

NOVEMBER 2019

# STRUCTURING CLEAN ENERGY INFRASTRUCTURE INVESTMENTS IN A WORLD WITHOUT SUBSIDIES

## **THE JOURNEY TOWARDS SUBSIDY-FREE**

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Renewable energy projects, like traditional power stations, earn revenues through selling the electricity that they generate. Electricity market prices, like the prices of other traded commodities, can be volatile and the potential riskiness of revenue streams over the course of a long-term investment in this class of infrastructure might dissuade more risk-

averse investors. However, due to the innate low-carbon properties of generating electrical energy from renewable resources, and the increasing geopolitical benefits in harvesting these resources domestically, governments across the globe have proactively supported private investment in new renewable energy infrastructure to tap these

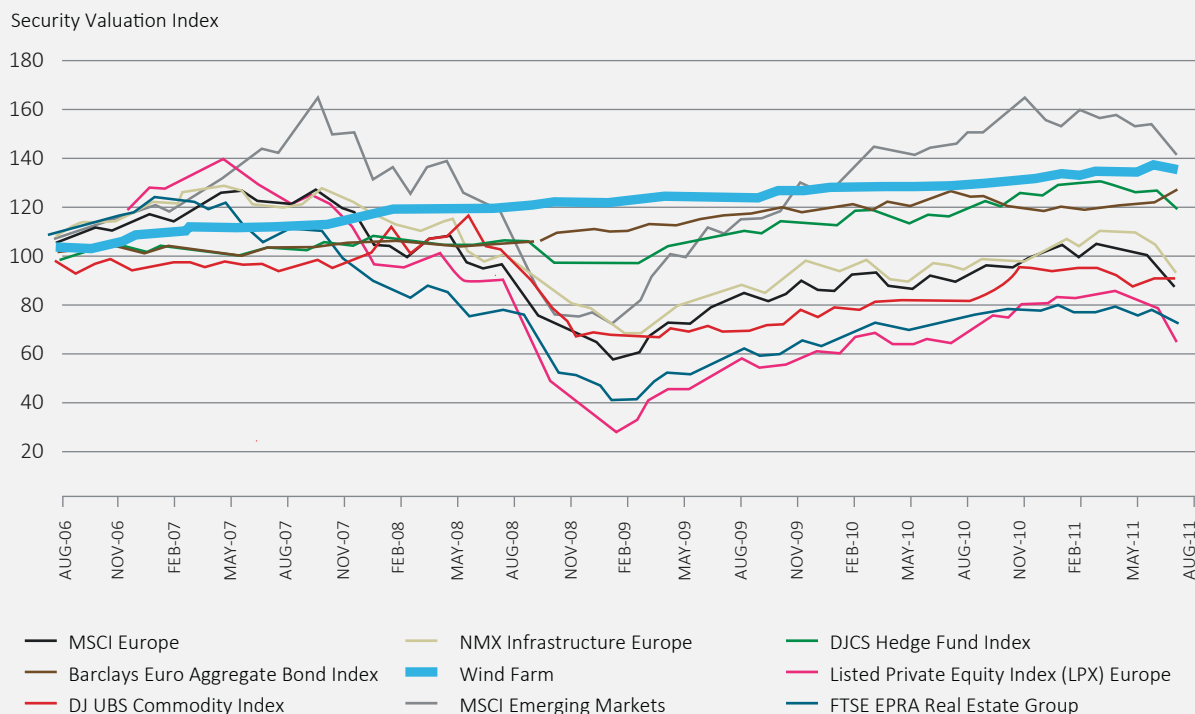
resources through a series of subsidy mechanisms to mitigate against this revenue uncertainty.

In Europe, subsidies for renewables have typically taken the form of inflation-linked feed-in tariffs (“FiTs”) or tradeable renewable energy certificates (“RECs”), providing renewable energy projects with a fixed price government-backed payment for each unit (or megawatt-hour, MWh) of electricity generated for 15-20 years from the commencement of operations.

Consequently, high-quality renewable assets have added a degree of uncorrelated, cash-yielding stability to investment portfolios. Renewables’ low macroeconomic correlation can be seen in the case of a German onshore wind farm through the financial crisis of 2008, shown below in **Figure 1**.

**“DUE TO THE INNATE LOW-CARBON PROPERTIES OF GENERATING ELECTRICAL ENERGY FROM RENEWABLE RESOURCES, AND THE INCREASING GEOPOLITICAL BENEFITS IN HARVESTING THESE RESOURCES DOMESTICALLY, GOVERNMENTS ACROSS THE GLOBE HAVE PROACTIVELY SUPPORTED PRIVATE INVESTMENT IN NEW RENEWABLE ENERGY INFRASTRUCTURE.”**

**FIGURE 1: PERFORMANCE OF ONSHORE WIND FARM VS. SELECT ASSET CLASSES DURING 2008 FINANCIAL CRISIS<sup>1</sup>**



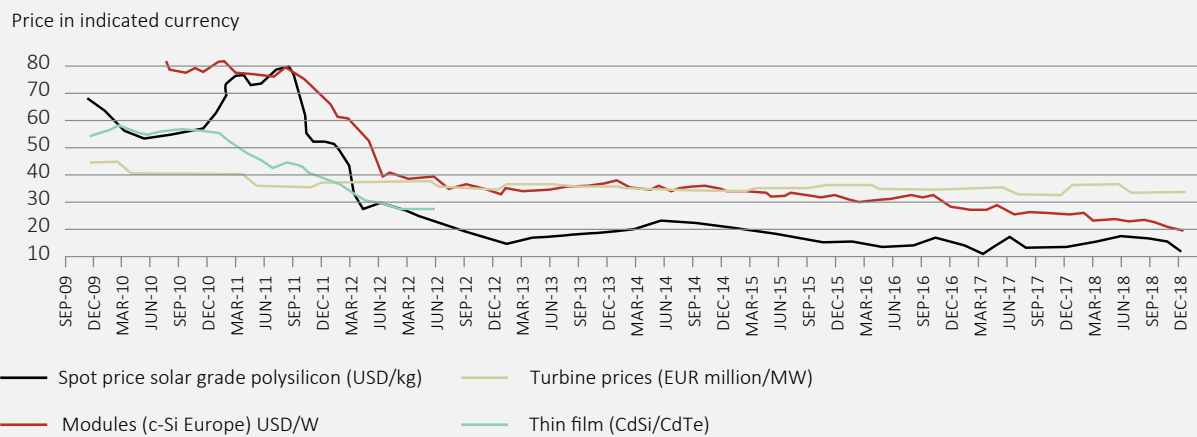
Source: Portfolio *Institutionell* Magazine

<sup>1</sup> Source: Portfolio *Institutionell* Magazine, Allianz Capital Partners (2012). Past performance and projected performance is not a reliable indicator or guarantee of future results.

This global government support for renewables has underpinned a huge expansion in the industry over the last fifteen years, allowing it to now reach a point of relative maturity. The benefits of economies of

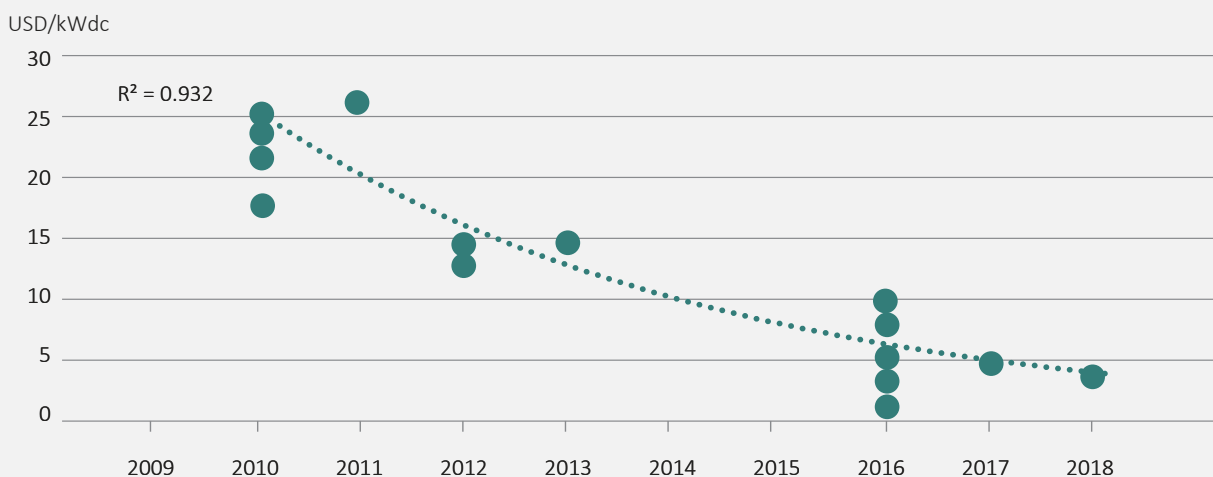
scale and consolidation across the industry and supply chain have resulted in significant technology cost reductions as shown in **Figure 2** and **Figure 3** below.

**FIGURE 2: RENEWABLE TECHNOLOGY COSTS OVER TIME<sup>2</sup>**



Source: Bloomberg New Energy Finance

**FIGURE 3: OBSERVED SOLAR OPERATING & MAINTENANCE (O&M) COSTS<sup>3</sup>**



Source: Capital Dynamics

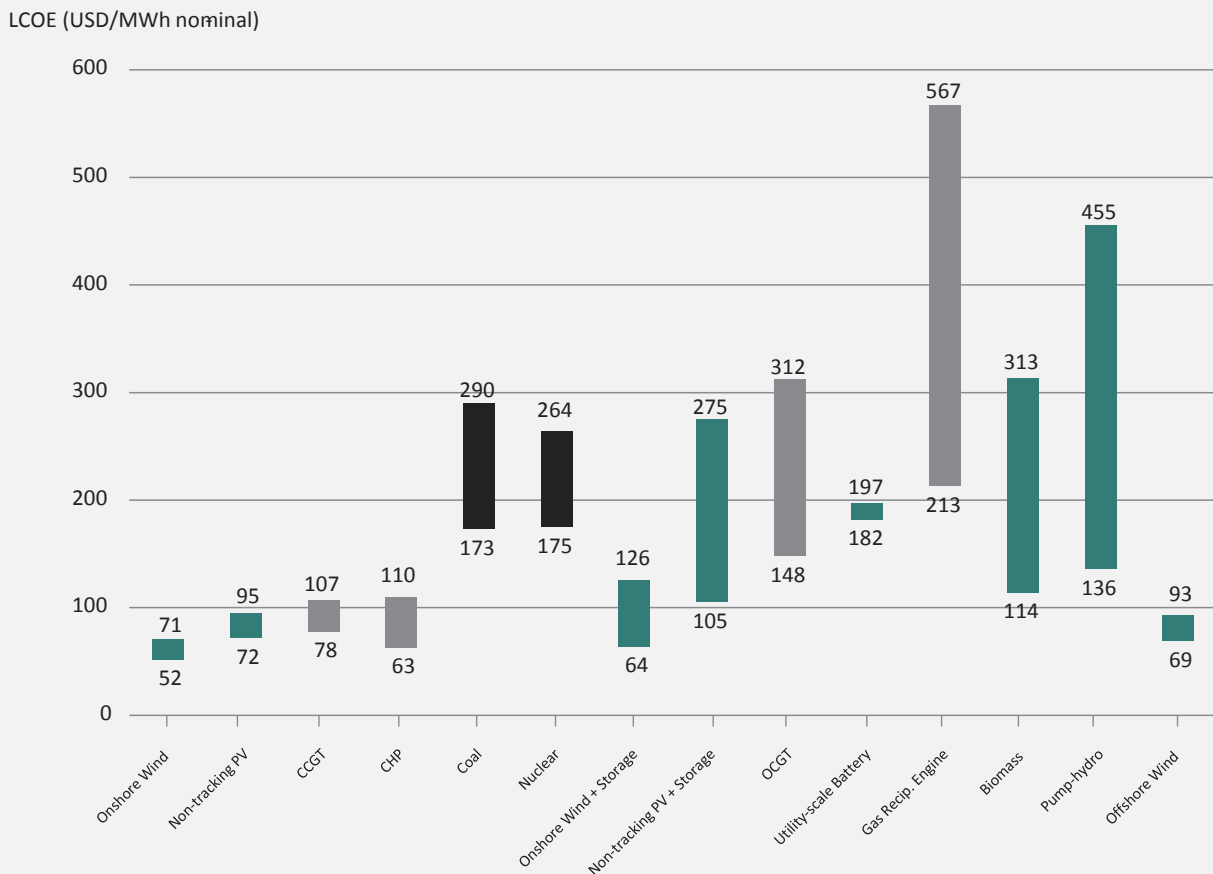
<sup>2</sup> Source: "Solar Modules to Get Even Cheaper and More Efficient." Bloomberg New Energy Finance. May 30, 2017.

<sup>3</sup> Source: Capital Dynamics' Clean Energy Infrastructure (CEI) internal database, based on current and historic solar investments.

Importantly, in select high-wind and high-solar resource locations, unsubsidized renewables can now compete against conventional fossil-fuel power generation infrastructure using the industry-accepted levelized cost of energy (“LCOE”) metric (as shown in **Figure 4**)<sup>4</sup>:

**“IN SELECT HIGH-WIND AND HIGH-SOLAR RESOURCE LOCATIONS, UNSUBSIDIZED RENEWABLES CAN NOW COMPETE AGAINST CONVENTIONAL FOSSIL-FUEL POWER GENERATION INFRASTRUCTURE.”**

**FIGURE 4: LEVELIZED COST (RANGE) OF DEVELOPMENT OF NEW FOSSIL FUEL AND CLEAN ENERGY ASSETS IN THE UK (USD/MWH)<sup>5</sup>**



Source: Bloomberg New Energy Finance

<sup>4</sup> Levelized Cost of Energy is the net present value of the unit-cost of electricity over the lifetime of a generating asset. It is often taken as a proxy for the average price that the generating asset must receive in a market to break even over its lifetime.

<sup>5</sup> Levelised Cost of Energy Comparison and Visualisation. 1H 2019 LCOE Global Report. Bloomberg New Energy Finance.

Given the decrease both in the cost of technology, and the ongoing costs to operate wind and solar projects in particular, governments have begun withdrawing subsidies to renewable power generation infrastructure across Europe. This means unsubsidized renewables projects must now effectively compete both with each other and with other conventional power stations to provide new power capacity, with the wholesale electricity price providing the signal to the market for new entry. In the absence of any public support or commercial

structuring, projects will therefore be exposed to the relative volatility of wholesale electricity prices, which may dissuade some risk-averse sources of capital (bank debt and low-cost institutional money) from investing in the sector. However, experienced investors in the space, such as the Capital Dynamics Clean Energy Infrastructure business, are able to structure the sale of power from select renewable projects such that the risk and revenue profile can mirror that of the previous subsidized world.<sup>6</sup>

## POWER PURCHASE AGREEMENTS IN A SUBSIDY-FREE WORLD

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The key to establishing long-term fixed price revenues for a renewables project in the subsidy-free world lies in the commercial structuring of the power purchase agreement (“PPA”) that is struck between the project and the universe of potential buyers of power. There are broadly three main classes of these long-term power offtakers:

- i **Utilities:** such as RWE and Statkraft, who buy renewable power and supply it to their underlying customer base. They typically offer up to a 15-year contract to acquire 100% of the power generated from a renewables project at the prevailing wholesale price, minus a small fee. In some instances they can offer a floor price for the power they acquire for the duration of the contract;
- ii **Trading platforms and virtual power plants:** who typically seek to trade the power in current and future markets. Typically, select entities from this sub-set of buyers can offer fixed prices for 100% of a project’s generated power over a 5-8 year horizon;
- iii **Corporates:** who seek 10-20 year fixed price contracts with renewables projects to meet Corporate Social Responsibility (“CSR”) goals and to hedge their long-term electricity prices. It is this type of buyer that is key to the new world of energy investing and is covered in more detail on the following page.

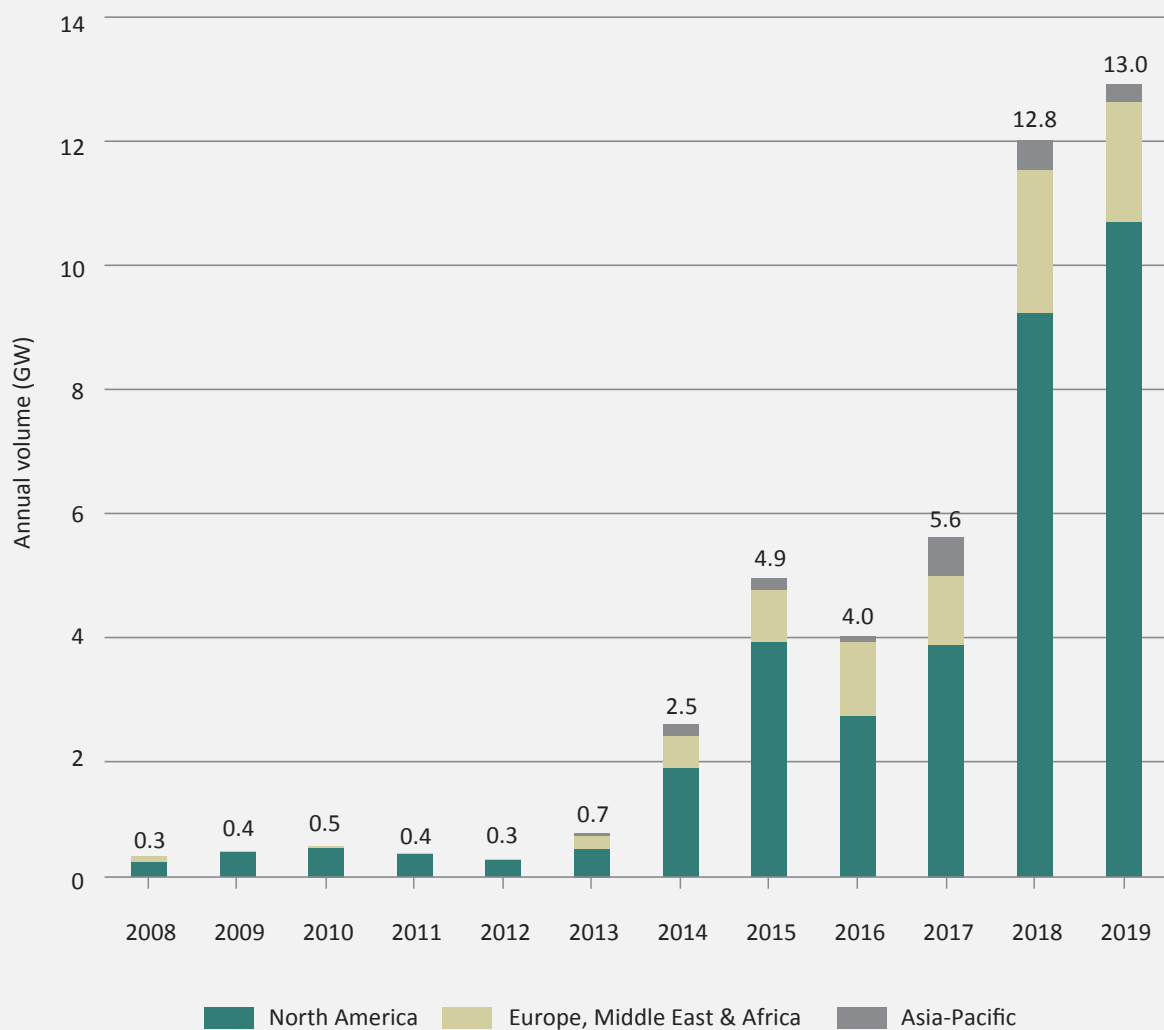
**“THE KEY TO ESTABLISHING LONG-TERM FIXED PRICE REVENUES FOR A RENEWABLES PROJECT IN THE SUBSIDY-FREE WORLD LIES IN THE COMMERCIAL STRUCTURING OF THE POWER PURCHASE AGREEMENT (“PPA”) THAT IS STRUCK BETWEEN THE PROJECT AND THE UNIVERSE OF POTENTIAL BUYERS OF POWER.”**

<sup>6</sup> The CEI business has a long track record in negotiating PPAs for its underlying renewables assets.

## CORPORATE PPA DRIVERS

Over the last 5 years there has been growing demand from global corporates to sign long-term PPAs with renewable energy projects. The trend in corporate PPA transactions over recent years is highlighted in **Figure 5** below.<sup>7</sup>

**FIGURE 5: VOLUME OF GW CAPACITY CONTRACTED UNDER A CORPORATE PPA OVER TIME**



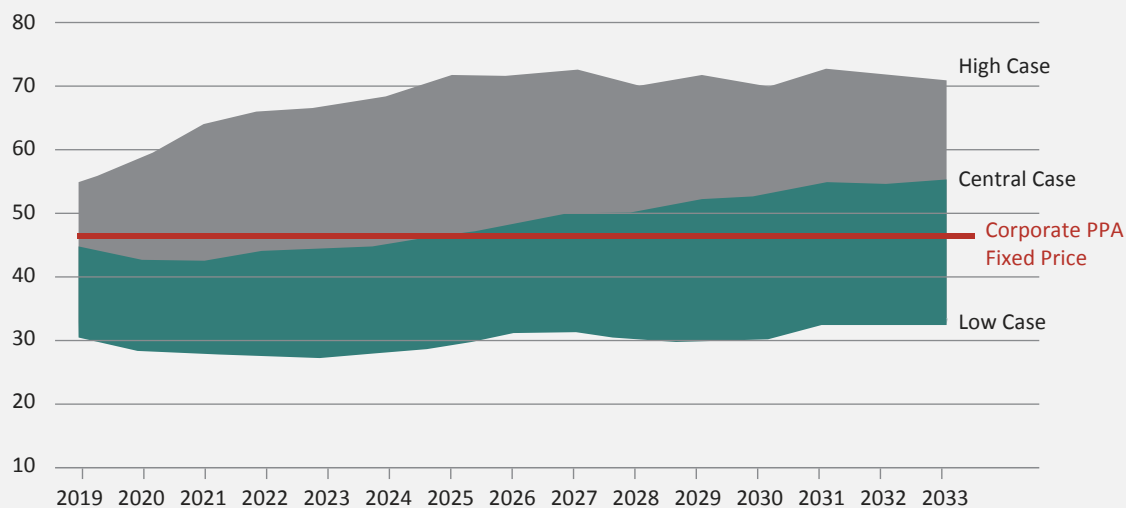
Source: Bloomberg New Energy Finance

<sup>7</sup> Source: Bloomberg NEF. Note: Data is through October 7, 2019. Onsite PPAs not included. APAC number is an estimate. Pre-market reform Mexico PPAs are not included. These figures are subject to change and may be updated as more information is made available.

This is driven by a combination of factors including:

- i A desire or requirement of certain large consumers of power to decarbonize.** A number of the world’s large corporations, such as Apple, Facebook, General Motors and Vodafone, have signed up to the ‘RE100’ Club, under which companies set a public goal to source 100% of their global power needs from renewable resources. A number of these entities have already struck long-term PPAs with renewable energy projects in Europe and North America.
- ii Increased demand for electricity,** particularly in the technology and IT sectors, means corporates are progressively looking to buy electricity ‘at-source’ rather than through typical supply models in order to minimize intermediary fees.
- iii Price volatility in the electricity markets.** In seeking to minimize operating cost volatility, corporates are increasingly seeking to hedge their power costs over a long-term horizon. This is typically between 10 and 20 years. In addition, where renewables projects can be paired with commercially-viable battery storage technology (which allows renewables projects to control when they dispatch power to the grid, rather than only when the wind blows or when the sun shines), this can allow corporates to mitigate their exposure to peak power prices at specific hours in the day. **Figure 6** below highlights the difference in the future power prices of a renewable generator with and without a corporate PPA in real terms.

**FIGURE 6: FORECAST MERCHANT POWER PRICES AND SPREAD VERSUS FIXED PRICE CORPORATE PPA (£/MWH, REAL 2017)<sup>8</sup>**



Source: Poyry Consulting

<sup>8</sup> Poyry Consulting Q2 2018 Forecast GB Power Prices – High, Central and Low Case forecasts. Corporate PPA price based on CEI Team market knowledge and recent transactions.

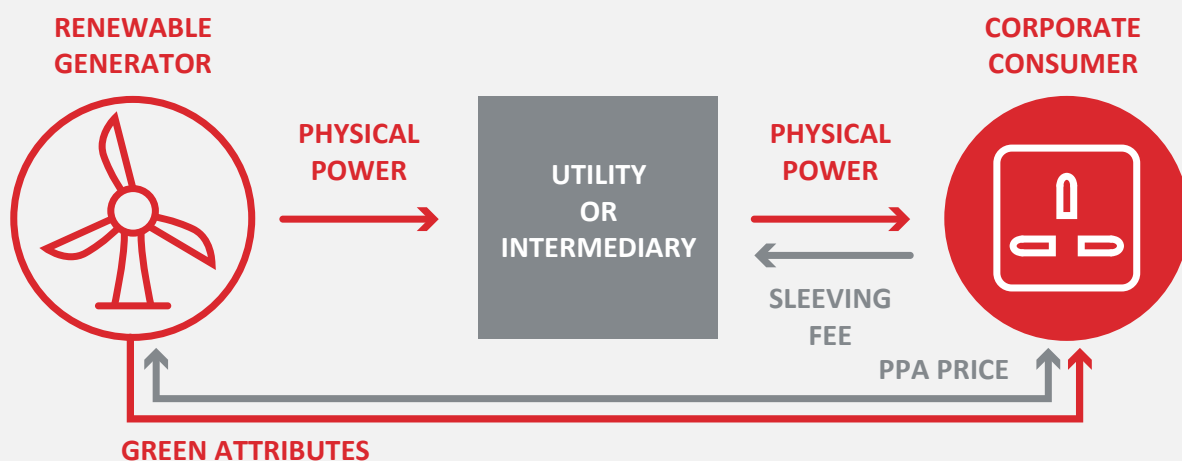
## CORPORATE PPA STRUCTURES

Corporate PPAs can take a number of forms. Direct, ‘off-grid’ physical arrangements, where a generator delivers physical power directly to the corporate end-user through a private interconnection, are possible but rare. These arrangements typically require the generating plant and the end user to be geographically co-located to keep the costs of constructing the private interconnection to a minimum. More typically, projects and corporates structure fixed-price arrangements (inflation-linked) with each other via a utility intermediary. Two such structures are outlined below:

### A Back-to-back PPAs

Back-to-back arrangements (also referred to as ‘sleeved’ arrangements), involve a single utility signing separate PPAs simultaneously with both the generator (from whom it buys the physical power) and the corporate consumer (to whom it sells the physical power) with mirroring commercial terms. The corporate consumer pays the utility a small fee for arranging the trade. The generator and corporate consumer agree to a price for each MWh of electricity generated and payments are paid directly from corporate to generator. This arrangement also ensures that any green rights associated with the power, which provides proof that the unit of electricity was sourced from a renewable energy power station, transfer to the consumer.

FIGURE 7: BACK-TO-BACK PPA STRUCTURE DIAGRAM



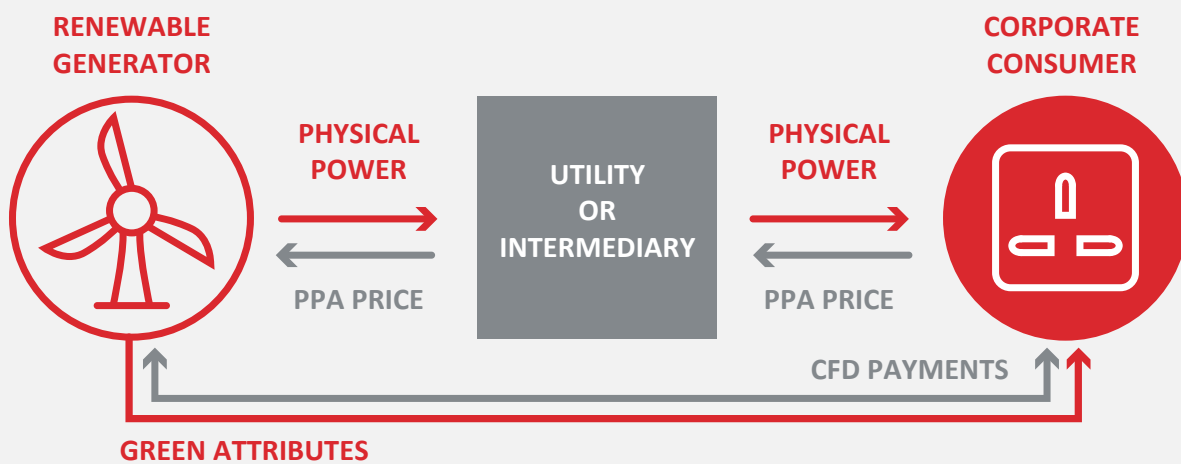
Source: Capital Dynamics



## B Synthetic PPAs

A synthetic PPA acts a form of contract for difference (“CfD”) between the generator and corporate consumer. Both generator and consumer enter into traditional offtake and supply contracts with the utility. However, under the separate financial contract, the two parties agree to a fixed strike price for the sale/purchase of power, with payment flows being determined by comparing that strike price against a market reference price. Where the market reference price is higher than the strike price, the generator pays the difference to the buyer. Where the market reference price is lower, the buyer pays the difference to the generator. They do not involve the physical delivery of output to the buyer or a utility agent of the buyer. This arrangement also ensures that any green rights associated with the power transfer to the consumer.

**FIGURE 8: SYNTHETIC PPA STRUCTURE DIAGRAM**



Source: Capital Dynamics

In the UK, the synthetic PPA structure is mainly adopted as it is regarded as more flexible and more efficient to scale up or down if multiple transactions are to take place with the same generator and offtaker.

## DELIVERING INVESTMENTS IN RENEWABLES PROJECTS BACKED BY CORPORATE PPAS

Structuring investments in renewables projects with corporate PPAs is highly complex. It typically requires a manager to piece together a number of separate components to form a commercial

structure that provides investors with the long-term fixed revenues that they seek. Each component is addressed in turn below:

Essential Component	Description	Complexity / Depth of Experience Required	Control Methods for Highest-Quality Renewable Energy Opportunities
Relationship with developers	Assets – from late-stage to operational – are mostly sold in discreet processes	High	Renewable energy sellers often limit access to pre-accredited buyers that have a track record executing transactions. With growing pressure to minimize transaction costs, sellers also increasingly focused on establishing bilateral relationships and running very limited processes to avoid transaction costs and streamline the sell-down of assets.
Ability to identify optimal projects	Projects need to be as lean as possible to deliver attractive investor returns against a competitive corporate PPA price. The project will need high production with low capital expenditure (“capex”) and operational expenditure (“opex”)	High	Efficient deal sourcing processes in the high-wind and high-solar locations is key. Deep relationships with the highest quality developers in the UK, Ireland, Germany and Nordic region for wind, and Spain, Italy and Portugal for solar are critical.  Experience in assessing the level and variability of resource is also key – high average wind speeds do not necessarily translate to a successful project if highly variable.
Relationship with purchasers of power	Investment grade corporate buyers of power are only willing to enter into long term PPA relationships with sophisticated and reputable owners of projects	High	Transacting with corporate PPA counterparties requires the project owners to have deep relationships with the relevant individuals within those entities.  Given the length of the agreement, corporates will want to ensure that they are partnering with reputable renewable asset owners with the right credentials for building and operating high quality dependable infrastructure.
Experience in negotiating PPAs	Negotiating the optimal commercial positions and risk allocation within the contracts are key	High	Deep expertise in negotiating and executing long-term power offtake agreements is fundamental.  For instance, the highest-quality PPAs are take-or-pay arrangements, meaning every generated unit of energy is acquired by the buyer, and do not penalize projects for basis risk or curtailment (beyond a reasonable cap).

Essential Component	Description	Complexity / Depth of Experience Required	Control Methods for Highest-Quality Renewable Energy Opportunities
Construction management capability	Projects need to be delivered on budget and to a strict construction program to meet corporate PPA deadlines.	High	<p>There are only a small number of high-quality engineering, procurement and construction (“EPC”) contractors available and willing to offer fixed-price, turnkey construction contracts with guaranteed completion dates that trigger liquidated damages if not met. However, the EPC contractors, procurement and change order(s) must be managed by specialized construction managers to ensure the highest-quality projects.</p> <p>Experienced investors rely on platforms with construction management capability to better manage execution and reduce third-party costs.</p>
Equipment and Technology	Price and quality of technology is key. Capex costs must be minimized to keep the investment efficient, but due care must be taken that only top-tier technology is utilized.	Medium	<p>Only experienced managers that have repeatedly transacted with the top tier technology suppliers can attain their most competitive pricing,</p> <p>Care must be exercised in the renewable technology selection process. Manufacturers should have a long track record and “new models” of existing product lines should not be accepted without heavily-negotiated additional protections and monetary damages from the manufacturers, usually with credit support posted.</p>
Operational	Projects need to minimize annual opex to maximize profit	Medium	In-house capability to operate renewables assets is critical to ensuring project outgoings are regularly benchmarked, scale benefits following aggregation are realized, and to ensure alignment of incentives between operators and owners.
Transaction Costs	Projects require significant legal structuring and efficient execution	Medium	<p>An investor will need to retain legal counsel for the acquisition of an asset and will need to pay lenders’ counsels. Inexperienced investors also often rely on advisors and pay extra fees to arrange debt.</p> <p>Inefficient execution can significantly impair the project’s return. Document negotiation also includes complex indemnity agreements that have material consequences throughout the life of each asset.</p>
Financing	The commercial terms and project economics need to be structured in a way that is attractive for long term debt finance	Medium	Interaction with lenders is critical to optimizing financing of any renewable project. Deep relationships with lenders and supporting them in understanding more complex PPA terms is critical to securing the most efficient capital structure.

## CONCLUSION

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Over the last fifteen years, long-term fixed-price subsidies for renewable energy infrastructure in Europe have attracted substantial volumes of low-cost capital to the sector. This has underpinned a period of tremendous growth and cost rationalization, bringing the industry to its current level of maturity. The recent trend of governments withdrawing subsidies from the sector is a signal of the industry's success; renewable power infrastructure in specific parts of Europe can now, under the right management, compete directly with conventional fossil-fueled technology in providing a country's new power generation capacity. The challenge to delivering this competitive infrastructure lies in attracting lower risk capital in a world without subsidies. This requires renewable energy managers to leverage the growing demand for renewable-sourced power, particularly from corporates, to structure attractive, long-term de-risked revenue streams for investors in renewables projects through structured PPA arrangements.

The full value of this asset class' risk-return profile is not easily accessible to all investors. The identification, optimization, construction, operation and financing of projects that deliver attractive risk-adjusted returns in the new world requires specialized knowledge across many aspects of power market operation. This includes financing, engineering, development and contracting, as well as deep industry relationships. It is imperative to partner with an experienced industry specialist who can address the risks that less experienced investors may face when identifying the highest-quality renewable projects, and understanding (and pricing) the nuances that make these assets most suitable for long term investors.

**"THE FULL VALUE OF THE RISK-RETURN PROFILE OF RENEWABLE ENERGY INFRASTRUCTURE INVESTMENTS IS NOT EASILY ACCESSIBLE TO ALL INVESTORS. THE IDENTIFICATION, OPTIMIZATION, CONSTRUCTION, OPERATION AND FINANCING OF PROJECTS THAT DELIVER ATTRACTIVE RISK-ADJUSTED RETURNS IN THE NEW WORLD REQUIRES SPECIALIZED KNOWLEDGE ACROSS MANY ASPECTS OF POWER MARKET OPERATION. IT IS IMPERATIVE TO PARTNER WITH AN EXPERIENCED INDUSTRY SPECIALIST."**

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Founded in 1999 and headquartered in Zug, Switzerland, Capital Dynamics employs approximately 150 professionals globally and maintains offices in New York, London, Tokyo, Hong Kong, San Francisco, Munich, Milan, Birmingham, Dubai and Seoul.

In 2019, Capital Dynamics was awarded the highest corporate rating (A+) from the UN-supported Principles for Responsible Investment, while the firm's clean energy infrastructure platform received top rankings from GRESB (the ESG benchmark for real assets) for commitment to sustainability.

<sup>1</sup>As of September 30, 2019

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