

RISK QUANTIFICATION AND RISK MANAGEMENT IN RENEWABLE ENERGY PROJECTS

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OVERVIEW

Renewable energy is one of the key solutions to deliver low carbon and secure supplies of energy. Years of research and development have brought a number of renewable energy technologies to a stage where they are technologically mature and ready for a more widespread market introduction. However, there is still a gap between renewable energy (RES) promoters and financing organizations. A key challenge in obtaining financing at a reasonable cost is the ability to quantify and manage the different elements of risks (organizational, political, technical, commercial,..) associated with RES projects [1].

The aim of this paper is to describe the results of the ongoing project “Risk Quantification and Risk Management in Renewable Energy Projects” commissioned by the International Energy Agency and conducted by Altran Germany, Italy, Spain, Netherlands and Arthur D.Little UK.

The paper will provide:

- specific guidelines in classification, assessment and management of different risk elements associated with RES project valuation;
- a clear benchmark methodology for quantification and an equally comprehensive approach to incorporate the quantified risks into the financial calculations in RES project valuation;
- reproducible and transparent techniques to assess the risk/return profiles of RES investments.

METHODS

The study is based on three main steps:

1. *Definition and assessment of major risk elements and risk management in energy projects.* Major investments in conventional energy are almost always addressed through a standardized risk management approach. This can follow different steps, according to several acknowledged standards (PMBOK, M_o_R, AS/NZ 43/60). We draw on our large experience in conventional energy project to describe a comprehensive analysis of current methodologies to identify, evaluate and manage risks. Then we share a set of recommendations to transfer risk management approaches from conventional to RES projects.
2. *Definition and assessment of all major risk elements and risk management in RES projects.* We elaborate and clarify the risk categories for RES projects. We focus on those risk elements that are specific to RES projects through the results coming from two workshops (in Spain for photovoltaic and Germany for offshore wind) organized with important players of the RES sectors.
3. *Definition of the potential of, and methodologies for quantification and management of different risk elements in RES project valuation.* We categorize in discrete areas the risks identified in the previous task and then we assess each risk in order to analyze its potential to be mitigated or transferred, or whether it should be retained. Second we incorporate the risks into the project valuation through the following activities:

- Assigning probability and impact through an iterative process, involving benchmarking of RES projects and interviews with industry key players (e.g. lenders).
- Quantifying the potential for mitigation and defining suitable mitigation strategies. This includes quantification of the impact of mitigation and residual risks. This step involves expert interviews, and case studies taken from related energy sectors where necessary. [2]
- To perform financial modelling analysis: we take the full list of applicable risks, and assess their potential effect on revenues, capital expenditures (CAPEX) and operational expenditures (OPEX). Their impact on the cash flow and financial viability of the project is studied through probabilistic analysis and scenario analysis. [3]

RESULTS

Results are preliminary as the project will be completed in July 2010.

1. We will develop a benchmark methodology for risk quantification and assessment for RES projects. We will describe the potential to transfer knowledge from risk quantification and management from conventional energy technologies.
2. We will present a comprehensive approach to incorporate quantified risk analysis into the financial calculations of RES projects. We will show how those risks influence the different cash flow elements.
3. Finally, risk mitigation strategies will be put together and will elaborate possible activities like risk acceptance, avoidance, reduction or transference.

CONCLUSIONS

This paper will help close the gap between RES project promoters and financing organizations. It will also assist policy makers support investment in RES projects. In particular:

- Policy makers involved in policy instrument design or project evaluations can have a better understanding of project risks. This will both improve the design of policy instruments and financial evaluation of proposed projects.
- Financing organizations willing to invest in RES will be able to identify and improve financing solutions when project risks are better identified and treated. The confidence of financing organizations can be increased by an adequate risk management approach.
- Project developers with limited experience in risk assessment and mitigation will be able to build their capability to assess project risks and develop mitigation strategies. The success rate of project development and financing by this group can be improved with help from the guidelines prepared in this project.

REFERENCES

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