



**Construction-related risks
in investments in
renewables projects**

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This note discusses how a financial investor which has not yet acquired in-depth experience of the renewables sector can approach the issue of construction risk when making direct investments in renewable electricity generation businesses.

1. Context

The issue must first be set in context. A financial investor will often purchase equity shareholdings in a range of businesses whose costs and revenues depend on changing market circumstances and are not defined by reference to long term contracts. These businesses face a much greater range of risks than is encountered in renewable power generation projects. This is because, in renewable generation projects, long term power offtake contracts (which are normally an essential element in an investment decision) define the income the project will receive if it performs properly, and the liability for non-performance is usually limited to loss of a defined proportion of income. Also, because there is no fuel cost, the risks faced by the business primarily relate to the cost, availability and performance of its assets.

Unlike many businesses which would have a diverse portfolio of production assets, in a renewable power generation project, the risks involved in the construction and performance of key business assets are further limited by the engineering procurement and construction contracts under which the assets are purchased.

Thus, while it is correct to say that construction is a process which involves significant economic risks which need to be assessed carefully, the characteristic feature of renewable generation projects is that even though construction and asset performance are the largest risks that projects face, even these can to a very significant extent be limited by contract.

The key issue is therefore to identify, in any particular investment, the extent to which key risks have been limited contractually, by project design, by insurance or otherwise, so that the residual degree of risk borne by the project can be assessed in relation to the price paid. This enables the investor to decide whether to make its investment on the basis of that risk allocation or whether to try and negotiate better terms in the share purchase negotiations.

2. Construction risk, the timing of investments and the terms on which the investor becomes a shareholder

An obvious point, which is however very important for a financial investor, is that construction risk is at its greatest in the early phases of the life of the renewable generating company, namely in the development phase, when the project company is in negotiation with construction contractors, and in the construction phase, when the assets are actually being built. The easiest way for a financial investor to reduce its exposure to construction risk is therefore to buy an interest in the project after construction has been completed and the generating facilities have entered into commercial operations. At that stage the costs incurred and timing of asset completion are known and the performance of the assets has been checked by commissioning tests and, perhaps, by a further period of successful operation. However, when buying in at this stage, a financial investor will be expected to pay a development premium to the other shareholders who took the project through the development and construction phases.

The corollary of this is that the highest risk time to invest is at the very start of the development phase, when all details of the project are still to be determined – including site, permitting, equipment and construction and power purchase arrangements. However, the exposure at that stage is largely to development and opportunity costs as significant capital investment only occurs after financial close.

A financial investor can take an intermediate level of construction risk if it invests after the development phase, so that the site, design, construction agreement negotiations, power offtake negotiations and debt financing arrangements have been finalised and the only outstanding risk is whether the construction contractor(s) will perform in accordance with the contract.

Obviously, a financial investor who takes part in the development phase is not normally in a position to secure a better degree of equity protection than the other developers. However if the financial investor begins to participate at the end of the development phase or once the assets have been constructed, it is perfectly possible to negotiate additional protections on construction risk as part of the terms of the investment.

3. **The elements of construction risk and how they can be mitigated contractually**

Two issues are important here: whether there is a single overall engineering procurement and construction (“EPC”) contract or a package of separate engineering equipment supply and construction management contracts; and how each element of construction risk is addressed within whichever overall framework applies. This note considers each of these in turn.

4. **A single EPC contract or a package of different agreements?**

The classic approach in a power generation project with limited recourse project financing is to have a single fixed price “turnkey” EPC contract under which the construction contractor commits to deliver the specified power generation facilities for a set price within an agreed timescale. This gives a high degree of certainty to the project company and its shareholders about the different aspects of construction risk. More importantly it gives a single point of accountability and it transfers the “integration risk” from the project company and its shareholders to the EPC contractor. This means that the EPC contractor is responsible for making sure that everything necessary is done by itself and its subcontractors to make sure that the project is delivered at the agreed price, to specification and on the agreed timetable. Thus the project company and its shareholders are not caught in the middle between different contractors all of whom blame each other. This sort of single fixed price turnkey EPC contract can be obtained on most forms of power project, including most types of renewables projects. The exact extent of the protection given on each aspect of construction risk is however often negotiated and there have been periods when the classic form of fixed-price EPC contract has been difficult to obtain because of market conditions.

There are however a number of energy and infrastructure projects where the nature of the asset makes it difficult to obtain a single turnkey EPC contract. This is normally driven by size or the need for specialist contractors or equipment. In the renewables sector, it has been challenging for offshore renewable projects to obtain turnkey EPC contracts, because of the particular difficulties of building wind farms at sea and the need for specialist ships and equipment, which are often in short supply and are owned by businesses that do not wish to take responsibility for the work of other contractors. So it may not necessarily be possible to get a single overall construction contract for an offshore wind project.

Another factor that affects the availability of this sort of contract is the simple size of the project. We have encountered very large onshore wind projects in Europe where there have been separate packages construction works, simply for reasons of size.

It is therefore not uncommon to encounter situations where different contractors are responsible for laying the cables that will connect the different windfarms, building the necessary substations and interconnection assets, constructing platforms on which wind turbines will be erected, supplying the actual turbines themselves and, at times, for managing the construction process as a whole.

Because renewable power generation projects consist of multiple smaller scale wind turbines or sets of solar panels, each of which is capable of producing electricity independently of the others, it is much easier to have a disaggregated set of construction contracts than it would be for a conventional thermal power generation plant. If some of the solar panels or wind turbines do not get built properly or on time, but the others are constructed and connected to the transmission grid, it would not be fatal to the overall viability of the project in the same way as a defect in a large thermal generating set would. This is why multiple construction contracts can be acceptable to lenders and equity investors, provided the exact nature of the arrangements has been due diligence and is well understood.

5. Different elements of construction risk and how to mitigate them

As mentioned above, construction risk consists of a number of different but related elements and these need to be considered individually so that an overall picture of the degree of risk which is accepted can be composed.

The important characteristic of renewable power projects is actually that, with the exception of integration risk on some wind projects, the other risks are often accepted by contractors to a greater degree than would be the case for thermal power generation projects, where the assets are more complicated and less predictable.

6. Price risk:

This is the classic risk which a fixed price EPC contractor will normally accept. Doing so is a great benefit to investors and lenders who seek price certainty and it therefore normally commands a price premium. However protection against price increases is not unlimited. For example, the fixed price will be conditional on a stated specification, size and timescale for the renewable installation to be constructed; and if these change at the request of the project company or due to certain factors beyond the contractor's control (for example a change in law or unexpected planning consent conditions) additional costs will be incurred.

7. Timetable risk:

In a classic fixed-price EPC contract the contractor will take the risk that the power station is not delivered and commissioned on time. As explained above, this is a great benefit but, of course, protection is not complete.

First of all, certain causes of delay will routinely be excluded - for example delays caused by the project company's fault, force majeure, inability to get consents on time et cetera. Others may be specifically negotiated.

Secondly, the contractual sanction for delay is generally liquidated damages at a set rate per MW of generating capacity and per day; and these damages will also be subject to an overall cap related to overall contract value. The first call on these liquidated damages will be to pay lenders the increased interest during construction that arises as a result of the delay. Under some power purchase agreements, the power offtake will negotiate penalties for delay in the start of commercial operations, and these will be funded out of any remaining amount of liquidated damages for delay.

Thus, while the availability of liquidated damages for delay protects the project company, and therefore its investors, against some of the costs that result from the delay, it is unlikely that equity investors will receive much if any additional financial benefit from these liquidated damages, so the presence of these sanctions does not result in shareholders escaping from delay risk.

In a renewables project, there are additional ways to mitigate the risk of delay, because the project consists of many different generating turbines or solar panels. If some of them are delivered late, the others can normally operate perfectly satisfactorily and the late ones can be added on with relatively little disturbance when they are ready. This means that many forms of construction delay only result in a reduced level of income, rather than in preventing the whole generating facility from operating at all, as is usually the case in a thermal power station.

Obviously, this does not apply to all assets. For example an offshore wind farm may be completely unable to operate if the key undersea cables which connect offshore wind turbines to the offshore distribution network and then to the main National Grid are not delivered in time. Even here, delays to outlying parts of the network will not prevent the rest of it from functioning. Similarly the substations needed to convert voltage for use on the grid will be crucial, but these are relatively straightforward construction projects when compared with directing offshore wind turbines. Delays

in completing the final phase of a renewable power generation project can also often be accommodated relatively easily in the project plan if, as often happens, the power project has been designed to have a significantly larger generating capacity than the committed power offtake agreements require. In that case, all the project loses is additional revenue from short-term or spot sales, but the failure to commission some of the turbines on time does not jeopardise the stability of all the projected income stream from the main power purchase agreements which underpin the company's project financing.

8. **Asset performance risk:**

The other major element of construction risk is whether the power generation facilities which are being built will match the agreed specification and whether they will perform with the expected levels of availability and reliability. This is obviously a very important point for investors because it determines the ability of the project company to earn the revenue necessary to repay construction and operational costs, debt service and other costs and taxes and to generate a return on equity.

The important thing for a financial investor to bear in mind is that, while construction contracts provide very significant incentives to the construction and operation contractors to make sure the assets perform properly, they do not give full protection on an unlimited ongoing basis. Thus the investor still takes the ultimate long-term risk that the project will not earn the expected revenue if its assets do not perform as required.

In deciding whether to invest in a particular renewable generation project, financial investors will therefore assess whether the construction contractor and the associated contractual arrangements taken together give a substantial degree of comfort that the assets are likely to work in the way that is projected.

This overall assessment is supported by checking various key elements as explained below.

9. **Identity of construction contractor and long-term interest in the project.**

It is normal for limited recourse project finance lenders and indeed equity investors to choose an experienced construction contractor with a strong track record as the contracting counterparty. This in itself provides practical reassurance that the contractor will be committed to delivering a successful project even if the contractual protection is not comprehensive in all circumstances.

In addition, it has for many years been necessary for construction contractors to commit equity capital to the projects where they are retained. The project company, its lenders and investors require this because they want to know that the construction contractor is incentivised to deliver a successful project and that if it fails to do so it will lose its equity capital in addition to making a loss on the construction contract.

These are therefore fundamental aspects in assessing construction risk during the period before the renewable generating facilities have actually been commissioned.

Sometimes projects do not present all of these desirable characteristics.

For example, the success of Chinese contractors in winning contracts with attractive pricing and pre-packaged Chinese debt finance means that some projects are being developed by contractors who may not necessarily have the same track record of reliability.

Even when a major contractor with that track record is involved, a point which can cause concern is the increasing desire of some of the best-known construction contractors to sell on some or all of their equity in projects as soon as possible after construction has been completed. Construction contractors seek to justify this on the basis that the project can rely on the construction contracts, ongoing operation and maintenance and long-term service agreements. Investors will normally look for some at least some partial limits on the ability of the construction contractor to sell its equity.

Construction contracts will contain a range of familiar mechanisms which protect the project and penalise the contractor if the generating assets do not correspond to specification, fail to pass completion tests, or develop defects within a period of defects liability after the generating facilities pass the commissioning tests and have entered into commercial service. Typically these contractual sanctions include the obligation on the contractor to rectify defects, to re-perform commissioning tests if the facility does not pass, to pay liquidated damages for shortfalls in capacity and, in extreme cases, the ability to reject the facilities completely and require their removal.

These protections are further enhanced by the availability in many cases of long-term warranties or long-term availability guarantees from contractors, often in association with a long-term service agreement where the contractor performs many of the functions which would otherwise fall to an operation and maintenance contractor. While these are also known in thermal power projects, they are a particular feature of renewable power projects. This is due to the relatively simpler technology, the ease with which individual problem turbines can be replaced and the relatively simpler nature of the operational input required on renewable assets, when compared with thermal generation plant. The exact degree of protection given and the associated cost depend very closely on the arrangements which are negotiated on the project concerned. Careful due diligence is therefore required on this.

10. **Conclusion**

In conclusion, therefore, it is important for a financial investor to bear in mind that, while a great deal of discussion on renewables projects focuses on construction risk and ways of limiting it, the reality is that, compared with many other classes of investment in businesses which build and own physical production plant, renewable generation projects face lower construction and commercial risks. Indeed, on the key risk of asset performance, renewable projects often contain better contractual protections than even thermal generation projects do. The important thing is to check exactly what degree of protection exists and then to factor that into the overall economic assessment of the attractiveness of the investment.



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