RENEWABLE ENERGY IN VIETNAM: AT AN INFLECTION POINT

15 May 2018
Nguyen Hanh Trang
trang.nguyenhanh@vndirect.com.vn

The renewable energy (RE) sector in Vietnam is currently underdeveloped but has huge long-term potential. Most RE projects have low profitability and there are currently no clear policy directives from the government. However, we believe the situation is beginning to change thanks to the evolution in technology, falling equipment costs, and more commitment from the government to clean energy. The sector is still nascent but clearly at an inflection point in its development.

Vietnam needs to push RE for environmental reasons. The government has made a commitment to increase environmental protection through the reduction of carbon emissions. This commitment will not be achieved if the country keeps adding more fossil fuel power plants in the capacity mix. As hydropower used to account for the majority of installed capacity and is nearly tapped-out and public opinion on nuclear power remains negative post-Fukushima, RE is now the only viable long-term alternative.

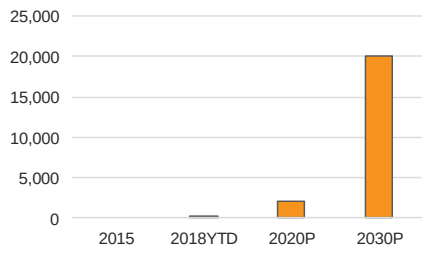
The government has set an ambitious target for RE development as the country needs to expand its current capacity. Continual flows of FDI into manufacturing and ongoing industrialization in Vietnam will drive a sustained rise in demand for electricity. In the revised Power Development Plan 7 (PDP 7) for 2030, the government has set an ambitious target to increase RE capacity from over 159MW at present (0.5% of total) to 2,150MW in 2020 (3.6% of total).

Vietnam's attractive geography and falling installation costs make for huge RE development potential in the country. Vietnam has ample potential for both wind and solar energy thanks to its geographic location near the equator and its long coast line. At the same time, technology advances have resulted in falling unit capex costs for capacity addition. This implies that RE unit economics in Vietnam could be very attractive in the medium-to-long term. This is especially true given Vietnam's growing reliance on imported LNG and coal to drive its thermal power plants as domestic production plateaus.

Investors are awaiting more policy clarity, particularly on the RE sales pricing mechanism. Concrete supporting policies for RE projects are currently lagging behind official announcements particularly in terms of pricing incentives and tax treatment. The current selling price for RE is 9.35 US cents/kWh for solar and 7.80 US cents/kWh for wind, translating to payback periods of more than 10 years (based on investor estimations on recent projects), which is not sufficient to attract large-scale investment even with the reduction in income tax rate by half for the first 15 years of operation.

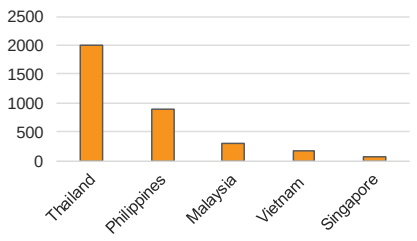
PGV, REE, GEX, CHP, SHP, GEG, and SEB represent a growing cohort of listed players with RE plans in Vietnam. EVN (unlisted) and Thanh Thanh Cong Group (TTC - unlisted) which owns GEG are the two largest players in the RE sphere in terms of both capability and planning capacity. But GEX is a dynamic recent entrant with ambitious plans for RE capacity addition.

Figure 1: Hisorical and planned capacity of Vietnam's Renewable energy (MW)



Source: PDP7, VNDIRECT Research.

Figure 2: Total renewable capacity of Vietnam and regional countries (MW, latest reported)



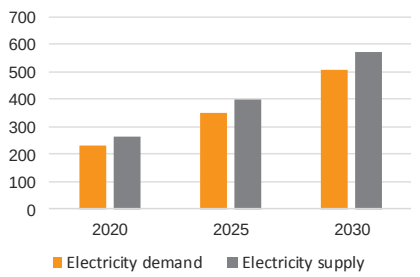
Data: Thailand (2016), Philippines (2016), Malaysia (2017), Vietnam (2018 YTD), Singapore (2017)

Source: International Renewable Energy Agency

Development of renewable energy (RE) is imperative in the long run, given the rapid growth in electricity demand in Vietnam, as well as rising environmental concerns and growing reliance on imported thermal power feedstock.

The latest power development plan treats RE as an important component of the total power mix, with RE accounting for approximately 21% of total new installed capacity added between 2015 and 2030 and contributing 16% of total installed capacity by the end of the period. This is because (1) Vietnam's hydropower potential has almost been fully exploited already, and (2) dependence on gas and coal thermal power both have a negative impact on the environment and are also increasingly dependent on imported feedstock which is neither good for macroeconomic stability nor for national energy security.

Figure 3: Forecasted electricity demand and supply in revised PDP 7 (bn kWh)

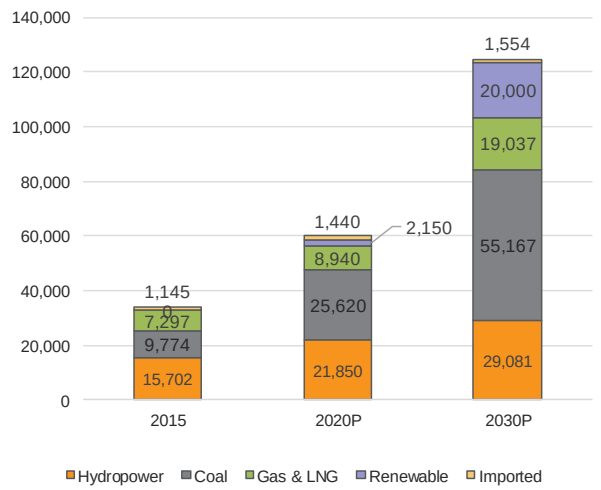


Source: Revised PDP 7

Vietnam's electricity demand is growing at a faster rate than for the region due to rapid GDP growth and inefficiency in energy usage. According to the Ministry of Industry and Trade (MOIT), electricity demand is predicted to continue growing at an average of 10%-12% per annum on the back of 6-7% GDP growth annually, creating the need to increase production capacity by another 91GW by 2030 (2.7x current capacity). Currently, Vietnam's current domestic production only meets approximately 97% of current electricity demand. Vietnam meets around 3% of its total electricity demand through imports from China and Laos and will continue to meet more than 2% of annual demand through imports from these countries in the next few years according to EVN.

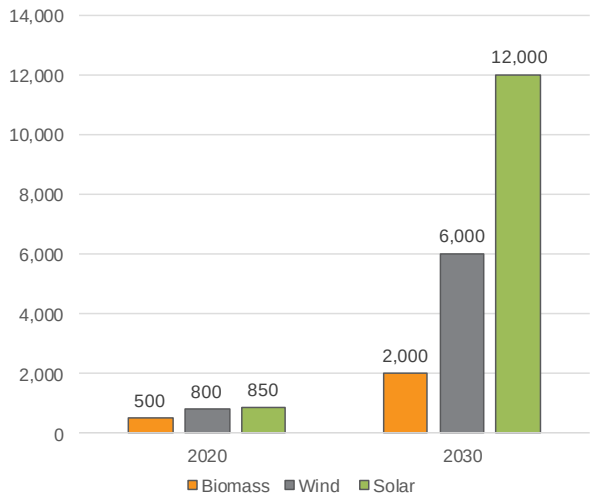
In the next few years, installed capacity growth will mainly depend on coal thermal projects. Since almost all of the hydropower potential in the country has been exploited, gas and coal-based thermal power have become the priority sources. In the latest Power Development Plan (PDP 7), around 49% of the capacity mix will be contributed by coal thermal power plants by 2025.

Figure 4: Planned structure of national capacity mix (MW)



Source: PDP 7

Figure 5: Planned future installed RE capacity (MW)

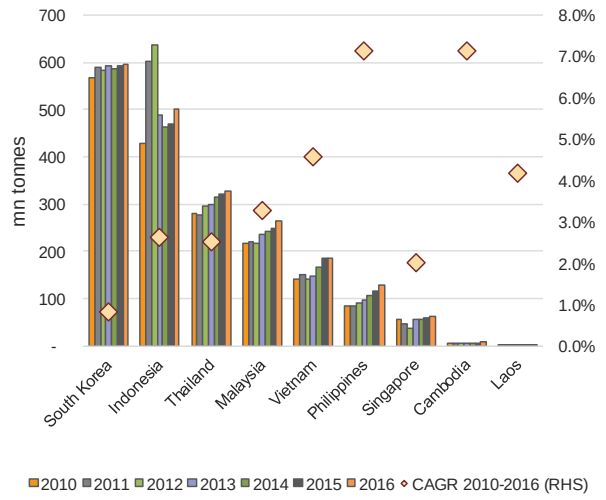


Source: PDP 7

However, adverse environmental effects from coal and gas thermal power generation make this reliance unsustainable. Detrimental environmental effects from coal and gas thermal power

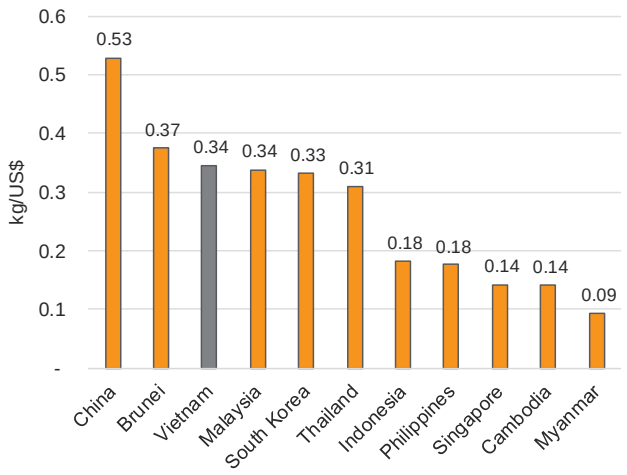
have become more severe for Vietnam, which has one of the highest carbon intensity ratios in the ASEAN region (Total CO2 emissions divided by GDP) of 0.34kg/US$ per year. The country's total greenhouse gas (GHG) emissions reached 187mn tonnes of Co2 in 2016, registering a CAGR of 4.6% during the period 2010-2016. According to Economic Consulting Associates (ECA) estimations, the health and environmental costs of Vietnam's thermal capacity addition under the latest PDP could reach US$15bn by 2030.

Figure 6: Carbon emissions (million tonnes of CO2) of select East Asian countries



Source: Global Carbon Atlas

Figure 7: Carbon Intensity: Total CO2 emissions divided by GDP at PPP in 2016 (kgCO2/GDP)



Source: Global Carbon Atlas

Vietnam has made a global commitment to reduce its CO2 emissions by 2030. At the COP21 Paris Conference on December 2015, Vietnam committed to reducing its carbon emissions by 25% during 2021-2030. In the G20 2017 conference in Germany, Prime Minister Nguyen Xuan Phuc once again reaffirmed Vietnam's responsibility in helping reduce global climate change and environmental pollution. This can only be achieved through scaling back new coal-based thermal power plants and pushing for a higher percentage of RE in the country's power capacity mix. In order to fulfill its promise to the global community, Vietnam needs to be more active in pushing RE development.

Project financing allocation shifts should also support the migration towards RE. With the government not being able to finance the current power development plan due to growing budgetary constraints and a persistent fiscal deficit, additional capacity will have to be supported by increased lending from foreign lending institutions and equity from private investors. However, due to environmental factors, the World Bank and Asian Development Bank are imposing constraints on lending to coal projects. This should add further impetus to Vietnam's policy-makers to increase share of RE in future power capacity additions.

The potential for solar and wind power in Vietnam is quite large but development is still in the very early stages.

Vietnam's tropical climate and long coastline are favorable for development of both wind and solar power.

Vietnam has up to 24GW of potential in wind power, as the country has more than 3,260km of coastline. The wind in the East Sea is fairly strong and changes seasonally, as compared to surrounding areas. According to the World Bank, Vietnam has the largest potential for

wind power, compared to other Southeast Asian countries such as Thailand, Laos and Cambodia. However, wind energy is still highly dependent on weather conditions and seasons.

Vietnam also has abundant potential for solar power capacity addition due to its favorable location near the equator. **The average direct normal irradiation (DNI) is estimated at 4-5kWh/m^2 per day.** Vietnam enjoys 1,600-2,700 hours/year of sunlight, with the highest potential being in the southern and central Vietnam regions as the average number of sunny days in these two regions is around 300 days/year. The solar radiation level in Vietnam is on par with other developing solar power markets in the region such as China, Thailand, and Philippines, as well as developed solar markets including Italy and Spain.

Figure 8: Solar radiation data

Region	Hours of sun/year	Solar radiation (kWh/m2/day)	Evaluation
North East	1,600-1,750	3.3-4.1	Average
North West	1,750-1,800	4.1.-4.9	Average
North Central	1,700-2,000	4.6-5.2	Good
Tay Nguyen and South Central	2,000-2,600	4.9-5.7	Very good
Southern	2,200-2,500	4.3-4.9	Very good
Nationwide average	1,700-2,500	4.6	Good

Source: Compiled from data published by EVN

Exploitation of Vietnam's RE potential is still in its infancy

The revised PDP 7 also aims to increase the total capacity of wind power to 800MW in 2020, 2,000MW in 2025 and 6,000MW in 2030. However, there are currently only 4 wind farms operating nationwide with a collective installed capacity of 159.2MW (Phu Lac 1 – 24MW, Bac Lieu – 99.2 MW, Tuy Phong – 30MW, Phu Quy – 6MW), which significantly lags behind the 2020 plan of 800MW.

Solar power development in Vietnam is at more advanced stages than wind energy, though it is still very small in scale. The majority of solar projects in Vietnam are small-scale solar panels installed on the rooftop of residential buildings, with the electricity produced being for captive consumption by domestic appliances, heaters and lighting systems rather than being fed into the grid.

Technology advances have reduced the development cost for RE significantly, making for better unit economics

The development cost for offshore windmill farms is higher than onshore ones. Moreover, the longer distance of transmission from the windmill to the grid also contributes to higher construction costs for offshore farms. Due to their higher construction costs, offshore windmills also enjoy higher electricity selling prices.

Equipment accounts for 70%-80% of the total investment cost for wind energy projects. Therefore, reducing the cost of equipment is a necessary step to make RE projects more economically viable.

In Vietnam, the investment cost per kW for wind power stood at US$3.5mn-4.0mn/MW before 2010 and fell to US$2.0mn-2.5mn/MW between 2015 and 2016. This number is expected to fall further to US$1.5mn/MW between 2020 and 2025. At present, based on the technology used in two existing wind power farms (Phu Lac 1 – onshore and Bac Lieu – offshore), the installation cost for onshore wind power capacity is estimated at US$1.6mn/MW and around US$2.1mn/MW for offshore farms, significantly lower compared to the cost over a year ago. The secular fall in installation costs will continue to support RE capacity development in Vietnam by taking the pressure off a cash-strapped government that can ill-afford to pay large subsidies.

The cost for a solar panel using current technology has decreased from US$3-4/Wp from five years ago to as low as US$0.5/Wp in the

Wp stands for watt peak capacity, which is the maximum capacity of a module under optimal conditions.

best case. The investment cost is predicted to reduce by 9-12%/year in the next few years (according to GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit) due to continued R&D to improve efficiency. The first major solar plant in Vietnam, Thien Tan Solar Farm in Quang Ngai, was constructed at a unit capex cost of US$1.8mn/MW. According to EVN's press release at the end of 2016, the estimated unit capex costs for a planned 200MW solar project in Ninh Thuan stood at a little more than US$1.7mn/MW. Thanh Thanh Cong Group (TTC) has announced plans to develop 1,002MW of solar energy at a unit capex cost of just around US$1.0mn/MW.

Figure 9: Unit capex costs for different types of electricity (US$mn/MW) in Vietnam

Type	In the past (*)	At the present
Wind energy	2.0-2.5	1.6-2.1
Solar energy	3.0-4.0	1.0-1.2
Hydropower		1.3-1.8
Coal thermal power		1.3-1.9
Gas thermal power		1.0-1.2

*Wind energy past data: before 2010
Solar energy past data: before 2013

Source: VNDIRECT

An effective way to further reduce the cost of solar power projects is to construct solar panels on top of hydropower reservoirs. This has become a popular solution in other countries, as a way to expand existing hydropower capacity without having to heavily invest in expansion. This model has been tested for the first time in Portugal recently, and it will be replicated in Brazil and the US (according to Huffington Post).

In dry seasons, hydropower plants often have difficulties operating due to the low reservoir water levels. A way to offset this reduction in electricity output during the low-water season is to construct solar panels on top of water reservoirs, which will make use of the area and the existing transmission system of the hydropower plants. This will reduce the investment cost per MW for solar energy, lowering it to just US$0.7mn/MW. Moreover, building solar panels on top of hydropower reservoirs also shortens the construction period to less than one year. Solar panels and hydropower production can make up for each other's output shortage during both dry and rainy seasons. This development bodes well for Vietnam due to the country's abundance of hydropower facilities (hydropower accounts for 48% of current installed capacity)

Figure 10: Solar panel built on the surface of Alto Rabagão hydropower reservoir in Portugal

Source: futurism.com

The government is sending some initial signals of its intent to formalize a feed-in-tariff (FIT) mechanism

The introduction of FIT is a good sign that the government is starting to recognize hurdles for investors. FIT is the guaranteed long-term agreements and pricing regime available for renewable energy projects, which aims to encourage the development of RE. Each type of renewable energy has a different tariff structure due to variations unit installation costs. In Vietnam, Decision 37/2011/QĐ-TTg and Circular 16/2017-TT-BCT regulate the selling price for wind power and solar power projects, respectively. In addition, Decision 11/2017QĐ-TTg in June 2017 also stated that EVN is obligated to purchase all electricity output from solar farms at the price of 9.35 USD cents/kWh. However, these farms must be completed and connected

Figure 11: Summary of the average selling prices for sources of power plants (not including VAT)

Sources	Electricity selling price to EVN (USD cents/kWh)
Wind power (on land)	7.80
Wind power (on the sea)	9.80
Solar power	9.35
Hydropower (*)	4.80
Coal thermal power (*)	7.00
Gas thermal power (*)	7.10

(*) Approximated based on 2017 data

Source: VNDIRECT Research

to the electricity grid before June 2019 in order to enjoy this selling price. The duration of the PPA contract between power plants and EVN will be 20 years for both wind and solar energy, which is similar to the contract duration for thermal power plants.

At the present, only offshore Bac Lieu wind power enjoys a higher selling price of 9.8 cents/kWh, while the FIT stated on all the official documents for wind energy remains at 7.8 cents/kWh. Even at this price of 7.8 cents/kWh, it is still 10-11% higher than the selling price for electricity generated by thermal power plants.

The government is using generous tax incentives to compensate investors for relatively low feed-in tariffs. This includes an import tax exemption for imported construction equipment used in RE plants, and the reduction or exemption of real estate taxes for land used. In addition, investors also enjoy a favorable tax rate of 10% or less within the first 15 years; the first 4 years will be tax exempt, while the tax rate for the next 9 years tax rate will be only 5% and tax rate for the last 2 years will be 10%, still half the normal corporate income tax rate.

RE investors are awaiting a better pricing scheme from the government before actually ramping-up their development plans

Although the potential for RE in Vietnam is significant, it is still in the initial stages of development. One of the reasons is the lack of pricing incentives from the government for potential investors. The current pricing scheme is not appealing enough to attract mass players into the industry. At the current low selling price and high development cost for renewable energy, the payback period is still rather long (>10 years), diminishing their appeal for commercial investors.

Figure 12: Wind electricity selling prices in some countries versus in Vietnam

Countries	US cents/kWh
Japan	30.0
Thailand	20.0
Philippines	29.0
Vietnam	7.8

Source: VNDIRECT

The low purchase price for wind power does not make for attractive economics for investors in wind farms.

The currently purchase price for wind electricity is much lower compared to other countries in the region. Interested investors are waiting for the government to announce higher prices before beginning construction of new wind farms.

A typical wind farm will be financed through 30% equity and 70% debt at an interest rate of 10% per annum. For Phu Lac 1 plant (24MW in capacity, estimated output of 56.5mn kWh/year), the total investment cost was VND1,100bn, and it generated VND100bn in annual revenue. With the abovementioned financing structure, the interest expense was around VND77bn annually, which only left the developer with VND23bn per year to cover all operating expenses (maintenance and labor costs). Phu Lac 1 plant estimated their payback period at 14 years. Moreover, wind turbines can only last for 20 years before they need to be replaced or go through major maintenance to be able to continue operating. Therefore, investors only have 6 years to generate profits before entering the next capex or maintenance cycle.

Levelized energy cost is the net present value of the unit-cost of electricity over the life time of the plant. It is the proxy for the average unit selling price that the plant should receive in order to break even over its lifetime.

According to MOIT/GIZ Energy Support Program's estimation, if a project uses technology from the US and EU that complies with IEC (International Electrotechnical Commission), the investment cost is US$2.3mn/MW, equivalent to a levelized cost of 10.68 cents/kWh. This is calculated using the above-mentioned financing structure. On the other hand, if the technology used is from China, the investment cost is only US$1.7mn/MW, resulting in a lower levelized cost at 8.6 cents/kWh. Based on this assumption, the payback period and depreciation in both cases is 20 year and 12 years, respectively. From this estimation and the regulated FIT price for onshore wind power (official price of 7.8 cents/kWh), it is understandable that investors are

hesitant due to the low profitability of the project, even if they opt for Chinese technology and equipment.

The current pricing scheme for RE is fixed until 2020. The MOIT proposed a new tariff level for wind power in November 2016 to increase the selling price to 8.77 USD cents/kWh and 9.97 USD cents/kWh, respectively. However, the specific timeline for the implementation of the new pricing regime is still unclear.

Figure 13: Comparision of wind and solar energy

	Wind	Solar
Capex cost/MW (US$mn/MW)	1.6-2.1	1.0-1.2
FIT/kWh (US cents/kWh)	7.80	9.35
Estimated IRR	<10%	12%
Estimated payback period (years) (*)	12-20	>10

(*): estimated payback period is dependent on technology used

Source: VNDIRECT

Solar power enjoys an FIT premium to wind energy and thus is attracting more investor attention, currently. At the selling price of 9.35 cents/kWh and unit capex cost of US$1.0-1.2mn/MW, the internal rate of return for these solar projects was around 12% or lower (according to Ernst & Young's estimation), and the payback period was greater than 10 years (equivalent to 40% of the useful life of the plant). While the economics are not optimal even for solar at the current FIT rates, compared to wind energy, solar power offers better returns than wind power and this might improve with the continued rapid fall in solar installation costs. Therefore, many investors are currently looking at solar power development, while waiting for a better pricing policy for wind power.

The window for investors to lock-in a higher tariff level for solar power is closing

At the present, investors in solar energy projects only have 14 months (to June 2019) to complete construction and connection to the grid if they want to enjoy a high selling price of 9.35 US cents/kWh. According to United States Agency for International Development (USAID), hundreds of solar power projects have registered to invest in Vietnam as of July 2017, with total capacity of 17,000MW; all of these projects are scrambling to complete construction before the deadline.

Projects that are completed after this deadline will have to wait for a new policy from the government, which means that they will be exposed to both policy and selling price risks. Moreover, as solar energy requires a large land area for installation of solar panels, it will also take a long time for investors to find suitable locations and carry out site-clearing and compensation processes (1MW of solar takes up 1-1.5ha of land area). This could hinder investor interest in the absence of greater policy certainty and administrative support from the government in terms of land acquisition and compensation.

Rising interest in RE from both domestic and foreign investors

Given that there is a large demand for electricity and that this demand is still growing, Vietnam has become an attractive destination for RE investors, though renewable energy is still in its early stages. For example, there was a total of 19,000MW of solar energy registered to be developed as of the end of August 2017, including both rooftop and land solar panels mostly in Dak Lak, Binh Thuan, Tay Ninh, Ninh Thuan and Khanh Hoa provinces. However, development permission will only be granted for some of the projects, as the local electricity grid is not yet equipped for feed-ins from these projects.

Thanh Thanh Cong Group (TTC) is an ambitious player in the market along with its subsidiary Gia Lai Electricity JSC (GEG VN). TTC Chairman has announced that RE will be one of the four main focuses for its investment plans until 2020. They have planned to invest in numerous solar projects with a total planned capacity of up to 1,002MW within 2 years. This is a very ambitious plan as the capacity alone is much larger than the entire nation's target of 850MW by 2020.

Figure 14: Planned solar projects by TTC

Name	Capacity (MW)	State of development
Tay Ninh	124	Planning
Binh Thuan	300	Planning
Ninh Thuan	200	Planning
Phong Dien - Hue	35	Started
Krong Pa - Gia Lai	49	Started
Long An	98	Planning
Tay Son - Binh Dinh	98	Planning
Ben Tre	98	Planning
Total	1002	

Source: VNDIRECT

Based on its estimation of a very low development cost of US$1.0mn/MW, TTC needs a total of US$1.0bn to build the projects, which will be financed through 30% equity and 70% debt. TTC will also face time constraints to finish all of these projects before June 2019, in order to secure a guaranteed PPA price. They only have around 14 months to complete all the financing and construction in order to enjoy the high selling price of 9.35 US cents/kWh.

That being said, TTC has several competitive advantages over other players in the market.

i. TTC's current land bank stands at 1,600ha. This will save them a lot of time and effort, as the company does not have to secure new land for all its needs.

ii. TTC has experience in constructing and operating power plants through its subsidiary GEG unlike several new entrants in this field who lack track-record and expertise.

iii. International Finance Corporation (IFC) and Armstrong Asset Management (Singapore) are strategic shareholders in GEC (14.7% and 18.5%, shareholding respectively) and can provide both financial and technical support to TTC.

In addition, TTC is planning to lift GEG's foreign ownership limit (FOL) from the current 49% to 100% as both foreign strategic shareholders International Finance and Armstrong A.M want to increase their stake in GEG. Both investors are experienced RE developers in the global market and are expected to help TTC/GEG to become a big player in Vietnam's RE industry (IFC has invested around US$1bn in 75 hydropower projects across 25 countries over the past 10 years while Armstrong has 50 RE projects globally, many of which are located in Southeast Asia).

During 1Q2018, TTC began constructing two solar projects including Phong Dien (35MW) and Krong Pa (49MW). Phong Dien, at a total estimated investment cost of US$30.6mn (VND700bn), will be completed by the end of 3Q2018 with an estimated output of 61,570MWh/year. Phong Dien's development will be carried out in two stages. 5MW will be connected to the grid by 2018 for the first stage and the remaining 30MW of capacity will be commissioned in 2019 as part of the second stage. Krong Pa (investment cost of US$62.4mn) will also be completed around the same time.

EVN is another major player with an ambitious plan for RE development

EVN, through its subsidiaries, also plans to implement 23 solar projects at a total capacity up to 3,100MW. It has proposed to the Prime Minister that it be allowed to include four projects (575MW capacity) into the national power development plan. Currently, EVN is also operating a 6MW wind power project on Phu Quy island.

Figure 15: EVN's solar projects pipelines

Name	Capacity (MW)	State of development
Proposed projects into Power Development Plan		
Kon Tum: Se San 4	47.0	Preparing to invest (COD: 2018-2019)
Ninh Thuan: Phuong Thai	200.0	Preparing to invest (COD: 2018-2020)
Binh Thuan: Song Binh	200.0	Preparing to invest (COD: 2019-2020)
Dong Nai: Tri An	126.0	Preparing to invest (COD: 2019-2020)
Subsidiary-level project		
EVN Genco 1		
Dong Nai 4 (Dac Nong) plant	50.0	
Da Mi (Binh Thuan)	50.0	
EVN Genco 2		
Song Ba Ha (Phu Yen)	100.0	
Thac Mo (Binh Phuoc)	139.0	
Quang Tri	30.0	
Cong Hai (Ninh Thuan)	40.0	
EVN Genco 3		
Srepok 3 (Dac Lac, Dac Nong)	30.0	
Buon Kuop (Dac Nong)	80.0	
Buon Tua Srah	120.0	
Hieu Hien (Ninh Thuan)	135.0	
Ca Ron (Ninh Thuan)	150.0	
Phuoc Huu (Ninh Thuan)	131.0	
Vinh Tan (Binh Thuan)	3.0	
EVN CPC/ECN SPC		
Cam Lam (Khanh Hoa)	50.0	
Phu Quy and Con Dao	4.2	
Total	**1685.2**	

Source: VNDIRECT

Unlike TTC, which already has an abundant land bank, some of EVN's projects are yet to secure sites. In addition, EVN will not be able to finance these projects through internal resources. Therefore, these projects need to secure funding sources before the construction can actually begin. This is a key disadvantage for EVN relative to TTC.

There are many other potential entrants in the industry and may make RE investments in the near future.

Refrigeration Electrical Engineering Corporation (REE VN) currently holds a portfolio of thermal and hydropower plants through subsidiaries and associate companies. The company aims to have utilities (water/electricity) as one of the main three segments that drives the company's growth in the next 5 years. Currently, REE is participating in the RE sphere indirectly through Thuan Binh Power JSC (EVN TBW), as both REE and EVN each hold a 25% stake in this entity. TBW is operating Phu Lac 1 wind power plant (24MW) and has also planned to go into solar energy – which has a more attractive tariff structure – while it awaits for better supporting policies from the government for wind energy. The company is planning to expand Phu Lac project and develop another 4 projects, the majority of which will be hybrid projects using both solar and wind power with total capacity of 1080MW (510MW of wind energy and 570MW of solar energy).

Figure 16: RE Projects under EVN TBW

Name	Location	Intended land area (ha)	Wind power capacity (MW)	Solar power capacity (MW)
Phu Lac (Binh Thuan)	Tuy Phong, Binh Thuan	400	50	100
Loi Hai	Thuan Bac, Ninh Thuan	523	50	70
Vinh Hao	Tuy Phong, Binh Thuan	600	60	
Ea H'Leo	Ea H'Leo, Dak Lak	1920	150	200
Kong Chro	Kong Chro, Gia Lai	3900	200	200
Total			510	570

Source: Thuan Binh Wind Power JSC

Vietnam Electrical Equipment Joint Stock Corporation (GEX VN) does not purely operate as an electricity generation company but, rather, is a power engineering, equipment manufacturing and generation conglomerate. GEX currently owns three hydropower plants (2 plants are in the middle of construction) and has plans to venture into the solar energy sector. On March 30, 2018, GEX signed an agreement with Power Solution Tech Company (PSTC - Thailand) to jointly develop Gelex solar plant in Ninh Thuan with a total capacity of 50MW. PSTC is one of the leading companies in Thailand in terms of consulting and development of solar farms and has experience supervising and acting as an EPC contractor for up to 1,000MW of solar capacity. Gelex's solar plant is currently in the last stage of preparation prior to begin construction in April 2018, which it plans to complete in May 2019, in time to lock-in the current preferential tariffs. The total investment cost is VND1,245bn (~US$1.1mn/MW investment value) and the plant's output is forecast to be approximately 82mn kWh/year.

Central Hydropower JSC (CHP VN) is a large hydropower company (total capacity of 170MW) that is beginning to move into the solar energy sector. CHP recently started the construction of Cu Jut solar plant (50MW capacity) in Dak Nong, aiming to connect to the grid upon completion in June 2019. The plant was placed into Dak Nong Electricity Development Plan for the period 2016-2025 and just signed a power purchase agreement with EVN on March 2018. Cu Jut solar plant will be constructed by Power Engineering Consulting JSC 1 (PECC1) and Vietnam Applied Technical Co. Ltd (Vatec). The total investment cost is VND1,250bn (~US$1.1mn/MW) with expected output of 78.6mn kWh/year.

Central Power Investment and Development JSC (SEB VN) is a small hydropower company (2 plants with a total capacity of 48MW) that has proposed the installation of solar panels on the current land where its hydropower plant operates. The capacity of the proposed solar farm is only 8MW, and the investment cost is only VND162bn (~US$0.9mn/MW). The reason for the much lower investment cost is because the company will make use of infrastructure and transmission lines already built for its the existing hydropower plant.

Another hydropower company that has joined the RE sector is **Southern Hydropower JSC (SHP VN)**. The company's three hydropower plants have a total capacity of 122.5MW, and it is considering building a small solar farm on top of the Da Dang 2 plant reservoir. However, there have not been much details released to the public yet.

Figure 17: Renewable Energy incumbents and recent entrants

Company	Country	Market cap (mn US$)	TTM NPAT growth (%)	TTM EPS growth (%)	ROA (%)	ROE (%)	D/E (x)	TTM P/E (x)	P/B (x)
TPI Polene Power PCL	Thailand	1,795.2	42.1	n/a	11.3	15.9	0.0	20.4	2.4
Superblock PCL	Thailand	997.1	-18.3	-18.4	2.7	10.6	2.2	24.7	2.5
SPCG PCL	Thailand	682.6	3.8	1.2	10.7	28.0	1.1	8.1	2.1
Zhong Min Energy Co Ltd	China	605.7	31.8	30.0	4.9	9.9	0.9	22.7	2.1
REE	Vietnam	494.4	15.3	15.3	10.9	19.2	0.4	7.9	1.4
GEX	Vietnam	423.1	47.3	27.4	6.9	22.3	1.2	11.9	2.2
Thai Solar Energy PCL	Thailand	209.9	-59.7	-59.7	4.0	9.1	1.5	16.8	1.5
CHP	Vietnam	138.9	-37.6	-34.2	13.3	23.1	0.6	16.1	1.7
SHP	Vietnam	89.7	-121.0	-120.0	7.2	14.8	1.0	12.6	1.7
GEG	Vietnam	58.0	2.6	-3.0	5.5	9.4	0.3	13.9	1.3
SEB	Vietnam	42.0	8.7	8.5	17.5	46.8	1.0	6.2	2.7
Average			**-7.7**	**-15.3**	**8.6**	**19.0**	**0.9**	**14.7**	**2.0**
Median			**3.8**	**-0.9**	**7.2**	**15.9**	**1.0**	**13.9**	**2.1**

Source: BLOOMBERG, VNDIRECT

DISCLAIMER

The content of this report (including the views and opinions expressed therein, and the information comprised therein) has been prepared by and belongs to VNDIRECT Securities Corporation, and is distributed by CGS-CIMB or CIMB Investment Bank Berhad ("CIMB"), as the case may be, pursuant to an arrangement between VNDIRECT Securities Corporation and CGS-CIMB. VNDIRECT Securities Corporation is not an affiliate of CGS-CIMB or CIMB.

This report is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of or located in any locality, state, country or other jurisdiction where such distribution, publication, availability or use would be contrary to law or regulation.

By accepting this report, the recipient hereof represents and warrants that he is entitled to receive such report in accordance with the restrictions set forth below and agrees to be bound by the limitations contained herein (including the "Restrictions on Distributions" set out below). Any failure to comply with these limitations may constitute a violation of law. This publication is being supplied to you strictly on the basis that it will remain confidential. No part of this report may be (i) copied, photocopied, duplicated, stored or reproduced in any form by any means or (ii) redistributed or passed on, directly or indirectly, to any other person in whole or in part, for any purpose without the prior written consent of CGS-CIMB or CIMB, as the case may be.

The information contained in this research report is prepared from data believed to be correct and reliable at the time of issue of this report.

VNDIRECT Securities Corporation may or may not issue regular reports on the subject matter of this report at any frequency and may cease to do so or change the periodicity of reports at any time. None of VNDIRECT Securities Corporation, CGS-CIMB or CIMB is under any obligation to update this report in the event of a material change to the information contained in this report. None of VNDIRECT Securities Corporation, CGS-CIMB or CIMB has any and will accept any, obligation to (i) check or ensure that the contents of this report remain current, reliable or relevant, (ii) ensure that the content of this report constitutes all the information a prospective investor may require, (iii) ensure the adequacy, accuracy, completeness, reliability or fairness of any views, opinions and information, and accordingly, VNDIRECT Securities Corporation, CGS-CIMB and CIMB and their respective affiliates and related persons including China Galaxy International Financial Holdings Limited ("CGIFHL") and CIMB Group Sdn. Bhd. ("CIMBG") and their respective related corporations (and their respective directors, associates, connected persons and/or employees) shall not be liable in any manner whatsoever for any consequences (including but not limited to any direct, indirect or consequential losses, loss of profits and damages) of any reliance thereon or usage thereof. In particular, VNDIRECT Securities Corporation, CGS-CIMB and CIMB disclaim all responsibility and liability for the views and opinions set out in this report.

Unless otherwise specified, this report is based upon reasonable sources. Such sources will, unless otherwise specified, for market data, be market data and prices available from the main stock exchange or market where the relevant security is listed, or, where appropriate, any other market. Information on the accounts and business of company(ies) will generally be based on published statements of the company(ies), information disseminated by regulatory information services, other publicly available information and information resulting from our research. Whilst every effort is made to ensure that statements of facts made in this report are accurate, all estimates, projections, forecasts, expressions of opinion and other subjective judgments contained in this report are based on assumptions considered to be reasonable as of the date of the document in which they are contained and must not be construed as a representation that the matters referred to therein will occur. Past performance is not a reliable indicator of future performance. The value of investments may go down as well as up and those investing may, depending on the investments in question, lose more than the initial investment. No report shall constitute an offer or an invitation by or on behalf of CGS-CIMB, CIMB, or VNDIRECT Securities Corporation, or their respective affiliates (including CGIFHL, CIMBG and their respective related corporations) to any person to buy or sell any investments.

CGS-CIMB, CIMB and/or VNDIRECT Securities Corporation and/or their respective affiliates and related corporations (including CGIFHL, CIMBG and their respective related corporations), their respective directors, associates, connected parties and/or employees may own or have positions in securities of the company(ies) covered in this research report or any securities related thereto and may from time to time add to or dispose of, or may be materially interested in, any such securities. Further, CGS-CIMB, CIMB and/or VNDIRECT Securities Corporation, and/or their respective affiliates and their respective related corporations (including CGIFHL, CIMBG and their respective related corporations) do and seek to do business with the company(ies) covered in this research report and may from time to time act as market maker or have assumed an underwriting commitment in securities of such company(ies), may sell them to or buy them from customers on a principal basis and may also perform or seek to perform significant investment banking, advisory, underwriting or placement services for or relating to such company(ies) as well as solicit such investment, advisory or other services from any entity mentioned in this report.

CGS-CIMB, CIMB and/or VNDIRECT Securities Corporation and/or their respective affiliates (including CGIFHL, CIMBG and their respective related corporations) may enter into an agreement with the company(ies) covered in this report relating to the production of research reports. CGS-CIMB, CIMB and/or VNDIRECT Securities Corporation may disclose the contents of this report to the company(ies) covered by it and may have amended the contents of this report following such disclosure.

The analyst responsible for the production of this report hereby certifies that the views expressed herein accurately and exclusively reflect his or her personal views and opinions about any and all of the issuers or securities analysed in this report and were prepared independently and autonomously. No part of the compensation of the analyst(s) was, is, or will be directly or indirectly related to the inclusion of specific recommendations(s) or view(s) in this report. The analyst(s) who prepared this research report is prohibited from receiving any compensation, incentive or bonus based on specific investment banking transactions or for providing a specific recommendation for, or view of, a particular company. Information barriers and other arrangements may be established where necessary to prevent conflicts of interests arising. However, the analyst(s) may receive compensation that is based on his/their coverage of company(ies) in the performance of his/their duties or the performance of his/their recommendations and the research personnel involved in the preparation of this report may also participate in the

solicitation of the businesses as described above. In reviewing this research report, an investor should be aware that any or all of the foregoing, among other things, may give rise to real or potential conflicts of interest. Additional information is, subject to the duties of confidentiality, available on request.

The term "VNDIRECT Securities Corporation" shall, unless the context otherwise requires, mean VNDIRECT Securities Corporation and its affiliates, subsidiaries and related companies. The term "CGS-CIMB" shall denote, where appropriate, the relevant entity distributing or disseminating the report in the particular jurisdiction referenced below, or, in every other case except as otherwise stated herein, CIMB Securities International Pte. Ltd. and its affiliates, subsidiaries and related corporations.

CGS-CIMB

Country	CGS-CIMB Entity	Regulated by
Hong Kong	CGS-CIMB Securities Limited	Securities and Futures Commission Hong Kong
India	CGS-CIMB Securities (India) Private Limited	Securities and Exchange Board of India (SEBI)
Indonesia	PT CGS-CIMB Sekuritas Indonesia	Financial Services Authority of Indonesia
Singapore	CGS-CIMB Research Pte. Ltd.	Monetary Authority of Singapore
South Korea	CGS-CIMB Securities Limited, Korea Branch	Financial Services Commission and Financial Supervisory Service
Thailand	CGS-CIMB Securities (Thailand) Co. Ltd.	Securities and Exchange Commission Thailand

CIMB

Country	CIMB Entity	Regulated by
Malaysia	CIMB Investment Bank Berhad	Securities Commission Malaysia

(i) As of 15 May 2018 VNDIRECT Securities Corporation has a proprietary position in the securities (which may include but not limited to shares, warrants, call warrants and/or any other derivatives) in the following company or companies covered or recommended in this report:
(a) -
(ii) As of 15 May 2018, the analyst(s) who prepared this report, and the associate(s), has / have an interest in the securities (which may include but not limited to shares, warrants, call warrants and/or any other derivatives) in the following company or companies covered or recommended in this report:
(a) -

This report does not purport to contain all the information that a prospective investor may require. CGS-CIMB, and VNDIRECT Securities Corporation and their respective affiliates (including CGIFHL, CIMBG and their related corporations) do not make any guarantee, representation or warranty, express or implied, as to the adequacy, accuracy, completeness, reliability or fairness of any such information and opinion contained in this report. None of CGS-CIMB, CIMB and VNDIRECT Securities Corporation and their respective affiliates nor their related persons (including CGIFHL, CIMBG and their related corporations) shall be liable in any manner whatsoever for any consequences (including but not limited to any direct, indirect or consequential losses, loss of profits and damages) of any reliance thereon or usage thereof. This report is general in nature and has been prepared for information purposes only. It is intended for circulation amongst CGS-CIMB's, CIMB's and their respective affiliates' (including CGIFHL's, CIMBG's and their respective related corporations') clients generally and does not have regard to the specific investment objectives, financial situation and the particular needs of any specific person who may receive this report. The information and opinions in this report are not and should not be construed or considered as an offer, recommendation or solicitation to buy or sell the subject securities, related investments or other financial instruments or any derivative instrument, or any rights pertaining thereto.

Investors are advised to make their own independent evaluation of the information contained in this research report, consider their own individual investment objectives, financial situation and particular needs and consult their own professional and financial advisers as to the legal, business, financial, tax and other aspects before participating in any transaction in respect of the securities of company(ies) covered in this research report. The securities of such company(ies) may not be eligible for sale in all jurisdictions or to all categories of investors.

Australia: Despite anything in this report to the contrary, this research is provided in Australia by CIMB Securities (Singapore) Pte. Ltd. and CIMB Securities Limited. This research is only available in Australia to persons who are "wholesale clients" (within the meaning of the Corporations Act 2001 (Cth) and is supplied solely for the use of such wholesale clients and shall not be distributed or passed on to any other person. You represent and warrant that if you are in Australia, you are a "wholesale client". This research is of a general nature only and has been prepared without taking into account the objectives, financial situation or needs of the individual recipient. CIMB Securities (Singapore) Pte. Ltd. and CIMB Securities Limited do not hold, and are not required to hold an Australian financial services license. CIMB Securities (Singapore) Pte. Ltd. and CIMB Securities Limited rely on "passporting" exemptions for entities appropriately licensed by the Monetary Authority of Singapore (under ASIC Class Order 03/1102) and the Securities and Futures Commission in Hong Kong (under ASIC Class Order 03/1103).

Canada: This research report has not been prepared in accordance with the disclosure requirements of Dealer Member Rule 3400 – Research Restrictions and Disclosure Requirements of the Investment Industry Regulatory Organization of Canada. For any research report distributed by CIBC, further disclosures related to CIBC conflicts of interest can be found at https://researchcentral.cibcwm.com.

China: For the purpose of this report, the People's Republic of China ("PRC") does not include the Hong Kong Special Administrative Region,

the Macau Special Administrative Region or Taiwan. The distributor of this report has not been approved or licensed by the China Securities Regulatory Commission or any other relevant regulatory authority or governmental agency in the PRC. This report contains only marketing information. The distribution of this report is not an offer to buy or sell to any person within or outside PRC or a solicitation to any person within or outside of PRC to buy or sell any instruments described herein. This report is being issued outside the PRC to a limited number of institutional investors and may not be provided to any person other than the original recipient and may not be reproduced or used for any other purpose.

France: Only qualified investors within the meaning of French law shall have access to this report. This report shall not be considered as an offer to subscribe to, or used in connection with, any offer for subscription or sale or marketing or direct or indirect distribution of financial instruments and it is not intended as a solicitation for the purchase of any financial instrument.

Germany: This report is only directed at persons who are professional investors as defined in sec 31a(2) of the German Securities Trading Act (WpHG). This publication constitutes research of a non-binding nature on the market situation and the investment instruments cited here at the time of the publication of the information.

The current prices/yields in this issue are based upon closing prices from Bloomberg as of the day preceding publication. Please note that neither the German Federal Financial Supervisory Agency (BaFin), nor any other supervisory authority exercises any control over the content of this report.

Hong Kong: This report is issued and distributed in Hong Kong by CIMB Securities Limited ("CHK") which is licensed in Hong Kong by the Securities and Futures Commission for Type 1 (dealing in securities), Type 4 (advising on securities) and Type 6 (advising on corporate finance) activities. Any investors wishing to purchase or otherwise deal in the securities covered in this report should contact the Head of Sales at CIMB Securities Limited. The views and opinions in this research report are of VNDIRECT Securities Corporation as of the date hereof and are subject to change. If the Financial Services and Markets Act of the United Kingdom or the rules of the Financial Conduct Authority apply to a recipient, our obligations owed to such recipient therein are unaffected. CHK has no obligation to update its opinion or the information in this research report.

This publication is strictly confidential and is for private circulation only to clients of CHK.

CHK does not make a market on other securities mentioned in the report.

India: This report is issued and distributed in India by CIMB Securities (India) Private Limited ("CIMB India") which is registered with the National Stock Exchange of India Limited and BSE Limited as a trading and clearing member under the Securities and Exchange Board of India (Stock Brokers and Sub-Brokers) Regulations, 1992. In accordance with the provisions of Regulation 4(g) of the Securities and Exchange Board of India (Investment Advisers) Regulations, 2013, CIMB India is not required to seek registration with the Securities and Exchange Board of India ("SEBI") as an Investment Adviser. CIMB India is registered with SEBI as a Research Analyst pursuant to the SEBI (Research Analysts) Regulations, 2014 ("Regulations").

This report does not take into account the particular investment objectives, financial situations, or needs of the recipients. It is not intended for and does not deal with prohibitions on investment due to law/jurisdiction issues etc. which may exist for certain persons/entities. Recipients should rely on their own investigations and take their own professional advice before investment.

The report is not a "prospectus" as defined under Indian Law, including the Companies Act, 2013, and is not, and shall not be, approved by, or filed or registered with, any Indian regulator, including any Registrar of Companies in India, SEBI, any Indian stock exchange, or the Reserve Bank of India. No offer, or invitation to offer, or solicitation of subscription with respect to any such securities listed or proposed to be listed in India is being made, or intended to be made, to the public, or to any member or section of the public in India, through or pursuant to this report.

The research analysts, strategists or economists principally responsible for the preparation of this research report are segregated from the other activities of CIMB India and they have received compensation based upon various factors, including quality, accuracy and value of research, firm profitability or revenues, client feedback and competitive factors. Research analysts', strategists' or economists' compensation is not linked to investment banking or capital markets transactions performed or proposed to be performed by CIMB India or its affiliates.

CIMB India has not received any investment banking related compensation from the companies mentioned in the report in the past 12 months.

CIMB India has not received any compensation from the companies mentioned in the report in the past 12 months.

Indonesia: This report is issued and distributed by PT CIMB Sekuritas Indonesia ("CIMBI"). The views and opinions in this research report are our own as of the date hereof and are subject to change. CIMBI has no obligation to update its opinion or the information in this research report. Neither this report nor any copy hereof may be distributed in Indonesia or to any Indonesian citizens wherever they are domiciled or to Indonesian residents except in compliance with applicable Indonesian capital market laws and regulations.

This research report is not an offer of securities in Indonesia. The securities referred to in this research report have not been registered with the Financial Services Authority (Otoritas Jasa Keuangan) pursuant to relevant capital market laws and regulations, and may not be offered or sold within the territory of the Republic of Indonesia or to Indonesian citizens through a public offering or in circumstances which constitute an offer within the meaning of the Indonesian capital market law and regulations.

Ireland: CGS-CIMB is not an investment firm authorised in the Republic of Ireland and no part of this document should be construed as CGS-CIMB acting as, or otherwise claiming or representing to be, an investment firm authorised in the Republic of Ireland.

Malaysia: This report is distributed by CIMB solely for the benefit of and for the exclusive use of our clients. CIMB has no obligation to update, revise or reaffirm its opinion or the information in this research reports after the date of this report.

New Zealand: In New Zealand, this report is for distribution only to persons who are wholesale clients pursuant to section 5C of the Financial Advisers Act 2008.

Singapore: This report is issued and distributed by CIMB Research Pte Ltd ("CIMBR"). CIMBR is a financial adviser licensed under the Financial Advisers Act, Cap 110 ("FAA") for advising on investment products, by issuing or promulgating research analyses or research reports, whether in electronic, print or other form. Accordingly CIMBR is a subject to the applicable rules under the FAA unless it is able to avail itself

to any prescribed exemptions.

Recipients of this report are to contact CIMB Research Pte Ltd, 50 Raffles Place, #16-02 Singapore Land Tower, Singapore in respect of any matters arising from, or in connection with this report. CIMBR has no obligation to update its opinion or the information in this research report. This publication is strictly confidential and is for private circulation only. If you have not been sent this report by CIMBR directly, you may not rely, use or disclose to anyone else this report or its contents.

If the recipient of this research report is not an accredited investor, expert investor or institutional investor, CIMBR accepts legal responsibility for the contents of the report without any disclaimer limiting or otherwise curtailing such legal responsibility. If the recipient is an accredited investor, expert investor or institutional investor, the recipient is deemed to acknowledge that CIMBR is exempt from certain requirements under the FAA and its attendant regulations, and as such, is exempt from complying with the following :

(a) Section 25 of the FAA (obligation to disclose product information);

(b) Section 27 (duty not to make recommendation with respect to any investment product without having a reasonable basis where you may be reasonably expected to rely on the recommendation) of the FAA;

(c) MAS Notice on Information to Clients and Product Information Disclosure [Notice No. FAA-N03];

(d) MAS Notice on Recommendation on Investment Products [Notice No. FAA-N16];

(e) Section 36 (obligation on disclosure of interest in securities), and

(f) any other laws, regulations, notices, directive, guidelines, circulars and practice notes which are relates to the above, to the extent permitted by applicable laws, as may be amended from time to time, and any other laws, regulations, notices, directive, guidelines, circulars, and practice notes as we may notify you from time to time. In addition, the recipient who is an accredited investor, expert investor or institutional investor acknowledges that a CIMBR is exempt from Section 27 of the FAA, the recipient will also not be able to file a civil claim against CIMBR for any loss or damage arising from the recipient's reliance on any recommendation made by CIMBR which would otherwise be a right that is available to the recipient under Section 27 of the FAA, the recipient will also not be able to file a civil claim against CIMBR for any loss or damage arising from the recipient's reliance on any recommendation made by CIMBR which would otherwise be a right that is available to the recipient under Section 27 of the FAA.

CIMBR, its affiliates and related corporations, their directors, associates, connected parties and/or employees may own or have positions in securities of the company(ies) covered in this research report or any securities related thereto and may from time to time add to or dispose of, or may be materially interested in, any such securities. Further, CIMBR, its affiliates and its related corporations do and seek to do business with the company(ies) covered in this research report and may from time to time act as market maker or have assumed an underwriting commitment in securities of such company(ies), may sell them to or buy them from customers on a principal basis and may also perform or seek to perform significant investment banking, advisory, underwriting or placement services for or relating to such company(ies) as well as solicit such investment, advisory or other services from any entity mentioned in this report.

As of 15 May 2018,, CIMBR does not have a proprietary position in the recommended securities in this report.

CIMBR does not make a market on the securities mentioned in the report.

South Korea: This report is issued and distributed in South Korea by CIMB Securities Limited, Korea Branch ("CIMB Korea") which is licensed as a cash equity broker, and regulated by the Financial Services Commission and Financial Supervisory Service of Korea. In South Korea, this report is for distribution only to professional investors under Article 9(5) of the Financial Investment Services and Capital Market Act of Korea ("FSCMA").

Spain: This document is a research report and it is addressed to institutional investors only. The research report is of a general nature and not personalised and does not constitute investment advice so, as the case may be, the recipient must seek proper advice before adopting any investment decision. This document does not constitute a public offering of securities.

CGS-CIMB is not registered with the Spanish Comision Nacional del Mercado de Valores to provide investment services.

Sweden: This report contains only marketing information and has not been approved by the Swedish Financial Supervisory Authority. The distribution of this report is not an offer to sell to any person in Sweden or a solicitation to any person in Sweden to buy any instruments described herein and may not be forwarded to the public in Sweden.

Switzerland: This report has not been prepared in accordance with the recognized self-regulatory minimal standards for research reports of banks issued by the Swiss Bankers' Association (Directives on the Independence of Financial Research).

Thailand: This report is issued and distributed by CIMB Securities (Thailand) Co. Ltd. ("CIMBT") based upon sources believed to be reliable (but their accuracy, completeness or correctness is not guaranteed). The statements or expressions of opinion herein were arrived at after due and careful consideration for use as information for investment. Such opinions are subject to change without notice and CIMBT has no obligation to update its opinion or the information in this research report.

CIMBT may act or acts as Market Maker, and issuer and offerer of Derivative Warrants and Structured Note which may have the following securities as its underlying securities. Investors should carefully read and study the details of the derivative warrants in the prospectus before making investment decisions.

AAV, ADVANC, AMATA, ANAN, AOT, AP, BA, BANPU, BBL, BCH, BCP, BCPG, BDMS, BEAUTY, BEC, BEM, BJC, BH, BIG, BLA, BLAND, BPP, BTS, CBG, CENTEL, CHG, CK, CKP, COM7, CPALL, CPF, CPN, DELTA, DTAC, EA, EGCO, EPG, GFPT, GLOBAL, GLOW, GPSC, GUNKUL, HMPRO, INTUCH, IRPC, ITD, IVL, KBANK, KCE, KKP, KTB, KTC, LH, LHBANK, LPN, MAJOR, MALEE, MEGA, MINT, MONO, MTLS, PLANB, PSH, PTL, PTG, PTT, PTTEP, PTTGC, QH, RATCH, ROBINS, S, SAWAD, SCB, SCC, SCCC, SIRI, SPALI, SPRC, STEC, STPI, SUPER, TASCO, TCAP, THAI, THANI, THCOM, TISCO, TKN, TMB, TOP, TPIPL, TRUE, TTA, TU, TVO, UNIQ, VGI, WHA, WORK.

Corporate Governance Report:

The disclosure of the survey result 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 result may be changed after that date. CIMBT does not confirm nor certify the accuracy of such survey result.

Score Range:	90 - 100	80 – 89	70 - 79	Below 70 or	No Survey Result
Description:	Excellent	Very Good	Good	N/A	

United Arab Emirates: The distributor of this report has not been approved or licensed by the UAE Central Bank or any other relevant licensing authorities or governmental agencies in the United Arab Emirates. This report is strictly private and confidential and has not been reviewed by, deposited or registered with UAE Central Bank or any other licensing authority or governmental agencies in the United Arab Emirates. This report is being issued outside the United Arab Emirates to a limited number of institutional investors and must not be provided to any person other than the original recipient and may not be reproduced or used for any other purpose. Further, the information contained in this report is not intended to lead to the sale of investments under any subscription agreement or the conclusion of any other contract of whatsoever nature within the territory of the United Arab Emirates.

United Kingdom and European Economic Area (EEA): In the United Kingdom and European Economic Area, this material is also being distributed by CIMB Securities (UK) Limited ("CIMB UK"). CIMB UK is authorized and regulated by the Financial Conduct Authority and its registered office is at 27 Knightsbridge, London, SW1X7YB. The material distributed by CIMB UK has been prepared in accordance with CGS-CIMB's policies for managing conflicts of interest arising as a result of publication and distribution of this material. This material is for distribution only to, and is solely directed at, selected persons on the basis that those persons: (a) are eligible counterparties and professional clients of CIMB UK; (b) have professional experience in matters relating to investments falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (as amended, the "Order"), (c) fall within Article 49(2)(a) to (d) ("high net worth companies, unincorporated associations etc") of the Order; (d) are outside the United Kingdom subject to relevant regulation in each jurisdiction, material(all such persons together being referred to as "relevant persons"). This material is directed only at relevant persons and must not be acted on or relied on by persons who are not relevant persons. Any investment or investment activity to which this material relates is available only to relevant persons and will be engaged in only with relevant persons.

Where this material is labelled as non-independent, it does not provide an impartial or objective assessment of the subject matter and does not constitute independent "research" (cannot remove research from here under the applicable rules of the Financial Conduct Authority in the UK. Consequently, any such non-independent material will not have been prepared in accordance with legal requirements designed to promote the independence of research (cannot remove research from here) and will not subject to any prohibition on dealing ahead of the dissemination of research. Any such non-independent material must be considered as a marketing communication.

United States: This research report is distributed in the United States of America by CIMB Securities (USA) Inc, a U.S. registered broker-dealer and a related company of CIMB Research Pte Ltd, PT CIMB Sekuritas Indonesia, CIMB Securities (Thailand) Co. Ltd, CIMB Securities Limited, CIMB Securities (India) Private Limited, and is distributed solely to persons who qualify as "U.S. Institutional Investors" as defined in Rule 15a-6 under the Securities and Exchange Act of 1934. This communication is only for Institutional Investors whose ordinary business activities involve investing in shares, bonds, and associated securities and/or derivative securities and who have professional experience in such investments. Any person who is not a U.S. Institutional Investor or Major Institutional Investor must not rely on this communication. The delivery of this research report to any person in the United States of America is not a recommendation to effect any transactions in the securities discussed herein, or an endorsement of any opinion expressed herein. CIMB Securities (USA) Inc, is a FINRA/SIPC member and takes responsibility for the content of this report. For further information or to place an order in any of the above-mentioned securities please contact a registered representative of CIMB Securities (USA) Inc.

CIMB Securities (USA) Inc. does not make a market on other securities mentioned in the report.

CIMB Securities (USA) Inc. has not managed or co-managed a public offering of any of the securities mentioned in the past 12 months.

CIMB Securities (USA) Inc. has not received compensation for investment banking services from any of the company mentioned in the past 12 months.

CIMB Securities (USA) Inc. neither expects to receive nor intends to seek compensation for investment banking services from any of the company mentioned within the next 3 months.

Other jurisdictions: In any other jurisdictions, except if otherwise restricted by laws or regulations, this report is only for distribution to professional, institutional or sophisticated investors as defined in the laws and regulations of such jurisdictions.

RECOMMENDATION FRAMEWORK

Stock Ratings	Definition:
Add	The stock's total return is expected to reach 15% or higher over the next 12 months.
Hold	The stock's total return is expected to be between negative 10% and positive 15% over the next 12 months.
Reduce	The stock's total return is expected to fall below negative 10% over the next 12 months.

The total expected return of a stock is defined as the sum of the:(i) percentage difference between the target price and the current price and (ii) the forward net dividend yields of the stock. Stock price targets have an investment horizon of 12 months.

Sector Ratings	Definition:
Overweight	An Overweight rating means stocks in the sector have, on a market cap-weighted basis, a positive absolute recommendation.
Neutral	A Neutral rating means stocks in the sector have, on a market cap-weighted basis, a neutral absolute recommendation.
Underweight	An Underweight rating means stocks in the sector have, on a market cap-weighted basis, a negative absolute recommendation.

Country Ratings	Definition:
Overweight	An Overweight rating means investors should be positioned with an above-market weight in this country relative to benchmark.
Neutral	A Neutral rating means investors should be positioned with a neutral weight in this country relative to benchmark.
Underweight	An Underweight rating means investors should be positioned with a below-market weight in this country relative to benchmark.

Anirban Lahiri – Head of Research
Email: anirban.lahiri@vndirect.com.vn

Nguyen Hanh Trang – Analyst
Email: trang.nguyenhanh@vndirect.com.vn

VNDIRECT Securities Corporation
1 Nguyen Thuong Hien Str – Hai Ba Trung Dist – Ha Noi
Tel: +84 2439724568
Email: research@vndirect.com.vn
Website: https://vndirect.com.vn