

Cleantech Post the Pandemic

Should Asian Private Equity Investors take another look at
Cleantech investments?



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Asia Cleantech Investing 2.0: *Cleantech post the pandemic*

By Michel Brekelmans

Cleantech has long been a niche investment category for Private Equity investors in Asia. Most generalist players have typically shunned the category focussing instead on traditional business models in the consumer or B2B space and, increasingly over the past 10 years, healthcare and digital technologies. But a flurry of deals during the pandemic and increased commitment by many governments in the region suggests another look at the category is merited. In this article we explore the latest developments in cleantech investing in Asia and highlight if and where private equity players should be looking to deploy their capital.

Cleantech resilient through the COVID crisis

We take a relatively broad definition of the Cleantech space. From renewable energy and fuels to energy efficiency, battery technology, lightweight materials and alternative proteins. As the Covid-19 crisis was unfolding many experts believed it could put the push for greener policies and economies down the priority list. With governments primarily preoccupied with getting the pandemic and subsequent economic meltdown under control, the thinking was that the political will and financial resources to tackle climate change issues would be limited.

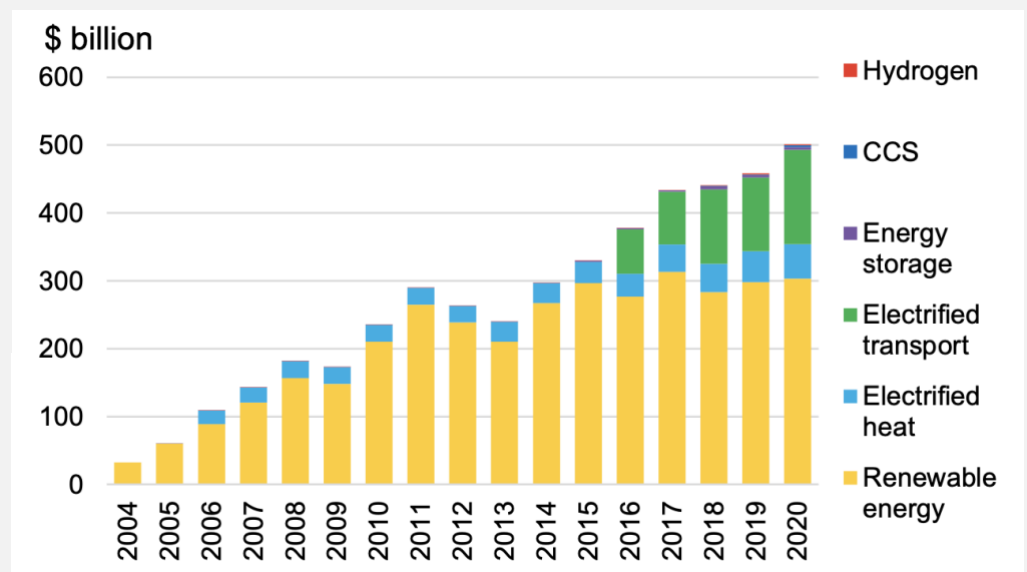
But investment flows into cleantech companies and projects has held up well through 2020 and the first half of 2021. A new, broad measure of 'energy transition investment', compiled by BloombergNEF (BNEF), shows that the world committed a record

\$501.3 billion to decarbonization in 2020, beating the previous year by 9% despite the economic disruption caused by the Covid-19 pandemic.

BNEF's analysis shows that companies, governments and households invested \$303.5 billion in new renewable energy capacity in 2020, up 2% on the year, helped by the biggest-ever build-out of solar projects and a \$50 billion surge for offshore wind. They also spent \$139 billion on electric vehicles and associated charging infrastructure, up 28% and a new record.

Other areas of energy transition investment also showed strength. Domestic installation of energy-efficient heat pumps came to \$50.8 billion, up 12%, while investment in stationary energy storage technologies such as batteries was \$3.6 billion, level with 2019 despite falling unit prices. Global investment in carbon capture and storage (CCS) tripled to \$3 billion, and that in hydrogen was \$1.5 billion, down 20% but the second-highest annual number to date.

Strong growth in energy transition investment over the past 15 years



Outlook for Cleantech is strong

Looking beyond the pandemic, the outlook for cleantech investment remains strong. Whereas 20 years ago, the push to sustainability was driven by fringe organisations such as Greenpeace or Friends of the Earth, nowadays there is much more broad-based consumer pull and political push to decarbonise

economies through changed consumer behaviour, regulatory frameworks and the development and adoption of new technologies , products and services.

After fulfilling his promise to bring America back into the Paris Agreement, President Biden convened 40 world leaders in a virtual Leaders Summit on Climate in April 2021 to rally the world in tackling the climate crisis and meeting the demands of science. The United States and other countries announced ambitious new climate targets ensuring that nations accounting for half of the world's economy have now committed to the emission reductions needed globally to keep the goal of limiting global warming to 1.5-degrees C within reach.

***Increased commitment
from Asian
governments to green
local economies***

Following the summit many countries in Asia also announced increased ambitions in their efforts to green their economies, for example:

- Japanese Prime Minister Yoshihide Suga said Japan will curb emissions by 46 percent by 2030 compared to 2013 levels, upping its previous commitment to a 26 percent reduction.
- Malaysia's Prime Minister Muhyiddin announced the country will participate in carbon trading systems and develop a green recovery plan in which Malaysia becomes a green economy, services and technology leader, while fostering healthy green lifestyles in all walks of life.
- Indonesia announced it will not approve any new coal-fired power plants as it steps up efforts to reduce carbon emissions. A remarkable move given that Indonesia has abundant thermal coal reserves. The country also plans to offer renewable energy incentives, impose carbon taxes and develop a carbon trading system as it seeks to cut emissions by 26.8 per cent to 27.1 per cent from its 2010 baseline. South-east Asia's largest economy will gradually shift about 5,200 diesel-powered plants, with total capacity of 2 gigawatts, to be powered by renewable sources

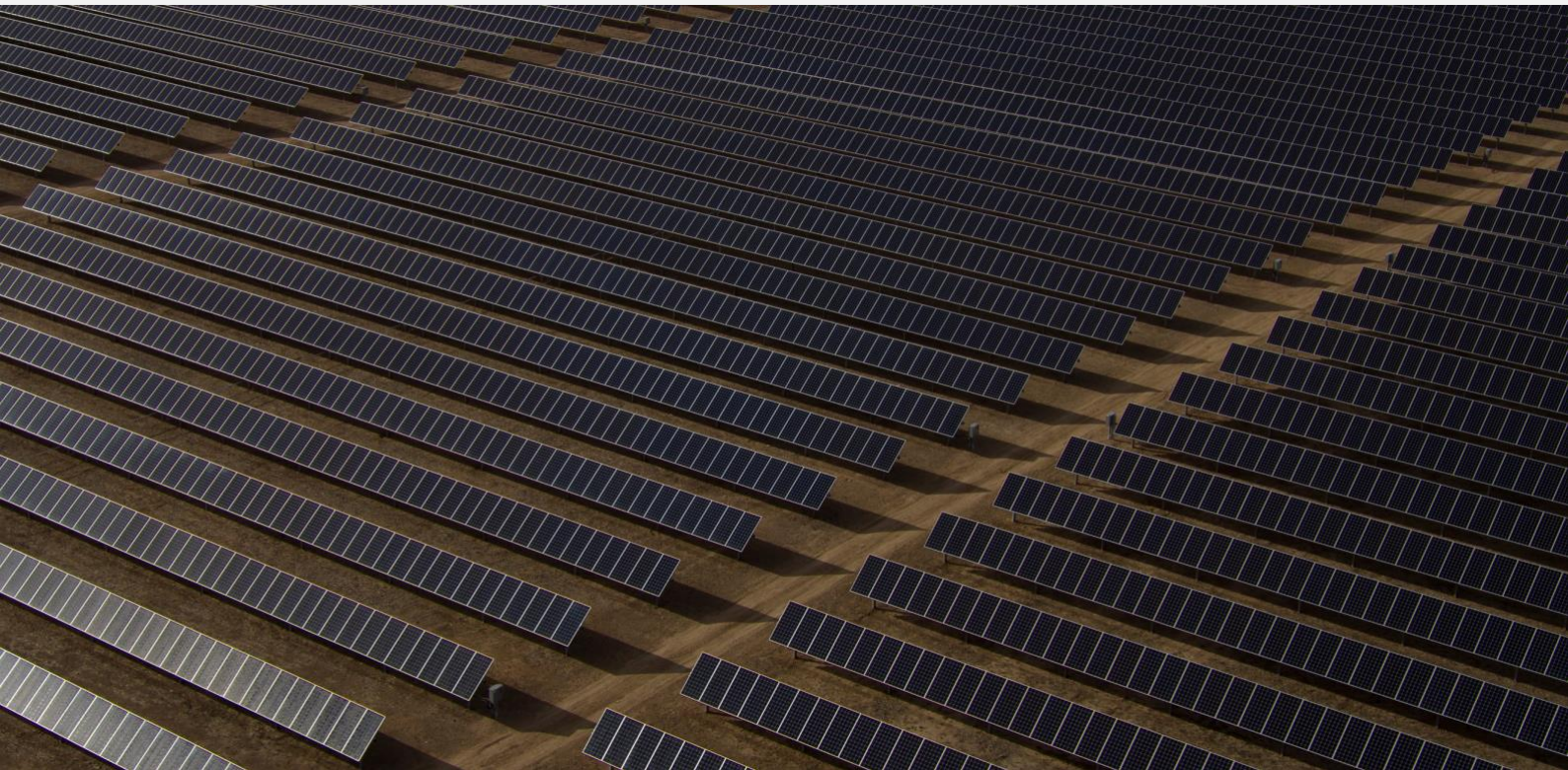
Despite these recent commitments several challenges remain in place requiring PE professionals to carefully asses which opportunities meet their investment objectives. For starters: not all

technology is ready to go. For instance, hydrogen is getting a lot of attention and funding in recent year but at least another decade of innovation is needed to determine what will be the fuel choice of the future and before hydrogen is ready to compete at commercial scale.

***More fundamental
research across many
cleantech areas***

Much of this innovation is more fundamental in nature and typically done at universities or government linked innovation centres. For Cleantech innovation, the route to commercialisation is much longer than in other tech sectors (think e-commerce or fintech). With Cleantech there are physical requirements, proof of concept and prototyping, permitting, etc. This means much more time and money is involved compared for instance to launching a new dating app.

Also, the true commitment from governments in developing economies remains to be seen. Environmentalism in the EU and US is more of a consumer pull which has translated into political action. On the other hand, many consumers in Asia are still less environmentally driven and more focused on making ends meet and moving up in the world.



As a result there is less political pressure to aggressively move towards decarbonisation and governments may eventually reprioritise job creation or easing investment restrictions in order to stimulate their economies. For instance, several Asian countries have oil and coal reserves which provide export potential and relatively cheap electricity supply. Also coal fired power plants generate a lot more permanent jobs than a solar farm of equivalent capacity. And GDP levels in many of these countries are still relatively lower making investment in expensive cleantech facilities harder to justify.

Corporate players moving into cleantech

The bulk of financial flows in the cleantech space are associated with project finance for new projects that have passed the concept development and permitting stage. Traditional financial institutions would typically fund the bulk of projects in the form of asset finance. Funding for technology development is typically from different set of sources, namely venture capital or government or corporate R&D programs.

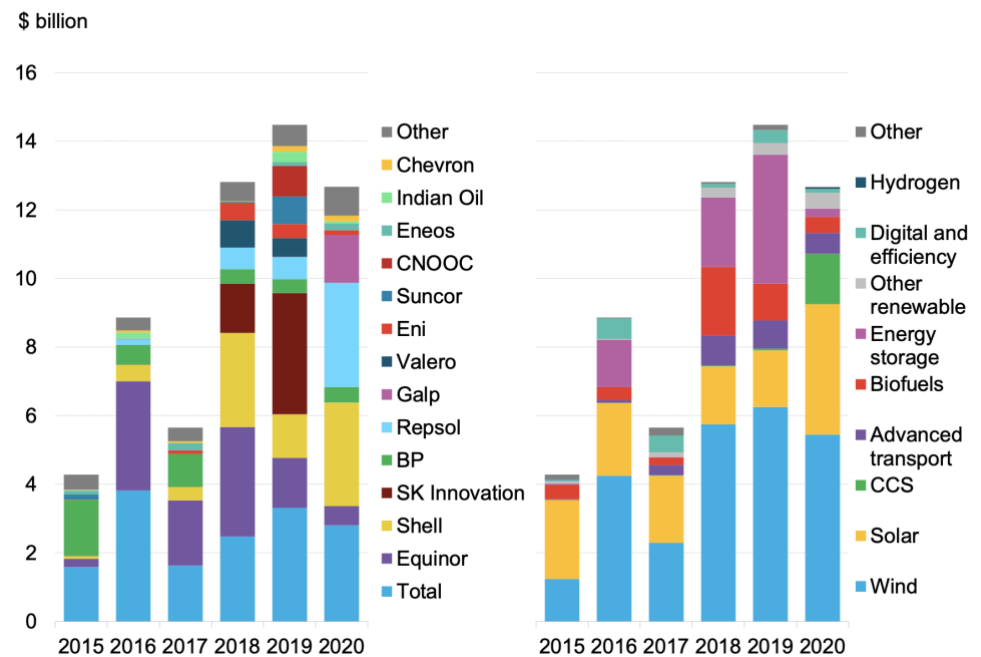
***Corporate players
have become
competitors for deal
flow***

A key trend underpinning clean energy investment is the push by oil and gas companies to build low-carbon portfolios. Most of the European majors have set goals to achieve net-zero emissions, not only from their own operations, but also from the consumption of the energy products sold to customers.

According to data from BloombergNEF, corporate investments into cleantech declined by 12% year- on-year to \$12.7 billion in 2020, as oil majors were looking for short time capex cuts given the collapse in the oil price. Shell, Total, Repsol and Galp account for the bulk of cleantech investment by the oil majors.

Over the past five years, total investment in renewables, storage, advanced transport, digital technologies, hydrogen and CCS has been almost \$60 billion, with wind, solar and battery storage making up the majority. Total oil sector capex in 2020 was likely to be over \$200 billion, so clean energy investment was equivalent to around 6% of that – higher than in previous years.

Clean energy investment by oil and gas companies, 2015-2020



Private Equity moving into cleantech

Private equity takes a relatively small share of the \$500bn global investment in energy transition. But increasingly we are seeing examples of deals done by private equity firms in the cleantech space in Asia. PE/VC investment in renewable energy and storage rose 51% in 2020 to a record-high of USD5.9 billion. Meanwhile, corporate M&A and PE buyouts totalled USD34.7 billion.

Increasing number of cleantech deals by Asia PE players

Several Asia deals were announced in recent years and deal flow has held up well during the pandemic:

- In December 2018, KKR made its first global impact investment in Southeast Asia, committing up to \$33 million for a stake in Barghest Building Performance, a Singapore provider of energy-saving solutions. The company uses sensors, software algorithms and equipment controls to cut electricity consumption by up to 40 percent in the air-conditioning systems of industrial and commercial customers throughout Asia
- In February 2019, KKR acquired a 60% stake in Ramky Enviro Engineers Limited ("REEL") for approximately US\$510 million. REEL is a provider of environmental management services. Through the provision of its technical and operational expertise, REEL offers custom solutions to a variety of complex environmental needs across areas including

industrial, municipal and medical waste management, wastewater and water treatment, environmental services, recycling and remediation. REEL operates waste treatment facilities in more than 60 locations across India, Singapore, the Middle East, and Africa.

- In January 2020 Temasek and impact investor ABC World announced they invested \$37m in Singaporean solar developer Sunseap Group. ABC World also invested in Australian alternative protein company v2food which provides plant-based meat.
- In April 2020 KKR acquired 317MW of solar assets in India from SP Infra. SP Infra will sell five operational solar energy assets to KKR for a total consideration of ₹15,540 million (\$204 million). The portfolio comprises 169 MW (DC) in Maharashtra and 148 MW (DC) in Tamil Nadu
- In July 2020 KKR invested in Australian environmental markets platform GreenCollar which uses environmental markets, such as carbon markets, to enable landholders, especially framers, implement projects that generate revenue and reduce greenhouse emissions
- In July 2020 TPG acquired solar assets from China-based photovoltaics (PV) maker Trina Solar Ltd. About 1 GW of solar assets were sold to TPG, which in turn has bundled them in a new renewable energy platform called Matrix Renewables. TPG, through its USD-5-billion (EUR 4.45bn) impact investing platform The Rise Fund, has acquired PV assets in Spain, Chile, Colombia and Mexico
- In August 2020 Actis completed the acquisition of 400MW of solar power projects from ACME Solar Holdings Ltd through Actis' Long Life Fund
- In August 2020 Partners Group acquired an Australian wind farm for \$129m from Macquarie Capital and Renewable Energy Systems. The Murra Warra II Wind Farm has 226 MW capacity.
- In June 2021 Actis agreed to buy 500MW of solar assets in India from Finland's state-controlled utility Fortum. This continues Actis' green investment strategy in India through its renewable energy platform, Sprng Energy. Actis plans to build up to a 2GW renewable energy platform and targets both utility and C&I (Commercial and Industrial) segments.

Increase in PE funds targeting green and impact investments in Asia

The rise in deal flow follows a significant increase in private equity funds raised for cleantech and impact investment. Funds are rapidly flowing into the sector as technologies are becoming economically viable and new business models have emerged. Examples of funds raised by leading global PE players include:

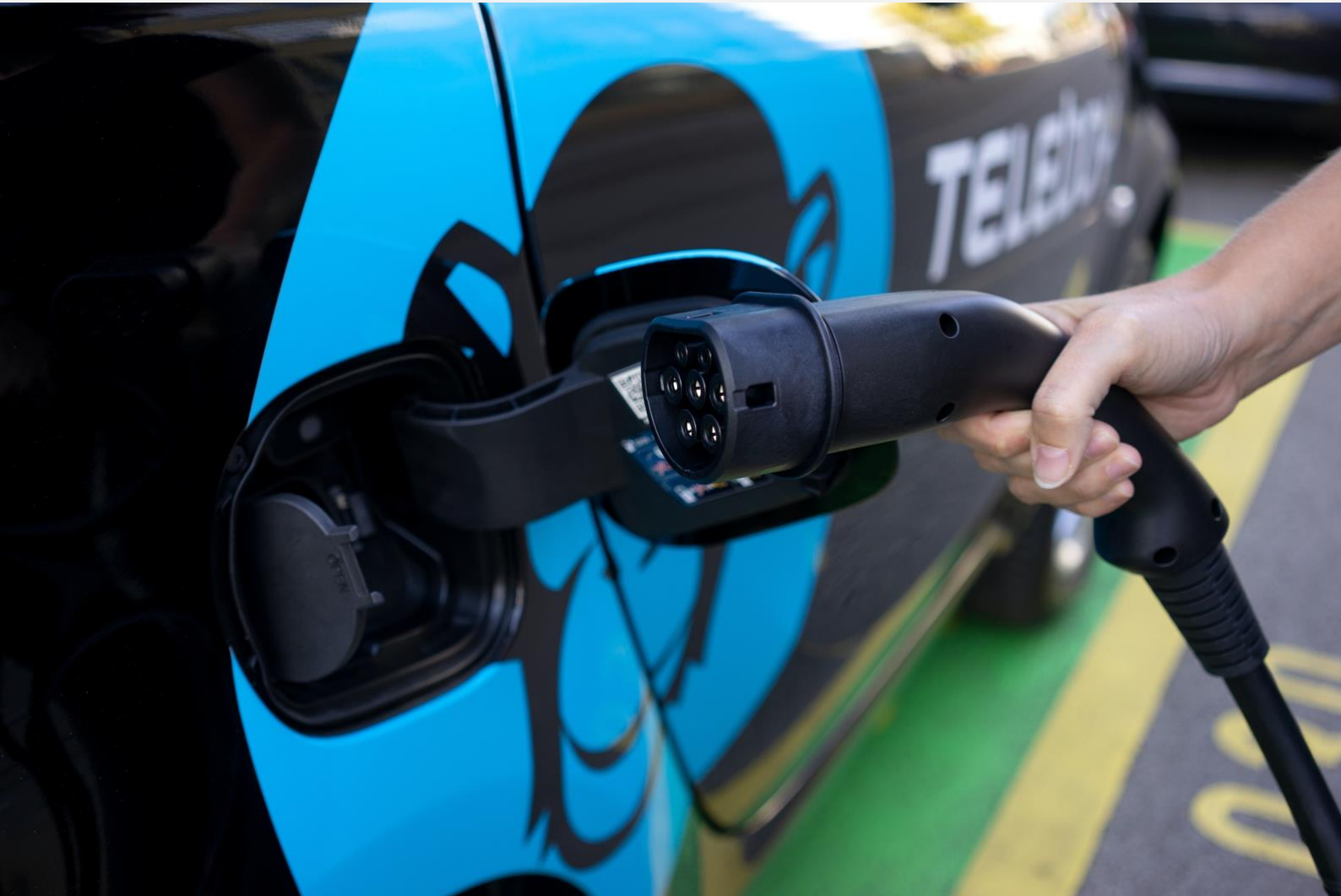
- The Rise Fund was founded in 2016 by TPG in partnership with Bono and Jeff Skoll and offers business solutions to help achieve the United Nations' Sustainable Development Goals. As part of TPG, The Rise Fund offers investment resources (\$4bn under management), business-building skills and a global network to help portfolio companies accelerate growth and impact.
- In 2018 Partners Group launched PG Life, \$1bn impact fund looking to invest in education, healthcare, energy access, clean energy and social inclusion.
- Singapore's Temasek, established ABC World in May 2019, guided by Temasek's mission to contribute to the United Nations' Sustainable Development Goals. The inaugural fund raised S\$405 million in capital from investors, including Temasek Trust, Temasek, Pavilion Capital, Mapletree Investments, Seatown Holdings, Sembcorp Industries, and Singapore Power.
- KKR raised \$3.9 billion for its first Asia-Pacific infrastructure fund in January 2021. It plans to invest in everything from renewable energy to waste management. This follows KKR's final closing of KKR Global Impact Fund, a \$1.3 billion fund dedicated to investment opportunities in companies whose core business models provide commercial solutions to an environmental or social challenge.

Where are the opportunities? Technology Readiness

Early stage cleantech deals less prevalent in Asia. PE players looking at mature business models

Where are the opportunities for PE in Cleantech in Asia? One way to look at it is to look at the Technology Readiness Level across the cleantech value chain. Backing of early stage cleantech companies tends to be more prevalent in Europe and US but less so in Asia. There are pockets of strengths in Asia (Japan, China) but typically the bulk of cleantech innovation takes place in Western markets whilst Asia's strength is scale-up and manufacturing, where Asia is better than anybody else. Ticket sizes in cleantech VC are smaller and large PE funds are typically looking to write bigger cheques.

So for most of Asia, the big opportunity for PE investors is to look for applications of proven technologies with established demand. With 2.5 billion people in East and SE Asia the market potential is typically enormous and unlike many other technology categories, cleantech can typically be applied quite seamlessly across borders without major language or cultural localisation required.



The most abundant cleantech dealflow has been in the development and operation of renewable energy projects, especially in wind and solar for utility power connected to the grid. But this project development model is also common in other cleantech segments such as energy saving or battery charging infrastructure.

The risk-reward profile of project development evolves over the life of the project:

- Highest risk exists during the development stage when you evaluate the site, look at grid connections, and apply for required permits. The process from concept to permit is typically 6-12 months and investments are several hundred thousands of dollar. It's typically the developer who takes this risk and equity IRR at this stage are around 10-12%
- Once permits are obtained and funding is secured (typically 70% debt from commercial banks) then construction can commence. Construction risk is perhaps 5-10% and can be managed quite well by contracting with an experienced EPC who will provide construction guarantees. Construction phase duration differs by technology and location, for example construction time for a 100MW solar plant is around 1 year with equity investment in the range of \$30-50. The IRR at this stage drops to around 9-10%.
- Once construction is completed and the project commissioning operation date (COD) is obtained the plant can start operations. At this stage all risks are well understood and the project will generate stable annuities as agreed with the grid through a Power Purchase Agreement. The project is operational and de-risked and the IRR drops to 6-8%

IRR's coming down as more money is chasing a limited number of scaled opportunities

PE investors will need to determine whether the risk-reward profile of cleantech projects match their investment objectives. The relatively low IRR's at the operation stage may be fine for pension funds who are looking for steady returns at low risks; but PE investors may be looking for more upside on their investment.

Also with more money available chasing relatively few large deals there is more competition to win new projects. For instance, Malaysia has held 4 large scale solar (LSS) solar auctions which has seen average bid prices decline steadily over time:

- LSS1 (2016): 41sen
- LSS2 (2017): 36sen
- LSS3 (2020): 23sen
- LSS4 (2021): 20sen

With prices coming down and the scope for further technology improvements reducing, IRR's are coming under pressure. This begs the question: is the risk premium for cleantech projects attractive against regular corporate bonds which provide similar risk-reward profile but with much better liquidity, especially when factoring in potential FX risk for global PE funds?

Relatedly there is increased risk of inflation globally with related impact on rates for T-Bills. The returns on T-Bills will be going up which will impact cost of capital and narrow the premium of cleantech projects against risk free government bonds. More reasons to doubt whether stepping into this segment of the cleantech investment space is the right move for PE investors.

Alternatives to Cleantech Utility Projects

Niche applications can generate better returns but come with their own set of challenges

To escape this downward trend towards marginal IRR's, investors can consider alternative strategies that follow the project development model but instead of targeting large scale utility projects focus on smaller niche applications that are proprietary in sourcing (i.e., not won through a bidding process) and where IRR's tend to be better. Examples include:

- Targeting frontier markets with less competition (e.g., Cambodia or Myanmar)
- Rooftop solar projects and other forms of distributed solar power
- Energy efficiency projects in the commercial / industrial sector
- Providing solar and battery storage for grid stability (the storage unit has power available immediately and gives grid time to fix the problem or do load shedding if a generating unit trips; this could be especially helpful for smaller grids)
- Replace / optimise diesel power generation with high load variability between peak and trough (a solar/storage combi can manage this cheaper and greener)

Ticket sizes for these types of projects are much smaller so PE investors would need to back more scaled developers that can build a portfolio of projects. But this model is not without challenges:

- Whereas utility renewable energy projects are relatively risk free with risks well understood and managed through the PPA, the smaller projects often have counterparty risk (building owners may go bankrupt making energy efficiency or rooftop solar projects more risky over the life of the project).
- There can be a mismatch in expectations between the building owner and tenant. A building owner may not be interested in investing in energy efficiency solutions or rooftop solar projects when their benefits are captured by the tenant in the form of lower energy costs. Likewise, a tenant may also not want to consider investment in rooftop solar or energy efficiency project, especially late in a tenancy agreement when there may not be enough time to recover the upfront investment. This dynamic makes it more challenging for developers to identify new project leads.
- With capex levels coming down, investment costs are coming down and building owners may opt to directly contract for a solution with a contractor given there is less need of funding as part of the overall solution. This again makes it harder for a developer to play a role in executing projects.



Look beyond the Project Development model

PE firms should look beyond the project development model to find better value creation opportunities

Given the challenges with the project development models, PE investors might better concentrate on other parts of the cleantech value chain. For instance there are companies that are copying the 'Gold Rush business model': it was the businesses who were supplying the jeans and shovels to the gold prospectors who were eventually the players that amassed the biggest fortune from the US Gold Rush in the nineteenth century. Similarly, specialised suppliers of products and services that enable core cleantech operations can enjoy very good profitability and might prove to be more attractive targets to PE investors.

Examples of these types of products and services include:

- Suppliers of drone inspection services for on and off-shore wind turbines
- Suppliers of cable protection stability systems to reduce subsea cable movement and damage for off-shore wind farms
- Capital equipment suppliers to support build out of hydrogen supply chain where significant investment is expected in the coming years (i.e. this strategy is similar to the success enjoyed by suppliers of LNG capital equipment in recent years)
- Suppliers of detection instruments for methane gas emissions that help reduce operational cost, increase inspection frequency and help reduce shutting down systems
- DNA testing service providers to increase the speed and lower the cost of environmental impact assessments by evaluating the presence or absence of certain protected species
- EV battery services providers including battery swapping, battery-as-a-service and battery charging networks.

The above list provides just a handful of examples of the types of business models that PE firms could consider for investment. Typically these businesses enjoy better margins and scale-up potential than the cleantech application projects which have become more commoditised in recent years.

Many companies operating these support product and services are in operation in Europe and the US where cleantech innovation is somewhat ahead of the curve compared to Asia. PE players can play a bridging role to bring companies with great technology, products and service capabilities into Asia for scaled commercialisation. This path of bringing Western companies into Asia has been well trodden by PE firms in other sectors ranging from consumer brands to construction equipment and could also prove lucrative in the cleantech support service sector. Often the Western players lack the knowledge and capability to penetrate the vast Asian markets but together with a strong local partner they have the opportunity to succeed.

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