

**CTF PRIVATE SECTOR PROPOSAL
SUSTAINABLE ENERGY GENERATION COMPONENT
A JOINT SUBMISSION FROM IFC & AfDB**

<i>Name of Project or Program</i>	South Africa Sustainable Energy Acceleration Program (the “Program”)
<i>CTF amount requested (US\$):</i>	<ul style="list-style-type: none"> ➤ Investment – up to US\$83.0 million equivalent (US\$41.5 million for IFC’s account, US\$41.5 million for AfDB’s account) ➤ Advisory services grant – up to US\$1.0 million (US\$500,000 for IFC’s account, US\$500,000 for AfDB’s account) ➤ Implementation and supervision budget – US\$1.0 million (US\$500,000 for IFC’s account, US\$500,000 for AfDB’s account)
<i>Country targeted</i>	Republic of South Africa
<i>Indicate if proposal is a Project or Program</i>	Program

DETAILED DESCRIPTION OF PROGRAM

Proposal Context:

This programmatic proposal is one of three joint IFC/AfDB Private Sector Proposals for South Africa under South Africa’s Country Investment Plan (CIP) which was endorsed by the CTF Trust Fund Committee on October 27, 2009 and allocated up to US\$150 million for flexible implementation to the private sector. The three proposals allocate these funds in equal amounts between energy efficiency, solar water heaters and renewable energy. This proposal addresses use of CTF funds to support private sector megawatt scale sustainable energy (SE) projects, including cogeneration energy efficiency (EE) projects and wind and solar renewable energy (RE) projects. More specifically the program seeks to encourage transformation of the private SE sector by establishing a series of direct, project level interventions in the wind, solar and cogeneration sectors, all of which are nascent but offer significant potential in South Africa . This proposed Program (“The Program”) addresses use of CTF funds of up to US\$83 million for investments and US\$1 million for Advisory Services. These initial investments will help to demonstrate that private sector participation in the power sector, and more particularly the SE power sector, can be successful in the South African context (thereby helping to reduce risk for future investors) while also addressing some of the early entrant barriers related to establishing precedents and reducing costs. The Program is consistent with the policies of the Government of South Africa (GoSA) and will directly support the GoSA’s specific goals of generating 4% of the country’s electricity requirements (about 10,000 GWh) from RE by 2013. South Africa’s CIP identifies large scale SE as a key strategic area for application of CTF resources in both the public and private sectors.

Further programmatic proposals which target support to solar water heaters, and energy efficiency investment via local financial institutions or otherwise are also being submitted jointly by IFC & AfDB.

Country and Sector Context:

South Africa is the largest contributor to GHG emissions in Africa. In 2000, emissions were 415 million tons of carbon dioxide equivalent (MtCO₂e), placing South Africa as the 11th largest emitter globally. The country’s emissions per capita are about 10 tons of CO₂/person, the eighth highest in the world. The energy sector is the single largest source of CO₂ emissions, accounting for more than 70 percent of the total. This is mainly because of South Africa’s heavy reliance on coal to meet its primary energy needs (75% of total energy

consumption and 93% of power generation was from coal in 2004).

The GoSA is a leading voice in the developing world on climate change issues. It has committed to doing its part to stabilize global temperatures at 2 degrees Celsius above pre-industrial levels, as recommended by scientific consensus. Recognizing South Africa's development needs, the climate change mitigation strategy the Government has adopted envisages an increase in greenhouse gas (GHG) emissions over the short term, stabilized emissions by 2020-2025, followed by an emissions decline in absolute terms by mid-century.

The private sector is generally well developed in South Africa but its participation in the energy sector, and in particular in power generation, has been limited by the dominance of the state-owned utility, Eskom, and by a number of other financial, institutional, and technical barriers. As part of the government's efforts to address climate change the regulator, National Energy Regulator of South Africa (NERSA), recently approved the Renewable Energy-Feed-in Tariff (REFIT) regime, in which a single buyer is required to purchase capped capacity amounts of renewable energy at set prices from independent power producers (IPPs). More recently, NERSA announced end-user tariff increases over the next three years which will start to close the gap between the cost of SE and end-user tariffs. Meanwhile the supply/demand balance continues to deteriorate and a Power Conservation Program is expected to be initiated which will constrain electrical consumption by large industrials in the near-term.

Barriers to Private Sector Development:

While the regulatory changes described above have the potential to unlock significant private sector engagement in the medium to long term, there remain short-term impediments to private sector-led SE project development which could stall progress and which will particularly affect pioneer projects. These barriers include clarification and creation of a single buyer, allocation of the capped capacity approved under REFIT, and grid extension and upgrades to handle the new capacity. The GoSA has made a clear commitment to resolve these final hurdles in its finalization of the REFIT program and is progressing accordingly, but for pioneer developers of SE projects the timeline for clarification and implementation of a normalized and proven system for IPPs remains unclear. Depending on the ultimate speed of regulatory progress, private sector investment faces the following challenges:

- *Given that the REFIT program is yet to be currently available and given that the RE capacity supported under this program will face some caps, what can be done in advance of and in addition to the REFIT program to fast-track sustainable energy development in RSA?* With end-user power tariffs increasing by almost 100% over the next three years and the prospect of power shortages once the economy returns to growth, many commercial and industrial consumers would like to develop their own SE power projects but in many cases this depends on clarification of their ability to "wheel" electricity through Eskom's grid and their ability to off-set such "self-generation" against any future Power Conservation Program (PCP) targets that may be imposed.
- *Once REFIT is in place, pioneer projects will face additional first-mover costs and risks that may make what appear to be adequate feed-in tariffs for long-term growth insufficient for these initial projects. How can these first projects be supported to pave the way for subsequent projects that will have lower costs and face lower risks?* The first round of projects to be developed under REFIT will face increased costs and risks that will not be faced by subsequent projects. These will include negotiating and setting contractual and risk mitigation precedents, attracting international equipment suppliers into the South African market for the first time, and building advisory, development and financing capacity and experience.

Program Summary:

The Program represents an IFC & AfDB joint initiative to accelerate private sector participation in SE generation in South Africa by addressing the barriers described above. It will target and apply CTF funds to support pioneer private sector SE projects and will address existing market barriers together with advisory services to catalyze market transformation. The Program specifically seeks to shorten the time it takes for South Africa to build a track record of private SE projects by: i) enabling some pioneer projects to proceed in advance of the completion of the REFIT regulations; and ii) supporting the pioneer projects that proceed under REFIT once the regulatory situation is finalized. This will pave the way for more rapid scale-up of SE IPPs and the creation of a sustainable SE sector in South Africa. Further, given that the REFIT program envisages caps to the capacity of SE that it will support (which is sensible fiscal management - similar caps are applied to feed-in tariffs in many developed countries), the Program will ultimately enable a greater capacity of SE to be developed in South Africa in the medium term than would be possible with REFIT alone.

Given the dynamic environment, both with regard to the evolution of the regulatory environment and with regard to development readiness of different private sector projects, the Program will seek to retain flexibility (in terms of approach, project selection, and application and structuring of CTF funds) in structuring the best way to accelerate the implementation of pioneer SE projects. The financial instruments, their pricing and terms of the CTF funds offered to private sector projects will be tailored on a project by project basis to address the barriers identified for each project. IFC and AfDB will seek to provide the minimum concessionality necessary to enable projects to proceed. In advance of completion of the REFIT process the Program will focus on enabling pioneer projects to be developed for “captive” or “self-generation” use by industrial off-takers. These initial projects will set a precedent for a new model of private sector investment in the South African SE power market (industrial self-supply) and will build SE sector capacity by demonstrating the SE technologies at scale, developing capacity in the engineering and advisory markets and providing equipment manufacturers with a signal of the importance of the South African market. Once the REFIT program is fully in place, the Program will seek to support pioneer projects approved by REFIT, overcoming the higher costs and risks that these first projects are expected to face. By supporting the initial projects to be developed under REFIT, CTF funds will ensure the success of the ground breaking REFIT program and mitigate both the increased costs associated with a range of “common good” challenges that the first projects will face (setting contractual, operational and financial precedents for IPPs, creating transmission links to key SE resource areas, building the sectoral scale that enables lower equipment prices from international suppliers etc) and the higher risks perceived by investors in these initial investments. In all cases the CTF funding will be structured on the basis of minimum concessionality adequate to enable the project to proceed and for projects in advance of REFIT the CTF will be structured such that in the case of subsequent REFIT application the CTF concessionality will be adjusted as appropriate.

The Program will focus on three technologies, each of which has significant potential for Gigawatt (“GW”) scale in South Africa. Transformation of these sectors therefore has the potential to have a material impact on the GHG emission intensity of South Africa’s power sector. As discussed in the South Africa CIP the Program will focus on solar power, wind power and co-generation. In each case, by supporting the rapid development and construction of some self-generation projects prior to the full implementation of REFIT and some early pioneer projects within the REFIT program, the Program will have a substantial demonstrational and transformative role. Given the relative economics of the three technologies selected, the Program will serve to help a range of technologies that represent both immediate low cost solutions and promising long-term answers for South Africa’s power needs: (i) cogeneration is a form of energy efficiency, generating both electricity and heat for industrial application, and is almost economic in the context of South Africa’s current

and increasing power prices. Relatively small amounts of CTF support could therefore help accelerate significant private sector investment; (ii) wind-power needs a long-term feed in tariff higher than the current end-user tariffs in South Africa, which the REFIT program will provide, and offers the potential for rapid generation capacity expansion once the initial projects succeed. CTF support will be needed to enable projects in advance of the REFIT completion and to accelerate deployment of the initial projects within the REFIT program; and (iii) solar-power is currently an expensive alternative but represents the future given the rapid cost reductions in the sector and the potential for scale with South Africa's huge solar resource. It will need long-term feed in tariffs higher than the current end-user tariffs in South Africa, which the REFIT program will provide. CTF support will be needed to enable projects in advance of the REFIT completion and to help ensure timely deployment of the initial projects within the REFIT program

The projects supported by the Program are expected to include:

- *In the solar sector*, the Program will support both captive/self-generation (i.e. on the site of consumption of an industrial or commercial operation) MW-scale installations as well as initial solar IPP projects under the REFIT program. The number of each will depend on timing of the finalization of REFIT. In both situations either photovoltaic ("PV") and/or concentrating solar power ("CSP") technologies could be supported depending on developer preference, market need and pace of market evolution. Based on IFC's conversations with the market in early 2010, few private sector CSP projects are sufficiently developed to be ready for financing at this time but certain industrial consumers are considering smaller PV projects for captive consumption. The developers of these projects expect REFIT to be in place in 12-18 months and would be interested to move forward earlier if CTF funding could bridge the gap between the cost of such power and the tariffs they currently pay to Eskom. CTF funding would likely be applied as low cost, long tenor senior loans alongside IFC & AfDB and other financiers to improve the economics of these early projects and enable them to proceed. Initial projects under the REFIT program are expected to be larger scale and are more likely to utilize CSP technology. Given that the feed-in tariffs under REFIT are expected to be sufficient for long-term growth of the sector, smaller proportions of CTF funding are expected to be needed to address first mover risks and costs. Such risks may be associated with the relatively new nature of the CSP technologies and so the CTF could be structured as mezzanine debt, alongside IFC & AfDB mezzanine loans, to encourage participation of commercial banks in senior loans. The demonstration effect of such projects will be high, representing a first step in application of a group of technologies (PV and CSP) that hold huge promise in South Africa.
- *In the wind sector*, Based on the MDB's conversations with the market in early 2010, despite there being over a GW of wind power under development there are only a few projects that are ready for financing immediately. These advanced projects expect the REFIT to be in place in approximately 12-18 months and so would consider alternative industrial off-takers in order to move forward more quickly, provided that CTF funding could bridge the gap between the cost of such power and the tariffs paid to Eskom. CTF funding would likely be applied as low cost, long tenor senior loans alongside the MDBs to improve the economics of these early projects and enable the projects to proceed. Once REFIT is in place, pioneer projects will still face additional costs associated with grid connection and other issues and would still require CTF funding support to enable reasonable returns commensurate to the higher first mover risks that the projects would face.
- *In the cogeneration sector*, investment decisions by industrial facilities are driven by the expected avoided cost of power that would otherwise be purchased from Eskom. With the recently announced tariff

increases for Eskom provided power many cogeneration projects, for generation of power that will be consumed onsite, are getting closer to viability. Only small amounts of CTF funding should be necessary to 'tip the scales' on enabling an initial projects and could either be structured as low interest senior loans or as guarantees associated with the avoided cost of power (to remove the risk of Eskom tariffs not increasing), and potentially to address issues of off-taker creditworthiness. With the demonstration provided by these initial projects and the expected continuation of grid-power tariff increases, further growth in private sector cogeneration projects is expected to occur sustainably without CTF support.

IFC & AfDB have been actively engaging with private sector project developers in the above three areas to get a detailed sense of the most advanced and suitable projects that merit CTF support. Specific projects are not mentioned in this programmatic proposal given issues of confidentiality and to preserve flexibility in the MDB's private sector discussions. Project selection is made on the basis of a sponsor's commitment and ability to deliver on the project as well as their influence in the market (as this is key for establishing a track record and enticing future developers). To further encourage awareness, once the Program is approved IFC & AfDB plan to advertise its availability in appropriate journals, but do not intend to run a formal competitive process: this would likely incur delays, and the MDBs do not believe there are enough projects that are ready to justify such a process. The individual projects would be financed by either IFC or AfDB, or if appropriate by both. In cases where both MDB's are providing financing the CTF investment would be structured by one or other of the MDBs.

Note that final agreement to provide CTF funding to any individual project would be subject to a full due diligence and approval by an internal IFC or AfDB approval body as well as IFC or AfDB's Board, per the CTF private sector guidelines. All projects financed under the Program will be required to meet the MDB environmental, social, governance and other compliance requirements as well as all South African regulatory requirements (BEE etc).

During the investment period an advisory program will be used to maximize the transformational impact of the projects financed by allowing the lessons learned to be shared with the market and by providing grant funding to address smaller scale barriers that are common to all projects and developers in the industry.

Advisory Services:

IFC & AfDB have learned from experience that targeted advisory support can further accelerate the development of a country's renewable energy sector by creating an enabling environment for future / parallel investments.

The renewable energy advisory projects typically address market uptake barriers, including regulatory barriers (such as advising the government on an appropriate feed-in tariff policy for renewable energy into the grid), market information gaps (such as assessing the feasibility of certain types of renewable energy technologies in a particular country or region), or the lack of a viable business model (such as a model for telecom companies to power their base telecom stations using solar or wind energy).

Lessons from existing renewable energy advisory projects:

- **A national renewable energy strategy or policy is a necessary pre-condition for advisory services in sustainable energy.** An explicit commitment on the part of the country government in the form of a national strategy or mission or policy or an international commitment towards GHG emissions reductions is crucial for private sector players to take an interest in developing renewable energy projects. In the absence of this type of commitment, private sector project developers are sceptical about the government's support for sustainable

energy projects, and therefore, technical assistance or soft financing alone cannot overcome this fundamental weakness in market signal. NERSA's recently approved REFIT regime and announced increases to end-user tariffs over the next three years creates a positive environment for catalyzing private sector development in the coming years.

- **Establishing a feed-in tariff pricing policy is critical.** For large-scale (utility scale) deployment of renewable energy projects, regulations need to be supplemented with financial incentives for project developers to offset the higher up-front costs of renewable energy projects. Advisory services aimed at supporting appropriate feed-in tariffs and net metering/wheeling can make a big impact in helping promote private sector entry into renewable energy projects is necessary
- **Limited capacity and market-level knowledge among operators about RE projects creates a higher perception of risk.** In many countries, where the World Bank Group operates, experience with building and operating wind, solar, biomass projects is quite limited. Other types of data/information such as optimal energy mix for the country's grid, resource procurement and storage, process and systems standardization, quality control and assurance, etc. are also missing in many of these markets. Advisory services to early leaders/first movers that leverages and transfers knowledge from international experience to local players and builds the capacity of local EPC (Engineer, Procure, Construct) contractors can contribute to the success of the project and help develop a cadre of local companies with EPC experience in renewable energy. Similarly, studies or analysis that add to market-level information (resource mapping, pre-feasibility studies, insolation data, etc.) can help reduce the risk perception of SE projects, which in turn enables more project developers to enter the RE market.

To ensure that the market has the adequate support necessary to catalyze growth, IFC & AfDB will develop an advisory services program that will support investments and address any identified barriers that could be best addressed through advisory work. The advisory program will retain some flexibility to respond to barriers that are identified during the course of the investment process but the program will include, at a minimum, regulatory advice, capacity building and knowledge management. Potential components of such program components are outlined below:

Regulatory Advice: The current policy environment does not always support RE investment. The AS program will help address this risk primarily by identifying and prioritizing regulatory impediments to and financial support for RE projects; particularly in relation to the policy work being undertaken by the World Bank. Documenting and disseminating best practice to a wide audience including regulators, developers, and sponsors in creating a suitable RE investment climate will be a key activity under the program's knowledge management activities. In addition, AREAS will include targeted regulatory and policy support under its capacity building component to address specific issues arising during implementation of RE projects. AREAS will continually monitor progress of ongoing regulatory reforms and help the World Bank build government and civil society awareness of the need for reforms as well as support specific WB efforts at building renewable energy advocacy and policy making capacity around reforms that target access to RE project finance.

Capacity Building: Lack of capacity prevents successful project development. This risk will be mitigated by screening projects in advance to ensure that sponsors and other key stakeholders have some capability to implement the project. The AS program will pro-actively identify RE project development opportunities and help project sponsors develop them into bankable proposals that will potentially qualify for CTF financing aimed at buying down financing and project development risk. In addition, the AS program will include a capacity building component that helps to overcome specific weaknesses in local RE project development capacity; and enhances local consulting capacity as well as promotes support for project stakeholders.

Knowledge Management Disseminating lessons learned and non-confidential information obtained from early projects to regulators, project developers, and the wider stakeholder group can be an effective way to promote a better regulatory/market environment and reduce perceived risks for future project developers and private financiers. By supporting “neutral” associations (eg. wind or solar associations) to gather, aggregate and share real time information on the sector, stakeholders are likely to get “comfortable” with investing in the sector at a faster rate. Transparency, monitoring and evaluation, and knowledge management are all key elements of the CTF supported projects and a knowledge management program would be developed to ensure an effective feedback loop is created to capture and share information while managing and balancing the confidentiality requirements of the projects and developers in question.

The advisory services component will be coordinated with a technical assistance and capacity building program that is currently under development by the IFC: the Africa Renewable Energy Access Advisory Services (AREAS) Program is a 3-year, US\$3m program that will be piloted in South Africa and then rolled out to other sub-Saharan countries. It includes three key advisory components: project identification; capacity building and knowledge management. Coordination of the CTF funded advisory services through AREAS will ensure that the funds are leveraged with other sources of donor funding.

Describe the Proposal’s strategy for achieving market transformation including:

South Africa’s electricity sector is facing a critical phase in its development. To date it has been monopolized by Eskom, the state-owned, vertically integrated utility, but both public and private capital will be necessary to provide for the massive 12GW forecast growth in demand over the next 5-7 years. Thus deregulation and the creation of an active IPP sector are urgent. Further, the dominant source of electricity generation has to date been from coal-fired power plants (coal provides for 75% of all energy consumed) but if South Africa is to address climate change and achieve its goals under GoSA’s Long Term Mitigation Scenarios (LTMS) it must diversify its generation mix urgently with increased contribution of SE.

The Program will provide a transformational role in the South African power sector both by supporting early successes in private sector participation in generation which can catalyze further market uptake and by supporting some of the first megawatt scale projects in three low-carbon technologies that offer the potential to contribute in gigawatt scale to the country’s energy mix. The demonstration effect of the proposed projects included under this Program will include: i) demonstration of different models for private sector participation in SE with both plants constructed for captive consumption by industrial facilities, and plants constructed as IPPs selling to the Single Buyer under REFIT tariffs. This will lead the way for developers, investors and lenders to follow with scaled-up investment; ii) demonstration of initial private sector megawatt scale projects in three technology areas which will improve capacity in the sectors providing these technologies (equipment supply, engineering, advisors etc) and prove the technical and economic realities of these technologies in the South African context.

In addition to the direct impact of the investment projects that the Program will support, a parallel advisory engagement is also envisaged which will support knowledge transfer from these initial projects and also be applied to any professional services which can benefit the common good of future market entrants (eg legal advice on negotiation of initial model contracts).

The Program is consistent with the policies of the GoSA and with South Africa’s Country Investment Plan (CIP) which was endorsed by the CTF Trust Fund Committee on October 27, 2009. The Program will directly

support the GoSA specific goals of generating 4 percent of the country's electricity requirements (about 10,000 GWh) from RE by 2013 and remains flexible to both support initial private sector investment under the REFIT program and to enable private sector investment in SE ahead of the REFIT program depending on the speed of regulatory progress achieved. South Africa's CIP identifies large scale SE as a key strategic area for application of CTF resources in both the public and private sectors.

IFC and AfDB will leverage their deep, international experience in all three technology areas to support developers in these first of kind projects. IFC has financed hundreds of megawatts of wind over the last two years in a range of geographies and under a range of regulatory environments. It has also financed several first of kind projects in the solar sector including the first megawatt scale PV installation in an emerging market and the largest PV installation in SE Asia. IFC and AfDB will apply innovative structuring to apply CTF funds in the most effective and efficient manner with minimum concessionality to address the key barriers that are preventing progress of private sector investment in each of the three sectors targeted.

FIT WITH INVESTMENT CRITERIA

Potential GHG Emissions Savings

The assumptions conservatively consider the project sizes that could be supported prior to the REFIT program completion. Subsequent to its completion the size of solar and wind projects that could be supported by the available CTF funds would be larger.

Depending on the final allocation of funds between the three technologies the Program is therefore expected to directly support emissions reductions of 25,949,000 tons CO₂e. Assuming a 5x multiple in terms of indirect, demonstration impact, the Program is expected to result in reductions of 129,745,000 tons CO₂e.

Solar, wind and co-generation are fully proven, both technically and commercially, and there are widespread examples of successful application at scale around the world. South Africa has excellent solar and wind resources that promise gigawatt scale development opportunity for SE in the country

Cost-Effectiveness

Based on the above calculations and an expected Program cost of US\$85.0m the implied direct GHG reductions per CTF dollar spent will be 0.31 tons CO₂e/\$ and the implied indirect GHG reductions per CTF dollar spent will be 1.53 tons CO₂e/\$.

Demonstration Potential at Scale

The Program seeks to support and enable the first megawatt scale private-sector wind and solar projects and significant expansion of private sector cogeneration in South Africa. Private sector participation in power generation in South Africa has been limited to date by the dominance of the state-owned utility, Eskom, and by a number of other financial, institutional, and technical barriers.

Development of captive power/self-generation by commercial and industrial facilities using co-generation technologies faces limited regulatory or non-financial barriers (though support from the GoSA to: (i) enable access to interconnection and wheeling through the grid; and (ii) permit offsetting of self-generation against PCP targets, are both needed and would support successful implementation of this Program). In addition, the sector has not taken off to date in South Africa, however, due to the very low power tariffs provided by

Eskom. This situation is now changing and in March 2010 the regulator (NERSA) announced tariff increases over the next three years which will effectively double the cost of power for industrial and commercial consumers. The resulting increases in the cost of power from Eskom will make captive power generation more attractive. Cogeneration is the lowest cost answer for captive power and the Program will use relatively small amounts of CTF funds to enable projects in this sector, providing a demonstration to industrial and commercial players of how such investments can provide an effective solution to enabling secure self-generation. As Eskom tariffs continue to increase future projects will not need concessionary funding to be justified and the gigawatt scale potential of this technology can be mobilized. Ultimately, with the regulations and processes clarified under which IPPs can sell power into the grid (with power purchase agreements either to Eskom or a newly created Single Buyer), co-generation can expand further with projects that generate more power than is necessary by the captive owner.

Wind and solar projects are higher cost solutions and relatively larger amounts of CTF support will be necessary to enable such projects. By supporting some initial captive power projects with these technologies, the current regulatory barriers to IPPs will be avoided and the Program can address the financial barriers to enable some initial commercial scale, private sector projects to demonstrate the technologies and build capacity in South Africa. Once the REFIT program is fully operational and the regulatory barriers removed, the Program will support pioneer projects under the REFIT, helping them overcome the higher first-mover costs that will not be faced by subsequent projects, allowing subsequent sustainable growth in these sectors. Both solar and wind have the potential to provide power in the gigawatt scale in South Africa but the REFIT program will be capped at certain levels so the initial captive projects supported by the Program will also supplement the total amount of capacity installed with these technologies.

The expected GHGs from South Africa's power sector under a business as usual case are approximately 300m tons CO₂e/annum. Depending on the final allocation of funds between the three technologies the Program is conservatively expected to directly support emissions reductions of 25,949,000 tons CO₂e and to indirectly result in reductions of 129,745,000 tons CO₂e over the lifetime of the projects.

Development Impact

The expected co-benefits achieved by the Program include:

- The construction and operation of the SE projects supported will provide employment, much of it rural.
- By accelerating the development of the renewable energy sector and supporting its achievement of critical scale in South Africa, the Program will open up opportunities for potential future renewable energy equipment manufacture in South Africa with its associated employment benefits.
- By enabling and accelerating private sector participation in renewable power generation in South Africa, the Program will directly support the diversification of the country's power generation mix which is currently highly dependent on coal-fired power.
- By demonstrating two different models of private sector investment in the power sector, self-generation and IPP, the Program will support the expansion of private sector engagement in the power sector as a whole.

Implementation Potential:

See description above regarding South Africa's solar, wind and co-generation market for details on the market context and regulatory environment. This project, along with other World Bank/AfDB CTF related interventions is expected to help the GoSA implement its LTMS.

The early projects supported under the REFIT program are expected to require lower amounts of CTF support and will thus achieve a greater leverage of other funding sources. In all cases, projects supported under the Program will seek to minimize the use of CTF funds and maximise the leverage achieved from MDBs, private sector, and carbon finance sources.

Additional Cost & Risk Premium

Cogeneration, wind power and solar PV are all fully proven (both technically and commercially) outside of South Africa and there are widespread examples of successful application at scale around the world. Concentrating solar power (of which there are multiple technologies) is technically proven but has less of a commercial track record (approximately 700MW of parabolic trough, less than 40MW of power-tower and only 1MW of sterling engine and linear Fresnel operating worldwide). South Africa has some very good areas of wind resource offering gigawatt scale development and a truly excellent solar resource that promises the greatest future potential opportunity for RE in the country. Given the level of agricultural and industrial activity in South Africa, there is also significant potential for cogeneration of many forms (biomass cogeneration, waste heat recovery and more).

- Cogeneration can provide power to industrial users at costs that are currently marginally over the tariffs they pay to Eskom. CTF funding applied to cogeneration projects will be used to lower costs of such projects to allow them to provide power at prices that are competitive with the current industrial power tariffs paid to Eskom. Given the announced increases in Eskom power tariffs over the next three years and the expectation that tariffs will continue to go up thereafter, it is expected that, with the demonstration of initial CTF projects, further private investment in cogeneration will grow sustainably without concessional support.
- Solar and wind projects supported in advance of REFIT will benefit from CTF support to (i) lower perceived risk of implementing a new model of SE self-generation in a country which today has almost none; and (ii) lower the costs of power from such projects to be in line with what industrial or commercial users would pay to Eskom for grid supplied power. CTF support to first-mover solar and wind projects under the REFIT program will mitigate the higher costs (setting contractual, operational and financial precedents for IPPs, creating transmission links to key SE resource areas, building the sectoral scale that enables lower equipment prices from international suppliers etc) and higher perceived risks faced by such pioneer projects. With successful demonstration of the first few projects, the regulatory support provided under REFIT is expected to enable sustainable growth of private sector investment in wind and solar power in South Africa.

Financial Sustainability

The announced increases in Eskom's power tariffs will increasingly make captive power generation more attractive. Cogeneration is the lowest cost answer for captive power and the Program will use relatively small amounts of CTF funds to enable projects in this sector, providing a demonstration to industrial and commercial players of how such investments can provide an effective solution to enabling secure self-generation. The Program will enable a more rapid scale-up of cogeneration technology which will become economically sustainable over the coming years as Eskom tariffs continue to increase. The potential of cogeneration would be further enhanced by the clarification of the regulations and processes under which IPPs can sell power into the grid (with power purchase agreements either to Eskom or a newly created Single Buyer), allowing cogeneration to expand further with projects that generate more power than is necessary by the captive owner.

The Program will support and enable some initial captive power projects with wind and solar technology.

Further expansion of these generation technologies will require the successful implementation of domestic regulatory support which the REFIT program promises to provide. The tariffs promised under the REFIT program appear to be sufficient to support sustainable growth of the sectors once the first few pioneer projects proceed. The Program will support the initial generation projects under REFIT to overcome these barriers and pave the way for sustainable growth of the sector. Given South Africa's bountiful supplies of coal, solar and wind power are likely to need ongoing regulatory support in the medium term. With further development of these technologies, however, costs will reduce due to technological improvement and economies of scale. And with future pricing of the carbon externalities of coal, both technologies have the promise of being competitive contributors to South Africa's power mix.

Effective Utilization of Concessional Finance

Cogeneration, including biomass cogeneration and waste heat recovery of existing thermal plants, offers a cost effective means of industrial power generation that can reduce demands on grid supplied power and even contribute excess power to the grid. Development of such technologies has to date been inhibited by the low power tariffs in South Africa. Though power tariffs are now being increased to reflect the full cost of the power sector and its future expansion, the economics of such projects are still marginal under the current tariff regime. Small amounts of concessionary finance will accelerate the growth of this technology in South Africa while in the medium term increasing grid-tariffs will allow this sector to grow sustainably. The Program will seek to maximize leverage of the CTF funds by either applying small amounts of concessionary senior debt or utilizing guarantees that give investors greater certainty over the avoided costs of power purchased from the grid (effectively removing the risk that Eskom tariffs will not increase) – as well as potentially to address off-taker creditworthiness.

Wind power is commercially proven worldwide but apart from in locations with particularly good wind resources cannot compete with the lowest cost forms of thermal power generation. Solar PV and concentrating solar power show great promise for long-term cost reduction and competitive provision of low carbon power but for now are relatively high cost forms of generation. Projects developed in South Africa for captive power use or wheeled through the grid to industrial off-takers will need concessionary funds to support the cost differential between the current power tariffs from Eskom and the full cost of wind power generation. The pioneer projects developed under the REFIT program will face higher costs and higher risks (than subsequent projects) associated with first movers and the concessionary financing will be used to address these. In the long-term however, it is believed that the proposed REFIT tariff will be sufficient to enable sustainable growth of the wind and solar sectors.

Given the varying economics of the three technologies considered under this programmatic proposal and the site specific economics of renewable power in general, the structuring of CTF funds will need to be tailored on a project by project basis but will always seek to maximize the use of other sources of funding (MDB, private sector, carbon finance and other concessionary sources) while minimizing the use of CTF.

To date almost no private sector investment has occurred in the power sector in South Africa so there is little precedent or benchmarking of other concessional approaches applied. Concessional support is however being applied to the public side of the power sector, with CTF support planned to go to Eskom's own wind and solar projects by IBRD and AfDB.

Mitigation of Market Distortions

The Program is designed specifically to have a supporting rather than distorting impact on the nascent private sector participation in the South African power sector. It aims to enable private sector investment in megawatt scale sustainable energy which is not currently possible in South Africa. The implementation of the Program

will remain flexible and responsive to the parallel development of the regulatory environment in South Africa, seeking to support initial projects under REFIT when this is fully functioning, ensuring REFIT's success and long-term sustainability. Projects enabled in advance of and outside of the REFIT program will fast-track the establishment of an SE sector in South Africa and support renewable generating capacity above and beyond the caps that will be applied under the REFIT.

Risks

Risks associated with the Program include:

- *Risk:* The South African power sector is going through a turbulent period with the GoSA, the regulator and Eskom adjusting to respond to the substantial need for increased generating capacity. In this dynamic environment the best approach to enabling and accelerating private sector participation in renewable power generation could change during the life of the Program.
Mitigant: The Program is designed to flexibly respond to this environment by enabling initial private sector investment in SE in advance of an operating IPP regulatory program and by accelerating the initial participation of the private sector under an operating IPP regulatory program.
- *Risk:* First megawatt scale private projects of solar and wind power in South Africa will face risks associated with lack of experience and capacity in the sector.
Mitigant: The Program will benefit from the MDB's selection of projects with the right combination of sponsors, suppliers and off-takers to maximize the chances of success. The Program will also benefit from IFC's global experience of financing private sector renewable energy projects.