UNEP e-Learning Course on

Insurance Risk Management for Renewable Energy Projects

Module 6 – Case Study

Risk Assessment for a 100.5 MW Wind Farm in Jilin Province, China

Overview

The training is organized in 6 modules and fits into a 2 day training schedule:

Module	Main Content	Length of Module
1 – Climate Change	Briefing, policy frameworks and business impact	2 hours
2– Renewable Energy Technologies and Risks	Renewable Energy technologies policy, investment trends and risks	3 hours
3 – Underwriting Guidelines and policy	Underwriting information, guidelines, risk evaluation, coverage evaluation	5 hours
4 – Claims handling and policy	Claims information, management, reserving, legal and payment	2 hours
5 – Intermediaries and networks	Project development, information and consultation	1 hour
6 – Case study	**Renewable energy case study, risk assessment, impact and suitability of instruments**	**3 hours**
Total		16 hours

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    - Section 4 –Impacts of risk transfer instruments on debt service and equity performance
    - Section 5 – Suitability and local market conditions
- Lesson Review
- Further Reading & Related Links
- Examination

Learning Objectives	
Risk assessment	To understand the main categories of risk that are of the most concern when financing RE projects.
Risk instruments	To verify the impact of certain risk transfer instruments on the default rate and economics of an RET project.
Suitability in local market	To understand the suitability of financial instruments in the context of local market deficiencies.

Introduction

A project case study highlights the main lessons presented in this course. The example considered is a hypothetical wind farm development project in China. This representative case is an example of an emerging RET project in a developing country.

The case study examines the risks associated with this example wind project. It focuses on contractual, performance, technology and other engineering risks. The study uses a survey method to produce a ranking of these risks in the context of the wind project in China.

Financial risk management (FRM) instruments can mitigate some of the risks with regards to the construction and operating phase of the wind project. However not all of the risks can be covered by traditional insurance products such as engineering, warranty and liability insurance. Non-traditional instruments such as wind derivatives, carbon credit delivery guarantees, and certified emission reduction (CER) futures contracts may be useful to address risks of volatile wind speeds and carbon credit market unpredictability.

Mathematical simulations using statistical sampling techniques are conducted to assess the impact of a variety of factors for several FRM instruments. Input parameters are fed into the simulation models, and the results are analysed. The input parameters are varied to represent different scenarios such as project performance, risk instrument pricing, and carbon credit price volatility. Many other key influencing factors are considered as well. The outputs generated by the models are economic measures such as the default rate and the internal rate of revenue (IRR), which represent the debt service and equity performance of the project.

In the case study different scenarios of project returns with the use of different levels of insurance are presented. The study clearly gives an indication of the positive impact of certain FRM instruments for the overall performance of the project.

The modeling results are evaluated with practical considerations regarding suitability in the Chinese insurance market. Issues such as local market immaturity, a lack of local underwriting expertise and regulatory barriers may hinder the flow of future investments into Chinese renewable energy projects. With time, however, it may be possible to overcome these challenges and tap into the vast potential of renewable energy in China.

Section 1

This section introduces the project case for a hypothetical wind project in China.

Section 2

This section explains how the main risks are identified and ranked in the context of the RE project, and describes the most important risks.

Section 3

This section presents certain financial risk management (FRM) instruments, and defines debt service and equity performance.

Section 4

This section highlights the impacts of using varying types and combinations of FRM instruments on debt service and equity performance.

Section 5

This section considers the results of the study with regards to suitability and local market deficiencies.

Project case[1]

The hypothetical project is a wind farm in China. Wind energy is a growing renewable energy technology (RET) with a viable economic attraction. China is an example of a significant growth market in Asia. The project provides a reliable basis on which to build a realistic financial model to measure the financial impact of risks on project economics.

The case study project involves the installation of 67 turbines, each of which has a capacity of 1500 KW, providing a total capacity of around 100 MW. The site is located in a northeastern Chinese province with good wind conditions. The power generated will be sold to the state-owned power grid, via a long-term power purchase agreement (PPA). The electricity price is set at USD 0.06 per kWh which is consistent with the price bids for Chinese wind farms in the market.

The initial financial structure of the project assumes a debt to equity ratio of 2 :1. It is assumed that most financing is provided by local lenders with some international lenders and financiers involved. It is assumed that the turbine manufacturer will be a turnkey provider of equipment, procurement and construction (EPC) based on a fixed-price contract. Operating and maintenance contracts will also be provided by the turbine manufacturer.

Overall the project characteristics are as follows:[2]

Project Information	
Location	Jilin Province, Northeast China
Technology	Model/Make: GTW 1500 KW turbines and associated sub stations
Installed Capacity	100.5 MW (equals 67 turbines with 1500 KW each)
Electricity Conversion Efficiency	28.8%
Annual Emission Reductions	253’287 tons of CO2
Project Financing	
Investment in USD	120’000’000
Debt to Equity Ratio in %	66.6 / 33.4
Revenue Streams (USD Annual)	
Expected Electricity Sales	20’000’000
Certified Emission Reductions	2’200’000
Expenditure (USD)	
Capital Expenditure	1250 per kW
Operating Expenditure	28.5 per kW

[1] The project case information is derived from a detailed UNEP study. See UNEP, Assessment of FRM Instruments Working Group 1, 2007.
[2] UNEP/Marsh, Assessment of FRM Instruments, Working Group 1 Report, 2007, Appendix A, p. 73.

Key contracts	
Construction	Engineering procurement and construction
Power	15 years PPA (Power Purchase Agreement)
Certified Emission Reductions	25 years fixed price forward (payment on Delivery)

The case study uses these hypothetical project characteristics, along with typical project risks and risk management products as inputs into various probability models to evaluate risk management of RET projects on several levels. The typical project risks are identified, ranked and described in some detail. This is covered in Section 2. Financial risk management instruments are described in Section 3. These instruments can be both traditional insurance products as well as non-traditional insurance products which are more specific to renewable energy technologies. The non-traditional products evaluated are wind derivatives, Credit Delivery Guarantees (CDG), and certified emissions reduction (CER) futures contracts. Different levels and combinations of these instruments are fed into the modeling system to examine which combination produces the best coverage across hundreds of various scenarios (using Monte Carlo method). The outcome is discussed in terms of debt service and equity performance. These results are presented in Section 4. Further discussion of the results with respect to suitability and local market conditions is presented in Section 5. This type of exercise can be used by insurance companies to assess the multiple risks and challenges that arise when insuring renewable energy technology projects.

The study identifies suitable financial risk management instruments and calculates their impacts on project economics. This outcome is valid from a conceptual perspective. However in reality these FRM instruments have to be challenged by the reality of legal, political, social and economic factors in the respective country on a case by case basis.

The analysis therefore gives detailed consideration to some practical constraints and challenges posed by wind project development in China. Local brokers and insurance companies provide key insights on local customer demand, FRM instrument information requirements and local insurance market conditions.

2 Risk assessment

The identification of risks are identified the experience of the risk manager. The risks cover the four major phases of a project:

- Planning and development;
- Construction, testing and commissioning;
- Project operation; and
- Benefits realization with regards to certified emission reductions.

These distinct project phases present different risk profiles and concerns for lenders and financiers. The chart below describes 21 risks, with their details and project stages. Each risk is given a letter as an identifier.

Figure 1 – Risk List[3]

Risk Identifier	Risk Description	Details of Risk	Project Stage
A	Permitting /Planning delays	Risk of delay due to the inability to obtain building permit/planning or other regulatory consents.	Project Development
B	Contract bankability	Risk of being unable to secure bankable offtaker / fuel supply contracts.	Project Development
C	CER bankability	Risk of Certified Emission Reductions (CER's) not being recognized as bankable revenue streams (i.e. able to support debt service obligations).	Certified Emission Reduction
D	Contractor non-performance	Risk of EPC and turn-key contractors being unable to deliver to specifications on time and at cost.	Contruction, Testing and Commissioning
E	Engineering risks	Risk of physical loss or damage to property caused by technical /engineering hazards (e.g. defective design, faulty parts and /or workmanship).	Contruction, Testing and Commissioning
F	Physical hazard (caused by man or nature)	Risk of physical loss or damage to property caused by man made and /or natural hazards /catastrophes (e.g. fire, lighting, explosion, earthquake, flood, windstorm).	Contruction, Testing and Commissioning
G	Offtaker contract failure	Risk that power offtakers withdraw from contract subsequent to financial closure.	Contruction, Testing and Commissioning
H	Catastrophic design failure	Risk of complete mechanical or control failure during testing and commissioning due to defective design.	Contruction, Testing and Commissioning
I	Process Interruption	Risk of complete plant shut down (total process interruption) at any time due to unscheduled maintenance.	Operating
J	Natural hazards	Risk of physical loss and /or damage to the plant and /or machinery breakdown caused by natural hazards / catastrophes (e.g. fire, lighting, explosion, windstorm, flooding)	Operating
K	Design / Engineering Risk	Risk of physical loss and /or damage to the plant and /or machinery breakdown caused by design / engineering perils (e.g. defective design, faulty parts and workmanship all occurring outside the scope of any warranty protection)	Operating
L	Physical hazard (caused by third party)	Risk of physical loss and /or damage to the plant caused by human hazards external to the project (e.g. strikes, riots, civil commotion, war)	Operating
M	Wind volatility	Risk that average wind speeds falls below required thresholds to generate economically efficient power outputs / electricity.	Operating
N	Offtaker default	Risk of the electricity offtaker defaulting on contractual obligations under PPA.	Operating
O	Warranty non-performance	Risk of the warranty provider failing to meet contractual obligations.	Operating
P	Legal liability	Risk of the legal liability caused by bodily injury or property damage to third parties.	Operating
Q	CER Regulatory Risk	Risk of Certified Emission Reduction (CER) delivery shortfall or failure due to Kyoto regulatory risk (e.g. changes to baseline methodology, monitoring procecures, additionality rules or other eligibility criteria).	Certified Emission Reduction
R	CER political risk	Risk of Certified Emission Reduction (CER) delivery shortfall or failure due to host country political action (e.g. expropriation, nationalization, confiscation and prohibitions in connection with the sale of CERs).	Certified Emission Reduction
S	CER performance risk	Risk of Certified Emission Reduction (CER) delivery shortfall or failure due to lower than expected plant performance.	Certified Emission Reduction
T	CER insolvency risk	Risk of Certified Emission Reduction (CER) delivery shortfall or failure due to insolvency of project proponents.	Certified Emission Reduction
U	Long term CER marketability	Risk of limited marketability of emission reductions post 2012.	Certified Emission Reduction

[3] see UNEP, Assessment of FRM Instruments, 2007, p. 9.

A risk survey gathering expert opinions is undertaken. The purpose of the survey is to capture the subjective perceptions of the above risks associated with the development and financing of the hypothetical wind installation in China, and to provide baseline data for further risk analysis and modeling. These risks will be entered into simulation models, assessed for severity and frequency and ranked according to expected loss. Subsequent runs of the models will evaluate these risks in terms of financial risk management instruments. This portion of the case study is discussed later in this module.

Severity	Impact of risk on the project translated into a corresponding financial loss.
Frequency	Likelihood of risk occurring translated in a percentage probability.
Expected Loss	Financial loss * Probability

There are four main risk categories identified:

- contractual risks;
- operational risks;
- physical hazards; and
- risks related to CERs.

Contractual, performance and technology risks are perceived to be of the most concern in the context of financing RE projects.

The most significant risk overall is contract bankability. It has the potential to effectively terminate the project. Other contractual-related risks are counterparty non-performance and default with respect to contractual obligations. Electricity offtaker default is considered to be symptomatic of doing business in emerging markets. Warranty non-performance is linked to the technology efficacy still in question.

Engineering risk linked to defect in design, parts and workmanship during the construction phase and is the number one ranked technology risk. This is also symptomatic of many RE technologies such as wind with prototypical technology maturity.

Risks involving clean development mechanisms (CDMs) appear less significant in terms of financial consequence compared to other risks. Still future certified emission reduction (CER) revenue streams depend on the delivery ability of the project. CER bankability risk is negatively affected by this.

Figure 2 - Risk Map using financial scales

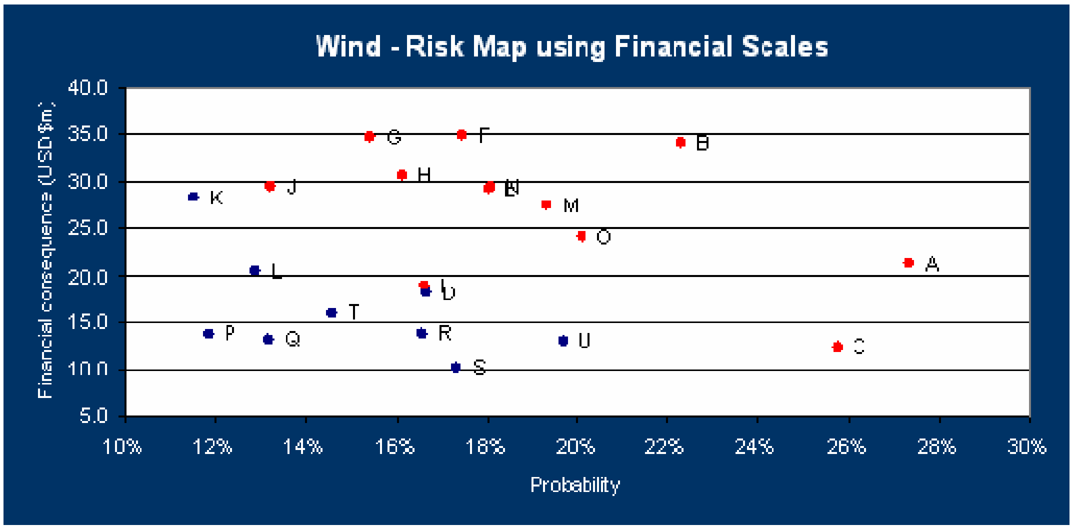


Figure 3 – Risk Ranking[4]

Risk Ranking	Risk Letter	Head Line Risk	Details of Risk	Expected Loss (US$)
1	B	Contract bankability	Risk of being unable to secure bankable offtaker / fuel supply contracts.	10,465,953
2	O	Warranty non-performance	Risk of the warranty provider failing to meet contractual obligations.	9,235,476
3	N	Offtaker default	Risk of the electricity offtaker defaulting on contractual obligations under PPA.	8,739,566
4	E	Engineering risks	Risk of physical loss or damage to property caused by technical / engineering hazards (e.g. defective design, faulty parts and / or workmanship).	8,086,700
5	F	Physical hazard (caused by man or nature)	Risk of physical loss or damage to property caused by man made and / or natural hazards / catastrophes (e.g. fire, lighting, explosion, earthquake, flood, windstorm).	7,740,908
6	J	Natural hazards	Risk of physical loss and / or damage to the plant and / or machinery breakdown caused by natural hazards / catastrophes (e.g. fire, lighting, explosion, windstorm, flooding)	6,992,974
7	G	Offtaker contract failure	Risk that power offtakers withdraw from contract subsequent to financial closure.	6,779,618
8	H	Catastrophic design failure	Risk of complete mechanical or control failure during	6,678,678

[4] UNEP, Assessment of FRM Instruments, 2007, p. 16.

			testing and commissioning due to defective design.	
9	A	Permitting / Planning delays	Risk of delay due to the inability to obtain building permit/ planning or other regulatory consents.	6,647,000
10	C	CER bankability	Risk of Certified Emission Reductions (CER's) not being recognized as bankable revenue streams (i.e. able to support debt service obligations).	5,191,547
11	M	Wind volatility	Risk that average wind speeds falls below required thresholds to generate economically efficient power outputs / electricity.	4,873,565
12	I	Process Interruption	Risk of complete plant shut down (total process interruption) at any time due to unscheduled maintenance.	4,310,388
13	P	Legal liability	Risk of the legal liability caused by bodily injury or property damage to third parties.	4,279,955
14	L	Physical hazard (caused by third party)	Risk of physical loss and / or damage to the plant caused by human hazards external to the project (e.g. strikes, riots, civil commotion, war)	4,014,440
15	T	CER insolvency risk	Risk of Certified Emission Reduction (CER) delivery shortfall or failure due to insolvency of project proponents.	3,959,167
16	D	Contractor non-performance	Risk of EPC and turn-key contractors being unable to deliver to specifications on time and at cost.	3,777,648
17	U	Long term CER marketability	Risk of limited marketability of emission reductions post 2012.	2,741,763
18	Q	CER Regulatory Risk	Risk of Certified Emission Reduction (CER) delivery shortfall or failure due to Kyoto regulatory risk (e.g. changes to baseline methodology, monitoring procedures, additionality rules or other eligibility criteria).	2,631,244
19	K	Design / Engineering Risk	Risk of physical loss and / or damage to the plant and / or machinery breakdown caused by design / engineering perils (e.g. defective design, faulty parts and workmanship all occurring outside the scope of any warranty protection)	2,623,672
20	R	CER political risk	Risk of Certified Emission Reduction (CER) delivery shortfall or failure due to host country political action (e.g. expropriation, nationalization, confiscation and prohibitions in connection with the sale of CERs).	2,615,596
21	S	CER performance risk	Risk of Certified Emission Reduction (CER) delivery shortfall or failure due to lower than expected plant performance.	1,512,113

Contractual risks	
Contract bankability	This is the number one risk and concerns the risk of the project being unable to secure bankable offtaker contracts. In reality, offtaker contracts are considered as a pre-condition to obtain financing. The expected costs do mirror the development costs and the costs of renegotiating and securing new offtaker contracts. (risk ranking of 1)
Warranty non-performance	This is the number two risk and concerns the risk of the turbine manufacturer failing to meet contractual obligations under the equipment warranty. This is a major concern for wind farm projects. They usually rely on a five-year manufacturing warranty to cover all the equipment service and repair, and in many cases, turbine availability. With the number of wind farm installations on the rise, the manufacturers' exposure to future liabilities is a clear concern. Considerations with regards to insurance protection for warranty providers are quite relevant. (risk ranking of 2)
Offtaker default	This is the third greatest risk and concerns the electricity offtaker defaulting on contractual obligations under the power purchasing agreement (PPA) once the project is operating. Since the PPA provides the long-term revenue certainty for the project, this aspect is of a significant concern for the lenders. Furthermore, changes in the bidding processes for securing long-term electricity tariffs for wind power projects in China must be considered. Creditworthiness and reputation are also key factors of the perceived risk associated with PPAs. (risk ranking of 3)
Offtaker withdrawal	This risk involves the withdrawal of the offtaker from contract after the financial closing date but before the project is operating. This risk is similar to above but due to the shorter timeframe, this risk is less likely to occur. Overall this risk is still considered to be of a high importance (risk ranking of 7).
Contractor non-performance	This risk focuses on the turnkey contractor not being able to deliver the specifications on time and at the promised cost. The risk is considered to be relatively low with a limited negative impact (risk ranking of 16).

Operational risks	
Technical / engineering hazards	This is highest ranking operational risk and fourth greatest overall. Technical and engineering hazards stem from defects in design, material and workmanship, which can cause a physical loss or damage to the project. Defects are normally detected during the testing and commissioning stage, when the entire plant's performance is being tried under operating conditions. Defects identified at this late stage of construction can result in much more expensive repair and replacement costs, can potentially lead to a significant delay to the overall operation of the project. The human element to this hazard causes this risk to be perceived as much more significant than the other operational risks.
Catastrophic design failure	This involves the risk of complete mechanical or control failure during testing and commissioning due to defective design. This risk has a very high financial impact but a much lower probability when compared with other technology-related risks. Overall this risk is still of high importance (risk ranking of 8).
Permitting / planning delays	This concerns the risk of delay due to the inability to obtain a building permit, planning clearance, and/or other required regulatory consents. The type of impediment would cause delay to the project's start date and a rework to the permission processes. It is of high importance overall (risk ranking of 9).
Wind volatility	This relates to the risk that average wind speeds could fall below the required thresholds to generate economically efficient power outputs and electricity. This risk is considered of moderate importance (risk ranking of 11).
Process interruption	This concerns the risk of a complete plant shutdown leading to a total process interruption at any time due to unscheduled maintenance. A maintenance event could be triggered by design failure, or other technical and engineering hazards. It is of medium importance overall (risk ranking of 12).
Legal liability	This concerns the risk of legal liability caused by bodily injury or property damage to third parties. It is of medium importance overall (risk ranking of 13).

Physical hazards and risks	
Physical hazards during construction	This concerns natural hazards and human-induced accidents (of a non-design or technological nature) resulting in a physical loss or damage during the course of construction. Overall this ranks as the fifth greatest risk. In China, natural hazards such as earthquakes, typhoons and floods cause the most concern. They cause the greatest extent of damage to plant and machinery even though they occur relatively infrequently. Exposure to natural hazards and catastrophes is ranked higher during the construction phase than during the operation phase. (risk ranking of 14)
Natural hazards during operation	This is similar to the above risk type. It concerns the risk of physical loss and damage to the plant and machinery due to natural hazards and catastrophes during the operating phase. Overall this risk ranks as sixth greatest. Natural hazards during operation have the same impacts as natural hazards during construction, but with a slightly less pronounced financial impact. (risk ranking of 6)
Physical hazards third party	This involves the risk of physical loss or damage caused by human action against the property such as strikes, riots, civil commotion and war. This risk is ranked as fourteenth overall and is of medium importance. It has a lower expected cost than the above physical hazards and operational risks. Political stability is a key driver of this risk. Since the political situation in China is considered to be reasonably stable, this risk is not of high importance. (risk ranking of 5)

CDM-related Risks	
CER bankability	This concerns the risk of CERs not being recognized as bankable revenue streams, and therefore not being able to support debt service obligations. CER bankability is considered to be of relatively high likelihood with a less significant financial impact. Overall it ranks as the tenth greatest risk. This means that CER bankability can have a moderate impact on the economics of a project. Carbon finance is still not fully utilized in the financing of RE projects. The potential benefits of carbon credits are reduced by the uncertainty of future CER delivery. Most buyers, therefore, require a significant price discount. (risk ranking of 10)
CER insolvency	This concerns the risk of CER delivery shortfall or failure due to insolvency of project proponents. The concern over insolvency could be due to the characteristics of the CDM market. Many companies involved are small start-up operations which do not have the balance sheets to which European buyers and investors are accustomed. (risk ranking of 15)
CER marketability	This involves the risk of CER marketability in the post Kyoto (post 2012) climate policy framework (see module 1). This is a fundamental market risk

	and will have the greatest impact on the CER revenue stream after 2012. Price assumptions and different pricing scenarios must be used for this period.(risk ranking of 17)
CER regulatory risk	This concerns the risk of CER delivery shortfall or failure due to changes in the Kyoto Protocol's regulatory framework. This could relate to changes to the baseline methodology and monitoring procedures, or in the additionality rules and other eligibility criteria. (risk ranking of 18)
CER political risk	This concerns the risk of CER delivery shortfall or failure due to political action of the host country. Actions could relate to expropriation, nationalization, confiscation, and/or prohibition in connection with the sale of CER. (risk ranking of 20).
CER performance risk	This concerns the risk of CER delivery shortfall or failure due to lower-than-expected plant performance. Overall this risk is perceived to be the lowest of all the risks considered (risk ranking of 21).

Further risks identified during the survey concern contractual, financial and regulatory risk. To some extent they are covered by the above pre-identified risks.

Additional risks identified	
Local grid permission	This risk relates to the grid owner not accepting the electricity generated by the wind project. It is similar to the offtaker default risk but happens at a very early stage of the project. Although the capital loss would not be significant, it would cause a delay in project development.
CER offtaker default	This concerns the risk that the offtaker tries to renegotiate the CER price upon issuance of CERs. Fundamentally this is a contractual risk that could become more of an issue as larger price differences emerge between the spot (actual) price of CERs and the forward (future) price.
Withdrawal of policy support measures	This concerns the risk that the host government withdraws incentives such as credits, capital subsidies and other measures designed to support the respective RETs. This issue is common in the RE industry as in many countries, RETs are underpinned by policy support measures. Changes in the Chinese laws with regards to RE must be considered in the analysis.
Lack of policy implementation	This is another regulatory risk that relates to the lack of implementation by the local authorities of the renewable energy policy.
CAPEX increases	This concerns the risk of an increase in capital expenditure (CAPEX). This is a common risk with many wind energy projects. Factors include turbine supply constraints leading to price rises.

3 Risk Treatment: identification of financial risk management instruments

Mitigation of the identified risks can be done with traditional insurance and non-traditional instruments. For the most relevant contractual risks such as contract bankability, it is very difficult to get insurance or risk coverage. Normally it is the responsibility of project and contractual partners to effectively manage these risks.

The following traditional insurance products are available:[5]

Risk Transfer Product	Basic Triggering Mechanisms	Scope of Insurance / Risks addressed
Construction All Risks (CAR) / Erection All Risk (EAR)	Physical loss of and / or physical damage during the construction phase of a project.	All risks of physical loss or damage and third party liabilities including all contractors work – this is the main product.
Physical Damage (PD) / Operating All Risks	Sudden and unforeseen physical loss or damage to the plant / assets during the operational phase of a project.	"All risks" package including Business Interruption (BI).
Machinery Breakdown (MB)	Sudden and accidental loss or damage necessitating repair or replacement.	Defects in material in material, design construction, erection or assembly. Random working accidents.
Business Interruption (BI) / Delay in Start Up (DSU)	Interruption / interference / delay resultant directly from, or in consequence of loss or damage causing loss of profits / reduction in gross revenue.	For BI: Perils insured under the PD policy. For DSU: Perils insured under the CAR policy.
Transit	Physical loss or damage to equipment in transit to site from anywhere in the world by land, sea or air.	All risks including those resulting from war and strikes.
General / Third Party Liability (GPL / TPL)	Liability imposed by law, and/or express contractual liability, for bodily injury or property damage.	Legal liability in respect of death or bodily injury, physical loss or damage to third party property, trespass nuisance and interference.

Traditional insurance can cover over 50% of the identified risks occurring during the construction and operating phase of the project:

- During the construction phase CAR/EAR insurance addresses the risk of physical damage or loss to property. ALOP or DSU insurance covers the reduction of profits caused by the interruption during this phase. Some engineering risks also might be covered by CAR insurance, such as the physical damage and loss caused by engineering perils but not the defective parts themselves.

[5] derived from UNEP, Assessment of Financial Risk Management Instruments, 2007, p. 26.

- Physical hazard related risks occurring during the operating phase of the project could be covered with OAR and MB policies. However for wind projects, insurers typically do not provide the full design cover under the MB policy but only the resultant damage. Also comprehensive policies are typically placed together under one operating package including PD, MB, BI, Transit and TPL.

Additional insurance products to be considered:

- Warranty liabilities of the turbine manufacturer could be addressed with warranty insurance.
- Political risk insurance (PRI) provides coverage in instances where asset deprivation of all or parts of the assets or financial investments by the government or government entities takes place. This might include non-honouring of government undertaking including those described in a power purchase agreement (PPA). Offtaker default can be considered as a political risk especially in situations where the electricity offtaker is state-owned as is the case in China.

Non-traditional risk mitigation can be done with following three instruments:

- **Wind power derivatives**: The risk of wind volatility could be addressed with a wind power derivative. A wind power derivative will indemnify the project up to an agreed amount per kWh if the production falls below a specific amount due to low wind speeds.
- **Credit Delivery Guarantees**: The CER bankability issue can be addressed by a Credit Delivery Guarantee (CDG). This policy can also include additional CER-related delivery risks.
- **CER future contracts**: The risk of carbon market volatility, especially the risk of collapse, can be addressed with a CER futures contract. This contract would be established as a put option with a defined strike price. The put option gives the buyer the right to sell the agreed amount of CERs for a certain price (strike price) at a future agreed trade date.

The following is an overview of the risks and the suggested financial risk management instruments if available:

Figure 3 – Financial Risk Management Instruments[6]

[6] UNEP, Assessment of FRM Instruments, 2007, p. 28.

T	CER insolvency risk	15	Operation	Insurance (Credit Delivery Guarantee)
D	Contractor non-performance	16	Construction	None
Q	CER Regulatory Risk	18	Operation	Insurance (Credit Delivery Guarantee)
K	Design / Engineering Risk	19	Operation	Insurance (Machinery Breakdown)
R	CER political risk	20	Operation	Insurance (Credit Delivery Guarantee)
S	CER performance risk	21	Operation	Insurance (Credit Delivery Guarantee)
U	Long term CER marketability	22	Operation	Futures Contract

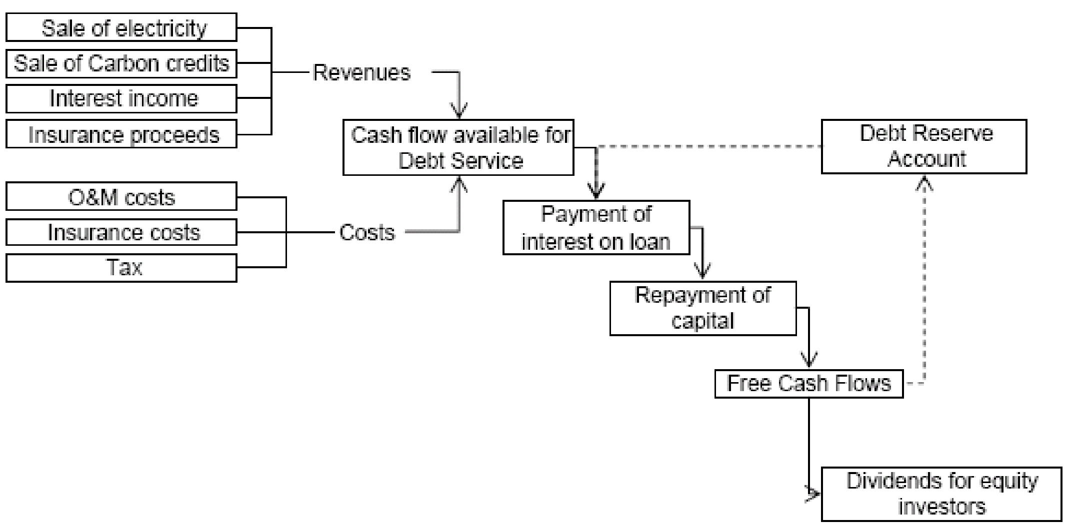
The risk modeling goes through four steps:

1. Establish calculation model for revenues and costs.
2. Define project performance assumptions to be used for calculations.
3. Define assumptions with regards to risk transfer pricing and scenarios.
4. Run simulation models to calculate the impacts of using risk management instruments on debt service and on equity performance.

a. Revenues and costs calculation model

A simple calculation model is based on the waterfall model. Revenues are generated with the sale of electricity and carbon credits plus interest income and possible insurance proceeds. Costs consist of operation and maintenance (O&M) costs, insurance costs and taxes. The difference between revenues and costs is the cash flow available for debt and equity service. For debt service, interest and repayment of the principal has to be considered. The remaining cash flow is the free cash flow. This is used to pay dividends to the equity investors and to allocate reserves for future debt service.

Figure 4 – Payments Waterfall[7]



[7] UNEP, Assessment of Financial Risk Management Instruments, 2007, p. 32.

b. Project performance assumptions

The project case assumptions cover the areas of energy production, operating revenues, costs and cash flows are as follows.

The project assumes a capacity factor of 26%, e.g. 2282 operating hours per year (The potential maximum hours per year are 24 hours per day, and 365 days per year, resulting in a total of 8760 hours). The wind farm consists of 67 turbines which, on average, each produce 1500 kW per hour. Multiplying the number of turbines by their output and by the number of operational hours yields an expected energy output of 229 GWh per year. Taking into account possible variations of wind availability and of capacity factor, it is assumed with a probability of 90% that a minimum of 183 GWh per year is achieved.

With regards to revenue, it is assumed that the electricity offtaker pays USD 64’000 for every GWh. In addition, 1005 CER units are acquired for every GWh. It is assumed that each CER generates USD 15. This results in a total CER revenue of USD 15’075 per GWh. The revenue of these two sources together is USD 79’075 per GWh. The energy offtaker provides 81% of this revenue; the CER units provide 19% of this revenue.

The project is expected to generate on average USD 0.0791 per kWh (e.g. 79’075 per GWh) of electricity produced. Overall revenues are USD 18.1 million for the expected average output. The project is expected to cost USD 0.0254 per kWh of electricity produced. Overall average gross operating profits are therefore USD 0.0537 per kWh.

With regards to cash flow, the value of the operating and discounted cash flow achieved during the whole project period of 25 years is USD 116 million on average.

c. Risk transfer pricing and instruments scenarios

Traditional insurance products as well as other risk transfer instruments, such as wind derivatives and CER futures contracts, are used. For traditional insurance offerings, local insurance quotes were obtained. DSU and BI insurance are not offered locally and therefore pricing of European insurers was obtained. The wind derivative is obtained from several weather insurance markets. Overall it uses a minimum wind power generation goal of 164 GWh. This goal is called the strike. If production falls short of the strike, the wind derivative product will indemnify USD 64 per MWh below strike. Similarly, the CER futures contract is based on the theoretical price of a EUR 5 strike price and a volume of 180’000 CERs.

The following scenarios are used to evaluate various risk transfer instruments:

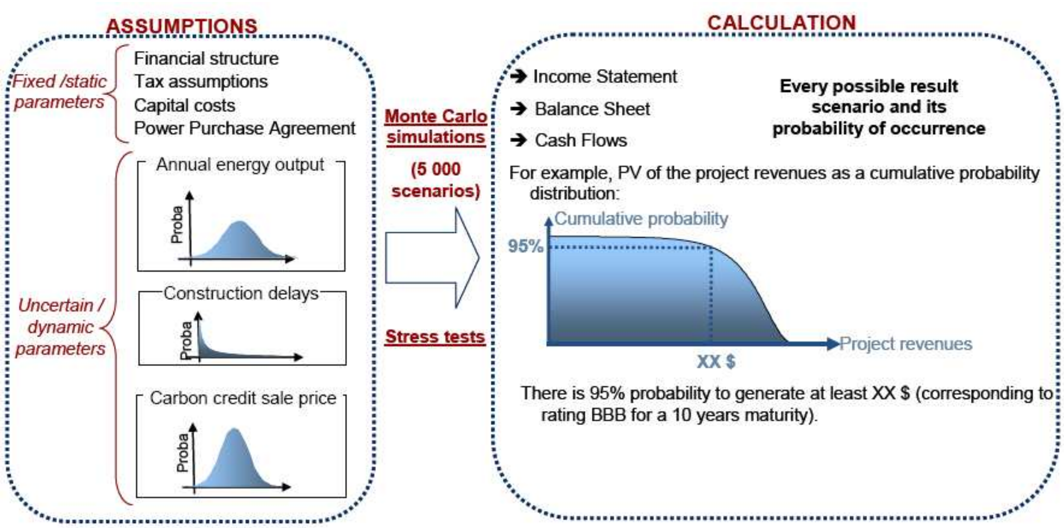
a. No insurance used.
b. Standard insurance package (traditional insurance policies including CAR, DSU, OAR, BI and TPL).
c. Standard insurance package excluding DSU and BI (according to the local insurance market situation in China).
d. Additional usage of political risk insurance, CER futures contract and wind derivative.

d. Simulation models

The study uses simulation models that are a combination of Monte Carlo simulations and stress tests. These stochastic models are used in order to make sure that extreme events and probability distributions are taken into account. Simple models relying on average measures do not cover unexpected and extreme cases. The Monte Carlo stochastic model measures probability distributions with confidence intervals based on repeating simulation runs (5000 repetitions) using fixed and dynamic parameters. These input parameters can be measures such as project performance, insurance pricing, carbon credit price volatility, variable annual energy output, and construction delays. Stress tests investigate more unlikely catastrophic events such as poor wind years, strong decreases in PPA prices, unexpected operating cost increases, and carbon market collapses. Positive scenarios are tested as well, such as the higher-than-expected CER revenues, and PPA tariff increases.

The model is used to calculate the impact of using various financial risk management (FRM) instruments such as insurance, different financing options and wind derivatives. The methodology is based on the fixed assumptions with regards to financial structure (debt to equity ratio), tax and capital costs assumptions and power purchase agreements.

Figure 5 – Outline of model methodology[8]



Various risk management instruments and combinations of risk management instruments are fed into these models to see how the project economics change. The project economics are the outputs of the models. The two areas of project economics which are measured are debt service and equity return.

The simulation models measure the impact of insurance packages used on two key areas:

1. Debt service. This includes three measures:
    a. The simulated default rate. This is expressed as the percentage of cases that are not able to repay the debt obligations.

[8] UNEP, Assessment of FRM Instruments, 2007, p. 12.

b. The probability distribution of the debt service coverage ratio (DSCR). This is the ratio of available cash flows to the debt service (interest and repayment) for the period of the debt term.

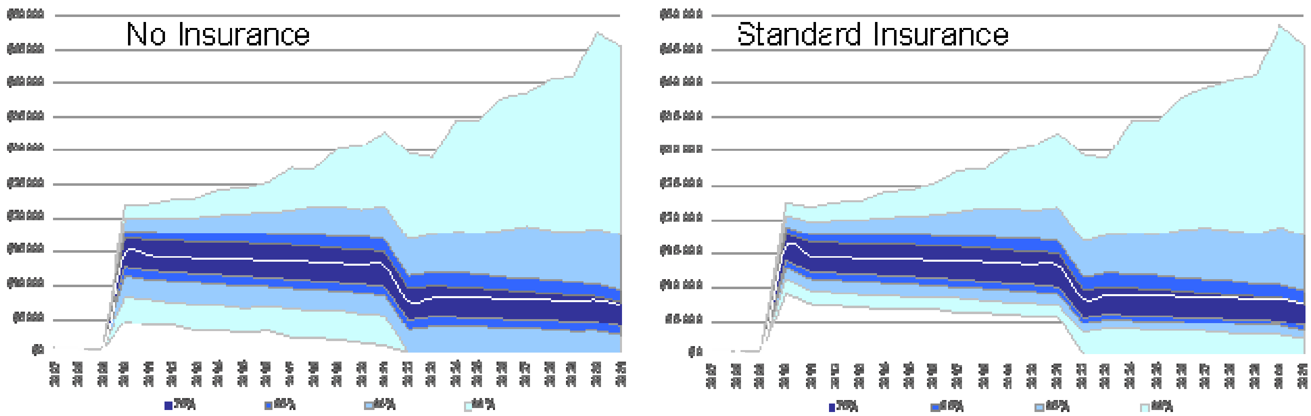
c. The probability distribution of the present value of cash flows. This is the cash flow available before debt servicing.

2. Equity return. Equity return is measured by the Internal Rate of Return (IRR) and based on the initial investment of the investors. Investors expect return dividends based on the available remaining cash flows at the end of each period. The IRR is the discount rate when the present value of the future stream of cash flows equals the initial equity investment.

4 Impacts of risk transfer instruments on debt service and equity performance

The following is the outcome of the model calculations using various scenarios and assumed parameters, for different insurance packages and risk management instruments.

Figure 1- Operating Cash Flows with and without Insurance



Area between the 25th and 75th percentile. There is 50 % probability the model results are in this area.

Area between the 10th and 90th percentile. There is 80 % probability the model results are in this area or the darker one above.

Area between the 5th and 95th percentile. There is 90 % probability the model results are in this area or the two darker ones above.

Area between the 1st and 99th percentile. There is 98 % probability the model results are in this area or the three darker ones above.

Impact of standard insurance package	
Overall impact on default rate	The default rate of a project with no insurance is 7.48%. Without insurance, the minimum DSCR are lower. For example, 30% of cases with a DSCR below 1.00 are not able to meet the cash flow requirements to serve debt. The default rate with a standard insurance package is 1.16%. The default rate of standard insurance package without DSU/BI is 1.72%. Purchasing insurance reduces the downside risk. Purchasing insurance was also shown to reduce the standard deviation of the results (e.g. less extreme).
Impact on equity return	The average IRR of a project with no insurance is 8.2%. The average IRR with a standard insurance package is 9.1%. The average IRR of a standard insurance package without DSU/BI is 9.0%.

Impact of DSU and BI	The inclusion of DSU and BI in a standard insurance package has a positive impact on project economics. It reduces the default rates and improves the internal rate of return of the project, thereby reducing the need for equity capital. This revenue protection is recognized by international lenders and financiers. However in China, local financing of wind projects is without any requirement for consequential loss protection through DSU and BI. Further coverage extensions to be considered are loss of earnings resulting from physical loss or damage at the suppliers' and/or customers' premises. This is certainly valid for other RETs such as biomass. Apparent demand and missing local supply for consequential loss coverage is definitely an issue as more international financing flows into the Chinese RE sector.

Impact of additional FRM instruments	
Impact on default rate	The default rate with a standard insurance package is 1.16%. For standard insurance plus political risk insurance (PRI) it is 0.70%. For standard insurance plus a CER futures contract it is 1.06%. For standard insurance plus a wind derivative it is 3.04%. For standard insurance plus PRI and a CER futures contract it is 0.54%. For standard insurance plus PRI and a CER futures contract and a wind derivative it is 2.04%. The lowest default rate can be achieved with a combination of standard insurance, PRI and a CER futures contract. The wind derivative enhances default rates. It is also prohibitively expensive with an expected cost of USD 300'000 per year.
Impact on equity return	The average IRR with a standard insurance package is 9.1%. For standard insurance plus PRI it is 9.3%. For standard insurance plus a CER futures contract it is 9.0%. For standard insurance plus a wind derivative it is 8.0%. For standard insurance plus PRI and a CER futures contract it is 9.1%. For standard insurance plus PRI and a CER futures contract and a wind derivative it is 7.8%. The best IRR is achieved with standard insurance plus PRI. Adding the expensive wind derivative to the insurance package leads to a significant reduction of the IRR.
Impact of PRI	The political risk insurance product is provided by commercial political risk insurers. It has been adopted to be triggered in the event of non-honouring of host government undertaking and non-honouring of an arbitration award. Since the electricity offtaker company is state-owned, PRI coverage should be

	available. This coverage is a relatively expensive product but has a positive impact on default rate and DSCR.
Impact of CER futures contract	The CER put option guarantees a minimum sale price in a specified time frame. A CER futures contract has a positive impact on the default rate. CER derivatives are still relatively expensive, however, due to limited trade and exchange mechanisms for CERs. A highly fluid CER exchange would enhance standardized contracts and delivery guarantees.
Impact of wind derivative	Weather derivatives offset the financial risk and uncertainty caused by weather volatility. Originally the weather insurance market traded temperature and precipitation indices. Wind-speed-based indices are relatively new, and the market for wind derivatives is still immature. Therefore, only over-the-counter transactions occur. In the future, as the use of wind power increases, there may be more attractive offerings, such as wind-derivative / BI-coverage combinations orwind derivative reserve models and wind interest swaps. ParisRe, the world leading weather covers reinsurer, has developed with UNEP and Marsh a cost competitive innovative wind power derivative model for wind farms under development in developing countries (see http://www.unep.fr/energy/finance/risk).

It is important to take into account other non-traditional financial risk managements as well. These were not used in the model, but are worth consideration.

Impact of credit delivery guarantee	A credit delivery guarantee (CDG) is offered by a select number of insurers to investors and buyers of emission reduction credits. These credits are generated from projects stemming from the Kyoto Protocol and are based on CDM and JI mechanisms. A CDG is a multi-risk product covering credit risk, political risk, Kyoto regulatory risk, technology performance risk and business interruption. It protects the insured against shortfall or failure of emission reduction credit delivery while under an emission reduction purchase agreement. These agreements are currently negotiated between buyers and sellers. In the absence of a CDG, the buyers are only willing to agree on forward purchasing of CERs at an extreme price discount. With the use of a CDG, the price discount will not be so severe, leading to higher CER prices and therefore a better project cash flow.
Impact of turbine warranty insurance	The survey shows that there is a significant risk of the warranty provider failing to meet contractual obligations. Growing obligations pose considerable future liabilities for some large American and European wind manufacturers. Manufacturers are very interested in the mitigation of this contingent liability risk and would like to be able to insure against it. The insurance industry has explored the possibility of offering this coverage, but has yet to offer it. There is not yet enough turbine operating data and technology efficacy information to write a policy. Once the loss and operating histories of this technology are established and better known, there is a good potential for the insurance industry to offer turbine warranty insurance.

5 Suitability and local market conditions

Deployment of FRM instruments in specific markets and countries depends on a range of legal, political, social and economic factors. These vary from country to country. The following six factors should be considered when evaluating the suitability of a particular instrument in a specific place: product status, customer demand, information requirements, financial market sophistication, cost/risk premium, and impact on project economics/affordability. For the hypothetical Chinese wind farm considered in this module, these six factors are evaluated with regards to six FRM instruments: DSU/BI insurance, Credit Delivery Guarantee (CDG), CER futures contract, wind derivatives, Power Purchase Agreement (PPA) with Political Risk Insurance (PRI), and warranty insurance. The chart below shows the rating of product suitability in the Chinese wind industry market with regards to these two groups:[9]

	DSU / BI	**CDG**	**CER futures contract**	**Wind derivatives**	**PPA PRI**	**Warranty insurance**
Product status	Emerging	Evolving	Evolving	Available	Emerging	Evolving
Customer demand	Low	High	Low	High	Low	High
Information requirements	Medium	Medium	Low	High	High	High
Financial market sophistication	Low	Low	High	Low	Low	Low
Cost / Premium	Low	Medium	Very High	Very High	High	High
Impact on project economics	+	Not modeled	+	-	+++	Not modeled

Suitability of FRM instruments	
Product status	Several promising instruments can be categorized as "evolving" or "emerging". "Evolving" means that the FRM instrument still requires further development to be effectively transacted at a commercial level by major insurers and reinsurers. CDG and CER futures contracts are examples of products that are still evolving. "Emerging" products are those such as DSU/BI and PRI, that are widely used in the developed markets but still not widely available in China.

[9] derived from UNEP, Assessment of FRM Instruments, 2007, p. 62.

Customer demand	CDG has a high demand in China. This is especially true for project developers who would like to secure maximum upfront payments for CERs. There is also high demand for warranty insurance from manufacturers and project developers. The demand for wind derivatives is linked to wind variability at the project site. Growing demands could be triggered by an increase in the amount of projects being developed. This could help reduce the current prohibitively high costs of purchasing this product.
Information requirements	Wind derivatives and warranty insurance require significant underwriting information in order to accurately price the underlying exposure. For wind derivatives, a minimum of ten years of wind resource data from nearby meteorological stations is required. DSU / BI requires more technical underwriting information to focus on risk management, loss prevention and loss control. Underlying technology risks, replacement parts, contingency plans and site accessibility have to be understood by the underwriter. Larger projects require specific underwriting surveys to be conducted by risk engineering experts. These information requirements still are a challenge in countries such as China.
Financial market sophistication	For PRI coverage, the PPA requires robust arbitration provisions. Also, CER futures markets have yet to be developed to a mature and fluid status similar to the EU allowance trading markets. Therefore for this type of product, market sophistication is very important for further deployment.
Cost / risk premium	There are significant risk premiums associated with many of the products, especially the wind derivative and the CER futures contract. They are still very expensive in terms of costs. Transactions are very customized and significant analytical expertise is required. DSU and BI insurance employ a more standardized underwriting approach. Transaction costs are lower in than for other products.
Impact on project economics / affordability	Ultimately FRM prices and conditions must be considered in the context of project revenues, costs and cash flows. Project economics can significantly benefit from the use of FRM instruments.

There are four key market deficiencies identified on the Chinese renewable energy market: market immaturity; lack of technical underwriting expertise; regulatory barriers to entry; and the inability to meet lender insurance requirements.

Chinese market deficiencies	
Market immaturity	The state of the Chinese insurance market is still relatively immature despite rapid economic growth in recent years. Insurance penetration rates historically have been low and are around 3% of

	GDP. The low level of risk awareness is a key factor in the limited uptake of insurance. Also there is a lack of innovative marketing and insurance mechanisms. On the other hand, the insurance market is fiercely competitive and premium rates can be up to 50% below international levels. By the end of 2005, in the non-life insurance business, there were 35 Chinese property / casualty insurance companies. Of these, 22 were state-controlled and held more than 98% of market share. Any innovation, therefore, must be in close cooperation with domestic insurers and insurance monopolies.
Lack of technical underwriting expertise	There is a skill shortage in China in all areas of the insurance industry, especially in the product development, actuarial and engineering fields. RETs such as wind power are not well understood. The approach to insuring RE projects is a standardized method used to insure traditional power plants. Coverage, therefore, is not tailored to the needs of the RE and wind industry. DSU and BI insurance are typically not provided by domestic insurers. There are significant gaps between the domestic and the international market in terms of coverage terms and conditions. This is a major concern for international lenders and financiers.

Insurance restrictions and exclusions in China compared to the international market are presented in the chart below:[10]

	China Market	International Market
Delay in Start Up	Excluded	Available
Design coverage	Limited	Wider cover available
Business Interruption	Limited	Wider cover available
Testing and Commissioning	Limited	Wider cover available
Consequential loss form wear and tear, corrosion etc	Excluded	Available
Strikes, riots and civil commotion	Excluded	Available
Legal liability during construction	Limited	Available
Terrorism	Excluded	Available

Regulatory barriers to entry	The Chinese market has undergone significant regulatory reform since 2001. Risks in the area of RE must be written by a licensed insurer or reinsurer and access to international markets is restricted. Especially for new areas such as RE, the ability to access international expertise and reinsurance capacity is key. There is also a restrictive use of foreign brokers due to limited access to the Chinese market. Regulatory provisions require that at least 50% of the risks are ceded to at least two domestic reinsurers. The balance of any risk remaining after local retention and cessation can then be placed outside of China. In the case of RE, even less business is ceded due to the higher retentions and smaller amounts. Reinsurance treaties are very broad in terms of the type of property and risks that can be covered. Treaty insurance can be cost effective as it allows much of the portfolio to be covered under one contract. On the other hand, certain aspects of coverage are generally excluded such as the testing and commissioning phases of construction insurance or DSU/BI consequential loss coverages. Individual risks can be covered through facultative insurance. From a financing perspective, these restrictions to mitigating project completion and revenue volatility with adequate risk transfer instruments are a major area of concern.

[10] derived from UNEP, Assessment of FRM Instruments, 2007, p. 65.

Lender insurance requirements	International financing requires insurance protection. Lenders and financiers can require consequential loss protection (DSU / BI), DSU from a marine peril, full faulty design and terrorism coverage. This is a key issue when the domestic markets do not underwrite those risks and that access to international capacity is restricted. Conditions and clauses are carefully designed to protect interests with regards to insurance inception at financial close; minimum notice of cancellation or change of terms; agreement with lenders; minimum levels of security; claims payment considerations; and waiver of rights of subrogation. A rating of S&P (Standard & Poor's) A- is considered as a minimum level of insurer security. Since the local Chinese insurers have no ratings, brokers normally have only minimum guidelines with regards to insurer security and surplus. This could result in international lenders ceding the majority of the risk to a reinsurer who offers adequate rating. As in many countries, fronting is not looked at favorably by insurance regulators in China, and requires additional approval from the Chinese Insurance Regulatory Committee and other duties such as offering small retentions to local cedents. The claims and settlement process is also a key area to be verified. Freely assigned sponsors' rights, titles, interests, and cut-through clauses are used as means to bypass local insurers in the event of their insolvency so that the insured and lenders still receive claims payments. The growth potential of the Chinese renewable energy market is currently undermined by a lack of secure and broad insurance coverage. There is an inability to provide the required protection to international project developers, contractors, investors and financiers. This impedes the flow of future investments into RE projects, not only in China, but in the rest of Asia as well.

Key Terms

Term	Definition
CER	Certified Emission Reductions (CER) are climate credits for the reduction of emission reductions achieved by CDM (Clean Development Mechanism) projects. They must be issued and verified by the CDM institutions (executive board and control bodies) in order to be compliant with the Kyoto Protocol. For further details see Module 1.
Derivatives	Financial market instruments that derive their value from an underlying value or asset. Typical underlying assets are commodities (such as oil, gold, coffee, corn etc), equities, bonds, interest rates, exchange rates, indexes (stock market, consumer price), and weather conditions. The main types of derivatives are futures, forwards, options and swaps.
Market maturity	Market maturity is the state of progress of a certain insurance or financial market in a country. The level of maturity can be measured with the insurance penetration rate. This is the ratio between the insurance premium volume and the Gross Domestic Product (GDP).A ratio below 3% is considered to be low penetration. Another measure for maturity is the level of competition e.g. the number, ownership and competitive behaviour of insurance players.
Monte Carlo Simulation	Monte Carlo simulations or methods are computational algorithms. They use random or stochastic sampling input to compute results. The sampling input takes into consideration extreme events and probability distributions.
PPA	PPA (Power Purchasing Agreement) is a long-term agreement to buy power from a company that produces electricity. It constitutes a legal contract between the electricity produces and a purchaser of energy (also referred to as offtaker).
Offtaker	Offtaker is the counterpart who purchases energy from the producer. Often the offtaker and the producer set up a long-term agreement in the form of a PPA. Offtaker might default or withdraw from a project. This constitutes a significant contractual risk for the project owner.
Regulatory requirements	Insurance is regulated by regulatory authorities - in most cases on the federal or state level. Regulatory requirements for example include the minimum capital requirements for insurers, the licensing criteria, provisions with regards to domestic and foreign insurers and brokers, as well as provisions with regards to treaty clauses, mandatory coverages and exclusions.

Lesson Review

Case study China wind project

The findings of the study indicate that certain financial risk management (FRM) instruments can have a significant positive impact on project economics such as default rate or IRR. Project completion risks and revenue volatility can be efficiently mitigated with the use of FRM instruments.

The analysis shows that traditional insurance products have a positive impact on project economics during the construction and operating phase. In particular, the default rates can be reduced, the debt service cash reserves can be increased, and the present value of cash flow can be enhanced. Overall these measures enhance the confidence level of lenders and allow the project to raise the required level of debt at a S&P BBB rating. Other FRM instruments also have a positive impact in certain areas. Political risk insurance and CER futures further lower the expected default rate. However new instruments such as wind derivatives are still prohibitively expensive. Their positive impact on project economics is hampered by too-high costs.

Improved power purchase agreements (PPA) and positive CER price developments can also significantly enhance the internal rate of revenue (IRR).

There are practical considerations with regards to the suitability of certain FRM instruments in developing countries. Despite the conceptual value of the instruments, real barriers to deployment exist such as lack of suitable risk information or the underdeveloped financial markets in many developing countries.

In China especially, the lack of underwriting skills and the strict regulatory restrictions on foreign insurers reduce the availability of certain products and coverages. The lack of DSU and BI insurance coverages in particular are viewed negatively by international lenders and financiers. It is essential to understand that these challenges must be overcome in order to achieve the significant projected uptake of RE in China.

Further Readings and Related Links

UN Publications	
UNEP	http://www.unep.fr
UNEP FI	http://www.unepfi.org
Full case study "Assessment of Financial Risk Management Instruments for Renewable Energy Projects, UNEP Working Group 1 Study Report", published by Marsh Ltd and UNEP Division of Technology, Industry and Economics (DTIE), 2007 can be downloaded from the project website, at http://www.unep.fr/energy/projects/frm/doc/UNEP%20WorkingGroup1Report2007.pdf	

Test

Question 1

What is offtaker withdrawal risk?

Answers:

This risk involves the withdrawal of the offtaker from contract after the financial closing date and after the project is operating. This risk is similar to offtaker default risk but due to the shorter timeframe, this risk is less likely to occur.	☐ Check if Correct
This risk involves the withdrawal of the offtaker from contract after the financial closing date but before the project is operating. This risk is similar to offtaker default risk but due to the shorter timeframe, this risk is less likely to occur.	☑ Check if Correct
This risk involves the withdrawal of the offtaker from contract after the financial closing date and after the project is operating. This risk is similar to offtaker default risk and the same likeliness to occur.	☐ Check if Correct
None of the above.	☐ Check if Correct

Question 2

Which statement with regards to CER risks is wrong?

Answers:

CER bankability risk concerns the risk of CERs not being recognized as bankable revenue streams, and therefore not being able to support debt service obligations.	☐ Check if Correct
CER insolvency risk concerns the risk of CER delivery shortfall or failure due to insolvency of project proponents.	☐ Check if Correct
CER marketability risk concerns the risk of CER marketability before the current deadline of the Kyoto Protocol expires. This is a fundamental market risk and will have the greatest impact on the CER revenue stream before 2012.	☑ Check if Correct
CER regulatory risk concerns the risk of CER delivery shortfall or failure due to changes in the Kyoto Protocol's regulatory framework. This could relate to changes to the baseline methodology and monitoring procedures, or in the additionality rules and other eligibility criteria.	☐ Check if Correct

Question 3

What is DSCR?

Answers:

This is the debt service coverage ratio. It measures the ratio of available cash flows to the debt service (interest and repayment) for the period of the debt term.	☑ Check if Correct
This is the discounted synergies coverage ratio. It measures the ratio of discounted project synergies to the debt service (interest and repayment) for the period of the debt term.	☐ Check if Correct
This is the debt service cash ratio. It measures the available cash in-flows to the cash out-flows for debt interest payments for the period of the debt term.	☐ Check if Correct
None of the above.	☐ Check if Correct

Question 4

What are typical characteristics describing the suitability of RE in emerging countries?

Answers:

Evolving and emerging product status, and very few underwriting information required.	☐ Check if Correct
Evolving and emerging product status and, and low financial market sophistication.	☑ Check if Correct
Already mature product status, but low financial market sophistication.	☐ Check if Correct
Evolving and emerging product status, but lower risk premiums associated with many products.	☐ Check if Correct

Question 5

Which of the following statements is true?

Answers:

Typically in emerging and developing countries, regulatory barriers to entry still exist. In many countries, regulatory provisions require a minimum cession amount to domestic reinsurers. Also there are no foreign brokers allowed.	☐ Check if Correct
Typically in emerging and developing countries, regulatory barriers to entry still exist. In many countries, regulatory provisions require a minimum cession amount to domestic reinsurers. However foreign brokers are explicitly allowed in these cases.	☐ Check if Correct
Typically in emerging and developing countries, most regulatory barriers to entry have already been removed. This is also valid for RE projects.	☐ Check if Correct
None of the above.	☑ Check if Correct