

CTF PRIVATE SECTOR PROPOSAL

Name of Project or Program	Expansion of the Approved South Africa Sustainable Energy Acceleration Program (SEAP)
<i>CTF amount requested</i>	Investment: USD 56.575 million Implementation and supervision budget: USD 0.925 million <u>Total amount: USD 57.500 million</u>
<i>Country targeted</i>	South Africa
<i>Indicate if proposal is a Project or Program</i>	Program
1 DETAILED DESCRIPTION OF THE PROGRAM	
<p style="text-align: center;">1.1 Proposal Context</p> <p>The <i>South Africa Country Investment Plan</i> (CIP, endorsed by the CTF Trust Fund Committee in November 2009) identified a potential role for CTF funds to unlock private sector engagement in the energy sector, particularly in renewable energy (RE) generation and energy efficiency (EE). To support this role, the CIP allocated USD 75 million to International Finance Corporation (IFC) (in parallel to an equal allocation to the private sector arm of African Development Bank) to be channeled into three private sector sub-components:</p> <ul style="list-style-type: none"> ➤ <i>Sustainable Energy Acceleration Program (SEAP)</i> to undertake direct investments in RE; ➤ <i>EE Program</i> to carry out investments in EE projects through financial institutions (FIs); ➤ <i>Solar Water Heaters (SWH)</i> sub-component to support to the SWH market. <p>In October 2013, the CTF Trust Fund Committee (TFC) endorsed the <i>Update of CTF Country Investment Plan for South Africa</i> that dropped the USD 50 million SWH sub-component due to limited interest from FIs and municipalities, and reduced the EE sub-component by USD 7.5 million, thereby making USD 57.5 million available to either a private sector <i>Sustainable Energy Acceleration Program (SEAP)</i> or a public sector <i>Vehicle Efficiency Program</i>, to be implemented by African Development Bank (AfDB).</p> <p>At this time (concurrently to the submission of this <i>Program</i> proposal), an <i>Amendment to the CTF Investment Plan for South Africa (Amendment)</i> is submitted by the Government of South Africa (GoSA), AfDB, and IFC. The <i>Amendment</i> proposes to retain the USD 57.5 million allocation for the private sector <i>SEAP</i> sub-component and channel these funds through IFC.</p> <p><u>Update on IFC's South Africa CTF allocation</u></p> <p>Following the <i>Update of CTF Country Investment Plan for South Africa</i> in October 2013, IFC retained CTF allocations for the following programs:</p> <ul style="list-style-type: none"> ➤ USD 42.5 million for the <i>SEAP</i>¹ to support private sector direct investment in RE projects. The <i>SEAP</i> is implemented in coordination and collaboration with AfDB that also has a USD 42.5 million allocation under this program; ➤ USD 7.5 million for <i>EE Program</i>² to support private sector EE projects through collaboration with FIs and Energy Services Companies (ESCOs). 	

¹ Approved by the CTF TFC in October 2010.

Both of these programs are under implementation, with *SEAP* funds fully committed to two sub-projects (one of which is already operational) and part of the *EE Program* funds committed to one sub-project with a pipeline of other sub-projects to follow.

This proposal for *Expansion of the SEAP* seeks an approval for increasing the funding of the IFC's account of the *SEAP* by USD 57.5 million. IFC has developed a strong pipeline of sub-projects that, when realized, will accelerate the use of the CTF funds in South Africa and allow CTF to support the momentum of innovation in solar power technologies in the country. IFC's project pipeline fully conforms to the objectives, scope, and expected outcomes of the USD 57.5 million allocation endorsed by the CTF TFC in October 2013 **and** the original *SEAP* approved in October 2010. While CTF *SEAP* funds have already helped achieve significant progress in promoting sustainable energy projects in South Africa, further support from the CTF within the scope of the *SEAP* is needed and will result in continued sector transformation.

1.2 Country and Sector Context

In the early 2000s, the Government of South Africa (GoSA) undertook a strategic approach to combating climate change issues. Starting with developing a National Climate Change Response Strategy in 2004 that laid out a broad range of principles and policy measures for mitigation and adaptation to climate change, GoSA outlined ambitious RE and EE plans, which continue to be updated, with current objective to build 17.8 GW of new RE generation capacity by 2030, representing over 40% of the country's planned power generation investments between 2010 and 2030. To achieve this ambitious target, GoSA has embarked on a series of actions promoting private sector investments, including a number of improvements to the regulatory framework.

Among GoSA initiatives is the Renewable Energy IPP Procurement Program (REIPPP, launched in 2011) that provides feed-in tariff incentives for the development of RE projects. Under the REIPPP, the GoSA has organized four procurement rounds to date, using a reverse auction process where private developers bid for allocated RE technology capacities and receive Power Purchase Agreements (PPAs) with the public utility Eskom. IFC and AfDB have directed CTF *SEAP* resources to support REIPPP's efforts to promote Concentrated Solar Power (CSP) technology, which was allocated 600MW of capacity through four rounds of bidding. So far, this support has led to three groundbreaking CSP sub-projects, totaling 250 MW of installed capacity.

In the first REIPPP round in 2011, IFC and CTF provided financing to two CSP projects awarded through a tender process: (i) Kaxu – a 100MW parabolic trough; and (ii) Khi – a 50MW tower. As of February 2015, the Kaxu project has completed construction and become the first operational CSP plant in an emerging market as well as the first operational CSP plant supported by the Climate Investment Funds. In parallel, AfDB brought forward the 100 MW parabolic trough Xina CSP project, backed by AfDB's CTF funding, as well as by commercial financing from IFC. Overall, the *SEAP* has helped mobilize over USD 2,200 million in financing for private sector CSP projects in South Africa.

The early experience with CSP technology in South Africa, supported by the *SEAP*, has been positive and contributed to reinforced GoSA commitment to CSP. In a relatively short time, the value of CSP technology and its ability to provide reliable base-load power from a RE source has become better understood, elevating GoSA's interest in further promoting the technology and encouraging CSP developers to improve project economics through technical design modifications. The evolution of the CSP technology in the last few years, supported by GoSA's policy framework and the REIPPP, has allowed significant reductions (~40%) in the average feed-in tariff for CSP projects in South Africa. In addition, growing CSP market has led to increased local capacity to provide related services, including manufacturing of project components, such as mirrors, construction and maintenance of operational

² Approved by CTF TFC in September 2010.

power plants.

Meanwhile, due to continued growth of power demand, the country's generation reserve margin has shrunk and the need for rapid expansion of the country's sustainable generation capacity has become even more acute. As rolling blackouts have become more pronounced and frequent, end-users' concerns regarding the reliability of grid power are prompting them to seek back-up solutions, resulting in rapid growth of secondary, distributed power generation. This trend has created a consistent consumer demand for innovative business models utilizing solar photovoltaics (PV) for self-supply of electricity. Overall, while the momentum and early success created by the REIPPP program are encouraging, there is now a significant need for continued rapid expansion of the country's sustainable energy installed capacity and increase in the reliability of delivered energy.

1.3 Barriers to Private Sector Investment

An excellent solar resource in South Africa presents a great opportunity for increasing the amount and reliability of energy supply in the country. Several CSP projects and number of utility-scale solar PV power plants have demonstrated the value and provided early experience in solar-based energy generation. Still, the need for increasing electricity supply in the country far outstrips the pace of the progress in RE, requiring applying additional efforts to continue removing the barriers precluding desired acceleration of the RE growth.

For example, there is a significant demand and interest in promoting distributed energy generation capacity. A number of private sector companies are evaluating successes and lessons learned from solar PV leasing companies, which have grown over the last decade in certain developed markets, most notably in the US. However, this business model remains largely untested in developing markets, including South Africa. As a result, "first mover" projects face unique financing and operational challenges linked to: (i) the learning curve of key project developers (e.g. project sponsors, engineering contractors, and operations and maintenance contractors); (ii) the absence of a proven regulatory framework for leasing/rental of solar PV equipment based on actual energy consumption; (iii) the lack of a proven track record of the savings from solar PV for potential clients; and (iv) the lack of an established local supply chain. Additionally, first mover projects have difficulty securing long-term financing, primarily due to the untested nature of the distributed solar PV business model in South Africa. Given the lack of a track record and uncertainty related to the credit risk of potential power off-takers, banks view lending to this type of project as risky. This risk perception further limits access to long term financing, which is necessary, given the long investment recovery period for this type of business model.

Similarly, the market penetration and experience with the CSP technology has not yet reached the point, where subsequent projects could be done on a fully commercial basis. While globally CSP technology is making significant strides towards becoming commercially viable and cost-competitive (with early successes supported by the CTF in Chile, Morocco, and South Africa), the technical features of CSP technology continue to mature and evolve, not only elevating its unique value as a source of base-load energy, but also increasing the complexity and cost of the technology.

The recent technical advances have allowed better and more cost-effective integration of CSP generation with energy storage, enabling a CSP plant to supply electricity that fully meets the demand requirements and profile, overcoming intermittency concerns and displacing fossil fuel-based base-load generation. To take a full advantage of this distinct feature, the GoSA has modified the tariff structure under the REIPPP to offer a tariff multiplier for power delivered during peak demand hours. As a result, project developers are now incentivized to maximize/optimize energy storage capacity in CSP project design, therefore enabling CSP energy to be delivered during both the morning and evening peak demand periods, at prices increasingly competitive to other peaking power options.

Despite the progress, CSP continues to require active facilitation from governments (in the form of higher

tariffs), International Financial Institutions and/or concessional finance – especially in emerging markets. Large upfront capital requirements, high costs, and increasing complexity of the technology (including new design and enhanced materials that enable increased energy storage) still present significant barriers for fully commercial uptake in the CSP sector. Responding to the demand for dispatchable power, developers are proposing ever more innovative and efficient designs such as the first facilities of scale to feature power tower designs with molten salt receiver systems and energy storage capabilities, allowing CSP plants to operate almost 24/7. These types of projects have no operational references at this scale anywhere in the world, thus presenting a strong technological innovation argument for concessional finance support. In addition, recent macroeconomic changes in South Africa, including extreme movements in exchange rates and rising interest rates, have negatively impacted capital intensive CSP projects. These and other exogenous factors threaten to reverse the positive trend in accelerated penetration of CSP generation and realized cost reductions of CSP projects.

With that, it is needed to continue to contribute to the development of CSP and distributed solar PV projects in South Africa, building on the growing momentum and aiming at reaching critical mass. IFC is proposing to use the reallocated CTF *SEAP* funds to support South Africa’s solar sector—both for emerging CSP technology under the REIPPP and for distributed generation or self-generation using solar PV. CTF funds can be deployed in a way to address the above market barriers to maintain the momentum of the growth of solar power generation in South Africa.

1.4 Investment Services Component

The proposed expansion of the *SEAP Program (Expanded SEAP)* will aim to address the barriers mentioned earlier and catalyze further scale-up of RE projects. Given the strong solar resource in South Africa, IFC has been supporting innovative uses and business models utilizing solar technology, particularly to improve the cost of electricity supply from solar-power generation. Much progress has been achieved towards reaching this objective; however, a further concessional support is needed in the next phase of RE market development. To that goal, the additional funds for the *SEAP* will be applied to support: (i) private sector solar power generation projects that are adopting further technological innovation in dispatchable RE generation technologies, such as CSP; and (b) demonstration of commercial viability of distributed generation business models outside of the REIPPP’s scope.

Project developers in South Africa are working on advancing projects that would use a CSP technology with more advanced features than these of the plants currently in operation or under construction in both developed and emerging markets. This enhanced CSP technology will improve power generation efficiency and allow for better integration into the grid, especially during periods of peak demand. However, while the value of this CSP technology is fully recognized, the cost remains high relative to the alternatives. As this cost is ultimately passed through to end users, CTF concessional financing can help lower the tariff burden on end users and support South Africa’s effort to continue scaling up CSP, while bringing the technology closer to competitiveness.

In order to further take advantage of the exceptional solar resource available in South Africa and improve the reliability of electricity supply in the country, a series of solar PV-based distributed generation projects can also be undertaken. These projects have the potential to meet the needs of large South African electricity consumers through a new business model, while also demonstrating the market opportunity and replicability of PV-based distributed generation. Given the untested nature of the regulatory framework and business models, and deficit of the appropriate financing, CTF funds can be used to help the first mover projects, showcasing their commercial viability and value.

Expanded SEAP will seek to retain flexibility (in terms of approach, project selection, and application of CTF funds) to achieve optimal structure to most effectively accelerate the implementation of these RE investments with minimal level of concessionality on a project-by-project basis. The financial instruments, pricing and terms of the CTF funds will be tailored on a project-by-project basis to address

the specific needs of each sub-project. Final agreement to provide CTF funding to any individual sub-project would be subject to a full due diligence process and approval by an internal IFC approval body, as well as IFC Board. All sub-projects financed under the Program will be required to meet IFC environmental, social, governance and other compliance requirements, as well as all South African regulatory requirements. IFC's participation in the sub-projects will ensure implementation of IFC Performance Standards, including environmental and social guidelines.

1.5 Program's strategy to achieve market transformation

The proposed *Program* will further enhance the transformational impact of CTF support to South Africa's RE sector by advancing a track record of innovative solar technologies and business models for distributed power generation. These first mover projects in Sub-Saharan Africa are expected to: (i) demonstrate the potential of solar PV in distributed generation/self-supply; (ii) reduce investor risk perception in the medium term and help similar future projects in the country and region to proceed with less or no subsidy; and (iii) increase the overall market experience in the development of CSP plants, using new technologies, which should increase efficiency and reduce cost of energy generation in the long-term.

Moreover, improved designs and more advanced technology in the projects being proposed should ultimately help bringing CSP tariffs ever closer to those of fossil-fuel based power plants. Further IFC/CTF support to the sector will help increase CSP developer capacity and experience with new technologies and designs, as well as continue to support financial sector risk appetite in this nascent sector.

Continued CTF support to the RE sector through additional resources for the *SEAP* remains fully consistent with CTF's primary objective to scale-up "*financing to middle income countries to contribute to the demonstration, deployment and transfer of low carbon technologies*".

2 FIT WITH INVESTMENT CRITERIA

2.1 Potential GHG Emissions Savings

The calculations of potential GHG emissions savings that can be achieved with additional funding to the *SEAP* are based on the following assumptions:

- The *Expanded SEAP* is expected to result in at least 100 MW of additional installed capacity;
- An estimated weighted average capacity factor of 55%, based on initial assessment of sub-projects mix;
- A combined margin emission factor³ of 0.980 tCO₂e/MWh⁴; and
- An anticipated lifetime of 20 years.⁵

³ For grid-connected renewable energy IFC follows the International Finance Institution Approach to GHG Assessment in Renewable Energy. GHG emissions are estimated based on the combined margin emission factor.

⁴ UNFCCC, 2013, *CDM-EB73-A03, Standardized baseline: Grid emission factor for the Southern African power pool*. Accessed at https://cdm.unfccc.int/filestorage/m/v/362UWIAX0NZK5CVBMS41EQDJTH9O8P.pdf/eb73_repan03.pdf?t=bVN8bm5sNWVhfDB286Kf6ySVZOIUO2LhhFJI

⁵ The IFC GHG accounting methodology provides guidance on calculation of the GHG emission reduction on the basis of one representative year. To assess the amount of the lifetime GHG savings, an anticipated life of the financial product is assumed to be around 20 years.

Sub-projects under this *Expanded Program* are expected to directly generate GHG emission reductions of about 470,000 tCO₂e (0.980 tCO₂e/MWh x 100 MW x 8,760 hours x 55%) over a representative year of operation, and over 9,400,000 tCO₂e over the life of sub-projects (estimated at 20 years).

Given that the *Program* may result in scaling up RE generation in South Africa, triggering a series of follow-up projects, IFC anticipates a significant replication effect. Assuming a multiple of at least 5x, the *Program* could indirectly lead to around 2,350,000 tCO₂e per year of GHG reduction.

Note, that the above amounts are expected to be achieved in addition to the targets under the original *SEAP* (see section 3, *Performance Indicators*, below).

2.2 Cost-Effectiveness

Based on the above calculations and the *Program* cost of USD 57.5 million, the direct GHG emission reductions per CTF USD will be USD 6.1/tCO₂e (or 0.16 tCO₂e/USD) over the life of sub-projects and indirect GHG emission reductions per CTF USD will be USD 1.2/tCO₂e (or 0.82 tCO₂e/USD).

With the total investment cost of around USD 700 million, the total investment per direct life-time GHG emission reductions is expected to be around USD 74/tCO₂e.

The cost-effectiveness numbers expected to be achieved under the *Expanded SEAP* (expressed in tCO₂e/USD) are slightly lower than those projected in the original *SEAP* at the time of TFC approval (please refer to the *Cost-Effectiveness* section of the 2010 *SEAP*, Attachment 1), with the difference largely explained by the difference in assumed life-time of sub-projects.

2.3 Demonstration Potential at Scale

This *Expanded SEAP* proposal seeks to support the growth and market maturation of RE projects in South Africa. As mentioned earlier, it intends to promote private sector participation in adopting an advanced CSP technology (the first of its kind in the African continent) and innovative business models deploying other RE technologies. The demonstration effect of sub-projects under the *Expanded SEAP* will include: (i) paving the way for developers, investors and lenders to follow with scaled up solar investments; and (ii) demonstration of private sector solar projects, which will improve capacity and prove the technical and economic realities of solar technologies in the South African context.

The outcomes and impacts of the *Expanded SEAP* are expected to be of the same nature as those of the original *SEAP* (please refer to the *Demonstration Potential at Scale* section of the 2010 *SEAP*, Attachment 1), although of a higher magnitude as indicated in the section 3, *Performance Indicators*, below.

2.4 Development Impact / Co-benefits

Please refer to the *Development Impact / Co-benefits* section of the 2010 *SEAP* proposal (Attachment 1).

In addition, this *Expanded SEAP* will seek to deliver the following:

- Continuing Support to Sector Reform: This *Program* proposal will continue to inform GoSA on the appropriate regulatory tools to support CSP and RE more generally;
- Contributing to GoSA's objective: The *Expanded SEAP* will contribute to further diversification of the country's energy mix and reaching the 2030 RE installed capacity target;
- Replication Effect: success of the investments under this *Program* proposal is expected to enable replication of the business models and technologies on a commercial basis in

- South Africa and potentially in other countries;
Promoting domestic economy: The *Expanded SEAP* will continue promoting development of local manufacturing capacity as well as relevant labor skills.

2.5 Implementation Potential

IFC is assessing market conditions and possibilities of undertaking investments in various projects employing solar technologies. The range of potential investments covers utility-scale, innovative-technology CSP sub-projects as well as innovative business models in distributed solar PV generation.

2.6 Additional Costs & Risk Premium

Please refer to the *Additional Costs & Risk Premium* section of the *2010 SEAP* proposal (Attachment 1).

2.7 Financial Sustainability

Please refer to the *Financial Sustainability* section of the *2010 SEAP* proposal (Attachment 1).

In addition, the following will contribute to achieving financial sustainability of the target sectors:

- As CSP projects have actively bid and won REIPPP tenders, and additional bidding rounds are expected in the near future, it is likely that through accumulated experience with this novel CSP technology, the costs and perceived risks will continue coming down, making the future projects one step closer to commercial.
- Similarly, initial investments in distributed solar PV generation are expected to significantly accelerate learning curves, making financiers more comfortable with extending commercial financing and increasing project sponsors' appetite to originate this type of projects. The financial community in South Africa is active, competitive, and monitors closely innovative activities of every sizeable participant. With a few successful first-movers, the market is likely to pick up and commercial financing will follow.

2.8 Mitigation of Market Distortions

In using CTF funds to support REIPPP projects, IFC and AfDB have been careful not to distort the competitive bidding process. An ability of CTF to focus its support on one sector allowed IFC and AfDB to offer financing on similar terms to all parties bidding in the CSP sector in a particular round. A similar approach will be taken in the *Expanded SEAP*, whereby CTF support will be structured to enable bidders to reduce the overall cost of the project above and beyond what is possible with purely commercial financing.

For further details please refer to the *Mitigation of Market Distortions* section of the *2010 SEAP* proposal (Attachment 1).

2.9 Effective Utilization of Concessional Finance

Concessional funding will:

- Absorb higher costs and higher risks associated with first mover projects adopting innovative CSP technology and innovative solar PV business models under unproven regulatory regime for distributed power generation;

- Enable sub-projects to obtain financing with terms not currently available on the market, but necessary for sub-projects to move forward. Allow IFC and other investors to provide financing to sub-projects, enabling them to reach financial closure;
- Directly contribute to the construction of a first-of-its-kind CSP project and accelerate an uptake of distributed solar PV generation in South Africa;
- Further encourage private sector participation, among RE project developers and FIs;
- Maximize leverage of the CTF funds and encouraging private sector participation.

2.10 Risks

Please refer to the *Risks* section of the 2010 SEAP proposal (Attachment 1).

3 PERFORMANCE INDICATORS

The performance indicators outlined below are derived from the CTF Results Measurement Framework. These indicators will be tracked at least annually.

Indicator	Original SEAP ⁶	This proposal – <i>Expanded SEAP</i>	Total under <i>SEAP</i> ⁷
DIRECT IMPACTS:			
Increased supply of RE, MW	250	100	350
GHG emissions avoided: per annum, tCO ₂ e	860,000	470,000	1,330,000
over life of sub-projects, tCO ₂ e	17,200,000	9,400,000	26,600,000
Incremental financing leveraged (of all non-CTF parties), USD million	2,200	700	2,900
Jobs created	na	na	na

⁶ Data are based on actual projects already approved by respective MDB boards and being either under construction or in operation.

⁷ Total amounts include the results achieved/expected from the original *SEAP* and incremental results achieved by added funds under the *Expanded SEAP*.