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# Mobilising Finance For Renewable Energies [1]

**Thematic Background Paper**

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**Disclaimer**

This is one of 12 Thematic Background Papers (TBP) that have been prepared as thematic background for the International Conference for Renewable Energies, Bonn 2004 (renewables 2004). A list of all papers can be found at the end of this document.

Internationally recognised experts have prepared all TBPs. Many people have commented on earlier versions of this document. However, the responsibility for the content remains with the authors.

Each TBP focusses on a different aspect of renewable energy and presents policy implications and recommendations. The purpose of the TBP is twofold, first to provide a substantive basis for discussions on the Conference Issue Paper (CIP) and, second, to provide some empirical facts and background information for the interested public. In building on the existing wealth of political debate and academic discourse, they point to different options and open questions on how to solve the most important problems in the field of renewable energies.

All TBP are published in the conference documents as inputs to the preparation process. They can also be found on the conference website at www.renewables2004.de.


**Executive Summary**

Renewable energy (RE) has a significant potential to mitigate global climate change, address regional and local environmental concerns, reduce poverty, and increase energy security. For renewable energies to achieve their market potential, policy frameworks and financial instruments are necessary that give financiers the necessary assurance and incentives to shift investment away from carbon-emitting conventional technologies to large-scale investment in clean energy systems**.** The paper assesses how renewable energies are different from conventional energy projects and what impact this has on their financing needs and ability to attract finance. It describes the various types of financing instruments needed for RE plant development and explains the barriers and financing gaps that today make it difficult to raise capital for RE. Emerging risk management instruments are described that mitigate risks and transfer them from project sponsors and financiers to insurers and other parties better able to deal with risk exposure. Recommendations are proposed for both policymakers and financial institutions.

**About the Authors:**

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# Table of Contents

## 1. Introduction

Renewable energy (RE) has a significant potential to mitigate global climate change, address regional and local environmental concerns, reduce poverty, and increase energy security. The challenge is to provide the **right policy frameworks and financial tools** that will enable RE to achieve its market potential and move from the margins of energy supply into the mainstream.

**Renewable energy is, in fact, a multi-billion dollar industry and the most dynamic sector of the global energy market**. Globally installed renewable energy capacity is expected to more than double over the next ten years from approx. 130 GW in 2003 to 300 GW in 2013.[1]

In Europe alone the renewable-energy market has an annual turnover of 10 billion EUR. Wind energy, as a result of performance and experience in Northern Europe and the US – together with supporting policies – has overcome the risk perceptions of financiers to become the fastest growing energy system.

Still, the **renewable energy sector remains by far the smallest segment** of the world's energy industry. Various finance-related risks and barriers are hindering faster growth. RE is site specific and most sites are still not cost-competitive with conventional fossil-fuel energy sources in the short to medium term. Most renewable energy projects have **high up-front capital costs** relative to competing technologies and **low rates of return**. Many investors therefore are not ready or willing to invest in these " high risk – low return options", or only under very unfavourable terms for the project sponsor. This is particularly the case in developing countries, where access to affordable finance is extremely difficult and relies on targeted subsidies.

This paper focuses on the potential for **market development** and for creating **investment opportunities** by pointing out the dynamic growth of market trends in renewable energies. It explains how RE projects are **financed** and describes the **barriers** that make financing RE difficult. **Finally, it analyses the most important financial instruments** that are **still weak or missing** for the promotion of the use of renewable energies. These address the issue of **financial risk,** and **risk-management instruments** are described that can mitigate the perceived risks associated with RE and affect conditions for investment in RE projects.[2]

Financing renewable energies is a complex issue and inextricably linked to the issues addressed in other Thematic Background Papers (TBP) prepared for the International Conference for Renewable Energies.

Financing responds to policy and regulatory signals and "financial institutions view themselves more as instruments of change rather than initiators".[3] Investors need the reassurance provided by strong and clear market signals and mechanisms that support renewable energies. **National Policy Instruments** (TBP 3) such as feed-in laws, targets, and tradable RE certificates create a framework that provide a guaranteed market and reward those who invest in renewables. A **Level Playing Field** (TBP 4) that makes RE more competitive results from policies that remove subsidies and internalise the environmental and social costs of burning fossil fuels to help eliminate market price distortions. The Kyoto instruments **CDM and JI** (TBP 6) provide a new source of finance for RE projects. **Capacity Development** (TBP 8) is needed to help the mainstream financial community understand renewable energy project opportunities and risks.

## 2. The Climate for Investment in Energy

The world is going to need significant investment to cover the growing demand for energy. According to the IEA´s recently released *World Energy Investment Outlook – 2003 (WEIO),*[4] if current trends continue, **US$16 trillion** will need to be invested in the energy sector over the next 30 years to **maintain, replace, and expand infrastructure**. Investment requirements vary from region to region: Russia will need 5% of GDP, Africa 4%, and OECD countries 0.5%.

Of this amount, **60% or $10 trillion** will be needed for the **electricity sector**. This is three times the amount invested in the last 30 years, which is due to the expected doubling of global electricity demand. More than half of this amount will be spent on **transmission and distribution** networks.

The WEIO 2003 warns that raising the capital to finance the required investment will be a daunting challenge, particularly in developing countries and transition economies, where almost half of the global energy investment ($5 trillion) will be needed**. Investment in these regions** is impeded by poorly developed financial markets, products, and institutions, as well as high political, credit, currency, and economic risks, the lack of local capacity to adapt technology, and the lack of infrastructure to deliver services. Financing has been largely the domain of public agencies and private investment has been on the decline.

The projected figures for investment requirements in the energy sector must be seen against the background of the current unprecedented turmoil and crisis in the power and infrastructure sectors. Deregulation, once expected to lower energy prices and increase security of supply, suffered a setback due to the California and Enron debacles and the summer 2003 blackouts in the US and Europe. Investors in power generation have discovered that they are **more exposed to risk** than they were in a regulated market, especially as regards peak capacity. The collapse of power prices and asset values, power project failures, and corporate fraud, which have shaken the confidence of investors and lenders, have resulted in the loss of hundreds of billions of dollars for investors.[5] It will take time and new business models to restore that confidence.

Increased risks and perceptions of risk have caused financial institutions to shun innovative, creatively structured products in favour of more traditional short-term solutions.

To obtain the investment it needs, the energy sector will have to compete with other sectors. The WEIO 2003 concludes that "The energy sector has in most cases been able to mobilise the required financing in the past. It will be able to do so in the future only if financing mechanisms are in place, investment returns are high enough, and investment conditions are appealing."

### Are investment conditions for renewable energy appealing?

Within the energy sector renewable energies have to compete with the other conventional segments of the industry. Generally, the market for RE is improving and is the fastest growing in the energy sector. Though market and investment conditions vary according to technology (size, capacity, on or off grid, energy resource, etc) and region, the market drivers for RE are the same: improved economics (in some cases), energy security, global, regional and local environmental benefits, economic development, and consumer support.

Market growth responds to a number of factors, the most significant of which is cost reductions. Renewable technologies are improving all the time and are becoming less costly to manufacture and operate. Wind and solar PV are one-tenth of the cost they were in the early 1980s and additional cost reductions of approx. 5% per year are expected in the near term. In the wind industry "mega deals" in the hundreds of million USD range are being transacted, and for the first time, bond markets have been accessed to finance projects.[6] Major investments in wind are being financed and moving forward faster than ever, especially when backed by a utility or strong corporate sponsor. Large oil firms and insurance companies are increasing investments in clean energy. RE's share of the venture capital market for new technology development is growing, although more slowly than other environmental technology areas.[7]

As finance sector interest in RE has grown, so has the volume of research and analysis produced by investment banks, such as Goldman Sachs and Merrill Lynch. This research, which principally provides 'buy and sell' recommendations on publicly traded RE stocks based on detailed analysis of company and sector performance, helps lower information barriers and thus increase RE access to the capital markets.

**New challenges have come with energy market liberalisation**. Deregulation is a mixed blessing for the renewables market. Privatisation can promote renewables by introducing new sources of capital. And the efficiencies derived from increased competition in energy markets should theoretically improve energy efficiency. In reality, however, privatising markets has made financing RE more difficult. Due to the higher capital costs and long return timeframes associated with RE financing, private producers with their typically short investment horizons tend to prefer gas and other conventional energy options with lower capital costs.

**Without regulatory incentives, competition is likely to steer investments away from renewables**. Competitive frameworks based on multiple electricity producers bidding into spot markets are unfriendly to non-dispatchable renewables such as wind and solar energy which cannot provide power on demand. Unless energy prices are made to reflect environmental costs, retail competition will work against renewables, as electricity suppliers favour the (seemingly) cheapest power available over more capital-cost intensive renewable options.

**Box 1: Transformations in the Power Sector**

Deregulation and competition have brought about changes in how power projects are developed, financed, and operated. The transformations involved are too complex to be properly addressed in this paper, however, the changes and their impacts on RE financing can be grouped into three transitions.

**First Transition:** Production Shifted from Utilities to Independent Power Producers backed by Power Purchase Agreements. Liberalisation of the energy markets meant new market entrants in the form of **independent power producers (IPPs)**, who sold power to a grid operator based on negotiated long-term **power purchase agreements (PPAs)**. With PPAs, project cash flows are contractual and therefore project financing is possible even for developers with a limited capital base. The majority of non-utility RE plants are IPPs that are backed by PPAs. These private entities should theoretically be more efficient at financing, constructing, and operating power plants. A number of **market imperfections**, however, have made it difficult for many IPPs to compete, particularly those operating in developing countries.

**Second Transition:** PPAs to Spot Markets. The **shift from long-term PPAs** to spot markets has made the situation worse for RE, with financiers reluctant to project-finance a plant that does not have a long-term offtake agreement. When they do provide project finance they require more equity from the project sponsor (**debt/equity ratio at or below 50%**). Even for projects that are able to secure PPAs, turmoil in the energy markets has increased the **counterparty risk** of these agreements (i.e. the likelihood that the utility cannot pay for the power it has agreed to buy), which has also led banks to require decreased debt/equity ratios.

**Third Transition:** Energy Market Chaos and a return to Utility Finance. Turmoil in the deregulated energy markets has caused private investors to disengage from the sector, leaving in many places **only utility-backed sponsors** to invest in energy infrastructure. The utilities in still regulated markets are now seen as less risky and have managed to maintain their AAA ratings, which positions them to raise less costly finance for RE development.

Investment in on-grid RE has to some extent come full circle.

## 3. Specifics of Financing Renewable Energies

Renewable energies represent a major step-change innovation as compared with existing energy-supply options. In terms of scale, capacity, energy resource characteristics, points of sale for output, status of technology, and a number of other factors, RE technologies are usually markedly different from conventional energy systems. The differences are not lost on financiers, as financing a RE plant is different from financing conventional fossil-fuelled power plants and requires new thinking, new risk-management approaches, and new forms of capital.

Since financiers are typically averse to things that are new, the differences between RE and conventional energy systems and the risk perceptions they imply can become the most significant barriers to investment, even for RE technologies that are cost-competitive with conventional energy-supply options. The following section will assess how RE are different from conventional energy projects and what impact this has on their financing needs and ability to attract finance. The discussion will address both larger scale grid-connected plants and smaller-scale off-grid distributed businesses.

**Financing renewable energies is new to financiers**. Considering to invest in the RE sector for the first time is an investment in itself. To become more effective at placing capital in RE markets, financiers must travel appropriate, and truthful information. In perfect markets this information is assumed to be available, but the reality is that energy markets are far from perfect, particularly those like the RE market in technological and structural transition. The information that enables a correct assessment of a project's up a learning or experience curve. Market failures impede this learning process and create barriers to entry into the market. To operate effectively, markets rely on timely,

viability is generally lacking, and there is limited economic justification for any single market participant to produce such information. As a result of insufficient information, underlying project risk tends to be overrated and transaction costs can increase.[8]

**Glossary of Terms**

**Private Finance** from personal savings or bank loans secured by private assets. This type of finance is concerned mainly with smaller companies and projects.

**Risk Capital**, equity investment that comes from venture capitalists, private equity funds or strategic investors (e.g. equipment manufacturers). Besides the developers own equity and private finance, risk capital is generally the only financing option for new businesses.

**Mezzanine Finance** groups together a variety of structures positioned in the financing package somewhere between the high risk / high upside equity position and the lower risk / fixed returns debt position.

**Corporate Finance**, debt provided by banks to companies that have a proven track record, using 'on-balance sheet' assets as collateral. Most mature companies have access to corporate finance, but have limited total debt loads and therefore must rationalise each additional loan with other capital needs.

**Project Finance**, debt provided by banks to distinct, single-purpose companies, whose energy sales are guaranteed by power purchase agreements (PPA). Often known as off-balance sheet or non-recourse finance, since the financiers rely mostly on the certainty of project cash flows to pay back the loan, not the creditworthiness of the project sponsors.

**Participation Finance,** similar to project finance, but the 'lender' is a grouping of investors; for example a co-operative wind fund, which often benefits from tax and fiscal incentives.

**Export Credits, Insurance, and other Risk Management Instruments** are used to transfer specific risks away from the project sponsors and lenders to insurers and other parties better able to underwrite or manage the risk exposure.

**Third-Party Finance**, where an independent party finances many individual energy systems. This can include hire-purchase, fee-for-service and leasing schemes, as well as various types of consumer finance.

**Consumer Finance**, often required for rural clients as a means of making modern energy services affordable. Various types of micro-credit schemes are now being deployed in the solar home system market, for example, which often involve risk-sharing at the local and institutional levels. Once client creditworthiness is proven, the portfolio can be considered an asset and used as collateral for financing.

**Compounding this lack of information are the issues of financial structure and scale**. RE projects typically have higher capital costs and lower operational costs than conventional fossil-fuel technologies. The external financing requirement is therefore high and must be amortised over the life of the project. This makes exposure to risk a long-term challenge (which also has political-risk implications in terms of changes in government policy). Since RE projects are typically small, as for example solar PV and mini-hydropower, **the transaction costs are disproportionately high** compared with those of conventional infrastructure projects. Any investment requires initial feasibility and due-diligence work and the costs for this work do not vary significantly with project size. As a result, pre-investment costs, including legal and engineering fees, consultants, and permitting costs have a proportionately higher impact on the transaction costs of RE projects. Furthermore, the generally smaller nature of RE projects results in **lower gross returns**, even though the rate of return may be well within market standards of what is considered an attractive investment.

**Developers of RE projects are often under-financed and have limited track records**. Financiers therefore perceive them as being high risk and are reluctant to provide non-recourse project finance. Lenders wish to see experienced construction contractors, suppliers with proven equipment, and experienced operators. Additional development costs imposed by financiers on under-capitalised developers during due diligence can significantly jeopardise a project.

**Financiers perceive many RE technologies as being commercially unproven**. With the exception of onshore wind, financiers regard the full cost and long-term performance risks of RE technologies as being higher than with conventional technologies. As with most new technologies, a vicious circle exists, with financiers and manufacturers reluctant to invest the capital needed to reduce costs as long as demand is low and uncertain. But unless there is investment, demand stays low, because potential economies of scale cannot be realised at low levels of production.

**Fuel supply risk can be a concern for RE**. Although fuel for RE plants is usually either free or low cost, fuel supply can be a concern for financiers, either in terms of assessing the resource (wind, solar, hydro, geothermal) or contracting the supply (bio-energy). In the case of a wind project, for example, at least one year of on-site wind speed measurements is usually required before a financier will seriously consider an investment. For bioenergy projects a guaranteed fuel supply is always required for non-recourse financing.

**State and Local Government Initiatives in the US**

The introduction of RE funds at the state level has been one of the most popular mechanisms for increasing investment for RE in the US. Between 1998 and 2012, ~$4.37 billion will be collected in fifteen states as System Benefits Charges (SBC) on conventional electricity bills, and pooled in SBC funds that invest in various ways in RE projects.
Some specific examples include California, where the SBC fund will invest $135 million/year in the RE sector. In addition, in San Francisco voters have supported a proposition that allows the city to issue up to $100 million in revenue bonds to finance renewable energy projects and energy efficiency measures in city and county-owned buildings.
The New Jersey State Board of Public Utilities´ Clean Energy Program and the NJ Economic Development Authority (EDA) are combining technical and financial expertise to build several new financing partnerships that will make US$60 million available for energy efficiency and renewable energy projects and make it more affordable for businesses to invest in clean energy equipment . The financial incentives include long-term bonds, a loan and guarantee fund, and an interest-free innovation fund.

*Innovation: Using System Benefits Charges to capitalise RE funds*

**The risks of conventional power projects are sometimes understated when compared with RE**, since existing cost-plus regulatory models allow fossil-fuel price fluctuations to be passed onto the consumer. In liberalising markets, where power producers are forced to assume the fossil-fuel pricing risk, their typical approach has been to lock in the fuel supply with futures contracts. A growing body of work, however, is finding that fixed-cost RE can effectively hedge fossil price risk by diversifying a producer's energy portfolio away from fossil fuels.[9]

But reducing portfolio risk is not the only issue that needs to be reflected in RE power pricing.

**How Financiers Make Investment Decisions**

Financiers make lending and investment decisions based on their estimation of both the risks and returns of a project. In considering a project, a financier will usually prepare a risk/return profile, as is shown below. The analysis involves assessing each individual risk and the means to mitigate its potential impact on the project. Assessing the returns involves verifying the cost and revenue projections and then comparing the financials of the project with the cost of financing to be used.

A lender will specifically focus on the ability of the borrower (or, in the case of project finance, the project) to make loan repayments. An equity investor, who shares in the upside of the project, will base his decision on an estimation of the risk-adjusted return of the project, which graphically (see smaller figure) means deciding whether the project falls above or below the investors risk/return yield curve. For on-grid RE the returns are usually easy to assess; it is the risks that can be difficult to assess or manage. When it comes to off-grid business models, a financier usually has difficulty understanding both the risks and the returns.

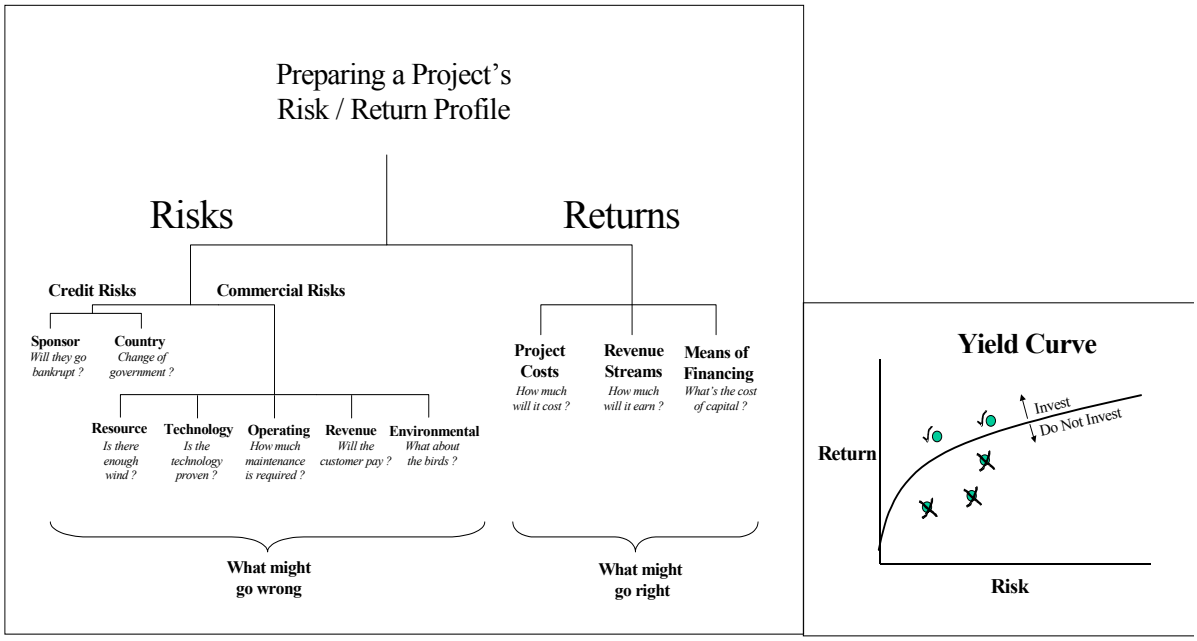


**Figure 1. How Financiers Make Investment Decisions**

A fundamental financing problem is that **most renewable energy investment is still not currently commercially viable if valued using 'conventional' market pricing models**. This is because the costs of emitting carbon and other environmental externalities are not yet accurately reflected in market prices. As governments introduce sustainable long-term targets and commitments, as well as reliable legal and regulatory frameworks, this policy intervention will change the financial balance in a structured and sustainable manner. The private sector will then have the incentive and confidence to invest at a scale commensurate to meeting government targets.

## 4. Developing Financial Solutions for Renewable Energy

As addressed in Thematic Background Papers (TBP) 3 and 4, imperatives exist for an increasing renewables-based energy mix, principally for environmental reasons, but also for social and economic reasons such as energy security. Policymakers thus have a mandate to take action, and since most of the capital for this greening will not come from public treasuries, most of this action will need to focus on creating enabling frameworks and finance mechanisms for technology R&D, commercialisation, and investment.

**Eventually, market forces will be the best way to determine how and where RE are used**. However, this ideal solution assumes mature technologies, efficient markets, and full internalisation of environmental and social costs - conditions that do not exist in any country at present. The G8 Renewable Energy Task Force found that "current approaches to financing renewable energy are inadequate to realise the promise of these technologies to meet expanding energy needs while producing environmental benefits."[10] Public interventions are therefore needed to help accelerate RE development, commercialisation, and financing.

Financing RE, whether on or off-grid, in developed or developing countries, is part of a larger **value chain** that exists in different degrees of completeness, depending on the market, the technology, and the infrastructure available to bring the technology to market. The completeness of this value chain in any location will determine whether the financial sector will become engaged.

The RE sector is marked by **incomplete value chains**. Financing is but one part of the value chain, and it is the part that enters the value chain only after all the other parts are in place. Therefore, to attract finance it is necessary to assess the state of a specific value chain, identify the missing steps, and design public interventions to **effectively and efficiently bridge the gaps**.

**World Bank Prototype Carbon Fund (PCF)**

The PCF is similar to a closed end mutual fund, with objectives to supply high quality carbon offsets at a competitive price, and to ensure that buyers and sellers of off-sets receive a fair share of the value added. The negotiated price of the carbon offsets covers the cost of additional emissions reductions measures over the baseline technology, as well as a margin representing equitable benefit, sharing between the investor and host government. As of late 2003, the PCF has been capitalised at $220 million USD.

*Innovation: Public-initiated 'market maker' that is helping to launch the carbon finance sector*

http://prototypecarbonfund.org/

To be successful, public interventions must[11]

- address specific market barriers or failures
- be removable (do not create dependence)
- reward innovation (improve the technology/service offering and bring costs down), and
- be cost-effective (leverage private-sector capital).

The following section assesses the finance step of the value chain by taking a closer look at the **finance continuum** - the sources of capital needed to take a project or enterprise forward to implementation. Recommendations for interventions that close the gaps in the continuum are proposed. The analysis is carried out separately for on-grid and off-grid RE markets, since the business models and scales are rather different.

## 4.1 Developing financial solutions for on-grid RE projects[12]

Generally, large and medium-scale renewable-energy projects need to operate within the same financing rules applied to conventional fossil-fueled energy projects. A key issue for financing on-grid renewables investments is how to create a **price support mechanism** that provides stability and predictability over the medium and long term. Achieving this will **reduce the risk** premium in the cost of capital, which **will increase the amount of investment** in renewables **and lower the price** that consumers have to pay for renewable energy. Policy interventions are taking a range of forms including **market-based mechanisms** such as carbon emissions trading and renewable obligation arrangements.

**Fixed-price schemes** such as the Feed-in Laws in Germany and Spain have demonstrated the impact a reliable regulatory environment can have on increasing the share of renewables.

Each market has a different 'tipping point' where smart money sitting on the fence can be induced to enter the sector. The most effective incentives are those that get markets past this tipping point. The US Production Tax Credit for wind, when in place, is a good example of a small incentive that has had a significant impact on wind investment. Unfortunately, its application has been inconsistent.

No one approach will be equally appropriate in all markets and regulatory environments. To be effective, however, they all must create **financial incentives for investors** to change the pattern of investment away from carbon-emitting conventional technologies in favour of large-scale investment in renewable/non-carbon emitting technologies.

## The On-Grid RE Finance Continuum

Numerous forms of capital are involved in the finance continuum of a grid-connected RE plant, as is shown in Figure 2[13]. The conventional power-sector finance continuum includes the following sources of capital:

- equity provided by the companies involved in the project, as well as in some cases by institutional and strategic investors;
- corporate or project-financed loans provided by commercial banks or special purpose funds;
- guarantees perhaps provided by an export credit agency (ECA) to cover specific cross-border risks;
- insurance provided by an insurer or insurance broker;
- key parties to the transaction, such as fuel suppliers or power purchasers, who have entered into long-term contracts with the project.

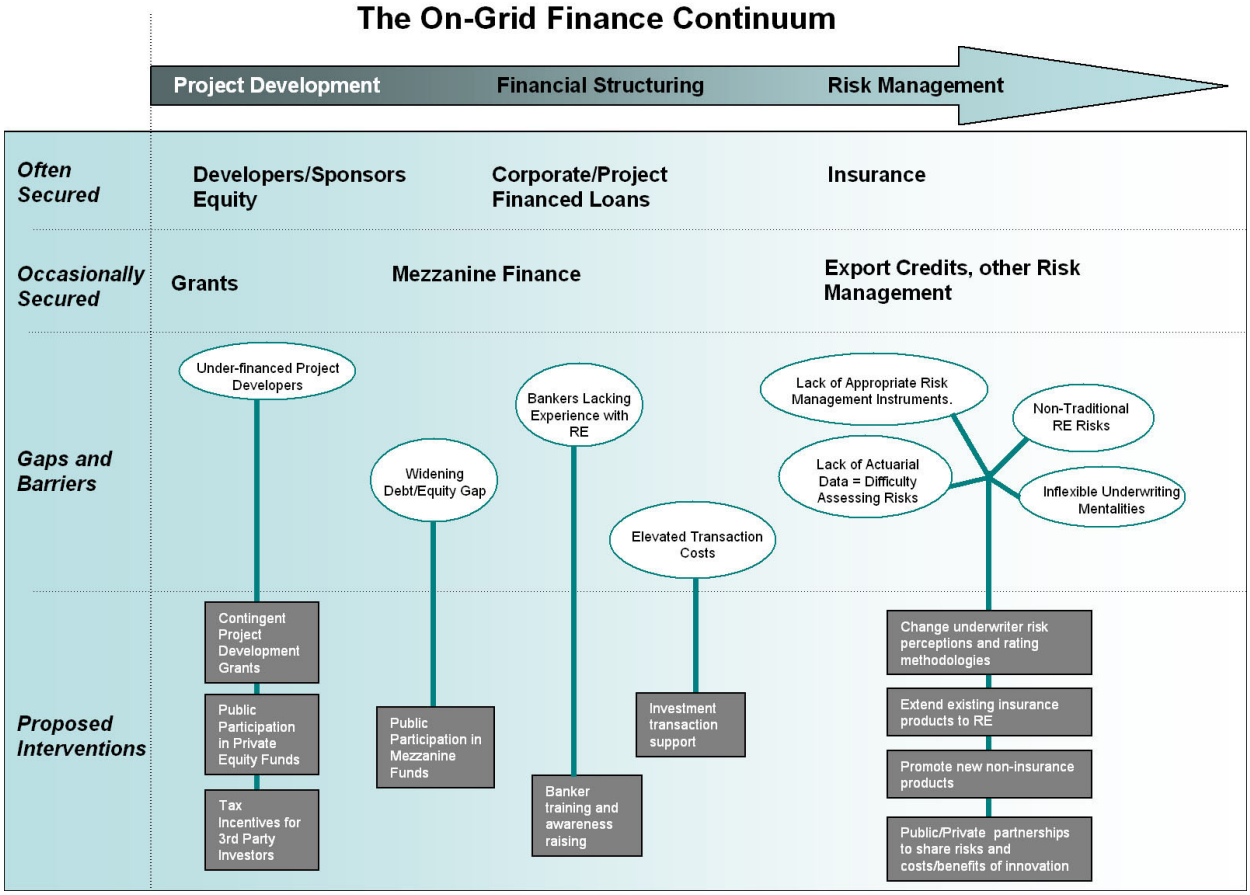


**Fig. 2. The On-grid Finance Continuum**

For RE on-grid projects the finance continuum is actually quite incomplete, and the gaps can often only be filled with niche financial products, some of which already exist and some of which need to be created. Figure 2 shows which types of finance are often secured by on-grid projects, which types are occasionally secured, and the current gaps and barriers in the continuum. Finally, the figure proposes some interventions that might be supported by public sources to close the gaps in the continuum.

**Project Development Capital**

Project preparation for on-grid RE projects is generally carried out either by large energy companies or specialised project-development companies (as is the usual case in Germany). Energy companies finance project preparation from operational budgets. Specialised companies finance project development work through private finance, capital markets, or with risk capital from venture capitalists, private equity funds, or strategic investors (e.g. equipment manufacturers).

Once a project developer has prospected out a site and has assessed the resource potential, the access to the grid, and the expected power purchase price, he or she will prepare a pre-feasibility analysis. If the analysis is promising, the developer will then begin the engineering design, the permitting, and the environmental assessment processes.

These steps can take several years and significant resources to complete. Facilities that can share some of the costs of development on a grant, or contingent grant, basis can effectively help move RE projects forward. These facilities need to be carefully structured to target the right projects and align interests on project development.

**Equity Finance**

If the concept successfully passes through the development stages, the project developer is then in a strong position to attract external financing. To reduce the expected time for plant commissioning and to minimise project complexity, smaller developers may wish to sell the majority of their ownership in the project to an entity that has sufficient resources to serve as sponsor and carry the project through financial structuring and contract negotiating.

To secure loans, developers and their equity sponsors will generally need to provide between 25% and 50% of the capital required for a project in the form of shareholder equity. As the risk (real or perceived) associated with a project increases, lenders will require that equity play a larger role in the financing structure. In other words, the higher the risk, the higher the amount of equity the lender will require in a project. This not only strains a developer's capital resources, it raises the cost of the entire project, since the cost of equity capital is always higher than the cost of debt capital. Therefore, innovative structures are needed that can fill the widening gap between the equity and debt available to a project.

**FIDEME Mezzanine Fund**

FIDEME is a 45 million EUR public-private investment partnership, which provides mezzanine finance to renewable energy companies in France. The French Environment and Energy Management Agency (ADEME) provides both capital and a first loss guarantee, which increases the risk adjusted returns for investors and retail banks.

*Innovation: Public-Private Fund Partnership for Renewables*

http://www.ademe.fr/

Developers will benefit from any public interventions that help strengthen their equity base by attracting third-party investors or private-equity funds[14] (e.g. training, tax incentives, fund capitalisation).

**Debt Finance**

Moving along the finance continuum, another option to fill this equity/debt gap is **quasi-equity or mezzanine finance**, which constitutes a variety of structures positioned in the financing package somewhere between the high risk / high upside equity position and the lower risk / fixed returns debt position. It most commonly takes the form of junior debt (paid only after senior debt claims have been satisfied), coupled with the option to purchase shares in the company at a predetermined level. Public participation in mezzanine funds, if structured appropriately, can buy down the risks or buy up the returns for commercial investors. A number of RE mezzanine funds are now being developed that target specific emerging markets.[15]

**Community-owned wind funds**

Community-based collective investment in RE is growing in countries such as Germany, Denmark, Finland, and Canada, especially in wind projects. In Germany most commercial-scale wind turbines are financed by community-owned funds, a participation scheme that raises awareness and local acceptance and allows everyday citizens to make sound ethical investments. The funds receive tax benefits.

*Innovation: Tax-incentivised community-owned funds*

The bulk of the financing provided to a project is usually in the form of senior debt, which can be structured as on-balance sheet corporate finance or off-balance sheet project finance.

**On-balance sheet corporate finance** can be used only by financially strong sponsors with a significant base of assets, debt capacity, and internal cash flow. Corporate financing requires a decision by the corporate sponsor to accept the risk and potential reward of a project in its entirety. In this financing approach project funding is arranged through the corporate treasury. For small projects, internal corporate cash flow will often be a sufficient source of capital. For larger projects, the sponsor may need to augment investment from free cash flow by some combination of new corporate debt, equity or bond issuance, or asset disposal. Any debt issuance is underwritten by the overall creditworthiness of the corporation, not the specific project revenues.

**Corporate finance is the preferred financing approach for small projects** (e.g. less than $15 million), since the financing can be executed more quickly and project revenues may be inadequate to support the transaction costs associated with other financing methods. Costs of legal and arrangement fees can be kept low. With a single sponsor accepting the majority of the project risk, technical and financial due diligence will typically be accomplished more quickly. Tax incentives (e.g., accelerated depreciation) and leasing structures can help improve the financials of RE projects for corporate sponsors.

**Off-balance sheet project financing** involves the use of a special-purpose financial vehicle to fund a specific power generation project with only limited recourse to the assets of external investors if the project under-performs or fails. Typical project-finance requirements include the following:

- Firm long-term fuel supply and power purchase agreements are obtained with creditworthy parties for all project activities;

- Fixed-price, turnkey design and build contracts are placed with experienced contractors;
- Guarantees, warranties, or bonds for completion and performance are provided from sponsors and contractors;
- All contracts and insurance polices are assigned to the bank, which allows the lender to take over the project in the event of non-performance by the project company. The ratio of debt to equity is higher when a plant is project financed, and the loan tenor (duration) can be extended for longer periods, so that the loan repayments can match the PPA revenue streams.

**Geothermal Development Facilities**

One of the significant barriers to investment in the geothermal sector is the high up-front exploration and drilling risk, an issue for which two partial risk guarantee facilities are now in development. The GEF-World Bank Geothermal Energy Development Fund (GEOfund) will provide partial risk guarantees to cover geological risks on geothermal developments in Eastern Europe and Central Asia. The African Rift Geothermal Development Facility (ARGeo) is a GEF-UNEP-KfW initiative that will also share with developers the geological risks related to exploration, appraisal, and production drilling in the East African Rift Valley. While data is available globally to judge the probability of drilling success, each particular geology is different and the natural resource and market for such resources require a public-private partnership in order to ensure development of viable resources. Private sector does not take the early risks in a cost effective manner and public agencies are not generally efficient at plant construction/operation.

*Innovation: Partial Risk Guarantees for Geothermal*

http://www.gefweb.org/

As discussed in Section 3, the extra costs associated with satisfying the higher 'burden of proof' that a bank's loan committee would normally apply to the first few RE investments normally fall on the project developer. RE developers are typically under-capitalised and often unable to absorb these transaction costs. Public facilities that share the costs of the investment decision-making and the transaction process can help bring bankable projects through to financial closure. At the same time, building RE awareness and capacity within financial institutions is also important (see box 2).

**Box 2: Building Capacity in the Bank**

When building renewable energy investment capacity within a financing institution, the **approach needs to be flexible,** as different institutions follow different 'product development' paths. To enter a new sector, some FIs first focus on creating the right policies or strategies, while others focus on training personnel. Other approaches include learning 'hands-on' by taking first investments or developing specialized funds or loan portfolios.

Pursuing change in a financial institution takes time and commitment at all levels. To be successful across the institution, **changes in the incentive structure are often needed**. Although the CEO may be interested in renewable energy investment activity for its policy implications, loan officers often focus on narrower targets, such as simply meeting the traditional benchmarks of rapid loan disbursement with minimal risk. Without stronger incentives, loan officers may pay only limited attention to renewable energy investments.

Changing the way a financial organisation considers new investments therefore requires both better information and new mandates to combine social and environmental factors – both risks and returns - as integral measures of economic performance.

## Risk Management

An integral element of deal structuring, particularly for off-balance sheet projects, is **financial risk management**. This process entails using financial instruments to transfer specific risks away from the project sponsors and lenders to insurers and other parties better able to underwrite or manage the risk exposure. Among other important factors, financial risk management is one of the keys to deployment of renewable energy technologies. Applied correctly, certain financial risk management instruments can help mitigate the perceived risks associated with RE and affect the degree and terms of investment into such projects. However, there are currently **constraints on the availability of such risk management instruments**, which relate to factors such as the **willingness and capacity of insurance and capital markets to respond**.

A number of insurers had bad experiences with wind power in the 1980s and early 90s, and although the industry has undergone enormous growth since then and the technology has matured considerably, many insurers are still reluctant to insure wind projects. There are some, however, who will do so, and a fully-financed wind project will usually find cover today. Cover for biomass is available for larger projects, however, what is still needed is a product to cover the **security of fuel supply**. Financiers want fuel supply insured, but as yet **there is no product** to do it. Large-scale hydro is well understood and can be insured. Run of the river hydro facilities are also catered to, however, small-scale and micro-hydro developers sometimes have difficulty finding sufficient cover, particularly for Contractors All Risks (risk of non-delivery of contracts).[16]

**There are still many insurance gaps in the finance continuum**. Projects of less than $15 million have difficulty finding insurance cover and, as a result, financing. Only niche insurance operations with low overheads are able to service small-scale developers and even then, there is a steep learning curve and indeterminate risk reward ratio for many projects. For emerging markets **targeted enhanced political risk insurance** is needed that covers the risk in the case of default in performance of obligation by government or other entity. Such insurance could come from governmental or from public-private entities.[17]

**There are a number of key barriers to the development of risk management instruments.** Many risks associated with RE projects are non-traditional and hence uninsurable. It can be difficult to diversify risks and actuarial data are not available to properly assess the risks (e.g. off-shore wind construction risk). Underwriters have limited understanding of RE projects and associated risks and have difficulty aligning strategies for dealing with them. Underwriting mentalities are therefore generally rigid and inflexible. Due to scientific uncertainties about the degree of connection between climate change and catastrophic events, climate change-related risks have yet to be consistently factored into underwriting premiums and deductibles.[18]

Efforts in the risk management area should aim to help:

- extend existing energy insurance product lines with similar operations or facing similar risks to include standard RE projects and, as and where possible, prototypical RE projects;
- change underwriting risk perceptions to increase the availability of risk transfer products;
- develop new markets through convergence of insurance and capital markets;
- develop appropriate new underwriting rating methodologies;
- develop new risk management instruments to bundle heterogeneous risks; and
- aggregate projects to create portfolios of scale and risk diversification.

The following table lists **emerging risk management instruments** that are at various stages of development. The table describes what risks the instrument covers and highlights the transfer of risk from one party to another where relevant.

| Risk Mitigation Product | Nature | Basic Mechanism | Risks covered |
|---|---|---|---|
| Weather insurance/ Weather derivatives | Hybrid of re-insurance and traded com-modities | Contracts and derivatives including weather-linked financing (e.g. temperature, wind, precipitation) traded over the counter (OTC). Risks transferred from project owners/sponsors to market through trading companies, banks, re-insurers. | RE 'volumetric' resource risks that adversely affect earnings/ weather exposure |
| Catastrophe bonds | Synthetic Re-insurance | A securitised risk finance instrument based on catastrophe insurance. Some risk transferred from client to re-insurer/ institutional investors in the capital markets. | Risks related to natural catastrophes (e.g. managing resource supply risk) |
| Contingent Capital | Risk finance | Insurance policy, swap option, hybrid security, debt or preference share provided by (re) insurer to support and / or replace capital, typically debt but can also be applied to equity. A revenue guarantee. | Inability to meet debt service requirements caused by defined events.<br>Loss of equity capital due to a defined event |
| Captives or other pooling/ mutualization structures | Alternative Risk Transfer (ART) | Self-insurance program whereby a firm sets up its own insurance company to manage its retained risks at a more efficient cost than transfer to a 3rd party. Pooling through 'mutualization' or 'Protected Cell' structures can further diversify risks amongst similar enterprises. This has been used in the wind and geothermal areas. | Property/ casualty insurance. Can be adapted to include financial risks. |
| REC or emissions reduction delivery guarantees | Insurance | Products provided by insurers and re-insurers to guarantee future delivery of 'credits' or money to purchase credits in spot markets to fulfil contractual requirements. Can be used to monetise future carbon or renewable credit related cash-flows and front-end associated revenue stream.<br>Risks transferred from project owner/investors to insurers. SwissRe is currently developing a product in this area. | Risks associated with delivery of RECs or emissions reductions, whether performance related or through interference by 3rd parties resulting in contract frustration / repudiation |

| | | | |
|---|---|---|---|
| GEF Contingent Finance Mechanisms | Grant, loan, guarantee | Contingent grant, performance grant, contingent/ concessional loans, partial credit guarantees, Investment funds and reserve funds provided by GEF in conjunction with World Bank, UNDP or UNEP. Transfers a certain level of project risk to providers of such finance. | Incremental costs associated with private sector investment or commercial lending to RE projects. |
| Synthetic securitization guarantees | Credit – backed Securities | These structures bundle (credit or other) risk together. Securities issued based on different levels of credit / risk exposure, thus creating a risk transfer and financing conduit based on credit differentials. IFC planning to use this form of guarantee as part of their new GEF supported Environmental Business Finance Programme. | Could be used to manage a 'pool' of project credit risks that individually would not attract efficient pricing. |
| Guarantees from MFIs | Guarantee | Partial risk guarantee (covers creditor/ equity investors) and partial credit guarantee (covers creditors) by World Bank group (IBRD, IDA, IFC and MIGA), Regional Development Banks (e.g. AfDB, IDB, ADB) etc. Risks transferred from commercial investor/lender to MFIs. | Specific political risks (e.g. sovereign risks arising from a government default on contractual obligations) and credit default |
| Export Credit Guarantees | Guarantee, export credit, insurance | Guarantees, export credits, insurance provided by bilateral Export Credit Agencies. | Commercial and political risks involved in private sector trade / investment abroad |

**Table 1. Emerging Risk Management Instruments for the RE Sector[19]**

Public-private partnerships can be developed to help move many of these instruments forward. Partnerships need to be developed on a risk-sharing basis in a manner that is equitable. Developing and improving risk management instruments in developing countries to support RE infrastructure and institutional capacity would also help immeasurably.

**On-Grid Financing in Developing Countries**

Most forms of financing used for on-grid projects in developed countries are also applicable to developing countries, however, the less mature financial markets make the gaps in the continuum significantly larger. This is exacerbated by market volatility and economic instabilities, which have caused foreign direct investment to decrease in recent years. It is a challenge to get capital markets more engaged, especially private sector institutional investors such as pension funds and insurance companies that manage large pools of capital and must invest conservatively.

To cover commercial and political risks in developing countries, **Export Credit Agencies** (ECAs) support exports through direct credits/financing, refinancing, interest rate

support, aid financing (credits and grants), or export credit insurance and guarantees. ECAs have had little experience to date with RE support, mostly since 1) despite RE's potential in developing countries, export flows are currently mostly directed towards developed countries, for which ECA coverage is not available; and 2) transaction costs for typically small RE projects are disproportionately high.

Options to overcome these ECA barriers include: systematic ECA consultation with the RE sector to design and market specific products; new products inspired by and responding to carbon trading; processes to bundle smaller RE projects, portfolio targets, and longer repayment terms for RE projects under the existing OECD Arrangement on Guidelines for Officially Supported Export Credits.[20]

The Energy Future Coalition, a bipartisan energy policy initiative in the US, is looking into the creation of a new class of international debt securities called **Global Development Bonds (GDBs)** to finance sustainable development. Qualified Issuers such as commercial banks might issue such securities to finance portfolios of Qualifying Projects in developing countries. GDBs would be entitled to certain automatic insurance coverage on political risk and foreign exchange risk from a government agency such as the US Overseas Private Investment Corporation (OPIC) and in return be regulated.[21]

### 4.2 Developing financial solutions for off-grid RE businesses in developing countries[23]

According to Beck & Martinot (2004, forthcoming), rural energisation/electrification policies have begun to promote entrepreneurship, which is increasingly recognized as a key condition for fulfilling sustainable rural-energy goals. Promising approaches are emerging that support rural entrepreneurs with training, marketing, feasibility studies, business planning, management, financing, and linkages to banks and community organizations.

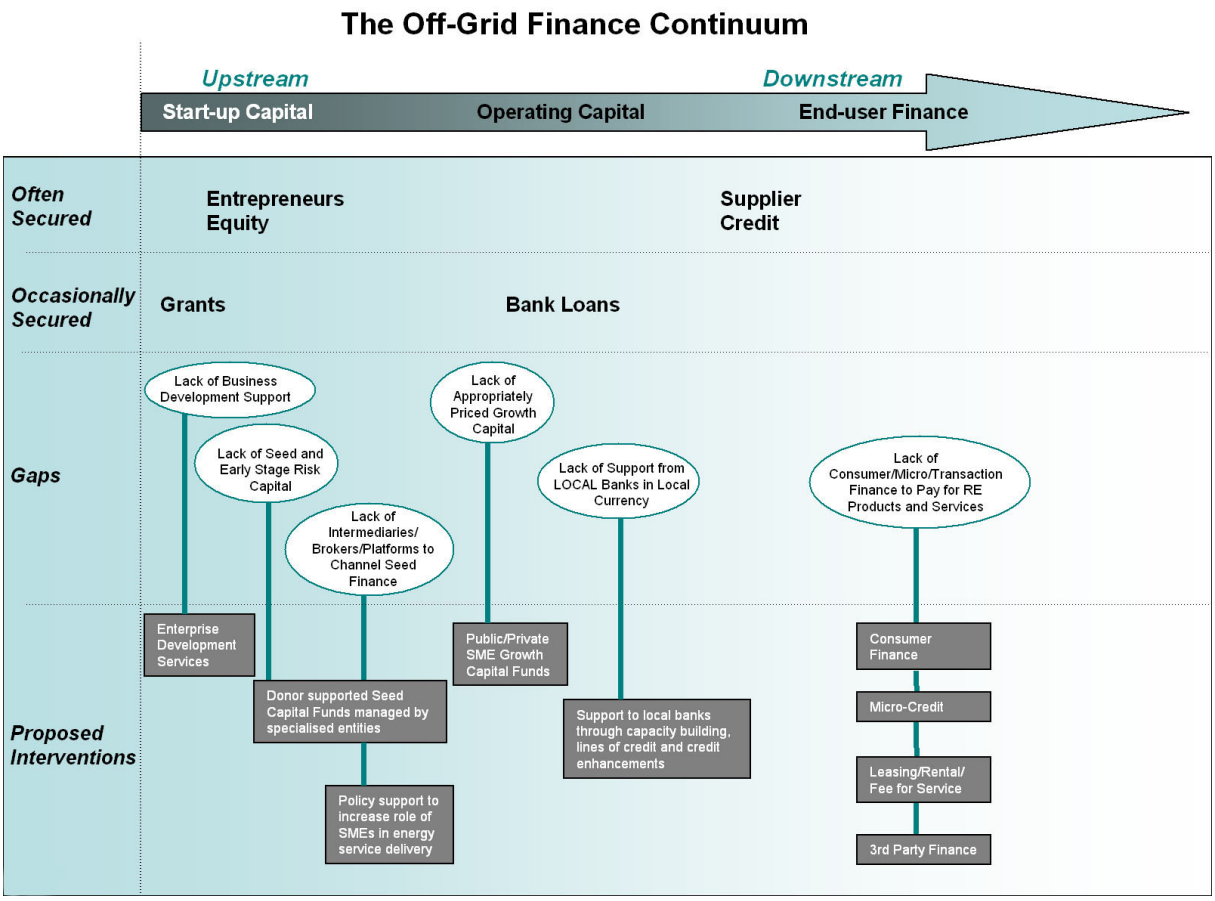


**Fig. 3 Off-grid Finance Continuum**

To initiate a new business activity an off-grid RE entrepreneur needs various sources of capital and business-development support. The capital needs can also be shown along a finance continuum (see Figure 3):

- starting upstream with the start-up investment the entrepreneur injects to plan and initiate the business;
- shifting to bank loans as the business gets up and running so that it has operating capital to finance day-to-day operations and business growth; and
- finally downstream, possibly some form of customer or transaction finance (supplier credit, consumer credit, leasing, performance contracting, etc).

Each step in the finance continuum has a distinct role to play and can involve either public or private, as well as public/private (or NGO) delivery channels. Each step also has its own risk/return profile and often requires specialised financiers to effectively deliver. Due to the various barriers and market failures cited earlier that inhibit financier participation in the (particularly off-grid) RE markets, there are many gaps today in this continuum, both financial and non-financial. Ultimately, these gaps make it difficult to launch a new off-grid RE business or even to expand an existing proven business.

**Start-Up Capital**

To start a new off-grid RE business, or expand an existing business into RE, the entrepreneur needs a significant amount of time and capital resources. Innovators are needed that have the **capital**, the **capacity**, and the **entrepreneurship** to take risks in developing and testing new business approaches and service offerings. For the entrepreneur it is not so much about understanding a new technology, but rather understanding a market need and being able to package an appropriate technology with a service offering to address this need. In developing countries the offering of RE products and services generally develops in two distinct phases:

1. Developing country RE industries usually first **begin to grow in response to public procurement markets**. For solar PV, for instance, this has included applications such as telecom, vaccine refrigeration, and street lighting. The RE companies responding to government tenders act mostly as traders and turnkey contractors, activities that require limited up-front investment and only moderate risk taking (e.g. timing risk - how long will it take to get paid?). Since these RE trading/contracting companies are now established in the major urban centres of most developing countries, the technology is now available. However, technology availability alone is not sufficient to create substantial RE markets.

2. The second stage of off-grid RE sector development is when companies begin **building service infrastructure**, thereby directly accessing end-users. Here they take on the role of energy service providers, somewhat akin to **decentralised utilities**. The business models involved are sophisticated. They have varying financing needs and investment horizons and they require entrepreneurs and financiers with larger risk-taking appetites. Selco and Shell Solar are examples of such RE innovators, both of whom have extensive service infrastructure in place in parts of India and Sri Lanka and are seeing healthy market growth.[24] **The up-front costs of this business model are significant** and include:

- increased financing costs (raising capital for a new type of business is time intensive and costly[25]);
- increased market awareness costs (RE products do not usually substitute directly for conventional products and therefore the consumer must be made aware of the benefits of the clean-energy option); and
- increased transaction costs.

**Rural Energy Enterprise Development**

Initiated in 2000 by UNEP, E+Co, and a number of country partners, and backed by the UN Foundation, the Rural Energy Enterprise Development initiatives support sustainable energy enterprises that use clean, efficient, renewable, and affordable energy technologies to provide energy services to rural and peri-urban customers in seven developing countries. REED offers rural energy entrepreneurs a combination of start-up financing, enterprise development services such as business planning, management structuring and financial planning, and assistance in securing later-stage financing. 25 enterprises financed to date in Ghana, Mali, Senegal, Tanzania, Zambia and Brazil include crop drying, charcoal production, biofuels, wind pumps, solar water heating, and efficient cook stoves.

*Innovation: Using seed finance to capitalise early stage clean energy SMEs*

http://www.areed.org or

www.energyhouse.com

To date, the few 'first mover' innovators that have set up extensive service infrastructures have done so mostly with their own resources. Though investing in new business development is not unusual for the private sector, off-grid energy markets generally do not reward first movers in a way that can justify such up-front investment. Resolving sector-wide barriers such as market awareness provides *free-rider* benefits to the rest of the industry. Much smart money thus sits on the fence, waiting for others to bring down the barriers that inhibit initial sector growth.

An early gap in the finance continuum is the lack of early stage capital and donor support needed to help RE innovators develop their business models, raise market awareness, and take the risks associated with new product/service offerings. Associated with this financing gap is the lack of appropriate intermediaries to channel support in 'business-like' ways to these young RE innovators.

Suggested solutions in this area of the continuum are **business development grants and risk-capital instruments** - approaches that align interests around creating new enterprise models, thereby preventing the usual moral-hazard problems associated with grant-making activities.

A fairly new form of early stage finance mechanism for small and medium size enterprises (SMEs) is **seed capital**, which is applied as a small initial investment meant to transform an innovative idea and a capable entrepreneur into a specific business. The seed capital needed can range from several thousand dollars for a new enterprise to simply pilot a new business activity, to a few hundred thousand dollars to take a new enterprise from a tested approach to a proven commercial business. The RE finance leader for the past decade in the seed finance area is the energy investment company E+Co.[26] The **willingness to take more risk** than conventional sources, combined with the provision of **enterprise development services**, constitute the main concessional aspects of the seed-financing approach.

Donor aid needs to take the lead in the seed-finance area. Donor agencies today are more willing to provide grant funding for demonstration projects than for the up-front costs of developing a new clean energy business. A key difference between the two approaches is the nature and extent of risk the donor takes. In a technology demonstration program the risk is that the *technology* will fail, while with the seed finance approach the risk is that the *entrepreneur* will fail. It is a basic fact of business that not all ventures succeed. It is also a fact that risk is an inherent and accepted element of doing business. The risk of failure – and the potential for profit – is what drives entrepreneurs to use their resources efficiently and to constantly seek new ways to deliver an improved product or service.

**South African Empowerment through Energy Fund**

The Shell Foundation, in partnership with ABSA, the European Union and E+Co affiliate RAPS Finance, has launched a ZAR51 million (US$6.3 million) 'Empowerment Through Energy Fund' to help small and medium sized enterprises (SMEs) in the energy sector offer affordable modern energy services to poorer communities in South Africa. The Fund provides pre-investment business-skills training to SMEs, seed capital in the form most suited to the needs of the individual business, as well as post-investment support.

*Innovation: Foundation provides soft capital and an operating grant to cover initial fund management costs.*

http://www.shellfoundation.org/energise/etef

In industrialised countries the risk capital needed to start new companies is now often provided by **venture capitalists** who are willing to invest both business-development support and capital in risky ventures in return for the prospect of high returns. Although many elements of the 'hands-on' investment model of venture capitalists is very appropriate for off-grid developing country SMEs, the prospect of elevated returns in this sector are limited, for reasons stated above, and therefore **the seed-capital business will need to be principally donor-supported**.

**Operating Capital**

As a new company scales up its operations, it will usually need a second injection of capital to manage its growth. The more successful a young company is, the higher its capital requirements will be. These '2nd stage' growth capital requirements include both short-term needs (e.g. working capital) and long- term needs (investing in service infrastructure), both of which should normally be financed with loans from local banks.

For SMEs in the RE sector, however, this is rarely possible. Whether loans are actually accessible depends on a combination of three factors, including cost (interest rate), collateral requirements, and, for larger loans, exchange-rate risk. The first two of these factors are based on bank risk assessment of the company and the project/product. Very few commercial lenders today are financing off-grid RE SMEs in developing countries. If they do, they usually provide funds in the form of private or corporate finance and therefore access to these loans has less to do with the business model than with the size of the owner´s asset base and the owner's willingness to provide these assets as security.[27]

Public and donor funding mechanisms and capacity development are needed to help engage commercial lenders and investors in financing the operating capital needs of off-grid RE companies. Typically, these support mechanisms have taken three forms: lines of credit, credit enhancements for loan provision, and SME growth capital funds.

**Lines of credit** are a common approach for development finance institutions (DFIs) to support the creation of credit windows in national or local banks for specific areas of lending, including RE enterprises. When local financial institutions start out in a new sector, this form of refinance is the quickest way to engage their participation and provides the most latitude for the donor/DFI to set the financing terms. On the other hand, treating local financial institutions only as intermediaries eliminates their risk exposure, which can make them less motivated to effectively manage the credit portfolio. The key to success for this approach is thus finding ways to **align DFI and FI interests**.

**IREDA Solar Thermal Financing Subsidies**

IREDA (Indian Renewable Energy Development Agency Limited) is a Public Limited Government Company established in 1987, which promotes, develops, and extends financial assistance for renewable energy and energy efficiency projects. Through government subsidies, IREDA has successfully promoted the commercialisation of low-grade solar thermal devices and in advancing their large-scale use. To date, the total installed capacity in India is 680,000 $m^2$.

*Innovation: Long-term low interest loans help banks build solar thermal credit portfolios*

http://iredaltd.com/

**Credit enhancements** are a variety of subsidies provided by DFIs or other donor programs aimed at softening loan financing, either for the lender or the borrower. The concessionality comes in the form of risk

sharing or interest-rate reductions. Partial risk guarantees ensure debt-servicing payments to selected lenders or other investors in a project, usually for specific time periods or exposure levels.[28] **Partial credit guarantees** act to extend loan repayment periods, thus improving the project's cash flows. Both forms of guarantee can motivate banks to lend for projects they perceive as risky. Buying down the risk can mean lower costs of financing for the borrower or decreased security requirements. **Guarantees are most effective at addressing elevated banker perceptions of risk**; once a bank has gained experience managing a portfolio of RE loans, they are in a better position to evaluate true project risks. Guarantees, however, do nothing in the long term to reduce a RE technology's true project risk.

**Interest rate subsidies**, which are another form of credit enhancement, lower the cost of financing for the borrower and can be an effective means of helping banks build their loan portfolios in specific RE sectors. By assuming the entire credit risk, the bank's interests are fully aligned with those of the donor, both in terms of minimising defaults and continuing lending activity after the donor support has been phased out.[29] However this approach is subtle and therefore will only work in larger RE markets where banks can be confident of building sizeable loan portfolios quickly. In less developed markets transaction costs might outweigh the benefits for the bank.

More public supported credit-enhancement programmes are needed that build on successful approaches applied to date.

A number of **RE growth capital funds** (also termed patient capital funds) have been created in the past few years to help SMEs grow or expand businesses that are still not financeable with commercial loans.[30] In contrast to seed capital funds, which are generally purely donor financed, **growth capital funds are financed with a mix of donor and commercial capital**. As with mezzanine finance funds (to which growth capital funds are quite similar), this blending is used to either buy down the risks or buy up the returns for commercial investors. Financing is provided either as equity or debt, although the trend is towards debt due to the difficulty of exiting equity positions. Experience with these funds has been mixed, as some have not managed to meet their investors' expectations and consequently have been dissolved. As compared with technology support programmes, investment funds are usually more technology-neutral and, therefore, can be more effective at responding to a specific market opportunity or need. Public support for growth capital funds must be redoubled, building on the approaches that have worked to date. As with seed capital, the intermediary fund manager is key and support to develop this area of finance expertise is necessary.

**ASTAE: Greening WB energy sector portfolio**

The Asia Alternative Energy Programme (ASTAE) established by the World Bank in 1992 with the goal of "greening" World Bank lending to the power sector in Asia. The programme has been so successful that it has exceeded the target of increasing the share of alternative energy in its Asian power sector loan portfolio to 10 percent. In the financial year of 1999, the share was as high as 46.3%. Since its inception, ASTAE has developed a renewable energy lending portfolio in Asia of over US$1.3 billion. The GEF supported Sri Lanka Energy Services Delivery project is a good example of an ASTAE programme supporting grid and off-grid RE and DSM services.

*Innovation: Bundling of small decentralised RE and energy efficiency projects for larger loan programmes*

http://www.worldbank.org/astae/

**End-User Financing**

There are a number of models for financing RE transactions through the end user, all of which have been implemented in various developing countries with varying degrees of success.

The **supplier credit model** is the most basic means for a RE enterprise to finance transactions with end users and is usually short term (3 to 12 months). It requires that the enterprise either finance its purchases, or receive manufacturer credit, which on occasion extend to six months, but seldom longer. This model also requires that the RE enterprise manage a credit portfolio, something that requires a different sort of expertise from that of running a RE business.

The **consumer credit (or micro-credit) model** is perhaps the most developed means of facilitating individual household purchases of renewable energy systems. Loans are made by local banks or entities that specialise in originating small-scale loans for solar or other renewable energy systems, either at the household or village scale. The transaction between the end user and the RE enterprise is commercial and does not require that the enterprise supply credit to the end user. Notable examples of consumer micro-credit for solar home systems have emerged in South-East Asia, including Grameen Shakti in Bangladesh, Sarvodaya in Sri Lanka, and Syndicate and Canara banks in India. The two forms of credit enhancements – guarantees and interest rate softening as discussed in Section 4.1 - can also be applied with consumer credit.

The **fee-for-service model**, whereby customers pay for an energy service, is an approach that makes RE products and services more affordable, while minimising the long-term risks for the customer inherent in the credit models (technology risk, rural electrification risk, etc). The basic grid-extension model for rural electrification is fee-for-service. Soluz has applied this model to PV in the Dominican Republic and Honduras. Though it is easier to build a customer portfolio with this model, experience has shown that managing customer turnover and system removal costs can be a challenge. Government concessions can be used to apply the fee-for-service model, usually with off-grid equivalents of grid-extension subsidies. The national utilities in Morocco (ONE) and South Africa (ESKOM) have followed this approach.

The **lease model** is similar to the fee-for-service model in that the lessor retains ownership of the equipment and hence responsibility for maintenance and equipment replacements. Leasing is normally provided by a specialised financial institution and can include tax benefits that lower system costs.

## 5. Conclusions and Recommendations

Financing renewable energy continues to be a daunting challenge in all regions of the world. On the other hand, however, the renewable energy sector appears to be a bright spot in the current crisis-plagued energy-sector investment environment, which is marked by turmoil, uncertainty, and extreme risk aversion. Social, environmental, and energy-security concerns, coupled with improved renewable energy technologies, are increasing the momentum for support for renewable energy. The challenge is to introduce the **right policy frameworks and financial tools** to enable RE to achieve its market potential. This is particularly crucial in developing countries, where investment is endangered by geo-political, economic, and regulatory risks and where the lack of developed financial markets and products leaves the risks resting solely on the shoulders of the lender or investor.

A free market does not function according to rules of social responsibility and therefore needs to work within certain boundaries that serve social and environmental, as well as economic goals. **Policymakers have a social responsibility** to set those boundaries. Legislators and regulators have it in their control to shift the future energy portfolio if they choose to decrease demand by improving energy efficiency and to push energy generation towards renewable energy.

**Financiers have a social responsibility** to develop and deliver market solutions to the challenges of building a sustainable energy future.

That energy future must take the form of a free energy market **with less carbon, less fuel and fuel-price risk, and more and better access for the poor**.

The following recommendations to address barriers to investment in RE are for policymakers as well as the financial sector.[31]

| GOALS | RECOMMENDATIONS FOR POLICYMAKERS |
|---|---|
| **Have coherent and consistent policies in place to create genuine incentives for investors** | • Introduce policy interventions that raise the output price and/or reduce the investment cost to ensure an adequate and predictable return on investment.<br>• Price in environmental benefits of clean technologies and environmental costs of fossil fuels<br>• Encourage fixed-price schemes, such as the German feed-in law, and market-based instruments such as tradable certificates and carbon trading schemes. Market-based schemes may be economically more efficient, but being less stable financiers can have difficulties to value them. Fixed tariff regimes cost more, but work faster.<br>• Provide incentives that reflect the various stages of development from R&D (e.g. public funds) to commercial use (e.g. production tax credits). Structure incentives to address specific market barriers, be removable, reward innovation, and be cost-effective. |
| **Lower front-end barriers to project development** | • Create public facilities to share some of the costs of project development on a grant or contingent grant basis.<br>• Improve the creation and sharing of information on RE plants to help financiers better understand and manage project risks and decrease risk perceptions. |
| **Strengthen the equity base of project developers** | • Implement public interventions that give third-party investors incentives to take early participation in RE projects (training, tax benefits, soft capital for fund capitalisation). |
| **Close the debt/equity gap** | • Increase public support for mezzanine type funds to buy down the risks and buy up the returns of commercial investors. |
| **Mobilise corporate finance** | • Introduce tax incentives and leasing structures that improve the financials of RE projects for corporate sponsors. |
| **Lower loan/investment evaluation and transaction costs** | • Develop public facilities to share the costs of investment decision-making and the transaction process. |
| **Mobilise the finance sector to improve/expand risk management tools** | • Build public private partnerships aimed at moving new risk management instruments forward (see below) |

| GOALS | RECOMMENDATIONS FOR FINANCIAL INSTITUTIONS |
|---|---|
| **New financial products** | • Develop and test innovative financial products tailored to the RE sector. |
| **Develop/Improve/Expand risk management tools** | • Extend existing energy insurance product lines with similar operations or facing similar risks to include standard RE projects and, where possible, prototype RE projects;<br>• Change underwriting risk perceptions to increase the availability of risk transfer products;<br>• Develop new underwriting rating methodologies;<br>• Develop new risk management instruments to bundle heterogeneous risks;<br>• Aggregate projects to create portfolios of scale and risk diversification<br>• Develop new risk transfer markets through convergence of insurance and capital markets;<br>• Develop the actuarial data sets needed to assess project risks. |
| **Increase awareness, information, and skills** | • Increase awareness and understanding of the threats of climate change and other environmental impacts of energy production and use.<br>• Initiate and carry out more work on financing renewable energy. Develop the skills to evaluate renewable energy project risks and revenue streams.<br>• Provide information to customers and clients on the opportunities in investing in RE<br>• Increase analyst coverage of listed RE companies |

**Recommendations specifically for developing countries**

| GOALS | RECOMMENDATIONS FOR POLICYMAKERS AND MULTI/BILATERAL INSTITUTIONS |
|---|---|
| **Support business development** | • Support companies that ensure reliable access to energy, provide local income generation, and improve living standards.<br>• Help project developers fill the gaps along the finance continuum. This can be in the form of support for feasibility and due-diligence work, as well as for business planning. |
| **Support new risk capital approaches for enterprise development** | • Support the creation of early-stage seed capital funds, providing capital and enterprise development services to innovative clean energy entrepreneurs.<br>• Support local intermediary capacity as a more efficient way to deliver seed capital and to support SMEs with business development services. |
| **Support growth capital approaches that help proven SMEs scale up their businesses** | • Finance growth capital funds using blended arrangements that buy down the risks and buy up the returns for commercial investors. |
| **Improve access to, and affordability of, credit markets** | • Provide credit enhancements to share the risks (guarantees) or buy down the financing cost (interest rate softening) of commercial loans. |
| **Partner with the private sector** | • Build effective financing partnerships with the private sector on a risk-sharing basis. This is necessary as long as the renewable energy industry in developing countries continues to rely on government and public funding |

| GOALS | RECOMMENDATIONS FOR FINANCIAL INSTITUTIONS |
|---|---|
| **Greater role in financing RE in developing countries** | • Develop risk management instruments to support RE infrastructure and institutional capacity in developing countries.<br>• Develop innovative financing strategies that ensure quantifiable benefits – in both social and financial terms – for both the public and private financier. |
| **Partnership with the public sector** | • Co-invest with IFIs in the RE sector to diversify risk and increase effectiveness and efficiency of financing.<br>• Play active role in managing the execution and financing of publicly funded projects. |
| **Greater role of ECAs in RET export support** | • Design and market tailored products, jointly with RE sector.<br>• Create risk management products inspired by and responding to Kyoto Mechanisms.<br>• Develop processes to bundle smaller RE projects. |

## Endnotes:

[1] World Energy Outlook 2002, International Energy Agency

[2] The reader should note that for the sake of brevity, this paper does not cover all RE technologies and financing models in detail, but rather uses some generalisations to describe the basic forms of renewable energy finance. Two of the most grievous generalisations are 1) focusing mostly on electricity-sector RE examples, and 2) grouping together larger projects as 'on-grid' and smaller projects as 'off-grid'.

[3] UNEP Finance Initiatives Climate Change Working Group, July 2002

[4] World Energy Investment Outlook 2003 - the first "major attempt" to assess the amount of investment in the energy supply chain that will be needed in each world region over the next 30 years (www.iea.org)

[5] Jacob J. Worenklein, "The Global Crisis in Power and Infrastructure: Lessons Learned and New Directions", Institutional Investor, Inc. Spring 2003

[6] During summer 2004, FPL Energy in the US and Britain's ScottishPower raised $380 million and $700 million, respectively through new bond issues for wind park financing. Windpower Monthly, November 2003.

[7] Clean technologies doubled their share of US venture-capital investment in 2003 to 8% ($641 million in the first half of 2003) against a backdrop of declining overall venture financing. However, the share of clean tech investment going to the clean energy sector has been dropping due to the lack of positive market dynamics in the distributed generation area and the weak performance of publicly-traded energy tech stocks. *Cleantech Ventures Network (2003)*

[8] The first few times a financier invests in a RE project, the evaluation process will be significantly more difficult. It is not uncommon to find in a bank a loan officer who is willing to shepherd a RE proposal through the bank's loan approval process, but who faces the challenge of convincing the investment committee that the project will provide returns commensurate with the risks of the new technology. Building a strong case often requires including the expertise of independent experts; for example, a technical specialist to verify that wind data for a proposed wind farm are technically sound. The amount of third-party expertise required for new types of energy investments is significantly greater than for conventional energy investments. In other words, incremental costs are associated with establishing the soundness of a RE project when compared with a conventional alternative.

[9] A portfolio approach to electricity planning: Implications for renewables and energy security. Shimon Awerbuch, August 2003

[10] G8 Renewable Energy Task Force Report, page 44

[11] A more comprehensive list of sustainable energy programme design criteria known as the Pocantico Principles is available at http://newsletter.winrock.org/December03/

[12] This section applies to both developed and developing countries.

[13] Financial continuum analysis based on work of Phil Larocco.

[14] The Johannesburg Renewable Energy Coalition, facilitated by the European Commission, is considering the creation of a private equity fund for developing country RE projects and enterprises.

[15] e.g. Central American Clean Energy Fund (E+Co) and the Central European Renewable Energy Fund (EIP)

[16] E. Olivier, Background Paper - PCF Workshop on Tools for Risk Mitigation in Clean Infrastructure Projects

[17] Jacob J. Worenklein, loc. Cit.

[18] Whether this will happen soon depends on whether the incremental risk created by climate change can be identified and quantified, and the extent to which a 'climate change factor' can be inserted into insurance products. Climate Change & the Financial Services Industry, UNEP FI, July 2002.

[19] Scoping Study on Financial Risk Management Instruments for Renewable Energy Projects, UNEP (forthcoming).

[20] Under the Arrangement special sectoral exclusions currently apply to nuclear power plants and aircraft.

[21] John E. Mullen (jmullenje@globalnetpartners.com) or
Michael Eckhart (meckhart@AmericanRenewables.org)

[23] Although this section applies mostly to developing country enterprises, generic elements of the financing needs/responses are the same for developed country SMEs.

[24] e.g. Selco India, a small privately owned PV company, has invested for years in developing the market for PV in southern India and Sri Lanka. Shell Solar, part of the Shell group of companies, has invested significant capital in developing its solar rural electrification businesses in a number of countries.

[25] The typical cost of raising financing for a conventional business is 1% to 5% of the capital raised. In the RE sector the costs of raising capital can range from 5% to 20%.

[26] E+Co has invested in some 90 companies in 28 developing countries, through applying a combination of seed finance and enterprise development services.

[27] Security requirements can range up to 300% of the loan value.

[28] IFC has developed a number of GEF financed guarantee products for the RE sector, most of which in future will be offered through their new Environmental Business Finance Programme.

[29] This approach is being successfully applied to both solar thermal (IREDA) and PV (UNEP) sectors in India.

[30] E.g., Empowerment Through Energy Fund, E+Co, Solar Development Group, PVMTI

[31] The authors also refer the reader to the Recommendations made by the G8 Renewable Energy Task Force 2001, as well as the UNEP FI Climate Change Working Group 2002


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