Modern Energy Management

RISK MITIGATION STRATEGIES BRIEFING

INTRODUCTION

WELCOME

With fewer mature market projects coming through and filling out investor pipelines, investor interest in the emerging markets has never been stronger. But, to secure the higher returns available in these markets, investors need to master risk management.

It is a truism that every renewable energy project in emerging markets has a unique risk profile. Understanding the risk profile of each development is the central tenet of MEM's core offering – and our focus in this briefing.

CURRENT RISK PRACTICES AND FUTURE TRENDS

An emerging trend among our client base of investors and developers building projects in emerging markets is a continued search for the best risk mitigation strategies.

Across gigawatts of project work in the emerging markets, MEM has seen investors discover mature market project management approaches may not work in frontier markets which lack experience, specialized transport and installation equipment and that present unique cultural and language barriers to effective project planning.

Historically, investors have looked to transfer risks to an appropriate party, often the EPC contractor. However, in the emerging markets whilst the EPC firm may have some track record in clean energy projects, it's highly likely that the actual construction team for the investor's specific emerging market project will not.

As a result, while construction risk may be transferred, that risk is still there, and it may not be properly managed. The impact of construction delays and the resulting financial implications of (in many cases) exceeding contract liquidated damages and liability caps may still have a significant influence on investor equity returns.

WHO SHOULD BE IDENTIFYING RISK AND PLANNING MITIGATION?

In the course of this briefing, we will highlight some of MEM's risk mitigation approaches for emerging markets, demonstrating how they may be used most effectively, and the key outcomes that can be expected.

At MEM our value proposition is to understand the investor business case for financial returns. And our significant experience across the project lifecycle enables us to identify the corresponding →

project levers that may be adjusted to enhance those returns above and beyond the investor's base case.

In the course of renewable energy development, risk mitigation planning has traditionally been handled by a variety of parties, including the owner, various external consultants (i.e. owners' engineer, legal advisor, financial advisor) or an EPC contractor. This has led to "silos" in project and risk mitigation planning; the gaps between these silos leading to rework, cost overruns and project delays.

In emerging markets this fragmented approach to risk mitigation is more problematic as the markets are by definition new. Regulatory frameworks may be incomplete, the legal environment contradictory or opaque, and local stakeholders may lack the experience to understand the project risks or the significance of the risk mitigation plan.

In MEM's experience, for instance, the focus of emerging market risk mitigation for renewable energy developers has often centered on project construction and operations. But investor returns are made and optimized during project development.

The strength of the risk mitigation plan establishes certainty in achieving investor returns.

Looking at value engineering, direct contracting, and the effective management of PPAs, we will outline how investors can avoid project delays, cost overruns, and impaired performance – the fundamental risks to any emerging market clean energy project.

By focusing on these key topics we hope that you find this briefing of value to your future project needs.

I would encourage you to provide any thoughts or comments on this briefing by contacting me at:
aaron@modernenergy.co.th

Best regards,

Aaron Daniels, Managing Director
Modern Energy Management

VALUE BUILDING VS 'VALUE ENGINEERING'

As renewable energy investor margins grow thinner, reducing project cost through 'value engineering' has become a recurring theme. But it's notable that, particularly within civil construction, this term has been abused and often now means little more than a focus on cost cutting. To experienced investors, there are a number of pitfalls with this approach, which jeopardizes business case certainty. Value engineering (i.e. cost cutting) without understanding of the full project lifecycle or the unique risk profile of the project can frequently lead to more risk to investors.

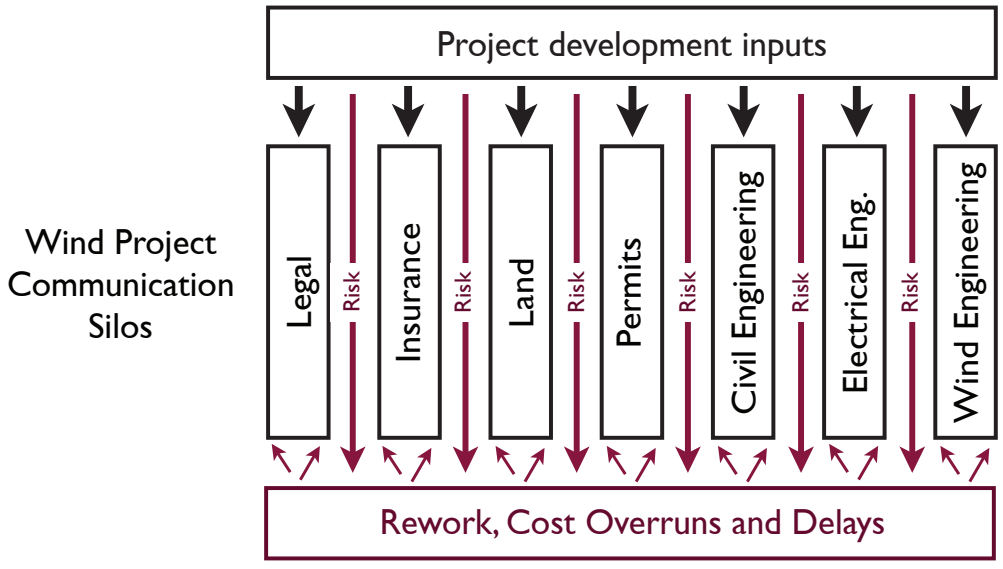
More widely, whilst several technical advisories have used 'value engineering' to create a commercial niche – each offering ways to manage down project costs – few have taken a 'value building' approach to developing in emerging markets.

Indeed, consultants often view their own project scope in silos, not always looking at the wider project picture, or understanding where their work may impact in other areas. This tends to add to the value of the consultant in terms of scope creep and variation orders, but not necessarily to the project.

WHAT IS VALUE ENGINEERING?

Value engineering typically seeks to examine project fundamentals with a view to achieving the same ends at lower costs. →

FIGURE 1: SILOS INCREASE SCOPE GAP RISK



When adopted as a standalone approach by advisory consultants focused on reducing capital expenditure and working in isolation from other project elements, it can create scope gaps and potential quality issues that will lead to increased project risks.

Narrow focus on reducing cost without understanding of the project lifecycle or the project risk profile can undermine the success of the project. To give two examples:

- Reducing scope of civil works (earth works) including drainage and erosion control can create significant delays during construction and installation.
- Planning the construction schedule so that installation occurs outside the high wind season, and/or including sufficient float in the crane schedule to accommodate potential wind delays both make project CAPEX more accurate and predictable.

Taken individually, or compounded, these issues frequently threaten project success for investors.

Undertaking value engineering in a bid to reduce early capital expenditure may increase the level of risk in elements critical to the quality of the project long-term. This can lead to increased cost during construction and later in the project lifecycle once the project is operational and generating power. The need to rectify issues as a result of value engineering will increase operational expenditure, and may result in significant turbine maintenance and downtime and an accompanying loss of revenue.

Inappropriately applying a value engineering methodology, therefore, can result in more significant project risks later in the development timeline.

WHAT IS VALUE BUILDING?

Value building, by contrast, is a consolidated approach to project development that requires consultants with experience throughout the project lifecycle. It takes a holistic approach in seeing the entire picture of the project, from development and construction through operations – and →

spanning from technical, legal and insurance to formulate a seamless and robust risk management approach. In doing so, it aims to develop a comprehensive understanding of how each of these factors impacts a project's financial model, and eliminate the project silos that result from a focus on cost cutting alone.

What this means in real terms is that a proper, experienced risk management team can add significant value to investors as they have access to multiple levers that yield financial returns to investors.

- For example, in late stage development, MEM successfully negotiated a shortened construction schedule (by optimizing the construction plan) and modified payments to be more back loaded. This had the effect of reducing the construction timeline, reducing overall cost (contractor cost and interest during construction). This, in combination with changing project cash flows had a significant impact to investor EIRR (Figure 2). →

FIGURE 2: BUILDING VALUE THROUGH RISK MANAGEMENT

Finance KPI	Base	Improvement	Change
Construction	USD 142.46M	USD 138.66M	USD -3.8M
IDC	USD 3.8M	USD 2.56M	USD -1.24M
Total CAPEX	USD 146.26M	USD 141.22M	USD -5.04M
IRR	15.73%	17.12%	**1.39%**

Example

60MW wind farm - PM team in contracting phase to optimize project plan, commercial contracting and payment milestones.

Success criteria

Integrated team brought levered IRR above the investor's 16% requirement.

Drivers

Optimized crane sequencing to reduce overall construction timeline. Negotiate EPC payment cash flows from front end to back end loading.

- Another common approach to value building lies in reducing civil works. WTG suppliers typically call for significant overbuild in their "standard specifications". MEM has achieved balance of plant civil cost reductions of up to 30% by sizing roads and crane hardstands for the crane to be used, rather than that indicated by the OEMs standard specifications. Of course, this requires integration of construction planning and contracting to ensure the planned road design is accepted as fit for purpose. But a 30% reduction in civil costs can result in a total EPC cost reduction of up to 10%.

What value building does require, however, is an integrated approach by a risk management team to deliver the right result, so that value building can yield significantly more value to investors over the lifetime of the wind farm.

MEM has pioneered this approach through its Investment Grade Verification (IGV) methodology, which seeks to move away from the budget cutting associated with value engineering gone wrong and move towards creating bigger, more meaningful positive impacts on projects, through a full project risk analysis (Figure 3).

BALANCING COST AND RISK

For emerging markets, like most of those in Asia, where many contractors lack experience of constructing wind farms, the "silo-approach" of value engineering through simple cost cutting will likely lead to increased risk. Whilst offering initial cost reduction, this will place investors at longer term risk of cost overruns and project delay.

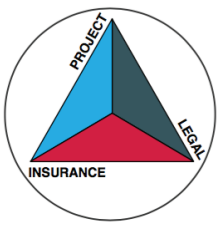
Ultimately, building value in a project to deliver better returns for investors requires the owners' representative to take a view across the lifecycle of the project in determining the benefits of cost savings. An experienced owners' representative will not accept cost cutting measures that offer savings in the short-term, if the end result is to add expense to the project, due to subsequent delays, or liabilities from additional risk. →

FIGURE 3: RISK RESPONSE STRATEGIES

Project Risk Analysis process

1. Identify risks
2. Qualitative risk analysis
3. Quantitative risk analysis
4. Plan risk response
5. Control risks

Risk response strategies	Risk strategy owner	Implementation method
1. Avoid	Project Manager	Project plan Operations plan Commercial strategy
2. Transfer	Project Manager Attorney Insurance	Commercial agreements Insurance cover
3. Mitigate	Project Manager	Project plan Operations plan
4. Accept	Project Manager	Project plan Contingency



OPPORTUNITIES IN DIRECT CONTRACTING

Country risk coupled with emerging market project risks lead to high cost of capital, making reasonable investor returns very challenging in some markets. Of course, having an EPC contractor with a balance sheet sufficiently large to guarantee project performance is ideal, but in some markets the cost of an EPC may prevent sufficient investor returns. While direct contracting must match the investor risk appetite, this strategy (compared with using an EPC contractor) can reduce CAPEX by 10% to 15%.

Many investors assume lenders have a hard requirement for an EPC contractor. Of course, choosing between direct contract and an EPC should be considered in the context of the larger project finance strategy. However, banks can be persuaded to provide funding on direct contract projects if they can clearly see that risk is understood and being mitigated by a team with experience, and that risks not transferred are covered in project contingency. MEM has extensive experience in securing non-recourse project finance – without any guarantees from sponsors – on direct contracts for emerging market projects.

ADDING VALUE, NOT CUTTING COST

In order to secure project finance in the emerging markets, there are a number of key project ingredients that lenders will want to see.

- The project team should be experienced and demonstrate a track record of success on other relevant projects and in comparable markets.
- Project risks should be qualified and quantified, and contemplated in contingency.
- Transferable project risks should be managed accordingly. Even without an EPC it is possible to transfer some risks commercially and through appropriate insurance.

Direct contracting can be an attractive strategy in emerging markets, where the high cost of capital, combined with low financial support for renewable energy, add complexity to developing renewable energy projects. With the help of an experienced project team, investors can effectively oversee all the different elements of a project, to deliver the targeted investor returns, despite these challenges. →

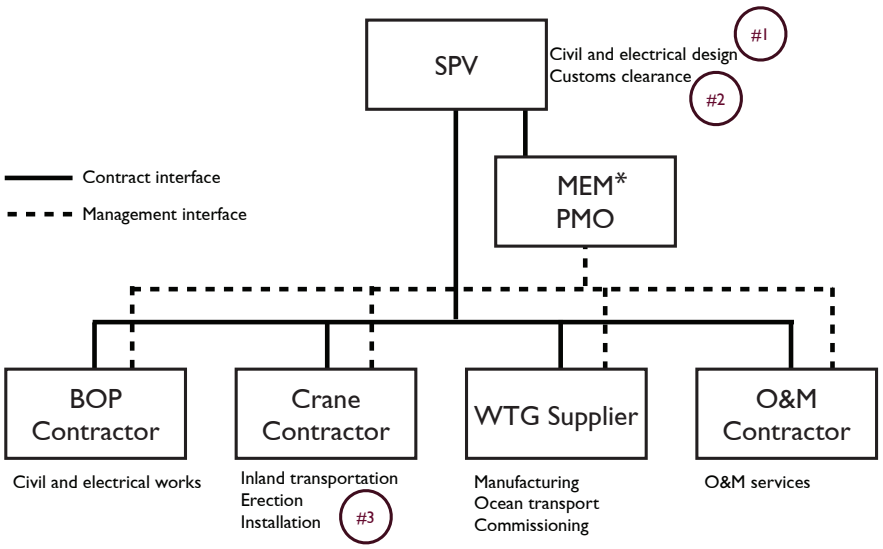
TRANSFERRING RISK IN DIRECT CONTRACTING

Historically, direct contracting has been seen as potentially giving rise to contracting gaps, but this isn't always the case. Properly structured, a contracting strategy that allows for "risk bundling" is typically able to capture most of the interface risk that results in cost overruns.

Consider that wind projects are notoriously unpredictable, with delays and cost overruns. However, most of investor's negative experience with wind projects have common themes:

- Delays in customs clearance delay inland transport of equipment to site.
- Delay or quality issues in construction of civil works result in delays to transport equipment and crane operations, presenting cost overruns.
- Delays to WTG commissioning due to delays in substation construction or grid interconnect. →

FIGURE 4: POOR CONTRACTING STRUCTURE INCREASES RISK TO INVESTOR



Point #1:
Direct engagement of design engineers presents a warranty pass through risk in case of defect. If defects in civil or electrical works appear, it may be difficult to sort out whether they are design or construction defects.

Point #2:
With the exception of duty exemption documents, customs documentation will beprepared by the WTG supplier. If there is an error in the documentation, the investor isexposed to **1)** detention charges at the portand **2)** transport equipment delays from the inland transport contractor and **3)** potential crane delay charges from the crane contractor.

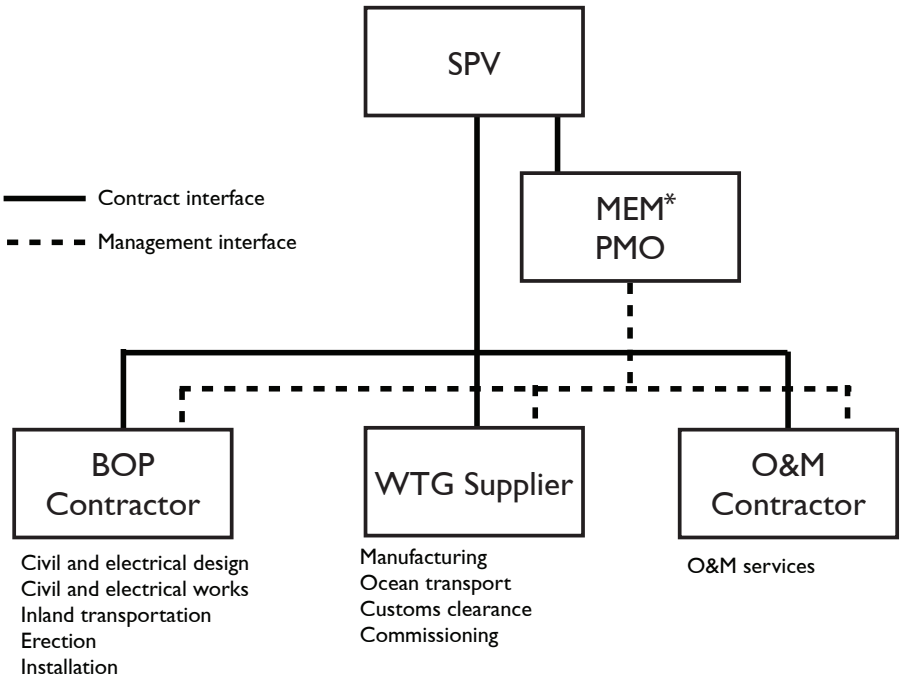
Point #3:
The common and most significant cause of cost overruns on wind projects, is impact on plant transport and installation of delays (and/or quality issues) in civil works. By separately contracting inland transport/crane and balance of plant, investors are fully exposed to the interface risks between the two scopes of work.

With an understanding of investor risk exposure an experienced risk management team can take a more informed approach to contract strategy, in order to reduce project costs, while still transferring risk. For instance, bundling crane, inland transport and balance of plant contracts together under one capable local BOP contractor eliminates the interface risk between them.

ENSURING A BROAD PROJECT OVERVIEW

Creating value through direct contracting is a valid strategy for investors with a higher risk appetite in a market with tight returns, and, with the right combination of team experience, track record and contingency, increasingly bankable. EPC contracting is certainly less risky to investors, but with a well planned commercial strategy, investors can still transfer significant risks in direct contracting while saving the typical EPC premium of 10% - 15% of CAPEX. →

FIGURE 5: OPTIMIZED CONTRACT STRUCTURE REDUCES INVESTOR RISK



EMERGING MARKET PPAs

In the emerging markets, MEM has noted that, typically, developers tend to miss critical opportunities and risks when negotiating PPAs. In many of the markets we operate in, offtakers have little experience with renewable energy. Developers may seek support from legal counsel in drafting PPAs, but both developers and legal counsel also typically lack experience with renewable energy. In our observation, the result has been PPAs that may lack opportunities to optimize revenue and may even present additional, hidden risk to investors.

THE BENEFITS OF A STRONG LEGAL TEAM

Offtakers in emerging markets typically have more experience working with conventional power than with wind power. As such their experience will typically encompass power plants that have a single commercial operating date (COD), rather than the distributed nature of a wind farm, which can reasonably have as many CODs as it has turbines. This lack of experience can have serious consequences for developer cash flow, if the PPA is negotiated on the basis of a single COD.

Failure by an inexperienced legal team to understand that each turbine can be treated as its own power plant could mean commissioned turbines are left idle for several weeks, up until the last turbine is commissioned and connected to the grid. Treating each turbine as a separate power plant, with its own commercial operation date, offers investors the opportunity to generate cash flow earlier in the project, cash flow that could be used to help fund construction of the remaining turbines.

The investor should attempt to negotiate a PPA that reflects the fact that as each turbine is commissioned, the power generated by →

that turbine could be sold as part of a purchase agreement which would support the investor's cash flow during construction of the remainder of the plant.

This is especially helpful in case of quality issues that may prevent a single WTG from being commissioned. Too often MEM has seen wind farm COD delayed due to delays related to a single WTG, and sometimes this results in liquidated damages being charged by the offtaker.

THE IMPORTANCE OF GRID QUALITY

The grid study will indicate if, how and where a project can connect to the grid. The focus of the grid study is almost always how the plant will impact the grid.

In emerging markets, the reality is the grid is often unstable, and non-firm power from renewable energy projects can exacerbate this instability. Grid instability (i.e. grid drops and outages) can have an adverse affect on wind turbines. Most wind turbine OEMs will specify the grid requirements. Contractually, grid is considered an owner risk, and failure to maintain the grid within the WTG specifications may lead to warranty exclusions and additional O&M fees.

To overcome these challenges, investors should ensure they highlight their technical requirements to the offtaker in the PPA. Offtakers may be receptive to making system adjustments to accommodate plant operating requirements, provided they have had the opportunity to discuss these needs with the developer. In a worst case scenario, if system upgrades are necessary, they will be identified in time to be incorporated into the scope of plant construction.

Negotiating this part of a PPA not only requires knowledge of the technical requirements of the turbine plant, but also an understanding of the local market, and the offtaker's needs.

As turbine OEMs often specify grid requirements in their warranties, and, should grid performance fall outside of these specifications, this may jeopardize equipment warranties and O&M costing from the OEM. Discussing OEM grid requirements with the offtaker will help minimize warranty pass through issues between the grid (owner risk) and the O&M agreement. →

HOLISTIC RISK MITIGATION STRATEGIES

To successfully deliver improved returns to investors, developers need to make a series of well-informed, sound decisions about which projects to develop, and how to build and manage them. In Pakistan, MEM is working to deliver the Hawa Wind Project in the Sindh Valley on behalf of JCM Power, from pre-screening and initial due diligence, through construction support, to operational asset management. This holistic project approach ensures continuity of strategy and execution at all stages of the project, eliminating the potential for silos to arise and delivering strong project leadership.

With the original briefing and goals of the client in mind, and framed in terms of the rate of return, MEM undertakes pre-screening of project opportunities in emerging markets that offer the potential to meet those goals. Whilst rates of return need to be borne in mind, a full consideration of a project should look at how value can be added, risks managed, and what this does for the internal rates of return to investors. In selecting the Hawa project for JCM Power, MEM's due diligence included:

- Site resource assessments to assess the viability of each individual site and the suitability of wind turbine technology options.
- Comparison of local approaches to financial support for wind energy investment.
- Understanding local legal and administrative risks to wind farm construction, e.g. the number of permits required, and the time taken to secure them.

An assessment of each project under consideration based on a comprehensive understanding of these risks supported the decision to invest in Hawa, helped JCM Power secure financing for the project, and laid the foundations for future strategic decisions relating to the project's financing, construction and operations.

A key element in attracting JCM Power to the Hawa project was recognising that the right approach to construction project management could reduce construction timelines, lower costs, and bring forward revenue generation. This opportunity to add value, combined with a regulatory environment geared towards encouraging foreign investment, was a significant influence in the choice of the Hawa project.

MEM has worked with JCM Power to model commercial and technical risks following financial close, and will continue to work with the developer and its investors through construction and operations, to execute the strategy identified for optimising returns from the very outset of the project.

ABOUT US

Modern Energy Management (MEM) delivers project lifecycle certainty to renewable energy financiers, developers, operators and investors working in rapidly expanding emerging markets.

The firm's team of project managers, consultants and engineers enable financiers and investors to successfully develop, construct and deliver complex, profitable projects in remote, rapidly expanding international markets.

MEM established its corporate offices in Thailand in 2013, and has since registered in Singapore to accommodate its growing international project pipeline. MEM is currently managing wind, solar and a number of other renewable energy initiatives in the developing markets of South East and Central Asia, Latin America and Africa.

For more information, please visit:

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