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Annex to the

COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

Mobilising public and private finance towards global access to climate-friendly, affordable and secure energy services: The Global Energy Efficiency and Renewable Energy Fund

IMPACT ASSESSMENT OF THE MOBILISING PUBLIC AND PRIVATE FINANCE TOWARDS GLOBAL ACCESS TO CLIMATE-FRIENDLY, AFFORDABLE AND SECURE ENERGY SERVICES: THE GLOBAL ENERGY EFFICIENCY AND RENEWABLE ENERGY FUND

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1. EXECUTIVE SUMMARY

If current trends would persist, according to the International Energy Agency (IEA), world energy demand will increase by more than 60 percent by 2030. However, at the same time, carbon dioxide emissions would rise by 62 % and an estimated 1.4 billion people would remain without access to modern energy services. Therefore, global leaders acknowledged that current trends are not sustainable. At the 2002 World Summit for Sustainable Development (WSSD), they agreed to urgently and significantly increase the global share of renewable energy whilst also halving the 1.6 billion people currently deprived from basic energy services. To make sure this would not remain an empty statement, the EU launched the Johannesburg Renewable Energy Coalition (JREC). Since it was established at the WSSD, more than 90 governments agreed to join. The Commission co-chairs the JREC and hosts the secretariat ensuring the necessary synergies with the EU Energy Initiative which maintains an important focus on renewable energy and energy efficiency. Furthermore, the G8 Gleneagles Action Plan on Climate Change, Clean Energy and Sustainable Development proposed to set up a specific investment framework for clean energy. The Commission's Green Paper "A European Strategy for Sustainable, Competitive and Secure Energy" sets out an integrated approach to tackling climate change aiming, inter alia, at radically increasing energy efficiency through the demonstration and deployment of energy efficient technologies and increased demonstration and deployment of renewable energy technologies.

Renewable energy investments, and to a similar extent investments in energy efficiency, generate significant benefits with typical public goods characteristics. They produce substantial global benefits, such as zero or low greenhouse gas emissions, as well as local and regional benefits, such as no or low emissions of traditional air pollutants. They help improving energy security by exploiting locally available energy such as wind, solar, geothermal heat or biomass. They also promote local employment and income generation, including through the provision of energy for productive use. These 'public goods' benefits render renewable energy and energy efficiency projects often economically very attractive, particularly in developing countries where power production is on average much less efficient and more polluting compared to industrialised countries with advanced environmental legislation.

In addition, renewable energy and energy efficiency investments are ready to become an integral part of the core energy and development investment agenda. They can today contribute to delivering electric power and non-electric energy supplies for local business and transport in particular where grid connection is uneconomic. Off-grid and mini-grids can ensure adequate and economical energy supplies in remote areas. A full range of technological solutions to serve enterprise and household needs can be offered which is particularly relevant for developing countries.

However, in spite of increasing success stories and commitments made by the International Community, the IEA predicts that the share of renewable energy would remain more or less constant in 2030 if current trends would persist. Even if the policy frameworks become more and more conducive, financing energy efficiency and renewable energy investments is not automatically ensured. The problems

underlying the financing gap are complex but mainly concentrated in the area of risk capital which provides important collateral for lenders. Mobilising private sector finance is essential in order to channel sufficient finance into sustainable energy investments. The high potential of renewables to generate a multitude of socio-economic and environmental public goods, both globally and locally, merits public support to solve this financing grid-lock and to provide public incentives to international and domestic private investors.

The Commission has already started to join hands with international finance institutions like the EIB, EBRD and the World Bank, private sector investors, and financial intermediaries, to set up a Global Energy Efficiency and Renewable Energy Fund (GEEREF) forming a global **Public-Private Partnership**. The objective is to mobilize public and private finance for scaling up pilot schemes that can help solving the financing grid-lock for economic renewable energy projects and businesses. The proposal draws on the Patient Capital Initiative launched by the European Commission in 2004 in the context of the JREC. It is based on a feasibility study for which the scoping and launching was guided by the debates at the 2002 WSSD and the first international high-level conference of the JREC held in Brussels (2-3 June 2003). The focus is particularly on developing countries and economies in transition.

The GEEREF will be set up as a global Public-Private Partnership that will offer suitable risk sharing and co-funding options for various commercial and non-commercial investors with a global investment mandate. It will allow engaging professional fund managers on a self-sustaining basis, acting in accordance with a specific mandate established by donors and investors. High-quality monitoring, reporting and control features will be provided through the structure.

The GEEREF will support renewable energy and energy efficiency projects below EURO10 million as these as mostly ignored by commercial investors and IFIs. It will cover Sub-Saharan Africa, Caribbean and Pacific Island States, Latin America, Asia, North-Africa and Neighbouring Countries. Funding will be market-driven whilst priority will be given to investments in those countries, regions or municipalities with supportive renewable energy policies that are conducive to private sector engagement and that facilitate renewable energy investments. Both, actual provision of risk capital and technical assistance will make the fund a 'one stop shop' which will reduce transaction costs and improve overall performance of the fund.

The investment scope will include a broad mix of project types, energy efficiency and renewable energy technologies whilst emphasising technologies with a proven technical track record. The funding target for the GEEREF is set at a minimum of EURO 100 million. This target is both necessary to have a meaningful impact at the global level and sufficient to establish a public-private partnership that will be self-sustaining over time.

Assuming that a first financial close in the order of EURO100 million is feasible, up to EURO 1 billion additional capital could be mobilised. Hence, the leverage factor would range around 10, which is considerably higher than for conventional grant-based support schemes that ask for co-funding in the range of 50 – 70%. Considering the prospects to recycle and reinvest the initial public funds, this figure could considerably grow over the coming years.

A significant contribution from the Community budget is essential to kick-start the initiative and to trigger substantial private sector co-funding. This novel instrument could serve as a positive example that could be replicated by other public and private investors and presents an important scaling-up instrument towards securing the overall financing need of EURO 241 billion until 2010. Once fully invested, the GEEREF could bring almost 1 Gigawatt of clean energy capacity to developing country markets. This could serve 1-3 million people with clean energy services, substituting 1-2 million tonnes of CO_2 per year (worth almost EURO 5 million at current prices).

The proposed Global Energy Efficiency and Renewable Energy Fund as outlined in this Communication will complement the range of financing instruments available at the level of the European Community. It is specifically designed to boost the Communities' capability to support the implementation of its partner countries sustainable development and poverty eradication programs, and accelerate the transfer, development and deployment of environmentally sound technologies. It will facilitate efficient co-operation amongst donors, attract strong interest from commercial investors, including international finance institutions, and ultimately accelerate the global market uptake of sustainable, secure, and affordable energy technologies and the services they deliver.

With gaining further experience, this novel approach of a concrete public private partnership could be expanded to other key areas for investment into clean, affordable and secure energy sector (e.g. in carbon capture and geological storage).

2. INTRODUCTION

This report summarizes the impact assessment underlying the Commission's proposal to establish an innovative Global Energy Efficiency and Renewable Energy Fund for mobilizing public and private finance to help solving the financing grid-lock for economic renewable energy projects and businesses. The proposal is contained in the Commission Work Programme for 2006.

Use of external expertise

The report draws on the Patient Capital Initiative (PCI) launched by the European Commission in 2004 in the context of the Johannesburg Renewable Energy Coalition[1]. The purpose of the PCI was to analyze funding barriers for renewable energy and to develop concrete innovative public-private financing options that could overcome those barriers. The study was led by Impax Capital Corporation Ltd., with support from Environmental Resources Management Ltd and SJ Berwin Legal Advisors[2]. Impax Capital Corp. Ltd. assessed various options including scope,

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1 The Johannesburg Renewable Energy Coalition was launched by the EU at the 2002 WSSD together with other governments. Membership is the prerogative of Senior Officials and Ministers. Members are committed to significantly increase the share of renewable energies in the global energy mix through co-operation on the basis of targets and timetables also with a view of guiding investments towards renewable energy technologies and use. The European Commission hosts the JREC secretariat and co-chairs the Coalition together with Morocco. To date, membership has grown from 66 Members in 2002 to 91 Members. More Members are expected to join.

2 Contract Reference: ENV.C.2/SER/2003/0068, dated December 16, 2003.

structure and feasibility of an initiative designed to mobilise private sector finance to renewable energy businesses and projects in developing markets. A Commission inter-service group was established to guide the study. Contributions were made by ENV, DEV, TREN, AIDCO, ECFIN, RTD, BUDG, and RELEX. The final report was completed in November 2004. A follow-up contract was launched to implement an innovative public-private financing mechanism as recommended in the feasibility study. The contract was assigned after an open call for tender to Triodos International Fund Management B.V. with support of E+Co (a leading NGO in energy for development)[3]. This impact assessment also draws on their additional analysis including a business plan.

Stakeholder Consultation

The scoping and launching of the feasibility study was guided by the debates at the 2002 World Summit for Sustainable Development (WSSD) and the first international high-level conference of the Johannesburg Renewable Energy Coalition (JREC) held in Brussels (2-3 June 2003). Ministers, senior officials, representatives from the renewable energy industry, EIB, other financing institutions and experts, and NGOs focused on issues related to the viability and affordability of renewable energy investments that would need tackling in order to increase the share of renewable energy in the global energy mix[4]. The conclusions stated the need to strengthen market-based financial instruments in support of renewable strategies. They highlighted the importance of focusing on viable renewable energy investments and recognizing the particular circumstances of developing countries. Equity fund constructions in which the public as well as the private sector participate (including at the regional level) were highlighted as particularly attractive[5].

Interim results and reports were presented and discussed at JREC senior officials' meetings and at the Global Forum for Sustainable Energy (Vienna, February 2004), the Asia Pacific Renewable Energy Conference (Bangkok, March 2004), at the European Renewable Energy Conference (Berlin, January 2004), at the International Renewable Energy Conference (Bonn, June 2004), and at the World Renewable Energy Conference (Denver, August 2004). In addition, it benefited from the comments of various renewable energy finance experts, including from the EIB, KfW, the UNDP and the IFC, and renewable investment specialists in emerging markets. Stakeholder and expert comments were accounted for in the final feasibility report. Moreover, all interim reports were at all times available for public comments on http://europa.eu.int/comm/environment/jrec. All consultations have been carried out in accordance with the minimum standards of the Commission.

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3 Contract Reference: 070201/2005/419370/MAR/C2, dated December 1, 2005.

4 For more information, including a list of participants, see http://forum.europa.eu.int/Public/irc/env/ctf/home.

5 For the purpose of preparing and follow-up of the Conference, an informal group of international experts in renewable energy technologies and finance was established. They assisted the Commission in identifying key financing barriers and in developing and/or validating preliminary "financial engineering solutions" for promoting renewable energies in particular in developing countries. Meetings took place in Brussels on 20 March and 20 May, 2003 in Brussels.

3. THE PROBLEM

3.1. Sustainable development challenges for the global energy sector

Since the early 90's most parts of the world enjoy an unprecedented phase of economic growth. Since 1994, global oil consumption has increased by 20 %, and is projected by the International Energy Agency (IEA) to grow by 1.6 % per year. According to the IEA, world energy demand is set to increase with more than 60 percent by 2030. Meeting this demand requires an estimated investment in the energy sector of USD 16 trillion over the next 25 years. The business as usual investment scenario would not only create a significant financing challenge, it would not lead to a sustainable future, in particular in terms of:

- **Greenhouse gas emissions**: It would allow CO_2 emissions from the energy sector to rise by 62 % by 2030 compared to 2002, while EU Heads of States at the Spring Council in 2005 have called for a global cut of greenhouse gas emissions of at least 15 % but perhaps as much as 50 % by 2050. G8 Leaders in 2005 also decided to act with resolve and urgency and agreed on the Gleneagles Plan of Action on Climate Change, Clean Energy and Sustainable Development. The transition to cleaner energy is to be financed through enhanced collaborative efforts of public and private sector with the World Bank preparing an investment framework for clean energy and development.

- **Air quality**: Rapid urbanization in emerging economies has resulted in high levels of air pollution in many cities with adverse effects on human health. For example, according to the World Bank, China is forecast to experience 590.000 premature deaths due to urban air pollution arising from the transportation and power sectors. Rehabilitation of inefficient power plants and buildings and increased used of zero or low emission technologies is required to revert these trend.

- **Poverty and sustainable management of natural resources:** An estimated 1.4 billion people in developing countries would still remain without access to modern energy in 2030, and the 2.4 billion people using traditional biomass in an unsustainable way for cooking and heating purposes would not decline in number. According to the IEA, the additional investment to achieve 100 % electrification is estimated at almost USD 655 billion). This is an enormous challenge for regions that are already struggling to raise capital.

- **Energy security:** More than 60 per cent of the increase in energy consumption would be in the form of oil and gas. This would further increase the import dependency of all major importing regions. For example, the EU's dependency on oil and gas imports would increase to 93% and 81 % in 2030 compared to 79 % and 49 %, respectively, in 2004. China, presently being independent, would have to import 27% of its gas demand in 2030. Oil and gas supplies from the Middle East and North African Region would increase to 44%. Contrary to this the European Commission, for instance, has proposed to aim for a minimum level of the overall EU energy mix to come from secure and sustainable use of low-carbon sources.

In order to resolve these issues, the Commission's Green Paper "A European Strategy for Sustainable, Competitive and Secure Energy" sets out an integrated approach[6] aiming at:

- radically increasing energy efficiency through the demonstration and deployment of energy efficient technologies;
- increased demonstration and deployment of renewable energy technologies; and
- promoting research and technology development as well as large scale demonstration of carbon capture and geological storage technologies.

However, in spite of increasing success stories (see box) and repeated commitments made by the International Community, the IEA predicts that the share of renewable energy would remain more or less constant in 2030 if current trends would persist.[7]

To ensure the optimal deployment of energy efficiency and renewable energy technologies the policy and regulatory environment should be conducive to private sector investment. Over recent years, the regulatory and policy issues are increasingly being addressed, including through a number of EU-led international initiatives (e.g. Johannesburg Renewable Energy Coalition, Renewable Energy and Energy Efficiency Partnership, REN21, etc.) and subsequent national legislative initiatives. For example, since the nineties, the EU has started to put in place legislative and support measures, complementing more than thirty years of Community research, demonstration and innovation programs to develop renewable energy technologies. EU Member States agreed on indicative targets to raise renewable energy's share of primary energy to 12% (from currently 6%), of the electricity production (from currently 14%) to 21% by 2010, and the share of biofuels is to go to 5.75%. Strong national policies, mainly in Denmark, Germany, and Spain, have resulted in a European market turnover of about 50% of the world renewable energy market. Wind and solar markets are growing at record rates, reaching 30% per year, already attracting some of the world's largest companies.

Worldwide, at least 48 countries now have some type of supporting policy for renewable energy, including at least 14 developing countries. Most targets are prescribing specific shares of renewables in electricity production, typically in the range of 5 - 30 percent by 2010 - 2012. Mandates for blending biofuels into vehicle fuels have been enacted in at least 20 states and provinces worldwide including three key countries: Brazil, China and India.

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6 COM(2006) of 8.3.2006.

7 Paragraph 20e of the Johannesburg Plan of Implementation which was adopted by Heads of State states the commitment to "significantly increase –with a sense of urgency, the share of renewable energies in the global energy mix. Similar international commitments were made in various earlier international initiatives, including the 1992 Convention in Rio de Janeiro ("Agenda 21"), the Global Environment Facility (GEF) and the Clean Development Mechanism (CDM).

Box 1: Renewable energy and energy efficiency markets and trends

Renewable energy sources such as wind, solar, hydropower, biomass and geothermal provide an estimated 13-17% of the global primary energy supply. It is the third most important source of power generation, following coal and gas. Among the renewable energy sources, large hydropower continues to contribute the largest share. Wind, solar, biomass, and small hydropower still only provide about 4 per cent of the world total. However, their growth over the last years was considerable and their contribution to the economy and the environment is increasingly recognised:

- The fastest growing energy technology in the world is grid-connected solar photovoltaic which grew in existing capacity by 60 % per year from 200-2004 to cover more than 400,000 roof tops. Second is wind power capacity which grew by almost 28 % per year.
- An estimated 40 million households worldwide heat their water with solar collectors, most of them installed in the last five years.
- Over 4.5 million green power consumers in Europe, the US, Canada, Australia and Japan purchased renewable electricity at the retail level or via certificates in 2004.
- Renewable energy industries provide 1.7 million jobs, most of them skilled and well-paying.
- CO2 reduction from renewable energy was 0.9 billion tons/year plus 3.7 billion tons/year from large hydro (for comparison EU total greenhouse gas emissions were 5.3 billion tons CO2 in 2003).
- Renewable energy costs have declined at rapid rates across the board over the past several decades and are all projected to continue to decrease resulting from improved technological performance and increasing scales of production and use.
- Renewable energy technologies, including geothermal, and biofuels, are now starting to compete with conventional fuels in four distinct markets: power generation, hot water and space heating, transportation fuels, and rural (off-grid) energy supplies.

With the broad range of benefits renewables are now ready to become an integral part of the core energy and development investment agenda. Renewables can today contribute to delivering electric power and non-electric energy supplies for local business and transport in particular where grid connection is uneconomic. Off-grid and mini-grids can ensure adequate and economical energy supplies in remote areas. A full range of technological solutions to serve enterprise and household needs can be offered which is particularly relevant for developing countries.

3.2. Barriers to Private Sector Financing of Energy Efficiency and Renewables

Even if the policy frameworks become more and more conducive, financing energy efficiency and renewable energy investments is not automatically ensured. It is noted for example that, in preparing the projected global energy supply and demand, the IEA remarked that "mobilizing the capital needed to build [the capacity needed] may prove an insurmountable challenge for some developing countries". The World Bank notes that 'even with an improved regulatory environment ant the use of policy and political risk mitigation instruments, the challenge of financing incremental costs and reducing technology risk will be significant. These issues could be addressed by means of innovative financial instruments.'[8]

The problems underlying the financing gap are complex but mainly concentrated in the area of risk capital which provides important collateral for lenders[9].

Financing options are lacking for scaling up the renewable energy segments of the sustainable energy market, a segment that is closely linked to energy efficiency technologies. This financing gap is common for technologies that move into the pre-commercialization stage which is characterized by the "weaning-off" of grant support and by high-cost activities such as initial and secondary prototype

8 World Bank. 2006. Clean energy and development: Towards an investment framework. Washington.

9 For an excellent summary and more details on the nature of the financing gap: UNEP-SEFI. 2005. Public Finance Mechanisms to Catalyze Sustainable Energy Growth

development and testing, site development, supply chain formulation, construction, and grid interconnection.

Private and public finance is scarce with large regional differences

The IEA estimated that meeting the demand under the business as usual scenario would require an estimated investment in the energy sector of more than EURO 13 trillion (USD 16 trillion) over the next 25 years. Until 2010, about EURO 200 billion (USD 241 billion) is required for global investment into renewable energy generation. While all regions are projected to require at least 25% of future supplies from renewables in 2001-2010, the greatest total requirement for generation investment exists in Asia and Latin America, due to economic growth and the increasing energy use of local economies. The associated need for risk capital in developing countries and transition economies is estimated at over EURO 9 billion.

These needs are in sharp contrast with current financing flows. As can be seen from Table 1, financing flows towards developing countries have declined during the last decade, and only reversed in recent years. In addition, it should be noted that equity providers (including large energy companies) have drastically reduced their involvement in the renewable energy sector, since the mid-nineties until 2000. This phenomenon followed global turmoil in the financial and energy markets and was not limited to emerging economies.

Table 1: Net Financial Flows to Developing Countries and Economies in Transition (in USD billion)

	1995	**2000**	**2004**
Aggregate net resource flow	232.3	219.6	280.7
Official net resource flow	53.9	33.6	32.9
- Grants	31.6	28.7	47.4
Private net resource flow	178.3	186.0	247.7
- Foreign Direct Investment	107.2	166.2	165.5
- Portfolio equity flows	17.3	12.4	26.8
Source: World Bank, Global Development Finance 2005			

While public grants have increased in recent years, the overall amount is insufficient to contribute to the funding needs in the energy sector until 2030. Moreover, as can be seen in Table 2, the situation in the different regions around the world is very different. East Asia, Europe and Latin America are attracting most of the net private flows, predominantly as foreign direct investment. Grant flows are comparatively less important. Private flows to Middle East, South Asia and Sub-Saharan Africa are modest and in Sub-Saharan Africa considerably smaller compared to development aid. However, the terms of commercial bank loans occasionally exceed five years and almost never exceed 10 years, even in "new" market economies including those in some of the new EU Member States.

Mobilising private sector finance is essential in order to channel sufficient finance into sustainable energy investments. In particular, the overall equity flow needs further stimulation.

Table 2: Net Financial Flows to Developing Countries and Economies in Transition in 2004, (in USD billion)

	East Asia & Pacific	Europe[1] & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa
Aggregate net resource flow	78.3	81.8	48.1	8.3	23.0	41.0
Official net resource flow	-5.1	7.1	-2.5	1.7	6.1	25.6
- Grants	2.7	9.0	3.2	4.0	4.3	24.2
Private net resource flow	83.4	74.6	50.6	6.6	17.0	15.4
- Foreign Direct Investment	63.6	37.6	42.4	4.1	6.5	11.3
- Portfolio equity flows	13.6	3.6	-1.5	0.2	7.5	3.5

[1] including Bulgaria, Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Turkey

Source: World Bank, Global Development Finance 2005

High upfront costs and long pay back periods are not attractive to private equity investors.

Renewable energy technology investments have much higher initial cash outflows than fossil fuel investments. As can be seen in Table 3 (next page), capital requirements are on average 3 – 7 times higher, even when leaving out most expensive photovoltaics. At the same time running costs of renewable energy technologies are significantly smaller because of reduced fuel costs and not subject to volatile fossil fuel world market prices. This leads to already competitive cost per units of produced energy.

High risks in developing countries are not compensated by returns of investments in renewable energy

In order to realise a reasonable return on the invested capital, equity investors would have to be remain financially engaged over a longer period of time compared to traditional fossil fuel projects. Considering the elevated political and commercial risks in these regions, such a cash flow profile is not attractive, particularly for private equity investors.

An increasing number of business developers in developing countries and economies in transition can offer returns for energy efficiency and renewable energy investments in the range of 10 - 18 %. These returns, however, are based on cash-flows generated in local currency. Considering exchange rate fluctuations, the equivalent returns on investments in Euros are ranging between 6 – 14 %[10]. The average historic rate of return on investment obtained in the OECD electricity sector

[10] Based on historical data, international investors such as Triodos International Fund Management B.V., applies an average a mark-up of 4% for their investments in a wide variety of facilities in developing countries. Exchange rate losses can significantly fluctuate over shorter periods. However, the more currencies an investor is exposed too, the lower the actual loss as currency fluctuations tend to cancel each other out over a longer investment period which is typical in infrastructure.

is above 8 %[11]. This is clearly more attractive for private investors than investing in renewable energy projects with high political and commercial risks, longer pay-back periods, and the lack of adequate risk mitigation options. These risks prevent project and business developers from attracting sufficient international equity capital on full commercial terms.

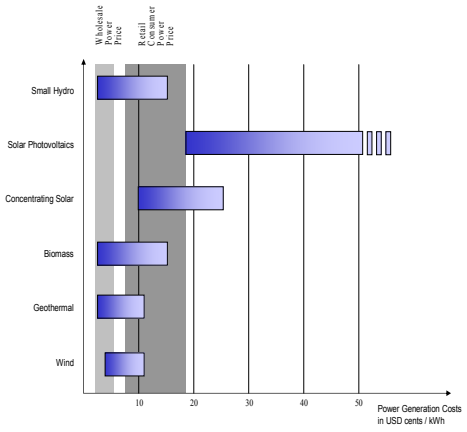
Limited access to equity, in turn, leads to a vicious circle: debt financiers are unwilling to fund without the equity cushion even to potentially viable commercial businesses.

Table 3: Capital versus power generation costs for different energy technologies

Technology	Capital Cost ($ per kW)
Gas combined cycle	400-600
Conventional coal	800-1,300
Advanced coal	1,100-1,300
Coal gasification (IGCC)	1,300-1,600
Nuclear	1,700-2,150
Gas turbine — central	350-450
Gas turbine — distributed	700-800
Diesel engine — distributed	400-500
Fuel cell — distributed	3,000-4,000
Wind onshore	900-1,100
Wind offshore	1,500-1,600
Photovoltaic — distributed	6,000-7,000
Photovoltaic — central	4,000-5,000
Bioenergy	1,500-2,500
Geothermal	1,800-2,600
Hydro	1,900-2,600

Source: IEA analysis.

Source: IEA. World Energy Investment Outlook 2003



Source: Renewables for Power Generation, Status and Prospects, OECD/IEA 2003

Private sector returns do not take account of public benefits

Renewable energy investments, and to a similar extend investments in energy efficiency, are typical public goods that produce substantial local and global benefits such as zero or low greenhouse gas emissions, no or low pollutant emissions, improved energy security by exploiting renewable energy such as wind, solar, geothermal heat or locally available biomass. They also promote local employment, and income generation, including through the provision of energy for productive use, in particular in remote areas for which grid extensions are not economically attractive. Whilst these benefits make renewable energy and energy efficiency projects often economically very attractive, they are not taken into account by investors. Hence they often do not consider them yet financially attractive, in particular in the more risky developing country markets.

[11] See IEA 2003, World Energy Investment Outlook 2003. Paris. pg. 69

Many energy efficiency and renewable energy investment opportunities are small and medium sized which lead to high transaction costs for international finance institutions

Energy efficiency and renewable energy technologies are especially suitable for small and medium sized projects and small and medium sized enterprises, particularly in developing countries. The typically small size of sustainable energy projects makes transaction costs disproportionately high. The limited options for equity investors in developing countries' start-up and growth companies to "exit" once certain returns have been achieved, present additional barriers, in particular for financing SMEs. Little or no private, and relatively few private or public finance institutions or programmes offer equity finance, and when they do, the amounts or conditions are mostly unsuitable for small businesses or projects of less than EURO 10 million capital, leaving many enterprises and projects unfunded. When competing for scarce private equity finance these facts put renewable energy at a distinct disadvantage and result in a general lack of equity finance in the renewables sector.

Long-term power purchase agreements are hard to come by and innovative financing options such as carbon finance and green certificates are not sufficient to compensate for high upfront investment costs.

Renewable energy technologies are suitable for off-grid solutions. Yet, off-grid project financings are very hard to get as private banks seek guarantees and power purchase contracts of at least 5 or 10 years (or at least 2 years longer than their loan). These are hard to come by in developing countries and economies in transition, in particular remote areas, even for some grid-connected grid situations.[12]

Carbon credits generated under the Clean Development Mechanism or Joint Implementation as well as green certificates increase the cash flow during the lifetime of the project but are rarely used as collateral in order to pre-finance investments. In addition, at the present point in time carbon finance and green certificate trading remain still thin.

Conventional development aid and other public-sector grant-based schemes do not attract interest from private sector and financial intermediaries

Debt and grant funding are currently the focus of public funding for emerging (technology) markets. Grants supporting renewable energy and energy efficiency investments are not only scarce but also often focusing on non-commercial projects therefore also lacking the necessary incentives for business developers to enhance the financial performance of their projects and business. Moreover, the fund raising options offered through traditional grant-based mechanisms are considered to costly and risky to be attractive for small and medium scale professional business developers and for financial intermediaries. In addition, public sector bodies running grant programmes are often lacking the necessary expertise to engage in risk capital financing of technology companies or projects in the pre-commercial phase.

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[12] This problem is also signalled by renewable energy developers to exist in some market economies such as those of the new Member States of the EU.

4. OBJECTIVES

4.1. General policy objectives

The Commission's general policy objectives in the field of energy are to simultaneously win the battle against climate change, to eradicate energy poverty and to secure global energy supplies.[13] These calls for profound changes in the way energy services are delivered and energy sources are used. As outlined in the Commission's Green Papers, increasing energy efficiency and deployment of renewable energy technologies could provide a major part of the solution. This is underpinned by the IEA's alternative energy scenarios. Increased reliance on energy efficiency and renewable energy could reduce the growth of global energy demand from over 60% to 50%, and those of global emissions from 62 % to 46 %. Reduced future demand could lead to a 15% reduction in oil prices. The Commission's analysis for long-term climate policies clearly shows that energy efficiency and renewable energy will have to contribute almost two thirds to greenhouse gas emission reductions during the course of this century[14].

4.2. Specific operational objectives

One key to radically increase energy efficiency and the deployment of renewable energy technologies is to overcome the financing gridlock outlined above with a focus on developing countries and economies in transition. The high potential of renewables to generate a multitude of socio-economic and environmental public goods, both globally and locally, merits public support to solve this financing grid-lock and to provide public incentives to international and domestic private investors.

Thus the specific objectives are to:

- design a **Private-Public Partnership** that crowds in significant sums of private finance. As public sector finance is scarce, there is a need to maximise the leverage of public funds.

- address the equity funding gap for energy efficiency and renewable energy businesses and projects with due consideration of the specific needs and risks in developing markets and economies in transition.

For public funds to mobilise private risk capital, and particularly to overcome the problems stated in the previous chapter, the public equity component will serve to:

- accept lower returns on a case by case basis depending for instance on the actual risks to be covered, and thereby lift returns for the private sector towards commercial thresholds;

- accept longer investment or repayment periods ('first in – last out') to match the high upfront investments with the low operating and maintenance costs;

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13 Reference to recent strategy papers (in Com)

14 SEC(2005) 180 of 9 February 2005, page 37

- take on higher transaction costs to allow targeting small and medium scale businesses and serve the needs for a broad range of business support services, seed and growth capital.

5. ESTABLISHING VIABLE POLICY OPTIONS

5.1. Pre-Screening

During a pre-screening process in 2003, several options were considered, including:

(1) Conventional project grants: Traditional grant programs that are executed by the Commission or its agencies through calls for proposals whereby successful projects proposed by public and/or private developers receive a non-refundable subsidy equal to a percentage of the eligible investment costs.

(2) Interest rate subsidies: The provision of subsidies to banks such as the EIB in order to offer loans at reduced interest rates to the clients.

(3) Patient capital fund: In this case, equity is created by blending grants and other non-commercial private funds with commercial risk capital. Returns can be delayed in time or lower in profitability than normal commercial equity. Such a fund would be run by dedicated professional financial intermediary.

Pursuing the first option (conventional project grants) was considered to be not effective and discarded at an early stage. The subsidy ranges typically from 80 % for non-governmental organizations to 30% for profit generating projects. This would result in a leverage factor of only up to a maximum of 3 at the project level. Moreover, co-financing a fixed share of the eligible costs does not encourage a least cost-approach, which may lead to oversized projects that are not adapted to local supply and demand. Furthermore, the costs in terms of human resources for centralized management calls for proposals, evaluation and contracting done out of the Commission is often extremely high, in particular where adequate follow-up is to be given and/or where the necessary expertise is lacking and needs to be contracted for the time of the project evaluations. This results not only in high transaction costs for the public bodies (such as the European Commission) but also for rather high transaction costs for private sector applicants, particularly in developing countries, who spend significant resources in preparing proposals with little scope for adjusting proposals where requirements were not fully understood or documented.[15]

The use of interest rate subsidies was neither pursued as it does not address the main problem, i.e. shortage of equity funding that could be used as collateral in order to become eligible for additional loans. Interest subsidies will not ease this constraint and are, therefore, inconsistent with the objectives.

Solely the third option 'patient capital fund' was maintained for a further detailed impact assessment. This was considered by a large range of stakeholders as the only option that would allow an effective and efficient pooling of public and private funds

[15] See also the non-paper prepared in support of the June 2003 High-Level Meeting of the Johannesburg Renewable Energy Coalition. Available at http://forum.europa.eu.int/Public/irc/env/ctf/home.

and, through appropriate risk sharing arrangements, provide an incentive for commercial capital to co-invest, thereby mobilising private capital that would not be available otherwise.[16] Annex I provides additional elements that were taken into account when comparing the 'patient capital fund' against the business-as-usual case.

5.2. The Global Energy Efficiency and Renewable Energy Fund

The objective is to mobilize public and private finance for scaling up tested pilot schemes that can help solving the financing grid-lock for economic renewable energy projects and businesses (See Annex 2).

How will it look like?

Before assessing the impacts, the preferred policy option and the underlying assumptions are described below. The GEEREF will be set up as a global Public-Private Partnership (PPP). Options for the practical legal arrangements are currently being developed and are further elaborated below (see section "How will the European Commission participate?"). A PPP will offer suitable risk sharing and co-funding options for various commercial and non-commercial investors with a global investment mandate. It will allow engaging professional fund managers on a self-sustaining basis, acting in accordance with a specific mandate established by donors and investors[17]. High-quality monitoring, reporting and control features will be provided through the structure.

Rather than providing finance directly to the target groups (specified below), GEEREF will actively engage in the creation and funding of regional sub-funds or scale up similar existing initiatives[18]. This will allow to accommodate specificities of the regional markets and to bring in international financial institutions, local expertise and to leverage additional private sector funding. Figure 1 provides a schematic overview of the overall structure of the Fund. GEEREF participation could range between 25 to 50% for medium to high risk sub-funds and 15 to 20% for low risk sub-funds.

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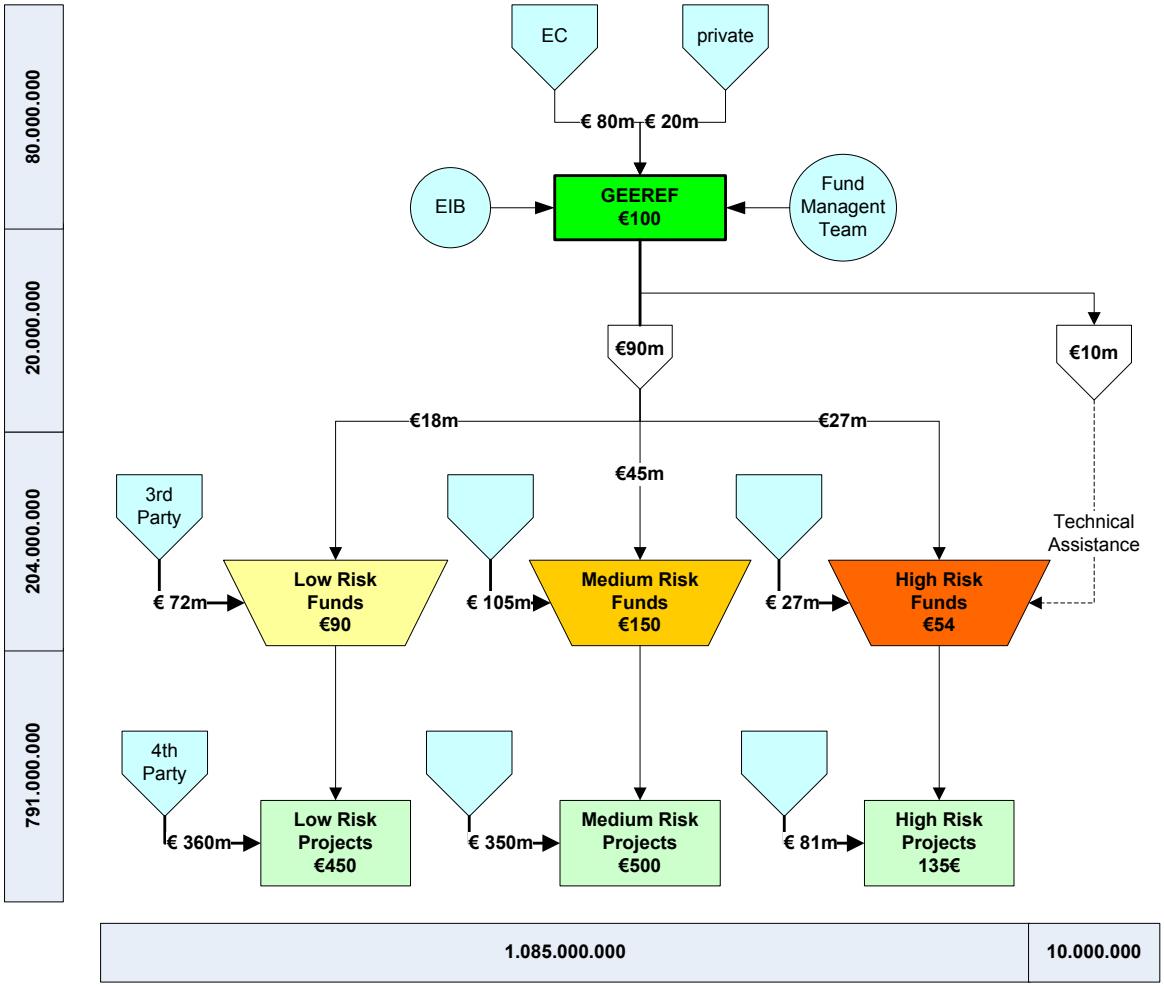
16 See inter alia the conclusions of the above mentioned multi-stakeholder conference, available at: http://forum.europa.eu.int/Public/irc/env/ctf/home

17 The European Commission, following a public tendering process in 2005, has contracted a professional fund management team, to put in place detailed arrangements, including soliciting interested co-finance providers.

18 Examples of existing pilot projects similar to what is envisaged and that could be scaled-up are provided in Annex.

Figure 1: Schematic Overview of the Fund



Three categories of Sub-funds will be invested in, i.e.:

- **High-Risk**: targeting projects and SMEs in least developed countries and/or small scale projects and SMEs that typically require close monitoring and support to ensure that projected returns materialize. Because funds will often cover untested markets, the fund size will be kept relatively small. GEEREF fund managers will take an active role in the creation and governance of these funds;

- **Medium Risk:** focusing on medium and large scale renewable energy and energy efficiency projects in middle-income developing countries. Because of more stable market environments, the funds will be larger than for the high-risk category. GEEREF fund managers will take an equally active role in the creation and governance of these funds;

- **Low Risk:** taking strategic position in newly created or existing funds targeting medium and large scale renewable energy and energy efficiency projects in emerging economies, economies in transition and economies with limited availability of risk capital. Patient capital deployed in these funds will mainly serve to mitigate currency exchange risks that would be considered too high by

commercial investors and/or or to widen the investment range (technologies) and deepen target groups (new geographical areas). GEEREF fund managers will take a less active role in the creation and structuring whilst focusing their efforts on the governance of these funds;

Engagement in sub-funds will be subject to the compatibility of its investment strategy with that of the Global Energy Efficiency and Renewable Energy Fund, its sound management and implementation capacity and the provision of a minimum proportion of commercial co-funding. The minimum share of commercial co-funding will be determined depending on the scale of the expected external public benefits

Who will be supported?

The GEEREF will support renewable energy and energy efficiency project developers and SMEs. The focus will be on projects that require below EURO 5 to EURO 10 million risk capital as these as mostly ignored by commercial investors. In addition to utility-based projects, investments will include manufacturing and assembly businesses, consumer, SME, and micro-finance intermediaries.

What regions will be covered?

The GEEREF will support regional sub-funds for Sub-Saharan Africa, Caribbean and Pacific Island States, the countries of the European Neighbourhood (including North-Africa, and non-EU Eastern Europe including Russia), Latin America, and Asia (including Central Asia and the Middle East).[19] Funding will be demand-driven with a priority to investments in those countries, regions or municipalities with supportive energy efficiency and renewable energy policies that are conducive to private sector engagement. There will be a special emphasize on serving the needs of ACP countries.

What type of support will be provided?

The major part of the Fund will be used to provide risk capital to different types of sub-fund investments at affordable "patient" terms. In addition, the fund will include a technical assistance facility. This will amount to 10 - 20 % of the total fund size depending on the actual needs for capacity building which is likely to be larger in less developed economies. Through this facility local and international technical expertise can be employed in order to improve project proposals and business plans.

Both, actual provision of risk capital and technical assistance will make the fund a 'one stop shop' which will reduce transaction costs and improve overall performance of the fund. GEEREF's grant facility will be allocated to high risk and medium risk sub-funds to facilitate fund development and a solid project pipeline development and to assist project and business developers in managing and developing the projects and business.

Additional risk-sharing between public and private investors will be offered through appropriate levels of sub-ordination. Public and private finance could be

[19] As regards countries covered by the Pre-Accession Instrument, supplementary funding from other Instruments should be secured.

subordinated in priority to commercial investors on a "FILO" basis. Public capital would make the first commitment ("First In") and commercial capital last. Private capital would also be the "Last Out" after commercial capital has had some time to recover funds or a floor return. In specifying the "Last Out" arrangements, similar formulas will be used to those that are commonly used for the sub-ordination of various interests within private equity funds. The precise terms of this approach will have to be negotiated with the investors depending on the regional risk profile.

Which types of technologies will be supported?

The investment scope will include a broad mix of project types promoting energy efficiency and renewable energy technologies. Given the focus on developing countries and transition economies, the emphasis will be placed on deploying technologies with a proven technical track record. Both experience and projections show that small hydro and biomass comprise a large part of investment prospects, with on-shore wind also offering significant potential. Photovoltaics possibly remain too costly for all but middle and high-income contexts. Energy efficiency projects will qualify in particular where similar financing barriers need to be resolved. Co-firing solutions (e.g. co-firing coal and bagasse), energy service companies, and other small and medium scale clean efficient energy solutions will also qualify (e.g. national or regional microfinance schemes supporting affordable consumer finance)., etc).

What is the envisaged Fund-size and impact?

The funding target for the GEEREF is set at a minimum of EURO 100 million. This target is both necessary to have a meaningful impact at the global level and to be sufficient to establish a public-private partnership that will be self-sustaining over time. Funds from non-Community sources at the global level are expected to be at least 20 % up to a maximum of 50 %. Further commercial funding will be raised at the level of the sub-funds and at the project/SME level. It is envisaged that up to €50 million co-financing may be obtained to from the Investment Facility established under the 9th European Development Fund and managed by the EIB to develop activities in ACP regions.

The Commission has already started to join hands with international finance institutions like the EIB, EBRD and the World Bank, private sector investors, and other financial intermediaries to set up the GEEREF. Initial co-investment possibilities were identified by the EIB (targeting in particular the ACP and MEDA regions) and by the EBRD (for covering the (non-EU) Eastern European markets).

How would the Commission participate?

Community Funds will have to be engaged in accordance with the provisions of the Financial Regulation and its implementing rules, as well as with the appropriate legal base. Any arrangement must, however, also be sufficiently comfortable to IFIs and private sector investors, also in view of the ultimate objective to develop the GEEREF into a fully self-standing initiative independent of further subsidies. Understandably, detailed arrangements can only be agreed at the time all other co-financing parties in GEEREF are known.

The legal basis for participation of the European Commission will be provided by the development Co-operation Instrument (DCI) under the Thematic Programme for the Environment and Sustainable Management of Natural Resources including Energy (ENRTP) [20].

The European Commission proposes to contribute up to EUR 80 million covering the period 2007-2010 to the GEEREF within the context of the ENRTP. A first contribution of EUR 15 million will be made in 2007.

The necessary financial and human resources needed to manage this initiative will be covered using existing resources within the managing services, where necessary through internal deployment. In addition to a first financial contribution of €15 million in 2007, the following contributions are envisaged: €15 million in 2008, €20 million in 2009, and €30 million in 2010. For each of the three years following 2007, up to €10.5 million will come from the existing ENRTP financial envelope. The remaining balance will be funded out of unspent balances (from the ENRTP or elsewhere) and/or from the margin of Heading 4. Should the latter sources exceed expectations, equivalent funding needs from within the existing ENRTP could be reduced. GEEREF will be structured to ensure that EC contributions can be reported in the annual development assistance committee (DAC) co-operation report.

The (annual) Financing Decision covering the spending under the annual ENRTP programme will also provide the basis for allocating Community funds to the GEEREF (possibly through the European Investment Fund as in the case of the European Fund for South East Europe; see below). Decision-making will take account of relevant provisions foreseen in the legal basis.

This proposal involves co-financing from a wide range of public and private bodies, including international finance institutions, private investors and companies, and foundations. EU and EEA Member States may contribute on a voluntary basis. An estimate of the level of this co-financing is indicated in the table below:

EUR million (to 3 decimal places)

Co-financing body		Year 2007	2008	2009	2010	2011	2012 and later	Total
Non EC Co-financing 1st tier		10,000	10,000					20,000
Non EC Co-financing 2nd tier		15,000	30,000	50,000	109,000			204,000
Non EC Co-financing 3rd tier		10,000	50,000	100,000	300,000	331,000		791,000
Total Non EC Co-financing	f	**35,000**	**90,000**	**150,000**	**409,000**	**331,000**	**0,000**	**1015,000**

GEEREF is expected to be set up jointly by public and private co-financing Parties as a separate independent legal entity. The use of a separate legal entity is common practice in the risk capital sector which structures investments in so called "special

[20] COM(2006) 20, dd. 25 January 2006.

purpose vehicles". This preferred option has several distinct advantages over other forms of pooling capital. Firstly, it avoids "institutionalizing" the GEEREF and creating top-heavy and expensive structures. This approach would allow creating a clear set of rules that are agreeable by all co-sponsors and investors, including the European Commission, IFIs such as the EIB, World Bank, interested Member States and private sector investors. It would also enable to clearly settle all necessary management and control options, including the joint contractual arrangement between the GEEREF and the professional fund management team that will carry the main responsibility for executing the investment mandate given by the donors under supervision of formal governance committees such as an investment and advisory board.

The Community contribution would be made available in accordance with one of the management modes foreseen in the Community Financial Regulation. It is in particular envisaged to have recourse to a "centralized indirect management" with implementing tasks delegated to a specialised Community body, such as the European Investment Fund (Article 54(2)(b) FR). In the framework of the ongoing revision of the Financial regulation, the Commission has proposed to specifically open indirect centralised management mode to bodies such as the EIF. The legislative authority is expected to adopt the revision of the FR by 1st January 2007, so that, if this proposal is accepted, delegation to EIF would be fully applicable during the budgetary year 2007, when this action would have to be implemented. The EIF would receive a delegation of powers from the Commission to subscribe shares to the GEEREF, hold those shares in a separate trust account on behalf of the Commission, take part in the decision making organs of the GEEREF and monitor the progress of the GEEREF and report to the Commission. Those tasks shall be detailed in an agreement to be concluded between the Commission and the EIF, which would be subject to the provisions and the conditions provided for in the FR for indirect centralised management based on existing cases (e.g. European Fund for South East Europe where the European Investment Fund is envisaged to act on behalf of the European Commission)[21], the statutes of the Luxembourg "SICAV" can accommodate the requirements of the European Commission and other core sponsors and investors.

An alternative option that has been considered would be to implement the GEEREF as a fund jointly with an international organisation. This would be made possible through the other option foreseen in the Community Financial Regulation, i.e. joint management with an international organisation, e.g. involving EIB/EIF, EBRD, or the IBRD/IFC (all of which have been involved in the feasibility study). This alternative option, although feasible and at first sight offering an attractive solution for the European Commission, has several disadvantages in this specific context. First and foremost, EIB, EBRD, and others (including the World Bank Group) do not have global investment mandates, thus, the idea of a global fund could not be realised. Instead, multiple financial management structures would increase associated transaction costs possibly several times. Joint management works for specific country groupings rather than global initiatives22. It could not collect the GEEREF's

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21 C(2006)2307.

22 See for example the arrangements between the European Commission and the EIB related to the FEMIP Trust Fund and most recently the EU-Africa Infrastructure Trust Fund.

funds from several public and private funders and hold them in trust until it receives instructions from GEEREF fund managers (hired by the IFI) for the disbursement of funds. Because of these regional restrictions, the EIB and EBRD have expressly indicated that they would want to join the initiative only at the level of the regional sub-funds. Furthermore, not relying on a special purpose vehicle such as described under option one, is likely to reduce the risk sharing and mitigation options for co-financing parties. It might also lead to higher transaction costs, both in terms of overall operating costs and the time it takes to approve investment proposals made by the fund management team. Whilst management fees charged by IFIs are similar to those charged by private sector fund managers, overall transaction costs will be higher because an additional layer is introduced whereby only one party has contractual arrangements with the fund management team and thus needs to organise a separate procedure to obtain approval from co-financing parties. Finally, this option is also likely to complicate the possible exit of the IFI responsible for executing the facility.

The proposed Fund structure fully accounts of lessons learnt which are reported in the 2004 Feasibility Study and the 2005 Draft Business Plan. These lessons include the need to ensure intermediate funding structures to avoid "parachute banking" whereby project funding is too distant from the beneficiaries; setting reasonable expectations with respect to returns on investment to commercial co-financing parties, combine investment support with technical assistance also for management training purposes; introduce performance based incentive structures for fund management teams that ensure investments will returns to investors.

The development of further details with co-financing parties will involve the review and approval by the European Commission's General Secretariat, Legal Service, DG Budget, AIDCO, and ECFIN. Relevant policy DGs (ENV, DEV, RELEX, TREN, ENTR, RTD, and possibly others) will remain closely involved in the process of finalizing and monitoring the investment mandate. The latter will have to reflect the policy orientations expressed in this document and the associated Communication, where appropriate taking into consideration comments received from the Council and the European Parliament and other stakeholders such the EIB and other IFIs that will play an active role.

6. ANALYSIS OF IMPACTS

The main expected impacts of the GEEREF are summarized below. They relate both to the general policy and the specific operational objectives outlined above.

The action will help meet the funding gap encountered by many renewable energy projects and businesses, in particular in the area of risk capital that is affordable and that is invested for a longer period than typical risk capital provided by commercial equity providers. The action is to address the shortage in developing countries, economies in transition and/or emerging renewable energy technologies which have no established commercial track records in industrialized countries.

The general and specific objectives are as follows:

#	Objective	Expected Results	Indicators
1	Reap public goods benefits from accelerated deployment of energy efficiency and renewable energy technologies	Reduce greenhouse gas emissions	Amount of Carbon dioxide avoided or reduced
		Provide poor with access to sustainable energy	# households provided with access to modern energy # of MW produced or installed renewable energy capacity
		Increase energy security	# of MWh saved or MWh clean energy delivered # mtoe substituted
		Engage private sector in energy efficiency and renewable energy business	# of businesses participating in the seed, start-up and growth phase.
2	Achieve high leverage of public finance	Help establishing and funding of regional renewable energy funds	€ and % of co-financing obtained
3	Achieve high degree of financial sustainability	Improving the quality of funding proposals or business plans to bring them to the level that required to obtain international and local finance	# of entrepreneurs and business developers trained # Co-finance due diligence in medium and high risk areas Cash flow of the Fund

The assumptions underlying these calculations are provided in Annex. This chapter also includes the outcome of the sensitivity analysis, carried out to assess the robustness of the impact assessment.

6.1. Impacts on general objectives

On the basis of the structure and the underlying assumptions, e.g. with respect to the mix of sub-funds and project types, the Global Fund is expected to have the following impacts on the overall objectives:

Table 4: Expected impacts of the GEEREF on the general policy objectives[23]

		Units	Impacts	Optimistic	Pessimistic	Notes
1	Capital Mobilized	Euro	**1.085.000.000**			Note A
2	Capital Cost per kW or equivalent	Euro	**1.739**	710	2.150	Note B
3	kW or equivalent Capacity Installed	kW	**623.846**	1.528.169	504.651	Note B
4	Average conversion efficiency		**33,5%**	25,0%	35,0%	Note C
5	kWh or equivalent delivered	kWh	**1.830.739.265**	3.346.690.141	1.547.260.465	Line 3 * Line 4 * (365*24)
6	Number of people served per year	people	**1.570.590**	3.415.568	550.102	Note D
7	Tonnes of CO2e saved per year	metric tonnes	**1.135.058**	2.861.445	340.518	Note E

- **Greenhouse gas emissions:** More than 1.1 million tonnes of CO_2 will be saved per year leading to long lasting effects for decades. This figure represents an estimate based on the assumption that the newly installed capacity financed through the GEEREF would replace the currently "average" fossil based electricity and combined heat and power plants in developing countries. In the optimistic case, if only coal based heat and power generation were to be replaced, annual CO_2 savings per year would reach almost 3 million tonnes. The pessimistic case, which assumes replacing gas-fired power and heat plants is considered highly unlikely; most energy investment in developing countries continues the expansion of energy supply capacity rather on the basis of cheap coal than on much more expensive gas. This could lead to cumulative savings of CO_2 between 10 and 30 million tons over a 10 year lifetime of the Global Fund, with lasting impacts for at least another 10 years. In any case, the final outcome will depend on the ultimate technology and geographical mix.

- **Energy security:** Roughly between 500 and 1500 MW of newly installed clean and indigenous renewable energy capacity or avoided capacity extensions due to energy efficiency investments are expected to be brought on-stream.

- **Access to energy:** Between 0.5 and 3.5 million people living in developing countries will be served with modern clean energy services. Beneficiaries are likely to include SMEs, thus increasing options for remote developing country regions to develop economic activities that would otherwise have not been possible. Moreover, it is expected to include the provision of modern cooking fuels and hot water to almost 500,000 houses.

- **Other:** More positive impacts are expected for which no quantifications were made. These include:

  - reduced emissions of traditional air pollutants including SOx, NOx, PM, and CO contributing to the improvement of local air quality reducing health problems including those caused by indoor cooking;

  - reduced pressure from expensive fossil fuel imports by exploiting renewable energy such as wind, solar, geothermal heat or locally available biomass;

[23] The notes in the table refer to the notes provided in Annex in support of these calculations.

– local employment and income generation, including through the provision of energy for productive use, in particular in remote areas for which grid extensions are not economically attractive;

– increased options for the development, transfer, and deployment of advanced technologies, including through new options for promoting the creation of joint ventures between European and developing country entrepreneurs thus transferring technological and management know-how.

It should be noted that the above impacts are indicative and are based on average impact indicators for non-industrialized countries. Details are provided in the Annex. Estimates from peer-reviewed data were used wherever possible. Expert judgement was applied to assess the robustness of the outcome, and in some cases for calculating impacts. The results also depend on the investment mix.

6.2. Impacts related to the specific operational objectives

6.2.1. Leverage factor and private sector participation

One of the key operational objectives of the GEEREF is to mobilize significant private sector finance towards renewable energy and energy efficiency investments in developing countries and economies in transition. This leverage will be realized at three levels as shown in Table 5 below (numbers are in million Euros and rounded).

This three-tier approach makes co-financing possible at the global (GEEREF), regional (Subfund), and local (project) level, thus enabling the involvement of a wide range of public and private investors.

Co-financing and private capital at GEEREF level

As shown in Figure 1 and in Table 5, a first closing of EURO 100 million is envisaged (with EURO 90 million for investment and EURO 10 million for business support services). This is the minimum level required to reach global coverage. An initial contribution of the European Community of EURO 80 million, (with EURO 70 million for investment and EURO 10 million for support services), will enable a successful kick-start of this public-private partnership that could subsequently mobilise over EURO 1 billion, i.e. reaching a leverage factor of more than 12 which is considerably higher than for conventional grant-based support schemes that ask for co-funding in the range of 50 – 70%.

Following expert judgement, additional co-financing of at least EURO 20 million can be obtained at the global level. This will mainly come from bi-lateral donors, International Finance Institutions, and socially responsible investors (SRI) including private foundations. Encouraging indications were received from Member States and international financial institutions that are willing to contribute, both at the top level, and directly into appropriate sub-funds. It is the intention of the contracting partners to solicit indicative commitments from investors, and to launch the GEEREF based on the support of a few "core investors" in 2007 at the latest.

Table 5: Capital expected to be mobilized for each of the GEEREF levels

All figures in € millions	Level 1 **GEEREF**	Level 2 **Sub-funds**	Level 3 **Projects and companies**	Total
Public sector technical assistance	10			
Public sector investment capital	70			
Private sector investment capital	+20			
Investment capital GEEREF		90		
Private sector co-investment		+204		
Investment capital sub-funds			294	
Private sector co-investments			+791	
Market value				1,085
Contribution private capital				1,005
Contribution public capital				80
Leverage factor				**12.5**

Co-financing and private capital mobilization at the sub-fund level

GEEREF will make "patient capital" investments in the three sub-funds types (see Chapter 5 above for a description of the high-medium-low risk sub-fund profiles). GEEREF financial commitment will subsequently attract private investors by offering the possibility to sub-ordinate capital repayments and/or dividends until private investors have received an attractive return, i.e. so-called hurdle rate estimated to be around 8%. As a result GEEREF turns projected insufficient returns into attractive returns to private co-investors in sub-funds.

Depending on sub-fund types, GEEREF's investments will catalyze between two and more than four times private capital (see also Figure 1). A high risk sub-fund is expected to require more "patient capital" to reach the return threshold required by private investors. This mechanism is to result in around EURO 200 million private co-financing at this level, which is expected to come mainly from international and regional financing institutions and international and regional private sector investors.

Co-financing and private capital at project and company level

Sub-funds provide this mix of patient and private capital to projects and companies serving as equity and quasi-equity. As a result, projects and companies are adequately capitalized to attract further locally available equity and debt financing provided predominantly by local financial institutions. This will mobilise about € 800 million co-financing at this level.

Incentives for Co-financing and Private Sector Participation

Model calculations have been made to assess the attractiveness of the proposed financial arrangements for private investors to engage in all three ranges of sub-funds. The underlying assumptions of the model are mainly based on expert judgements on a relatively large set of variables for the calculation of the expected return on investment for investors in the GEEREF as well as in the sub-funds. The financial model assumes a first closing of EURO 100 million as explained above. It incorporates the following arrangements:

(1) In the low risk funds, GEEREF and the private investors share the risks related to the capital recovery shortfall (pari passu). Private investors obtain preferential returns until an 8 % IRR threshold is reached, after which the dividends are shared between private investors and GEEREF on the basis of their share in the fund's capital.

(2) In the high and medium risk subfunds, GEEREF's capital recovery and dividends are subordinated, whereby the sub-fund's free cash flows are distributed as follows:

   (a) capital recovery to private investors

   (b) interest on private investor capital until a specified threshold is reached (e.g. 8 %)

   (c) capital recovery to GEEREF

   (d) distribution of additional returns to private investors and GEEREF according to their relative shares

By structuring the public contribution in this way it is possible to offer private co-investors net rates of return of around 8%, i.e. net of exchange rate losses, write-offs and management costs in all sub-fund types (see Table 6). This rate of the return would be roughly equivalent to historic rates of return obtained in the OECD energy sector (particularly in the electricity sector)[24], and can therefore be seen as an appropriate 'hurdle rate' for private sector engagement.

The outcome of this average scenario is summarised in the table below. It is calculated bottom-up from project to GEEREF level. Details on the main underlying assumptions are presented in the Annex and are further discussed in the sections describing the self-sustainability and sensitivity analysis.

[24] See IEA 2003, World Energy Investment Outlook 2004, page 69 "Financial Performance of the Energy Sector".

Table 6: Expected Returns for GEEREF and Sub-Funds

Category of GEEREF Subfunds	**High Risk**	**Medium Risk**	**Low Risk**
Share in GEEREF portfolio	**30%**	**50%**	**20%**
Average net return at sub-fund level	3.5%	6.3%	8.7%
Average net return for co-investors in sub-funds	8.0%	8.0%	8.7%
Average Gross return to GEEREF from sub-funds	0.0%	3.3%	8.7%
Average net weighted return to GEEREF investors	2.4%		

Note: Ranges and sensitivities are discussed in the section below.

6.2.2. Sustainability of the Fund

Based on indicative investment patterns for a portfolio of 10 investments, the financial model confirms that positive returns after subtracting operating and management costs can be expected both at the level of the sub-funds and at the GEEREF level. This means that the Global Fund would be revolving and that it would be financially sustainable. At the level of the Global Fund, GEEREF would be able to offer a return of about 2.4 % (see Table 6) which is acceptable to public sector and a growing number of socially responsible investors for projects generating strong public goods benefits.

6.2.3. Sensitivity Analysis

In order to assess the robustness of the above results, a number of sensitivity tests were carried out using the above mentioned financial model. The two most critical variables for the financial performance are the (i) expected gross returns of the investment portfolio of sub-funds and (ii) expected percentage of write-offs.

The gross return on projects and enterprises is assumed to vary between 6% and 14%. This is based on current experience for small and medium scale investments in projects and SME's. It also accounts of the impacts of currency devaluations, which on the basis of ten years of experience of two microfinance funds are around 4%. Gross returns in high-risk sub-funds are usually found to be lower because projects are often pilot projects and therefore operational costs are higher. This is also reflected in higher write-off percentages.

For the pessimistic scenario, the gross rates of return were assumed to be 15 – 25 % below those of the average case, and at the same time the write offs were doubled compared to the average case.

The results of this sensitivity analysis are shown in Table 7. It is assumed that in all sub-funds private investors would be able generate an internal rate of return of 8% for private investors. In order to reach this level, GEEREF would have to allow for capital losses only in the rather

unlikely pessimistic scenario. In the pessimistic scenario, poor performance of the high-risk and medium risk funds would result in an overall capital loss of the GEEREF of 63%.

Table 7: Outcomes of GEEREF Sensitivity Analysis

All scenario's	**High risk sub-fund**			**Medium risk sub-fund**			**Low risk sub-fund**		
GEEREF portfolio	30%			50%			20%		
GEEREF capital	50%			30%			20%		
Assumptions	**High risk sub-fund**			**Medium risk sub-fund**			**Low risk sub-fund**		
	Real.	Pess.	Opt.	Real.	Pess.	Opt.	Real.	Pess.	Opt.
Returns	8%	6%	10%	10%	8%	12%	12%	10%	14%
Write offs	7.5%	15%	5%	5%	10%	2.5%	2.5%	5%	1%
Returns on sub-fund level	**Sub-fund IRR**			**Private investor IRR**			**GEEREF IRR**		
	Real.	Pess.	Opt.	Real.	Pess.	Optim.	Real.	Pess.	Optim.
High risk	3.5%	0.4%	5.9%	**8.0%**	**8.0%**	**7.0%**	99% capital recovery	41%capital recovery	4.5%
Medium risk	6.3%	3.5%	8.6%	**8.0%**	**8.0%**	**8.6%**	3.3%	36%capital recovery	8.6%
Low risk	8.7%	6.3%	10.9%	**8.7%**	**7.0%**	**10.9%**	8.7%	0.7%	10.9%
IRR for GEEREF investors	**Realistic scenario**			**Pessimistic scenario**			**Optimistic scenario**		
	2.4%			37% capital recovery			6.8%		

It should be noted, however, that

- the mix of investments in sub-funds was kept constant in the analysis: 80% in high and medium risk sub-funds, 20% in low risk sub-funds. Should GEEREF sponsors not accept the risk of losing a substantial part of their contribution, a higher percentage of GEEREF investment capital could be allocated to low risk funds. This would have an upward effect on the net return at GEEREF level.

- the technology mix was also kept constant in the analysis. Here too, their remains a potential to shift towards fewer technologies, which could reduce the transaction costs, and towards technologies with higher returns per unit of investment. This would as well increase the returns generated by GEEREF.

- for the sake of simplicity, a non-performance-based flat management fee was assumed for modelling purposes. It is expected, however, that in practice the fund management fee would include a performance-based component, whereby GEEREF and sub-funds would not be charged the full management fee should agreed financial performance not have been reached.

Hence, the capital loss figures in the sensitivity analysis present rather conservative estimates.

6.3. Conclusions

The in-depth assessment shows that a relatively limited amount of public finance can mobilise significant private funds for the enhanced deployment of energy efficiency and renewable energy technologies. Accelerating such investments will have considerable environmental, energy security and developmental benefits.

For commercial co-investors including IFIs that operate on marked based terms the inclusion of "patient capital" effectively improves the risk-return prospects. Moreover, the use of sub-funds leads to bundling of investments, and therefore to reduced transaction costs and enhanced risk management, particularly for investors used to making large commitments of over EURO 10 million per transaction. Commercial investors that co-invest in tandem with the "patient capital" benefit of a reduction of the risk. As a result, one would expect that a broad range of commercial investors would be willing to co-invest.

The provision of "patient capital" or funds provided on a long term and subordinated return basis will equally buy down the cost of capital for renewable energy and energy efficiency projects/SMEs. This will improve the investment conditions for private equity co-investors or senior lenders, thereby making the project/SMEs eligible for funding from these sources. The latter will thus have access to resources previously outside their reach.

It must be made clear however that although GEEREF aims to be financially self-sustainable, it is just as important to attract private investors in high risk and medium risk sub-funds. Given the implicit risk of investing in untested markets in developing countries markets it is under pessimistic assumptions possible that 100% capital recovery will not be achieved.

7. MONITORING AND EVALUATION

7.1. Monitoring

Financial reporting will be in accordance with the requirement of the International Financial Reporting Standards that are applicable to financial intermediaries and the EC Financial Regulation. This will include the provision of:

- Quarterly un-audited financial statements,
- 6-monthly financial statements and annual report audited by certified public accountants qualified for auditing financial institutions.

Additional financial reporting will allow tracking additional criteria such as:

- Catalytic financing effects in terms of money leveraged from co-financiers
- Number of projects and enterprises funded
- Entrepreneurs receiving Technical Assistance

Non-Financial reporting will complement quarterly financial statements with annual summaries based on selected environmental, social and economic objectives or parameters, such as:

- Clean energy generated in MWH
- Energy saved from energy-efficiency initiatives in MWH
- Customers installing energy-efficiency equipment
- Barrels of oil displaced
- Dollar value of oil displaced
- CO_2-offset for life of project
- CO_2-offset annually in tons
- Value of CO_2-offsets for life of project
- Households served
- People with access to modern energy services
- Jobs created

7.2. Terms and frequency of future evaluation

In addition to the periodic monitoring outlined in the previous section, an in-depth evaluation will be carried out no later than five years and ten years following the disbursement from the European Community budget (i.e. five years following 2007

disbursement of the first EURO 20 million). The evaluation will be carried out by an independent body, and will be contracted and appointed by the European Commission (in consultation with other donors and investors).

7.3. Anti-fraud measures

The GEEREF will comply with the anti-fraud measures foreseen by the Community Financial regulations and the respective legal bases.

The administrative monitoring of contracts and payments will be shared by the European Commission and a dedicated agency such as the European Investment Bank Group. Special provisions will be implemented to ensure that each of the operations financed by the European Commission will be supervised at all stages of the project cycle on the basis of contractual arrangements with professional fund management teams. These arrangements will ensure sound financial managements and the legality and regularity of transactions.

Any agreement or contract will expressly provide for monitoring of the proper implementation by the European Commission's internal control bodies, including the European Anti-Fraud Office (OLAF), and audits by the European Court of Auditors, if necessary on the spot. They shall authorize OLAF to carry out on-the-spot checks and inspections in accordance with the Council Regulation (Euratom, EC) N° 2185/96 of 11 November 1996.

In addition, the Fund Management Team will need to have access to anti-fraud tools and procedures as implemented by European financial institutions.

Particular attention will be paid to the nature of the expenditure (eligibility of expenditure) and to verify supporting information and relevant documentation (evidence of expenditure).

ANNEX 1: COMPARING GEEREF AGAINST BUSINESS AS USUAL POLICY

The table below compares some of the impacts of the GEEREF against the business as usual scenario that is based on a continued use of traditional grant based systems.

Options / Impacts on:	**1) "Business as usual" using conventional grant based programmes**	**2) Establishing the Global Energy Efficiency and Renewable Energy Fund**
Mobilizing Private Sector Funding towards energy efficiency and renewable energy	(+/-) Leverage factors of up to 3 could be reached through the use of traditional grant programmes (limiting co-financing of commercial activities to 30%). (-) Conventional grant-based programmes are failing to attract significant interest from private sector investors leading to limited impact on the investments. (+/-) Limited impact of awareness raising and capacity building efforts, and limited replication of success stories due to lacking financing options to support investments in energy efficiency and renewable energy investments.	(++) Increased leverage of private sector funding of up to a factor 12. Potential to generate significant critical mass with limited pubic funding. (+) Full integration of technical assistance and investment support leading to significant prospects for private sector participation, enhanced o-operation with international financial institutions, and enhanced options for following up specific awareness raising and capacity building programmes
Sustainable Energy Sector Growth and Technology Transfer and Development	(-/+) Limited options for accelerating market take up new renewable and energy efficiency technologies due to lack of financing options to buy down investment risk for private sector investors	(+) enhanced range of instruments to support the development, transfer and deployment of renewable energy and energy efficiency technologies. (+) Accelerated market take-up through enhanced opportunities for private sector to invest on renewable energies and energy efficiencies, including financial intermediaries, IFIs, and SMEs.
Sound Financial Management, Competitivenes, and Visibility	(-) Difficult to create long-term financial structures that allow for a flexible co-operation amongst European Institutions, Member States (including EEA Members) and private sector. (-) No Community support to encourage entrepreneurial attitudes (-) No comprehensive instrument that addresses market failure in access to finance for SMEs throughout the early stages of the business life-cycle not addressed in complementary manner (-) No possibilities to effectively engage technology financing experts on a self-sustaining basis. (-) Uneven, incoherent and fragmented response to needs for reducing the burden on business and less fragmented funding rules.	(+) Pioneering public-private financing mechanisms that addresses market failures related to access to finance throughout the difficult stages of the business life-cycle. (++) Flexible financing instrument enabling smooth pubic-private partnerships including with Member States, EIB, EBRD, and others on a voluntary basis; allows to direct funding towards EU political priorities; underpinning EU political and corporate leadership; Enhanced visibility and unity of action for business stakeholders (+) Enhanced possibilities to support market-based technology development, transfer and deployment through possibilities to support "north-south" joint ventures, including at SME level. (+) reducing "balance sheet" stress on (EU) renewable energy and energy efficiency (SME) producers hence freeing up capital for corporate R&D driven innovation.

ANNEX 2: PROJECT EXAMPLES

China Environment Fund 2004

The Dutch development finance institution FMO invested USD 3 million in the China Environment Fund 2004 (CEF). CEF is managed by Tsinghua Venture Capital Management and seeks to invest in small to medium-size enterprises in China. CEF focuses on companies offering proprietary products, technologies or services, which are both environmentally friendly and earn healthy returns. It provides capital and also offers fledgling companies guidance in the process of their commercialization and professionalisation. Capital for environmental investment is still scarce, thus the balance that CEF provides between commercial viability and promoting sustainable development seamlessly fits FMO's vision of entrepreneurialism and sustainable growth. Examples of the short-listed investment targets include:

- Beijing Witstart Technology Co., Ltd Incorporated with a registered capital of RMB 6 million in 2001, provides high performance power-saving products & solutions for lighting. Witstart power-saving equipment automatically regulates the output of power source and electric energy so that the power demand and the power supply can be well balanced. Customers can achieve energy saving between 15% and 35% and also extend the lifetime of the lighting equipment. The company is in a fast growing stage with revenue of RMB 9.8 million for 2004 and estimated RMB 35 million for 2005. It is in the process of fund raising of RMB 30 million to scale up production capacity and increase its marketing.

- Wu'an Bioenergy Sources Co., Ltd. started R&D of biodiesel in 1995 and successfully started producing biodiesel in 2001. The company has developed its own production process and related catalyst with two innovation patents (pending). Current annual capacity is 10K ton and another 20K ton will be ready by the end of March 2006. In 2002, the company's biodiesel passed the State level testing institute –the only approved biodiesel in China, also conforming to the US ASTM Biodiesel Standard. The founder has over 20 years R&D experiences in the alternative fuels sector.

La Esperanza –An Energy Enterprise in Honduras

La Esperanza is a Honduras-based enterprise that was established in 1999. It is developing a 12.7 MW run-of-river hydroelectric project in the remote and mountainous rural area of the Intibucà region in Honduras. La Esperanza sells electricity generated from hydro-electric to the national utility company, through a 15-year Power Purchase Agreement (PPA). This guaranteed for the first time a reliable and steady supply of electricity to the town of La Esperanza and surrounding communities, reaching about 40,000 people. At the outset, La Esperanza's developers received technical assistance from E+Co to establish a sound business plan. This was followed in 2002 by a $250,000 loan for construction of the first powerhouse, covering about 15% of the total investment need. In May 2003, a local Honduran private bank approved a term loan to complete the first phase (1.5 MW). In 2004, after a follow-on investment of $ 200,000 made by E+Co, financing was secured for full construction via the Central American Bank for Economic Integration (CABEI) and Finnish development bank Finnfund for the balance of the

13.5 MW plant for a total of about USD 13 million. In October 2005, he Kyoto Protocol's Clean Development Mechanism issued the first ever certified emission reductions (CERs) to La Esperanza, thus allowing it to create a historic milestone in the global carbon market. La Esperanza sold the certified greenhouse gas emission reductions to the World Bank's Community Development Carbon Fund for USD 1,395,000. The company created 40 direct and 120 indirect jobs, and served around 600 households.

The Central American Renewable Energy and Cleaner Production Facility

CAREC is an innovative mezzanine and debt financing facility, developed by E+Co with support of the Multilateral Investment Fund (MIF) of the Inter-American Development Bank (IDB). CAREC intends to invest in 20-25 small and medium-sized enterprises (SMEs), with annual revenues of up to USD 5 million and less than 100 employees in the Central American region with strong technical and management teams that can benefit from the financing to be provided by CAREC. Eligible sectors include grid-connected renewable energy that utilizes proven technologies such as hydro, biomass, wind, geothermal and alternative cogeneration schemes. Investments will be made in projects and enterprises with contracted revenues through, either long-term power purchase agreements (PPAs), energy efficiency and cleaner production service agreements and performance contracts. It is structured to utilize mezzanine-financing mechanisms such as subordinated debt, convertible debt, preferred shares and other quasi-equity instruments. Return on investments will be generated inter alia from fixed interest rate payments, and predefined preferred dividends. A diversification strategy will limit investments by country, business sector and technology. MIF-IDB has approved a USD5 million equity investment in CAREC plus USD 500,000 in grant resources for technical assistance. In addition FMO, the Dutch development finance institution, has approved a EURO 220,000 grant for technical assistance. The Central American Bank of Economic Integration (CABEI) has approved a USD5 million equity investment. BIO, the Belgian investment company for developing countries, has committed USD 2 million.

ANNEX 3: ASSUMPTIONS UNDERLYING THE GEEREF FINANCIAL MODEL

The 2004 feasibility study contained substantial financial modelling to test the patient capital concept. The assumptions underlying these models were reviewed by stakeholders and by the fund management team that won the follow-up contract. The main changes compared to the 2004 study that are reflected in the current analysis are:

- Three types of sub-funds (high-medium-low) rather than two (strong – weak) to better reflect the range of project returns and associated transaction costs;
- Broader range of project returns between 6 and 14%;
- The use of lower return thresholds offered to private sector, reflecting the targeting of the broad range of finance providers in the project and corporate finance sector, rather than the targeting of pure venture capital investors (which are mainly focussed on mature infrastructure sectors in emerging markets which can offer returns as high as 30-50).

The financial model assumes a first closing of EURO 100 million (with EURO 90 million for investment and EURO 10 million for grants and no subsequent closings. The major assumptions for the base case financial model are (more details available below):

- To model the business plan, we assumed that the GEEREF invests in three sub-fund types (see chapter 5 for a description);
- The Fund makes 10 investments in 4 years in the three sub-funds. For the purpose of financial modelling, all sub-funds have a 12-years term. This results in a 16-year investment term for GEEREF. Note, however, that GEEREF is intended to be structured as an open-ended fund meaning that the fund would not have to be unwound after 16 years and that subsequent investment rounds are possible. In and open-ended fund structure, there remain possibilities for investors to "exit", including through the issuing of securities (bonds or shares) to pay-back investors'capital inlays.
- The Fund provides between 20% and 50% of the capital of the sub-funds. Smaller sub-funds need a relative larger portion of patient capital in order to attract co-investors.
- At the sub-fund level, all operational costs, including write-offs, and fund manager fees are paid from the gross returns generated by the sub-fund itself. The resulting "free" cashflow at the sub-fund level then distributed to according to the "patient capital" mechanism, i.e.:

– In the low risk funds, GEEREF and the private investors share the risks related to the capital recovery shortfall (pari passu). Private investors obtain preferential returns until an 8 % IRR threshold is reached, after which the dividends are shared between private investors and GEEREF on the basis of their share in the fund's capital. In these larger funds, GEEREF fund managers take a less hands-on approach and invest on the basis of equal terms with other investors (pari passu).

Their role is geared towards influencing the investment agenda of the fund and if needed a hurdle rate to mitigate risks (such as currency exchange);

– In high-risk and medium risk sub-funds investments are "subordinated" to commercial investors. The "subordination terms" of patient capital to commercial capital is structured such that patient capital receives capital distributions starting after commercial investors have fully received their capital contribution and an 8% hurdle rate.

– The portfolio of sub-funds is invested in a variety of countries whereby project cashflows are denominated in local currency. Because sub-funds need to offer a hard currency return to their investors, the projected returns of project are "netted" for currency exchange fluctuations which can be significant in many unmature markets and developing countries. The returns from projects to the sub-funds are thus assumed to be in the range of 6%-14%, which is 4% net of the 10%-18% range being delivered by project developers in local currency.

– Returns that are made during the sub-funds investment period are used for sub-fund operating expenses and are re-invested if applicable.

– The Fund's investments are assumed to be mainly income generating and self-liquidating. "Income generating" means that there is income from the investments paid as a coupon on subordinated debt or dividend on shares). "Self-liquidating" means that there is a some kind of principal repayment schedule agreed by the investee company in the form of subordinated debt amortisation, redemption of preference shares, puts to the company or its other shareholders, or refinancing from follow on investments made. This approach follows common practice in the financial structuring of renewable energy projects where equity investors do not have the same "exit" options as in mature financial markets (e.g. possibilities to sell their shares to follow-on investors or offer them on the stock market). A small portion of straight equity (5%-10%), is complemented with a larger share of quasi-equity (30%-40%). Quasi-equity can take the form of subordinated debt of preferred shares. The share of equity and quasi-equity then provides the necessary "risk" cushion for attracting debt instruments (ideally long term loans) and to reach financial closure. Note that, where equity is provided, the model assumes no premium at exit.

– Investments in projects and companies have an average term of 8 years with the redemption (or repayment) in the last four years. This is a typical investment cycle for renewable energy projects whilst it is shorter for SMEs.

– Depending on the sub-fund type between 1% and 15% of its investments are fully written-off. In the financial model, provisions for write-offs are made at the time of investment, whereby these amounts do not generate any income from the moment the investment is made.

- At the GEEREF level, operating costs and management fees are paid from the gross returns obtained from sub-funds. Net returns are distributed to GEEREF investors (which can decide to reinvest).

- The EURO 10million grant facility doesn't generate returns or directly increases the value of the sub-funds or the sub-fund investments.

- Management fees are representative for current market practice although the model doesn't include performance based fees. To avoid that the provision of soft "patient capital" will lead to reduced commercial discipline by fund managers, it is however expected that part of the fees will be performance based.

Summary of Main Assumptions

GEEREF			
Investment facility		EUR 90m.	
Grant facility		EUR 10m.	
Investment period		4 years	
Term for financial model		16 years	
Organizational costs		Paid by lead investor	
Management fee		1%	
SUB-FUNDS			
	"high-risk sub-funds"	"medium-low risk sub-funds"	"low-risk sub funds"
Percentage of the Fund's portfolio	30%	50%	20%
Allocation of investment capital to risk category	EUR 27m.	EUR 45m.	EUR 18m.
Number of sub-funds	4	4	2
Average investment per sub-fund in each category	EUR 6.75m.	EUR 11.25m.	EUR 9m.
Funding from private investors	50% EUR 27m.	70% EUR 105m.	80% EUR 72m.
Average sub-fund size	EUR 13.5m.	EUR 37.5m.	EUR 60m.
Term	12 years	12 years	12 years
Investment period	4 years	4 years	4 years
Weighted average gross return on investments	6-10%	8-12%	10-14%
Write-off percentage	5-15%	2-10%	1-5%
Management fees	2.5%	2.0%	2.0%

Patient capital terms	Subordination of capital repayments and Subordination of dividend distributions until a 8% net hurdle rate for private investors is met	Subordination of capital repayments and Subordination of dividend distributions until a 8% net hurdle rate for private investors is met	Pari-passu with possible subordi-nation of dividend distributions until a 8% net hurdle rate for private investors is met
COMPANIES AND PROJECTS			
Average investment per project	EUR 850,000	EUR 2,250,000	EUR 3,750,000
Average investment term	8 years	8 years	8 years
Average deals per year	4	4	4
Dividends payments starts after	1 years	1 year	1 year
Divestment period	4 years	4 years	4 years
GRANT FACILITY			
Allocation of Grant facility	EUR 5m.	EUR 5m.	
Purpose of grant's	Organizational expenses, sub-fund development support, business development support	Part of the organizational expenses, business development support	None

ANNEX 4: ASSUMPTIONS UNDERLYING ESTIMATED NON-FINANCIAL IMPACTS OF THE GEEREF.

		Units	Impacts	Optimistic	Pessimistic	Notes
1	**Capital Mobilized**	Euro	**1,085,000,000**	2,250,000,000	450,000,000	Note A
2	**Capital Cost per kWor equivalent**	Euro	**1,739**	710	2,150	Note B
3	**kWor equivalent Capacity Installed**	kW	**623,846**	1,528,169	504,651	Note B
4	**Average conversion efficiency**		**33.5%**	25.0%	35.0%	Note C
5	**kWh or equivalent delivered**	kWh	**1,830,739,265**	3,346,680,141	1,547,260,465	Line 3 * Line 4 * (365*24)
6	**Number of people served per year**	people	**1,570,590**	3,415,568	550,102	Note D
7	**Tonnes of CO2e saved per year**	metric tonnes	**1,135,058**	2,861,445	340,518	Note E

NOTE A: Assumptions related to the GEEREF investment mix and resulting leverage

GEEREF Investment guideline

Investment fund size	€ 90,000,000.00
TA fund size	€ 10,000,000.00
Types of sub-funds	3
Allocation SF-type 1 (high risk)	**30%**
Allocation SF-type 2 (medium risk)	**50%**
Allocation SF-type 3 (low risk)	**20%**
Total	100%
GREFF holding within SF-type 1	**50%**
GREFF holding within SF-type 2	**30%**
GREFF holding within SF-type 3	**20%**
SF-type 1 holding within project	**40%**
SF-type 2 holding within project	**30%**
SF-type 3 holding within project	**20%**

Financial leverage	**Sub-fund types**			
	high risk	**medium risk**	**low risk**	**Totals**
GREFF-finance to SF	27,000,000	45,000,000	18,000,000	90,000,000
3rd-parties' finance to SF	27,000,000	105,000,000	72,000,000	204,000,000
SF-finance to projects	54,000,000	150,000,000	90,000,000	294,000,000
4th-parties' finance to projects	81,000,000	350,000,000	360,000,000	791,000,000
Total finance to projects	135,000,000	500,000,000	450,000,000	**1,085,000,000**

Technology Mix		Projected investment (including leveraged funds)
Hydro	**30.0%**	325,500,000 Euro
Wind	**15.0%**	162,750,000
Biomass	**20.0%**	217,000,000
Biogas	**7.5%**	81,375,000
Energy Efficiency	**7.5%**	81,375,000
Solar Thermal	**5.0%**	54,250,000
PV	**5.0%**	54,250,000
Others	**10.0%**	108,500,000
Total	100.0%	1,085,000,000

NOTE B: Assumptions related to the capital cost of invested technologies

Capital Cost per kW or equivalent

	Current Capital Cost Estimate Lower Limit (EUR)	Current Capital Cost Estimate Higher Limit (EUR)	Average investment in EUR per kW	**Average to use for calculation Eur per kW**	% of Portfolio	Weighted Cost Euro per kW	If 100% of portfolio (including PV & EE)	Weighted Cost Extrapollated for full portfolio Euro per kW
Hydro	1,809	2,476	2,143	**2,150**	30.0%	645	31.6%	679
Wind	857	1,048	952	**950**	15.0%	143	15.8%	150
Biomass	1,428	2,381	1,905	**1,900**	20.0%	380	21.1%	400
Biogas	1,428	2,381	1,905	**1,900**	7.5%	143	7.9%	150
Solar	3,809	6,666	5,238	**5,200**	5.0%	260	5.3%	274
Energy Efficiency and other	381	571	476	**470**	17.5%	82	18.4%	87
Min/max	381	6,666			95.0%		100.0%	**1,739**

From IEA World Energy Investment Outlook 2003, Table 7.3: Current Capital Cost Estimates

	Current Capital Cost Estimate Lower Limit (USD)	Current Capital Cost Estimate Higher Limit (USD)	Average investment per kW (USD)	Current Capital Cost Estimate Lower Limit (EUR)	Current Capital Cost Estimate Higher Limit (EUR)	Average investment per kW (EUR)
Gas combined cycle	400	600	500	381	571	476
Conventional coal	800	1,300	1,050	762	1,238	1,000
Advanced coal	1,100	1,300	1,200	1,048	1,238	1,143
Coal gasification (IGCC)	1,300	1,600	1,450	1,238	1,524	1,381
Nuclear	1,700	2,150	1,925	1,619	2,047	1,833
Gas turbine - central	350	450	400	333	429	381
Gas turbine - distributed	700	800	750	667	762	714
Diesel engine - distributed	400	500	450	381	476	429
Fuel cell - distributed	3,000	4,000	3,500	2,857	3,809	3,333
Wind onshore	**900**	**1,100**	**1,000**	**857**	**1,048**	**952**
Wind offshore	1,500	1,600	1,550	1,428	1,524	1,476
Photovoltaic - distributed	6,000	7,000	6,500	5,714	6,666	6,190
Photovoltaic - central	4,000	5,000	4,500	3,809	4,761	4,285
Bioenergy	**1,500**	**2,500**	**2,000**	**1,428**	**2,381**	**1,905**
Geothermal	1,800	2,600	2,200	1,714	2,476	2,095
Hydro	**1,900**	**2,600**	**2,250**	**1,809**	**2,476**	**2,143**
			FX-rate USD/EUR ultimo 2002:	1.0501		

Sensitivity of kW installed and kWhrs delivered based on investment technology mix

	Base Case	Cheapest Technologies	Most Expensive Technologies
Capital Mobilized	1,085,000,000	1,085,000,000	1,085,000,000
Capital cost per KW invested	1,739	710	2,150
KW Capacity Installed	**623,846**	**1,528,169**	**504,651**
Efficiency conversion	33.5%	25.0%	35.0%
kWh or equivalent delivered	**1,830,739,265**	**3,346,690,141**	**1,547,260,465**

Cheapest technology mix: 50% on-shore wind and 50 energy effiency
Most expensive technology mix: 100 Hydro

NOTE D: Assumptions related to the calculation of the number of people served with clean energy

Number of people served with clean energy based on energy consumption per capita: base case, high and low estimate
kWh or equivalent delivered

	Base Case	High estimate based on low per capita consumption	Low estimate based on low per capita consumption	
Electricity use per capita (kWh)	1,166	3,328	536	From table below
kWh or equivalent delivered	1,830,739,265	1,830,739,265	1,830,739,265	From Base Case
Number of people served	**1,570,590**	**550,102**	**3,415,558**	

Electricity and CO2e per capita: Table 22 Human Development Report 2005	**Population/2003 Table 5 / millions**	**Electricity use (kWh)**	**Electricity use per capita (kWh)**
Sub-S Africa	674	361,264	536
South Asia	1,503	850,698	566
East Asia and Pacific	1,928	2,774,392	1,439
Latin America	541	551,279	1,019
CEE and CIS	406	1,351,168	3,328
Total / **Average**	5,052	5,888,801	**1,166**
High			3,328
Low			536

NOTE D bis: Assumptions related to the calculation of the number of people served with clean energy based on optimistic cost of technology mix

	Base Case	High estimate based on low per capita consumption	Low estimate based on low per capita consumption	
Electricity use per capita (kWh)	1,166	3,328	536	From table below
kWh or equivalent delivered	3,346,690,141	3,346,690,141	3,346,690,141	From Base Case
Number of people served	**2,871,124**	**1,005,616**	**6,243,825**	

Electricity and CO2e per capita:

Table 22 Human Development Report 2005	**Population/2003 Table 5 / millions**	**Electricity use (kWh)**	**Electricity use per capita (kWh)**
Sub-S Africa	674	361,264	536
South Asia	1,503	850,698	566
East Asia and Pacific	1,928	2,774,392	1,439
Latin America	541	551,279	1,019
CEE and CIS	406	1,351,168	3,328
Total / **Average**	5,052	5,888,801	**1,166**
High			3,328
Low			536

NOTE E: Assumptions related to the CO2 savings per year

CO2 Savings per year --Conservative estimates

All based on base Kilowatt-hours produced, excluding high and low ranges

Assuming comparison with developing counries' **fossil fuel based generation** of electricity, combined heat and power, and public heat plants		Base Case (a)	High estimate (b)	Low estimate (c)	
kWh or equivalent delivered	kWh/year	1,830,739,265	1,830,739,265	1,830,739,265	From Base Case
C02 emmissions per kWhr electricity and heat	g/kWh	620	1,263	186	See notes (a), (b), ©
CO2 emmissions saved per year	TCO2/year	1,135,058	2,312,224	340,518	

Notes:
CO2 factors taken from IEA "CO2 Emissions from Fuel Combustion 1971-2002, 2004 Edition (page II.61-63)
(a) 1990-2002 average for UNFCCC Non-Annex I Parties
(b) 1990-2002 average for Tanzania reflecting high end of UNFCCC Non-Annex I Parties
(c) 1990-2002 average for Latin America reflecting low range for UNFCCC Non-Annex I Parties. Lower figures exist although these reflect low electrification rather than clean production

CO2 Savings per year --Optimistic Estimates

All based on base Kilowatt-hours produced, exclusinh high and low ranges

Assuming comparison with developing counries' **coal based** generation of electricity, combined heat and power, and public heat plants	Units	Base Case (a)	High estimate (b)	Low estimate (c)	
kWh or equivalent delivered	kWh/year	1,830,739,265	1,830,739,265	1,830,739,265	From Base Case
C02 emmissions per kWhr electricity and heat	g/kWh	973	1,563	788	See notes (a), (b), ©
CO2 emmissions saved per year	TCO2/year	1,781,309	2,861,445	1,442,623	

Notes:
CO2 factors taken from IEA "CO2 Emissions from Fuel Combustion 1971-2002, 2004 Edition (page II.65-66)
(a) 1990-2002 average for UNFCCC Non-Annex I Parties
(b) 1990-2002 average for Zambia reflecting high end of UNFCCC Non-Annex I Parties
(c) 1990-2002 average for Chile reflecting low range for UNFCCC Non-Annex I Parties.

NOTE E (bis): Assumptions related to the CO2 savings per year with optimistic cost of technology mix

CO2 Savings per year --Conservative estimates

All based on base Kilowatt-hours produced, excluding high and low ranges

Assuming comparison with developing counries' **fossil fuel based generation** of electricity, combined heat and power, and public heat plants		Base Case (a)	High estimate (b)	Low estimate (c)	
kWh or equivalent delivered	kWh/year	3,346,690,141	3,346,690,141	3,346,690,141	From Base Case
C02 emmissions per kWhr electricity and heat	g/kWh	620	1,263	186	See notes (a), (b), ©
CO2 emmissions saved per year	TCO2/year	2,074,948	4,226,870	622,484	

Notes:
CO2 factors taken from IEA "CO2 Emissions from Fuel Combustion 1971-2002, 2004 Edition (page II.61-63)
(a) 1990-2002 average for UNFCCC Non-Annex I Parties
(b) 1990-2002 average for Tanzania reflecting high end of UNFCCC Non-Annex I Parties
(c) 1990-2002 average for Latin America reflecting low range for UNFCCC Non-Annex I Parties. Lower figures exist although these reflect low electrification rather than clean production

CO2 Savings per year --Optimistic Estimates

All based on base Kilowatt-hours produced, exclusinh high and low ranges

Assuming comparison with developing counries' **coal based** generation of electricity, combined heat and power, and public heat plants	Units	Base Case (a)	High estimate (b)	Low estimate (c)	
kWh or equivalent delivered	kWh/year	3,346,690,141	3,346,690,141	3,346,690,141	From Base Case
C02 emmissions per kWhr electricity and heat	g/kWh	973	1,563	788	See notes (a), (b), ©
CO2 emmissions saved per year	TCO2/year	3,256,330	5,230,877	2,637,192	

Notes:
CO2 factors taken from IEA "CO2 Emissions from Fuel Combustion 1971-2002, 2004 Edition (page II.65-66)
(a) 1990-2002 average for UNFCCC Non-Annex I Parties
(b) 1990-2002 average for Zambia reflecting high end of UNFCCC Non-Annex I Parties
(c) 1990-2002 average for Chile reflecting low range for UNFCCC Non-Annex I Parties.

NOTE E (bis): Alternative calculations related to the CO2 savings per year

	Units	Base Case	High estimate	Low	
Number of people served		1,570,590	1,570,590	1,570,590	
C02 emmissions per capita	Metric Tonnes/Year	2.1871	5.9000	0.8000	From Table Below
CO2 emmissions saved per year	Metric Tonnes/Year	3,435,092	9,266,484	1,256,472	

CO2e per capita: Table 22 Human Development Report 2005	**Population/2003 Table 5 / millions**	**CO2 e per capita/metric tonnes**	**CO2e (metric tonnes)**
Sub-S Africa	674	0.800	539
South Asia	1,503	1.200	1,804
East Asia and Pacific	1,928	2.600	5,013
Latin America	541	2.400	1,298
CEE and CIS	406	5.900	2,395
Total / **Average**	5,052	**2.187**	11,049
High		5.900	
Low		0.800	