

# Study of Risks affecting Renewable Energy Financing

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**Abstract:** Significance of Power sector in the economic development of any country can not be debated and the growing significance of Renewable Energy in the overall composition of power generation is obvious because of various reasons. However one reason identified for underutilization of this source of power generation is lack of availability of finance from private financiers. For private financiers every investment requires proper assessment of risk reward calculus. Study aims to identify and name various risks affecting RE financing.

**Key Words:** Renewable Energy, Risk, Classification, Financing

## I. INTRODUCTION

Significance of Power sector in the economic development of any country can not be debated. Need of time is to shape an economy in a sustainable manner which can satisfy the requirement of 125 crores Population rightly demanding the equal opportunity for upliftment and development in Indian Scenario. Ensuring Sustainability means keeping in mind what nature safely offers. Renewable Energy Sources are the only option left when we try to meet the Twin Objectives of meeting the increasing energy demand for economic growth and also of environmental Protection.

Renewable Energy is any naturally occurring, theoretically inexhaustible source of energy such as biomass, solar, wind, tidal, wave and hydroelectric power, that is not derived from fossil or nuclear fuel ([www.dictionary.com](http://www.dictionary.com)). As per Raghuvanshi et al(2008), "Renewable energy refers to energy resources that occur naturally and repeatedly in environment and can be harnessed for human benefit".

There has to be a significant change in Policies, Business models, technological up gradation for shifting to development route based on RE from the conventional way which in addition to change in the mindset also requires massive investment. Though Government does play a significant role when it comes to providing support for funding, however this cannot be and also should not be the only source of financing these kinds of investment. This increased investment requirement can also be considered to be an opportunity by private financiers. There have been an increasing flow of investment in green energy projects from various sources which seems to be an encouraging trend. For example, as per Green Investment Report(2013), Global investment in Renewable energy was to an extent of 257 billion US\$

in 2011. This is six times as compared to investment in 2004, showing an increase of 17% a compared to 2010 figures. Statistics shows that developing countries are playing an increasing bigger role when it comes to mobilizing funds for RE investment. Investment originating from OECD countries grew at the rate of 27% per annum from 2004 till 2011 whereas the rate of growth has been 47% in case of non OECD countries. As per BNEF report overall growth in green energy is @33% on an average between 2004 and 2011. In 2012, the quantum of investment from developing country has for the first time exceeded that from the developed country. In India, total annual RE investment was between 4-5 billion USD during the year 2006-2009 which rose rapidly to reach 12.3 billion USD in 2011.

Despite this considerable short fall in investment exists and meeting this shortfall is the need of hour. Appropriate action of Government and cooperation from international financial institutions and also from private financiers is needed to meet this shortfall. RE projects are not at all competitive when compared to that of traditional fossil fuels. There cost of production per unit is higher. This requires that there has to be some support from the Government. Though Government does play an significant role when it comes to providing support for funding, however this can not be and also should not be the only source of financing when it comes to RE investments. Attracting private investment thus can be considered to be a prerequisite for growth by way of providing funds. For private investments, way for this is to improve risk reward calculus. For this a thorough understanding is required of various risks affecting investments in RE projects."

## II. PURPOSE OF STUDY

Purpose of this study is to have a detailed overview of various risks affecting investments in Renewable Energy projects and to summarize the various risk classification approaches when it comes to RE projects.

Study is entirely based on secondary data by attempting to analysis the existing literature in a systematic manner.

### III. RISK

Oxford dictionary of English defines the term risk as, "hazard, chance of a bad consequence, loss, exposure to chance of injury or loss".

Webster's dictionary of English defines the term risk as, "chance of injury, damage or loss".

As per Rivza, S., Pilvere, I. (2012), "Risk is the multiplication of probability of a event occurrence and its significance level of potentially unfavorable consequences".

Term 'risk' an 'uncertainty' has been used interchangeably in academic literature. Term 'Risk' is generally used when probability of occurrence of each outcome is known. Whereas the term uncertainty is used when the probability of occurrence is unknown.

Vaughan, Emmett (1996) have stated that risk is a condition where there exists a possibility of bad deviation from the result wanted or expected.

As per Marsh (2004), Risk from the perspectives of Investors can be defined as, "Potential for unexpected events to occur and for unexpected events not to occur, either of which can affect projects returns and / or fluctuations in revenue".

They have also stated that risks preventing a rapid uptake of RE based technology are diverse but they are interrelated. Renewable energy sources are abundant in almost all regions of the world and there are plenty of promising options also for conversion into energy, but still achieving what we could possibly achieve is affected by number of risks.

In IEA (RETD) Report (2011), while highlighting the difference between RES and conventional energy projects, it is clearly stated that in case of RES, there is a high risk of unknown factors affecting the profitability of projects. Study uses PEST classification for detailed analysis of Risk that is into, Political, Economic, Social and Technical risk.

As Per De Jager Rathmann (2008), "Assesment of the associated risk of a project has a major impact on its cost of capital".

As per CPI report titled, "The Risk Gap: A Map of Risk Mitigation Instruments for Clean Investments (2013), risk whether real or perceived the most important factor influencing the financing in terms of availability of funds and also increasing the return expectations of fund providers. They have divided the risk into following categories:

- a. Political, policy and social risk
- b. Technical, physical risk

- c. Market, commercial risk
- d. Outcome risk

Marsh (2004) in the study, "Scoping study of financial Risk Management Instruments for Renewable energy Projects" have stated the following risks to be the key ones which are influencing the Re Investments:

- a. Regulatory and Policy related issues
- b. Market related issues
- c. Deficiency in financial, legal and institutional structures
- d. Issues of loan tenors, credit and lack of bankable structures.

Komendantova, n. et al., (2009), on the basis of their empirical study concluded that regulatory risk, political risk and force majeure risk are considered to be very significant. In their study they identified nine classes of risk to begin with, they were: technical, construction, operating, financial, revenue, financial, force majeure, regulatory environmental and political.

David de Jager et al. (2011) have listed the following as the main risks affecting the availability of finance.

- a. Specific risk by Technology:
- b. Planning and Development
- c. Access to grid
- d. Construction risk
- e. Operation risk
- f. Resource quality risk
- g. Risk by country:
- h. PPA security
- i. Policy Risk
- j. Uncertainty

Parhelion and Standard and Poor conducted a survey in 2010 of private investors. In this survey participants were asked to examine the riskd which are involved n providing capital for RE projects. Risk were organized into following broad categories with several subcategories within each category.:

- a. Policy risk
- b. Capacity risk
- c. Tansactional risk
- d. Project risk

Sussane (2012) have listed a set of risks which are affecting RE projects along with their possible mitigants. Following risks are the risks affecting availability of finance as per them:

- a. Regulatory risk
- b. Technical risk
- c. Commercial risk
- d. Financial Risk

Waissbein (2013) conducted a modeling exercise considering the following categories of risks which as per them are affecting financing cost and they are:

- a. Power market risk
- b. Permits risk
- c. Social Acceptance risk
- d. Grid Integration risk

- e. Counter party risk
- f. Financial Sector Risk
- g. Political risk
- h. Currency/ Macro- economic risk
- i. Risk Affecting cost of debt:
- j. Power market risk
- k. Social acceptance risk
- l. Grid integration risk
- m. Counter party risk
- n. Political risk
- o. Currency/ Macro Economic Risk.

In BNEF Report(2013), a detailed list of risks has been prepared which needs to be managed in RE projects. The report focuses on Wind and Solar Projects. Risk has been classified into following broad categories:

- a. Construction risk
- b. Loss or Damage
- c. Delay in start up
- d. Operational risk
- e. Loss, damage and failure
- f. Business Interruption
- g. Market related Risk
- h. Weather
- i. Curtailment
- j. Power Price
- k. Counter party
- l. Policy risk

As per Mitchell, Bauknecht et al.(2006), risks for RE includes additionally market price uncertainty, uncertainty regarding quantity sold and also balancing of power.

#### IV. CONCLUSION

Analysis of existing study clearly suggests that risks in RE projects have been classified in various ways using various terminologies. In RE projects, risks have primarily been classified on the basis of cause of risk. However certain risks are more commonly considered by the majority of researchers than others. Risk analysis has to be done in a very detailed and significant manner for promoting RE projects and making them a viable option in times to come as risks adds to uncertainty in the revenue projects ultimately affecting the profitability and the financial viability of the project.

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