



United Nations Environment Programme

Terminal Evaluation of Project GF/4040-05-09 (4826) Assessment of Risk Management Instruments for Financing Renewable Energy

Evaluation Office

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Table of Content

Table of Content.....	2
Acronyms and Abbreviations.....	3
Executive Summary	5
I. Evaluation Backround.....	5
A. Context	7
B. The Project.....	11
1. Project rationale and objectives.....	11
2. Project Components (Tasks)	11
3. Project Organisation	14
4. Project financing	15
C. Evaluation objectives, scope and methodology.....	17
1. Evaluation purpose, key-questions and evaluation criteria.....	17
2. Timeframe and evaluation methodology.....	17
3. Evaluation limitations	18
II. Project Performance and Impacts	19
A. Attainment of objectives and planned results.....	19
a. Achievements of Outputs and Activities (tasks)	19
b. Relevance	23
c. Effectiveness.....	24
d. Efficiency	26
e. Review of Outcome to Impacts	26
B. Sustainability	28
a. Socio-political sustainability	29
b. Financial resources	29
c. Institutional framework and governance	29
d. Environmental sustainability.....	30
C. Catalytic role and replicability	30
a. incentives.....	31
b. champions.....	31
c. policy changes	31
d. catalytic financing	32
DProcess of affecting attainment of project results.....	32
D1.Preparation and readiness	32
D2 Implementation approach and Adaptive Management.....	33
D3. Stakeholder Participation and Public Awareness	33
D4. Country ownership/driven-ness.....	34
D5. Financial planning and management.....	35
D6. UNEP Supervision and Backstopping.....	36
D7. Monitoring and Evaluation.....	36
a. M&E Design.....	36
b. M&E Plan Implementation	37
c. Budget for M&E activities	37
III. Conclusions and Recommendations.....	37
A. Conclusions	37
B. Lessons Learned	41
C. Recommendations	41

Acronyms and Abbreviations

BASE	Basel Agency for Sustainable Energy
BDA	Bilateral Development Agency
BI	Business Interruption (insurance)
BM	Biomass
CAR	Construction All Risk (insurance)
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CFI	Commercial Financial Institutes
DSCR	Debt Service Cover Ratio
DSU	Delay in Start Up (insurance)
ECA	Export Credit Agency
EE	Energy Efficiency
EKF	Eksport Kredit Fund (Danish ECA)
EPC	Engineering, Procurement and Construction (contracts)
ERPA	Emission Reduction Purchase Agreement
FRM	Financial Risk Management
FRMI	Financial Risk Management Instrument
FY	Fiscal Year
GEB	Global Environment Benefit
GEF	Global Environment Fund
GHG	Green House Gas
KfW	Kreditanstalt für Wiederaufbau
IRR	Internal Rate of Return
MDA	Multilateral Development Agency
MFI	Multilateral Finance Institution
MIGA	Multilateral Investment Guaranty Agency
MW	Megawatt
NAMA	National Appropriate Mitigation Action
OAR	Operating All Risk (insurance)
PAS	Program Assessment and Supervision
PIR	Project Implementation Report
PM	Project Manager
PMU	Project Management Unit
PPA	Power Purchase Agreement
R&D	Research & Development
RE	Renewable Energy
RET	Renewable Energy Technology
ROI	Review of Outcomes towards Impacts
SEFI	Sustainable Energy Finance Initiative
SHS	Solar Home Systems
SSRE	Small Scale Renewable Energy
STAP	Scientific and Technical Advisory Panel of the GEF
ToR	Terms of Reference
UNEP	United Nations Environment Program
UNEP DTIE	UNEP Division for Technology, Industry and Economics
UNFCCC	UN Framework Convention on Climate Change
URC	UNEP RISØ Centre on Energy, Climate and Sustainable Development

Project General Information¹

Project Title	Assessment of Financial Risk Management Instruments for Renewable Energy Projects		
Executing Agency	UNEP DTIE		
Project partners	World Bank, UNDP, Private Sector Partners		
Geographical Scope	Global		
Participating countries	Global		
GEF project ID	2538	IMIS Number	PMS GF/4040-05
Focal Area(s)	Climate Change	GEF OP	6
GEF Strategic Priority/Objective	CC2 Increased Access to Local Sources of Financing for Renewable Energy and Energy Efficiency	GEF Approval Date	
UNEP Approval date	March 2005	First disbursement	18 April 2005
Actual start date	April 2005	Planned duration	24 months
Intended completion date	March 2007	Actual or Expected completion date	December 2008
Project type	MSP	GEF Allocation	USD 969,000
PDF GEF costs	0	PDF Co-financing	0
Expected MSF/FSP Co-financing	USD 165,000	Total Cost	USD 1,461,000
Mid-term review/eval. (planned date)	N/A	Terminal Evaluation (actual date)	October 2011
Mid-term review/eval. (actual date)	N/A	No. of revisions	3
Date of last Steering Committee meeting	6 December 2006	Date of last revisions	July 2008
Disbursement as of 30 June 2009	USD 980,933	Date of financial closure	June 2010 (expected)
Date of completion	N/A	Actual expenditures reported as of 30 June 2009	USD 980,670
Total co-financing realized as of June 2007	USD 120,000	Actual expenditures entered in IMIS as of 30 June 2009	USD 673,094
Leveraged financing	N/A		

¹ Updated version(the original table is included in the UNEP GEF PIR FY09 and the Evaluation Terms of Reference)

Executive Summary

- Renewable Energy Technologies (RETs) aim to satisfy countries' increasing power demand with cleaner energy and, at the same time, making them less dependent on imported fuels. Numerous barriers exist of financial, legal and political character hampering RET projects in gaining a wider use. The perceived risks for implementing and operating RET projects often prevent project developers from investing. The financing of RET projects is faced with long pay-back periods demanding investing grade creditworthiness of the project implementer or, for larger energy/infrastructure projects, guaranties for repayment of the loans. Financial Risk Management Instruments (FMRI) - such as contracts, insurances, contingent capital and credit enhancement products - may be required to mitigate or transfer some of the risks associated with RET project financing in developing countries. The Global Environment Fund (GEF) has set as a strategic priority to increase funding availability to RET projects by leveraging private financing, and it has on an ad-hoc basis tested different contingent finance mechanisms to mitigate the risks and the high costs of project development.
- As banks/investors require an adequate knowledge of the likely risks an initiative is exposed to before agreeing to a loan, and as different models for financing reduce or increase the bank's exposure and the provision of security, the project "Assessment of Risk Management Instruments for Financing Renewable Energy" aimed to systematically review which risk management instruments are available to meet investors' needs, creating in this way a catalogue of available instruments to be used by new bilateral or multilateral RET projects programme managers during the planning phase.² The overall objective of the project was to "facilitate Green House Gas (GHG) emission reductions by a broader deployment of RET projects through improved availability of FRMIs". The expected project outcomes were to: i) identify and get GEF (and other donors) increasingly adopt best practice methodologies for financial risk management for RET projects, and; ii) facilitate greater engagement by the private sector financial institutions in RET risk management and financing in GEF eligible countries.
- The project successfully produced each of the programmed outputs in the ProDoc: reports by Working Groups and Feasibility Studies on Large Scale Renewable Energy Technologies; Small Scale Renewable Energy Risk Mitigation; and Financial Risk Management Instruments for Geothermal Energy Development Projects. Only a too ambitious plan for the resources available forced the Management to reduce the number of Working Groups and Feasibility Studies. Savings were used to produce an integrated training kit on risk management for renewable projects, now available on-line, which was appreciated.
- The project contributed to creating an alliance of insurance companies dealing with RE projects in GEF countries. An IT platform was chosen as marketing channel. Much effort was vested in the initiative, and information was disseminated at international climate conferences by the coordinator of the initiative from Carbon Re and in UNEP SEFI reports. Although the platform received several requests, none has led to insurance business. The platform success will highly depend on establishing trustworthy relationships to the financing banks.
- Overall, while the project produced all the outputs as planned, it did not achieve any high-level results or long-term impact. A proposal was drafted for a full scale follow-up GEF funded project in 2009, but this was however not approved. It is the impression of the

² Communiqué from the Sustainable Energy and Finance Initiative (SEFI) and Renewables meeting "Creating the Climate for Change, Sustainable Energy and Finance", Bonn, June 2004

evaluator that it was too early for it, and that some more policy work (as the three policy papers later produced by SEFI) was needed as a preparatory step.

- It is not possible to attain the ambitious investment levels in climate change mitigation (and even adaptation, if we think of Energy efficiency investments) advocated for by the international community if appropriate risk management instruments are not made available on the markets. This depends also on the maturity of the financing and insurance sectors, as well as of an adequate regulatory framework. The insurance and finance industries have been working a lot in this sense and have sufficient resources of their own to market re-insurance products. However, little interaction with public entities has been taking place. UNEP and the GEF have a unique chance to accelerate the process and produce higher-level and sustainable results, influencing the political conditions in the individual countries and entering into risk sharing programmes. Independently of the decision to propose a phase II to the project, it is also of utmost importance that UNEP and the GEF continue to use the project's outputs to enhance awareness through future initiatives when participating in GEF financed/supported projects, or when assisting countries in the formulation of FRMI packages in the coming NAMAs.

I. Evaluation Background

A. Context

1. Renewable Energy Technologies (RETs) aim to satisfy countries' increasing power demand with cleaner energy and, at the same time, making them less dependent on imported fuels. Numerous barriers exist of financial, legal and political character hampering RET projects in gaining a wider use. Developing countries have enacted few policies to facilitate the use of RETs. Political/economic instability, market distortions, and the lack of a clear regulatory framework combine with limited knowledge and expertise among policy makers in making the implementation of RET projects more difficult. To facilitate the deployment of RETs, some steps are to be taken, including: improving policy frameworks, establishing successful Public Private Partnerships, enhancing access to venture capital, and improving the deals through the use of Financial Risk Management Instruments (FRMIs).³
2. The perceived risks for implementing and operating RET projects often prevent project developers from investing. The financing of RET projects is faced with long pay-back periods demanding investing grade creditworthiness of the project implementer or, for larger energy/infrastructure projects, guaranties for repayment of the loans. Financial Risk Management Instruments (FMRIs) - such as contracts, insurances, contingent capital and credit enhancement products - may be required to mitigate or transfer some of the risks associated with RET project financing in developing countries, thereby reducing the cost of capital and mobilizing more private capital flows to the sector. Standard insurance products may be partly available through local insurance and reinsurance brokers, who then place insured risks directly on international markets. These have however underwriting restrictions because of difficult reinsurance procedures and low capacities on the international markets.
3. For medium sized projects involving foreign private companies either as equipment exporters or as investors/developers, one of the options is to obtain guaranties from Export Credit Agencies (ECAs). ECAs may typically guarantee 80 to 100 % of the supplies/investment costs of the financing bank typically domiciled in the country of the ECA. The bank might then share the project financing with other banks in the developing or emerging countries reducing the exchange rate risks. The premium to pay depends on the type of project, the risks involved, the project partners and the country in which the project is situated. Yet, as the production and delivery of energy is paid in local currency, exchange rate risks linked to repaying a loan in foreign currency may still prevent the investor from starting a project. To obviate this obstacle, instruments such as the Clean Development Mechanism (CDM) of the Kyoto protocol generate Carbon Emission Reduction Rights which are saleable on the world market against hard currency. This both provides some security against exchange rate variations and increases the rate of return of a RET. The process and the cost of having these rights registered is however still complicated and long, adding other risks to a project.
4. The Global Environment Fund (GEF) has set as a strategic priority to increase funding availability to RET projects by leveraging private financing, and it has on an ad-hoc basis tested different contingent finance mechanisms to mitigate the risks and the high costs of project development. The Sustainable Energy Finance Initiative (SEFI) had introduced

³ Communiqué from the Sustainable Energy and Finance Initiative (SEFI) and Renewables meeting "Creating the Climate for Change, Sustainable Energy and Finance", Bonn, June 2004

new approaches to financing sustainable RET projects already before 2004, when the project under assessment was proposed for GEF financing. Among others, the “Loan Program for Solar Home Systems in Karnataka State, India” – which was managed by UNEP RISØ Centre starting in October 2002 and which can be considered as a predecessor to the project under assessment – proved that eliminating/reducing the financial risks for local banks committing funds to small scale renewable energy projects could activate larger private loan capital. A reserve fund was set up as guarantee to local banks providing loans for private solar panels’ power production. Success was achieved at low cost, as UNEP only secured the banks against losses in case of no repayment of loan up to the amount being available on the reserve fund. The amount to cover poor performance increased every month, as the sales of solar panels financed by loans increased and UNEP transferred a proportional share from an Escrow project fund to the reserve fund. The bank had access to the reserve fund against documented defaults of loan amortisation. In addition to this, the risk of technical defaults of the photo voltaic panels was secured by establishing qualification criteria for vendors. Only solar panels from approved vendors were covered by the guaranty reserve fund.

5. To mention another example of a project aiming to promote private sector investments in RETs⁴, in 2000 GEF allocated 12 million USD to the development of a 98 million USD wind farm in China. USD 6 million was a direct financial support in the form of grant, whereas the other 6 million was an interest-free contingent loan to be repaid if the wind farm was successful, or converted into a grant in the case it was not.
6. As banks/investors require an adequate knowledge of the likely risks an initiative is exposed to before agreeing to a loan, and as different models for financing reduce or increase the bank’s exposure and the provision of security, the project “Assessment of Risk Management Instruments for Financing Renewable Energy” aimed to systematically review which risk management instruments are available to meet investors’ needs, creating in this way a catalogue of available instruments to be used by new bilateral or multilateral RET projects programme managers during the planning phase.
7. In order to speed up the progress of the project prior to its approval, a “Scoping Study on Financial Risk Management Instruments for Renewable Energy Projects” was initiated under the SEFI frame. This study divides the risks in commercial and non-commercial risks (events which are fully or in part outside the control of the project, but which still have an implication on the business success rate), as illustrated in the table 1 overleaf. For larger scale RET projects (such as large hydropower plants) financed by soft loans in developing countries, the guarantee against a loss may come from sovereign guaranties or other multilateral insurance credit agencies such as the World Bank Multilateral Investment Guaranty Agency (MIGA). As this kind of guarantee is an all-inclusive FRMI, these projects have no further requirements for FRMIs. They will however need them in a second phase, as amortised loans need normal insurance products covering the operation risks. For medium scale projects (and even larger scale, where the investor is a power utility company such as E.On, EdF, EdP, Suez or other national power utility companies in the developing or emerging market countries), private sector banks might approve the loan on the company’s balance sheet with no further security requirement, if the company has and maintains investor grade credit rating (with or without ECA guarantee to cover the political risk). The likelihood of professional power companies requiring insurance cover for more exotic risks - such as weather derivatives or emission reduction price caps

⁴ Example given in the Reference study by MARSH in association with Ted Olivier, Andlug Consulting and Rödl and Partner “Scoping Study on Financial Risk Management Instruments for Renewable Energy Projects SEFI, UNDP page125

- is low, as premiums in general are higher than the risks/profits at stake. However, professional risk cover during construction period and operation period is any case required. The maturity of the financial sector institutes and the regulatory regime in the country play an important role in this respect. For other project developers, and for power companies which want a non-recourse project risk cover, a private bank will scrutinise the equity level available in the project, the expected Debt Service Cover Ratio (DSCR) and the project risks. The security of the banks (and the project developer) lies here in sufficient insurance policy cover for events which could severely influence the cash flow of the project. In this case, all kinds of FRMI are relevant.

Table 1: Commercial and non-commercial risks for RET projects

		Commercial Risks				Non-Commercial Risks	
Financial Risks		Operational Risks		Business Risks		Country & Event Risks	
Risk	Sub-Risk	Risk	Sub-Risk	Risk	Sub-Risk	Risk	Sub-Risk
Balance Sheet	D/E Structure Asset Liability Provisions Write-downs Derivatives	Business Strategy & Market	Marketing Mkt.Demand Product Price Resources Technology Support	Legal	Laws Documen- tation Judiciary Enforcement Litigation Liability	Political	Confiscation Expropriation Nationalisation Deprivation Breach of Contract Sub- Sovereign
Income Statement	Structure Profitability R-o-Assets Debt Service Revenue Risk Capital Cost Ops. Cost Derivatives	Mgt. Systems & Operations	Production Human Financial IT Training Control Int. Audit Security	Policy Change	Taxation Inflation Exch. Rate Ind. /Sector Labour Social Regulatory Tariff	Credit-worthiness	Sovereign Provincial Local Municipal
Capital Adequacy	Equity Quasi-equity Debt Burden Off-B/Sheet	Technology	New Proven Equipment Sequence Training	Financial System	Payments Services Credit Soundness Access	War & Conflict	Civil Border Regional Terrorism
Credit	Borrower Sub-borrower Guarantor Supplier Customer Agent	Fraud & Corruption	Shareholder Employee Supplier Customer 3rd Party Government	Business Support	Accounting Auditing IT Support Recruitment Consulting	Natural Event	Earthquake Coastal Calamity Mudslides Drought Flood Famine
Liquidity	Cash Cash-flow Curr. Assets Curr.Liability Intrst Cover	Business Disruption	Int. Factors Ext. Factors Acts of God Infrastructure Accidents	Infra-structure Service Failure	Transport Power Water Drainage Telecoms	Policy Failure Event	Banking crisis Financial crisis Cap. Mkt. crisis Fiscal crisis Labour crisis
Interest Rate	Domestic Foreign Long-Term Short-Term			Environ-mental Factors	Air Pollution Water Pollutn Soil Erosion Land Rehab. Acid Rain Oil spills Gas leaks Radiation Mine leakage	Global Event Impact	War elsewhere September 11th Oil Price Shock Global Cap. Mkt. Dollar Crisis
Currency	Volatility Convertibility Remittance 3rd Currency			Compe-tition	Foreign Domestic New entrant Dropout	Civil Society Pressures	Boycotts Sanctions Threats to Property Threats to People

Source: GEF SEFI scoping study, by MARSH in association with Ted Oliver, Andlung Consulting and Rödl and Partners.

B. The Project

1. Project rationale and objectives

8. The overall objective of the project was to “facilitate Green House Gas (GHG) emission reductions by a broader deployment of RET projects through improved availability of FRMIs”. No limitation was given to the kind and size of RETs to be considered, as to countries to be covered (apart from being GEF eligible ones).
9. The expected project outcomes were the following:
 - Best practice methodologies for financial risk management for RET projects identified and increasingly adopted by GEF (and other donors);
 - Facilitation of greater engagement by the private sector financial institutions in RET risk management and financing in GEF eligible countries.
10. The project aimed to achieve these objectives by providing:
 - A baseline assessment of the sources and nature of risks associated with financing RET projects and current risk management instruments/practices for RET projects;
 - An evaluation and an identification of promising modalities of Risk Management Instruments for RET projects where private sector could play an active role;
 - An assessment of the potential role of GEF, public financial institutions and donors in helping promoting the development and application of risk management instruments in GEF eligible countries;
 - Feasibility studies on selected risk management instruments in GEF eligible countries to estimate the market prospects and suggest options for GEF and other donors in the area of risk management interventions for RET projects.

2. Project Components (Tasks)

Table 2: Project’s components (initial plan)

Task	Output	Activities	Timing (month)
1. Identify the risks that can be effectively managed through financial risk management instruments by analysing the sources and nature of the risks	Report which includes: - baseline assessment of the sources and nature of risks associated with financing RET projects - identification of risks where financial risk management can play a significant role	<ul style="list-style-type: none"> • Taxonomies of sources and nature of the risks associated with investment in RET projects according to technology types and typical project characteristics (e.g. investment size and proponent profiles) • Identification of types of risks that could be effectively addressed through financial risk management instruments 	By 4
2. Review existing risk management instruments for RET projects and the role	(cont.) - baseline assessment of	<ul style="list-style-type: none"> • Brief overview of the role of financial risk management 	

these instruments play in financing RET projects	financial risk management instruments for RET projects	instruments for financing conventional energy projects <ul style="list-style-type: none"> • Determine current role and availability of risk management instruments for financing RET projects 	
3. Examine possible scope for developing new financial risk management instruments	(cont.) - identification of scope for financing developing risk management instruments for RET projects in developing countries and key barriers to their development		
4. Conduct consultations on current risk management for RET projects, the associated barriers and possible scope for developing new and emerging instruments Specify focus areas of work with high potential of successful interventions to form 4-6 working groups	Summarized consultation results on the review of current risk management for RET projects, the associated barriers and possible scope for developing new instruments ToR for research by 4-6 working groups discussed		4-5
5. Conduct research by working groups	4-6 working groups reports with detailed analyses on risk management instruments in respective focus areas	<ul style="list-style-type: none"> • Examine possible scope for enhancing financing opportunities for RET projects through new and emerging risk management instruments in respective focus areas. • Examine practicability and constraints of developing such instruments in GEF eligible countries, delineating the risks that the private sector could assume and those it cannot, and recommend possible modalities of instruments in respective focus areas. 	5-10
6. Share the WG research results and conduct consultations on	Summarised consultation results on the research conducted by WGs and		10-11

recommended risk management instruments	recommended risk management instruments		
7. Consolidate the research and suggest modalities of recommended risk management instruments	A peer-reviewed consolidated report, describing the results of the research activities (Task 1-6) and suggesting recommended modalities of risk management instruments for RET projects		12- 15
8. Feasibility studies: estimate market prospects for selected recommended risk management instruments	5-10 feasibility studies on selected risk management instruments in GEF eligible countries		16-21
9. Consolidate the feasibility studies' analyses and suggest options for risk management interventions for the GEF and other donors	Report including: - summary of feasibility studies' results - recommendations on options for risk management interventions by GEF and other donors		22
10. Conduct an international workshop to disseminate the results and reinforce partnerships among relevant stakeholders	Workshop proceedings including presentations and summarised experts' views on the recommended risk management instruments		22-23
11. Based on the results of the assessment and the feasibility studies, identify follow-up activities where recommended risk management instruments could be applied in partnerships with GEF or other donors	A new programme based on identified opportunities for actual application of recommended risk management instruments in GEF eligible countries		22-24

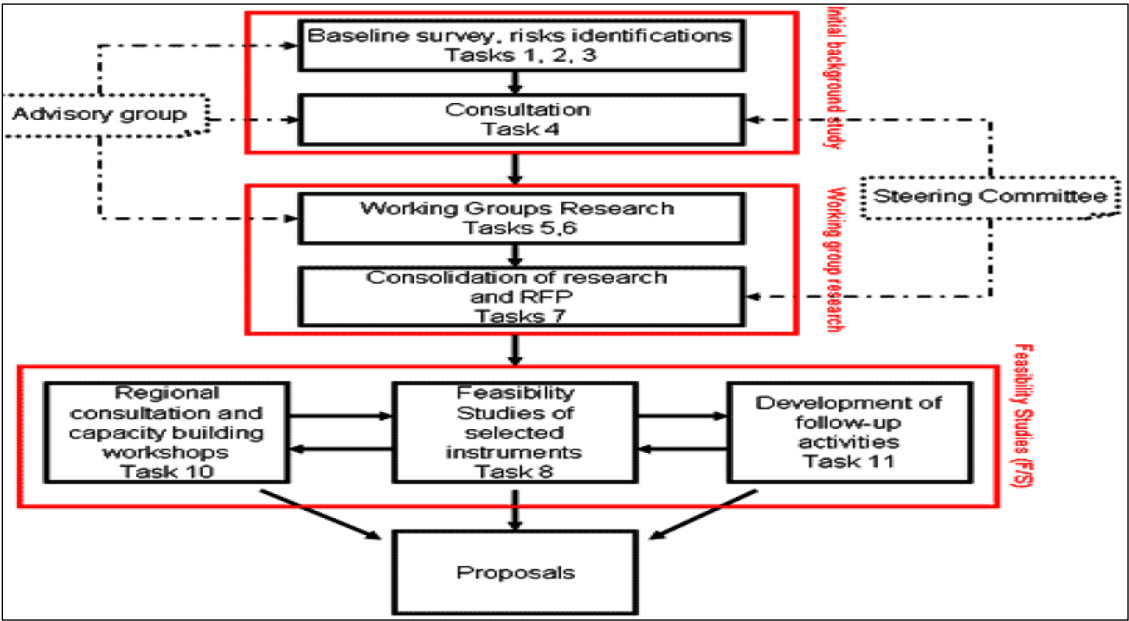
11. For all but task 11 (identification of follow-up activities), outputs were to be filed and published on the project's web site. However, as the Project Management Unit (PMU) acknowledged the complexity of transmitting all the various findings of the project using reports published on the project's web-site only, in the last phase of the project the PM decided to divert some resources to the production of a (not previously planned) well-structured and comprehensive training kit on insurance risk management for different types of RET projects. The kit includes the following modules:

- Climate Change
- Renewable Energy Technologies and Risks.
- Underwriting Guidelines and Policy.
- Claims management, reserving, and payment.
- Intermediaries and Networks.

3. Project Organisation

12. The project was initially managed by a project coordinator (L3) and, in the second phase, by a project manager (L2) from the Energy Branch of the UNEP Division of Technology Industry and Economics (DTIE). Single assessment tasks (reports) were delegated to consultants and private financial and insurance corporations specialized in the area of renewable energy finance and financial risk management, working in teams and corporate consortiums. The Working Groups (WGs) for the research tasks were managed by external task managers and coordinated by the project unit. The feasibility studies were prepared by insurance consortiums representing the different sectors of the industry (broker, insurer, and reinsurers) and coordinated by the project unit.
13. While the project proposal was still being finalised, several companies⁵ and organisations presented their interest in participating in the project. The stakeholder group (labelled as Advisory Group, see figure 1) exercised its advisory function during the first consultation meeting (task 4) on the recommendations/findings in the draft report of the baseline survey on risk identification (task 1-3), and later as members of the WGs (task 5) and/or in the second consultative meeting when the results of the WGs were discussed (included in task 6). The advisory group also reviewed the expressions of interest received for the preparation of feasibility studies, and recommended independent reviews as needed to assess market needs and evaluate which stakeholders needed to be involved.

Figure 1: Project Management Structure



⁵Munich RE, Garant, Dresdner Bank, GAIA Capital, EntergyKoch Trading Europe, Marsh Specialty Operations Limited, Marsh Finances, GSDP, EPIA, Roedl & Partner GbR, SIP, GTN, Auxilia, Andlug Consulting, 3C Climate Change Consulting GmbH, GERES, International Solar Energy Society, Lloyd Ascot Renewco, Royal & SunAlliance

Stakeholders from developing countries: Agence Nationale des Energies Renouvelables, KenGen, ANPPER, AMISOLE, CREIA, IREDA

Project developers: EC – DG Research, ADB, BCIE-CABEI, Development Bank of the Philippines

14. Contrary to the management arrangements described in the project's Terms of Reference, a permanent Steering committee⁶ as such was not formed but intervened in the project on an ad-hoc basis. One Steering Committee meeting was held on 6th December 2006⁷, as it was required to put the project back on track. The Steering Committee decided to change the project structure, and a new project manager took over from June 2007.
15. The project completion date was first postponed from March 2007 to May 2008, and later to December 2008, for multiple reasons, including: a six-month delay for the completion of the background study; the revision in the project's management arrangements, and; further delays in the completion of the reports of the WGs 1 and 2.

Figure 2: Project time schedule after the first revision

Task 1: April 2005 to July 2005 (Background study, identify risks for RET projects)
Task 2: April 2005 to July 2005 (review existing FMR instruments for RETs)
Task 3: July 2005 to January 2006 (analysis of possible scope for new FMR instruments)
Task 4: February 2006 (1 st consultative meeting took place 20-21 February 2006 in Paris)
Task 5: March 2006 to December 2006 (WGs and main reports)
Task 6: January 2007 to July 2007 (starting with 2 nd consultative meeting 6-7 December 2006)
Task 7: Mid July 2007 to mid-September 2007 (call for tenders Feasibility Studies)
Task 8: Mid-September 2007 to March 2007 (Feasibility Studies of new instruments)
Task 9: March 2008 (Consolidation of analyses and suggestion of options for FRMI)
Task10: March 2008 (International Workshop)
Task11: September 2007 to April 2008 (Identify and follow-up for application of recommended risk management instruments in partnership with GEF and other donors)

4. Project financing

16. The total budget for the project was set at USD 1,509,000, of which USD 994,000 provided by the GEF. The project was expected to mobilize another USD 515,000 in co-financing (both in-kind and cash contributions) from multiple partners. In-kind contributions from stakeholders were expected to cover participation in consultation meetings (including the final dissemination workshop), contribution to the research and the feasibility studies through interviews and reviews.

Table3: Project sources of funds

GEF Component	969,000
PDF A (GEF)	25,000
Sub-total GEF	994,000

⁶ The Steering Committee - composed of representatives from the World Bank, UNDP, GEF Secretariat and the Scientific and Technical Advisory Panel(STAP) - was intended to provide general guidance on project direction and outcomes, as well as to assist the Project Management Unit (PMU) in developing linkages with other projects.

⁷ Documented in PAS March 2005-April 2008.

Co-financing	
PDF co-financing (UNEP cash and in-kind)	23,000
World Bank (in-kind)	13,000
UNEP (cash from SEFI)	30,000
UNEP (in-kind from SEFI)	50,000
Industry (in-kind)	264,000
Industry (cash/ in-kind for feasibility studies)	120,000
SIP (cash)	15,000
Sub-total co-financing	515,000
Total project financing	1,509,000
Total MSP Financing	1,461,000

17. The ProDoc estimated a budgetary breakdown by task/activity as well (Table 4).

Table 4: Project budget (estimated, USD)

Task	Sub-contract	Travel	Miscellaneous			Personnel	Co-finance		Total by Task
			Mktg Costs	Publ.	Com m.		Cash	In-kind / Travel	
PDFA	20000		5000				18000	5000	48000
1	20000	5000				12000		5000	42000
2	20000					12000	10000	5000	52000
3	20000	5000				12000	12000	5000	82000
4	40000	20000	5000			15000		37000	97000
5	86000	18000				12000		25000	141000
6	20000	20000				15000		37000	97000
7	40000	5000				15000		5000	65000
8	25000	60000				15000		151000	476000
9	30000	5000		15000		12000		5000	67000
10	30000	50000	15000		5000	18000	15000	142000	275000
11	20000	5000				12000	15000	15000	67000
Total	596000	198000	30000	15000	5000	150000	78000	437000	1509000

18. The project budget was revised in the course of the project implementation, and reduced in the amount of USD 139,308.75. These funds were transferred to a sub-project (GFL/4828) to cater for payment of consulting fees associated with the accomplishment of the feasibility studies by the UNEP BASE collaborating centre.

C. Evaluation objectives, scope and methodology

1. Evaluation purpose, key-questions and evaluation criteria

19. The evaluation has two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote learning, feedback and knowledge sharing among UNEP, the GEF and their partners by identifying lessons of operational relevance for future project formulation and implementation.
20. The evaluation focused on the following set of key questions, based on the project objective and intended outcomes:
 - a) Was the project successful in identifying best practice methodologies for financial risk management, whose relevance has been acknowledged by the STAP, GEF and other stakeholders?
 - b) To what extent have the financial risk management instruments for RE projects generated by the projects been up-taken and utilised in following interventions?
 - c) To what extent has the project promoted a greater engagement of private sector insurance and financial institutions in RET risk management and financing in GEF eligible countries?
 - d) To what extent have the project outputs finally contributed to a faster and more systematic deployment of renewable energy technologies by supporting and positively influencing the development of markets for RE project risk management instruments?
21. The evaluation criteria are grouped in three categories:
 - a) Attainment of objectives and planned results, which comprises: the assessment of activities implemented and outputs achieved, relevance, efficiency, effectiveness and the review of outcomes towards impacts (ROtI);
 - b) Sustainability and catalytic role, which focuses on: financial, socio-political, and institutional factors conditioning sustainability of project outcomes. It also assesses efforts and achievements in terms of replication and up-scaling of project lessons and identified good practices;
 - c) Processes affecting attainment of project results, which covers: project preparation and readiness, implementation approach and adaptive management, stakeholder participation and public awareness, country ownership/driven-ness, project finance management, UNEP supervision and backstopping, and project monitoring and evaluation systems.

2. Timeframe and evaluation methodology

22. The evaluation was conducted from 28th September 2011 (day the contract was signed) to 20th November 2011, when a zero draft evaluation report was sent for revision and quality assurance to the UNEP Evaluation Office. The evaluation report will be circulated to stakeholders for comments and finalized by February 2012⁸.

⁸ A first evaluation of the project “Assessment of Financial Risk Management Instruments for Renewable Energy Projects” started in January 2011 and was expected to be completed by July 2011. A UNEP Evaluation Officer conducted a number of interviews with key UNEP DTIE staff in Paris in March and delivered the results of the interviews to the then selected

23. The evaluation methodology included a desk review of all the project documents uploaded on the project's web site, as well as other relevant documents by the UNEP Sustainable Energy Finance Initiative (SEFI). This was followed by targeted investigations for detailed documentation on the operationalization of the project through tight phone and mail contacts to the project manager, the responsible head of department of UNEP DTIE at the time of the project execution, as well as to the present staff of UNEP DTIE. To get information on the effectiveness of the project and the likelihood to generate long term impact, the consultants contacted a sample of stakeholders who participated in the project, including staff from the World Bank, power equipment suppliers, power utilities, ECAs, external consultants, insurance and reinsurance companies, as well as companies working on RET projects.
24. The Review of Outcomes to Impact (ROtI) method⁹ was used to assess contribution of project's results towards generating a durable impact, and understand the difference between what "has happened with" and "what would have happened without" the project. In this case, the Global Environmental Benefit (GEB) impact to attain is to increase the number of RET projects in developing countries by using the analyses/findings and the FRM instruments proposed by this targeted research project. The extent to which the outputs of the project (the analyses) have generated outcomes in the form of best practice methodologies for FRM for RET projects increasingly being adopted resulting in GEB impacts, and the extent to which greater engagement by private sector financial institutions in RET project management risks has facilitated the process is examined in the following chapter.

3. Evaluation limitations

25. At the beginning of his assignment, the consultant was provided with a set of documents¹⁰ and a list of contact persons put together by the Evaluation Office. The list contained information on contact addresses which were collected during the execution of the project 6 to 4 years earlier. When finally contact was successfully made to the PM¹¹ most of the deficiencies as to the project documentation relating to the execution were obtained, forming thus the base for the evaluation.
26. Despite the support of UNEP DTIE in the form of an introduction letter, contacts with stakeholders through questionnaire and interviews were often not possible as half of the e-mails were returned due to unknown addresses (change of jobs/companies) and replies were in any case not forthcoming. A selected number of persons/organisations were contacted directly by phone to acquire data. As the evaluation was performed as a desk evaluation, the evaluator used his personal contacts in Germany and in Denmark¹² to follow-up on project's results.

consultant who, however, abruptly resigned from the job with no output produced. Mr Frydenberg was then hired to undertake the evaluation.

⁹ See Annex 5

¹⁰ The project documents are listed in Annex 3 and consist of over 1000-pages reports and of the training kit in insurance FMR instruments

¹¹ The project manager for the second phase of the project had in the meanwhile left UNEP and moved working in another UN body.

¹² Personal follow-up requests have been made to Siemens, EdF, Codan (RSA), Munich RE, EKF (the Danish ECA) and RISOE Centre.

II. Project Performance and Impacts

A. Attainment of objectives and planned results

a. Achievements of Outputs and Activities (tasks)

27. The project has successfully produced each of the programmed outputs in the ProDoc. A Background Study (tasks 1 to 3) was produced, starting in April 2005, by IT Power India Pvt. Ltd, with the collaboration of Mirador Consulting Ltd (for the financial risk management instruments in developing countries) and of Marsh Ltd (for the Global Insurance Survey). The output was a 118 pages report, structured around the following themes: Large Scale Projects, Small Scale Projects, Geothermal Projects and Carbon Financed Projects. The report also differentiated as to what stage the RET is in, being Research & Development (R&D) stage/demonstration stage requiring government support, or being in a commercialisation/market-driven stage where market-based solutions could apply to mitigate the project risks.¹³ The geographical variation in terms, condition and instruments was covered through a country survey:

- Latin America: Brazil, Chile and Mexico
- Asia: China, India and Vietnam
- Africa: South Africa, Senegal and Morocco

28. The background study formed the base for following activities performed within Working Groups and agreed upon at the first consultative meeting in Paris in February 2006 (task 4). Three Working Groups, a reduction from the 4-6 foreseen in the ProDoc, were formed:

- Working Group 1: Large Scale Renewable Energy Technologies;
- Working Group 2: Small Scale Renewable Energy Risk Mitigation;
- Working Group 3: Financial Risk Management Instruments for Geothermal Energy Development Projects.

29. WG 1 was managed by the insurance broking company Marsh Ltd, who had already been involved in the publication of the background study and, prior to this, hired by the SEFI programme to produce the “Scoping Study of Financial Risk Management Instruments for Renewable Energy Projects”. The produced outcome by WG 1 was an 80 page report “Assessment of Financial Risk Instruments for Renewable Energy Projects” directed towards large scale projects. The assessment of FRMIs for large scale renewable energy projects was illustrated by using a 1000 MW wind farm in China and a 50 MW biomass power plant in India as examples. For both, a risk engineering study was presented¹⁴.

¹³Solar Thermal power production and Fuel Cells are at a R&D stage; off-shore wind, wave and tidal, hybrid and thermal dryers are at demonstration stage. In the stage of early commercialisation are: Biomass (all types, which is not totally correct as in Denmark this kind of projects have been in operation for several decades in various market-driven situations), Solar PV, Geo Thermal, Small Wind Turbines, Mini/Micro/Pico Hydro, Small scale Biomass, Solar PV Lightning, Solar PV Pumping and Solar Thermal Cookers. From the study it appears that only the wind on-shore RET, small hydro and thermal solar heaters are in a market-driven position.

¹⁴ For details, see the power points presented at the 2nd meeting of 6th -7th December 2006, which can be found on the project web site. The insurance rate / annual premium for the various types of insurances which are used for the model calculation are indicated on Power Point 21. In particular the rate for Wind derivative and CER price protection are in the high end with respectively 17% and 5% of the policy limit.

Insurance instruments such as Construction All Risk (CAR), Delays in Start-Up (DSU) or Business Interruptions (e.g. traditional products) are mandatory for debt securing. Weather derivatives for wind or biomass production, if at all possible, will hardly improve the Internal Rate of Return (IRR). Further access to insurance products from local underwriters is limited and in developing countries even further restricted as RE insurers will be reluctant to be involved with back cover. This study, as the other produced by Marsh Ltd, is comprehensive and informative, describing existing insurance and other FRMI and opening up for a number of new ideas about FRMIs, although less than the other products by Marsh. The risk assessment - which is the main focus of the WG 1 report - is better illustrated in the training kit; the report also omitted considering the potential application of World Bank MIGA insurance products.¹⁵

30. WG 2 was made up of a number of representatives from UNEP, the Basel Agency for Sustainable Energy, GEF and others with a profound experience from small scale RET projects in developing countries. The finalization of the WG report was managed by two highly qualified consultants, one from the Energy Efficiency and Finance Corporation and one from the Energy and Security Group. WG 2 made use of a UNEP working group for peer review, and the output produced (a 101 pages research paper) is comprehensive, covering FRM and other side issues. The assessment of FRMIs for small scale renewable energy (SSRE) projects was focussed on establishing an SSRE Financing Support Facility. The presentation and discussion at the second consultative group meeting focused on the guaranty or soft loan on lending given towards vendors/local banks for debt services from end users. The possible inclusion of donor funds for covering the eventual losses as tier capital, avoiding market distortions and other practicalities as to secure vendor equipment standards and loan arrangements was further discussed. For SSRE, possible FRMIs are all non-insurance products. This is well explained in the WG 2 output, and several examples are given on public-private financed solutions. However, the report lacks consideration of ECA products.
31. WG 3 was managed by the World Bank, in collaboration with a specialist in geo-thermal technologies from Geo Hills Associates. The 80-page report considered the development phase risks and the operation phase risks, describing the Partial Risk Guarantee as a useful FRM instrument. The involvement of a commercial institute in financing (on non-recourse conditions) depends on whether the geothermal reservoir engineering survey and development report is at all bankable¹⁶. During the construction phase, the risk is normally covered by the contractor under an Engineering, Procurement and Construction (EPC) contract, whereas the design, procurement, construction and completion risks are transferred to the EPC contractor against an insurance risk premium included in the prize of the contract. In the operation phase, the normal insurance portfolio consists of property

¹⁵ In the Scoping Study “Financial Risk Management Instruments for Renewable Energy Projects” by Sustainable Energy Finance Initiative (SEFI) Multi Financial Institutions Risk Mitigation Products are well described (page 115-135)

¹⁶ As the major part of small scale RET projects is in the pre-commercial or early commercial development phase, Partial Risk Guaranties are realistically made by a non-insurance FRM (a donor supported Loss Reserve fund) which may make the project become viable. The cost of risk cover is a product of the probability of an event taking place and the cost of the event plus administrative charges. For example, a claim to an insurance company can be raised for a lost when the geo-thermal water production from it is below what is specified in the policy, in terms of volume per hour and temperature. The premium may be in the order of 25% of the cost of a borehole, and insurance companies typically make a backing cover with a re-insurance company. For the RE insurer to enter in such a venture, the insurance company (and the backing RE insurer) will closely analyse the quality of the hole line from a geological survey, the interpretation of results and due diligence paid by the project drilling experts in the risk assessment exercise. The respect of these pre-conditions is not always evident in developing countries.

insurance, business interruption insurance, earth quake insurance, catastrophic insurance, and general liability insurance. The insurance complex may further include payment risks from power purchase agreements (PPA) and emission right purchase agreements (ERPA). The report produced was of good quality and may be directly used for a RET project risk evaluation and for costs analysis in the choice of FRMIs. Importantly, the paper was produced in time for the 2nd consultative meeting in December 2006.

32. The outputs of the WGs (even those at a draft stage) were presented on the occasion of the second consultative meeting in December 2006, which served as a forum for knowledge exchange among risk management specialists and RE representatives. The presentations were of high quality. However, as only the report of WG 3 was ready before the meeting, detailed knowledge products on best practice FRMIs was lacking. The reports of WGs 1 and 2 – originally expected for presentation at the second consultative meeting in December 2006 and finally deferred to late 2007 - were later discussed within UNEP. However, because of a lack of financial resources and the need to accelerate the implementation of the other activities, they were never formally discussed in a workshop.
33. The reports were considered useful reference materials by the PMU and the project manager selected for second part of the project and guided the choice of the instruments to be tested during the Feasibility Studies. As per the plan, findings of the three WGs were then consolidated in a short report by Marsh Ltd, dated in September 2007. The consolidated report dealt in a practical manner with the most essential/best practice FRMIs (here understood as insurance products) to apply to a RET project in order to reduce the default rate to a minimum, and produce an optimal credit rating, while achieving a high IRR for the investor. Although it is debatable if an insurance risk portfolio consisting of the above products may lead to a high IRR, such products would undoubtedly improve the default rate and the possibility of having a positive risk assessment by the credit financial institution.

Figure 2: Conclusions from the consolidated report by Marsh Ltd

<p>Political Risk Insurance: <i>this instrument has shown very positive impact on default rate and debt rating. This FRM leads to a greater ability for renewable energy projects to attract financing</i></p>
<p>Standard Insurance Products <i>include: Construction All Risks (CAR), Delay in Start Up (DSU, Operating All Risks (OAR) Business Interruption (BI), and Third Party Liability(TPL). These products have shown to be valuable in mitigating the effects of risks for renewable energy projects.</i></p>

34. Of the 8-10 Feasibility Studies planned in the ProDoc, only four proposals (out of the 14 expressions of interest received in response to the professional tender) were selected and co-financed by the proposers¹⁷:
 - Wind Power Derivative for Large Scale Wind Farm Projects in Mexico, study conducted by Marsh Finances and Paris Re
 - Renewable Energy Insurance Facility for Wind Farm Projects in the People's Republic of China (PRC), study conducted by Marsh UK and Lloyd's Ascot Renewco
 - Global Renewable Energy Insurance Facility for Large and Medium Scale Renewable Energy Projects, study conducted by Carbon Re, Munch Re, Royal & SunAlliance, Climate Capital, GSDP, PRS and UPCAR Tunisia

¹⁷ All studies are available at <http://www.unep.fr/energy/activities/frm/feasibility.htm>

- Insurance Solutions for Small Scale Biomass Power projects in India, by Crestar Capital, National Insurance Company and IFFCO/Tokyo General Insurance Co. LTD

35. The call for proposals was made during the summer 2007, and the studies were delivered in May 2008 (later than originally planned). In addition, the funds of the feasibility studies supported the formation of a public-private partnership in the form of a platform for renewable energy insurance in developing countries. The innovative on-line facility insurance4renewables.com was set-up in collaboration with RSA Insurance group (CodanForsikring A/S), Munich Re and Carbon Re.
36. The final roundtable organised in October 2008, which saw the participation of 51 stakeholders, further facilitated the dialogue between leading market players and public representatives on the barriers to, and opportunities for, the development and use of FRMIs in RE projects in the context of different regions. The agenda included:
 - A presentation of products and services developed through successful public-private partnerships, under the UNEP umbrella (expected outcome of the project);
 - An assessment and regional comparison of successes and areas requiring further efforts;
 - A set of recommendations to UNEP and other international organisations (expected outcome of the project).
37. All the project outputs were uploaded on the project's website and disseminated on the occasion of various seminars and visits to organizations. During the implementation of the project the Project Manager prepared every three months project status notes (July 2007, March 2008, September 2008, October 2008), which were uploaded on the home page of the project and circulated to project stakeholders for information.¹⁸
38. Some of the funds saved from travel reductions were used to produce a training kit on the insurance FRMIs available for medium to large RET projects. The PM, assisted by the founder of CarbonRe and with back up from insurance and re-insurance companies, extracted useful information from the study documents and structured them around the following modules:
 - Climate Change
 - Renewable Energy Technologies and Risks
 - Underwriting Guidelines and Policy
 - Claims handling and policy
 - Intermediaries and networks
39. Finally, a proposal for an "International Risk Management Framework for Energy Efficiency and Renewable Energy Projects" (task 11 in the Prodoc) for the continuation and consolidation of the FRM assessment study was drafted. A project proposal was endorsed by the GEF Chief Executive Officer in March 2010 and received GEF Agency Approval in September 2010, with a total budget of 12,400,000 USD (of which the GEF financing was 3,769,700 USD). However, the project was never approved for implementation.

¹⁸Assessment of Financial Risk Management Instruments for Renewable Energy Projects (July 2007); Financial Risk Management Instruments for Renewable Energy projects (March 2008); UNEP Feasibility studies for the development of insurance solutions for renewable energy projects (September 2008); Innovative financial risk management for RE projects in developing and emerging economies (October 2008)

Despite the GEF STAP had already in its comments to the project proposal suggested to narrow the scope of the project¹⁹, the latter remained too ambitious. Despite the delays in producing some of the outputs (which are partly due to the too ambitious project design), all the outputs were at the end produced and are of good quality. The overall rating is satisfactory.

b. Relevance

40. The evaluation assessed whether the project's objectives and implementation strategies were consistent with, and relevant for:
- i. Global environmental issues related to financing sustainable energy projects²⁰, including both the needs of the target countries (large vs. small scale projects, technologies, etc.) and the commercial strategies of domestic and international private sector partners;
 - ii. UNEP's mandate, policies and programme of work
 - iii. the GEF Climate Change focal area, its strategic priorities and operational programmes.
41. i. As acknowledged during the SEFI and UNEP BASE meeting in 2004 (see also above), the development of FRMIs is one of the 10 actions recommended to facilitate the deployment of RET projects. RET projects require the use of FRMIs both for raising loan capital and for avoiding detrimental losses in the case of adverse incidents. To this end, there is a need for capital investments beyond the available funds of Multilateral and Bilateral Donor Agencies (MDAs and BDAs). Private sector needs to be involved, especially when RETs are in the market-driven and, for some, in the early commercial phase. By assisting in developing FRM instruments, the project aimed to produce a catalytic effect on private business involvement in energy project development. The idea behind it is that MDA and BDA donor financed partial risk cover guarantee mechanisms would have a catalytic effect creating the risk data necessary to overcome the private insurance sectors' reluctance and hence not creating market distortions. The project was relevant in this respect.
42. Looking in more details at the WG outputs, the investigations on FRMIs for small scale RET projects (WG2), which focused on non-insurance FRM products (apart from political risk cover), may serve both the donor organisations and the private sector. The report gives numerous useful examples, such as the Loan Program for Solar Home Systems (SHS) in Karnataka State (India) where the Partial Risk Guarantee provided by a donor financed a reserve fund to partially cover losses of the private banks providing loans. Similarly, the analysis of risk transfer for geothermal projects (WG3) is very relevant, although it is doubtful that the private insurance and reinsurance companies will enter into such a high risk type of investments, in neither a developing nor an emerging country.²¹ The weather derivative for wind farms also presents difficulties when it comes to risk assessment (due to the lack of reliable long term wind data) and for an insurance company to have a sufficient pool of wind farm projects to enter the market. A proper risk assessment by an insurance company demands up to 10 years of wind speed measurements and probability assessments for the particular site. It may be relevant for

¹⁹ The GEF STAP argued that "if the research problem to be tested was not more clearly formulated, there would be a significant risk that it would fail to produce replicable results".

²⁰ Sustainable energy projects defined as EE and RE projects.

²¹ An interview with representatives from Munich RE pointed out that, even in the German market, Munich RE would not enter into underwriting risks of dry geothermal wells. Munich RE reinsured only one project with a 5 years duration and a triggering production limit.

some high wind locations in Morocco, Namibia (South Africa), Mexico, Peru and Chile. The index method which uses a wind farm power performance matrix²², compared to a P90 expected power generation using long term data, is a possibility but it has some deficiencies. Although methods exist for moving data from one site to another, measurements at a particular site are required for consecutive years.

43. In any case, the development of FRMIs cannot stand alone. The project's background study and the scoping study sufficient well explained the importance of analysing the maturity of the local insurance market, and understanding what the limitations in the application of FRMIs for medium and large scale projects are before starting a new project. For the reasons explained below (see stakeholder involvement section), the project should have made clear from the beginning that its focus was on emerging countries only, such as Mexico, Chile and South Africa. In parallel, the project should rather have included EE projects in its analysis. EE projects are characterised by a short payback period compared to RET projects, but they are affected by similar political, legal and regulatory risks. It is the opinion of the evaluator that including EE projects might have been enhanced the project's relevance and effectiveness, since GEF has numerous Energy Efficiency/Energy Conservation projects in its portfolio.
44. ii. The project is in alignment with UNEP's mandate, policies and programme of work, as the application for funding, the Prodoc, the Communiqué from the SEFI meeting in conjunction with the Renewables 2004 conference, and the summary of discussion at the Risk Management session stated (see Annex 6).
45. iii. According to the GEF web site, 429 GEF projects have been approved within the Climate Change category since the start of this project. Among these, there are several which could benefit from the findings of the research study under assessment.

*The project is indeed highly relevant as a preparatory step for increasing the number of RET projects. The relevance of the assessment study is high as long as the RET is in the pre- or early commercial phase and to assist the maturation of insurance/re-insurance markets. The relevance of the study (and the use of its findings in future projects) however differs from country to country, and its use will be affected by other project management/business risks which exist in an early commercial RET market and which are not possible to transfer to others by using FRMIs. The rating applied is **Satisfactory**.*

c. Effectiveness

46. The project outputs (tasks 1 to 6) contain multi-purpose information to be used by Government Agencies, MDAs and BDAs, ECAs, insurance brokers, insuring companies, re-insurance companies, investors and commercial banks. They cover different geographical areas, emerging and development countries, large and small scale projects and various forms of RET projects. The feedback received from the stakeholders invited at the roundtable in October 2008 confirmed the quality of the studies. On that same occasion, a number of recommendations were issued taking into consideration the generic character of the analyses, and calling for the need to apply the results of the studies in follow-up projects.²³

²² It is similar to a wind turbine power curve but the curve is a matrix as it considers not only the wind speed but also the wind direction/ shade effects turbulence etc.

²³ The detailed recommendation of the final roundtable summarising the findings of the project is found as annex 6 in the annexes to the Terminal Evaluation Report.

47. The numerous missions²⁴ that the PM undertook in 2007-08 contributed to enhancing awareness of the project's products. Project status notes were prepared to try marketing the work with governments and the financial sector of developing countries; insurance representatives from developing countries were invited to the final roundtable; a training on risk management for renewable energy projects was held in Cape town at the annual meeting of UNEP FI in June 2009, and a roundtable was organised with Munich Re and RSA insurance (fully financed by them) during the Copenhagen climate summit in December 2009. However, as noted by the stakeholders during the meeting in Paris, the broad nature of the analyses gives inspiration to all, but not detailed direction on how to assess which FMRIs to best integrate in the development of specific RET programs in a particular country. The scoping study and background report on Risk management instruments for renewable energy projects have been mentioned/ referred to in a number of other papers by UNCTAD, UNFCCC, the World Bank, the Asian Development Bank, and academia.
48. The evaluator with the PM that that the background study and the reports from the three Working Groups (perhaps to a lesser extent for the Geo-Thermal report) remain too academic, and their practical use to promote the development of useful FRMIs limited. To compensate for this and facilitate the use of the studies' findings, the PM showed good sense in summarising the main elements in a training kit, which was made available on-line and in CD-ROMs. The production of the training kit made the document usable by both newcomers and traditional insurers and banks interested in RET projects. The distribution of CD-ROMs during the PM's missions was highly appreciated. The evaluation has however not been able to get from UNEP DTIE statistics on the number of visits to the project web site, nor feedback by prospective users. The quality of the training kit is undisputable; the challenge lies in marketing it.
49. The decision to produce summary reports (task 7, in the original plan), and to discuss them at regular intervals on the occasion of stakeholder meetings, is appreciated and considered a good practice. Similarly, the feasibility studies served as practical illustrations of FRMIs adapted to RET.
50. The "insurance4renewables" platform has resulted in many requests for assistance, but not yet in any insurance business. According to Carbon Re, more than 140 requests have been made, but none, according to the other partners in the platform, was deemed of enough value for following-up. The web-site is a useful instrument, as it strengthens the links between local finance institutes and RE insuring companies. As the success of the initiative depends on its capacity to build trust over time among stakeholders, the evaluation recommends that the web-site maintenance and development is continued (see recommendation section).
51. At its end, the project contributed to an initiative by Paris Re and MARSH aimed at establishing an insurance market for REs. An index-based product was designed to provide coverage against the lack of sufficient wind/ power generation. In addition, KfW mentioned having used the report by WG 3 to assess geothermal project development risks. Finally, the evaluator considers that the PM's awareness visits and the presentation of the methodology to the Renewable Energy & Energy Efficiency Partnership in India have had an influence on the development of SHS projects. Findings of the WG2 also informed the choice by a project related to Prosol thermal solar heaters in Tunisia.

*The rating is **Moderately Satisfactory**.*

²⁴ Mission to Bangkok and New Delhi 8-16 September 2007, Mission to London 8-10 October 2007, Mission to Brussels 28 January 2008, mission to New Delhi 4-9 February 2008, and Mission to Munich 29 May 2008

d. Efficiency

52. The lack of clear project management responsibilities assigned at the beginning, combined with the involvement of many stakeholders, has significantly impacted the project's efficiency. The project experienced considerable delays from its start. Not only was the background study delayed for over six month, but the finalised reports by the WGs also came late. In addition, the decision to hire as consultants specialists such as lawyers, bankers, insurance underwriters or risk assessors was extremely costly. The initial budget could be adhered to only by reducing the number of WGs and, in particular, the number of feasibility studies.
53. It was not until the second project manager took over that the project was efficiently managed, administrative procedures adhered to, and cost and time optimised efficiently. The execution of all the project activities was possible thanks to a more tight financial management, and the decision to assign feasibility studies through a call for tenders. The decision of allocating the funds for travel to the preparation of a training kit/manual for insurance of REs projects appears sensible.

*In view of the improvements in efficiency in the second phase of the project, the rating is **Moderately Satisfactory***

e. Review of Outcome to Impacts

54. The project is a targeted research project. This implies the process leading to higher-level results (increased adoption of RETs) and long term GEBs (such as the reduction of GHGs) is longer than for an engineering or capacity building project. The project design went as far as disseminating its outputs to stakeholders such commercial finance institutions (CFIs), insurers and project proponents. The web site is very well-structured and the management decision to use part of the available funds to produce a training kit enhanced the likelihood that the tools are adopted and results achieved. Referring to the project's Theory of Change (see Annex 5) and to the ROtI terminology, the project's outcome is the "increased adoption of best practice (financial risk) methodologies for RET projects"; a "better understanding of most promising modalities of future donor RE risk management interventions where private sector is ready to contribute" and "reinforced partnership among private and public risk management actors" are intermediate states to it. As such, the use of the project's outputs and the engagement of the insurance companies and reinsurance companies in a global platform *insurance4renewables* are intermediate states. As the set-up of the platform has resulted in many requests, but not yet in any insurance business, and as there is not significant evidence that the training kit contributed to increasing the adoption of best practice methodologies, it can be argued that intermediate states have been achieved, while project's outcomes have not to any significant extent. Similarly, the production of feasibility studies - which also aimed to promote co-operation of the World Bank, UNDP, private sector financial institutions and national agencies as to specific RET project opportunities to facilitate follow-up initiatives – does not seem not to have gone far in the chain of results' achievements.
55. Following from this, long term impacts and GEB have not occurred yet. Although more difficult as time passes, the achievement of higher level results and impact can be expected over time. The training kit can now be accessed from the UNEP FI website, but

it would benefit from better exposure. The training kit has already proven useful²⁵ and may generate long-term benefits, provided it is properly marketed. Overall, the project design would have benefited from using the ToC in pitching the outcomes at the right level.

56. The original project design counted on a lot of assumptions (outside the control of the project) to reach outcomes and impacts. As stated in the ProDoc, important assumptions are that:
- Renewable Energy technologies are cost-competitive,
 - Risk management is one of the key factors influencing investment decisions;
 - the financial sector is sound enough to engage in new product development and is willing to invest in Renewable Energy projects in GEF eligible countries;
 - Sufficient GEF or other donors' funds are available to help the application of such new instruments in collaboration with the private sector.
57. Since the number of CDM projects being transmitted for validation and registration to the UNFCCC has dramatically increased since the project started, and even more so after it finished, the first assumption that the RET projects are cost-competitive is fulfilled, at least when the profit from selling the Certified Emission Reductions (CER) is capitalised.
58. As acknowledged in the background study, the second assumption is differently valid for developing and emerging economy countries, and further shows variation within these categories.²⁶ To generalise, construction all risk policies and warranty guaranties exist (although restricted in many countries to simple insurance products) in emerging economy countries, but not in developing countries. The coverage of long term operational risk may be hampered by the lack of available risk data and the fact that the intervention of re-insurers to cover insurers and banks apart from ratings and risk assessment is based on trust developed over long time. Risk management instruments for RET projects in developing countries exist in the form of political risk cover and general project risks cover from ECAs, although often related to export of specific goods from developing countries. As a significant difference exists between the conditions in the GEF countries whether being developing countries or emerging economy countries - not to mention the CIS and Balkan countries which appear to have been entirely forgotten in the study – the project should have considered in its design two different Theories of Change (or at least one with different assumptions) for type of country. This might have led to different studies, or brought to a clear statement about the intention of the project to consider only emerging economies, where external conditions are more conducive to investments in RET financing.
59. As to the third assumption, the evaluator finds difficult to formulate a definite statement. The significant increase in the number of RET projects under registration as CDM projects can be considered as a positive indicator of the will of financial institutions to invest in the RET market. However, almost all projects under registration are unilateral, which means that the interest of project proponents in countries other than the project country may be quite limited. The lack of available FRMIs is an important factor behind the limited spread of RETs. This again, however, depends also on the maturity of the financing and insurance sectors, as well as of an adequate regulatory framework.

²⁵ According to the PM, the training kit has been used by a number of insurers and consulting firms based in developing countries.

²⁶ For developing countries the lack of adequate financial, legal and service infrastructure, security and availability of local insurers, and restrictive local insurance regulations (table 5 page 112 Background Study) is the major barrier for private sector investment projects.

60. Finally, in relation to the forth assumption, it seems that GEF and other donors have an interest, in the years to come, in putting the new tools into operation, as the publication by SEFI and SEF Alliance of several documents, such as the “Private Financing of Renewable Energy – a guide for policy makers”, the “Publicly Backed Guaranties. As Policy Instruments to Promote Clean Energy”²⁷, and “Catalysing low-carbon growth in developing economies”, show.

*The project delivered its outputs and they were designed to feed into a continuous process, but with no prior allocation of responsibilities after the project funding stopped. Some measures to move towards intermediate states have been taken, but have not produced results yet. If the project itself is evaluated based on its ability to generate impacts in the form of GEB the rating is unlikely. The achievement of outcomes still depends on the continuation of the web-site and the continuing use of the project’s outputs as background information (especially the training kit) in other UNEP/GEF projects, and with the current status quo is moderately likely. The overall rating is thus **Moderately Unlikely**.*

B. Sustainability

61. In order to assess the long term sustainability of the movement towards an increased market for RET in GEF countries, macro-economic factors and the EU Carbon Cap policy play a major role.
62. In the World Energy Outlook published in October 2011, all the scenarios for world energy prices for fossil fuels are pointing upwards. World market prices on coal have increased from around 35 USD per tons (as the average price in decades) to 60 USD, when the oil prices rocketed and some of the demand from power plants was transferred to coal. As the demand of coal increases, the need to import it does it as well. With the rapid expansion in the number/capacity of coal fired power plants in the eastern part of China, the expansion of mines in, and the transport from, western part China have become a bottleneck. A recent only 3% increase in the demand of coal on the world market has caused a doubling of the coal prices to 120 USD per tons. The oil prices are presently in the range of 100 USD²⁸, but the demand for oil - due to the increasing number of cars in China - will cause a steady increase in world market oil prices too. Two other factors will influence the price development. First, when the economic and financial crises move towards the end, the demand for oil generally increases. Secondly, if unrest and wars made the situation in the Middle East unstable, the oil production would decrease triggering rapid increases in the prices. The replacement of oil and coal by gas in the European power sector, by importing increasing volume of gas from Russia, may temporally slow down the price increase on the other fossil fuels. However, as the demand for energy is rapidly growing in China, the gas market for export from Russia to China will go up. All in all, green energy becomes an economic alternative to fossil fuel.
63. The number of projects in the UNFCCC CDM register is rapidly increasing. Apart from RE and EE projects gaining momentum, the fact that the EU will only permit CER from developing countries (and not from emerging economies) to be bought within the European Carbon Cap after March 2012 (with or without a new Kyoto Agreement) may be the most likely reason for this acceleration. With a limited production of new CER from developing countries into the European Carbon market, the prices are likely to peak

²⁷ This document contains at page 81 a reference to the incurance4renewable initiative.

²⁸ It is estimated the drop in demand due to the crises is the reason behind the fact that oil prices are presently in the range of 100 USD. Otherwise, the price level fluctuates between 130 and 150 USD.

up. This again will trigger two developments. First, the RE and EE projects will economically be more attractive for the developing countries; second, investors/power utilities from EU will be inclined to invest in these types of projects in order to secure an inflow of CER (at a cost which is a function of the initial investment cost and not the CER market) or speculate in higher returns on investment. As a consequence, an increasing part of the CDM projects will become bilateral. This may imply that the investment culture from the developed market to the financial sector in the emerging and developing countries gains ground. The application of FRMIs, which in the background study was illustrated to differ from country to country, may experience a more uniform development.

a. Socio-political sustainability

64. As described above, public and stakeholder awareness is closely linked to the commercialisation of RET projects in developing countries. The rate of increase in the utilisation of FRMIs is expected to increase as fossil fuel prices increase, and as bilateral (instead of unilateral) investments in CDM projects in developing countries increase and, with it, the investment culture gains ground in developing countries. It is expected that the wider use of FRMIs for RETs will be introduced first in emerging countries. Whether the progress will be moderate or rapid may however depend on the specific protection rules supporting local insurance companies in the various countries and on the penetration rate of international reinsurance companies/special insurance risk companies²⁹. For developing countries, the insurance sector and the local banking sector are still not developed enough to sponsor the use of non-insurance FRM instruments for Climate Change/CDM projects. The effort the project made to disseminate the knowledge on FRMIs in general, and insurances in particular, through the training may work for sustainability. However, it is important that UNEP and the GEF continue to use the project's outputs to enhance awareness through future initiatives.

*The rating is **Likely***

b. Financial resources

65. When the project ended, a proposal for a new full sized GEF project on FRMIs for both EE and RE projects was drafted. A budget of 3,769,700 USD from GEF of and 9,013,000 USD of co-financing put forward for an Earth Fund. It is the impression of the evaluator that it was too early for it, and that some more policy work (as the three policy papers by SEFI) were needed as a preparatory step. Reinsurers, such as Munich-Re³⁰ and Lloyds, have sufficient resources of their own to market re-insurance products, although this seems to be still in an early development stage. When FRMIs are introduced in developing projects, financial resources will most likely have to come from external donor sources for setting up loss reserve funds to banks or partial risk coverage to projects or insurers.

*The rating is **Moderately Likely**.*

c. Institutional framework and governance

²⁹ Only Lloyds is currently present worldwide

³⁰ Munich-RE has been, and still is, interested in a co-financing arrangement with UNEP/GEF on FRMI

66. The project contributed enhancing the collaboration among different stakeholders and formed a private-sector alliance to promote and underwrite risk policies for RET projects worldwide in emerging and developing countries. This initiative constitutes a framework which may be made operational. However, the success of the IT platform will be heavily dependent on creating trustworthy connections to local commercial finance institutes and on developing the capacities in countries to assess the risks involved in each RET projects to be insured.
67. Other institutional framework and governance issues are related to the countries' political context and are different from country to country. This is well explained in the background study and exemplified in the "Feasibility Study for a Renewable Energy Insurance Facility for the People's Republic of China" by MARSH and Ascot Renewco³¹. In China, the Government's regulation restricts foreign insurance companies' operation possibilities on the market, and local Chinese insurance companies may be reluctant to insure risks which they are not able to assess. For example, in areas such as wind energy technology, risks may not be fully understood and the companies may feel uncomfortable with products such as DSU and BI. Further, for wind projects in China, insurance products for which a wider cover is available on the international market³² make coverage on the local Chinese market limited – and reinsurance impossible.

*Putting aside any consideration about the institutional framework which is country dependent, for the insurance framework created by this project the rating is **Moderately Likely**, lot depending on follow up activities taking place.*

d. Environmental sustainability

It is well explained in the documentation of the project that a dollar spent by the GEF or other donors on financing FRMIs may have a multiplication effect of 10 to 15 times compared to if donors financed RET projects directly. Other considerations related to environmental sustainability *strictu sensu* are not relevant for this project.

*The rating is **Moderately Likely***

*The overall rating for the Sustainability criterion is **Moderately Likely***

C. Catalytic role and replicability

68. The purpose of the targeted research project was to act as catalysers by facilitating the adoption of FRMIs in future RET projects. No evidence can be found that the project has contributed to an increased inflow of capital to RET projects, thanks to the use of FRMIs and new developed instruments as weather derivatives for wind. The insurance4renewable.com website has had more than 140 requests according to CarbonRe, but other sources indicate that none has materialised. On the other hand, with the increasing numbers of CDM projects recently approved or under registration (see for example the URC database), it cannot be excluded that, through the dissemination of the

³¹ A branch of Ascot which is one of the largest syndicates of Lloyd's London)

³² Such as Design Coverage, Testing and Commissioning, Consequential loss from wear and tear and corrosion, Strikes Riots and Civil Commotion, Legal liability during construction and Cover for Prototypical Technology

project documents on the website and the involvement of the world largest international reinsurance companies, the project could generate a positive catalytic effect on the application of RET for energy production. However it may only indirectly be assumed the study has had an influence. This will also easily fade away, if the training kit remains unknown/unused.

69. In May 2010, the SEFI Alliance published the “Publicly Backed Guarantees - As Policy Instruments to Promote Clean Energy” report, which addressed policy issues. This work could be seen as complementary to the one under assessment, and (although not directly) suggested by the latter.

a. incentives

70. The incentive to make use of a risk assessment and a risk cover against the most unlikely events with detrimental consequences should be obvious, as premiums for covering such risks are normally low. Incentives to use weather derivatives for wind power or to insure geothermal borehole constructions are less obvious due to high premiums(if at all) available. These types of risks are best avoided by doing proper project development investigations and data collection. As the background and scoping studies show, the development of public private partnerships for grants combined with partial risk insurance cover can serve as incentives for the establishment of RET projects.

b. champions

71. A new instrument developed which could catalyse similar action may be named a champion if it is sufficiently outstanding. In this sense, the feasibility study developed by MARSH Finances and Paris Re “Weather Derivative solutions for Wind Farm Financing in Mexico” may be named as such. Following the development of the index based solution, Paris Re proudly announced in a press release (9 October 2008) that “PARIS Re, Marsh and the UNEP/GEF had developed innovative renewable energy solutions”, showing their interest in providing cover for loss of wind /loss of power production in the future.

c. policy changes

72. The project has been one of the inputs to a UNEP policy paper “Catalysing low-carbon growth in developing economies”³³ prepared for the COP 15 in Copenhagen 2009. The paper contains several pages describing risk mitigation instruments, and the transferral of project risks by using FRM. The project outputs might as well be used as guidelines by developing countries when preparing National Action plans for Mitigation of Climate Change (NAMAs). This could thus generate an impact at policy level, which is not visible so far.

³³ Catalysing low-carbon growth in developing economies, Public Finance Mechanisms to scale up private sector investments in climate solutions, UNEP and Partners, October 2009

d. catalytic financing

73. As described above, FRMIs may serve as catalytic financing. The Prosol project, where FRMIs have been used to set up thermal water heaters in Tunisia and where the power company collects the repayment over the electricity against a partial risk guaranty, is an example of additional funds raised. A number of SHS projects in India, which followed the first example in Karnataka state where donor support was activated through a loss reserve fund as the guarantee for loan repayments, may serve as another example. This seems less likely for full-cover risk products for larger scale private RET projects in developing countries, where the local insurance sector is not fully developed and operations are hampered by the lack of reliable information on risks.
74. No financing followed this project directly.

The overall rating of a-d is Moderately Satisfactory

D. Process of affecting attainment of project results

D1. Preparation and readiness

75. The project's objectives and components were clear but not practicable and feasible within its timeframe, nor within its budget. The Scientific and Technical Advisory Panel (STAP) of the GEF asked already in their comments to the Prodoc for a simplification of the tasks. The extension of the project's timeframe which was needed to produce documentation of high quality proves it. The ambition of the background study to be worldwide and to cover all types of RETs and all project scales can be also questioned.
76. Lessons from GEF-supported projects, SEFI reports and from the SHS projects have been used as sources of information for the project design. In particular, the document "Financial Risk Management Instruments for Renewable Energy Projects" (by UNEP SEFI, 2004) provided valuable inputs.
77. The log frame was well prepared as to the definition of the tasks, but the execution thereof was difficult as it was performed on separate work places with lack of communication at least until the finalisation of the WG reports. Whereas the description in the ProDoc of the tasks to execute was clear (but without setting manageable limits), the delegation of project responsibilities to consultants and WGs appears - at least for the period until the change in project management occurred - to have been difficult to manage. The first project manager (who had the title of project coordinator) experienced some difficulties in directing the groups, and the time overruns - for all but the WG3 report - clearly indicate it.
78. The recommendation by the STAP³⁴ to contact the financing and insurance industry at the start-up of the project has been promptly followed. The selection process of stakeholders is well documented by the supporting letters from companies, organisations from both developed and developing countries being interested in participating.
79. Some doubts may be raised as to the capacities of executing institutions and counterparts being properly considered when the project was designed. The project is a global project, and the selection of the best executing institutions should be either driven by their prospective capacities to integrate the project's results in follow-up projects, or by their

³⁴ Annex V to the ProDoc proposal communication with Dennis Anderson, STAP

capacities to identify “best practice methodologies for FRM for RET”. How counterparts were initially selected is not apparent to the evaluator. Apart from the World Bank, the institutions involved in the WGs were very academic in their approach.

The overall rating is Moderately Unsatisfactory

D2. Implementation approach and Adaptive Management

80. The project was implemented according to the plan in the Prodoc. Only the WG number was cut from 4/5 to 3 and the feasibility studies from 8/10 to 3, mainly for budgetary reasons. FRMIs were defined for either small scale or large scale RET projects (which conforms to the CDM denomination), and with geo-thermal projects as a particular case.
81. The PMU was not sufficiently strong to perform its task, including supervision, in the first phase of the project. The PM had at the beginning more the character of a coordinator and quality controller of the work performed by the consultants and the three working groups, to which a delegation of power to produce and decide was given. The PMU conferred too much power to the stakeholders at the first, waiting until the second consultative meeting to set the direction. As a consequence, the PM was managed by the project and not vice versa, with significant conflicts raised.
82. The project was in a serious risk of becoming multi directional and too academic. A new project manager was appointed in June 2007. She increased supervision on project’s activities and pertinently adapted the project approach, involving insurance and reinsurance companies who produced high quality feasibility studies on new FRMIs, developing an insurance training kit for RET projects which is directly usable for implementation, and facilitating the set-up of the insurance4renewables IT platform.
83. The Steering Committee only met once³⁵, and DTIE performed intensive backstopping and supervision functions. The Steering Committee was positively responsible for adapting the management course and bringing the project to a successful conclusion. Among the others: the participation of the PMU in meetings with consultants conducting the research studies and feasibility studies, and the production of project status notes to be uploaded on the project’s website on regular basis. The Steering Committee further recommended regular feed-back and financial reports³⁶, as to have weekly telephone follow up between UNEP DTIE and Base (responsible for the WG 2 output).

The overall rating is Moderately Satisfactory, considering the adaptations made

D3. Stakeholder Participation and Public Awareness

84. The term stakeholder as “individuals, groups, institutions, or other bodies that have an interest or stake in the outcome of the project” is taken literally. If the phrase was adapted towards “an interest to use the outcomes of the project”, the number of global stakeholders would widely include:
 - local and international financial institutes financial institutions;
 - ECAs;
 - MDAs and BDAs;
 - Insurance and reinsurance companies;

³⁵ The group only met in December 2006. A second meeting was scheduled to take place (but never happened) in fall 2007, but only if required.

³⁶ Never received by the evaluator, despite several requests

- Government administrations in both developed and developing countries;
 - RET representative organisations, the International Energy Agency ;
 - Power Utility Companies;
 - Power Equipment Suppliers, RET equipment suppliers;
 - Private Investors;
 - Academics and policy makers.
85. The Annex 1 of the ProDoc lists stakeholders and key collaborators, including: insurance companies, power utility companies and equipment suppliers, banks, RET and development organisations.
86. Stakeholders from both the public and the private sector participated in the consultative meetings in February 2006 and December 2006. 51 of them participated in the round table on “Final Risk Management for Renewable Energy Projects in Emerging and Developing Countries”. Partners provided a good feedback on the project management during these meetings.
87. The project was successful for what concerns the involvement of the financing sector, and in particular the insurance and re-insurance companies, as the primary stakeholders. Over 10 leading insurance and financial institutions were directly involved in the Feasibility Studies of non-tested innovative approaches to risk management in renewable energy projects in developing countries. The sector acted proactively and participated in co-financing of the FS studies and dissemination activities. The stakeholders explained that they would have not have considered developing those instruments without the support of UNEP and its intermediation in the countries (e.g. in Mexico and China, UNEP facilitated the collection of weather and other data from public institutions, in India various stakeholders were consulted and asked to develop innovative solutions with support from UNEP for rural small scale projects).
88. However, as indicated in the FY08 and FY09, the ultimate interest of participating stakeholders in applying FRMI instruments was limited, probably as RETs and Full Cover Risk products are considered not yet compatible for commercialisation in developing countries. The risk element is one side of the problem, the handling of claims (even more important) the other, as lack of confidence in a correct handling of a claim in a different cultural setting may prevent both RET project investors and RE insurance companies from acting.
89. The attempt to make the project’s outputs available through various knowledge management tools is appreciated, but it requires significant follow-up efforts. Public awareness is facilitated by an extremely informative website, from which the pertinent information can be downloaded as time makes FRM for RET in developing countries more mature.

*The rating is **Moderately Satisfactory**.*

D4. Country ownership/driven-ness

90. The project is global and not country-specific. Documentation of the situation in nine countries is given, with respect to the maturity of the financial market, the available support from ECAs and development banks, and the policy in the power sector including RETs. The three geographical areas investigated are: Asia (India, China, and Vietnam), Africa (Morocco, South Africa, and Senegal), and Latin America (Mexico, Chile, and

Brazil). Where Chile, South Africa and Mexico have to some degree an open financial sector and full supportive governments to drive the open market, none of the Asian countries is fully supporting FRMIs and a full intervention of international banks, insurance and reinsurance companies. Most of African countries, such as Senegal, are having currency default risks ratings below long term investment grade credit rates. According to Lloyd (the world's leading insurance specialist), the following is valid in the nine investigated markets:

Brazil:	Not licensed for direct underwriting	NO Reinsurance as State Reinsurer
Chile:	Not licensed for direct underwriting directly	OK accepts reinsurance business
Mexico:	Not licensed for direct underwriting broker	OK reinsurance placed through local broker
China:	Not licensed for direct underwriting cession	OK for off shore reinsurance, small to China Re
India:	Not licensed for direct underwriting GIC	OK but obligatory cession of 20% to GIC
Vietnam:	Not licensed for direct underwriting	NO state is reinsurer
South Africa	YES all classes of short term business	OK licensed to write reinsurance business
Senegal:	Not licensed for direct underwriting to	OK but only 75% of risk can be ceded reinsurer of choice
Morocco:	Not licensed for direct underwriting to State	OK but 10% of all classes of business Company

*The rating differs from emerging countries to developing countries and is in fact country dependent. The overall rating chosen here is **Moderately Satisfactory***

D5. Financial planning and management³⁷

91. The initial budget for the project was very low for the outputs to be produced, even if an attentive project management from the start in April 2005 had been exercised. Resources only permitted three WGs to be established, and three feasibility studies to be later accomplished. These were selected using standard UNEP procedures, through a three person individual evaluation of the proposals.
92. Financial management was particularly conscious in the project's second phase. When the new project manager took over, selected consultants were not having renewed their contracts not only for cost reasons, but also with the aim to launch a professional selection procedure for FS resulting in an optimal value for money. As a matter, of fact, contracts with the consultants for the background study and to assist in the work of the WGs were selected on the basis of their high professional expertise, even if not cost-effective. The overall budget was at the end respected, by limiting quantity not quality.

³⁷ The information made available to the evaluator does not allow a detailed reply to the questions raised in the ToR

93. Some adjustments to the initial budget were made, as funds were transferred to BASE to undertake research for WG 2. Financial resources were received as expected, including co-financing from partners (e.g. the WB for WG3)³⁸. The budget for travelling was transferred to pay for high quality assistance for the production of the training kit.

The rating as to the tight financial management avoiding overruns is Satisfactory, but the financial planning was too ambitious (too many aspects to cover). Overall rating is thus Moderately Satisfactory.

D6. UNEP Supervision and Backstopping

94. UNEP exercised its supervision function through: six-month Progress Reports, PIR (yearly project implementation reports), and PAS (project supervision plan). Overall the progress reports as well as the project implementation reports showed better quality as the study approached itself. Thanks to the information included in a project supervision report, project management was strengthened and the communication between the different WGs and PMU enhanced. Progress reports did not always include detailed financial information, but were quite precise in all other respects. Project implementation reports and supervision plans also adequately highlighted risks and challenges the project was confronting.

UNEP supervision and backstopping were successfully accomplished. The rating is Satisfactory.

D7. Monitoring and Evaluation

a. M&E Design

95. The design of the M&E is presented in the ProDoc. The Logical Framework indicates the overall objective goal and outcomes, together with objectively verifiable indicators and means of verification.
96. The project is a targeted research project from which the findings may be applied worldwide. A global baseline study on the extent to which insurance and non-insurance products are applied, and to what degree standard construction risk and building risk insurances are available, is not included in the ToR of the project.
97. The monitoring of results achieved does not appear in any project document³⁹. A survey of GEF Implementing Agencies on “how they have been able to use the recommendations of the assessment of FRM study in the design of other GEF projects in the area of Climate Change and other relevant areas” was planned, but never carried out. Verification from other sources (register of GEF Climate Change projects or of CDM projects under validation or registration) is not possible either, as none of the two data registers includes information on whether FMRI have been used for obtaining financing.

³⁸ In the first half progress report issued by the Project Coordinator, IT Power India BASE project granted USD 65,000 the World Bank Guarantee Department donated USD 75,000 to finance the work of WG 3.

³⁹ According to the ProDoc, it was the obligation of UNEP to monitor the M&E plan in accordance with the terms of agreement with GEF SEC

*The design of M&E for a global research study is complicated by a long chain of results (as it is for all normative work products) and numerous assumptions. The project pitched its results at a too high level. The M&E design is rated as **Moderately Unsatisfactory**.*

b. M&E Plan Implementation

98. As explained above in the “supervision and backstopping section”, the project was monitored through detailed half yearly progress. The four reports cover the middle period of the project where the activities were most intense. The last two in particular covering the 2007 are well structured and give a perfect picture of the project situation. However, the monitoring stopped at the project activities’ implementation level.

99. No mid-term evaluation was carried out, as it is not mandatory for medium-size GEF projects.

*The PIR produced by the PM is of outstanding quality and the progress reports reflect the improvements in project performance. However, no effort was made in monitoring the achievement of the project’s results (the planned survey was never accomplished). The overall rating is thus **Moderately Satisfactory**.*

c. Budget for M&E activities

100. A separate budget line for M&E does not appear in the project budget.

*The rating is **Unsatisfactory***

*The overall rating of the M&E criterion is **Moderately Unsatisfactory**.*

III. Conclusions and Recommendations

A. Conclusions

101. The project “Assessment of Risk Management Instruments for Financing Renewable Energy” aimed to assess the availability of both insurance and non-insurance FRMIs to facilitate their adoption in future RET projects. This is well explained in the background study, where the instruments to mitigate generic risks on large scale projects and small scale are listed⁴⁰. The recommendation for further research included:

- *Large Scale Projects: Standard Insurance Products, Political Risk Insurance, Credit Derivatives, MFI Guaranties/Credit Enhancement, GEF Mechanisms, Surety Bonds*
- *Small Scale Projects: Guarantee Funds, Partial Credit Guaranties, Micro Insurance*
- *Geothermal Projects: Partial Risk Guarantee*

102. The background study, and the previous scoping study by SEFI, gives an excellent starting point for concrete actions in the following phase in the working groups

⁴⁰ Page 41 and 46

which were formed in February 2006. The examples used well illustrate different existing conditions at country level in markets for underwriting in Asia, Latin America and Africa. It is further documented by examples in the background study that limitations exist for private sector underwriters and for reinsurance companies.

103. The project duration was initially of 24 month. However, the project accumulated some delays in its implementation, and the work of the WGs – which started on three concrete themes - went somehow astray. The reports of WG1 and 2 (on large scale and small scale RET projects) were published with significant delay (not in time for the second consultative meeting in December 2006) and remained academic consultancy reports. The report of WG3 on geothermic power plant development, and the exploratory and operational risk associated to, was produced on time. It is precise and interesting from an engineer point of view, but not necessarily of general interest to a commercial underwriters and reinsurance companies⁴¹. It takes specialists to understand the subject of most RET projects and the risks related to them. Not all risks can be handled by FRMIs, but demand careful engineering and local knowledge of other external factors affecting RET projects' implementation. Overall, the project can thus be considered a good starting point of research, but would have benefited from more clarity in its design to be more effective and pave the way for impact generation.
104. Project Management experienced issues of poor coordination at its start. In December 2006, a new Project Manager was hired and a plan to bring the project back on track drafted. Good adaptive management choices brought to the involvement of insurance and reinsurance companies and to the production of an integrated training kit on risk management for renewable projects easy to use. However, budget limitations hampered the implementations as originally planned: the number of feasibility studies was reduced to four (including the platform insurance4renewables.com). Costs were adapted to the available budget and the Progress reports and Project Implementation Review reports issued are of first quality.
105. The initial choice of stakeholders was sub-optimal. The PM and the UNEP Task Manager put significant efforts in the second phase of the project on publishing all project findings and documents on the UNEP project web site to enhance awareness and knowledge among relevant stakeholders. The co-operation between UNEP and GEF and the professional insurance and reinsurance companies was productive and appreciated from both sides. The project contributed creating an alliance of insurance companies dealing with RE projects in GEF countries. An IT platform was chosen as marketing channel. Much effort was vested in the initiative and information was disseminated at international climate conferences by the coordinator of the initiative from Carbon Re and in UNEP SEFI reports. Although the platform received several requests, none has led to insurance business. The platform success will highly depend on establishing trustworthy relationships to the financing banks.
106. Overall, while the project produced all the outputs as planned, it did not achieve any high-level results or long-term impact. A proposal was drafted for a full scale follow-up GEF funded project in 2009, but this was however not approved.
107. The lack of available FRMIs is an important factor behind the limited spread of RETs. This again, however, depends also on the maturity of the financing and insurance sectors, as well as of an adequate regulatory framework.
108. The home page of the project www.unep.fr/energy/activities/frm, although of excellent quality, was not utilised sufficiently. This may have contributed to the project's

⁴¹ For geothermal project development, Munich Re had reinsured drilling of geothermal boreholes for a project in Europe on full recover if the volume or temperature of geothermal water were too low for 5 years.

fading out and a shift in strategy by GEF not to fund finance-related projects. The value of the website should not be underestimated and the online training kit, and its CD ROMs which were distributed at the final roundtable and in following missions, neither. Seeds have been planted for a broader understanding of the usefulness of FRM instruments.

	Sub-criteria	Evaluator's Summary Comments	Rating	
A. Attainment of project objectives and results (via ROTI)	c Effectiveness - overall likelihood of impact achievement (c and e rated together).	In spite of a great effort made by the PMU particularly in the last part of the project for involving the private insurance and financing sector to make a IT platform for entering the FRM market for RET – no results (GEB) to date	MS	MS
	b. Relevance	Relevant and consistent with the goals of GEF	S	
	d. Efficiency	Delays necessitated new PM to reallocate funds optimizing the value efficiently.	MS	
B. Sustainability of project outcomes	a Socio-political	Commercialization of RET projects in depending on cost of the alternative the fossil with increasing prices the need for RET increases	L	ML
	b. Financial	Financial resources for RET through CDM and possible utilization of FRM as guaranty for commercial bank financing is in the long term sustainable	ML	
	c. Institutional framework & governance	The implementation of RET supported by CDM and institutional framework is developing, a full opening of the direct insurance and re-insurance market will come slowly and gradually paving the way for use of FRMI	ML	
	d. Environmental	The reports documents if public funding is used for Partial Risk Guaranty /FRM instruments a dollar spent might have a 15 time multiplier effect	ML	
C. Catalytic Role		Assessment of Risk Management Instruments for financing Renewable Energy was a targeted research study having a catalytic role, this need follow-up action	MS	
D. Stakeholders involvement		The stakeholders from the private insurance and financial sector acted very proactively. The project was not successful in activating ECAs and donor organizations, travelling contacts made by the PM in 2009 compensated a little	MS	
E. Country ownership / driven-ness		Country ownership have the inverse effect: local insurance companies may oppose fully opened insurance markets and being Risk adverse against RET	MS	
F. Achievement of outputs and activities (point a under A)		The project has successfully produced all the outputs specified in the ProDoc. The number of outputs in the form of Working Group reports were reduced to 3, number of FS was reduced to 4. Extra: a training kit was produced.	S	

	Sub-criteria	Evaluator's Summary Comments	Rating
G. Preparation and readiness		The project objectives, expected outputs and project components were clearly stated in ProDoc but not manageable in the time frame. The letters of support from companies could have been further scrutinized for more stakeholders.	MU
H. Implementation approach		The project suffered serious delays which resulted in change of project manager Who did put the project on track produced the outputs specified + training kit	MS
I. Financial planning		The budget was either too low or the tasks to complete overambitious. The available budget was well managed by the new project manager. .	MS
J. Assessment of monitoring and evaluation system	J.1. M&E Design	The ProDoc contained a sufficiently detailed M&E plan and responsibilities for monitoring functions. The time table for the tasks was unrealistic due to the intention of covering globally and for all types of RET. The responsibilities for monitoring was only taken as the delays peaked up	MU
	J.2. M&E Plan implementation (use for adaptive management)	No midterm evaluation was performed. The progress reports and the PIR particular during the phase of the New PM perfect. Evaluation was made by the PM at the end of the project proving the adaptive management worked..	MS
	J.3. Budgeting & funding for M&E activities	No special line budget was made in the overall budget for M&E. For the internal M&E it is assumed financed as in kind.	U
K. UNEP Supervision and backstopping		The project supervision was not setting up a permanent steering committee but acted conscientiously in changing PM and direction	S

Rating	Project objectives and results	Project M&E
Highly Satisfactory (HS):	<i>No shortcomings</i> in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.	No shortcomings in the project M&E system.
Satisfactory (S):	<i>Minor shortcomings</i> in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.	Minor shortcomings in the project M&E system.
Moderately Satisfactory (MS):	<i>Moderate shortcomings</i> in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.	Moderate shortcomings in the project M&E system.
Moderately	<i>Significant shortcomings</i>	Significant

Rating	Sustainability
Likely (L):	No risks affecting this dimension of sustainability.
Moderately Likely (ML).	Moderate risks that affect this dimension of sustainability.
Moderately	Significant risks that affect

Unsatisfactory (MU):	in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.	shortcomings in the project M&E system.	Unlikely (MU):	this dimension of sustainability
Unsatisfactory (U):	<i>Major shortcomings</i> in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.	Major shortcomings in the project M&E system.		
Highly Unsatisfactory (HU):	<i>Severe shortcomings</i> in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.	The Project had no M&E system.	Unlikely (U):	Severe risks that affect this dimension of sustainability.

B. Lessons Learned

109. The FRMI market is characterized by lack of technical underwriting expertise, and poor skills in most areas of the insurance industry, especially in product development, actuarial and engineering sectors. For FRMIs to be up-taken, awareness and innovative marketing mechanisms are key.
110. It is not possible to define at global level which FRMIs should be applied to RET projects. Different FRMIs apply to different types of countries, whether being development or emerging economies, and projects being small or large scale. Small scale projects typically require non insurance instruments. Large scale projects are rather not bankable without insurances.
111. The project manager for this type of targeted research studies have to sit in the driving seat, as it was the case in the second part of the project.
112. A clear strategy for the involvement of stakeholders shall be drafted at the start of the project, permitting an expansion of it during project's implementation. Stakeholders and project's partners are to be carefully selected on the basis of their technical expertise on the ground. This type of project cannot be implemented by academics only, but representatives of the private sector are to be highly involved for the analysis to be comprehensive.
113. Rules for tight communication with working groups, who are responsible for the delivery of outputs, need to be established and adhered to, if high quality targeted results are to be produced in time.

C. Recommendations

To: UNEP

114. As pointed out in the evaluation report, continuity for this project is crucial and should be prioritized by UNEP. It will not possible to attain the ambitious investment levels in climate change mitigation (and even adaptation, if we think of Energy efficiency investments) advocated for by the international community, if appropriate risk management instruments are not made available on the markets. The insurance and finance industry have been working significantly in that sense, but little interaction with public entities have been taking place and UNEP can play an important catalyser role in that area. The evaluation recommends that UNEP re-submits the project proposal which was endorsed by the GEF Chief Executive Officer in March 2010 as a large scale project

(budget 12,400,000 USD with a GEF share of 3,769,700 USD) but not yet implemented, in due time before the COP negotiations in 2015.

To: UNEP and GEF

115. The evaluation recommends that UNEP and the GEF continue to use the project's outputs to enhance awareness through future initiatives when participating in GEF financed/supported projects, or in assisting in the formulation of FRMI packages in the coming NAMAs.

To: UNEP and GEF, in partnership with insurance companies

116. The evaluation recommends to continue the operation of the insurance4renewables IT platform, administered by insurance companies such as Munich RE. The success of the IT platform will be heavily dependent on creating trustworthy connections to local commercial finance institutes and on developing the capability in a local context to assess the risks involved in each RET projects to be insured.

To: UNEP

117. The evaluation recommends to upgrade and revise the UNEP FI web-site, and to promote its use among donors and other stakeholders. The website should not just include the training kit, but also all the reports produced on the subject by UNEP DTIE and STAP, and link to other full product examples of both insurance and on non-insurance FRMIs, such as the SHS for Karnataka State. The influence of the training kit and other related products will easily fade away, if it remains un-know/unused.

**Project GF/4040-05-09 (4826)
Assessment of Risk Management Instruments for
Financing Renewable Energy**

Annexes

Annex 1- Evaluation Terms of Reference

1. PROJECT BACKGROUND AND OVERVIEW

a. Project General Information⁴²

Project Title	Assessment of Financial Risk Management Instruments for Renewable Energy Projects		
Executing Agency	UNEP DTIE		
Project partners	World Bank, UNDP, Private Sector Partners		
Geographical Scope	Global		
Participating countries	Global		
GEF project ID	2538	IMIS Number	PMS GF/4040-05
Focal Area(s)	Climate Change	GEF OP	6
GEF Strategic Priority/Objective	CC2 Increased Access to Local Sources of Financing for Renewable Energy and Energy Efficiency	GEF Approval Date	
UNEP Approval date	March 2005	First disbursement	18 April 2005
Actual start date	April 2005	Planned duration	24 months
Intended completion date	March 2008	Actual or Expected completion date	December 2008
Project type	MSP	GEF Allocation	USD 969,000
PDF GEF costs	0	PDF Co-financing	0
Expected MSF/FSP Co-financing	USD 165,000	Total Cost	USD 1,461,000
Mid-term review/eval. (planned date)	N/A	Terminal Evaluation (actual date)	December 2009 (expected)
Mid-term review/eval. (actual date)	31 August 2008	No. of revisions	3
Date of last Steering Committee meeting	N/A	Date of last revisions	July 2008
Disbursement as of 30 June 2009	USD 980,933	Date of financial closure	December 2009 (expected)
Date of completion	N/A	Actual expenditures reported as of 30 June 2009	USD 980,670
Total co-financing realized as of June 2007	USD 120,000	Actual expenditures entered in IMIS as of 30 June 2009	USD 673,094
Leveraged financing	N/A		

b. Project Rationale

⁴² UNEP GEF PIR FY09

1. Renewable Energy Technologies (RET) aim to satisfy increasing power demand with cleaner energy and/or to make countries become less dependent on imported fuels. However, financial, legal and political barriers have so far prevented their deployment, especially in developing countries. Few policies have been enacted to facilitate the use of RETs. Political/economical instability, market distortions, and the lack of a clear regulatory framework combine with limited knowledge and expertise among policy makers in making the implementation of RET projects more difficult.
2. Financing RET projects is generally hampered by relatively small project sizes, high transaction costs, low marginal returns, perceived weak creditworthiness of companies, limited resource availability and high supply risks. Financial risk management instruments – such as contracts, insurances, contingent capital and credit enhancement products – can mitigate or transfer some of the risks associated with RET project financing, thereby reducing the cost of capital and mobilizing more private capital flows to the sector. In developing countries, standard insurance products may be partly available through local insurance and re-insurance brokers, who then place insured risks directly on international markets. These have however higher underwriting restrictions because of difficult re-insurance procedures and low capacities on the international markets. Therefore, with the exception of some weather derivative products and the GEF contingent finance, the application of emerging products to RET projects is very limited.
3. Increased funding availability for renewable energy investments to leverage private finance is one of the GEF strategic priorities. The GEF has long supported different contingent finance mechanisms to mitigate the risks of investments and the high costs of project development. GEF approaches had however generally been tested on an ad-hoc basis without any systematic assessment of modalities of available risk management instruments.
4. Under the umbrella of the Sustainable Energy Finance Initiative (SEFI), the UNEP DTIE Energy Programme and the Finance Initiative jointly launched a series of new activities to bring about increased investment in the clean energy sector by introducing new approaches to financing sustainable energy and catalyzing strategic partnerships in the area of clean energy finance. Under SEFI, in 2004, UNEP commissioned a scoping study on “Financial Risk Management Instruments for RET projects” which provided a preliminary overview of financial risk management instruments in use at that time. Still in 2004, UNEP was involved in the preparation of a background paper on energy finance on occasion of the International Conference for Renewable Energies.

c. Project objectives and components

5. The ultimate goal of the project “Assessment of Risk Management Instruments for Financing Renewable Energy” was to bring about a faster and more systematic deployment of RET by supporting the development of markets for RET projects’ risk management instruments.
6. The project aimed to provide the GEF and other donors with a better understanding of how they might work with private sector and public risk management actors to address some of the barriers hindering RTE deployment in developing countries through risk management instruments. Expected project outcomes, as in the ProDoc, were:
 - Best practice methodologies for financial risk management for RET projects identified and increasingly adopted by GEF and other donors;
 - Facilitation of greater engagement by private sector financial institutions in RET risk management and financing in GEF eligible countries.

Project implementation proved that a strategic adjustment to project management was needed, to include more work with market players on the development of financial risk management instruments for RE markets in developing countries. A third project outcome, reflected in the project final report, was thus added:

- Development of adapted financial risk management instruments for RE projects for implementation by donor agencies and industry.

7. The project planned to reach its outcomes by offering a systematic and comprehensive analysis of risk management (both insurance and non-insurance based) options for financing RET interventions, reviewing practicability and constraints related to such risk management instruments, and conducting feasibility studies for selected tools in GEF eligible countries to estimate their market prospects. Results were to be extensively disseminated to stakeholders to facilitate a wide application of recommended risk management instruments.

d. Main Project Activities

8. The project duration was two years, starting from April 2005. The completion date was however later postponed to December 2008. The planned outputs and activities (and relative timing) under each task (as in the Prodoc) are presented in Table 1 below.

Table1: Project Activities

Task	Output	Activities	Timing
1. Identify the risks that can be effectively managed through financial risk management instruments by analyzing the sources and nature of the risks	Report which includes: - baseline assessment of the sources and nature of risks associated with financing RET projects - identification of risks where financial risk management can play a significant role	<ul style="list-style-type: none"> • Taxonomies of sources and nature of the risks associated with investment in RET projects according to technology types and typical project characteristics (e.g. investment size and proponent profiles) • Identification of types of risks that could be effectively addressed through financial risk management instruments 	By month 4
2. Review existing risk management instruments for RET projects and the role these instruments play in financing RET projects	(cont.) - baseline assessment of financial risk management instruments for RET projects	<ul style="list-style-type: none"> • Brief overview of the role of financial risk management instruments for financing conventional energy projects • Determine current role and availability of risk management instruments for financing RET projects 	
3. Examine possible scope for developing new financial risk management instruments	(cont.) - identification of scope for financing developing risk management instruments for RET		

	projects in developing countries and key barriers to their development		
4. Conduct consultations on current risk management for RET projects, the associated barriers and possible scope for developing new and emerging instruments Specify focus areas of work with high potential of successful interventions to form 4-6 working groups	Summarized consultation results on the review of current risk management for RET projects, the associated barriers and possible scope for developing new instruments ToR for research by 4-6 working groups discussed		Months 4-5
5. Conduct research by working groups	4-6 working groups reports with detailed analyses on risk management instruments in respective focus areas	<ul style="list-style-type: none"> • Examine possible scope for enhancing financing opportunities for RET projects through new and emerging risk management instruments in respective focus areas. • Examine practicability and constraints of developing such instruments in GEF eligible countries, delineating the risks that the private sector could assume and those it cannot, and recommend possible modalities of instruments in respective focus areas. 	Months 5-10
6. Share the WG research results and conduct consultations on recommended risk management instruments	Summarised consultation results on the research conducted by WGs and recommended risk management instruments		Months 10-11
7. Consolidate the research and suggest modalities of recommended risk management instruments	A peer-reviewed consolidated report, describing the results of the research activities (Task 1-6) and suggesting recommended modalities of risk management		Months 12- 15

	instruments for RET projects		
8. Feasibility studies: estimate market prospects for selected recommended risk management instruments	5-10 feasibility studies on selected risk management instruments in GEF eligible countries		Months 16-21
9. Consolidate the feasibility studies' analyses and suggest options for risk management interventions for the GEF and other donors	Report including: - summary of feasibility studies' results - recommendations on options for risk management interventions by GEF and other donors		Month 22
10. Conduct an international workshop to disseminate the results and reinforce partnerships among relevant stakeholders	Workshop proceedings including presentations and summarised experts' views on the recommended risk management instruments		Months 22-23
11. Based on the results of the assessment and the feasibility studies, identify follow-up activities where recommended risk management instruments could be applied in partnerships with GEF or other donors	A new programme based on identified opportunities for actual application of recommended risk management instruments in GEF eligible countries		Months 22-24

9. Following field consultations, a training kit including six modules on insurance for renewable energy was prepared to complement the activities of the Global Renewable Energy Insurance Facility. The training kit has been made available free of cost as an on-line application on the UNEP project website.⁴³

e. Executing Arrangements

10. The project was managed and implemented by the Energy Branch of UNEP DTIE. A Stakeholder group⁴⁴ composed of representatives from the World Bank, UNDP, GEF Secretariat and the Scientific and Technical Advisory Panel (STAP) was intended to provide general guidance on project direction and outcomes, as well as to assist the PMU in developing linkages with other projects.
11. Single assessment tasks were delegated to consultants (either from private companies or international partner organizations) specialized in the area of renewable energy finance and financial risk management. A number of private sector industry representatives (e.g. from technology suppliers, insurance and banking sectors, industry associations from both

⁴³ www.unep.fr/energy/finance/risk

⁴⁴ Labelled as Steering Committee in the Prodoc

industrialized and developing countries) were consulted as primary stakeholders. Together with other relevant national agencies and consultancy companies, they were implicated in the Working Groups' research and the accomplishment of the feasibility case studies.⁴⁵ The industry stakeholder group was also involved in the identification of follow-up opportunities to apply recommended risk management instruments, in cooperation with the WB, UNDP, GEF Secretariat, UNEP FI and SEFI.

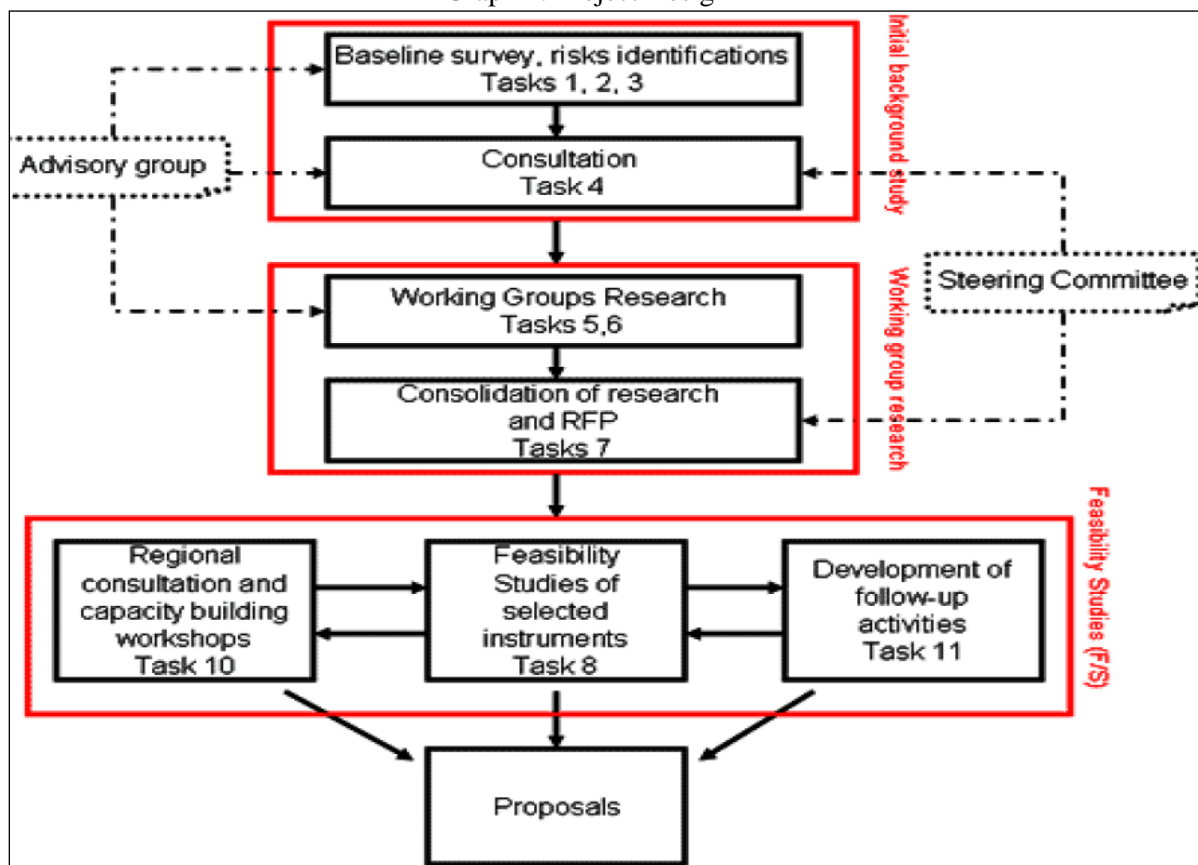
12. An Advisory Group - composed of representatives from UNEP, the WB, UNDP, GEF STAP, the Basel Agency for Sustainable Energy (BASE), and the team leaders from the Working Groups – was tasked with providing technical advice on current risk management practices for RET projects (Task 4) and peer-reviewing the consolidated analyses of the feasibility studies (Task 9) to provide feedback on options for risk management interventions by GEF and other donors.
13. The project was implemented in cooperation with the World Bank (Carbon Finance Initiative) and UNDP, which were involved in the formation of working groups, the selection of feasibility studies, and in outreach/follow up activities. Both the Organizations were expected to contribute to the project through country case studies, including on-going projects such as:
 - Geothermal Energy Development Fund (GeoFund), Central and Eastern Europe
 - African Rift Geothermal Development Facility (ARGeo)
 - Generation of Delivery of Renewable Energy Based Modern Energy Services in Cuba
 - Renewable Energy Based Electricity Generation for Isolated Mini-Grids in Zambia
 - Russia-Renewable Energy Program (RREP)
 - Solar and Wind Energy Resource Assessment (SWERA), Global

⁴⁵**Key collaborators and supporting technical organizations from developed countries:** Siemens, EDF, Munich RE, Garant, Dresdner Bank, GAIA Capital, EntergyKoch Trading Europe, Marsh Specialty Operations Limited, Marsh Finances, GSDP, EPIA, Roedl & Partner GbR, SIP, GTN, Auxilia, Andlug Consulting, 3C Climate Change Consulting GmbH, GERES, International Solar Energy Society, Lloyd Ascot Renewco, Royal & SunAlliance

Stakeholders from developing countries: Agence Nationale des Energies Renouvelables, KenGen, ANPPER, AMISOLE, CREIA, IREDA

Project developers: EC – DG Research, ADB, BCIE-CABEI, Development Bank of the Philippines

Graph 1: Project Design



f. Project Cost and Financing

14. Table 2 presents a summary of expected financing sources for the project as presented in the ProDoc. The total budget for the project was set at USD 1,509,000, of which USD 994,000 provided by the GEF. The project was as such categorized as a Medium-Sized Project (MSP). The project was expected to mobilize another USD 515,000 in co-financing (both in-kind and cash contributions) from multiple partners.

Table2: Project sources of funds

GEF Component	969,000
PDF A (GEF)	25,000
Sub-total GEF	994,000
Co-financing	
PDF co-financing (UNEP cash and in-kind)	23,000
World Bank (in-kind)	13,000
UNEP (cash from SEFI)	30,000
UNEP (in-kind from SEFI)	50,000
Industry (in-kind)	264,000
Industry (cash/ in-kind for feasibility studies)	120,000
SIP (cash)	15,000
Sub-total co-financing	515,000
Total project financing	1,509,000
Total MSP Financing	1,461,000

15. In-kind contributions from stakeholders were expected to cover participation in consultation meetings (including the final dissemination workshop), contribution to the research and the feasibility studies through interviews and reviews, and – in the case of SEFI - follow-up activities and other outreach and networking efforts.
16. The ProDoc estimated a budgetary breakdown by task/activity as well (Table 3). Of the total USD 1,509,000 project budget, USD 476,000 (31%) were allocated to the production of feasibility studies, USD 275,000 (18%) to cover the costs of the final international dissemination workshop, and USD 141,000 (9%) to fund the working groups' meetings.

Table 3: Project budget (estimated, USD)

Task	Sub-contract	Travel	Miscellaneous			Personnel	Co-finance		Total by Task
			Mktg Costs	Publ.	Comm.		Cash	In-kind / Travel	
PDFA	20000		5000				18000	5000	48000
1	20000	5000				12000		5000	42000
2	20000					12000	10000	5000	52000
3	20000	5000				12000	12000	5000	82000
4	40000	20000	5000			15000		37000	97000
5	86000	18000				12000		25000	141000
6	20000	20000				15000		37000	97000
7	40000	5000				15000		5000	65000
8	250000	60000				15000		151000	476000
9	30000	5000		15000		12000		5000	67000
10	30000	50000	15000		5000	18000	15000	142000	275000
11	20000	5000				12000	15000	15000	67000
Total	596000	198000	30000	15000	5000	150000	78000	437000	1509000

17. The project budget was revised in the course of the project implementation, and reduced in the amount of USD 139,308.75. These funds were transferred to a sub-project (GFL/4828) to cater for payment of consulting fees associated with the accomplishment of the feasibility studies by the UNEP BASE collaborating centre.

TERMS OF REFERENCE FOR THE EVALUATION

A. Objective and Scope of the Evaluation

18. In line with the UNEP Evaluation Policy⁴⁶, the UNEP Evaluation Manual⁴⁷ and the Guidelines for GEF Agencies in Conducting Terminal Evaluations⁴⁸, the terminal evaluation of the project “Assessment of Financial Risk Management Instruments for Renewable Energy Projects” is undertaken at the end of the project to assess project performance (in terms of relevance, effectiveness, and efficiency) and determine outcomes and impacts stemming from the project, including their sustainability.
19. The evaluation has two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote learning, feedback and knowledge sharing through results and lessons learned among UNEP, the GEF and their partners. Therefore, the evaluation will identify lessons of operational relevance for future project formulation and implementation. In addition, the evaluation will go over the recommendations of the mid-term internal review⁴⁹ and their implementation.
20. The evaluation will focus on the following set of key questions, based on the project objective and intended outcomes, which may be expanded by the consultant as deemed appropriate:
 - a) Was the project successful in identifying best practice methodologies for financial risk management, whose relevance has been acknowledged by the STAP, GEF and other stakeholders?
 - b) To what extent have the financial risk management instruments for RE projects generated by the projects been up-taken and utilised in following interventions?
 - c) To what extent has the project promoted a greater engagement of private sector insurance and financial institutions in RET risk management and financing in GEF eligible countries?
 - d) To what extent have the project outputs finally contributed to a faster and more systematic deployment of renewable energy technologies by supporting and positively influencing the development of markets for RE project risk management instruments?

B. Overall approach and methods

21. The terminal evaluation of the Project “Assessment of Financial Risk Management Instruments for Renewable Energy Projects” will be conducted under the overall responsibility of the UNEP Evaluation Office (EO). It will be an in-depth evaluation using a participatory approach whereby the UNEP Task Manager, the project manager and other relevant staff are kept informed and consulted throughout the evaluation process.
22. The evaluation will use mostly qualitative methods to determine project achievements against the expected outputs, outcomes and impacts. The findings of the evaluation will be based on the following:
 - a) A desk review of project documents including, but not limited to⁵⁰:
 - Relevant background documentation, inter alia: UNEP and GEF policies, strategies and programmes pertaining to sustainable energy finance and financial risk

⁴⁶ <http://www.unep.org/eou/StandardsPolicyandPractices/UNEPEvaluationPolicy/tabid/3050/language/en-US/Default.aspx>

⁴⁷ <http://www.unep.org/eou/StandardsPolicyandPractices/UNEPEvaluationManual/tabid/2314/language/en-US/Default.aspx>

⁴⁸ http://www.thegef.org/gef/sites/thegef.org/files/documents/TE_guidelines7-31.pdf

⁴⁹ The mid-term review was conducted through the submission of a progress report and a following meeting between DTIE and DGEF

⁵⁰ Documents to be provided by DTIE are listed in Annex 5

management; previous scoping studies and papers by UNEP SEFI on finance for RET projects;

- UNEP request for GEF project financing and project's approved Terms of Reference (ToR);
- Project monitoring reports (such as progress and financial reports, minutes of stakeholders' meetings, observations by the Advisory Group, Annual Project Implementation Review (PIR) reports to GEF and relevant correspondence);
- Documents and materials produced by the project: report on research findings (Task 1-3); summarized consultation results reports; ToR for research working groups; reports by WGs; feasibility studies; communication and awareness materials (including the training kit); final workshop proceedings;
- Project website;
- Any document referring to follow-up activities resulting from the project.

b) Interviews (in person/phone/emails) with:

- Project management located in UNEP/DTIE, Paris and other project staff (consultants);
- UNEP staff experts on energy finance (UNEP Finance and SEFI initiatives), Geneva;
- Members of the stakeholder group and the Advisory Panel;
- Key collaborators and supporting private sector technical organizations which participated in the project implementation (including the feasibility studies and the final roundtable) and/or commented on the project outputs;
- Actual and prospective users of the project website and the training kit;
- Key actors in RET finance and management, to assess any replication and follow-up to the project.

The consultant shall determine whether to seek additional information and opinions from representatives of donor agencies and other organizations, as deemed most appropriate. The consultant may similarly decide to draw on simple questionnaires as evaluative tool for the broader range of stakeholders/ project output users.

C. Key Evaluation principles

23. Evaluation findings and judgements should be based on sound evidence and analysis, clearly documented in the evaluation report. Information will be triangulated (i.e. verified from different sources) to the extent possible, and when verification was not possible, the single source will be mentioned⁵¹. Analysis leading to evaluative judgements should always be clearly spelled out.
24. The evaluation will assess the project with respect to a minimum set of evaluation criteria grouped in four categories: (a) Attainment of objectives and planned results, which comprises the assessment of outputs achieved, relevance, efficiency, effectiveness and the review of outcomes towards impacts (ROtI); (b) Sustainability and catalytic role, which focuses on financial, socio-political, and institutional factors conditioning sustainability of project outcomes, and also assesses efforts and achievements in terms of replication and up-scaling of project lessons and identified good practices; and (c) Processes affecting attainment of project results, which covers project preparation and readiness, implementation approach and adaptive management, stakeholder participation and public awareness, country ownership/driven-ness, project finance management, UNEP supervision and backstopping, and project monitoring and evaluation systems. The consultant could add other evaluation criteria as deemed appropriate.
25. In attempting to attribute any outcomes and impacts to the project, the evaluator should consider the difference between what has happened with and what would have happened

⁵¹

Individuals should not be mentioned by name if anonymity needs to be preserved.

without the project. This implies that there should be consideration of the baseline conditions and trends in relation to the intended project outcomes and impacts. This also means that there should be plausible evidence to attribute such outcomes and impacts to the actions of the project. Sometimes, adequate information on baseline conditions and trends is lacking. In such cases this should be clearly highlighted by the evaluator, along with any simplifying assumptions that were taken to enable the evaluator to make informed judgements about project performance.

26. As this is a terminal evaluation and over two years have passed since the project completion, particular attention should be given to project's follow-up and learning from the experience. The consultant will need to go beyond the assessment of "what" the project performance was, and make a serious effort to provide a deeper understanding of "why" the performance was as it was, i.e. of processes affecting attainment of project results (criteria under category "c"). This should provide the basis for the lessons that can be drawn from the project.
27. **Ratings.** All evaluation criteria will be rated, either on a four-point or six-point scale. Annex 2 provides detailed guidance on how the different criteria should be rated and how ratings should be aggregated for the different evaluation criterion categories.

D. Evaluation criteria

a. Attainment of objectives and planned results

28. The evaluation should assess the relevance of the project's objectives and the extent to which these were effectively and efficiently achieved.
- (a) *Achievement of Outputs and Activities:* Assess the project's success in producing each of the programmed outputs as presented in the ProDoc, both in quantity and quality, as well as their usefulness. Briefly explain why the project was successful or less successful in achieving its different outputs, cross-referencing as needed to more detailed explanations provided under Section "c" (which covers the processes affecting attainment of project objectives);
- (b) *Relevance:* Assess, in retrospect, whether the project's objectives and implementation strategies were consistent with: i) Global environmental issues and needs related to financing sustainable RET projects, including both needs of the target countries (large vs. small scale projects, technologies, etc) and the commercial strategies of domestic and international private sector partners; ii) the UNEP mandate, policies and programme of work at the time the project was designed and implemented; and iii) the GEF Climate Change focal area's strategic priorities and relevant operational programs.
- (c) *Effectiveness:* Appreciate to what extent the project has achieved its objectives, i.e.: i) best practice methodologies for financial risk management for RET projects have been identified and increasingly adopted by GEF and other donors; ii) adapted financial risk management instruments for RE projects have been developed for implementation by donor agencies and industry; and iii) the engagement of private sector financial institutions in RET risk management and financing in GEF eligible countries has been facilitated. The evaluation will also review the project's information dissemination strategy to assess the effectiveness of the means through which project outputs have been made available to stakeholders. Briefly explain what factors affected the project's success in achieving its objectives, cross-referencing as needed to more detailed explanations provided under Section "c".
- (d) *Efficiency:* Assess the cost-effectiveness and timeliness of project execution, and describe any cost- or time-saving measure put in place in attempting to bring the project to a successful conclusion within the programmed time and budget. Analyse how delays, if any, have affected project execution, cost and effectiveness. Give special attention to efforts by the project team to make use of pre-existing methods, data sources and assessment programmes. Wherever possible, compare the cost and time results ratios of the project with that of other similar projects.

- (e) *Review of Outcomes to Impacts (ROtI)*: Appreciate progress made towards impacts, taking into account achieved outcomes, assumptions and impact drivers, using the methodology presented in the GEF Evaluation Office's ROtI Practitioner's Handbook⁵² (summarized in Annex 6). The analysis should mainly revolve around the extent to which the identification of best practices, the development of financial mechanisms, and the greater involvement of private sector stakeholders have contributed reducing risk perceptions around RET projects and thus facilitated commercial investments towards renewable energy initiatives in GEF eligible countries. The analysis should also consider whether the necessary impact drivers (incl. resources) have been present and assumptions surrounding the project follow-up remained valid.

b. Sustainability and catalytic role

29. **Sustainability** is understood as the probability of continued long-term project-derived outcomes and impacts after the external project funding and assistance end. The evaluation will identify and assess the key conditions or factors that have contributed to/undermined the persistence of benefits. Some of these factors might be outputs or outcomes of the project (e.g. stronger institutional partnerships); others will include contextual circumstances or developments that were not outcomes of the project but that might have conditioned the sustainability of outcomes. The evaluation should also ascertain to what extent any follow-up work has been initiated and how project outcomes have been sustained and enhanced over time. The evaluation will look at how the products, tools and partnerships developed by the project have been put to good use after the project ended and, more specifically, whether feasibility studies resulted in any follow-up action. Application of the ROtI method will assist in the evaluation of sustainability.
30. Four aspects of sustainability should be addressed to the extent possible: financial, socio-political, institutional frameworks and governance, and environmental. The following questions provide guidance on the assessment of these aspects:
- a. *Socio-political sustainability*: Are there sufficient public and stakeholder awareness, interest and incentives in support of the long term objectives of the project? Are there any social or political risks that may influence positively or negatively the sustenance of project outcomes and progress towards impacts? How far are risk management options finally incorporated in management and/or development policies and activities of governments?
 - b. *Financial resources*: Are there any financial risks that may jeopardize sustenance of project outcomes and onward progress towards impact? To what extent are the outcomes and eventual impact of the project dependent on continued financial support? If this is the case, have adequate financial and economic resources⁵³ been or become available once the external assistance to the project ended?
 - c. *Institutional framework and governance*: To what extent is the sustenance of the outcomes and onward progress towards impacts dependent on issues relating to institutional frameworks and governance? Are there any institutional achievements, legal frameworks, policies and governance structures and processes in place that contribute to sustaining project benefits? To what extent have project awareness activities and collaborations contributed to the set-up of such institutional framework?
 - d. *Environmental sustainability*. Are there any environmental factors, positive or negative, that can influence the future flow of project benefits? Are project outputs

⁵²http://www.thegef.org/gef/sites/thegef.org/files/documents/Impact_Eval-Review_of_Outcomes_to_Impacts-RotI_handbook.pdf

⁵³ Those resources can be from multiple sources, such as the public and private sectors, income generating activities, other development projects etc.

and outcomes likely to affect the environment, which, in turn, might affect sustainability of project benefits?

31. **Catalytic role and replicability.** The evaluation will assess the catalytic role played by this project and the actual replication of project activities and methodology. The **catalytic role** of UNEP and the GEF is embodied in their approach of supporting the creation of an enabling environment, investing in activities which are innovative and showing how new approaches and market changes can work. UNEP and the GEF aim to support activities that upscale new approaches to a national, regional or global level, with a view to achieve sustainable global environmental benefits. **Replication**, in the context of GEF projects, is defined as lessons and experiences coming out of the project that are replicated (experiences are repeated and lessons applied in different geographic areas) or scaled up (experiences are repeated and lessons applied in the same geographic area but on a much larger scale and funded by other sources).
32. The evaluation will assess the approach adopted by the project to promote replication effects and appreciate to what extent actual replication has already occurred or is likely to occur in the near future, with special attention to replication effects derived from successful feasibility studies. The evaluation will generally look at the degree the project has:
 - a. Provided *incentives* (social, economic, market based, competencies etc.) to catalyze changes in stakeholder behaviour. In particular, the evaluation should assess to which extent the risk management measures developed by the project have contributed increasing the in-flow of capital funds to the deployment of RET projects, and to what extent the benefits derived from the new measures have been made public.
 - b. created opportunities for particular individuals or institutions (“*champions*”) to catalyze change (without which the project would not have achieved all of its results), thanks to the capacities and know-how the project built;
 - c. contributed to *policy changes* (on paper and in implementation of policy);
 - d. contributed to sustained follow-on financing (*catalytic financing*) from Government, GEF or other donors.
33. The evaluation will also assess the extent to which following GEF and non-GEF programmes have taken advantage of the studies, tools, and training materials developed by the project, as well as of the recommendations made by the project final roundtable.

c. Processes affecting attainment of project results

34. **Preparation and readiness.** To assess preparation and readiness, the evaluation will look at the extent to which:
 - a. Project’s objectives and components were clear, practicable and feasible within its timeframe;
 - b. Lessons from other relevant projects were properly incorporated in the project design and an incremental approach with reference to existing knowledge was adopted;
 - c. Stakeholders were adequately identified, with careful consideration given to stakeholders from both developed and developing countries being represented;
 - d. Capacities of executing institutions and counterparts were properly considered when the project was designed;
 - e. Counterpart resources (staff, funding, facilities) were available when the project started.
35. **Implementation Approach and Adaptive Management.** This includes an analysis of approaches used by the project, its management framework, the project’s adaptation to changing conditions, the performance of the implementation arrangements and partnerships,

relevance of changes in project design, and overall performance of project management. The evaluation will:

- a. Ascertain to what extent the project implementation mechanisms outlined in the project document (including the stakeholder group) have been followed and were effective in delivering project outputs and outcomes. Were pertinent adaptations made to the approaches originally proposed?
- b. Assess the clarity of project design, in terms of roles and responsibilities assigned to each project partner (including the stakeholder group);
- c. Assess the efficiency and effectiveness of project management and how well the PMU was able to adapt to changes during the life of the project;
- d. Assess the role and performance of the various working groups and committees established and the project execution arrangements at all levels;
- e. Identify administrative, operational and/or technical problems and constraints that influenced the effective implementation of the project, and how the project partners tried to overcome these problems;
- f. Assess the extent to which the project responded to the recommendations made by the Steering Committee and the Advisory Board;
- g. Assess the extent to which the project responded to the mid-term review.

36. **Stakeholder⁵⁴ Participation and Public Awareness.** This consists of three related and often overlapping processes: (1) consultation, (2) stakeholder participation, and (3) information dissemination. The evaluation will specifically assess:

- a. The approach(es) used to identify and engage project partners. What were the strengths and weaknesses of these approaches with respect to the project's objectives?
- b. To which extent the project has engaged private sector representatives (from technology suppliers, insurance and banking sectors, industry associations from both industrialized and developing countries) in scoping financial risk management instruments (needs and usefulness). Have mutual benefits and the integration of efforts in the overall UNEP and GEF strategy been clearly explained? How is this likely to promote the stakeholders' ownership of the assessment findings and facilitate follow up and replications?
- c. How different stakeholders (including policy and decision makers) have been involved in the feasibility studies and the analysis of market prospects for risk management products;
- d. To what extent have the working groups used the contributions by partner organizations (namely, the World Bank and the GEF) as inputs to the initial research;
- e. The degree and effectiveness of communication and public awareness activities (including distribution of project communication material, meetings with RE stakeholders in developing countries, and the final workshop) undertaken during the implementation of the project.

37. The ROtI analysis should assist the consultant in identifying key stakeholders and their respective roles, capabilities and motivations in each step of the causal pathway from activities to objectives to impact.

38. **Country ownership / driven-ness:** This criterion usually assesses the performance of Governments in the project. In this case, the project did not involve any Government counterpart. It is relevant to assess, however:

⁵⁴Stakeholders are the individuals, groups, institutions, or other bodies that have an interest or stake in the outcome of the project. The term also applies to those potentially adversely affected by the project.

- a. How consistent the project was with Government plans and policies in selected GEF eligible countries, including those related to the UNFCCC and the Kyoto Protocol and any measure for RET promotion;
 - b. To what extent the effectiveness of the methods developed finally depends on political and institutional frameworks (this would be largely addressed under the sustainability criterion);
 - c. Whether, and how, Government capacities were expected to be built to raise awareness and facilitate the set up a conducive institutional environment to the deployment of RET projects.
39. **Financial planning and management.** Evaluation of financial planning requires an assessment of the quality and effectiveness of financial planning and control of financial resources throughout the project's lifetime. The assessment will look at actual project costs by activity compared to budget (variances), financial management (including disbursement issues), and co-financing. The evaluation will:
- a. Verify the application of proper standards (clarity, transparency, audit etc.) and timeliness of financial planning, management and reporting to ensure that sufficient and timely financial resources were available to the project and its partners;
 - b. Appreciate other administrative processes such as recruitment of staff, procurement of goods and services, preparation and negotiation of cooperation agreements etc. to the extent that these might have influenced project performance;
 - c. Present to what extent (cash and in-kind) co-financing has materialized as expected at project approval (see Table 2). The evaluation will provide a breakdown of final actual costs and co-financing for the different project components.
 - d. Describe the resources the project has leveraged since inception and indicate how these resources contributed to the project's ultimate objective.⁵⁵
40. **UNEP Supervision and Backstopping.** The purpose of supervision is to verify the quality and timeliness of project execution in terms of finances, administration and achievement of outputs and outcomes, in order to identify and recommend ways to deal with problems which arise during project execution. Such problems may be related to project management but may also involve technical/ substantive issues in which UNEP has a major contribution to make. The evaluator should assess the effectiveness of supervision and administrative and financial support provided by UNEP including:
- a. The adequacy of project supervision plans, inputs and processes;
 - b. The emphasis given to outcome monitoring (results-based project management);
 - c. The realism and candour of project reporting and ratings (i.e. are PIR ratings an accurate reflection of the project realities and risks);
 - d. The quality of documentation of project supervision activities; and
 - e. Financial, administrative and other fiduciary aspects of project implementation supervision.
41. **Monitoring and evaluation.** The evaluation shall include an assessment of the quality, application and effectiveness of project monitoring and evaluation plans and tools, including an assessment of risk management based on the assumptions and risks identified in the project document. The evaluation will appreciate how information generated by the M&E system during project implementation was used to adapt and improve project execution, achievement of outcomes and ensuring sustainability. M&E is assessed on three levels:

⁵⁵Leveraged resources are additional resources—beyond those committed to the project itself at the time of approval—that are mobilized later as a direct result of the project. Leveraged resources can be financial or in-kind and they may be from other donors, NGOs, foundations, governments, communities or the private sector.

- a. *M&E Design*. Projects should have sound M&E plans to monitor results and track progress towards achieving project objectives. An M&E plan should include a baseline (including data, methodology, etc.), SMART⁵⁶ indicators, data analysis systems, and evaluation studies at specific times to assess results. The time frame for various M&E activities and standards for outputs should be specified. The evaluator should concentrate on the following M&E design aspects:
- Quality of the project logframe as a planning and monitoring instrument;
 - SMART-ness of indicators: Are there specific indicators in the logical framework for each of the project objectives and outcomes? If so, are the indicators measurable, attainable (realistic) and relevant to the objectives and outcomes? Are the indicators time-bound?
 - Adequacy of baseline information: To what extent have baseline information on performance indicators been collected and presented in a clear manner? Was the methodology for the baseline data collection explicit and reliable?
 - Arrangements for monitoring: Have roles and responsibilities for M&E activities been clearly defined? Were the data sources and data collection instruments appropriate? Was the frequency of various monitoring activities specified and adequate? In how far were project users involved in monitoring?
 - Arrangements for evaluation: Have specific targets been specified for project outputs? Has the desired level of achievement been specified for all indicators of objectives and outcomes? Were there adequate provisions in the legal instruments binding project partners to fully collaborate in evaluations?
- b. *M&E Plan Implementation*. The evaluation will verify that:
- the M&E system was operational and it facilitated timely tracking of results and progress towards project objectives throughout the project implementation period;
 - annual project reports and Progress Implementation Review (PIR) reports were complete, accurate, timely and with well justified ratings;
 - the information provided by the M&E system, including the mid-term review, was used to improve project performance and to adapt to changing needs.
- c. *Budget for M&E activities*. The evaluation will determine the adequacy of budgetary resources allocated to M&E activities and whether the funds had been released in a timely fashion in the course of the project's implementation.

E. The Evaluation Team

42. The evaluation will be carried out by an independent consultant, specialised in the areas of renewable energy finance and financial risk management. The consultant will be responsible for collecting and analysing project data, and drafting the evaluation report.
43. The consultant will work under the overall responsibility of the UNEP Evaluation Office and (s)he will consult with the EO on any procedural and methodological matters related to the evaluation. It is, however, the consultant's individual responsibility to arrange for any other logistical matters related to the assignment. (S)he will liaise with the UNEP/DTIE Task and Project Manager, who will provide full support on any logistical issues, allowing the consultant to conduct the evaluation as independently as possible.
44. The consultant certifies to the EO that (s)he has not been associated with the design and implementation of the project in any way which may jeopardize his/her independence and impartiality towards project achievements and project partner performance. In addition, (s)he

⁵⁶ Specific Measurable Achievable Relevant Time-bound

certifies that (s)he will not have any future interest in cooperating with the project's executing or implementing units within six months after the completion of his/her contract.

F. Evaluation Deliverables and Review Procedures

45. The **evaluation report** should be brief (no longer than 35 pages – excluding the executive summary and annexes), to the point and written in plain English. It must explain the purpose of the evaluation, exactly what was evaluated and the methods used (with their limitations). The report will present evidence-based and balanced findings covering all the evaluation criteria, consequent conclusions, lessons and recommendations, which will be cross-referenced to each other. The report should be presented in a way that makes the information accessible and comprehensible. Any dissident views in response to the evaluation findings will be appended in footnote or an annex as appropriate. Annex 1 includes the annotated outline the evaluation report is expected to follow.
46. The **draft report**, including any relevant working paper, shall be submitted to the Head of the Evaluation Office. The EO will review the report for clarity and comprehensiveness. When found acceptable, the Head of Evaluation will share the report with the Task and Project Managers for initial review and consultation. DTIE is invited to comment on the draft evaluation report and will forward the draft to project stakeholders, in particular DGEF, the members of the Advisory Board and the Stakeholder group, for review and comments. Stakeholders may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. Consultations will be held between the consultant, EO staff, the Task Manager and key members of the project execution team. These consultations will seek feedback on the proposed recommendations and lessons. The EO will then collate all review comments and provide them to the independent consultant for consideration in preparing the final version of the report. The consultant will prepare a **response to any comments** that contradict his/her own findings and could therefore not be accommodated in the final report. This response will be shared by the EO with the interested stakeholders to ensure full transparency.
47. **Submission of the final Terminal Evaluation report.** The final report shall be submitted by email to:

Segbedzi Norgbey, Head
UNEP Evaluation Office
P.O. Box 30552-00100
Nairobi, Kenya
Tel.: (+254-20) 762 3387
Fax: (+254-20) 762 3158
Email: segbedzi.norgbey@unep.org

The Head of Evaluation will share the report with the following persons:

Maryam Niamir-Fuller, Director
UNEP/Division of GEF Coordination
P.O. Box 30552-00100
Nairobi, Kenya
Tel: + 254-20-7624686
Fax: + 254-20-623158/4042
Email: maryam.niamir-fuller@unep.org

Edu Hassing, Task Manager Climate Change
UNEP Division of Technology, Industry and Economics
15 rue de Milan
75441 Paris Cedex 09
France

Tel: +33 (0)1 4437 1472
Fax: +33 (0)1 4437 1474
Email: edu.hassing@unep.org

48. The final evaluation report will be published on the Evaluation Office web-site www.unep.org/eouand and may be printed in hard copy. Subsequently, the report will be sent to the GEF Office of Evaluation for their review, appraisal and inclusion on the GEF website.
49. As per usual practice, the Evaluation Office will prepare a **quality assessment of the final report**, which is a tool for providing structured feedback to the evaluation consultants. The quality of the draft evaluation report will be assessed and rated against both GEF and UNEP criteria as presented in Annex 4.

G. Resources and Schedule of the Evaluation

50. The evaluation will be undertaken by an independent consultant contracted by the UNEP Evaluation Office.
51. The consultant will submit the first draft report latest by 25th November to the UNEP EO and revise the draft following the comments and suggestions made by the EO within two weeks.
52. The EO will circulate the revised draft to project partners. Comments from stakeholders would be expected within two weeks after the draft report has been shared. Any comments or responses to the draft report will be sent to UNEP / EO for collation and the consultant will be advised of any necessary revisions. The consultant will submit the final report no later than two weeks after reception of comments by stakeholders.

H. Schedule Of Payment

53. The consultant will be hired under an individual Special Service Agreement (SSA). The fee will be estimated as a lump-sum, inclusive of all expenses such as communication and incidental expenses.
54. 40% of the honorarium portion of the fee will be paid upon acceptance of a draft report deemed complete and of acceptable quality by the EO. The remainder will be paid upon satisfactory completion of the work. In case the consultant is not able to provide the deliverables in accordance with these TORs, and in line with the expected quality standards by the UNEP Evaluation Office, payment may be withheld at the discretion of the Head of the Evaluation Office until the consultant has improved the deliverables to meet UNEP's quality standards.
55. If the consultant fails to submit a satisfactory final product to UNEP in a timely manner, i.e. within one month after the end date of their contract, the Evaluation Office reserves the right to employ additional human resources to finalize the report, and to reduce the consultants' fees by an amount equal to the additional costs borne by the Evaluation Office to bring the report up to standard.

Annex 2 - Evaluation Program

Upon return of signed contract the 28 September UNEP DTIE was contacted for producing a letter of introduction to be circulated together with a simple questioner among the registered participants who were assumed to be able to contribute to the questionings as to whether the project had generated long term durable Global Environmental Impacts or were in the process of doing so.

The first contact to UNDP proved unsatisfactory but the second produced the required letter for approaching contact persons for interviews, the persons contacted are listed below. Only few answers were obtained and contacts were then made by phone where possible. In particular contacts were made to the insurance companies who had taken active part in the development of the targeted research project. Although the Terminal Evaluation was planned as a desk top study only contacts were made in Denmark and Germany (profiting of a Power Gen Europe conference planning meeting in Munich 10-11 November) in order to have more in depth answers to the outcome of the project. The persons with whom meetings were conducted are marked by asterisks in the list below. In the beginning of November successful contacts were made to UNEP and the Project Manager who it had been difficult to get in contact with due to her change from the UNEP DTIE to UNDP Ethiopia. Tight contact to UNEP was maintained throughout the preparation of the 3 draft versions of the report.

Company	Contact	Email/Phone Number
UNEP DTIE (the project manager now with UNECA)	Fatma Ben Fadhl	FBenFadhl@uneca.org +251(0)11 544 513 By phone interview twice
UNEP	Eric Usher EduHassing DeanCooper Maryam Namir Fuller James Verner (const.)	Eric.usher@unep.org interview by phone EduHassing@unep.org interview by phone Dean.Cooper@unep.org by phone (through UNEP) By phone
World Bank Carbon Finance Initiative World Bank GEF	Veronique Bishop Helmut Schreiber Richard Hosier	By phone. Hschreiber@worldbank.org rhosier@worldbank.org
GSDP – Carbon Re	Dirk Kohler	Dirk.kohler@carbonre.eu by an 1 hour phone interview
Munich RE	Dirk Hollnack Stefan Feldhütter	DHollnack@munichre.com sfeldhuetter@munichre.com meeting on the 11 November * followed by communications
Codan/RSA	Rune Sandholt NielsKragelund	rus@codan.dk interview by phone NKR@codan.dk
URC	John Christensen Jørgen Fenhann Søren Lützen JiotyPainuly	* and by phone interview * * By phone on SHS initiative
BASE	Virginia Sonntag-O'Brien	virginia.sonntagob@ren21.org
Roedl and Partner	Christian Schonwlesner-Bozkurt Imolauer Kai	Kai.imolauer@roedl.com
Dresdner Bank	Armin Sandhoverl	Armin.Sandhoevel@Drestner-Bank.com
Paris Re	Salah Dhouib	Salah.dhouib@paris-re.com
Garant	Jacques Losey	info@garant.at
Marsh (Marine and Energy, Finances, and Risk Consulting)	Tom Sexton Emmanuel Leblanc	Tom.sexton@marsh.com Emmanuel.leblanc@marsh.com

	Hélène Bourgeois Guilherm Bourbon Warren Diogo Man Cheung Philip Sanchez	Helena.bourgeois@marsh.com Guilherm.bourbon@marsh.com Warren.diogo@marsh.com Man.cheung@marsh.com Philip.sanchez@marsh.com
Andlug consulting	Andrew Dlugolecki	andlug@hotmail.com
GVEP / Energy Security Group Energy Efficiency and Finance Corporation	Judy Siegel John Mac Lean	judy@energyandsecurity.com jmaclean@qwest.net
Eksport Kredit Fonden (Danish ECA)	Anne-Marie Owie Jørn Fredsgaard Sørensen Thomas Blomgreen	amo@ekf.dk by telephone Jfs@ekf.dk meeting * tbg@ekf.dk meeting *
Siemens	Roland Lutz	Roland.lutz@siemens.com
EDF	Sarah Adams Gilles Deleuze	Meeting with Francois GigerEdF the 11 November.
3C Climate Change	Sasha Lafeld Julia Rothe Rian van Staden	Sasha.lafeld@3c-company.com Julia.rothe@3c-company.com vanstaden@ises.org
ICICI Bank	PradeepChaunan	Pradeep.c@icicibank@com
ADB	Samuel Tunywa	stuniwa@adb.org
JBIC	M. Tanimoto	m-tanimoto@jbic.go.jp
VERGNET	Guillaume Chapuy	g.chapuy@vergnet.fr
BCIE-CABEI	Claudia Lucia Alvarado Ney	clalvarado@bcie.org
IED	Anya Shanker	a.shanker@ied-sa.fr

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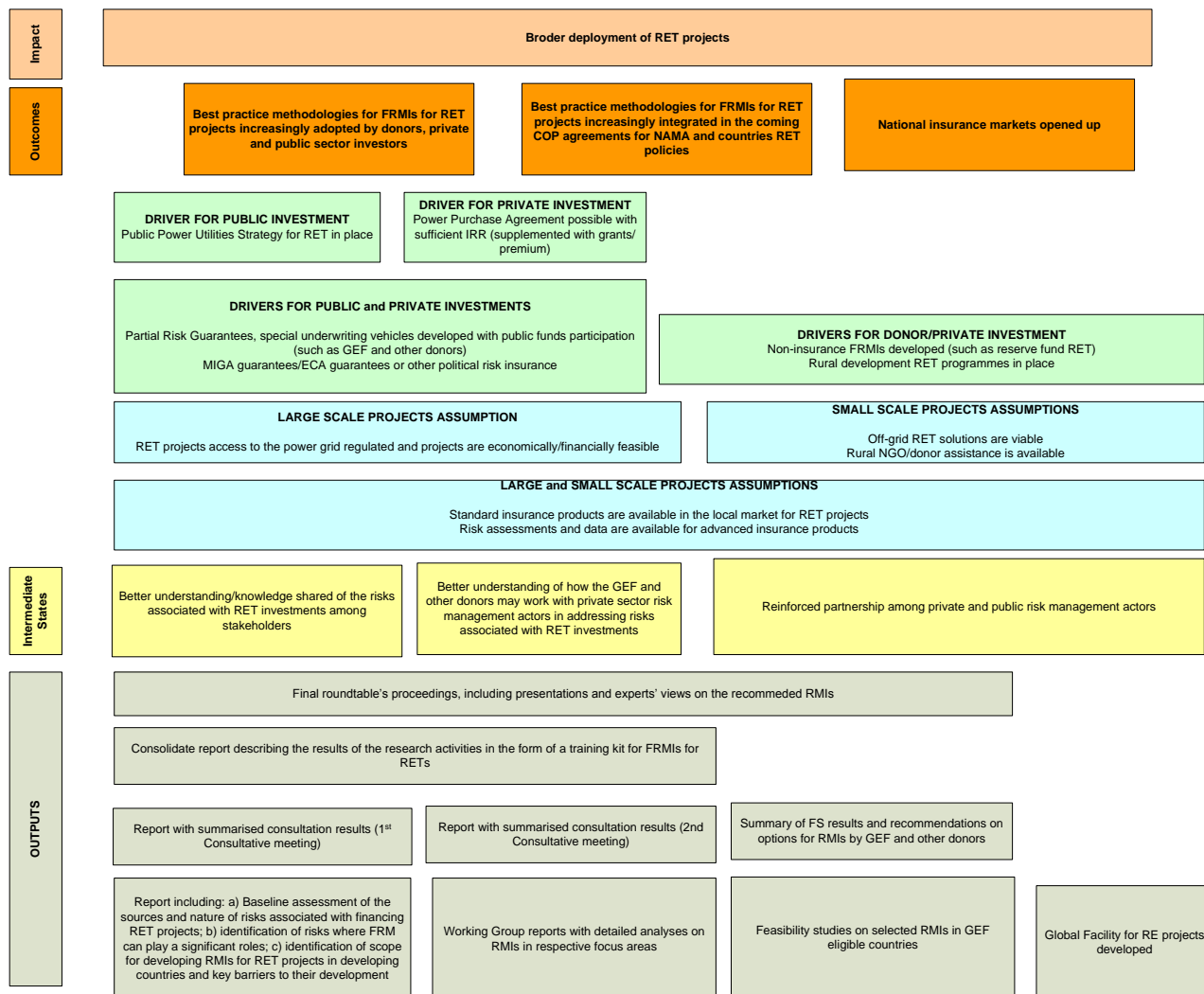
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Annex 4 - Summary of finance

DTIE-executed umbrella project: Assessment of Financial Risk Management Instruments for Renewable Energy Projects								
GFL-2328-2721-4826/Rev.3								
GF/4040-05-09								
			2005	2006	2007	2008	2009	Total
10	PERSONNEL COMPONENT							
	1100	Project Personnel						
	1101	UNEP Project Coordinator (L-3)	37.877,69	73.156,85	52.311,67	90.763,73	(10.301,40)	243.808,54
	1199	Sub-total	37.877,69	73.156,85	52.311,67	90.763,73	(10.301,40)	243.808,54
	1200	Consultants						
	1201	Implementation support						-
	1220	Unspecified (no terms of reference available)						-
	1299	Sub-total	-	-	-	-	-	-
	1600	Travel on official business						
	1601	UNEP staff travel		568,00	12.252,25	10.055,11	(1.368,00)	21.507,36
	1699	Sub-total	-	568,00	12.252,25	10.055,11	(1.368,00)	21.507,36
1999	Component total		37.877,69	73.724,85	64.563,92	100.818,84	(11.669,40)	265.315,90
20	SUB-CONTRACT COMPONENT							
	2200	Sub-contracts (MOUs/Las for supporting organizations)						
	2201	BASE						-
	2299	Sub-total	-	-	-	-	-	-
	2300	Sub-contracts (for commercial purposes)						
	2301	Research (incl travel)	30.524,63					30.524,63
	2399	Sub-total	30.524,63	-	-	-	-	30.524,63
2999	Component total		30.524,63	-	-	-	-	30.524,63
30	TRAINING COMPONENT							
	3300	Meetings/Conferences						
	3301	2 consultancy meetings (incl travel)						-
	3302	1 international meeting		19.906,33	834,47	(1.118,38)		19.622,42
	3399	Sub-total	-	19.906,33	834,47	(1.118,38)	-	19.622,42
3999	Component total		-	19.906,33	834,47	(1.118,38)	-	19.622,42
50	MISCELLANEOUS COMPONENT							
	5200	Reporting costs						
	5201	Publication	1.841,17					1.841,17
	5299	Sub-total	1.841,17	-	-	-	-	1.841,17
	5300	Sundry						
	5301	Communications				162,13		162,13
	5399	Sub-total	-	-	-	162,13	-	162,13
5999	Component total		1.841,17	-	-	162,13	-	2.003,30
99	GRAND TOTAL		70.243,49	93.631,18	65.398,39	99.862,59	(11.669,40)	317.466,25
	Previous budget (Rev.2)		70.243,49	93.631,18	222.900,33	70.000,00		456.775,00
	Variance (as at Rev.3)		-	-	(157.501,94)	29.862,59	(11.669,40)	(139.308,75)

Annex 5 - ROTI

Drivers and assumptions are quite different for the developing and emerging countries, as well as for small scale and large RETs, not to mention advanced FRMI for geo-thermal power plant and weather derivatives. This comes out very clearly when drafting the project's Theory of Change.



Annex 6 - Detailed recommendations from the project final Roundtable in October 2008

Areas of Work	Through private-public partnerships (PPPs)	Through public technical assistance and cooperation initiatives
<u>Communication</u>	<ul style="list-style-type: none"> i) Development of investment fundamentals for clean energy projects to help address Business/market risks, Counterparty risks, etc. ii) Analysing the current challenges in managing counterparty credit risk, and exploring the relevant best practices in risk monitoring, modelling and mitigation. iii) Training on specific risk management strategies for renewable energy and energy efficiency projects. 	<ul style="list-style-type: none"> i) Improving the flow of information and building capacity on climate change talks and on regional and national policy initiatives. ii) Assessing market risks and opportunities, using different post 2012 scenarios - for use by investors and other project stakeholders.
<u>Renewable energy policy framework</u>	<ul style="list-style-type: none"> i) Improving the consistency and interpretation of renewable energy policies by both public and private stakeholders. ii) Advocating for increased engagement of project developers with the insurance industry. 	<ul style="list-style-type: none"> i) Enhancing the legal environment for renewable energy projects and namely to address the counterparty and off-taker risks. ii) Further involvement of credit export agencies in
	<ul style="list-style-type: none"> iii) Conducting a top-down approach in order to identify the key policy issues when dealing with project risk management. 	<p>renewable energy projects as debt repayment periods can be impacted by political decisions.</p>
<u>Certification and standardisation</u>	<ul style="list-style-type: none"> i) Exploring the possibility of developing certification programmes for use by lenders and investors, as they do not process the technical due diligence that insurers undertake. 	<ul style="list-style-type: none"> i) Enhancing quality control for renewable energy technologies through certification programmes to be used by investors and other project sponsors.

<p><u>Large-scale financing</u></p>	<ul style="list-style-type: none"> i) Need for R&D support for the development of appropriate risk mitigation schemes in developing countries involving local authorities. ii) A more programmatic weather data measurement approach needs to be developed at the national and international level to facilitate the development of weather hedged instruments. iii) Need to advocate for the use of risk management solutions including insurance in order to bring in risk managers at the early stage of projects development. iv) Renewable energy manufacturers need to keep an increased share of business risks in house while still transferring volatile risks to reinsurers e.g. catastrophic risks, guarantee performance, technology risks etc.. 	
<p><u>Small-scale financing</u></p>	<ul style="list-style-type: none"> i) Need to define the right policies, financing schemes, the degree of risks that can be carried by financial and insurance institutions and the possible CDM aggregation approaches. ii) Need to address the risks in tranches by banks, MFIs and end-users through the use of partial credit or risk guarantees and insurance coverage (namely on the end-users side). 	

	<ul style="list-style-type: none"> iii) There is a need to test approaches through pilot projects before scaling up the mechanisms. iv) Micro-insurance covers specific to renewable energy and Energy Efficiency Technologies can be developed and scaled-up in developing countries. 	
<u>Post 2012</u>	<ul style="list-style-type: none"> i) Need for support to the design of innovative carbon finance trading tools and enhanced methodologies for carbon price discovery while looking at two time-frames: until 2012 and post 2012 (post Kyoto framework). ii) Contingent structures for the development of innovative tools. iii) Registration risk may become predominant, need for increased awareness on existing insurance products, such as registration insurance. iv) Feeding-in views on risk management in the climate change talks and changing the mindset about insurance. 	<ul style="list-style-type: none"> i) Testing of voluntary carbon market schemes in developing countries.
<u>Global Environment Facility (GEF)</u>	<p>When developing PPPs, partnering companies need to be ensured of their eventual participation in the implementation of projects. This point was raised in reference to procurement procedures that are in place at the GEF.</p>	<p>Given the different stage of advancement of renewable energy markets (e.g. large vs. small scale); there is a need to structure and segregate programme objectives and outputs between developing and emerging economies.</p>

Annex 7 – Short curriculum Vitae of the Consultant

Bernt Frydenberg

Curriculum Vitae

Name : Bernt Frydenberg
Profession : M.Sc., Civil Engineering, Technical University of Denmark
B. Com, Finance and Banking Copenhagen Business School and London Business School
Date of Birth : 09.21.1945
Years with Firms : 15 ELSAM/EP 7 Mercapto CDM Consult (personally owned company)
Nationality : Danish
Membership in Professional Societies: Member of the Society of Civil Engineering, the Energy group, the Environmental group and the Management Group.
Chairman for Energy Technologies on low to Zero CO₂ emission Power Gen Europe.
London Business School Association

Key Qualifications:

Bernt Frydenberg was in 1972 one of the founders of Copenhagen Cooperative Bank where he served from 1995 to 2010 as vice-chairman of the bank on top of his other professional jobs giving a valuable experience in risk assessment of project loan applications. From 1995 he was vice-chairman of a Water Board in North Zealand where he took over as chairman from 2005.

In 2010 he assisted the UNEP EO in Nairobi in evaluating a UNEP World Bank program on implementation of CDM projects/ RE projects/Environmental projects in Africa . The method used for the Terminal Report Evaluation of the project *Using Carbon Finance to Promote Sustainable Energy Services in AFRICA (CF-SEA)* was the ROTi method.

Since 2008 he has assisted the Danish Government (The Danish Energy Agency and the Transmission System Operator “Energinet.dk”) evaluating applications for financial support to demonstration projects in renewable energy and energy conservation. The evaluation contains a technical, financial, economic as well as a risk analyse of each individual project application as well as a rating/ recommendation on which projects to support. Alone in the first half of 2011 he has evaluated 10 projects and another batch of projects is expected in the second half of the year 2011. He further evaluated 4 terminal reports for projects completed in 2011 rating them successful or faulty suggesting improvements.

Mr. Bernt Frydenberg has since 2004 performed his services as an independent senior energy expert to World Bank and EU projects and as an advisor and evaluator to the European Power Gen Conferences, the Danish Government (DEA)and Energinet.dk(the Danish TSO). He has assisted the World Bank Carbon Finance Unit and the East Asia and Pacific Unit in developing CDM project pipelines, PINs, baseline studies, monitoring plans and Project Design Documents (PDDs). In particular he assisted in CHP and district heating projects and the integration thereof in the power system in Mongolia and China where he in 2009 developed PDDs for Yingkou and Dashiqiao Cities DH systems..

He has since 1995 been member of the planning committee for the annual Power Gen Europe conferences responsible for introduction of renewable energy into the forum and since 2001 Chairman for the Low to Zero CO₂ emission policy and technology conference track now focussed on Carbon Capture and Sequestration (CCS).

In his 15 years with ELSAM he has as coordinator of EU supported energy programmes and project activities such as the PHARE, Tacis, Synergy, Thermie, gained substantial energy sector knowledge. For Elsam he was member of the Eurelectric working group on external cooperation. During this period he assisted in the co-operation between Eurelectric and the Electric Power Counsel of the CIS and he was responsible for EU assisted project on transmission projects in the CIS countries the synchronisation and reliability thereof. Result of his work as Business Development Manager are among others: Wind farm Poland, CFB boilers Poland, EU support to the first 3 1MW pilot wind turbines in the world at Tjæreborg

Enge, Bellacorric wind farm Ireland, Tarifa wind farm Spain, Paul da Serra wind farm Madeira, EU support to Grenå straw fired CHP, Madsnedso straw thermal gasification unit and Assens Bio-gasification plant.

Education:

Education in Engineering : M.Sc., Civil Engineering, Technical University of Denmark 1969
Education in Economy : B. Com, Finance and Banking, Copenhagen School of Economics and Business Administration, 1972 Civil Economist (4 years educational program)
London Business School : Executive Management Programme, 1973 .

Since 2004 Independent Consultant and CEO for Mercapto Consult.

Special focus areas are System optimization, New RE technologies, Energy conservation and CDM. January 2010 appointed external evaluator of the CF-SEA programme by UNEP and World Bank in Zambia, Mali, Cameroon, Ghana and Mozambique.. The co-financed initiative CF-SEA programme was established to promote CDM projects in Africa.

From July 2008 he is assisting the World Bank as STC in establishing Project Design Documents for CDM projects for Yingkou EDZ and Dashiqiao cities district heating and CHP systems. The projects are ongoing and likely to expand to other cities in China.

January 2008 appointed evaluator of new energy technology development projects to be supported financially by the Danish Government through the TSO EnergiNet Denmark. Ongoing in the field of Biomass and Wave Energy. The services has as a spin-of resulted in similar services being performed on biogas projects and energy conservation projects for the Danish Energy Agency.

He is the Danish member of Power Gen Europe conference committee. Power Gen Europe is an annual event consisting of a 3 day conference and the largest exposition in Europe of power equipment. In 2008 and 2009 he was chairman for the conference track on low to zero CO2 emission energy policies and technologies including CCS.

From June 2007 internal STC for the World Bank assisting in the "Clean Air for Ulaan Baatar" project. The package of projects to finance in order to reduce air pollution contained CDM projects (*reference Gdraugelis@worldbank.org*)

2005 to 2007 in a consortium with Risoe and IED France, PNOG Philippines, Institute of Energy Vietnam and MIME Cambodia developing wind projects having the overall responsibility for integrating CDM issues in the projects. The study was supported 50% by the EU ASEAN Energy Facility Program and included several work shops and capacity building in order to enable the ASEAN partners to develop wind energy projects as CDM projects.

From September 2005 as STC for the W B assisting the project proponent establishing a model PDD for "A Retrofit Programme for Decentralised Heating Stations in Mongolia" which was registered 28 August 2006. And establishing a package of CDM PINs for ERPA between the World Bank and the Mongolian government. (*reference: Rcandoysekse@worldbank.org ; Isteele@worldbank.org*)

Advisor to Foster Wheeler on implementation of Coal Biomass co-firing projects in Thailand as CDM projects September 2005.(*reference: janne.lujala@fwfin.fwc.com*)

From December 2004 and ongoing STC for the World Bank East Asia and Pacific establishing CDM project pipeline in Mongolia, and developing PIN's for energy conservation/efficiency portfolio in Ulaan Baatar, Choibalsan and Chutul. (*reference: Arivera2@worldbank.org*):

Internal consultant in the Carbon Finance Unit of the World Bank for the CDCF (2003 and 2004) (*ref Kenn Newcombe, Apinna@worldbank.org*).

2000-2004 ELSAM (now DONG Energy)

Marketing Manager for Business Strategy and Development within EU, Eastern Europe and South East Asia and Danish representative in Eurelectric NE International Energy Cooperation

Member of the standing conference committee in Power-Gen Europe on new energy technologies and chairman for the track on Renewable Energy and Zero CO₂ emission technologies. Responsible for arranging the financial support from the Danish Government to a Wind farm in Poland (the first wind farm owned by Elsam outside Denmark and the first in Poland).

1989-2000

DANISH POWER CONSULT A/S (100% owned by ELSAMPROJEKT A/S/ Elsam Engineering)

EU-coordinator for ELSAM on matters relating to EU external cooperation, energy policy, efficiency and new technology development. (Clean Coal, Gas, Electricity, Renewable Energy Saving). The function included establishment of a network with the Danish Energy Agency and the staff in DG 12 and 17 for obtaining financial support to energy demonstration projects (*reference: Carl Hilger*)

Market and project developer and coordinator for energy projects in Southern and Eastern Europe and CIS (in particular wind and CHP).

Organizer of international conferences with the Electric Power Council of the CIS for Eurelectric. Chairman of Eurelectric conferences on energy policy from 1993 to 1996 and Power-Gen conferences on renewable energy from 1996 to 2000 (for Elsam).

Organizing the financing support to windfarms in Ireland, Spain and Madeira (Portugal) from EU development programmes.

1983-1989

I. KRÜGER A/S, Copenhagen, Denmark

Regional manager and market co-ordinator of projects financed or supported by the EU and EIB. Among these development of a biogas production plant at Ribe, Denmark and wind farms in Ireland, Spain, Portugal and Greece (later executed when joining Elsamprojekt A/S). Further he was as project director responsible for a number of planning, engineering and capacity building projects within the water and sanitation sector in countries as Malawi, Somalia, Kenya and Egypt.

1981–1983

DONG (Danish Oil and Natural Gas Company)

Project manager for the basic and detailed design of the Natural Gas Storage project with 200 engineers reporting to him through the organisation. Construction manager of the structures related to the gas storage project, leaching facilities and development of 6 caverns in the salt dome at Lille Thorup for storing 200 Mio. m³ NG at the cost of 55 Mio. EUR. As Operation manager he was responsible for the selection and capacity building of the gas storage operational staff. The project gave a thorough experience in design of natural gas systems. He was further responsible for the evaluation of alternative gas storage projects at Tønder and Steen Lille – both aquifer type of storages projects being of the seasonal storage types where as Lille Thorup with high extraction rates is of the peak storage type.

1973-1981

I. KRÜGER A/S

Project engineer, project economist and project manager in Nigeria/Denmark, France/Denmark, Togo/Denmark, Niger/Denmark, Burkina Faso/Denmark, Vietnam, Denmark, Iran and Tanzania.

The portfolio of projects were mostly water supply projects both for rural water supply and for major cities as Lagos and Ouagadougou.

Erection, start-up and optimisation of one of the world's first large-scale industrial wastewater denitrification and anaerobic treatment plants, producing 300 m³/h biogas on waste from pectine production.

1971-1973

The Danish Engineering Academy, Copenhagen

Professor and tutor in hydraulics, wave hydraulics, hydrology, coastal engineering and harbour construction.

Bigum & Steenfos, A/S / GTO Survey leader for rural development in Jacobshavn (Ilulissat), Frederikshåb and Julianehåb (Greenland), summer 1971, 1972, and 1973.