DATA INSIGHT REPORT

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South East Asian clean energy projects

Reflecting on 2015 and looking ahead to 2016

Bird & Bird

This Data Insight Report, sponsored by international law firm Bird & Bird, reviews clean energy projects in South East Asia during 2015. South East Asian clean energy project finance totalled $2.7 billion in 2015, a 16% decrease on the $3.2 billion invested in 2014. This was the direct result of a lack of particularly large deals, of which there were plenty in 2014. Most notably, the $1.6 billion Sarulla geothermal plant closed financing in 2014. If this unusually large deal is excluded, clean energy project finance increased 69% in 2015.

Note. In this report clean energy is specifically defined as wind, solar, biomass and geothermal. The South East Asia region comprises ten countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam. The analysis is based on deals tracked by Clean Energy Pipeline's data team.

Between 2010 and 2015, investment across the region grew at a 19% compound annual growth rate, with investment in solar and wind projects accounting for nearly two-thirds of the $14.3 billion total. By comparison, clean energy project investment in Australia totalled $11.7 billion during the same period.

2016 has started on a relatively quiet note. Only $291 million was invested clean energy projects in South East Asia in the first two months of 2016, all of which are located in The Philippines.

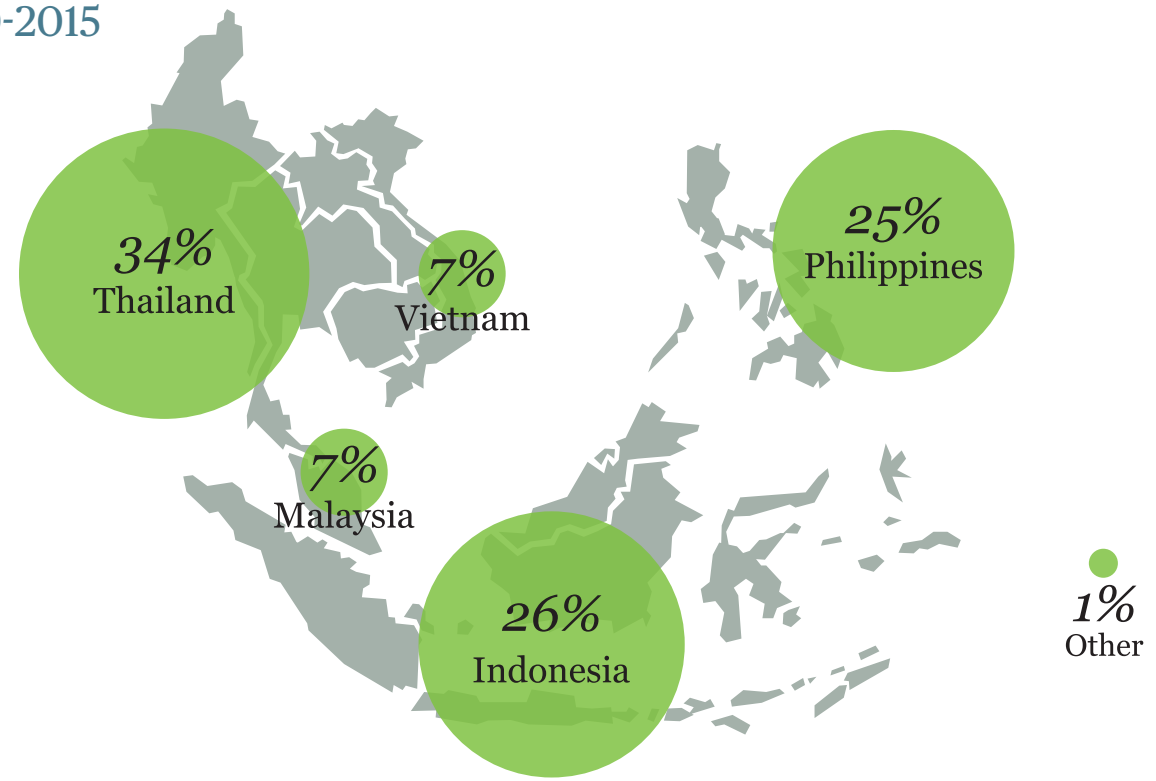
Solar rebounds after a quiet 2014

Investment in South East Asian solar projects totalled $1.7 billion in 2015, a record high. This represents a 6x increase on the $323 million invested in 2014 and is 88% above the average annual investment ($902 million) between 2010 and 2014. In fact, solar was the largest sector for investment in South East Asia in 2015, accounting for 61% of committed debt and equity.

The increase was underpinned by deal activity in the Philippines, where $1.1 billion of debt and equity was committed to solar projects. This represents an almost 9x increase on 2014. Most of the solar plants that secured financing are located in Negros Occidental, which has abundant solar energy resources and attractive subsidy schemes. The solar boom in Negros Occidental was cause by a rush to bring projects online before 15 March 2016 so that project developers are eligible for the PHP 8.69 (18.4 US cents) per kilowatt hour feed-in-tariff.

The financing of the La Carlota and Manapla solar farms (totalling

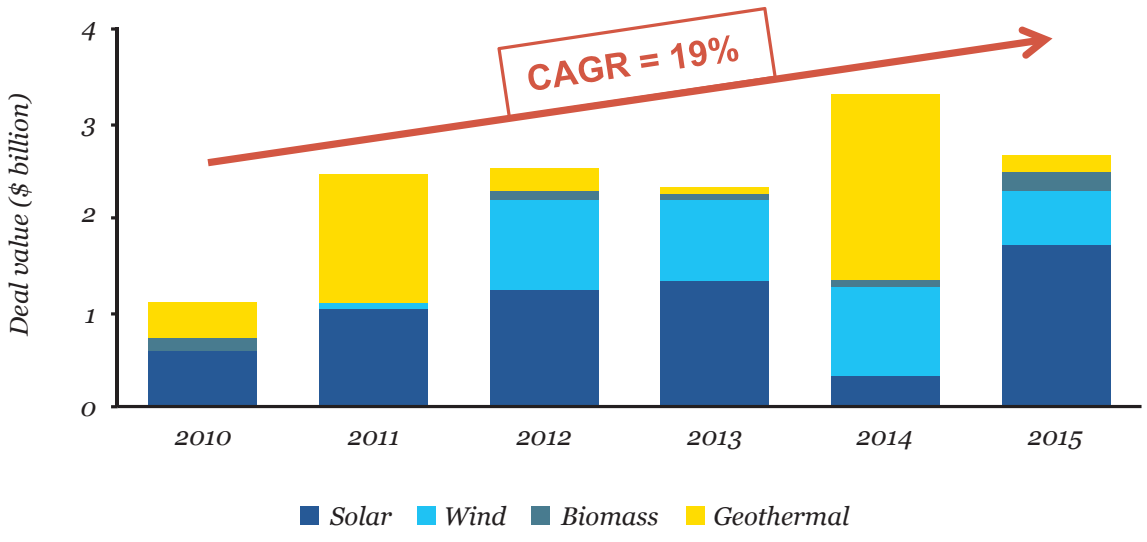
Clean energy project finance in South East Asia by country 2010-2015



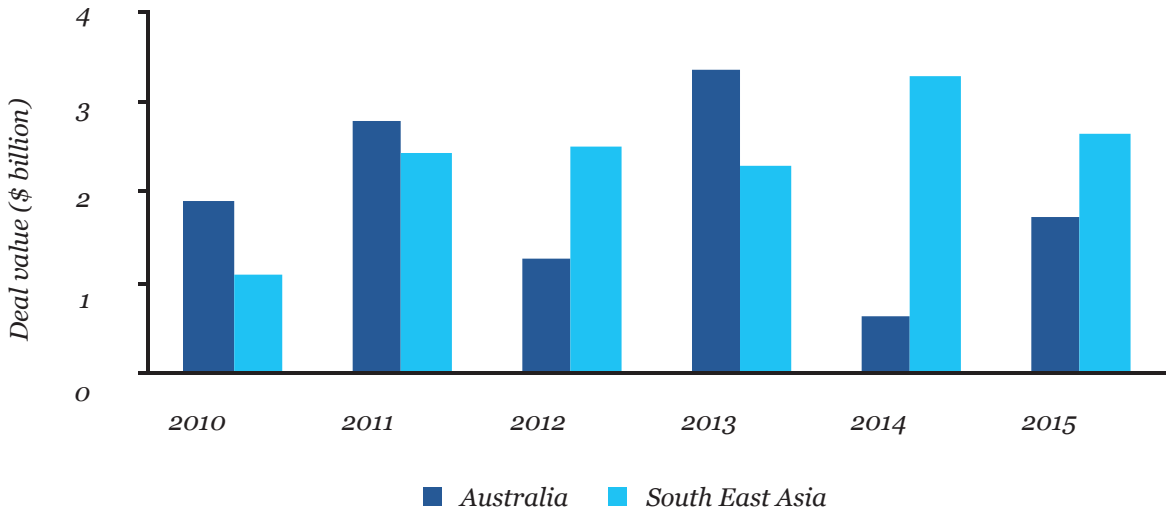
80 MW), located in Negros Occidental, was the most notable deal in the Philippines in 2015. The projects secured a $173 million equity investment from the Macquarie-managed Philippine Investment Alliance for Infrastructure (PINAI) in November 2015. The 59 MW San Carlos City solar farm, developed by Aboitiz Power and the world's largest renewable energy project developer SunEdison, also reached financial close last year. The $127 million project was funded with sponsor equity provided by Aboitiz Power (60%) and SunEdison (40%) and a $78 million commercial bank debt facility arranged by BDO Unibank in December 2015.

Thailand remains a major solar market in South East Asia - $478 million was invested into solar

Annual clean energy project finance in South East Asia 2010 - 2015



Annual clean energy project finance in South East Asia and Australia 2010 - 2015



projects in 2015. This was 13% below the $539 million annual average volume of investment in solar projects between 2010 and 2014. Some $2.6 billion was invested in Thai solar PV projects in the past five years, accounting for 46% of total investment in solar across South East Asia. In addition to the Philippines and Thailand, emerging solar markets in South East Asia are Malaysia and Vietnam, which secured a combined $100 million investment in solar PV projects in 2015. This is a significant figure considering solar investments in these two countries were negligible in the preceding years.

Wind investment totalled $700 million in 2015

Wind energy project finance decreased 43% year-on-year to $546 million in 2015. This was caused by a few large project finance transactions reaching financial close last year, such as the $450 million 150 MW Burgos wind farm in the Philippines. The largest wind project finance transaction in South East Asia in 2015 was for the 81 MW Chaiyaphum wind farm in Thailand. It is sponsored by local independent power producer Electricity Generating Public Company (90%) and German wind developer Pro Ventum (10%). The project, which is being developed as a public-private partnership under Thailand's small power producer program, secured a local currency loan of up to THB 1.8 billion ($55 million) provided by the Asian Development Bank (ADB) and a $30 million loan from the ADB-administered Clean Technology Fund.

The second largest investment in 2015 involved a portfolio of assets located in Thailand. In July 2015, PowerChina ZhongNan started construction of the 50 MW Wayu, 2 MW Subplu 1 and 8 MW Subplu 2 wind farms in central Thailand. The projects were internally funded by PowerChina.

Notable announcements in 2015 included the International Finance Corporation (IFC)'s investment in the 62.5 MW Jeneponto 1 wind farm in Indonesia, which is being developed by Singapore-based project developer Asia Green Capital Partners. This is the IFC' first wind investment in East Asia. The project is expected to reach financial close in the first quarter of 2016.

2015 was also notable for the placing into service of Vietnam's largest wind farm - the 99 MW Bac Lieu project in southern part of the country. The project is owned by Cong Ly Construction-Trade-Tourism and was jointly funded by the Export-Import Bank of the United States and Vietnam Development Bank in 2013.

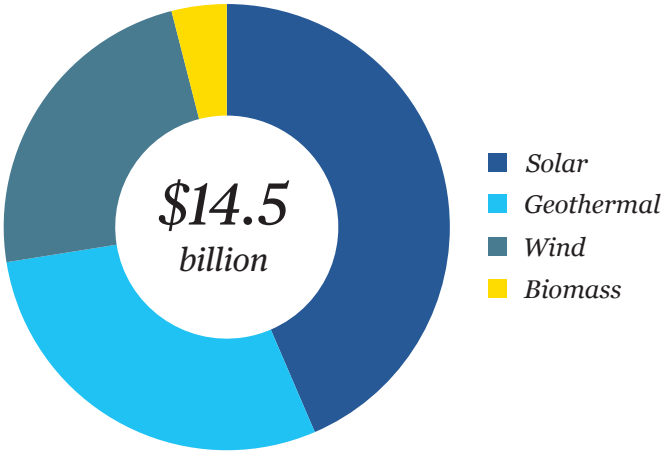
Between 2012 and 2015, some $3.3 billion was invested in South East Asian wind projects, primarily underpinned by investment in the Philippines and Thailand and the emergence of Indonesia and Vietnam. In fact, the Philippines

and Thailand are home to some of the region's largest wind farms. These include the 207 MW Huay Bong wind farm in Thailand, which reached financial close in 2012 and commenced operations in early 2013, and the 150 MW Burgos wind farm, which reached financial close and became operational in late 2014.

Geothermal investment rebounds

Investment in geothermal projects slumped to $170 million in 2015, a 10x decrease on the nearly $2 billion invested in 2014. This was a direct result of the absence of billion dollar project finance transactions that were common last year. These include the 330 MW Sarulla geothermal project ($1.6 billion) in Indonesia. This was the largest ever renewable energy project finance transaction and the only transaction over $1 billion in South East Asia. Excluding this large scale investment, annual geothermal investment averaged $200 million between 2012 and 2015. This level of investment is underpinned by projects in the Philippines and Indonesia - the world's second and third largest geothermal power producers respectively. The largest geothermal project finance transaction was for the $162 million 30 MW Bac Man III project, sponsored by local developer Energy Development Corporation.

Sector breakdown: Clean energy project finance in South East Asia 2010-1015



Top five project finance transactions in South East Asia (2015)

Project	Sector	Country	Deal value ($ million)	Sponsors	Debt providers	Financing date
La Carlota II and Manapla solar PV plants (80MW)	Solar PV	Philippines	173	Bronzeoak Philippines / The Philippine Investment Alliance for Infrastructure (PINAI)		4Q15
Bac Man III geothermal plant (30MW)	Geothermal	Philippines	162	Energy Development Corporation	Undisclosed	3Q15
Chaiyaphum wind farm (81MW)	On-shore wind	Thailand	157	Electricity Generating Public Company (EGCO) / Pro Ventum	Asian Development Bank / Asian Development Bank Clean Technology Fund	1Q15
Energy Absolute 's solar PV portfolio (67MW)	Solar PV	Thailand	145	Energy Absolute		3Q15
San Carlos City solar PV plant (59MW)	Solar PV	Philippines	127	SunEdison / Aboitiz Power	Banco de Oro Unibank	4Q15

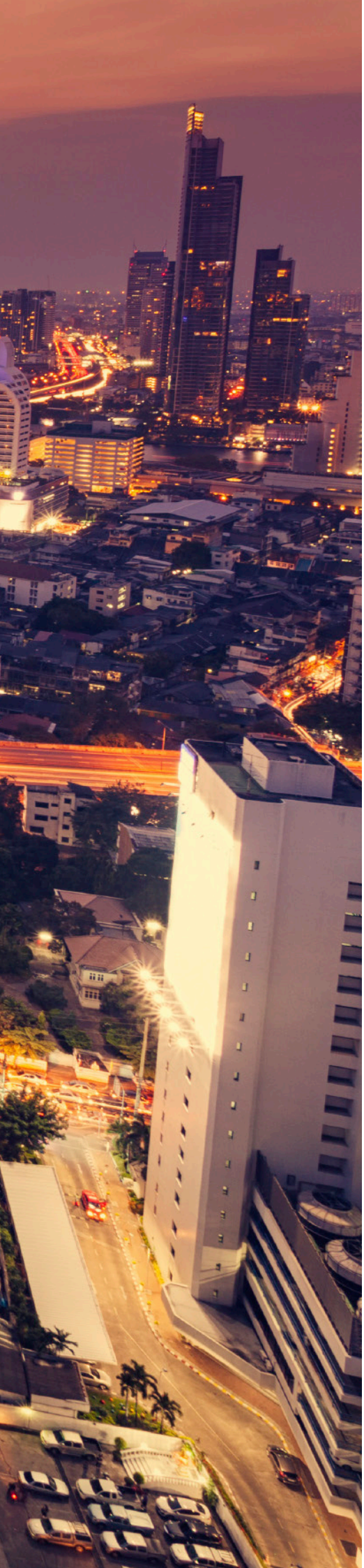
Top ten project finance transactions in South East Asia (2010-2015)

Project	Sector	Country	Deal value ($ million)	Sponsors	Debt providers	Financing date
Sarulla geothermal plant (330MW)	Geothermal	Indonesia	1,600	Itochu / Kyushu Electric Power / Ormat Technologies / Medco Energi Internasional	Japan Bank for International Cooperation / Asian Development Bank / Canadian Climate Fund / Societe Generale / ING / Mizuho / Sumitomo Mitsui Banking Corporation / National Australia Bank / Clean Technology Fund / PT Bank Mizuho Indonesia	2Q14
Sungaipenuh, Karaha & Mataloko geothermal plants (165MW)	Geothermal	Indonesia	625	Perusahaan Listrik Negara / Pertamina Geothermal Energy	Asian Development Bank	4Q11
Ulubelu and Lahendong geothermal plants (150MW)	Geothermal	Indonesia	575	Pertamina Geothermal Energy	International Bank for Reconstruction and Development / Clean Technology Fund	3Q11
Burgos wind farm (150MW)	On-shore wind	Philippines	450	Energy Development Corporation	Nord/LB / Asian Development Bank / ING / ANZ / DZ Bank / Philippine National Bank / Malayan Bank / Banco de Oro Unibank / Security Bank / PNB Capital and Investment Corporation / SB Capital Investment Corp / Land Bank of the Philippines	4Q14
Wayang Windu 3 geothermal plant (220MW)	Geothermal	Indonesia	350	Star Energy	Barclays / Standard Chartered Bank / Nomura	1Q10
Lopburi solar PV plant (84MW)	Solar PV	Thailand	334	Natural Energy Development Company	Asian Development Bank / Kasikorn Bank / Bangkok Bank / Siam Commercial Bank	3Q10
Portfolio of 51 solar PV systems (520MW)	Solar PV	Thailand	250	SunEdison	Overseas Private Investment Corporation	4Q11
Huay Bong wind farm (270MW)	On-shore wind	Thailand	222	Wind Energy	Kasikorn Bank / Siam Commercial Bank / TISCO Bank / ICBC (Thai)	1Q12
Soleq's solar PV portfolio (72MW)	Solar PV	Thailand	200	Soleq Solar Thailand	Siam Commercial Bank	3Q13
Bac Lieu Phase II wind farm (83.2MW)	On-shore wind	Vietnam	195	Cong Ly Construction-Trade-Tourism	Vietnam Development Bank / Export-Import Bank of the United States	3Q13

A slow start to 2016

Deal activity has been subdued at the beginning of 2016. Only $204 million was invested in clean energy projects in South East Asia in the first two months of 2016. Annual investment in 2016 will only reach $1.2 billion if transaction volumes continue at this pace. Of course we are only two months into the year, so there is still plenty of time for deal activity to pick up.

Other projects are nearing financial close. For example, The Eastern Petroleum Group announced in February it has secured equity commitments for a 25 MW biomass plant located in Butuan City, The Philippines. The equity commitments account for 30% of the $87 million investment required. Debt finance from local and international banks is expected to be secured in the second quarter of 2016.



Q&A with Ken Cheung

Partner, Bird & Bird

Which South East Asian countries will be most active for renewables investment in the next 18 months?

The busiest markets for renewables in 2015 were Thailand and the Philippines and they will continue to lead the way in the next 18 months. Much of the investment in these countries was based on developers trying to meet deadlines to get projects completed in order to qualify for government incentives. Having said that there are still very good support programmes in place in both Thailand and the Philippines for continued expansion.

Indonesia is also an interesting market. It has taken some time to get going but it has great potential (in terms of renewable resources, energy demand etc) and a lot of my clients are already looking there. The other country to look out for is Myanmar. It is a fair way behind its neighbours but a lot of developers are looking there for opportunities.

What is attractive about Myanmar?

Myanmar has a power deficit. This will drive continued investment as long as the political situation remains stable. There are no specific programmes in place because new legislation was put on hold at the beginning of the elections in 2015. A new government has recently taken office and it will take some time for new programmes to be introduced. Myanmar continues to experience power disruptions and blackouts are commonplace. The major multilaterals including the World Bank, IFC and ADB are very supportive of development there and will be crucial in financing projects.

Has the volatility in oil prices impacted the prospects for renewables?

It is having some impact but not as big as I thought. Despite low oil prices, investment in renewables has grown in the region because governments want to go green and make their energy sources sustainable. Technology improvements have also made solar, wind and biomass cheaper and more competitive against fossil fuels. In the Paris meetings last December, there was a big push for governments to build out renewables infrastructure.

Interestingly, there are significant subsidies for oil in places like Indonesia and Malaysia. Cheaper oil prices have made it easier to remove some of these. This will make it more of a level playing field for renewable and clean energy.

How are projects typically financed in South East Asia?

Most renewable projects I work on are between 20 MW and 50 MW,

which is too small for typical international banks to project finance. Many projects are completely equity financed from the balance sheet. A lot of institutional funds are willing to deploy capital directly into projects. Where there is debt involved, it is usually provided by local banks. Thai banks are particularly active.

You also sometimes see vendor finance. For example, a project that uses Vestas turbines would often get Danish government ECA support.

The way in which projects are financed in South East Asia is very different to mature markets because they are a lot riskier. Therefore, the returns expected are a lot higher. The bigger banks aren't so willing to lend, so there tends to be more government-supported lending and export credit finance. Multilaterals take a more active role than in mature markets, whether it's the Asian Development Bank, the IFC, or the World Bank. Many projects without government support are simply not attractive or even feasible for investors.

To what extent are international investors involved on the equity side?

Increasingly so. Some major funds like Armstrong Asset Management and Equis Funds Group are active in the region. Increasingly European funds are exploring this market but the issue remains finding suitable investments. These types of investors typically prefer larger, utility-scale renewable projects but there aren't very many in the region. That accounts for the lack of involvement.

Opportunities in Europe are drying up so they are increasingly venturing out. At the moment, I am working with UK and European based funds that are looking at projects in the region.

How much of an obstacle to investment is the cap on foreign ownership of assets? How can that be structured around?

Obviously, foreign investors want to have control over their investments and that's not always possible with the restrictions that often require local majority control. It means you have to find good local partners, of which careful due diligence is required. The restrictions force you to joint venture. It also mitigates against the risk

of investment because, being a foreign party, you simply don't have the same knowledge, contacts or understanding of the country. By entering into a joint venture you benefit from that.

At the same time, not having majority control often poses problems. There are ways around this, for example structuring through nominees, but that is becoming harder to do due to changes in legislation.

It is all the typical emerging market risks, particularly corruption, which is increasingly an issue. The way business is done in the region is not as transparent as in mature markets. People are often not prepared for this.

It's important to get advice on corporate structuring and tax issues. It's also critical to understand how to get approvals and the various frameworks under which PPAs and feed-in-tariffs are issued. That differs from country to country.

In Europe, there are different countries but they operate under the same single market. We don't have this is South East Asia, where each country has its own governance and their own way of doing things. It varies from Singapore, which is first world, non-corrupt and strong economically, to other countries where it is quite the opposite. You have that vast difference and that's what investors really have to deal with. This is a real challenge.

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