



## White Paper 2023-04

### Specifics of Large Renewable Energy Projects

*Large renewable projects and in particular, offshore wind and hydropower projects are becoming more prevalent. They have some specifics that owners and contractors should be aware of. These specifics are due to the specific type of energy source (low density, wide area), and also on the financing requirements as many of those projects are financed using institutional or non-recourse financing. In this White Paper we detail some specifics of those projects.*

While large renewable projects must be dealt with like other major industrial projects, including a carefully managed development phase, specific aspects need to be considered from the outset. This White Paper is based on recent PVD experience in advising owners and contractors for such projects.

#### Key development success factors

Some key aspects require careful consideration and need to be accounted for from the start of project development:

- Accurate energy resource estimating (wind, water, weather) is essential for assessing the economic potential of the location. It must be based on actual measurements taken on-site and must also consider potential changes and sensitivities, e.g. to climate change, during the operation of the facility. This is a key competitive advantage for owners that have developed advanced knowledge of resource estimating,
- Obtaining regulatory authorisations and local acceptance is very often on the critical path of project development, and therefore requires a very comprehensive stakeholder management capability including the early setup of a local office from the outset, irrespective where the main office is located,
- Power sales contracts are essential economic parameters, and they may create substantial constraints on construction completion (such as drop-down dates, delays potentially invalidating the contract). They thus need to be carefully negotiated,
- Interface with the grid operator is a key enabler, as the facility will likely produce a high-power capacity that will need to be connected to the grid. This includes technical as well as schedule aspects,
- Projects generally cover a very large acreage (including a lake and catchment area for dams), which will lead to high geotechnical investigation costs. It is important not to skimp on these, many renewable projects have had disappointments and substantial excess costs and delays due to this factor. Soil investigations must be carried out at the exact spot where major facilities will be installed, only a few meters difference can give substantially different soil samples,

**As large renewable projects become more widespread, it is useful to remember that such projects have some important specific aspects. A lot derive from the fact that such projects are very capital intensive, and their overall much larger acreage spread**

- Long term agreements with key equipment suppliers may be needed to avoid the current industry bottlenecks due to the significant increase of this type of projects,
- A current trend is to combine various renewable secondary power production from primary sources to increase profitability: offshore wind energy coupled with hydrogen production or batteries for energy storage, hydraulic operation both ways to use excess power at night, etc. This tends to improve the business plan at the expense of additional complication and capex. A proper compromise between economics and complexity must be found.

#### Key execution technical success factors

- Renewable sources generally require a much larger share of capital input compared to hydrocarbon energy sources as part of the overall economics (and operating costs are proportionally a smaller share). As a result, the quantities of material involved in construction are proportionally much higher per unit of power. This is valid for offshore wind foundations as well as for hydraulic dams. This leads to potential local capacity issues, logistics challenges, and higher sensitivity to the cost of raw material and actual project performance,
- For offshore wind projects as well as solar projects, series effect on foundations and equipment is an essential project performance driver. Leveraging this series effect is an essential Capex driver / possibly a major risk,
- There are currently no contractors offering a full EPC turn-key package (with the possible exception of integrated Chinese dam building contractors): owners need to compose with several specialised contractors and manage interface risks (including in terms of schedule), which leads to the mobilisation of substantial owner teams with suitable experience,
- The trend being towards larger infrastructure to benefit from scale effect, the construction equipment is often at its limit and may be rare to source (case of offshore construction vessels for wind farms),

- Contractors may not be fully competent in building this type of infrastructure (local civil works contractors, offshore installation contractors with oil & gas experience), and the current increase in activity leads to new contractors entering the market with limited experience, resulting in higher project execution risks.

## Financing aspects

More renewable projects are being financed by non-recourse financing or institutional financing (world bank, development banks...) than oil & gas or nuclear. One benefit is to increase the return on equity (through the debt leverage), however, financial bodies will require substantial guarantees for the loans.

This situation leads to some consequences in the way the projects are structured, decisions are made, and risks are being transferred in the supply-chain:

- Project entity organisation and governance typically tend to be more complex and decisions need to involve lenders, which creates substantial delays when activities are committed outside the original budget,
- Project definition phases can be lengthened by the need to secure financing, develop stronger Corporate Social Responsibility (CSR) actions and cases,
- Financial bodies tend to impose lump sum contracts to contractors and the transfer of all execution risks including risks that the contractor may not be the best placed to handle (e.g. soil risk). This may not be

the best contractual strategy depending on the situation and may create unwanted situations further down the line.

For some owners, there may be a competitive advantage in being able to finance such projects through corporate financing. This may allow for quicker and more effective decision-making, and more flexible contractual arrangements with contractors.

**Financing has a major influence on project organisation, governance, contractual strategy and risk transfer between contributors**

## Summary

As large renewable projects become more widespread, it is useful to remember that such projects have some important specific aspects. A lot derive from the fact that such projects are very capital intensive, in terms of share of Capex in the overall

economics. Also, due to the low density of the energy source, they tend to spread over a much wider acreage. The current scale of such projects and their sheer number creates bottlenecks in the supply-chain that need to be considered early. Also, series effect, while creating potentially significant savings, can also be a major risk if not properly addressed. Finally, financing arrangements have also to be considered carefully to keep a proper decision-making and governance framework.

All of these aspects need to be understood and require prudence for owners that are involved in other energy sources and would like to develop large renewables projects. Contractors must also understand those factors to keep their risk profile under control.

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