international development finance club
IDFC

SCALING UP RENEWABLE ENERGY INVESTMENTS

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IDFC discussion note

The present document aims at presenting IDFC actions in the field of renewable energy.

Scaling Up Renewable Energy Investments

IDFC DISCUSSION NOTE

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INTRODUCTION

Throughout the world, a pressing need exists for energy solutions that simultaneously preserve environmental resources while bolstering social and economic development. The international community has acknowledged that implementing a robust strategy of renewable energy development fulfills several important public goals.

- *The use of renewable energy (RE) contributes to the security of energy supply protecting economies from price shocks and shortages on international markets for fossil fuels.*
- *Renewable energy empowers economic development. With rising and volatile prices, fossil fuel will continue to be a critical matter in particular for developing and emerging economies. Heavy reliance on fossil fuel imports constitutes a strong incentive to invest in RE since resources are local. In almost all cases, the use of renewables has a positive impact on national balance of payments.*
- *Prioritizing renewable energy helps protect the environment, and contributes to the fight against climate change. Renewable energy systems are CO2 neutral, and generally do not produce water, air or soil pollutants.*
- *Renewable energy -notably small scale photovoltaic (PV) systems - can significantly improve access to basic social services in isolated rural areas, where national power grids are absent.*
- *Finally, renewable energy technologies are becoming more and more competitive, and are often the most cost effective solution in order to meet energy needs. The planet's vast renewable potential is sufficient to serve most of humanity's rising energy needs and the resources are widely dispersed over the planet*

The economic, social and environmental benefits of renewable energies are manifest and because of their multiple advantages, the use of renewable energy is growing, meeting an increasing share of human energy needs.

However, despite the remarkable potential for renewable resources to deliver secure and clean energy, the growth of renewable energy remains slower than called for by public authorities. Many barriers subsist, blocking or slowing the expansion of renewables, especially in developing countries.

This document describes how IDFC member public financial institutions are promoting the growth of renewable energy. The first part of the document focuses specifically on developing and emerging countries. The document concludes on a proposal for priority actions by public authorities - which could be supported by IDFC - to overcome barriers and accelerate the effective spread of renewables.

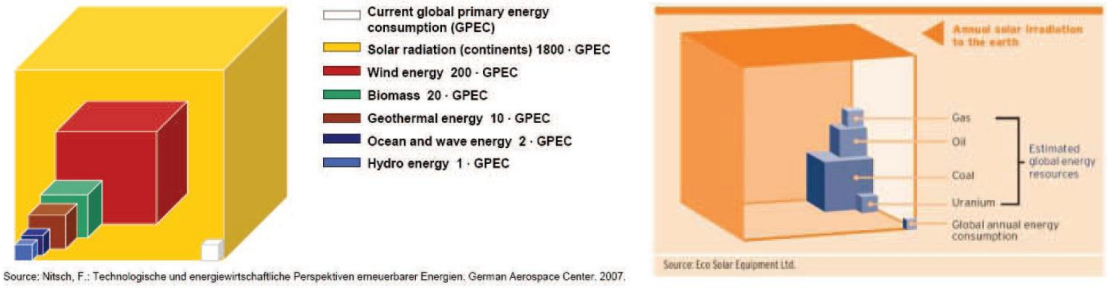
PART I: RENEWABLE ENERGY INVESTMENTS IN DEVELOPING AND EMERGING COUNTRIES

1. MULTIPLE BARRIERS TO THE USE OF RENEWABLE ENERGY (RE) IN DEVELOPING AND EMERGING COUNTRIES (DECS)

1.1 Renewable Energy: a broad variety of resources and technologies

The term "renewable energy" refers to several various sources of energy, and to numerous technologies that allow the collection, concentration and use of these sources to provide different energy services.

Abundant renewable flows versus limited fossil and fissile stocks



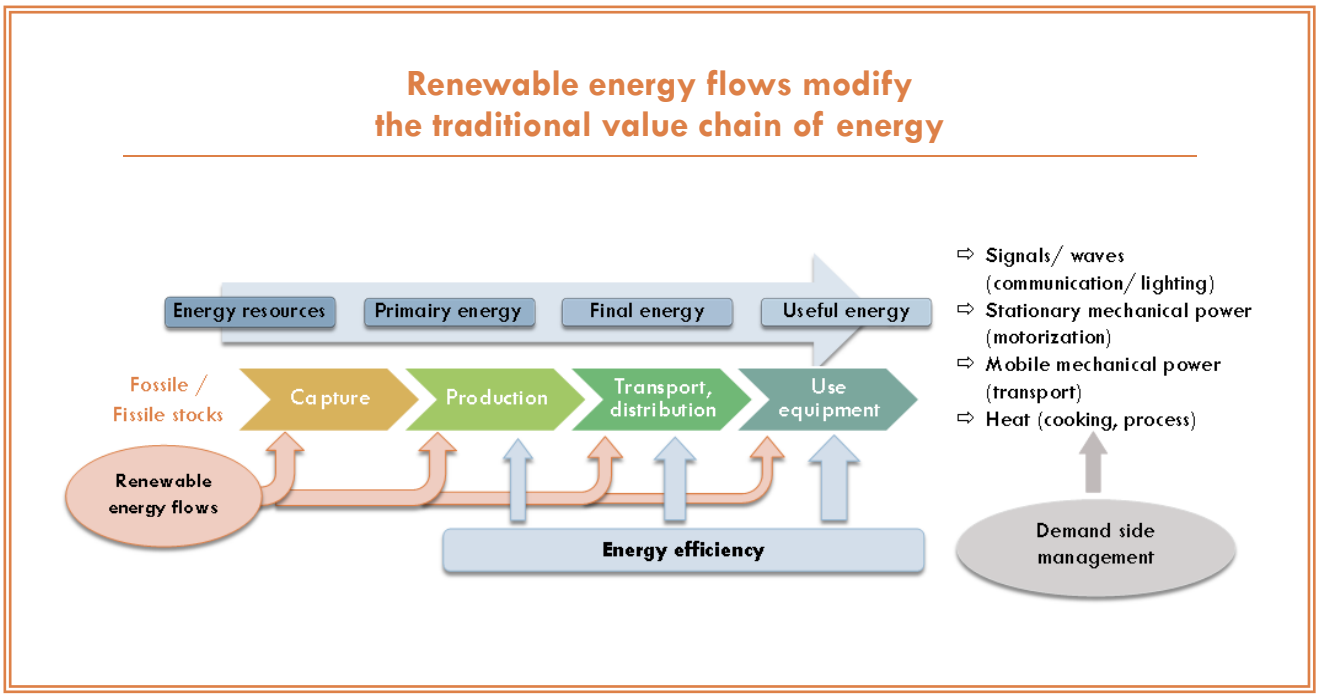
Source: Nitsch, F.: Technologische und energiewirtschaftliche Perspektiven erneuerbarer Energien. German Aerospace Center. 2007.

Annual flows of renewable energies are significantly greater than total fossil fuel stocks. These flows are also much more abundant than the world's annual use of energy (as shown by the various sizes of cubes representing these flows and stocks, the smallest cube being the annual world energy consumption). Humanity's current level of energy consumption could be totally fulfilled by our available RE resources, if we properly harness and use these resources. On the opposite, our current use of energy is quickly depleting fossil fuel stocks.

There is a great variety of RE value chains with respect to their technical and economic characteristics - maturity of technology, size range of equipment, intermittence of energy supply, geographic distribution, final uses, type of end-users - that have important consequences for their adoption in developing and emerging economies. The diagram below shows the energy value chain. Fossil and fissile energies are considered as a source in the beginning of the chain. On the contrary, renewable resources can be integrated at any stage of the value chain depending on the nature of the resource and how it is captured. As a consequence, large integration of renewable energy implies profound modification of the widespread vision of the energy value chain.

1.2 Specificities of Renewable Energy projects

Renewable energy systems have specific characteristics whose impacts vary depending on the level of socio-economic development of a country. These specificities affect the implementation of projects in developing and emerging countries.

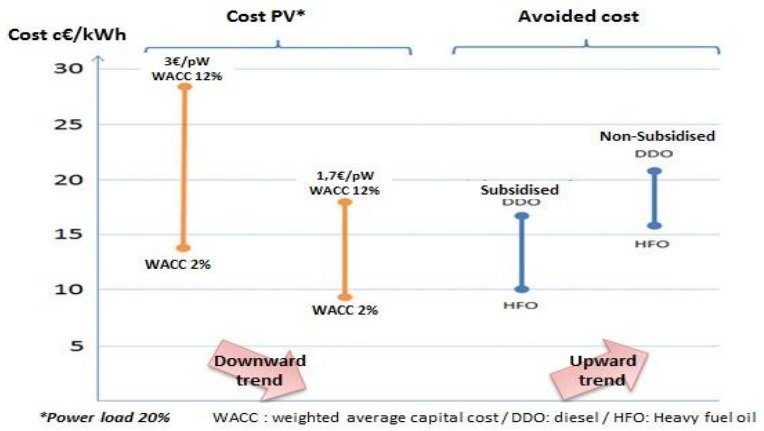


RE technologies are capital intensive. Harnessing RE sources - collecting, concentrating and converting the primary energy into useful forms – requires high capital investments for the necessary equipment. As compared to fossil energy sources, whose life cycle costs are dominated by fuel purchases, capital expenditures account for the major portion of life cycle costs for RE. Furthermore, in many developing and emerging countries, much of the equipment is imported. As a consequence, the capital expenditures must be made in hard currencies, exposing the projects to a "scissors" effect in case of currency devaluation.

The cost composition for RE systems is characterized by high CAPEX and low OPEX. The following graph compares the LCOS (levelized cost of electricity) of wind and gas power plants. It underlines the fact that the cost of capital has a large impact on RE costs, as opposed to fossil based plants where the costs of fuel are predominant.

The graph below states that for a PV power project, capital costs can more than double the LCOE (levelized cost of electricity), depending on the interest rates. It also shows that favorable access to capital can bring RE electricity to grid parity in countries or sites where power supply is based on diesel generation.

Electricity costs (c€/kWh): Solar PV versus diesel generation



Source: AFD-UE(RECP program)

Considering the recent shrinks in PV equipment prices and financing plan at competitive rate, PV energy can be more competitive than fossil fuels, if fossil fuels are not excessively subsidised

RE sources depend on local conditions. Fossil resources have been created by geological processes over millions of years into concentrated but limited stocks. Today, they are extracted and transported with wide spread dedicated infrastructure. In contrast, renewable energy sources consist mostly of low density flows of energy that must be captured at specific sites. Whereas a coal-powered power plant can be sited near a port facility, a similar generation capacity based on water, sun or biomass would only be possible in specific places.

In addition, for large power plants, renewable energy systems require large amounts of a particular natural resource – land, water or biomass – with specific constraints linked to the particular site where it is to be implemented (for instance large-scale centralized solar energy require significant land areas).

Some constraints may also arise because the renewable energy source is already allocated to other high value uses. For instance, investments in hydropower plants and biomass energy may be in competition with agricultural activities for access to water or biomass. Moreover, the interaction of renewable energy systems with land and water often implies more complex governance arrangements

than for fossil fueled energy systems. This means that specific institutional and social arrangements, supported by public action, are necessary to guaranty long term reliable access to these resources.

Are renewable energies more expensive?

Contrary to a widely held idea that they are expensive, RE is often the lowest cost energy solution, for instance:

- *Where a high quality hydro resource is available, hydro power is usually the lowest cost power generation technology. In favorable conditions, medium and large hydro power can cost as little as 0.02€/kWh. Thus, Bhutan exports its low cost hydro power to India*
- *High quality wind resources are competitive in many countries of the world. For instance, in Morocco, capacity has been steadily growing since 1999 to reach 291 MW today*
- *Grid connected PV has reached grid parity in some regions, when the alternative is diesel power, or when the PV station can be located at the end of long transmission lines.*
- *In isolated rural areas far from national grids, stand-alone PV is almost always the lowest cost solution for low power applications, such as lighting or ICT. Cell phone relay towers are often PV powered, both in developing and developed countries.*
- *Biofuels – ethanol, biodiesel, straight vegetable oils - can be competitive with fossil fuels, notably where a low cost resource is available (as in the Brazil ethanol program), or where fossil fuel costs are high because of difficult transport conditions.*

The cost comparison is even more favorable to renewables when externalities and long term energy strategy objectives are taken into account.

Use of RE and the nature of energy-using sectors are closely intertwined. The use of renewable energy has specific technical implications for the sectors they power. For instance, the use of biofuels may require modifications in motors. Integrating significant proportions of solar or wind power requires adaptation of electricity grids. Industrial boilers have to be modified to efficiently use biomass for heat and steam production. The design, installation and operation of these modifications necessitate specific training, and sometimes specific applied research. For such changes, the availability of the required human and technical capacity is often limited in developing and emerging economies.

RE systems are associated with high perceived risk. The risk/profitability profile of projects is a fundamental criterion that determines the feasibility of energy technologies. RE systems have distinctive elements of risk that differ from fossil-based technologies. In developing and emerging countries, when combined with other elements of country risks, these specific risk elements can become a major barrier. The most important RE specific risks are:

- **Variable resources.** Renewable projects are based on the short term flow of natural resources: sun, wind, flowing water; agro-wastes…. There is a risk that pre-project assessments of the resource are inaccurate, and that the completed project has lower power output than planned. Furthermore, the short term fluctuation of renewable sources, such as solar and wind, results in reliability difficulties in balancing generation with user electricity needs.

- **"Newness" risk.** With the exception of hydro power, renewable energy systems are relatively new technologies. Builders and operators are at the beginning of the technology learning curve,

and are more exposed to failures than in comparable conventional energy projects. Besides, renewable projects often lack sufficient local "track records" and benchmarks, resulting in difficulty for financial institutions to properly evaluate risks. As a consequence, they might over estimate risks. In addition some renewable sources mobilize a high proportion of local civil engineering works, thus further increasing project completion risk, especially for small RE systems.

- **Greater construction risks.** Multi-contract structure creates logistical challenges and interface risks. This can be mitigated by a conservative and detailed project schedule (Master Interface Schedule) shared among all contractors and closely monitored by the project-company which may appoint an independent Construction Manager for assistance in this task.

- **High upstream costs for project development.** Project costs are 90% up-front: though the energy source is generally free, there is a long and expensive phase of construction and installation that delays revenue streams. Integration of renewable energy into electricity grids is also problematic. The grid connections are more numerous, smaller in size, and more geographically scattered than for conventional power plants. Furthermore, the variable nature of power generation poses specific problems in terms of grid stability and back up generation capacity. These problems are more difficult to solve in the small and medium size grids of many developing and emerging countries. Cross border interconnections, that can be part of the solution, are often inexistent or inadequate. These difficulties are compounded by the inertia, both of physical infrastructure, and of the actors in energy value chains. Grid operators and regulators in particular, are often loath to adjust their practices to the needs of emerging RE technologies.

- **Smaller size and additional costs.** RE projects are often of significantly smaller scale in terms of physical size and financial return compared with conventional fossil fuel power plants and are subject to higher administrative costs associated with risk assessments, loan processing and insurance.

- **High fossil fuel subsidies persist.** The International Energy Agency estimates that fossil-fuel consumption subsidies worldwide amounted to $409 billion in 2010, up from $300 billion in 2009, with subsidies to oil products representing almost half of the total. In developed, emerging and developing countries, fossil fuel subsidies continue to account for a non-negligible share of countries' budgets. This is specifically the case in emerging and developing countries where investments in areas such as social welfare or infrastructures are greatly needed. The International Monetary Fund published a report on the opportunities for dynamic economic development in the region of Sub-Saharan Africa (SSA). Energy subsidies are described as expensive, poorly targeted and inefficient. In fact, subsidies to petroleum products represented 1.4% of the regional GDP in 2012 and mainly benefit high income households, at the expense of the poorest.

Fossil fuel subsidies are inefficient since they discourage new investment in the energy sector, particularly for renewable energy deployment. Thus, the competition between RE and fossil fuel remains unfair. The question of reforming energy subsidies is on the agenda of many countries but is still faced with many barriers. The phasing-out of fossil fuel subsidies requires more efforts to realize full extent of economic and environmental benefits.

To conclude, the barriers to RE projects in the context of developing and emerging economies can be categorized as follows:

- ***High upstream costs for project development.*** *Public support may be essential to realize the initial phases of project identification and development that may seem unattractive to private investors.*
- ***High capital costs*** *requiring adequate financial instruments*
- ***High perceived risks,*** *requiring specific risk mitigation measures – financial or institutional – since standard risk mitigation tools are often unsuitable or unavailable for RE projects. When perceived risk is higher than real risk, public action may be needed to convince value chain actors to change their perception.*
- ***Need to adapt rules and institutional frameworks for RE projects****. Operational integration of RE into power grids or other energy systems often requires changes in institutional frameworks, notably to guarantee long term access to resources.*
- ***Smaller size and return*** *that offer lower economies of scale.*
- ***High fossil fuel subsidies*** *prevent RE deployment.*

2. SOLUTIONS TO INCREASE USE OF RENEWABLE ENERGY

As explained, the development of renewable energies in the context of developing and emerging countries faces specific barriers. To overcome these barriers, IDFC members have developed and deployed a number of mechanisms that can be broadly categorized as:

- **Financial instruments,** dedicated to public or private entities.
- **Project specific accompanying measures,** by public authorities or by specialised agencies, and supported by the IDFC members themselves.
- **Creation of favorable framework conditions,** implemented by public authorities, in many cases with support from public financial institutions.

Each of these classes of support mechanisms contributes to overcome the four barriers – capital cost, risk, project development, framework conditions – described above. The following paragraphs synthesize what IDFC members have done in each area.

2.1 Financial instruments

Financing investments in infrastructure is the core activity of IDFC members. Their position and status allow them to make long term loans at competitive rates. This is particularly important to remove the "**high capital costs**" barrier to RE projects.

"Feed-in-tariffs" a universal solution?

It is important to note that some of the usual instruments used in developed countries to expand renewable electricity generation – such as a "feed in tariffs (FITs)" or fiscal support measure through accelerated depreciation – are generally inapplicable in developing and emerging countries.

Such mechanisms require substantial public subsidies (or cross subsidies) that public authorities in DECS are unwilling or unable to provide.

FITs are not always warranted since the energy price equations differ in many developing countries, in particular, in those where RE resources are more abundant and costs of conventional fossil solutions are higher than in developed countries.

Finally, such economic mechanisms may be ineffective since they do not address the most important institutional and financial barriers to increase use of RE.

In fact, appropriate solutions are often to couple provision of adequate loan financing, with institutional support and appropriate tariffs, rather than massive subsidies for investment or operation.

Furthermore, several IDFC members employ procedural and financial mechanisms to improve the risk profile of projects, therefore offsetting the "risk" barrier to RE projects. An important risk mitigation mechanism is assistance to project teams during the project formulation process (as described in the next paragraph). In addition, purely financial mechanisms include:

- Risk guarantees funds. These mechanisms can be quite expensive, and often require allocation of public resources;
- Quasi capital or mezzanine loans that reduce the risk for private co-lenders of a project. This can attract commercial debt by allowing the project to maintain greater levels of debt / equity.
- Equity participations in private sector firms engaged in the business of developing and operating renewable power projects to help them leverage financing for their business expansion.

In some cases these mechanisms benefit from some element of grant financing. Channeling public grant financing into risk guaranty mechanisms is considered by some institutions to be an efficient use of such funds, providing high leverage and impact.

Channeling public and private financing to Renewable Energy in India

AFD credit line to Ireda

In December 2009, AFD decided to commit to the Indian Renewable Energy Development Agency IREDA's activity and granted a 70 million euro credit in the form of a loan guaranteed by GoI. The credit line aims at promoting the financing of high capital cost RE projects led by independent power producers (IPP) in the sectors of biomass, cogeneration, small hydro, wind energy, photovoltaic and concentrated solar plants. In addition, technical support mostly on new solar technologies accompanies this credit line.

Proparco quasi-equity investment in renewable energy developers

The Indian company NSL Renewable Power Private Ltd (" NRPPL ") (one of the five largest independent power producers in India) recently entered an active phase of expansion both in and outside India aimed at bringing its installed generation capacity of 169 MW to over 1,000 MW by 2015 with a main focus in the wind sector. PROPARCO's investment in the company in 2013 took the form of quasi-capital (convertible preference shares) allowing the company to increase its debt leveraging capacity.

2.2 Project specific accompanying measures

Since IDFC members have a public mandate to encourage RE projects, their due diligence can go beyond a "passive" evaluation of bankability, and may include active support to project developers in improving some aspects of the project. This can be carried out as part of due diligence, or through specific, stand alone, project preparation facilities.

Furthermore, because they are public institutions, IDFC members can intervene to help overcome project specific obstacles, through support in:

- Negotiations to obtain guaranteed access to renewable resources lying on publicly controlled lands (biomass resources in public forest), or controlled in part by public institutions (as in river basin management institutions);
- Negotiations with grid operators to install grid connection facilities (lines, substations);
- Carrying out studies: detailed resource mapping for hydro or wind projects, environmental or social impact studies, studies to quantify positive economic impact, etc.
- Establishing legal agreements necessary for project completion, for instance upstream resource access, or downstream power purchase agreements;

- Support in international negotiations, for instance for large hydro projects where both water use and the power generated impact more than one country;

- Ensuring the completion of public infrastructure necessary for project construction, for instance access roads, or port facilities.

While some of these actions can be relatively low cost – for instance aid during due diligence, or support in negotiations with public authorities – substantial financial and human resources are necessary to carry out most project components.

All these project specific support measures can both reduce the **cost of capital**, and **improve the risk profile** of projects.

Facilitating private investments on RE

Encouraging the private sector investment in RE is favoured by the continued decline in the costs of RE technologies although they remain high relative to fossil fuel. The cost of wind power has significantly fallen since the mid-1980s and the cost of solar panel has fallen by 60% since 2008. This trend is linked to the maturing of technologies with potential for further cost reduction through innovation or scale economies. This brings small scale RE projects (residential PV power) close to competitiveness.

Development of private investment in Renewable Energy in Turkey: TSKB support to pioneering projects

In 2009, the largest geothermal power plant in Turkey was financed by TSKB, together with a group of lenders. The project was the first of its type benefiting from a technology used in Turkey by the private sector, namely the Double Flash Power Generation. The project had some obstacles at the beginning such as the uncertainties regarding the reservoir, the conceptual model of the geothermal zone.

TSKB has played a similar role in supporting pioneering hydro-electric, wind and biogas projects.

However there are still risks remaining which may appear significant for the private sector:

- Physical risks: risks linked to the intermittency of natural ressources (wind, hydro). Surveys show that this risk is more acute for wind and hydro than for solar and other RE technologies : wind volumes may deviate 25% from normal values in any given year but solar radiation levels typically deviate by no more than 4% from normal levels

- Technological risk: while conventional fossil fuel energy employ mature technologies most of the time, RE projects employ evolving technologies which do not have the same established track record (eg CSP, offshore wind, etc.). The development of geothermal power, for instance, entails major technological risks. Reliable information about whether a site is suitable can only be obtained through elaborate and expensive drilling processes, which are often unsuccessful. Up until now, many developers have been unwilling to take this risk

- Financial risk linked to the capital cost intensiveness of ER projects (see above 2.2)

- Political and regulatory risk which may derive from adverse changes in regulatory framework (e.g. feed in tariff retroactive change). Uncertainty over the period of time the State will support a policy regime allowing RE projects to be economically viable can be a deterrent for RE developers. Given that subsidies to solar projects account for up to 85% of initial revenue in Europe this increases the political risk linked to the RE projects. Hence potential cuts to RE subsidies can change the economic equation for the projects. Spain for instance recently introduced cuts to feed in tariffs of up to 45% leading investments to drop significantly. In 2012 there was a global decline in RE investments due mainly to the uncertainty over support policies in North America and Europe.

Thus, fostering private sector investment in the RE may be challenging. These risks can be mitigated by implementing risk management, for instance using political risks instruments (dealing with contractual and regulatory risk). In addition, bilateral and multilateral DFIs continue to play a strong role in facilitating long term financing in developing economies where risks are higher. They are likely to catalyse private investment in RE projects, by addressing the political risk and the financial gap.

Developing hydro power in Latin America: CAF support through the "Sustainable Hydro Program"

Latin America is home to the world's cleanest energy mix due to the heavy use of hydroelectric power. Although only 23% of the region's hydroelectric potential has been developed, hydropower already supplies 25% of all energy consumed. In order to further develop the hydropower market, CAF has launched its Sustainable Hydro Program, currently active in Bolivia, Peru, Sao Paulo state in Brazil, the Bermejo river basin in Argentina and the Binational Dominican Republic-Haiti basin.

Through the program, CAF supports assessment of hydrological resources, including reservoirs and inclines, analyzes the data and combines it with local restrictions, such as protected areas and environmental regulations. In this way, CAF prepares the way for hydro investments.

2.3 Creation of favourable framework conditions

One of the main barriers to RE projects consists of unsuitable institutional frameworks. IDFC members, because they are "close to the ground", have detailed knowledge of the operational needs of RE projects. They are thus equipped to counsel and aid public authorities in adjusting framework conditions. In fact, such action is often an explicit element of their mandate and responsibilities. It can take some of the following forms:

KfW Geothermal Risk Mitigation Facility (GRMF)
A catalyst for geothermal development

GRMF was established by the African Union Commission (AUC), the German Federal Government and the EU-Africa Infrastructure Trust Fund via KfW Entwicklungsbank to catalyze geothermal development in Eastern Africa. The following countries are eligible for GRMF: Burundi, Comoros, Eritrea, DRC, Djibouti, Uganda, Kenya, Tanzania, Ethiopia, Rwanda and Zambia. The objective of the GRMF is to encourage public and private investors (project developers) to develop geothermal projects for power generation in Eastern Africa by providing cost share grants for surface studies and **drilling of reservoir exploration wells**. 50 million Euro (approx. 62 million USD) have been committed for projects that will lead to electricity generation in Eastern Africa.

- Support to sector reform for electricity, and technical assistance to establish specific legal and regulatory texts, notably on the status of RE Independent Power Producers (IPP).
- Definition of legal and practical modalities for grid access. This is can be both for sale of electricity to the grid, and for power wheeling for "virtual inside the fence" installations. This can help in situations where grid operators, hesitant to integrate RE, delay the building of infrastructure for grid connection.
- Negotiation of tariffs and power purchase agreements (PPA). While preferential feed in tariffs are rare in developing or emerging countries, this does not imply that there are no tariff negotiations. In particular, the value of an intermittent supply of power, or the obligation to buy available renewable power, can give rise to complex political discussions.
- Establishment of power sector regulatory mechanisms. Since many RE projects are built by entrepreneurs rather than by utilities, the existence of credible independent regulatory mechanisms is essential.
- Infrastructure planning. Building of decentralized RE projects such as mini-grids depends on the existence of reliable and transparent information on plans for grid extension.

- Again, as with project specific support actions, counsel to public authorities can require substantial human resources within the national development institutions.

Holistic Approach to Energy Efficiency: Case study from Vietnam

JICA provides a holistic approach to promote energy efficiency and conservation in Vietnam. From 2008 to 2009, the "Master Plan Study on Energy Conservation and Efficiency Promotion" has been implemented to develop a roadmap in promoting energy efficiency, leading to the enactment of the "Law on Energy Efficiency and Conservation" in 2011.

Accordingly, JICA has implemented the "Energy Efficiency and Renewable Energy Promoting Project" by soft loan since 2009. It provides financial incentives through low interest loans from Vietnam Development Bank (VDB) to energy efficiency and renewable energy investments with a credit line of 4 Billion Yen.

Furthermore, JICA has implemented technical cooperation projects to facilitate technology transfer to the two main pillars of the energy efficiency law, namely the "Project for Establishment of Energy Management Training Center (2011-2015)" to support the energy management and energy audit system, and the "Project on Strengthening the System and Operation on Standards and Conformance for Energy Efficiency and Labeling" to support the energy labeling program. (Refer to figure below for details)

Through policy dialogue among related stakeholders, key milestones of these projects are selectively identified as policy actions of the program loan "Support Program to Respond to Climate Change (SPRCC)" since 2009, to successfully promote energy efficiency and conservation in Vietnam.

3. THE WAY FORWARD: HOW TO SCALE UP RE INVESTMENTS IN VARIOUS CONTEXTS?

The preceding sections argue that solutions exist to overcome the "capital", "risk", "project" and "framework" barriers to an increased use of RE. IDFC National Financial Development Institutions have experience and capacity to provide financial tools and project technical assistance – lending, risk management, counsel to project developers – to lift the "capital" and "risk" barriers.

The following paragraphs suggest measures that could scale up and accelerate national programs to increase use of renewable energy.

3.1 Linking dedicated loans for RE investments with technical institutional support

The National Financial Development Institutions that constitute the IDFC group are in position to support RE projects, by linking long term financing with project specific accompanying measures. The nature and the mandate of these institutions allow them to raise capital at advantageous conditions, and provide long term lending.

Furthermore, the public service and development mandates of IDFC member institutions is reflected in their human and institutional capital, giving them an understanding of how the regulatory environment impacts the bankability of RE projects. They can thus design and implement cost effective accompanying measures.

Public financial institutions are well placed to design and carry out cost effective actions in support of renewable energy projects, integrating financial instruments – notably, long term, competitive rate lending - with project specific accompanying actions, adapted to local conditions and specific value chains.

3.2 No "one size fits all": adapting projects to local conditions and to specific value chains

As explained above, RE value chains have common elements – use of local resources, creation of local value added – that make them similar from the point of view of public development objectives. On the other hand, the technologies themselves are vastly different, with various scales, numerous groups of actors, and different cost/benefit balances.

Thus, while at the national level, it makes sense to develop national RE targets and policies, at the project level, achieving the objectives of the policies requires detailed matching of instruments and methods to the specificities of each RE project – resource availability, siting constraints, technology barriers, links to user sectors, etc. In practice, for RE projects, there is no "one size fits all" method.

IDFC member institutions have gained knowledge and experience on how to support RE projects, taking into account these local specificities. In particular, they are in position to identify local solutions with public and private partners and combine different tools to favor the development of RE in various contexts

3.3 Scaling up IDFC support to RE

Accelerating the growth rate of RE energies requires linking financing with both project specific accompanying measures and adjustment of national framework conditions.

As a consequence, the key to increase activities in the field of RE often lies in the capacity of institutions to allocate human and financial resources to these accompanying measures. The resources needed for upstream support activities are relatively small compared to the downstream impact, in energy and development terms. In some cases, access to climate finance instruments could provide the key to allocate resources to this need.

Public financial institutions could make cost effective use of additional resources to carry out the accompanying measures necessary to increase the penetration of renewable energy technologies.

Barrier	*Solutions*		
	Financial instruments	**Project specific support**	**Accompanying measures to adapt framework conditions**
High capital costs	Long term, low interest loans		Remove fossil fuel subsidies, to create "level playing field".
High perceived risk	Guarantee funds Mezzanine loans, quasi-capital	Accompanying studies. Support in negotiations.	Secure judicial and regulatory framework
High upstream costs for project development	Aid to project developers, as part of due diligence	Project preparation actions and facilities. Resource management measures (water, biomass ...).	Public support for resource maps Transparent planning for grid extension
Unsuitable institutional framework		Aid to facilitate PPAs.	On regulatory framework for the energy sector.

3.4 Accompanying private investments upstream

According to UNFCCC's estimates, 85% of the funds required to mitigate climate change impacts will come from the private sector. However, for instance when looking at Sub-Saharan Africa, private sector involvement is still far behind what is needed and could be expected: 7 GW of additional generation capacity per year totaling 27 billion USD of investments would be needed over a ten year period to match demand growth. Today only 4.6 billion USD are invested annually in new capacity, out of which only 50% come from the private sector.

In the RE sector, falling technology costs already allow RE generation projects to become competitive with conventional energy capacities over the project lifetime, in developing economies heavily dependent on conventional thermal power. However, private developers still face excessive upstream financial risk linked both to the time frame for development of RE projects in insufficiently mature markets and to the upfront capital cost intensiveness of RE projects (see section 2.2 above).

Accompanying at an early stage private sector firms engaged in the business of developing and operating renewable power projects and/or directly participating in the financing of the development costs of greenfield RE projects upstream, through new climate finance instruments would greatly boost the development of RE.

The private sector must play a key role in the development of RE capacities in the emerging and developing economies. Public climate financing could help accelerate this involvement by contributing to the upstream development of such private initiatives.

PART II: MAPPING OF RENEWABLE ENERGY FINANCE DELIVERED BY IDFC MEMBERS IN 2012

1. INTRODUCTION

***The International Development Finance Club IDFC**, formed in 2011, is a group of twenty national, bilateral, and regional development banks that share a similar vision of the development finance and the global climate change challenges the international community faces.*

*Since 2010, the IDFC members have been **mapping their green finance** (including climate finance) contributions in an effort to align the collation and transparent reporting of these financial flows. In doing so, the IDFC contributes practical experiences to the international climate finance forum, helping to shape discussions on methodologies to accurately define, estimate, and track the mobilization of green and climate finance.*

*The IDFC green finance mapping exercise for 2012 collects and publishes complete data on new green finance commitments. After giving the key findings of this mapping, **this report focuses on IDFC members' financing to renewable energy (RE) deployment in the year 2012**. The contribution of IDFC RE finance to the global RE investment picture is reviewed. Potential solutions to improve RE investment mapping and practices are also addressed.*

2. MAPPING OF IDFC GREEN FINANCE

In a collective effort to contribute the defining, tracking, and reporting of climate finance, IDFC has implemented its green finance mapping initiative of 2012.

As there is no internationally-agreed definition for green and climate finance, this methodology provides working definitions for both terminologies. Green finance is a broad term that can refer to financial investments flowing into sustainable development projects and initiatives, environmental products, and policies that encourage the development of a more sustainable economy.

For the purposes of the mapping exercise, green finance is split into three separate categories or themes:

- Clean energy and mitigation of greenhouse gas emissions
- Adaptation to climate change impacts
- Other environmental objectives.

The total green finance contribution of IDFC members in 2012 was 95 billion US$, an increase of 5 billion US$, or 6.7%, from 2011 statistics.

Figure 1 depicts green finance flows from institutions based in OECD countries and non-OECD countries. End-distribution of the finance varies according to whether countries spend the finance in OECD countries, non-OECD countries, or their respective home country.

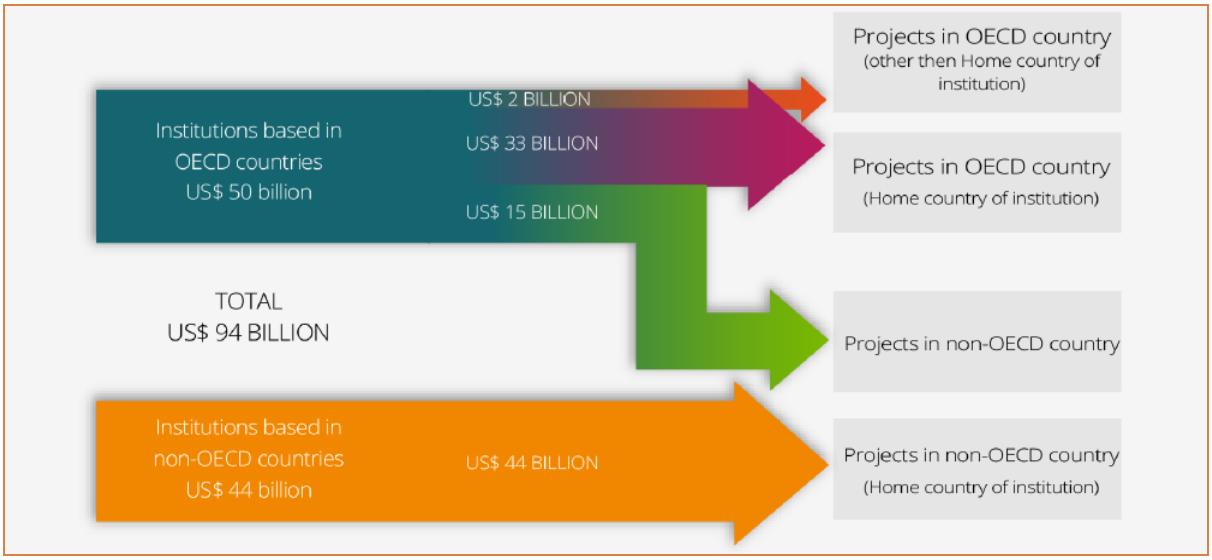


FIGURE 1: COMPARISON OF THE SHARE OF FINANCIAL COMMITMENTS IN 2012 (SOURCE: ECOFYS).

Renewable energy supply falls within the category "Clean energy and mitigation of greenhouse gas emissions".

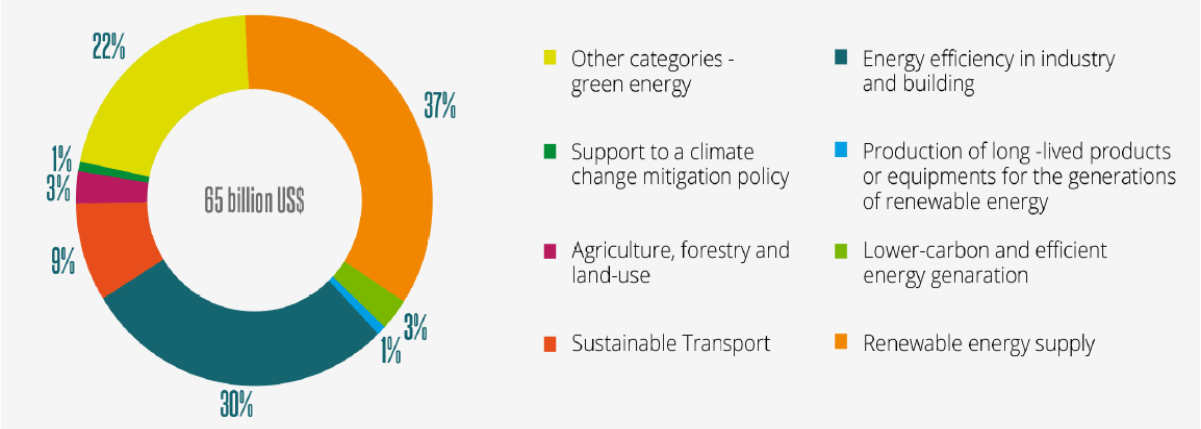


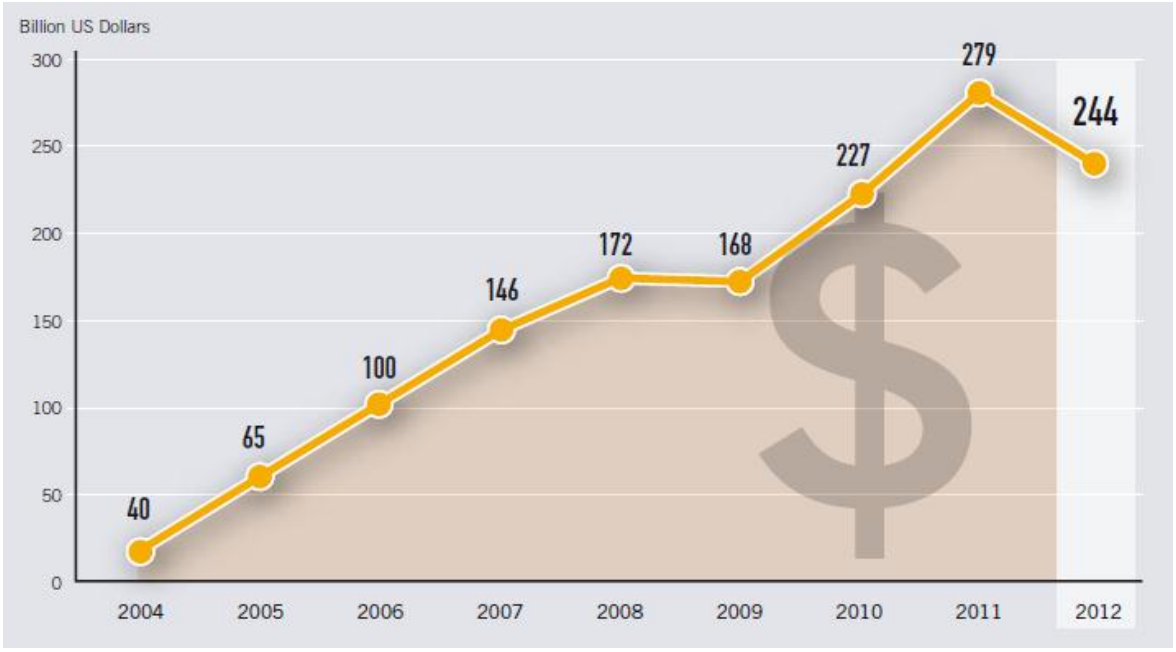
FIGURE 2: FINANCE TO CLEAN ENERGY/MITIGATION OF GHG EMISSIONS PROJECTS IN 2012

RE supply accounts for 37% of the total investment of 65 billion US$, as shown in Figure 2 giving the amount of financing disaggregated into sub-categories.

3. GLOBAL PICTURE OF RE INVESTMENT IN THE WORLD

This part aims at presenting and commenting the state of RE investment worldwide. Information in the box below is extracted from REN 21 (2013). Renewables Global Status Report publishes annually a global status report for renewables.

Global new investment in renewable power and fuels was USD 244 billion in 2012, ***It had been steadily increasing until 2011 and decreased slightly on 2012.***



GLOBAL NEW INVESTMENT IN RENEWABLE ENERGY, 2004-2012

The year 2012 saw the most noticeable shift yet in the balance of renewable energy investment worldwide, with the dominance of developed countries waning and the importance of developing countries growing.

In the developing world, renewable energy outlays reached USD 112 billion, up from USD 94 billion in 2011, and represented some 46% of the world total (up from 34% in 2011). By contrast, outlays by developed economies fell sharply (29%), from USD 186 billion in 2011 to USD 132 billion in 2012, the lowest level since 2009.

(Source REN 21, 2013)

4. IDFC MEMBERS' GLOBAL CONTRIBUTION

4.1 Focus on renewable energy IDFC finance

The total amount of financing attributed to clean energy and mitigation of greenhouse gas emissions projects in 2012 is 65 billion US$. **Renewable energy supply projects made up 37% of financing attributed to this category, a total of 24 billion US$ in 2012**, at a similar level as RE financing in 2011 (24.6 billion US$).

This contribution represents approximately 10% of the world's total new investment in RE capacity.

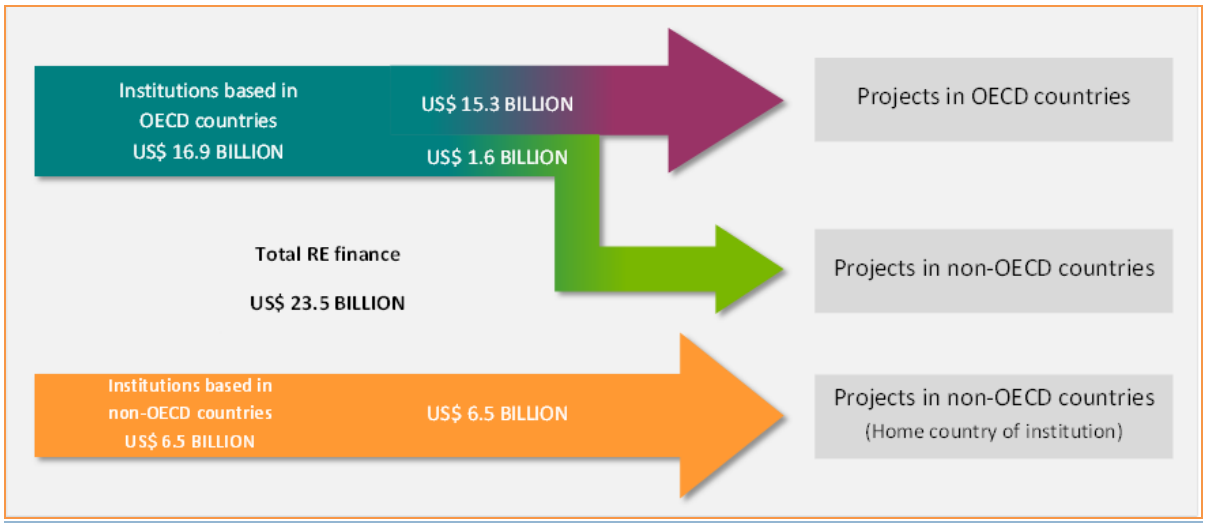


FIGURE 3: COMPARISON OF THE SHARE OF FINANCIAL COMMITMENTS FOR RENEWABLE ENERGY SUPPLY PROVIDED IN 2012 BY IDFC INSTITUTIONS.

The regional breakdown of the RE financing from IDFC members highlights emphasis on the investments in OECD countries as well as in non-OECD countries ([13] billion US $ in OECD countries and nearly [11] billion US $ in non OECD countries).

The share of RE financing originating from institutions based in OECD countries is [73%] while their end-use financing spent in non-OECD countries is [45%].

4.2 IDFC members' strategies on RE

Over the past years, IDFC members have remained strongly committed to prioritizing investments in RE projects by placing renewable energy at the core of their energy strategies/guidelines. Several IDFC members have explicitly adopted an energy strategy where renewable energies are a substantial priority. Those strategies for RE combine three channels of action: (i) long term financing (public or private); (ii) assisting the establishment and adaptation of regulatory and institutional frameworks; (iii) support through grants or specific facilities to implement projects (for instance supporting feasibility studies).

IDFC members support investment in technologies which are now mature such as geothermal, hydropower, wind or bio-energy projects. They also support rapidly developing technologies such as photovoltaic and concentrated thermo-dynamic solar technology, which, though costs are falling, still need an attractive regulatory and institutional framework.

They ensure proactive promotion of renewables through direct financing or through special funds and dedicated credit lines.

The implementation of these renewable energy strategies has resulted in driving a robust contribution of IDFC members to global RE investment.

5. IMPROVING IDFC MAPPING AND PRACTICES ON RE INVESTMENT

When the IDFC mapping exercise on RE supply is compared with global new RE capacity data, it appears that greater efforts are still needed to improve IDFC RE investment mapping.

The mapping exercise for RE finance could be improved on its methodology, data collection and data breakdown.

The following recommendations could be discussed among IDFC members to address improvements on RE investment, both on mapping IDFC RE investments and practices :

- **Improve data collection on RE projects within IDFC members**. The mapping exercise should provide more detailed data on investments in terms of both physical capacity (MW) and financial commitments ($).

- **Cross "finance" and "technology" data**. It may be interesting to collect investment data disaggregated by technology and type of financing. An interaction between IDFC members and technical entities such as REN21 could accelerate progress on this issue.

- **Strengthen the end-use finance analysis**. The purpose is to move beyond the non-OECD/OECD breakdown to further distinguish the investments by level of economy: (i) developed countries (ii) emerging countries (iii) less-developed countries.

- **Better knowledge sharing between IDFC members on best practices**. Harmonization of strategies could create synergies in the RE sector.

- **Closer coordination among IDFC members on RE financing**. Co-financing of RE projects should be promoted.