA	THANI	THCOM	THG	
THIP	THRE	THREL	TIP	TIPCO	TISCO	тк	TKT	TMB	TMILL	TNDT	
TNL	TOA	TOP	TPBI	TQM	TRC	TSC	TSR	TSTE	TSTH	TTA	
TTCL	TTW	TU	TVD	TVI	TVO	TWPC	U	UAC	UBIS	UV	
VGI	VIH	WACOAL	WAVE	WHA	WHAUP	WICE	WINNER	TRUE			
VERY GO	OD LEVEL										
2S	ABM	ACE	ACG	ADB	AEC	AEONTS	AGE	AH	AHC	AIT	
ALLA	AMANAH	AMARIN	APCO	APCS	APURE	AQUA	ASAP	ASEFA	ASIA	ASIAN	
ASIMAR	ASK	ASN	ATP30	AUCT	AWC	AYUD	В	BA	BAM	BBL	
BFIT	BGC	BJC	BJCHI	BROOK	BTW	CBG	CEN	CGH	CHARAN	CHAYO	
CHG	CHOTI	CHOW	CI	CIG	CMC	COLOR	COM7	CPL	CRC	CRD	
CSC	CSP	CWT	DCC	DCON	DDD	DOD	DOHOME	EASON	EE	ERW	

Source: Thai Institute of Directors Association (IOD); FSSIA's compilation

evaluation of operation and is not based on inside information.



ESTAR

GLAND

IMH

L&E

PDI

QLT

SKR

SSF

тсс

TMD

TPS

UPF

7UP

B52

CPT

GSC

KCM

MDX

SGP

TTI

OCEAN

PROUD

SUPER

Disclaimer:

BROCK

YUASA

GOOD LEVEL

JCKH

MBAX

NETBAY

SAWAD

FE

INET

JMART

LALIN

MEGA

NEX

PICO

RCL

SCI

SKY

STANLY

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MJD

PAF

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Excellent

Very Good Good

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ZMICO

SF

FORTH

GULF

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RPC

SEG

SNP

SUC

TFG

TNP

TSE

UWC

AL I

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D

IHL

NC

PLE

RJH

SMART

THMUI

VCOM

FSS International Investment Advisory Company Limited does not confirm nor certify the accuracy of such survey results.

and corruption SEC imposed a civil sanction against insider trading of director and executive; ** delisted

KWG

PL

LOXLEY

FSS

GYT

IT

KGI

LPH

MILL

occ

ΡM

RWI

SFP

SPA

SUN

TNR

TVT

VL

TIGER

ALUCON

BH

CCP

EKH

INOX

KYE

NDR

PMTA

ROJNA

SOLAR

VRANDA

The disclosure of the survey results of the Thai Institute of Directors Association ('IOD") regarding corporate governance is made pursuant to the policy of the Office of the Securities and Exchange Commission. The survey of the IOD is based on the information of a company listed on the Stock Exchange of Thailand and the Market for Alternative Investment disclosed to the public and able to be accessed by a general public investor. The result, therefore, is from the perspective of a third party. It is not an

The survey result is as of the date appearing in the Corporate Governance Report of Thai Listed Companies. As a result, the survey results may be changed after that date.

* CGR scoring should be considered with news regarding wrong doing of the company or director or executive of the company such unfair practice on securities trading, fraud,

TIW

FTE

HPT

ITD

KIAT

LRH

OGC

PPP

S11

SGF

SPC

SYNEX

TITLE

TOG

TWP

VNT

AMC

BIG

CGD

INSET

LEE

NER

POST

RP

SPG

TNH

WIN

EΡ

MITSIB

FVC

HTC

ITEL

LST

MK

OSP

PRIN

SHR

SPCG

TKN

TPA

UEC

VPO

APP

BKD

CITY

IP

ESSO

MATCH

NFC

PPM

RPH

TOPP

WORK

SQ

Т

SALEE

KOOL

GENCO

ICN

KTIS

PATO

PRINC

SIAM

SR

TAE

TKS

UMI

WIIK

ARIN

BLAND

CMAN

FMT

JTS

MATI

NNCL

RSP

SSP

трсн

WPH

PRAKIT

TPAC

SAMCO

MODERN

.1

Μ

GJS

IFS

JAS

MTI

PΒ

PSTC

SANKO

SINGER

SRICHA

TAKUNI

TPCORP

UOBKH

ТΜ

WP

AS

ВM

СМО

GIFT

JUBILE

M-CHAI

PRECHA

STARK

TPIPP

NPK

SF

Score Range 90-100

80-89

70-79

KWC

MACO

GL

ILM

JCK

KWM

MVP

PDG

SAPPE

SKE

SSC

TBSF

тмс

UP

хо

AU

BR

CMR

GREEN

KASET

MCS

NUSA

PRIME

SFLEX

TPLAS

STC

TPOLY

PΤ

MAJOR

Anti-corruption Progress Indicator 2020

CERTIFIED										
2S	ADVANC	AI	AIE	AIRA	AKP	AMA	AMANAH	AP	AQUA	ARROW
ASK	ASP	AYUD	В	BAFS	BANPU	BAY	BBL	BCH	BCP	BCPG
BGC	BGRIM	BJCHI	BKI	BLA	BPP	BROOK	BRR	BSBM	BTS	BWG
CEN	CENTEL	CFRESH	CGH	CHEWA	CHOTI	CHOW	CIG	CIMBT	CM	CMC
COL	COM7	CPALL	CPF	CPI	CPN	CSC	DCC	DELTA	DEMCO	DIMET
DRT	DTAC	DTC	EASTW	ECL	EGCO	FE	FNS	FPI	FPT	FSS
FTE	GBX	GC	GCAP	GEL	GFPT	GGC	GJS	GPSC	GSTEEL	GUNKUL
HANA	HARN	HMPRO	HTC	ICC	ICHI	IFS	INET	INSURE	INTUCH	IRPC
ITEL	IVL	К	KASET	KBANK	KBS	KCAR	KCE	KGI	KKP	KSL
KTB	KTC	KWC	L&E	LANNA	LHFG	LHK	LPN	LRH	М	MAKRO
MALEE	MBAX	MBK	MBKET	MC	MCOT	MFC	MFEC	MINT	MONO	MOONG
MPG	MSC	MTC	MTI	NBC	NEP	NINE	NKI	NMG	NNCL	NSI
NWR	000	OCEAN	OGC	ORI	PAP	PATO	PB	PCSGH	PDG	PDI
PDJ	PE	PG	PHOL	PL	PLANB	PLANET	PLAT	PM	PPP	PPPM
PPS	PREB	PRG	PRINC	PRM	PSH	PSL	PSTC	PT	PTG	PTT
PTTEP	PTTGC	PYLON	Q-CON	QH	QLT	QTC	RATCH	RML	RWI	S & J
SABINA	SAT	SC	SCB	SCC	SCCC	SCG	SCN	SEAOIL	SE-ED	SELIC
SENA	SGP	SIRI	SITHAI	SMIT	SMK	SMPC	SNC	SNP	SORKON	SPACK
SPC	SPI	SPRC	SRICHA	SSF	SSSC	SST	STA	SUSCO	SVI	SYNTEC
TAE	TAKUNI	TASCO	TBSP	TCAP	TCMC	TFG	TFI	TFMAMA	THANI	THCOM
THIP	THRE	THREL	TIP	TIPCO	TISCO	ТКТ	ТМВ	TMD	TMILL	TMT
TNITY	TNL	TNP	TNR	TOG	TOP	TPA	TPCORP	TPP	TRU	TSC
TSTH	TTCL	TU	TVD	TVI	TVO	TWPC	U	UBIS	UEC	UKEM
UOBKH	UWC	VGI	VIH	VNT	WACOAL	WHA	WHAUP	WICE	WIIK	ХО
ZEN	TRUE									
DECLARED										
7UP	ABICO	AF	ALT	AMARIN	AMATA	AMATAV	ANAN	APURE	B52	BKD
BM	BROCK	BUI	СНО	CI	COTTO	DDD	EA	EFORL	EP	ERW
ESTAR	ETE	EVER	FSMART	GPI	ILINK	IRC	J	JKN	JMART	JMT
JSP	JTS	KWG	LDC	MAJOR	META	NCL	NOBLE	NOK	PK	PLE
ROJNA	SAAM	SAPPE	SCI	SE	SHANG	SINGER	SKR	SPALI	SSP	STANLY
SUPER	SYNEX	THAI	TKS	TOPP	TRITN	TTA	UPF	UV	WIN	ZIGA
Level										
Certified	This level indic	cates practical p	articipation with	thoroughly exar	mination in relation	on to the recomm	mended procedu	ires from the au	dit committee or	the SEC's

certified auditor, being a certified member of Thailand's Private Sector Collective Action Coalition Against Corruption programme (Thai CAC) or already passed examination to ensure independence from external parties. Declared

This level indicates determination to participate in the Thailand's Private Sector Collective Action Coalition Against Corruption programme (Thai CAC)

Disclaimer:

The disclosure of the Anti-Corruption Progress Indicators of a listed company on the Stock Exchange of Thailand, which is assessed by Thaipat Institute, is made in order to comply with the policy and sustainable development plan for the listed companies of the Office of the Securities and Exchange Commission. Thaipat Institute made this assessment based on the information received from the listed company, as stipulated in the form for the assessment of Anti-corruption which refers to the Annual Registration Statement (Form 56-1), Annual Report (Form 56-2), or other relevant documents or reports of such listed company. The assessment result is therefore made from the perspective of Thaipat Institute that is a third party. It is not an assessment of operation and is not based on any inside information. Since this assessment is only the assessment result as of the date appearing in the assessment result, it may be changed after that date or when there is any change to the relevant information. Nevertheless, FSS International Investment Advisory Company Limited does not confirm, verify, or certify the accuracy and completeness of the assessment results.

Note: Companies participating in Thailand's Private Sector Collective Action Coalition Against Corruption programme (Thai CAC) under Thai Institute of Directors (as of June 24, 2019) are categorised into: 1) companies that have declared their intention to join CAC, and; 2) companies certified by CAC.

Source: The Securities and Exchange Commission, Thailand; * FSSIA's compilation

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FSS International Investment Advisory Securities Co., Ltd

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Company	Ticker	Price	Rating	Valuation & Risks
Indorama Ventures	IVL TB	THB 41.25	BUY	The key downside risks to our EV/EBITDA-based TP are weaker-than-expected margins for PX-PTA and PET-PTA, lower demand for polyester, and delays in IVL's projects.
IRPC PCL	IRPC TB	THB 3.92	BUY	Key risks to our positive view and EV/EBITDA-based target price are weaker-than- expected oil product demand growth and lower-than-expected PP-naphtha and SM- benzene margins.
PTT Global Chemical	PTTGC TB	THB 59.25	BUY	The key downside risks to our EV/EBITDA-based TP are the weaker-than-expected HDPE price and HDPE-naphtha margin
Siam Cement	SCC TB	THB 428.00	BUY	Downside risks to our SOTP based TP include 1) a lower-than-expected demand for chemicals, CBM, and packaging; 2) rising coal costs for its cement and packaging units; and 3) weaker demand from the automobile industry that could erode the demand for SCC's chemical unit and its dividend contributions.
Eastern Polymer Group	EPG TB	THB 11.00	BUY	Downside risks to our EV/EBITDA-based target price include 1) a sharp rise in feedstock prices, driven mostly by a higher oil price; and 2) lower-than-expected demand for plastics used for insulators and the automobile and packaging industries.
Thai Oil	TOP TB	THB 54.50	BUY	Downside risks to our EV/EBITDA-based TP are a sharp rise in oil price and weak demand for refined oil products.
SCG Packaging	SCGP TB	THB 61.25	BUY	Downside risks to our EV/EBITDA based TP include a lower than expected demand for packaging, rising raw material costs of recycled paper and higher energy costs.

Source: FSSIA estimates

Additional Disclosures

Target price history, stock price charts, valuation and risk details, and equity rating histories applicable to each company rated in this report is available in our most recently published reports. You can contact the analyst named on the front of this note or your representative at Finansia Syrus Securities Public Company Limited

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All share prices are as at market close on 1-Jul-2021 unless otherwise stated.

RECOMMENDATION STRUCTURE

Stock ratings

Stock ratings are based on absolute upside or downside, which we define as (target price* - current price) / current price.

BUY (B). The upside is 10% or more.

HOLD (H). The upside or downside is less than 10%.

REDUCE (R). The downside is 10% or more.

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 market price and the formal recommendation.

* In most cases, the target price will equal the analyst's assessment of the current fair value of the stock. However, if the analyst doesn't think the market will reassess the stock over the specified time horizon due to a lack of events or catalysts, then the target price may differ from fair value. In most cases, therefore, our recommendation is an assessment of the mismatch between current market price and our assessment of current fair value.

Industry Recommendations

Overweight. The analyst expects the fundamental conditions of the sector to be positive over the next 12 months. **Neutral.** The analyst expects the fundamental conditions of the sector to be maintained over the next 12 months. **Underweight.** The analyst expects the fundamental conditions of the sector to be negative over the next 12 months.

Country (Strategy) Recommendations

Overweight (O). Over the next 12 months, the analyst expects the market to score positively on two or more of the criteria used to determine market recommendations: index returns relative to the regional benchmark, index sharpe ratio relative to the regional benchmark and index returns relative to the market cost of equity.

Neutral (N). Over the next 12 months, the analyst expects the market to score positively on one of the criteria used to determine market recommendations: index returns relative to the regional benchmark, index sharpe ratio relative to the regional benchmark and index returns relative to the market cost of equity.

Underweight (U). Over the next 12 months, the analyst does not expect the market to score positively on any of the criteria used to determine market recommendations: index returns relative to the regional benchmark, index sharpe ratio relative to the regional benchmark and index returns relative to the market cost of equity.