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BlueOrchard Brief

Southeast Asia witnesses solar boom in grid connected utility scale solar – what is next?

Extended thought piece

This extended thought piece by Prabaljit Sarkar, Investment Director Infrastructure at BlueOrchard, concludes that Southeast Asia is poised for unprecedented growth of the solar market in the coming years. C&I market will thrive and corporate power purchase agreements (PPAs) will be the emerging trend that will take a significant chunk of the solar market in Southeast Asia over the next few years. While the BlueOrchard Infrastructure team will look at investment opportunities across all renewable energy projects in Asia, the team will give specific focus on the high growth solar sector.

Boom of solar in Southeast Asia and C&I solar appears the most promising sector

The boom of solar investments in Southeast Asia is visible. Owing to its geographic location, annual global horizontal irradiation (GHI) levels across the many parts of Southeast Asia are in general remarkably high with solar power potential estimated at 41 TWh¹.

Solar power capacity in Southeast Asia has more than doubled in 2020, increasing from 10,4 GW at the end of 2019 to reach 22,9 GW at the end of 2020².

Much of these capacity additions have come from utility scale³ grid connected solar power projects. However, large utility scale solar projects face difficulties of securing land rights, as they are often competing with agricultural land, impacting food security. Furthermore, raising project financing in these markets is challenging due to template PPAs with lopsided risk allocation to investors and financiers. Finally, many state-owned utilities in the region are not creditworthy, compounding the bankability challenge.

However, the transition to renewables is still high on the agenda for developers, investors, utilities, and policymakers. Regional policies, combined with growing demand for renewable power in the manufacturing

¹ The analysis by National Renewable Energy Laboratory (NREL), operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE).

² Data released by the International Renewable Energy Agency (IRENA).

³ The primary defining characteristic of utility-scale solar projects are that they are tied to grid and sell the power they generate directly into the electric grid. Utility-scale solar are often described as being “in front of the meter” as opposed to distributed generation systems such as C&I solar, which are “behind the meter” i.e., a system that is paired with energy load of a customer and supplies that customer directly without grid in between.

industry as a key part of their decarbonization plans, will require 27 GW of new PV installations across the region over the next five years⁴.

As the adoption of renewable energy accelerates in the region, commercial and industrial (C&I) solar appears to remain as a “low hanging fruit” in Southeast Asia. Technology improvements, economics as well as availability of different financing options are driving the sector.

Economics of large utility-scale solar vs C&I solar

Economics of utility-scale solar are mainly derived from a tariff which is available in country’s program often backed by Government such as Feed in tariff (FIT)⁵ a tariff based on an auction process or other incentives.

Typically, the sale and purchase of power is governed under a template PPA signed with the national utilities. The project developers have limited means to change the risk allocation as determined in the PPA with respect to events such as force majeure, grid curtailment, change of law and termination, potentially leading to a risk return imbalance.

The economics of C&I solar is derived from

- (i) energy volume savings i.e. displacement of grid power with solar power;
- (ii) peak shavings by way of eliminating short-term demand spikes, and avoiding demand charges where the customer pays demand charges for the highest electric usage or “peak demand”⁶; and
- (iii) exporting surplus power to the grid, where the regulatory environment allows net metering.

In terms of business modelling and economics, the C&I space has greater scope for flexibility than utility-scale solar, offering a raft of possibilities from ground-mount through to ingenious use of rooftop space (so no major issue on land use and resettlement unlike utility scale solar), quick deployment due to smaller scale of each individual installation, and the choice to identify and select customers based on parameters such as credit rating. Furthermore, projects sponsors are able to negotiate different deal structuring, determining how risks are allocated between seller and purchaser, and different financing options to share upfront costs such as a lease model or corporate PPA.

However, alongside greater scope of flexibility, the C&I sector has associated contracting challenges for a few reasons. For example, in many commercial buildings, the occupant is not the building owner, which could result in a mismatch in building lease and PV financing terms. It is often difficult to achieve economies of scale unless aggregated to a larger total overall capacity.

C&I solar is clearly offering a competitive alternative to large utility-scale solar projects.

⁴ IHS Market analysis.

⁵ A feed-in tariff, or FiT, is a policy mechanism that compensates solar customers at a fixed rate per kilowatt hour (either on gross or net generation) and is guaranteed for a long period.

⁶ Demand charges can be a significant part of a monthly utility bill for large customers with spiky load profile such as businesses, manufacturing and industrial operations, educational institutions and faith-based organizations.

Key factors that are driving the value of C&I solar in Southeast Asia

Driver	Description	Factors that drive the value of C&I solar upwards
Improved cost savings due to rising industry tariff	<ul style="list-style-type: none"> Customers install solar to offset their electricity bill typically supplied by the national utility, at retail electricity rates C&I solar reduces peak demand charges (per kW) of customers 	<ul style="list-style-type: none"> High retail tariff (e.g., industrial tariff in Vietnam is high) High spikes in power consumption due to nature of business resulting in high demand charges. Universities, Colleges, shopping malls, and manufacturing plants, where load profiles are well-aligned with solar, typically see the greatest benefit from installing rooftop solar. Avoided demand charges, for example, could improve the economics of adding storage. Tariff structure moving towards 'time of day' (ToD) usage resulting in a high-power bill during peak hours. Storage solutions start making more economic sense if deployed both for demand management and self-consumption to avoid high tariff under TOD usage, and thereby achieving high utilisation rate of the battery. High fuel prices that are passed on to the customers through fuel surcharge in electricity bill
Policies supporting net metering	Revenue generation from excess electricity fed back into grid	<ul style="list-style-type: none"> Presence of regulations favouring net metering e.g., Philippines, Malaysia
Technology shifting towards higher efficiency modules	With the introduction of supplementary components, such as solar trackers and battery energy storage systems (BESS), to rooftop solar installations, and adoption of high-efficiency solar modules, ability to raise system efficiency levels has improved. These technologies have upgraded current rooftop solar systems to capture maximum solar irradiation to increase input energy which increases their power output. Battery systems store this intermittent power and can dispatch stabilised power on demand.	<ul style="list-style-type: none"> Lower overnight cost Falling cost of high efficiency solar modules Local supply chain of high efficiency modules
Corporate net zero promises (local and international)	<p>Several large companies are planning to increasingly source power from renewable sources. There are several RE 100 companies who made a commitment for '100% renewable', are present in Southeast Asian countries. These include, amongst others, Amazon, Decathlon, Google, IKEA, Nike, Schneider Electric.</p> <p>Many of these companies, such as IKEA, are looking beyond their own operations to engage with their suppliers and partners on climate. Pathways for supply chain engagement include encouraging suppliers to establish, measure, and disclose their own carbon reduction strategies, and to begin to transform their suppliers' entire operations to renewables. Microsoft additionally mentioned the need for Scope 3 emission</p>	<ul style="list-style-type: none"> Presence of several local, regional and international companies with high credit ratings. Bankable solar project pipeline

targets to consider not only upstream along product supply chains but also downstream, with points of sale, customers, and end of product life, which are all potential points for emission reductions.

How are industries and corporates accessing the C&I market in Southeast Asia?

There are two key business models to access the solar C&I market:

CAPEX model or outright purchase – Under this business model customers own a solar system utilising their own capital, and directly benefit from the energy saving from the solar energy generated.

Opex model – this gives the customer better options as there is little to zero upfront cost to install a solar system at their building. Under this model there are two variations:

Solar leasing provides C&I customers the use of the solar system in exchange for an agreed monthly fee or with an agreed solar tariff which is a lower electricity rate than the grid, depending on the leasing agreement offered by the third-party investors. Lease agreements are usually around 15 years. At the end of lease agreement period, the ownership of solar system will be transferred to lessors. In some cases, lessees may have to purchase the solar system at the end of the agreed time frame at a subsidized rate, renew the lease or have the system removed.

Corporate PPA: While independent power producers in Southeast Asia typically sell their electricity to state-owned utilities that have a monopoly on the market, Corporate PPP will encourage the development of renewable energy by allowing C&I customers to buy electricity directly from private clean energy producers in the country.

In Southeast Asia, capex models are limited as this is more suitable for large energy users such as manufacturing companies or RE 100 companies to satisfy their large energy requirement for RE100 targets to be feasible.

The corporate PPA model benefits from flexibility of pricing design similar to a power retail contract to attract customers, making it more attractive than the fixed leasing model to both sellers and customers. As a result, the solar market landscape is shifting. The corporate PPA is gaining traction fast in Southeast Asia particularly in Cambodia, Indonesia, Malaysia, Philippines, Thailand, and Vietnam.

However, the greatest obstacle for the corporate PPA market is a lack of clarity on policy. For example, in Thailand, which has been Southeast Asia's forerunner in implementing conducive solar regulations, solar power developers with corporate PPA's still cannot export power from their solar systems to the grid. Similarly, there are challenges with getting licenses in Indonesia to sell excess power to the grid. In general, there is also conflict of interest with state-owned utilities in all these countries as opening the system to net metering will encourage more corporate PPA's and loss of revenue for the utilities.

With ambitious carbon neutrality targets and corporate emission reduction obligations, Asia Pacific businesses are increasingly pressuring regulatory bodies to ease corporate procurement regulations towards offsite generation projects offering larger capacities. Big brand customers including RE100 companies are also exerting their power to influence the country regulators to open up the corporate PPA market to purchase power from offsite generators instead of just relying on the renewable energy firms to persuade governments.

While challenges remain, policy, corporate ambition and economics are starting to tilt the balance towards a more conducive corporate PPA landscape for growth. Industrial offtakers followed by retail and service offtakers together expected to comprise the largest share of the corporate PPA market in Southeast Asia.

Potential impact of the COVID19-related equipment supply-chain constraints, pricing and uptake of C&I capacity roll-out

The pandemic has caused global supply chain constraints, pushing up costs and posing challenges to the power sector as a whole, and solar power is no exception.

Among the biggest headwinds for solar is a tripling of steel prices, a key component in the solar panels mounting system, and polysilicon, the raw material used in solar panels.

In China, the world's top solar product maker, producers are already raising prices to protect margins, leading to reduced product demand. According to three solar panel manufacturers in China polled by Reuters, prices for panels are up 20-40 % in the past year, following the surge in costs for polysilicon. China's Canadian Solar Inc, a top panel producer said that its product prices were up 10% in the first quarter of 2021 from the previous quarter, an increase it plans to pass on to customers. This signals there will be supply constraints, and so also price increase and therefore resulting in pressure on C&I roll out.

Despite these inhibitors, C&I solar PPAs are still getting done, as effect of supply constraints is not as bad compared to other energy sources. An increase of solar panel production and deployment is a possible new form of supply response as corporate policy and environmental, social, and governance (ESG) concerns are both driving demand for renewable energy sources. IHS Markit estimates that solar module production could be raised by an additional 25% over the next 12 months.⁷

A few possible reasons for C&I solar gaining substantial traction even during pandemic and post-pandemic are:

- Shipping and materials costs of C&I solar projects account for a lesser percentage of the overall project cost than that of other energy projects including even utility solar projects. If shipping and equipment costs creep up, it's less likely to financially 'make-or-break' a C&I project when compared to other energy projects.
- The slowing growth of investment in large energy projects has also opened up new opportunities for bite-sized renewable energy developments such as lower-megawatt C&I solar.
- As industries strive to bring down cost of production due to rising inflation, and soaring energy costs, C&I solar provides a pathway for industries to save on the cost of electricity consumption.

A prominent example is Viet Nam where the industry added whopping 11 GW rooftop PVs during the pandemic in 2020, according to data released by IRENA⁸.

It is clear that the reopening of parts of the economy would lead to a recovery. Question is how quickly, and which energy sources will generate quicker response for supply. Despite the challenges and the uncertainty of post-pandemic, C&I solar in particular will be emerging as an important source of undeniable optimism for resilient, clean and just future.

⁷ "Executive Briefings: Oil and Gas Global Energy: The crunch of 2021—a crisis of surplus capacity" - IHS report.

⁸ https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Apr/IRENA_RE_Capacity_Statistics_2021.pdf

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