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Thailand - Utilities

ระยะการเติบโตใหม่สำหรับไฟฟ้าที่ผลิตจากขยะ

กำลังการผลิตไฟฟ้าหมุนเวียนใหม่มากถึง 840MW พร้อมประมูลภายในกลางปี 2022

เมื่อวันที่ 14 ธ.ค. 2021 กระทรวงพลังงานได้ประกาศว่ากระทรวงฯ กำลังเตรียมงบประมาณเพื่อซื้อกำลังการผลิตไฟฟ้าพลังงานหมุนเวียน (RE) ใหม่จำนวน 840MW ในกลางปี 2022 ประกอบด้วยไฟฟ้าที่ผลิตจากพลังแสงอาทิตย์ 200MW ในปี 2023, ลม 200MW ในปี 2024, ชีวมวลและก๊าซชีวภาพ 140MW ในปี 2023, และขยะ (WTE) 300MW ในปี 2022 กระทรวงฯ จะส่งข้อเสนอดังกล่าวไปให้ ครม. พิจารณาใน 1Q22 และคณะกรรมการกำกับกิจการพลังงาน (ERC) จะเปิดซองประมูลภายในกลางปี 2022 เราคิดว่า ETC เป็นหนึ่งในผู้เล่นที่ดีที่สุดที่จะได้บางส่วนของกำลังการผลิตไฟฟ้าจากขยะจำนวน 300MW ในปี 2022

เข้าใกล้เป้ากำลังการผลิตไฟฟ้าจากพลังงานหมุนเวียนที่ 50% ไปอีกหนึ่งก้าว

แผนพลังงานแห่งชาติใหม่ภายใต้แผนพัฒนากำลังการผลิตไฟฟ้าปี 2018 ฉบับแก้ไขครั้งที่ 1 (PDPR1) ในปัจจุบันมีเป้าหมายบรรลุเป้าการปล่อยคาร์บอนเป็นศูนย์ด้วยสัดส่วน RE ที่เพิ่มขึ้นเป็น 50% ของกำลังการผลิตไฟฟ้ารวม แผนขั้นต้นจะครอบคลุม 10 ปีแรก (ปี 2021-30) ภายใต้แผน PDP ใหม่ปี 2022 ซึ่งจะลดกำลังการผลิตไฟฟ้าจากก๊าซ แสงอาทิตย์ ชีวมวล และก๊าซชีวภาพเพื่อแทนที่ด้วยกำลังการผลิตไฟฟ้านำเข้าจากน้ำ ลม และขยะ เป้ากำลังการผลิต RE รวมจะเพิ่มอีก 1GW จาก 9.2GW ภายใต้ PDPR1 เป็น 10.2GW ภายใต้ PDPR1 ฉบับปรับปรุงใหม่ ซึ่งจะทำให้สัดส่วนกำลังการผลิต RE เพิ่มจาก 23% เป็น 27%

ทำไมการปล่อยคาร์บอนเป็นศูนย์จึงสำคัญสำหรับประเทศไทย?

ประเทศไทยวางแผนเพิ่มกำลังการผลิตไฟฟ้าจาก RE เพื่อให้เป็นไปตามข้อตกลง COP26 ที่ต้องการบรรลุเป้าการปล่อยคาร์บอนเป็นศูนย์ภายในปี 2050, ลดการปล่อยก๊าซเรือนกระจก (GHG) เป็นศูนย์ภายในปี 2065, และเลี่ยงกำแพงนำเข้าที่ไม่ใช่ภาษีในอนาคตสำหรับสินค้าส่งออกของประเทศไปยังประเทศในยุโรป ซึ่งได้ริเริ่มกลไกการปรับคาร์บอนก่อนข้ามพรมแดน (CBAM) ไว้แล้ว CBAM สำหรับธุรกิจบางประเภทมีเป้าหมายเพื่อจัดการความเสี่ยงในด้านการเปลี่ยนแปลงภูมิอากาศโดยจะลดการปล่อย GHG ในสหภาพยุโรปและทั่วโลก โดยจะนำรายการสินค้า CBAM มาใช้ใน 5 กลุ่มสินค้าโภคภัณฑ์ประกอบด้วย อลูมิเนียม ปูนซีเมนต์ ไฟฟ้า ปุ๋ย รวมถึงเหล็กและเหล็กกล้า ซึ่งอาจส่งผลให้สินค้านำเข้าต้องจ่ายภาษีคาร์บอนภายในปี 2026

ETC และ ACE เป็น 2 หุ้นเด่นในอุตสาหกรรมการผลิตไฟฟ้าจากขยะ (WTE) ของไทย

ในกลุ่ม 4 ผู้เล่นหลักประกอบด้วย ETC, ACE, TPCH, และ TPIPP ในอุตสาหกรรม WTE ของไทย หุ้นเด่นของเราประกอบด้วย ETC และ ACE เราเลือก ETC เป็นตัวเก็งสำหรับโอกาสในการเติบโตของกำลังการผลิตไฟฟ้าจากขยะอุตสาหกรรม (IW) และ ACE เป็นตัวเต็งสำหรับโอกาสในการเติบโตของกำลังการผลิตไฟฟ้าจากขยะมูลฝอยชุมชน (MSW) ETC ซึ่งเป็นบริษัทย่อยของ Better World Green (BWG TB, NR) ดำเนินกิจการโรงไฟฟ้า WTE จาก IW 3 แห่งพร้อมกำลังการผลิตติดตั้งรวม 20MW และกำลังการผลิตที่มีสัญญาจำนวน 16.5MW เราเชื่อว่า ETC จะชนะประมูลกำลังการผลิตไฟฟ้า WTE ใหม่จาก IW อย่างน้อย 5MW ในปี 2022 ในขณะที่ ACE ดำเนินกิจการโรงไฟฟ้าชีวมวล 9 แห่ง โรงไฟฟ้า WTE จาก MSW 2 แห่ง และโรงผลิตไฟฟ้าขนาดเล็ก (SPP) จากก๊าซ 1 แห่ง เราคิดว่า ACE จะสามารถใช้ประโยชน์จากจุดแข็งของบริษัทฯ ในธุรกิจชีวมวลและ WTE เพื่อให้ได้กำลังการผลิต WTE ใหม่จำนวน 5-10MW ในปี 2022.

Suwat Sinsadok
suwat.sin@fssia.com
+66 2611 3558

Siriluck Pinthusoonthorn
siriluck.pin@fssia.com
+66 2611 3562

More manifest growth in renewable WTE power plants

After two years of a checkmate status in developments in the WTE power industry, the Thai power industry is once more at an inflection point, pending the approval by the Thai regulator, the ERC, to open bidding in mid-2022 for up to 840MW of new RE capacity (300MW of this being WTE capacity). This is taking place under the revised and approved PDP 2018 Revision 1 (PDPR1-10Y), a transitional PDP leading to the new PDP 2022, which will officially replace PDPR1.

While the full details of PDP 2022 remain undetermined, the recent announcement of the quick-win 840MW renewable capacity to be on the grid in 2023-24 is in line with our expectation that the changes from PDPR1 to PDP 2022 will address future power trends as well as the changing electricity demand-supply balance in Thailand. This will no doubt lead to changes in capacity growth opportunities for Thai listed power companies.

Recap of PDP 2018 Revision 1

Under PDPR1, the Thai government aimed to achieve a long-term sustainable power demand-supply balance for Thailand, including 1) power security; 2) minimising power costs; and 3) minimising environmental impacts. There are four key principles that the regulator employed to achieve these goals:

- Focusing on both the national and regional electricity demand-supply balance;
- Promoting renewable hybrid power plants;
- Addressing regional power demands for the Eastern Economic Corridor (EEC), EVs, and independent power supply (IPS);
- Expanding the transmission power line system and smart grids to accommodate regional distributed generation (DG).

Exhibit 1: Changes between PDP 2015, PDP 2018 Revision 1, and expected changes in PDP 2022

PDP 2015	PDP 2018 Revision 1	PDP 2022
Three key goals	**Three key goals**	**Three key goals**
1. National and regional power security	1. National and regional power security	1. National and regional power security
2. Minimise power cost structure	2. Minimise power cost structure	2. Minimise power cost structure
3. Reduce environmental impact	3. Reduce environmental impact	3. Reduce environmental impact
Four key principles	**Four key principles**	**Four key principles**
1. Fuel diversification	**1. Fuel diversification**	**1. Fuel diversification**
Reduce the capacity proportion of gas-fired power plants	Reduce the capacity proportion of coal-fired power plants	Reduce the capacity proportion of coal-fired power plants
Increase the number of clean coal-fired power plants	Promote renewable firm hybrid power plants (renewables plus batteries)	Promote renewable firm hybrid power plants (renewables plus batteries)
Higher power imports	Address regional power demand and supply for EVs, EEC, and IPS	Power demand and supply for EVs to accommodate the transition from an internal combustion engine to an EV car production industry
Increase renewable energy proportion from 8% to 20% by 2036	Increase renewable energy proportion from 9% in 2017 to 20% by 2039	Increase renewable energy proportion from 11% in 2020 to up to 50% by 2043
Introduce nuclear power plants at the end of the PDP period post-2030	Introduce nuclear power plants at the end of the PDP period post-2031	Increase wind farm and biomass/biogas capacity and higher power imports
2. Maintain the reserve margin at the minimum 15%	**2. Focus on regional and national power demand-supply balance**	**2. Change from 15% minimum reserve margin to loss of load expectation (LOLE), allowing for an electricity shortage of up to 0.7 days annually**
3. Promote small power producers with steam and power sold to industrial users	**3. Promote DG to ensure regional power security**	**3. Promote DG to ensure regional power security**
4. Expand transmission lines and develop smart grids	**4. Develop smart grid system to accommodate DG power sources**	**4. Develop smart grid system to accommodate DG power sources**

Sources: PDP 2015; PDP 2018 Revision 1; FSSIA estimates

After the implementation of PDPR1 since 2020, the Thai government has faced many challenges that have made PDPR1 inefficient, including:

1) The demand downside from the impact of the Covid-19 pandemic;

2) Faster and stronger-than-expected demand for electricity for new sources, such as EVs, the EEC campaign, and IPS or power plants with private power purchase agreements (PPAs);

3) The megatrend of increasing renewable energy to reduce carbon emissions and capitalise on the highly competitive cost of renewable energy, including solar and wind farms and the use of energy storage systems (ESS).

Exhibit 2: Offshore wind farm projects

Source: ManagerOnline

Exhibit 3: Solar farm projects

Source: ManagerOnline

In response to the changes in regulations and the direction of the country's development in the power industry toward greener and more cost competitive structures in the power generating industry, most listed Thai companies have been active in participating in different types of renewable growth opportunities.

Smaller power companies under our coverage, including ETC, ACE, TPIPP, and TPCH, have been clearly preparing to bid for the upcoming growth opportunities to leverage their existing strengths in biomass, biogas, solar, wind, and most importantly, WTE power plants.

Larger power firms, including Electricity Generating (EGCO TB, BUY, TP THB245), Ratch Group (RATCH TB, BUY, TP THB60), Banpu Power (BPP TB, BUY, TP THB23), and Global Power Synergy (GPSC TB, BUY, TP THB100), have already moved to secure additional capacity growth overseas, but also are ready to invest in renewable growth opportunities in Thailand.

According to local newspaper, Manager Online, dated 25 November 2021, EGCO aims to achieve its carbon neutrality target by 2050, with a 10% reduction target of carbon emission intensity by 2030. The company plans to increase its capacity by 1GW in 2022 via M&A of mostly renewable power plants, focusing on the US power market where EGCO has recently entered into via its acquisition of a 28% stake in Linden's gas-fired power plants and a 17.5% stake acquisition of Apex Clean Energy Holding.

Recent development for the new PDP 2022 draft

On 20 September 2021, the Energy Policy Executive Committee (EPEC) approved the proposed National Energy Plan under the current PDPR1 – the predecessor of the new PDP 2022 – to reduce carbon emissions by:

1) Increasing RE capacity at the expense of a lower capacity of coal/gas-fired power plants;

2) Including biomass, biogas, solar, wind, and WTE – both MSW and IW – in the RE capacity;

3) Increasing the power imports from hydropower plants in Laos;

4) Revisiting the delayed RE capacity to reschedule new commercial operation dates for the Power Plant for Community (PPC) scheme (biomass and biogas) and WTE for municipal waste;

5) Initiating a hybrid RE and ESS to improve the efficiency of solar farms and ESS.

Exhibit 4: Renewable capacity breakdown under PDP 2018 Revision 1

Projects	PDP 2018	PDP 2018 Rev 1
	(MW)	(MW)
Projects under government-supportive policy		
- WTE – community waste	400	400
- Biomass (Pracharat) for four southernmost provinces	120	120
- Power Plant for Community (PPC)	**-**	**1,933**
Subtotal	**520**	**2,453**
Projects under AEDP 2018		
Solar	10,000	8,740
Biomass	3,375	2,780
Biogas	546	400
Solar floating	2,725	2,725
Wind	1,485	1,485
WTE – industrial	44	44
Small hydro	-	69
Subtotal	**18,175**	**16,243**
Total	**18,695**	**18,696**

Source: Ministry of Energy

New Alternative Energy Development Plan in the pipeline. Under the broad national PDPR1, the Energy Policy and Planning Office (EPPO) will revise the renewable capacity target with details for each type of renewable power plant to be included in the new Alternative Energy Development Plan (AEDP).

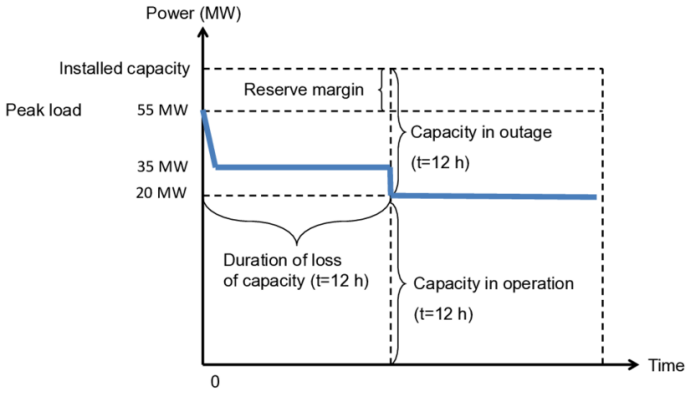
Exhibit 5: Feed-in-tariffs (FiT) for power plants under Power Plant for Community

Fuel type	Tariff	PPA life	FiT premium for special zone
	(THB/kWh)	(year)	(THB/kWh)
Solar power	2.90	20	0.5
Biomass less than 3MW	4.85	20	0.5
Biomass more than 3MW	4.26	20	0.5
Biogas (waste-to-energy)	3.76	20	0.5
Biogas (energy crops)	5.37	20	0.5
Hybrid (waste-to-energy + energy crops)	4.73	20	0.5

Source: Ministry of Energy

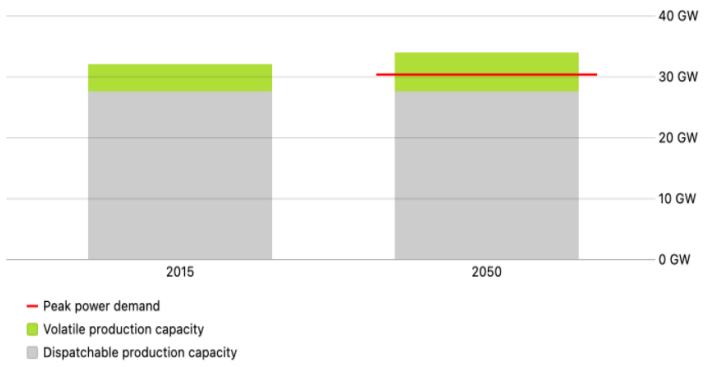
We believe that with the change from the 15% reserve margin to the new loss of load expectation (LOLE), the renewable capacity proportion could rise to 40-50% of the total power generating capacity by 2040. Also, the higher power capacity for the hydropower plant imports from Laos will be specifically addressed in the new AEDP and PDP 2022, according to EPPO.

Exhibit 6: Simplified LOLE power model



Source: ResearchGate

Exhibit 7: LOLE concept



Source: ResearchGate

Up to 840MW of renewable capacity available for bidding in mid-2022

On 4 August 2021, EPEC approved the National Energy Plan aimed at achieving a zero-emission target with a higher RE proportion of 50% of total generating capacity. The initial plan will cover the first 10 years (2021-30) under the new PDP 2022 currently under development.

The power generating capacity for gas, solar, biomass and biogas, mostly under the PPC scheme, will be cut and replaced by higher imported hydroelectric, wind, and WTE power capacity, following the unsuccessful implementation of the PPC and the floating solar farm scheme. The total RE capacity target will increase by 1GW from 9.2GW under PDPR1 to 10.2GW under the revised PDPR1, resulting in the RE capacity proportion rising from 23% to 27%.

Exhibit 8: Change in renewable capacity in 2021-30 under PDP 2018 Revision 1

Power plant type	New capacity	PDP 2018 Rev 1 (current)	PDP 2018 Rev 1 (revised)	Change	
		(MW)	(MW)	(MW)	(%)
Fossil	Gas	5,550	4,850	(700)	(13)
	Lignite	600	600	-	-
	Total fossil	**6,150**	**5,450**	**(700)**	**(11)**
Renewable	Import for hydro	1,400	2,766	1,366	98
	Solar	5,194	4,455	(739)	(14)
	Wind	270	1,500	1,230	456
	Biomass	1,120	485	(635)	(57)
	Biogas	783	335	(448)	(57)
	WTE	400	600	200	50
	Small hydro	26	52	26	100
	Total renewable	**9,193**	**10,193**	**1,000**	**11**
	Total	**15,343**	**15,643**	**300**	**2**

Source: Ministry of Energy

Why is carbon neutrality critical for Thailand?

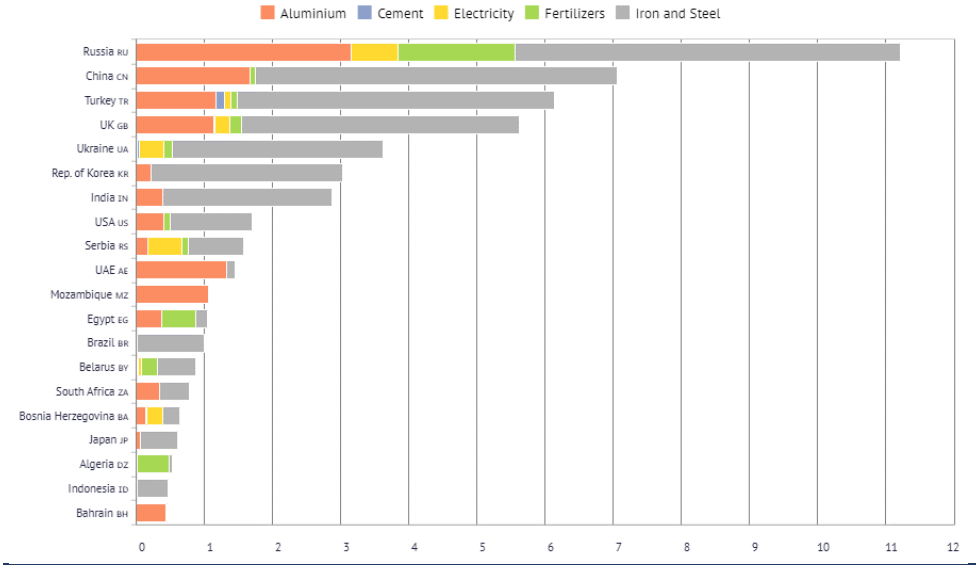
The revised PDPR1 is in response to the recent COP26 summit on 1 November 2021. It is meant to help Thailand achieve its carbon neutrality target by 2050 and cut GHG emissions to zero by 2065, according to the prime minister of Thailand's announcement.

On the positive side, the plan to increase the RE capacity could allow Thailand to avoid future non-tax barriers (NTB) against its export products to European countries, which have already initiated CBAM, a set of legislative proposals aimed at achieving the EU's enhanced climate target of reducing emissions by 55% by 2030 compared to 1990 levels. CBAM would put a price on emissions of certain imported products produced in jurisdictions with more lax emission rules.

As a part of the European Green Deal, the European Commission has presented CBAM for selected sectors aimed at addressing the risk of climate change by reducing GHG emissions in the EU and globally.

The current list of CBAM goods include five broad commodity groups – aluminium, cement, electricity, fertilisers, and iron and steel – but the list may be extended in the future.

Exhibit 9: Top 20 exporters to the EU-27 of CBAM goods, 2020 (USD b)



Source: Knoema

To ensure that the price of imports more accurately reflects their carbon content, EU imports of CBAM goods (or domestic consumption of imported goods) will be subject to a carbon tax, which is expected to bring around 10 billion euros of additional revenue per year into the EU budget.

The current plan is for CBAM to be fully implemented in 2026 after a transition period in 2023–25 during which declarants of imported CBAM goods will have to report on a quarterly basis the actual embedded emissions in goods imported, detailing direct and indirect emissions as well as any carbon price paid abroad.

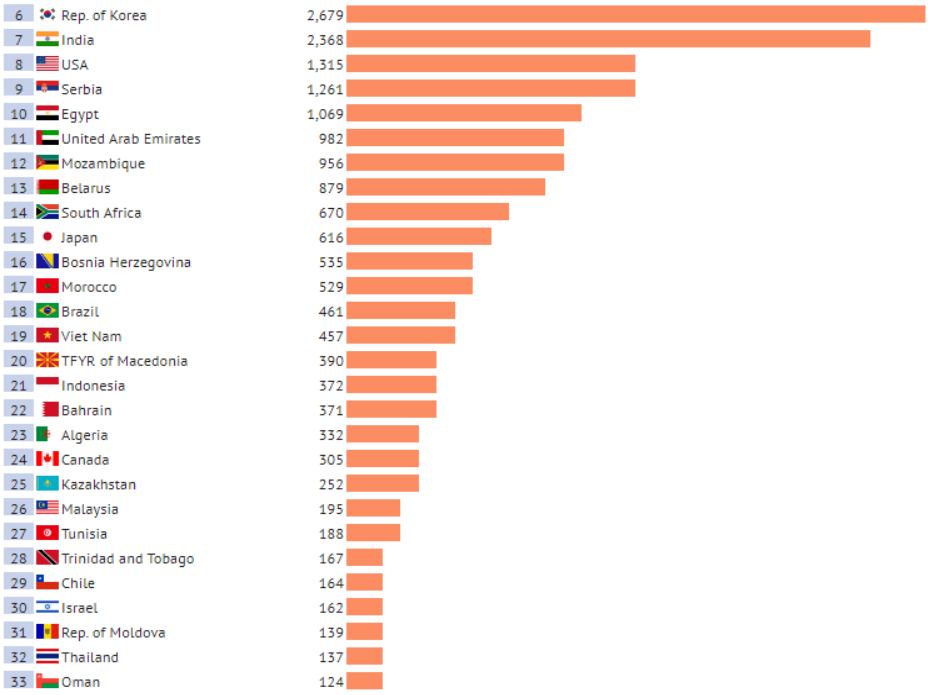
Carbon tax price has spiked following the COP26 meeting. After the COP26 summit meeting in November 2021, the price of carbon emission futures – an index for the cost of carbon emissions to be imposed on the prices of aluminium, cement, electricity, fertilisers, and iron and steel goods imported to the EU market by 2026 – has risen sharply to hit €80/tonne, up from sub-€10/tonne in 2013-18.

Exhibit 10: Carbon emission futures – Dec 2021 (CFI2Z1)

Source: Investing.com

While Thailand ranked low at 32nd globally in terms of CBAM goods exported to the EU-27 during 2015-20, worth USD137m average annually, it is mandatory for Thailand to start reducing carbon emissions via an increase in RE capacity and transforming its internal combustion engine industry to an EV automotive production and export industry by 2040. Without a plan to reduce GHG and carbon emissions, by 2026, Thailand could face hefty penalties in the form of a carbon tax on its goods exports to EU markets.

Exhibit 11: Total exports of CBAM goods to the EU-27 by country, 2015–20 (USD m)



Source: Knoema

Capacity growth for WTE is the largest among four types of renewables

According to Energy News Center, on 14 December 2021, the Energy Ministry announced that it is now preparing a package to purchase the new RE capacity in mid-2022, including solar farms, wind farms, WTE, biomass, and biogas power plants. The total purchase capacity is 840MW and the proposal will be submitted to the cabinet for consideration in 1Q22.

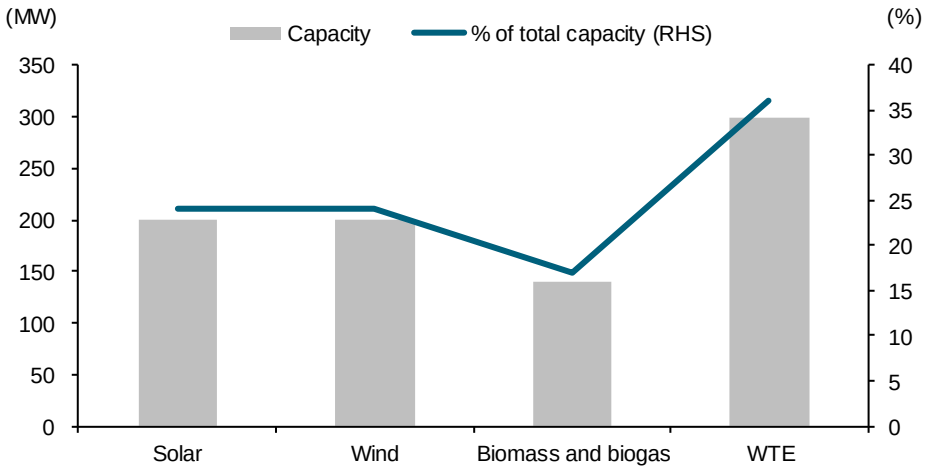
The move to accelerate the purchase of RE capacity is in line with the capacity revision for the first 10 years (2021-2030) under the current PDPR1 (PDPR1-10Y), already approved by EPPO on 28 October 2021, and is expected to be officially enforced by 2H22, according to the ERC.

Assuming the plan gets the greenlight from the cabinet in 1Q22, the ERC will start to open the bidding for the new 840MW RE capacity purchase by mid-2022, to ensure that the new 200MW solar farm capacity will enter the grid in 2023, in accordance with the PDPR1-10Y.

Under the 840MW of new RE capacity in 2021-30, there will be four types of RE power plants, with WTE capacity seeing the highest growth at 300MW.

- 200MW of solar farm capacity in 2023
- 200MW of wind farm capacity in 2024
- 140MW worth of biomass and biogas power plants in 2023
- 300MW of WTE capacity from MSW and IW power plants in 2022

Exhibit 12: Capacity breakdown of the 840MW of new renewable capacity

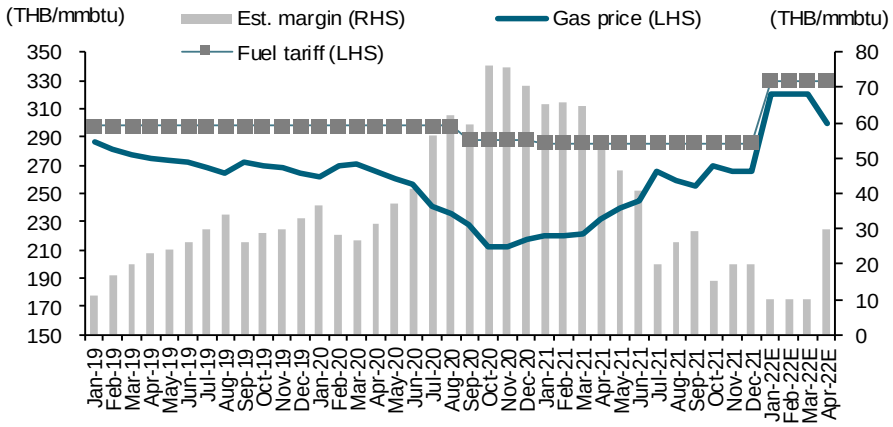


Source: ERC

RE tariff subsidy could end sooner by 2022

One of the most limiting factors for increasing the RE capacity on the grid is RE's high electricity cost, which has ranged over USD0.2-0.3/kWh (THB6-10/kWh) in the past 10 years. However, the reduction in investment cost by over 50% and the much higher operational efficiency of solar and wind farms by over 30-40% during the past 10 years have effectively changed the competitive landscape of RE vs conventional fossil-based power generation.

Exhibit 13: Thailand's gas price, fuel tariff, and estimated SPP margin



Sources: BGRIM; ERC

Thailand's gas price shot up significantly in 11M21, driven by the higher price of gas produced in the Gulf of Thailand (75% of total gas supply of 4,500mmscfd as of 11M21) and the higher imported gas price from Myanmar (15%). Both gas prices are linked to the high sulphur fuel oil price. The global spike in imported LNG (20%) to Thailand to supplement the gas supply shortage from the Gulf of Thailand also exacerbated the situation.

According to B.Grimm Power (BGRIM TB, BUY, TP THB58)'s management, the gas cost for its SPPs will rise by 14% q-q and 15% y-y from THB286/mmbtu in 3Q21 to THB326/mmbtu in 4Q21, resulting in a significant margin squeeze for SPPs which has led to share price weakness for SPP operators, including BGRIM.

The ERC and EPPO are fully aware of the potential impact of the higher electricity tariff on the national tariff, which is a blend of the costs of gas produced in the Gulf of Thailand, imported gas from Myanmar, and LNG imports, and the ERC has been seeking the most optimal subsidy levels for the each type of new RE capacity to balance the impact of the higher electricity tariff from the additional RE capacity vs the financial returns for the private sector as developers of the RE projects (solar, wind, WTE, and biomass and biogas).

RE subsidy cost hit THB108.7b in 2020-21. According to the ERC, the cost of the subsidies for the existing RE capacity, both adder and feed-in-tariffs (FiT) embedded in the fixed base tariff and the variable fuel tariff (Ft), in 2020 was THB0.3018/kWh (11% of total tariffs), estimated to be worth THB52.2b. In 11M21 alone, it was THB0.3211/kWh (15%) or THB56.6b. This has brought the total subsidy cost burden to THB108.7b for the public electricity tariff for two years.

We estimate that the electricity FiT for WTE should remain high at over THB4/kWh, based on 1) the high investment cost of over THB80-100m/MW capacity; 2) the difficulty of MSW and IW collectability, availability and reliability; and 3) the strategic benefit of MSW and IW management to permanently reduce the waste amount, currently an overwhelming national problem for the Thai government, according to the ERC.

For other RE – solar and wind – the FiT could drop to as low as USD0.5/kWh (THB1.6/kWh) for solar and USD0.8/kWh (THB2.5/kWh) thanks to the sharp drop in the investment cost and higher operational efficiency.

The FiTs for biomass and biogas are expected to decline to USD0.1/kWh or lower, given the lower invest cost and higher operational efficiency, according to the ERC.

WTE power plants – a unique growth opportunity

WTE power plants remain one of the top priorities for the government, and it is promoting them with the aim of effectively and simultaneously reducing waste and converting it into a useful fuel for power generation plants. There are two types of WTE power plants – MSW for community waste and IW.

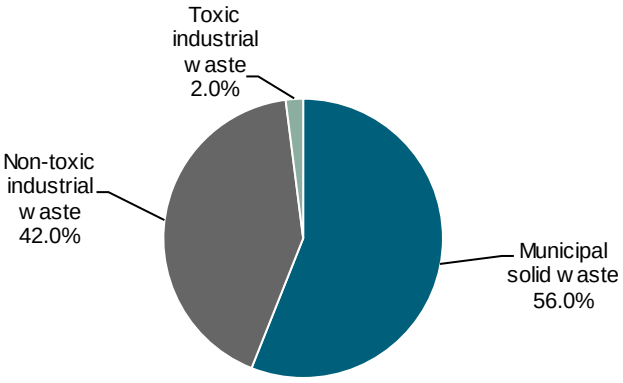
Exhibit 14: Power plant projects under PDP 2018 for WTE, biogas, and biomass power plants

Capacity (MW)	FiT (THB/kWh)			Subsidy period (years)	FiT premium (THB/kWh)	
	FiT (fixed rate)	FiT (variable rate)	FiT (total)		Bio-energy project (first 8 years)	Projects in 4 southernmost provinces of Thailand (all project life)
Waste-to-energy (WTE)						
less than 1 MW	*3.13*	*3.27*	*6.34*	*20*	*0.7*	*0.5*
1 - 3 MW	*2.61*	*3.27*	*5.82*	*20*	*0.7*	*0.5*
more than 3 MW	*2.39*	*2.74*	*5.08*	*20*	*0.7*	*0.7*
Waste-to-energy (Landfill)	5.6	-	5.6	10	-	0.5
Biomass						
less than 1 MW	*3.16*	*2.25*	*5.34*	*20*	*0.5*	*0.5*
1 - 3 MW	*2.61*	*2.25*	*4.82*	*20*	*0.4*	*0.5*
more than 3 MW	*2.39*	*1.89*	*4.24*	*20*	*0.3*	*0.5*
Biogas (wastewater)	3.76	-	3.76	20	0.5	0.5
Biogas (energy crops)	2.79	2.6	5.34	20	0.5	0.5

Source: ERC

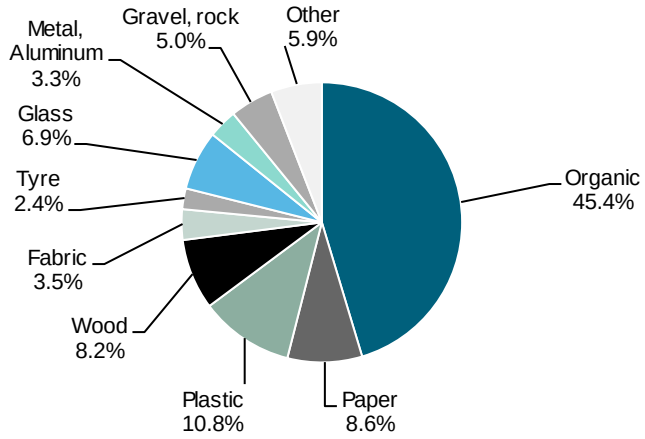
Under PDPR1, of the 400MW available for WTE capacity within 2022, 356MW is for MSW WTE power plants and 44MW is for IW WTE power plants. In 2018, out of the total annual 49.8mt of waste, 27.9mt was MSW and 22mt was IW, comprising 20.9mt of non-toxic IW and 1.0mt of toxic waste. This 22mt IW can be used as a feedstock for up to 2,000MW of WTE power plants.

Exhibit 15: Thailand's waste breakdown (2018)



Source: ETC

Exhibit 16: Municipal solid waste breakdown



Source: TPIPP

WTE capacity growth opportunity under LOLE and PDP 2022. According to the ERC, many private companies have already made preparations to build and operate WTE power plants under the government's 400MW bidding capacity under PDPR1. A total of 26 projects with 221MW of installed capacity and 187MW of contracted capacity are ready for bidding once the ERC opens the bidding process.

According to Interior Ministry statistics, per capita, Thai people generate an estimated 1.14kg of solid waste per day – 50% of which is biodegradable. Refuse nationwide in 2019 amounted to 28.7mt, up about 0.7% y-y. Of this, 4.5mt was generated in Bangkok. Only about 5-6mt were recycled. Only about 9.8mt were handled in accordance with global best practices. Thailand's waste management plan calls for 75% of Thailand's total solid waste to be properly disposed of or recycled in some way by 2023, up from 50% in 2020.

Exhibit 17: Municipal solid waste mountain in Bangkok

Source: Energy News

Exhibit 18: Thailand's municipal solid waste in 2019

Source: Thailand Environment Institute (TEI)

ETC and ACE: two potential winners under the upcoming bidding for WTE

Among four major players in Thailand's WTE industry, we prefer ETC as the most likely winner of the IW WTE growth potential and ACE as the most likely winner of the MSW WTE growth opportunities.

TPIPP, ETC, ACE, and TPCH are the four leading and largest operators of MSW WTE and IW WTE power plants, respectively.

TPIPP currently operates four WTE power plants (180MW), solely using MSW as a key fuel source.

ETC is a subsidiary of Thailand's leading industrial management company, BWG, currently operating three IW WTE power plants with a total installed capacity of 20MW and contracted capacity of 16.5MW.

ACE operates 9 biomass power plants, two MSW-based WTE power plants, and one gas-fired SPP.

TPCH currently operates 10 biomass power plants and one WTE power plant via its 50% subsidiary Siam Power (not listed), a company focusing on WTE growth projects in Thailand.

ETC: A key winner for industrial waste WTE power plants. As a subsidiary of Thailand's leading industrial management company, BWG, ETC currently operates a contracted WTE capacity of 16.5MW.

Using non-toxic IW procured directly from its parent company, ETC has consistently run its three power plants at high utilisation rates of over 90% in 2019-20.

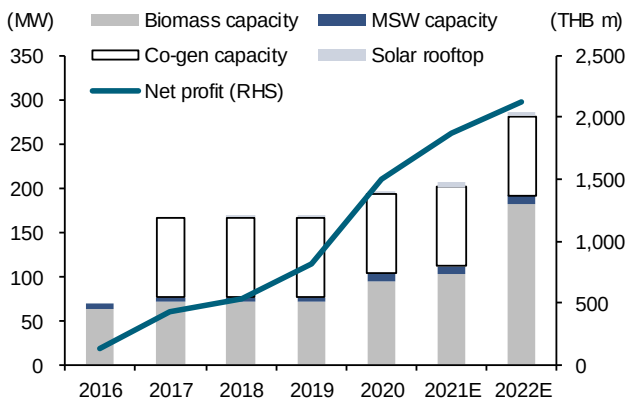
Exhibit 19: ETC's projects

Plant	Installed capacity	Contracted capacity	COD	---------- FiT (THB/kWh) ----------				PPA life	Feedstock	Location
	(MW)	(MW)		Fixed FiT	Variable FiT	Adder for IW	Total	(years)		
ETC	9.4	8.0	Mar-17	2.39	2.74	0.70	5.83	20	MSW/non-toxic IW	Sraraburi
AVA	7.0	5.5	Sep-19	3.39	2.74	0.70	6.83	20	Non-toxic IW	Phranakornsriayudhaya
RH	4.0	3.0	Dec-19	3.39	2.74	0.70	6.83	20	Non-toxic IW	Phichit

Source: ETC

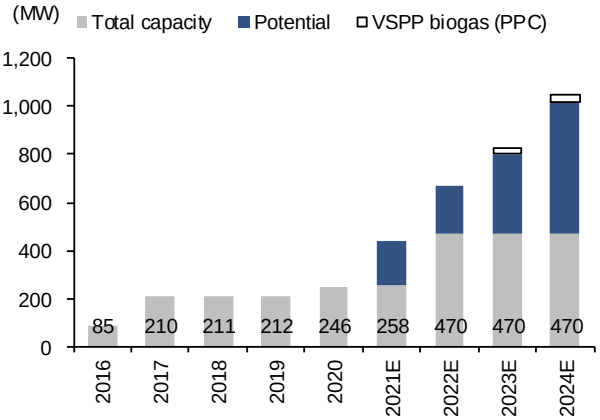
ACE: A key player in renewable biomass and WTE. While ACE currently operates nine biomass power plants, the company also operates two WTE power plants using MSW as a key feedstock.

Exhibit 20: Equity capacity projections vs net profit



Sources: ACE; FSSIA estimates

Exhibit 21: Installed capacity growth projection breakdown



Sources: ACE; FSSIA estimates

ACE has been able to achieve a higher availability factor of over 85% and a capacity factor of over 80% on average, despite the challenges presented by feedstock procurement and price controls. This reflects that ACE is one of Thailand's most efficient operators of renewable biomass, biogas, and WTE power plants, and is likely

to win more WTE capacity growth under the upcoming 300MW available for bidding in mid-2022, in our view.

TPCH: From biomass to WTE growth. TPCH is one of Thailand's leading players in the renewable business, currently operating 10 biomass power plants and one WTE power plant.

Exhibit 22: TPCH – new growth projects in four southernmost provinces

	Projects	Investment	Installed capacity	Location	FiT	COD
		(THB m)	(MW)		(THB/kWh)	
1	TPCH Power1 Co Ltd	800	9.9	Yala, Southern Thailand	3.1	1H21
2	TPCH Power2 Co Ltd	788	9.9	Yala, Southern Thailand	3.1	1H21
3	TPCH Power5 Co Ltd	648	6.3	Narathivas, Southern Thailand	3.4	1H21
4	Pattanee Green	1,721	21.0	Pattanee, Southern Thailand	4.3	Jun-20
5	Waste-to-energy (Siam Power)	1,425	9.5	Nonthaburi, Thailand	5.8	Sep-21
	Total	**3,957**	**47**			

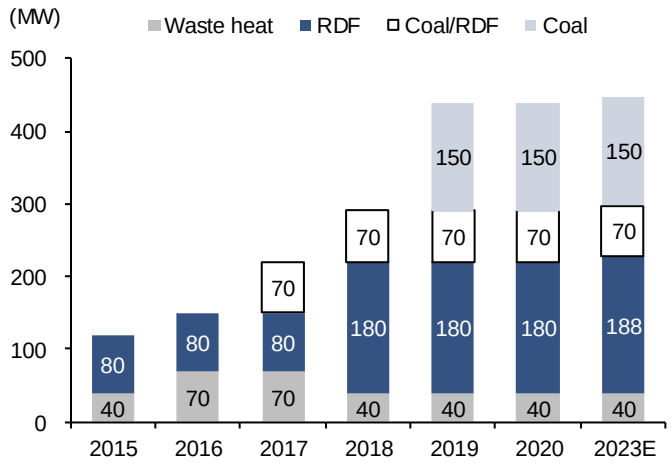
Sources: TPCH; FSSIA estimates

While the earnings downsides from the subpar operations of TPTG are manifest due to the subpar operational efficiency of its four new biomass power plants as a result of the higher cost of biomass feedstock, we remain positive on TPCH's net profit growth outlook in 2022-23, projecting net profit growth of 114% y-y in 2022 and 16% y-y in 2023.

The key driver would be the COD of its 9.5MW WTE biomass power plant in September 2021 – a one-month delay from its original COD due to the Covid-19 lockdown. TPCH is currently developing five new WTE power plants, which we think will be key earnings catalysts to offset the weak net profits from its biomass power plants.

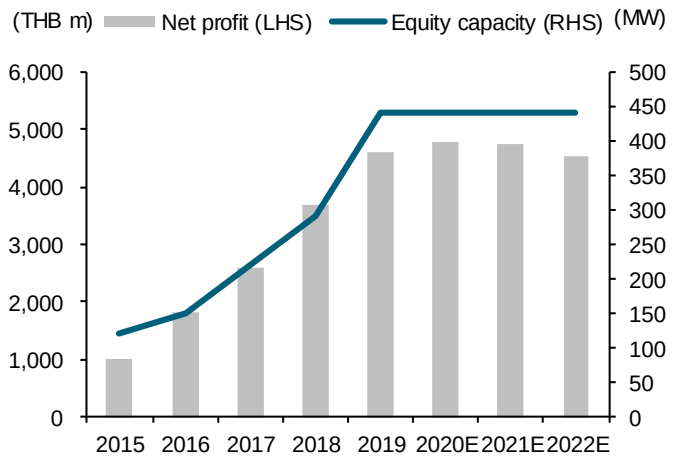
TPIPP: Focused on MSW WTE growth. We believe TPIPP could secure up to 66MW of new MSW WTE power plant capacity in 2022 (from 356MW bidding capacity), while ETC could potentially secure up to 20MW of IW WTE capacity in 2022 (from 44MW bidding capacity). However, we conservatively apply only 5MW new capacity growth into our earnings and target price for ETC as we think it is likely to secure 5MW.

Exhibit 23: TPIPP – capacity breakdown by type



Sources: TPIPP; FSSIA estimates

Exhibit 24: TPIPP – net profit and equity capacity



Sources: TPIPP; FSSIA estimates

Exhibit 25: Peer comparisons

Company	BBG code	Rec	Share Price	Target price	*Upside*	Market Cap	3Y EPS CAGR	----- PE ----		---- ROE ----		---- PBV ---		- EV / EBITDA-	
								21E	22E	21E	22E	21E	22E	21E	22E
			(LCY)	(LCY)	*(%)*	(USD m)	(%)	(x)	(x)	(%)	(%)	(x)	(x)	(x)	(x)
THAILAND															
Bcpg	BCPG TB	BUY	12.7	17	*34*	1,100	(6.4)	14.1	14.4	10.8	9.8	1.4	1.4	17.4	17.4
Ck Power	CKP TB	BUY	4.98	6.6	*33*	1,211	97.0	17.9	12.7	9.1	11.9	1.6	1.5	10.1	11.7
Energy Absolute	EA TB	BUY	85	122	*44*	9,486	33.0	37.2	31.1	27.0	25.6	9.0	7.1	29.3	21.7
Gunkul Engineer	GUNKUL TB	BUY	4.88	5.4	*11*	1,297	41.4	16.7	14.0	20.2	22.0	3.3	2.9	14.2	12.7
Demco Pcl	DEMCO TB	BUY	3.86	5.9	*53*	84	64.6	15.6	13.3	3.8	4.4	0.6	0.6	(99.4)	(72.6)
Power Solution	PSTC TB	BUY	2.68	3.7	*38*	190	196.7	57.2	18.1	1.9	5.8	1.1	1.0	16.0	21.7
Sermsang Power	SSP TB	BUY	12.4	20	*61*	390	19.5	13.8	11.0	18.7	18.2	2.1	1.9	9.9	8.3
Tpc Power	TPCH TB	BUY	11.9	14	*18*	143	30.8	21.2	9.9	7.5	15.1	1.6	1.4	13.0	8.5
Tpi Polene Power	TPIPP TB	BUY	4.18	5.7	*36*	1,051	(3.6)	7.5	7.7	15.7	14.8	1.2	1.1	6.5	6.5
Absolute Clean Ener	ACE TB	BUY	3.6	5.2	*44*	1,096	31.0	19.4	16.9	15.1	16.5	2.8	2.8	15.5	12.1
Earth Tech Envi	ETC TB	BUY	3.26	3.8	*17*	218	14.2	30.5	23.5	9.5	11.3	2.8	2.6	18.4	15.2
Clover Power	CV TB	BUY	3.14	5.5	*75*	120	12.3	22.6	23.2	10.7	8.1	1.9	1.8	12.1	11.6
Thailand avg						**16,387**	**34.6**	**28.8**	**23.7**	**21.4**	**21.0**	**6.1**	**4.9**	**21.8**	**17.3**
HONGKONG															
Datang Intl Power	991 HK	n/a	1.53	n/a	*n/a*	7,087	nm	nm	nm	nm	nm	nm	nm	nm	n/a
Huadian Power	1071 HK	n/a	3.42	n/a	*n/a*	7,045	(3.3)	14.2	6.2	1.5	10.6	0.5	0.4	12.7	9.0
Huaneng Power	902 HK	n/a	4.85	n/a	*n/a*	18,914	(3.3)	13.6	9.7	(0.6)	6.3	0.6	0.6	12.8	9.4
China Power Inter	2380 HK	n/a	4.96	n/a	*n/a*	6,831	14.3	27.1	17.2	5.0	7.4	1.2	1.1	12.7	10.4
China Resources	836 HK	n/a	26.1	n/a	*n/a*	16,338	18.8	16.0	11.9	8.2	10.8	1.4	1.3	9.0	7.6
Clp Holdings Ltd	2 HK	n/a	76.55	n/a	*n/a*	24,722	0.6	17.3	16.0	9.7	10.1	1.6	1.6	10.8	10.3
Power Assets	6 HK	n/a	48.2	n/a	*n/a*	13,185	3.1	16.1	15.1	7.7	8.2	1.2	1.2	78.3	75.7
Hongkong avg						**94,123**	**3.5**	**15.3**	**12.0**	**5.4**	**8.3**	**1.1**	**1.1**	**19.8**	**17.9**
MALAYSIA															
Petronas Gas	PTG MK	n/a	16.9	n/a	*n/a*	7,863	(0.7)	16.2	16.9	15.6	14.6	2.6	2.5	9.0	9.0
Tenaga Nasional	TNB MK	n/a	9.29	n/a	*n/a*	12,543	8.6	10.9	11.0	8.6	8.3	0.9	0.9	6.4	6.3
Ytl Power Inte	YTLP MK	n/a	0.625	n/a	*n/a*	1,188	97.0	11.1	13.8	3.6	2.7	0.4	0.4	10.3	10.5
Malaysia avg						**21,594**	**4.4**	**2.9**	**3.1**	**2.5**	**2.4**	**0.3**	**0.3**	**1.7**	**1.7**
CHINA															
China Datang	1798 HK	n/a	3.08	n/a	*n/a*	2,918	26.3	11.6	9.4	7.4	7.7	1.4	0.9	9.5	8.3
China Gas	384 HK	n/a	14.86	n/a	*n/a*	10,671	6.2	7.3	8.3	23.5	15.9	1.6	1.2	7.6	8.0
China Longyuan	916 HK	n/a	17.76	n/a	*n/a*	18,499	20.5	19.1	16.6	10.7	11.3	2.0	1.8	10.4	9.3
Beijing Enterprises	392 HK	n/a	27.1	n/a	*n/a*	4,569	14.0	4.3	4.2	9.4	9.2	0.4	0.4	6.7	5.7
Kunlun Energy	135 HK	n/a	7.6	n/a	*n/a*	8,423	22.3	10.7	9.5	10.3	11.7	1.0	0.9	3.4	3.1
China avg						**45,080**	**14.0**	**6.1**	**5.5**	**6.4**	**5.8**	**0.7**	**0.6**	**3.8**	**3.5**
Utilities under coverage						**16,387**	**34.6**	**28.8**	**23.7**	**21.4**	**21.0**	**6.1**	**4.9**	**21.8**	**17.3**
Average (all)						**177,184**	**14.9**	**12.7**	**10.4**	**6.8**	**8.1**	**1.4**	**1.2**	**13.7**	**12.2**

Share prices as of 15 Dec 2021
Sources: Bloomberg, FSSIA estimates

Corporate Governance report of Thai listed companies 2020

EXCELLENT 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	CK	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	K	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	TK	TKT	TTB	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 GOOD 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	B	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
ESTAR	FE	FLOYD	FN	FORTH	FSS	FTE	FVC	GENCO	GJS	GL
GLAND	GLOBAL	GLOCON	GPI	GULF	GYT	HPT	HTC	ICN	IFS	ILM
IMH	INET	INSURE	IRC	IRCP	IT	ITD	ITEL	J	JAS	JCK
JCKH	JMART	JMT	KBS	KCAR	KGI	KIAT	KOOL	KTIS	KWC	KWM
L&E	LALIN	LDC	LHK	LOXLEY	LPH	LRH	LST	M	MACO	MAJOR
MBAX	MEGA	META	MFC	MGT	MILL	MITSIB	MK	MODERN	MTI	MVP
NETBAY	NEX	NINE	NTV	NWR	OCC	OGC	OSP	PATO	PB	PDG
PDI	PICO	PIMO	PJW	PL	PM	PPP	PRIN	PRINC	PSTC	PT
QLT	RCL	RICHY	RML	RPC	RWI	S11	SALEE	SAMCO	SANKO	SAPPE
SAWAD	SCI	SCP	SE	SEG	SFP	SGF	SHR	SIAM	SINGER	SKE
SKR	SKY	SMIT	SMT	SNP	SPA	SPC	SPCG	SR	SRICHA	SSC
SSF	STANLY	STI	STPI	SUC	SUN	SYNEX	T	TAE	TAKUNI	TBSP
TCC	TCMC	TEAM	TEAMG	TFG	TIGER	TITLE	TKN	TKS	TM	TMC
TMD	TMI	TMT	TNITY	TNP	TNR	TOG	TPA	TPAC	TPCORP	TPOLY
TPS	TRITN	TRT	TRU	TSE	TVT	TWP	UEC	UMI	UOBKH	UP
UPF	UPOIC	UT	UTP	UWC	VL	VNT	VPO	WIIK	WP	XO
YUASA	ZEN	ZIGA	ZMICO							

GOOD LEVEL

7UP	A	ABICO	AJ	ALL	ALUCON	AMC	APP	ARIN	AS	AU
B52	BC	BCH	BEAUTY	BGT	BH	BIG	BKD	BLAND	BM	BR
BROCK	BSBM	BSM	BTNC	CAZ	CCP	CGD	CITY	CMAN	CMO	CMR
CPT	CPW	CRANE	CSR	D	EKH	EP	ESSO	FMT	GIFT	GREEN
GSC	GTB	HTECH	HUMAN	IHL	INOX	INSET	IP	JTS	JUBILE	KASET
KCM	KKC	KUMWEL	KUN	KWG	KYE	LEE	MATCH	MATI	M-CHAI	MCS
MDX	MJD	MM	MORE	NC	NDR	NER	NFC	NNCL	NPK	NUSA
OCEAN	PAF	PF	PK	PLE	PMTA	POST	PPM	PRAKIT	PRECHA	PRIME
PROUD	PTL	RBF	RCI	RJH	ROJNA	RP	RPH	RSP	SF	SFLEX
SGP	SISB	SKN	SLP	SMART	SOLAR	SPG	SQ	SSP	STARK	STC
SUPER	SVOA	TC	TCCC	THMUI	TIW	TNH	TOPP	TPCH	TPIPP	TPLAS
TTI	TYCN	UKEM	UMS	VCOM	VRANDA	WIN	WORK	WPH		

Description	Score Range
Excellent	90-100
Very Good	80-89
Good	70-79

Disclaimer:
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 evaluation of operation and is not based on inside information.
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. FSS International Investment Advisory Company Limited does not confirm nor certify the accuracy of such survey results.
* 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, and corruption SEC imposed a civil sanction against insider trading of director and executive; ** delisted

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

Anti-corruption Progress Indicator 2020

CERTIFIED										
2S	ADVANC	AI	AIE	AIRA	AKP	AMA	AMANAH	AP	AQUA	ARROW
ASK	ASP	AYUD	B	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	K	KASET	KBANK	KBS	KCAR	KCE	KGI	KKP	KSL
KTB	KTC	KWC	L&E	LANNA	LHFG	LHK	LPN	LRH	M	MAKRO
MALEE	MBAX	MBK	MBKET	MC	MCOT	MFC	MFEC	MINT	MONO	MOONG
MPG	MSC	MTC	MTI	NBC	NEP	NINE	NKI	NMG	NNCL	NSI
NWR	OCC	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	TKT	TTB	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	XO
ZEN	TRUE									
DECLARED										
7UP	ABICO	AF	ALT	AMARIN	AMATA	AMATAV	ANAN	APURE	B52	BKD
BM	BROCK	BUI	CHO	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 indicates practical participation with thoroughly examination in relation to the recommended procedures from the audit 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 th e 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

GENERAL DISCLAIMER

ANALYST(S) CERTIFICATION

Suwat Sinsadok FSS International Investment Advisory Securities Co., Ltd

The individual(s) identified above certify(ies) that (i) all views expressed in this report accurately reflect the personal view of the analyst(s) with regard to any and all of the subject securities, companies or issuers mentioned in this report; and (ii) no part of the compensation of the analyst(s) was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed herein.

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Company	Ticker	Price	Rating	Valuation & Risks
BCPG	BCPG TB	THB 12.70	BUY	The downside risks to our SoTP-based TP include: 1) lower-than-expected demand for electricity in Thailand, the Philippines and Indonesia; and 2) government intervention by way of electricity tariff subsidies.
CK Power	CKP TB	THB 4.98	BUY	The downside risks to our SoTP-based TP include lower-than-expected demand for electricity in Thailand and lower-than-expected water supply for hydro projects.
Energy Absolute	EA TB	THB 85.00	BUY	Downside risks to our SoTP-based TP include: 1) lower-than-expected demand for electricity in Thailand; 2) lower crude prices; and 3) lower-than-expected demand for batteries.
Gunkul Engineering	GUNKUL TB	THB 4.88	BUY	The downside risks to our SoTP-based TP on GUNKUL include 1) lower-than-expected demand for electricity in Thailand, 2) declining EPC backlogs, and 3) lower-than-expected utilisation rates for solar and wind farms.
Demco	DEMCO TB	THB 3.86	BUY	Downside risk includes delays in bidding for power transmission projects.
Power Solution Technologies	PSTC TB	THB 2.68	BUY	The downside risks to our SoTP-based TP on PSTC include 1) lower-than-expected demand for electricity in Thailand and delays of power plant project start-ups.
Sermsang Power Corp	SSP TB	THB 12.40	BUY	The downside risks to our SoTP-based TP for SSP include 1) a lower-than-expected demand for electricity in Thailand; 2) a lower crude price; and 3) project start-up delays.
TPC Power Holding	TPCH TB	THB 11.90	BUY	The downside risks to our SoTP-based TP include 1) lower-than-expected demand for electricity in Thailand, 2) a lower crude price, and 3) higher costs of biomass feedstock.
TPI Polene Power	TPIPP TB	THB 4.18	BUY	Downside risks to our SoTP-based TP include 1) lower-than-expected demand for electricity in Thailand; 2) lower crude price, and 3) unplanned shutdown of the company's power plants.
Absolute Clean Energy	ACE TB	THB 3.60	BUY	The downside risks to our SoTP-based TP include 1) lower-than-expected demand for electricity in Thailand, 2) a lower crude price, and 3) higher costs of biomass feedstock.
Earth Tech Environment	ETC TB	THB 3.26	BUY	Downside risks to our SoTP-based TP include: 1) lower-than-expected demand for electricity in Thailand; 2) lower crude price; and 3) lower-than-expected industrial waste volumes.
Clover Power	CV TB	THB 3.14	BUY	The downside risks to our SoTP-based TP include 1) lower-than-expected demand for electricity in Thailand, 2) a lower crude price, and 3) higher costs of biomass feedstock.
Electricity Generating	EGCO TB	THB 173.50	BUY	Downside risks to our SoTP-based TP include 1) lower-than expected demand for electricity in Thailand; 2) delays in project commencement or commercial operation dates (COD); and 3) government intervention in electricity tariff subsidies.
Banpu Power	BPP TB	THB 17.20	BUY	Downside risks to our SOTP valuation are the start-up delays of its new projects and government intervention in the electricity tariff.
Ratch Group	RATCH TB	THB 44.75	BUY	The downside risks to our SoTP-based TP include 1) lower-than-expected demand for electricity in Thailand; 2) lower crude price; and 3) delays in starting new projects.
Global Power Synergy	GPSC TB	THB 74.50	BUY	The downside risks to our SoTP-based TP on GPSC include 1) lower-than-expected demand for electricity in Thailand; 2) a lower crude price; and 3) lower-than-expected demand from industrial users.
B.Grimm Power	BGRIM TB	THB 39.25	BUY	The downside risks to our SoTP-based TP include 1) lower-than-expected demand for electricity in Thailand, 2) a lower crude price, and 3) unplanned shutdowns of its SPPs.

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 15-Dec-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.