Climate Investment Funds

CTF/TFC.13/6
June 2, 2014

Meeting of the CTF Trust Fund Committee
Montego Bay, Jamaica
June 26, 2014

Agenda Item 6

REVISED CTF INVESTMENT PLAN FOR MENA CSP

PROPOSED DECISION

The Trust Fund Committee reviewed document CTF/TFC.13/6, *Revised CTF Investment Plan for MENA-CSP* (June 2014), submitted by the Governments of Algeria, Egypt, Jordan, Libya, Morocco, and Tunisia, in collaboration with the African Development Bank (AfDB) and the World Bank Group, and takes note of the updates on the implementation of the projects and programs financed by the CTF and the following proposed revisions to the *CTF Investment Plan for MENA-CSP*:

a) increasing the indicative allocation in CTF funding from USD 660 million from the last revision endorsed by the Trust Fund Committee in May 2013 to USD 750 million (the same amount as in the original *CTF Investment Plan for MENA-CSP* endorsed in December 2009);

b) adding Libya as a new participating country in the program (in addition to Egypt, Jordan, Morocco, and Tunisia) and including Algeria (which was one of the original five participating countries) as a country to participate in the technical assistance component of the program; and

c) allocating or re-allocating indicative CTF funding as follows:

Country	CTF Financing (USD Million)	Project Capacity (MW)
Egypt	123	100 (Komo Ombo)
Jordan	50	Up to 100 (including CPV)
Libya	20	100
Morocco	197 238 50	160 (Noor I) 350 (Noor II&III) 100 (Phase II of Midelt or Tata)
Tunisia	62	50 (Akarit)
Technical Assistance (Algeria, Egypt, Jordan, Libya, Morocco, and Tunisia)	10	
Total	750	960

The Trust Fund Committee endorses the revisions as a basis for the further development of the proposed activities for CTF funding, subject to comments made at the meeting or submitted in writing by July 11, 2014. The Trust Fund Committee also recalls that the approval of CTF funding by the Committee is dependent upon the submission of high quality project or program proposals. The Committee requests AfDB and the World Bank Group to work closely with the participating countries in the MENA region to expedite the development of the projects for submission to the Trust Fund Committee for funding approval in the proposed timeframes.

CLEAN TECHNOLOGY FUND

MENA CSP INVESTMENT PLAN

Third Update Note

June 14, 2014

Middle East and North Africa

CLEAN TECHNOLOGY FUND

MENA CSP INVESTMENT PLAN

Third Update Note

Table of Contents

List of Abbreviations

AFD	French Development Agency
AfDB	African Development Bank Group
CPV	Concentrated Photovoltaic
CSP	Concentrated Solar Power
CTF	Clean Technology Fund
DNI	Direct Normal Irradiation
EIB	European Investment Bank
ESMAP	Energy Sector Management Assistance Program
EU	European Union
GoE	Government of Egypt
GW	Gigawatt
GWh	Gigawatt Hour
IBRD	International Bank for Reconstruction and Development
IP	Investment Program
ISCC	Integrated Solar Combined Cycle
KfW	Kreditanstalt für Wiederaufbau (German Development Bank)
LCOE	Levelized cost of energy
MENA	Middle East North Africa
MSP	Mediterranean Solar Plan
MWe	Megawatt (electrical)
NIF	Neighborhood Investment Facility
NREA	New and Renewable Energy Authority
PV	Photo Voltaic
RE	Renewable Energy
TES	Thermal Energy Storage
TFC	Trustfund Committee
WB	World Bank

EXECUTIVE SUMMARY

E1. Deployment of the CSP technology, a promising technology for low-carbon power systems as it is a reliable and flexible source of power, with many co-benefits such as energy security, industrial development and job creation, continues to progress successfully around the world and costs are declining. Despite slow progress on some projects, the MENA region has been at the forefront of the technology deployment, thanks in large part to the successful launch in Morocco of one of the largest CSP plant in the world with support from the Clean Technology Fund (CTF). The MENA region, led by Morocco and Saudi Arabia, wants to remain a key player in a rapidly evolving market, reaping the benefits of technology improvements, cost reductions and derived socio-economic impacts. However, this will be possible only if the CTF continues to support deployment of the technology in the region through concessional funding and if other sources of grants can be found, as several countries are facing economic hardships.

E2. The Middle East and North Africa (MENA) Concentrated Solar Power (CSP) program of the Clean Technology Fund (CTF) as originally conceived supported the large-scale deployment of solar energy in the MENA region through CTF financing of US$750 million that aimed at leveraging nearly US$5 billion from other donors and private financing in support of about1 gigawatt (GW) of CSP capacity and two related transmission infrastructures projects in five MENA countries. It was endorsed by the CTF trust fund committee (TFC) in December 2009. It was updated in November 2010 and May 2013. Participating countries in the program are Algeria, Egypt, Jordan, Libya, Morocco, and Tunisia.

E3. Following the second revision, the scope of the plan was reduced to US$660 million subject to confirmation by means of the present third update. The program has been further delayed as the fundamental reasons for such delay continue to be (i) the Arab Spring and the uncertainties this has brought about for large infrastructure investments in some countries, (ii) subsidy requirements in excess of what is considered affordable by the participating countries, (iii) specific project-related delays, and (iv) possibly economic difficulties in Europe.

E4. However, while some countries are experiencing delays, the program has progressed satisfactorily in Morocco, and even better than expected in some aspects. In June 2011, the CTF TFC approved the first project under the MENA CSP CTF IP, the Noor[1] I 160 MW project (the first phase of the 500 MW Noor Solar Complex), which is considered a success for the following reasons: (i) it attracted significant interest from bidders, indicating that strong competition was present and that there was an appetite in the private sector to participate in this type of project despite the inherent risks. The bid price, at UScts 17.4/kWh, was 30% below estimates and presents one of the lowest CSP levelized cost of electricity (LCOE) achieved globally to date; (ii) Noor I is also one of only three infrastructure Public Private Partnerships (PPPs) to reach financial close in North Africa since the Arab Spring.

[1] Please note that during the official inauguration of the project by Morocco's King in May 2013 the project was renamed from Ouarzazate solar complex to Noor solar complex. In Arabic "Noor" means light or illumination.

E5. The project established a model in the region for promoting solar energy development and for establishing a partnership between Morocco and the international community for CSP scale-up for both domestic use and exports. In June 2013 the project reached effectiveness, and construction is now well underway. The plant is expected to become operational in 2015. The next phase of the Noor Solar Complex, the 350 MW Noor II & III project is also progressing well, and the first stage of bidding has been completed. Financial close is expected by November 2014. CTF trust fund committee approval is expected for June 2014.

E6. Other projects in the original MENA CSP CTF IP are facing delays and have not yet been presented to the CTF TFC. At the time of the second MENA CSP program update, the transmission line projects were canceled. In mid-2014, the CSP projects in Egypt and Tunisia most specifically may no longer be able to advance within the initial timeframe of the MENA CSP CTF program unless a remedy for financing the incremental costs of the plants can be found. Moreover CSP costs are declining, implying that less subsidies than initially expected might be required in the mid-term, and socio-economic benefits are gaining prominence as a key driver of renewable energy deployment, potentially offsetting the CSP incremental cost.

E7. In accordance with CTF rules, if all projects in an endorsed investment plan are not submitted for funding approval within 24 months of IP endorsement, a review of the progress of implementation of the IP is to be prepared and an IP update is to be submitted to the TFC with a detailed explanation on the reasons for delay, corrective measures, and new delivery targets. The last IP Update that was submitted in line with these rules was submitted in May 2013. As there remained significant levels of uncertainty with respect to the projects' advancing at the time of this last update, it was proposed to initiate a second update in parallel with the next MENA CSP CTF program-sponsored project presentation to the CTF trust fund committee (TFC). The next project ready for presentation at the CTF TFC is the Noor II and III project in Morocco, for which approval by the TFC is required in June 2014. To this end, this Investment Program (IP) Update has been prepared. An initial draft was prepared for discussion at a workshop in Rabat in early April 2014 where the participating countries met to discuss progress on their projects and agree which projects to include in this Update.

E8. As part of the preparation of the original MENA CSP CTF IP, the participating countries proposed a pipeline of generation projects for 900 MW. Based on an indicative CTF contribution of US$0.725 million/MW for proposed generation projects and allocations for two transmission projects, the resulting allocation by country was: Algeria – US$ 160 million, Morocco – US$ 197 million, Tunisia – US$ 186 million, Egypt – US$ 95 million, and Jordan – US$ 112 million. The November 2010 IP Update had projects amounting to 1,200 MW inscribed, based on the announcement of ambitious solar plans in several countries with CTF amounts by country remaining unchanged. The May 2013 Update saw a significant reduction in the number of projects and of the total power generating capacity of those projects to 710 MW. The table below summarizes the pipeline of projects in the December 2009, November 2010, and May 2013 IPs. It also presents the status of these projects as of mid-2014.

Table E1: MENA CTF indicative financing plan endorsed in December 2009, November 2010, May 2013, and status in mid-2014 (in US$ million)

Country	CTF Investment Plan Approved December 2, 2009			CTF Investment Plan Update Approved November 2010		CTF Investment Plan Update Approved May 2013			Project Status mid-2014
	Project (Name)	Capacity (MW)	CTF financing (US$ million)	Project (Name)	Capacity (MW)	Project (Name)	Capacity (MW)	CTF financing (US$ million)	
Algeria[2]	Megahir	80	58	Megahir	80			-	Feasibility (Megahir)/pre-feasibility (Naama) studies launched for PPP projects, but Algeria confirmed that it will not use CTF financing for specific projects.
	Naama	70	51	Naama	70			-	
	Hassi R'mel II	70	51	Hassi R'mel II	70			-	
Egypt	Kom Ombo	70	51	Kom Ombo	100+	Kom Ombo	100	123	Feasibility study near finalization. ESIA launched using a CTF PPG. Bidding documents in preparation. NIF grant of US$32.5 million confirmed. Financing confirmed from KfW, EIB and AFD, in addition to IBRD and AfDB. But the Government of Egypt is not committed to cover the incremental cost at this point in time, and is exploring various grant options.
	Marsa Alam	30	44						

[2] Algeria's intentions vis-à-vis CTF financing were unclear at time of initial IP preparation in 2009 but, at the time of the 2013 Update, Algeria has indicated that it does not intend to borrow from CTF, but would like to continue participating in the MENA CSP initiative.

Jordan	Ma'an Province	100	72	Ma'an	100	Ma' an	100	50	Five private investor consortia prequalified for trough or tower CSP projects in July 2011. Two private investor consortia initially prequalified for CPV projects, but CPV projects have now been transformed into PV projects. Entire Jordan CTF allocation to be mobilized by IFC on two private sector CSP projects.
	Mashreq CSP Transmission	-	40	Mashreq CSP transmission	-	-	-	-	NIF grant for feasibility study, but no CTF resources requested.
Morocco	Tan Tan	50	35	Noor Solar Complex (formerly Ouarzazate)	500	Noor I	160 MW	197	Noor I (160 MW) awarded to a consortium led by ACWA Power on Sept 24, 2012. Commercial close on Nov 19, 2012. Financial close in June 2013, and construction underway. Co-financing by AFD, EIB, KfW, AfDB, and the World Bank. Prequalification complete for Noor II and III and technical bids under evaluation (350 MW)
	Ain Beni Mathar	125	90			Noor II & III	300 MW	218	
	Ouarzazate	100	72						
Tunisia				STEG-CSP	50	STEG-CSP	50	62	Feasibility study completed. DNI data collected from April 2012 to March 2014. Environmental studies nearly completed. But the Government of Tunisia is reluctant to cover the subsidy requirements for the project and is seeking

									further grants, or other ways to reduce costs.
	ELMED-CSP	100+	73	ELMED-CSP	100+	-	-	-	Prequalification process launched in April 2010, with 11 submissions received by the deadline of July 26. Project on hold and is being re-engineered.
	IPP-CSP Project	100	73	STEG renouvelables/SITEP	50	-	-	-	Downsized to 5 MW and financed through a grant from Japan. No use of CTF funds.
	Tunisia-Italy transmission	-	40	Tunisia-Italy transmission	-	-	-	-	Was put on hold until more clarity on legal and institutional framework for export to Italy/Europe. New study launched for a public sector project that could serve to transmit electricity in both directions (from Italy to Tunisia in short-term given excess supply in Italy). May not be able to use CTF resources given the time frame.
CSP TA Grant							-	10	Under joint preparation by AfDB and World Bank.
Total		**895**	**750**		**1,120**	**710**	**660**		

E9. In this IP Update document, the pipeline of projects is realigned with the aim of (i) reflecting the specific developments in the program countries, as several projects continue to be delayed by the political turmoil that swept the region since January 2011; (ii) providing an update of the overall assessment of the development of CSP as a technology and its constraints; and (iii) developing options for covering the incremental costs that currently are not covered through funding from concessional sources. Two proposals were put forward for discussion at the regional MENA CSP CTF program workshop in Rabat in early April 2014.

E10. Under the first proposal, funds were to be redeployed from those projects that are now unlikely to succeed with the aim of meeting the objectives of the MENA CSP CTF IP as efficiently and rapidly as possible, resulting in the removal of projects in Tunisia and Egypt but the inclusion of new projects in Morocco. Under the second proposal, the CTF funds would be augmented on a per kW basis, compared to the per kW allocation in the initial IP, for those countries in which projects are not progressing due to their high incremental costs (Egypt and Tunisia), while still including the new projects in Morocco but at a lower level of CTF support than under Proposal 1.

E11. Following discussion of the two options, the workshop attendees decided to retain projects in Egypt and Tunisia, as country representatives felt strongly that progress would now be made as the political situation stabilizes and international donor mobilization is strong to support the development of CSP in those two countries, possibly through new grants. The country teams in Tunisia and Egypt also committed to review cost estimates and investigate ways to reduce costs, for instance through hybridization of existing thermal power stations with solar collection fields. A solution with more balanced development throughout the region was therefore favored.

E12. The high incremental costs of the CSP projects combined with economic and political uncertainties present the single-most important factors for the delay of the CSP program. Initially it was hoped that some of the excess costs could be covered by means of green electricity tariffs from export of electricity to Europe. However, agreement on such trades has been delayed and may only be available in the long term.

E13. As part of the review process under the current update the inclusion of photovoltaic (PV) projects as part of the MENA CSP CTF program has been discussed, suggesting that the lower cost of this technology would enable the preparation of projects especially in Egypt and Tunisia. However, it was emphasized that the MENA CSP program has only notionally allocated CTF amounts to countries and is really towards the development of the CSP technology to impact the learning cost curve development world-wide. It was also highlighted that what is key to bringing the cost curve down is the size of the program overall and not the number of projects in various countries.

E14. The proposed IP Update recognizes that, while the program in Morocco has gone from strength to strength, the projects in Egypt and Tunisia are at risk and could miss the CTF financing opportunity if solutions are not found rapidly to address the incremental cost issue. It does also recognize that the recently experienced decline in CSP cost could provide a solution if the MENA CSP CTF program time frame can be extended until further cost declines result in reduced levels of incremental costs.

E15. Morocco is well positioned to leverage the success of Noor I, which received US$197 million of CTF funds (or US$1230/kW). Noor II & III, the project to install the remaining MW of the Noor Solar Complex, is being launched and is moving forward quickly. In line with the indicative allocation in the original investment plan of US$725/kW, Noor II & III were allocated the amount of US$218 million as part of the second IP Update in May 2013, for an expected capacity of 300 MW. However, at this stage with technical proposals under evaluation, it is expected that Noor II and III capacity together will amount to 350 MW. The CTF allocation for Noor II and III has been increased slightly to US$238 million, using an allocation slightly less than

in the original plan, i.e. of US$680 of CTF financing/kW. On 17 March Morocco announced the next candidate sites for CSP, which are part of the Morocco Solar Plan. These include Midelt and Tata. A notional CTF envelope of US$50 million is proposed in support of the next phase for an additional 100MW (at the lower per kW basis of only US$500/kW, a level of support that could go up later).

E16. The two public sector projects, the 100 MW Kom Ombo plant in Egypt and the 50 MW Akarit plant in Tunisia, were allocated the same unitary amount of CTF funds as Noor I US$1230/kW, which implied a total CTF financing of US$62 million for Akarit and US$123 million for Kom Ombo. During the workshop which took place in March 2014 several alternatives were discussed including the removal of those two projects from the MENA CSP CTF IP or the reduction in capacity in order to reduce the needed subsidies. Following presentations by the country representatives and confirmation of the countries' commitment to CSP, it was decided to keep them in the IP at the same level of CTF support as in the May 2013 Update until the next IP Update and to seek solutions to obtain more grants or to reduce the "gap" by means of different options.

E17. In Jordan, the Ma'an public sector project had been cancelled and replaced by MOUs signed with private sector project developers amounting to 225 MW of trough and tower CSP projects and 20 MW of CPV projects. While, since May 2013, the CPV projects have been converted into PV projects, which are not eligible under the MENA CSP program, the CSP projects are progressing in their preparation. Libya has indicated its interest in participating in the program by means of an investment and an indicative envelope is added.

E18. The newly added technical assistance (TA) component has been welcome by the partner countries for the CTF and is under preparation. It will focus on enhancing the local manufacturing potential for CSP in the region as well as enhance the capacity of countries on CSP technology questions, in particular through knowledge exchange forums.

E19. In conclusion, the present IP Update suggests keeping the overall financing envelope for the MENA CSP program at the original amount of US$750 million. The increase compared to the May 2013 Update amount of US$660 million reflects a higher amount for Noor II and III due to the larger capacity and the addition of new projects in Morocco and Libya. The proposed electric CSP capacity to be installed is increased from 710 MW to 800 MW (excluding the already approved Noor I project) compared to the 2013 Update capacity. When including the 160 MW Noor I plant, the capacity targeted by this IP Update at 960 MW is close to the original objective of the MENA CSP CTF IP 1 GW. The contribution of the CSP plan to the learning curve of CSP is expected to be significant, as the program is adding about 20 percent to today's installed capacity of CSP, which is at about 4000 GW. The table below provides the new pipeline of projects after reallocation, excluding the Noor I project, which has already been approved.

Table E3: MENA CTF Indicative Financing Plan <u>after</u> Reallocation—June 2014 Update (in US$ million)[3]

	Projects/ Capacity (MW)	**CTF financing (US$ million)**
Egypt	Kom Ombo (100)	123
Tunisia	Akarit (50)	62
Morocco	Noor II & III (350)	238
Morocco	Phase I of Midelt or Tata (100)	50
Jordan	IFC (Up to 100 MW)	50
Libya	100 MW	20
Total Projects	800	543
Technical Assistance	NA	10
Total Financing Envelope		553

[3] The table presents new projects only.

SECTION I: INTRODUCTION

1. Following the May 2013 Investment Plan (IP) Update, the MENA Concentrated Solar Power (CSP) Investment Plan disposes of US$660 million of financing from the Clean Technology Fund (CTF) to support the MENA CSP scale-up initiative. It aims to leverage up to US$5billion in co-financing to foster the development of CSP in five MENA countries (Algeria, Egypt, Jordan, Morocco, and Tunisia) through concessional financing to implement 710 MW of CSP capacity. The MENA CSP CTF Investment Plan (MENA CSP IP), endorsed by the CTF Trust Fund Committee (TFC) in December 2009 and updated in November 2010 and May 2013, lays the foundation for a landmark climate change mitigation program with the aim of forging an international partnership, starting with the 500 MW Noor Solar CSP generation complex in Morocco, which is the largest in the world, for demonstration of the CSP technology and cost reduction through economies of scale.

2. As part of the preparation of the original investment plan, the participating countries proposed a pipeline of generation projects for 895 MW. Based on this pipeline, the indicative CTF contribution was based on a US$725 /kW of generation capacity allocation. It also included two transmission line projects. This resulted in a pipeline of projects amounting to: Algeria – US$ 160 million, Morocco – US$ 197 million, Tunisia – US$ 186 million, Egypt – US$ 95 million, and Jordan – US$ 112 million. However, it was indicated explicitly that these allocations were likely to change depending on the progress of project preparation and justification for support to be made at the time of submission of individual projects for CTF review. Countries could therefore draw more or less funds than originally indicated depending on progress of project development. As expected, projects have been significantly modified since the endorsement of the MENA CSP Investment Plan by the CTF Trust Fund Committee on December 2, 2009.

3. The MENA CSP initiative is motivated by objectives of energy security, climate change mitigation, and regional integration in the Mediterranean. The overall objective is to help bring down the global costs of CSP technology, through economies of scale and learning effects from replication. The MENA CSP initiative also aims at generating much-needed employment through technology transfer and local manufacturing, a need exacerbated by the political transformation underway in the region.

4. The development of new CSP plants must be seen in a regional, rather than strictly a country-based, context. Developing a critical mass of CSP plants in the region will create a much more powerful demonstration effect than doing so within one country. In addition, a regional approach will maximize economies of scale by creating substantial manufacturing demand for critical CSP technology components such as mirrors, receiver tubes and control equipment. Finally, enhanced interconnections within the MENA countries and between MENA and the EU are critical to improve the program's operability (as it is easier to integrate significant renewable capacity within a larger system) and its viability in a regional context (through the possibility of maximizing exports to higher paying markets).

5. The program is at various stages of implementation in the selected countries, but continues to be delayed due to (i) the Arab Spring and the uncertainties this has brought about for large investments, (ii) subsidy requirements in excess of what is considered affordable by the

participating countries, (iii) specific project-related delays, and (iv) economic difficulties in Europe. The 160 MW Noor I CSP power plant in Morocco near Ouarzazate is under construction, but the Egypt and Tunisia projects in the original MENA CSP IP now do not seem to be able to move ahead within the original timeframe of the MENA CSP CTF program. The question arose whether the funds for Egypt and Tunisia should be reallocated to currently more promising project prospects in Morocco or whether more grants should be made available from CTF or other sources to secure development of projects in these two countries.

6. As proposed at the time of the submission of the second IP Update in May 2013, this third update proceeds in parallel with the next project of the MENA CSP program being presented to the CTF trust fund committee. This next project is the Noor II & III CSP project in Morocco. Since the last report there is more clarity regarding the feasibility of proceeding with projects under the plan. This also applies for some key aspects that are seen as drivers of the development of CSP: its technological development and costs and its potential to harness additional resources through export of green electricity.

7. Section I of this report is this introduction. Section II presents an update of technological and market developments of CSP and how it relates to the MENA CSP CTF program. Section III presents the status of projects under the original IP. Section IV reviews circumstances and rationale for the IP update. Section V presents the proposed projects for the updated IP. Section VI analyses the impact of the proposed IP changes. Section VII presents the monitoring and evaluation framework. Annex I contains an update of all project concept notes in the program. Annex II presents some possible instruments to buy down the CSP cost.

SECTION II: A REVIEW OF THE CSP MARKET AND LINKAGES WITH THE MENA CSP CTF PROGRAM

8. Since the MENA CSP CTF IP was first presented in 2009, the global outlook on the CSP market and the technology development has improved. As of early 2014, approximately 2,136 MW of CSP plants were operational world-wide and 2,527 MW were under construction. An additional 10,134 MW of capacity had been announced. This is a significant increase compared to the 485 MW that had been installed by end 2008. While most plants in operation to date are located in Spain and the USA, the Middle East and North Africa (MENA) region is increasingly important in the solar energy sector. Ambitious plans exist for India (20GW), China (3GW by 2020), and South Africa (1GW).

9. North Africa is home to three existing CSP plants in Morocco (Ain Beni Mathar), Egypt (Kureimat), and Algeria (Hassi R'mel). In the Middle East, the ambitious mandate of Saudi Arabia's K.A. CARE targets 25 GW of CSP by 2032. The process is envisioned to commence with two competitive procurement rounds followed by the institution of feed-in tariff incentives after appropriate price levels have been determined by prior rounds. The procurement process for the first project was launched by Saudi Electricity Company (SEC) with the call for expressions of interest (EOI) to build, own and operate the Duba 1 power plant. The 550MW Integrated Solar Combined Cycle power plant (ISCC) (designed to integrate a parabolic trough unit of around 20 to 30MW) will be located 50km North of Duba, on the Red Sea coast of Saudi Arabia.

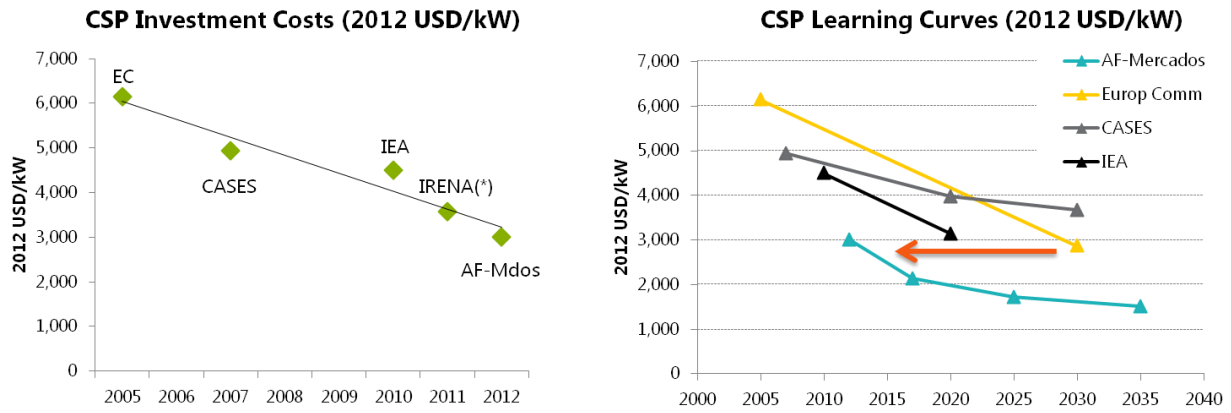
10. A recent consultants' report[4] reviewed the current state of the CSP sector in MENA countries with respect to developments in technology, costs, and potential markets. Three key findings of the report are important to the development of the CSP IP for the region.

Declining Capital Costs

11. The first key finding is that reductions in the capital cost of CSP plants have outpaced expectations over the past decade. Current capital costs are already at levels that, as recently as a few years ago, were only projected to be achieved over the 2020 to 2030 time frame. Figure 1 below, taken from the report, illustrates the actual average capital cost per kW, as well as past projections of costs based on the expected learning curve. As the figure demonstrates, the observed investment costs for CSP have fallen by more than half over the past 7 years, equivalent to a compound annual rate of 10% per year. By contrast, the learning rate estimated in previous studies was only 3% per year.

[4] AF Mercados EMI, Sun to Market Solutions, "Concentrated Solar Power (CSP) in the Middle East and North Africa Region: A Review of Issues and Options", prepared for the World Bank and ESMAP, May 2013, MI1384

Figure 1 - Learning curves trends (2012, USD/kW)



Note: (*) IRENA and Ecofys present very similar values for 2011 therefore we present them as a single observation

12. The consultants also carried out their own in depth analysis of the potential for future improvements in the capital costs for CSP - shown as the 'AF-Mercados' line in Figure 1. They conclude that there is still room for significant cost reduction over the coming years. The learning curve is expected to reduce investment costs at a rate of 7% per year between 2012 and 2017, by 3% per year between 2017 and 2025, and by 1% per year between 2025 and 2035.

13. In deriving their estimated future learning curves, the consultants took into account both expansion in the scale of future CSP facilities and improvements in the efficiency of plant components, which would allow future complexes to be built at lower costs per installed kW of capacity. Economies of scale would accrue in areas such as the production of major components (e.g. heliostats) and in the fixed costs of plant construction (site preparation, design, supervision). Improvements in efficiency were anticipated in a number of areas including (i) higher temperature heat transfer fluids (HTFs); (ii) improved or new designs for components of the solar system to improve optical performance; (iii) improved efficiency of the power generation process; and (iv) increased automation and control to optimize the plant's operation.

Constrained Export Markets

14. One of the key instruments that were thought to render the CSP program financially viable until the costs of the technology are on par with those of other technologies was exports of green electricity to Europe. The report finds that the potential to export significant quantities of CSP-generated electricity from MENA countries to the EU is likely to be constrained over the medium term. Most of the EU countries are well ahead of their commitments under the European Union (EU) Directive 2009/28/EC, which sets the percentage of each state's electricity consumption which is to be supplied by renewables by the year 2020. As a result, they are not under any pressure to look for additional sources of supply of energy generated by renewables apart from those that are already either in place or committed. A few countries are behind schedule in terms of meeting their targets. However, these countries have the option, under the Directive, to negotiate statistical transfers of renewable energy with member states that are in surplus, as long as there is a physical interconnection between the two countries. Since overall the members are forecast to have a significant surplus of renewables capacity relative to their 2020 commitments, it should not be

necessary for countries with deficits to have to look outside the EU in order to meet their obligations.

15. In the longer term, there is a commitment on the part of the EU to support the development of renewable sources of energy in MENA countries in the form of (i) a series of communications from the Commission in recent years that underline the need for renewable energy development, closer co-operation with third countries (in particular in the MENA region) and market integration in the Mediterranean region;[5] and (ii) a number of MENA CSP support initiatives aimed at promoting the co-operation between decision makers in MENA and in the EU in the area of renewable energy that were taken up and/or financed by the European Commission (EC).[6] The recently released 2030 EU climate/energy package states that it is possible to both progress toward a low-carbon economy and improve the EU security of supply, by increasing the share of renewables in the energy mix and improving energy efficiency (which both reduce GHG emissions).

16. At the request of the European Council, the European Commission is due to issue a plan in June 2014 for reduction of EU energy dependence. In particular, the plan is to propose an action plan to accelerate EU energy supply diversification and to promote the development of infrastructure, including across and around the Mediterranean, to support this diversification in a sustainable manner. Concerns over Russian gas supply may also be a driver for green electricity imports from MENA. In conclusion, even though exports seem less likely in the short term than when the MENA CSP CTF IP was first designed, they are likely to materialise in a longer timeframe when Europe will need access to MENA solar resources to achieve its climate mitigation and energy security objectives in a cost effective way.

Attractiveness of Capital Subsidies

17. Compared with other mature conventional technologies, CSP remains in the earlier stages of technological development, and there is a natural resistance on the part of existing electricity consumers to pay the costs associated with moving up the learning curve to technical and market maturity, especially when lower cost competitors are available. It is expected that subsidies will be necessary during the next few years in order to ensure its broad-scale adoption and consequent further cost reductions through additional technological advancements and economies of scale. What method of subsidy best serves the objectives of encouraging the uptake of CSP, however, without causing long-term distortions in the electricity markets remains a key question.

[5] European Commission (2011), On security of energy supply and international cooperation - The EU Energy Policy: Engaging with Partners beyond Our Borders, COM(2011) 539 final, Brussels; European Commission (2012), Renewable energy: a major player in the European energy market, COM(2012) 271 final, Brussels; European Commission (2012): Supporting closer cooperation and regional integration in the Maghreb, Brussels, 17.12.2012/ JOIN(2012) 36 final: Joint Communication to the EU Parliament, The Council, the European Economic and Social Committee and the Committee of the Regions.

[6] The most prominent is the Mediterranean Solar Plan (MSP) of the Union for the Mediterranean (UfM) and its project facility "Paving the Way for the Mediterranean Solar Plan" (PWMSP), which is supported financially by the EC.

18. The report presents the case for subsidies targeted at reducing the capital costs of the plant, either through direct grants or through concessionary financing terms. Since the average or levelized cost of electricity (LCOE) generated by CSP over the life of the project is heavily weighted towards the capital cost of the installation, a subsidy that reduces the debt service costs and/or return on equity requirements will have a significant and sustained impact on the cost of electricity supply.

19. The capital subsidies needed to bring CSP into parity with competing technologies are significant in the near term. However, as the costs of constructing CSPs decline, the level of subsidy required would correspondingly drop. Furthermore, over time, the costs of generation from plants fired by fossil fuels, which are expected to be the primary competitor to CSP, are expected to gradually rise in line with fossil fuel prices which are forecast to increase in the long-term. This is expected to further narrow the gap between CSP and fossil fuel technologies, further reducing the need for subsidies.

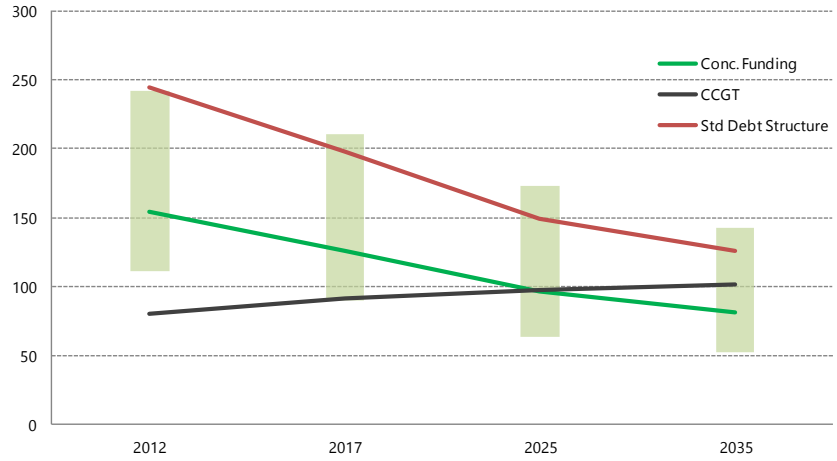
20. The consultants' report examined two options for capital subsidies. In one instance, they looked at the impact of concessionary financing, comparing the resultant LCOE for CSP (taking into account expected reductions in the capital costs of CSP technology) with that of combined cycle gas thermal plants. The assumptions regarding the concessionary financing are as follows:

Table 1 - Debt Structure

	Standard Debt Structure	Concessional Finance
Debt / Equity:	70% / 30%	70% / 30%
Cost of Debt:	7.5% USD (real)	0.0% USD (real)
Loan Maturity:	10 yrs	25 yrs

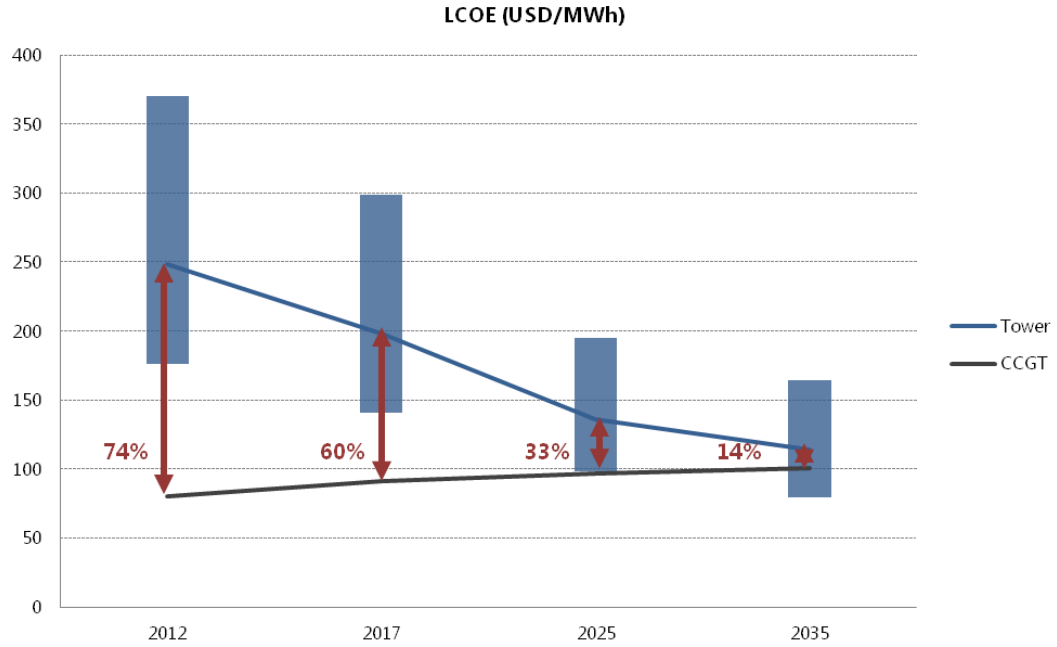
21. The resultant LCOE for plants developed at different future points in time is shown in Figure 2 below. For comparison, the LCOE of CSP with a standard debt structure is also shown. Under these assumptions, the concessional financing results in a drop of almost 40 percent in the LCOE for CSPs built over the near term. By 2025, concessional financing could make CSPs competitive with CCGT technology. However, up until that time, even terms as attractive as those postulated in the example are insufficient to overcome the cost disadvantages of CSP.

Figure 2 - LCOE differential of CSP and CCGT (USD/MWh)



22. The second option examined in the report was a straight capital subsidy. The consultants examined the degree to which the capital cost of the CSP (in this case a solar tower) would need to be subsidized in order for the LCOE to achieve parity with CCGT. Figure 3 below shows the findings.

Figure 3 – Impact of CAPEX subsidy in the LCOE of Power tower system



23. In this instance, the subsidy could make CSP immediately competitive with CCGT, but at a high cost - 74% of the capital cost of the plant in 2012 falling to 60% in 2017. However, on average the amount of subsidy decreases from an initial 74% of the total to 14% in 2035 (the bars show maximum and minimum range), and the best projects may not need any subsidy on the capital cost from 2025. The conclusion to be drawn for the CTF CSP program is that conversion of CTF concessional loan into an upfront subsidy may be beneficial to ensure the viability of the project and to decrease the burden of countries to carry the incremental cost for this technology.

Buying Down the Costs

24. Governments are seeking to support CSP technology as the only new renewable energy technology that can provide base load in a world that needs to significantly curb greenhouse gas emissions, however the high cost can be a major burden. To overcome the high initial cost of the technology and overcome market failures that prevent proper valuation of derived socio-economic benefits in decision-making, various deployment policies and price/fiscal incentives are being put in place. The most efficient are, as discussed above, those that result in immediate reduction of the initial cost, such as capital grants, or increased revenues from the plant output, for instance through FiT or exports to markets that are willing to pay a premium for zero-carbon electricity. However, the availability of grants are limited, consumers are reluctant to pay for the scale-up of the technology to the benefit of all and exports may not materialize in the near-term. Other measures, in particular financing approaches, can be useful in lowering the cost when the most efficient measures cannot realistically be implemented. Some of them are presented in Annex II

SECTION III: STATUS OF ORIGINAL INVESTMENT PLAN IMPLEMENTATION

25. Despite slow progress in some countries, due to lack of grants when government support is difficult due to economic hardship, the program has been progressing well with the successful launch of the first project in Morocco that should result in the largest CSP plant in the world. As the global outlook of CSP projects is improving, it is important to understand what is causing delays in some countries, in order to either find solutions to better support those delayed projects or redeploy the funds toward projects that have the potential to progress rapidly, therefore contributing to the global cost reduction.

Good Progress in Morocco, with Approval of Noor I Project, Expansion of Capacity at Noor near Ouarzazate and Launch of New Projects

26. The first project of the MENA CSP CTF IP to be approved by the TFC was the Noor/Ouarzazate[7] I project in Morocco. The Noor I CSP Project aims at supporting the Moroccan Agency for Solar Energy (MASEN) in the development of the 500 MW Noor/Ouarzazate solar power plant by financing the first phase (160 MW) through a public private partnership (PPP). The Project was approved by the CTF TFC on June 22, 2011, by the World Bank Board on November 17, 2011 and by the Board of the African Development Bank (AfDB) on May 31, 2012. Noor I is supported by a CTF loan of US$197 million[8], a US$200 million loan from IBRD and loans from AfDB. AFD, EIB and KfW. Grants are provided by the European Neighborhood Investment Facility (NIF) (Euros 30 million) and the German Ministries of Environment (Euros 15 million) and Development Cooperation (through an interest rate subsidy to KfW).

27. The Noor I 160 MW project (the first phase of the 500 MW Noor Solar Complex) is considered a success for the following reasons: (i) it attracted significant interest from bidders, indicating that strong competition was present and that there was an appetite in the private sector to participate in this type of project despite the inherent risks. The bid price, at UScts 17.4/kWh, was 30% below estimates and presents one of the lowest CSP levelized cost of electricity (LCOE) achieved globally to date; (ii) Noor I is also one of only three infrastructure Public Private Partnerships (PPPs) to reach financial close in North Africa since the Arab Spring. In June 2013 the project reached effectiveness, and construction is now well underway. The plant is expected to become operational in 2015. The project represents a model in the region for promoting solar energy development and for establishing a partnership between Morocco and the international community for CSP scale-up. An important outcome of the lower than expected bid price is that the gap to be covered from the government budget (difference between the selling price by MASEN and the purchase price from power plant) is much lower than initially estimated (around US$28 million per year –or US Cents 9/kWh versus an initial estimate of US$ 60 million per year over the 25 year life of the PPA).

[7] Please note that during the official inauguration of the project by Morocco's King in May 2013 the project was renamed from Ouarzazate solar complex to Noor solar complex. In Arabic "Noor" means light or illumination.
[8] This is the full indicative CTF allocation for Morocco in the November 2010 IP Update, implying a per unit CTF funding of US$1230/kW.

28. The next phase of the Noor Solar Complex, the 350 MW Noor II & III project, is also progressing well, and the first stage of bidding has been completed. Financial close is expected by November 2014. CTF trust fund committee approval is expected for June 2014.

29. The Noor Solar Complex is the first plant of the Morocco Solar Plan and the first large-scale CSP plant in MENA. The Morocco Solar Plan, launched in November 2009, is the cornerstone of the country's climate change mitigation strategy. The US$ 9 billion Solar Plan calls for the commissioning of five solar power generation plants between 2015 and 2020, for a total capacity of 2,000 MW, thus helping Morocco achieve higher growth and employment while ensuring sustainability. With this plan, 4,500 GWh annually will be produced from solar energy. This implies a major transformation of not only the energy sector but the entire economy, as this 'green stimulus plan' will gear industrial development as well as the research community (e.g. through publically financed dedicated research centers) towards renewable energy. In addition to fostering low-carbon development of the energy sector and enhancing energy security, it will stimulate large investments, enhance Morocco's competitiveness and position the country as an 'early mover' on a promising green technology by encouraging the development of domestic manufacturing capacity. Morocco is ideally positioned to initiate the MENA regional scale-up of the CSP technology, given its high solar resource base, favorable investment climate, and proximity to European markets.

30. However, the Noor Solar Complex project is only economically justified if it catalyzes replication. Replication will bring additional revenue, investment and jobs to post-Arab Spring MENA, and it is only with replication that those objectives will be achieved. That replication in turn depends on financial viability of forthcoming projects, so that the required subsidies from home countries disappear rapidly, either as a result of cost decline or the opening of markets paying a premium for low carbon electricity. Until such conditions develop, grants and adequate low cost climate financing from multilateral and bilateral sources, are necessary to ensure success of the program. Other CSP projects in the region need to follow suit on the success of Noor I, to ensure replication.

31. Morocco is well positioned to leverage the success of Noor I. Noor II & III, the project to install the remaining 500 MW of the Noor Solar Complex, has been launched and is moving forward quickly. MASEN issued an invitation for prequalification in January 2013 and four highly qualified consortia were invited to participate in the next bidding stage, 3 of which qualified to bid for both Noor II and III, and 1 qualified to bid for Noor III only. On December 12, 2014, MASEN issued the request for proposal (RfP) in the first stage of the bidding process to invite technical bids. Final bids are due in the latter end of 2014, and award is expected to be made to the lowest evaluated combined financial bid for Noor II and III. MASEN expects to reach commercial closing (e.g., signature of the PPAs, on-lending agreement(s) that will govern pass-through of the Bank's and other IFI's funds from MASEN to the SPV(s), and other project-related documentation) for both Noor II and III contemporaneously with award of the projects to selected sponsors.

Table 1: Status of Approval of CTF Projects

Project Title	TFC Approval Date	MDB Board Approval Date	CTF Funding (US$ million)	Leveraged Funding (US$ million)
Noor I (IBRD/AfDB)	June 2011	IBRD Nov 17 2011 AfDB May 2012	197	880
Noor II & III (IBRD/AfDB)	June 2014 (expected)	IBRD Sept 18 2014 AfDB (expected)	238	2800

Delayed Projects in Other Countries

32. All projects in the CTF MENA CSP IP outside Morocco are facing delays for reasons further explained in the next section.

33. In **Tunisia**, all projects that were in the initial CTF MENA CSP IP, except the STEG Akarit project, were dropped from the CTF pipeline during the May 2013 Update, mostly because they were unlikely to proceed fast enough to fit in the CTF time frame.

34. The STEG project in Akarit, was making progress in terms of technical preparation at the time of the previous update, even if somewhat delayed, and was kept in the pipeline with a low likelihood rating. Since then, preparation has continued with the environmental and social safeguards study for the proposed Akarit STEG CSP plant now prepared by STEG. However, political instability and several changes of Government in the past year have meant that the Government has not been able to commit to cover the required incremental costs. The project has been redesigned in order to reduce costs, by increasing the contribution of natural gas from 5% to 15% and reducing the storage from 4 hours to 3 hours. The resulting LCOE is now estimated at UScents 25/kWh, which will still imply an annual incremental cost of around US$ 10 million. The feasibility study was finalized in June 2013, and bidding documents have been prepared in late 2013. The next step at the technical level will be the recruitment of the Owner's Engineer who would assist in the recruitment of the EPC contractor. The ESIA was somewhat delayed because of lack of financing, and is expected to be finalized by mid-2014. The Tunisian Government has requested a CTF Project Preparation Grant (PPG) to complete the necessary studies to explore different technical and financing options and then launch the RFP and is also seeking additional CTF financing for this project.

35. The 2,000 MW Nur CSP project and its associated HVDC cable to Italy mainland, remains under development and has expressed interest in accessing CTF. However, the timeline for the development of this project is unlikely to coincide with the timeline for the CTF. Moreover it has not been proposed by the Government of Tunisia.

36. In **Egypt**, the MENA CSP CTF IP supports the construction and operation of the proposed 100 MW Kom Ombo CSP plant (with 4 hr storage). The plant is proposed as a public sector project to be implemented by the New and Renewable Energy Agency (NREA), which leads the

implementation of donor financed public sector renewable energy projects in Egypt. The feasibility study financed by KfW has been completed in October 2013. The ESIA study for the project has been completed in June 2013 and land use agreements have been signed. However actual project implementation has not started as the Government of Egypt has found it difficult to commit to cover the estimated incremental cost of nearly US$ 2 billion (estimate from feasibility study) and has requested that adequate concessional financing should be available for it to go ahead with the project. Consequently, there has been no progress in project implementation since the May 2013 Update, despite an increase in CTF financing from US$97 million to US$123 million at the time of the Update.

37. In **Jordan**, the Ma'an 100MW CSP public sector project had been replaced by private sector CSP and CPV IPP projects in the May 2013 Update. Although MOU were signed, the CPV projects have been converted into conventional PV projects, which do not qualify for CTF funding under the MENA CSP CTF IP. Four trough CSP projects are all 50 MW in size and there is one tower CSP project which is 25 MW. Constraints on Jordan external borrowing capacity have been hampering the country from requesting loans for CSP projects, despite reasonably good project economics given the lack of indigenous natural gas supplies and the high price of competing fuel oil based thermal power generation. Some of the amount available from the CTF is being mobilized by IFC for those private sector projects.

SECTION IV: CIRCUMSTANCES AND RATIONALE FOR INVESTMENT PLAN UPDATE

38. The May 2013 had identified several challenges that had delayed the implementation of the MENA CSP scale-up investment plan as updated and approved in November 2010 and these challenges remain valid:

- **Country Specific Challenges:** The Arab Spring has delayed project preparation in Egypt and Tunisia by nearly two years compared to the original schedule. The situation in both countries has been particularly unstable during the past year. Moreover, the fact that Italy reported a surplus rather than a deficit previously in the status report of implementation EU RES Directive 2009/28 implies that countries in the region are unlikely to see export revenues for their CSP plants for the short and mid-term.

- **Regional Challenges:** The economic crisis in the European Union (EU) delayed the perspective for MENA CSP exports into European markets**.** The sovereign debt crisis that struck Spain and Italy, two key European countries in a potential export agreement with Morocco and Tunisia respectively, had ripple effects on electricity consumption in both EU countries. In this context, discussions were put on hold on a MoU that would allow for the transit through Spain of green power from MENA countries to northern Europe if use of the transmission network is remunerated adequately, it does not cause stress on its network and the interconnection with France through the Pyrénés is built. Although Germany has stated that it may require imports of CSP generated electricity from MENA countries under its new energy policy ("Energiewende"), which includes the phase-out from nuclear by 2022 and the reduction of CO_2 emissions by at least 80% by 2050 (compared to 1990), no progress has been made on a bilateral agreement with Morocco in the short-term to develop a "pilot" export project under the EU RES Directive 2009/28. Although it looks increasingly unlikely that Europe will need to import green electricity from the MENA countries to satisfy its objectives under the RES Directive 2009/28, security of supply concerns, especially following threats to gas supply as a result of the Russia-Ukraine crisis, may prompt Europe to call on RES from MENA in search of supply diversification, as indicated by the EU 2030 climate/energy package and the European Council of March 2014.

- **Market and Technical Developments:** Although CSP deployment in MENA has been slower than expected the upward trend has remained steady in the rest of the word. Since the MENA CSP CTF IP was first presented in 2009, the global outlook on the CSP market and the technology development has improved. As of early 2014, approximately 2,136 MW of CSP plants were operational world-wide and 2,527 MW were under construction. An additional 10,134 MW of capacity had been announced. This is a significant increase compared to the 485 MW that had been installed by end 2008. While most plants in operation to date are located in Spain and the USA, the Middle East and North Africa (MENA) region is increasingly important in the solar energy sector. Ambitious plans exist for India (20GW), China (3GW by 2020), and South Africa (1GW). The reductions in the capital cost of CSP plants have significantly outpaced expectations over the past decade.

Current capital costs are already at levels that, as recently as a few years ago, were only projected to be achieved over the 2020 to 2030 time frame.

- **Financial Challenges:** Some MENA countries hesitate to invest in CSP technology because of the persistent high capital costs and limited availability of grant funding and exports**.** Despite the substantial CTF financing and other concessional financing available such as the NIF of the EU, at least Egypt, Morocco, and Tunisia are expected to be needing to provide an additional subsidy during the period of plant operation in order to close the gap between the cost of electricity generation and the cost of an equivalent conventional power plant. For those countries with economies in crisis due to the Arab Spring, providing these subsidies presents a challenge and has given rise to the question of whether and how CTF financing can be augmented in order to reduce the subsidy gap.

39. However, there are positive developments in CSP worldwide and even in Morocco in the MENA region, which clearly indicate the need to move forward and to continue with the CTF CSP program. Morocco successfully closed the financing of the first project of the MENA CSP CTF IP, with actual costs substantially below initial estimates. Morocco plans to pursue aggressively its plans for large scale CSP deployment in the country. As evident in the discussions taking place under the CSP dialog between the CTF and the Climate Policy Initiative[9], CSP scale-up has many benefits beyond providing carbon free electricity; it can contribute to energy security, job creation and the development of a local industry. The present IP Update, required by the CTF process, seeks to build on the strengths of the Morocco program and elsewhere in the world to address issues in those countries where projects are delayed so that they can move forward successfully.

[9]At the request of the Climate Investment Funds, the Climate Policy Initiative (CPI) is analysing the CSP landscape to extract insights to be considered when analysing the effectiveness of public interventions to finance CSP in emerging economies. The CPI will distil lessons on how effective the CIF and other public entities have been in financing CSP to inform the extension and adjustment of these entities' financing vehicles. The analysis is based on two in-depth case studies (India and South Africa) and three expert dialogues. The third dialogue took place in Washington on May 8, 2014.

SECTION V: PROPOSED CHANGES TO THE INVESTMENT PLAN

40. The objective of the MENA CTF CSP IP remains unchanged. The high level objective is to accelerate global adoption of the CSP technology by supporting the CSP expansion programs of countries in the MENA region, in order to reduce costs to competitive levels through economies of scale in CSP equipment manufacturing. The intermediate objective of the CTF CSP IP is to finance 750-1000 MW of CSP capacity to achieve a demonstration effect that will catalyze replication. The replication is needed on a substantial scale before costs can come down to competitive levels.

41. The purpose of the June 2014 IP Update is to realign the pipeline of projects to reflect the reality on the ground, as several projects were delayed by several factors, including the political turmoil that swept the region since January 2011, to build on the experience of the first project to move forward, the Noor I 160 MW plant in Morocco, and to ensure MENA remains a key player in a rapidly evolving global market, therefore reaping the benefits of technology improvements and cost reductions.

42. Arguably, the success factors in the Noor I project have been (i) a strong political will by the Government of Morocco to deploy CSP on a large scale in pursuit of energy, climate change and industrial and economic development objectives; (ii) a clear and well established institutional framework, with the creation of an agency fully dedicated to the implementation of the Morocco Solar Plan; (iii) a well-designed PPP bidding process that resulted in prices 30% below cost estimates and well below typical; and (iv) a strong backing by a wide range of international players including all IFIs and initiatives such as the Mediterranean Solar Plan (MSP).

43. Furthermore, the CPI advised policymakers, during the third CSP dialog, to reflect on the following lessons for scaling up CSP and driving cost-reductions:

- National policymakers and international players such as IFIs have to join forces to cover the viability gap for several GWs to buy down the learning curve and scale up CSP.
- International public finance is most likely to be effective in countries where political willingness to close the viability gap is high**.** While IFI finance has helped to enable CSP plants in many countries, it has been most successful where national policymakers committed resources early on, such as in Morocco and India.
- Public support has to be attractive enough to promote deployment but linked to falling technology costs over time to both ensure effectiveness and reduce costs and policy risks.
- National policymakers and IFIs can improve effectiveness of viability gap funding with low cost debt that reduces financing and policy risks in emerging economies. The cases of India, Morocco and South Africa highlight that public low-cost debt– both national and international – does not only reduce financing costs but also policy risks, as the national government shares the project risks, either through credit guarantees for foreign public debt or through equity participation.
- In the medium term, policymakers should initiate the transition towards more private local debt to secure long-term financing and reduce currency risks. The Indian case study has shown that IFI finance is not able to provide enough loans for the ambitious CSP plans in the country. Policymakers have to mobilize private debt to secure the financial capital needed for the transition to an overall low-carbon energy system (beyond single projects).

- In the longer term, policymakers have to move away from flat power tariffs and remunerate the system benefits of stable and flexible power supply from technologies like CSP to complement an increased use of wind and solar PV in future low-carbon energy systems**.** Simulations show that deeper penetration of intermittent renewable energy sources will increase the power system benefits of CSP with storage.

44. The long-term vision and the road map remain unchanged compared to the initial IP, although the dates and duration of the different periods may change, as a result of faster cost declines than initially anticipated and delays in the materialization of export markets. The vision is to develop several hundred GW of installed CSP capacity in MENA by 2020 and several thousand GW longer-term to serve the objectives of energy security, climate change mitigation and industrial development in the home countries, while serving markets in Europe and contributing globally to cost declines for a technology that has the potential to provide a safe, reliable and secure power supply with no carbon.

45. The roadmap can be broken down into four periods where the driving forces of the CSP market (concessional financing, exports, cost reductions and macro-economic and derived industrial benefits) play a different role. In the first period, concessional financing (with a high proportion of grants) is needed to avoid a heavy burden on government budget. This is followed by a period during which exports are increasingly a source of revenues, thus decreasing the need for grants and alleviating the burden on State budgets. However, this period may be short, or even completely disappear in some countries, if costs decline rapidly. As a result, CSP costs may reach parity with those of conventional fossil fuel technologies before exports materialise. Exports would however be a welcome source of revenues and would allow a substantial scale-up of CSP deployment in the region. Finally, in the long-term, local services and manufacturing contribute substantially to economic growth and job creation and CSP provides a low carbon, affordable and reliable form of energy for MENA markets and also potentially a source of wealth through export revenues.

46. All projects, except Noor I, have experienced delays due to the political situation in the host country, the economic crisis in Europe and project specific issues. The question is how to redeploy funds to achieve the objectives of the MENA CSP CTF IP as efficiently and rapidly as possible, taking into account the success of Noor I. The issues were discussed at a workshop in Rabat in early April 2014 where each country presented the status of their projects and expected future progress. Two proposals were put on the table for discussions. Under the first proposal, funds were to be redeployed from those projects that are now unlikely to succeed with the aim of meeting the objectives of the MENA CSP CTF IP as efficiently and rapidly as possible. Projects in Tunisia and Egypt would be removed for the moment (with the possibility of putting them back into the IP at a later stage should the situation in these countries change) and replaced by other projects that are showing more momentum and chance of success, in particular in Morocco which is well positioned to leverage the success of Noor I.

47. Under the second proposal, the CTF funds on a per kW basis were to be augmented for those countries in which projects are not progressing due to their high incremental costs, in an attempt to address the incremental cost issue associated with the proposed projects head on so that CSP projects in Egypt and Tunisia can proceed. To this end, the sizes of plant were to be halved

for both countries while the CTF allocation would be only somewhat decreased compared with Proposal 1.

48. After discussion during the workshop, the countries participating in the MENA CSP CTF IP decided to adopt an approach closer to the May 2013 Update and to keep the projects in Egypt and Tunisia in the pipeline at the same capacity and financing level. This was motivated by the indication that Governments in Egypt and Tunisia[10], as evidenced by the presentations given during the workshop and further communications[11] thereafter, were committed to the development of CSP in their countries and to closing the financial viability gap by seeking other sources of funds, or developing alternative designs including hybrid solutions. At the same time, all participants agreed that successful projects should get access to CTF financing and the program in Morocco was given a higher allocation. Libya's request to enter the program with a nominal amount was also endorsed.

49. While the primary project to be supported in Egypt is still the Kom Ombo plant, in a letter to the CTF trust fund committee dated May 13, 2014 the Government of Egypt is requesting funds to undertake a study assessing the viability of a thermal CSP hybridization in Egypt for the Oyoun Moussa and Kureimat steam-cycle power plants. The expectation is that the incremental cost of these plants would be significantly lower. If this feasibility proves to be promising, the Government of Egypt would like to reserve its right to utilize the CTF funds towards one or more of these plants rather than the Kom Ombo CSP project.

50. Morocco remains the country most likely to deploy CSP at a sustained pace in the short to mid-term, and it has so far developed only 32% of the capacity in the pipeline in the original CSP CTF IP. With the second phase of the 500 MW Noor-Ouarzazate plant now launched, Morocco is in a unique position to achieve the goals of the CSP CTF IP:

- The political and economic situation provides a stable environment in which to implement a visionary green growth policy. In early 2014, Morocco is one of the best performing economies around the Mediterranean.
- The solar energy resource base is very good.
- Morocco is close to European markets that have pledged to increasingly use green electricity, and also have the ability to pay for it
- Morocco needs a low carbon energy resource in order to meet its fast growing electricity demand without increasing its reliance on imports, strain on the climate and the environment and threat to supply reliability. CSP is the best renewable energy to provide low carbon firm, safe, reliable and secure power supply.
- Morocco has proven its ability to attract international investors and developers thanks to its legal/regulatory framework and the PPP business model for risk sharing.

51. Morocco is well positioned to leverage the success of Noor I, which received US$197 million of CTF funds (or US$1230/kW). Noor II & III, the project to install the remaining 500 MW of the Noor Solar Complex, is being launched and is moving forward quickly. In line with

[10] For instance, climate change mitigation is now an integral part of the new Tunisian constitution

[11] Egypt has reconfirmed its commitment to the program through an official letter to the World Bank and the African Development Bank.

the indicative allocation in the original investment plan of US$725/kW, Noor II & III were allocated the amount of US$218 million as part of the second IP Update in May 2013. The CTF allocation for the Noor II & III has been increased slightly, compared to the May 2013 Update, to US$238 million to reflect the fact that the plant capacity will be higher than initially assumed (340 MW vs 300 MW), although not as much as it would have been under the previous allocation rule (the amount corresponds to US$680/kW). On 17 March Morocco announced the next candidate sites for CSP, which are part of the Morocco Solar Plan. These include Midelt and Tata. A CTF envelope is suggested in support of the next phase for an additional 100MW at the lower per kW basis of US$620/kW.

52. In Jordan, the Ma'an public sector project has been cancelled and replaced by MOUs signed with private sector project developers amounting to 225 MW of trough and tower CSP projects and 20 MW of CPV projects. While, since May 2013, the CPV projects have been converted into PV projects, which are not eligible under the MENA CSP program, the CSP projects are progressing in their preparation.

53. Libya has expressed its interest in participating in the program and has proposed a project in Sebha, 750km South of Tripoli for a capacity of 50-100 MW using dry cooling as water is scarce in the south where DNI levels are very good. A feasibility study will be launched soon in order to be finalized by mid-2015. For the moment, an indicative envelope of US$20million has been added to the IP until there is better visibility on the projects and more certainty on funding availability because of other projects not progressing.

54. Table 2 presents the updated pipeline based on the changes discussed above. In aggregate, the present IP Update suggests keeping the overall financing envelope for the MENA CSP program at the original amount of US$750 million. The increase compared to the May 2013 Update amount of US$660 million reflects a higher amount for Noor II and III due to the larger capacity and the addition of new projects in Morocco and Libya. The proposed electric CSP capacity to be installed is increased from 710 MW to 800 MW (excluding the already approved Noor I project) compared to the 2013 Update capacity. When including the 160 MW Noor I plant, the capacity targeted by this IP Update at 960 MW is close to the original objective of the MENA CSP CTF IP 1 GW.

55. As noted above the indicative CTF contribution in the original IP and its November 2010 Update was US$725/kW. For Noor I, the CTF contribution was US$1230/kW. In the indicative pipeline, the contribution is assumed to be US$1230/kW for all first phase projects—the first project in each country participating in the program. Second phase projects (e.g. Noor II&III) could get a contribution of the original indicative amount or slightly less. Third phase projects like Midelt/Tata and projects in Libya would only be given a notional amount, until there is more clarity on availability of CTF funds, either as a result of projects dropping out or an increased envelope following the program success. In the case of Jordan, the CTF contribution would be only US$500/kW, as the use of funds by IFC is capped. The present proposed IP would result in an average amount of CTF support of US$679/kW for all projects still in the pipeline. If the approved project Noor I is included, the average CTF support level is US$770/kW. Details of each project including schedules for CTF TFC submission and MDB Board approvals appear in Annex I.

Table 2: MENA CSP CTF Indicative Financing Allocation Plan after Reallocation - June 2014 Update

	Projects/ Capacity (MW)	CTF financing (US$ million)	CTF financing (US$/kW)	Required annual government subsidy (US$ million/year)	Required annual government subsidy (US$/kW)	Risk of further delays compared to plan
Morocco	NoorI 160	197	1230	60*/28**	375*/140**	
	Noor II&III 350	238	680	38*	111*	Low
	Phase I of Midelt or Tata 100	50	500+	NA	NA	Medium
Egypt	Kom Ombo 100	123	1230	48***	480***	High
Tunisia	Akarit 50	62	1230	10***	200***	High
Jordan	IFC Up to 100 MW (incl CPV)	50	500	NA	NA	Medium
Libya	100	20	200	NA	NA	High
Total Projects	960	740	770			
Technical Assistance	NA	10				

*Initial estimate, pre-bid ** Bid results

*** Initial estimate- To be confirmed during project preparation

+ Initial notional allocation. Likely to increase when more funds are available

Note: The differences in value of the subsidy levels are not only attributable to the differences in de facto subsidy needs but also due to the differences in methodology used. See Annex II of May 2013 Update for further explanation.

56. **Technical Assistance:** while project-based activities go some way in bringing down the barriers to the development of CSP in the MENA region, as has been argued on the previous two updates, these are not sufficient instruments in addressing these barriers. The May 2013 Update therefore proposed a technical assistance (TA) component, which was endorsed by the TFC and all participating countries welcomed it. The TA component was discussed at the April 2014 workshop and country representatives expressed interest in assistance in a number of areas including: (i) development of roadmaps/strategies for enhancing local manufacturing of CSP parts, (ii) support to prepare bidding documents for CSP plant development, (iii) just-in-time advisory services through the establishment of a roster of consultants, (iv) capacity strengthening of research centers, (v) knowledge exchange and (vi) various technical and economic studies to explore alternative CSP applications, including industrial steam and hybrid schemes. To ensure that expressed assistance needs are considered in the MENA CSP TA, IFIs agreed to work in close collaboration and to follow up with further consultations with country representatives. It is proposed that the TA program include the following components: (1) competitive small grants program based on the development marketplace approach, (2) just-in-time advisory services, and (3) south-south knowledge exchange. A separate proposal is being submitted to the CTF for approval.

SECTION VI: POTENTIAL IMPACTS OF PROPOSED CHANGES ON INVESTMENT PLAN OBJECTIVES

Table 3: Assessment of Proposed Changes

CTF Investment Criteria	Original Investment Plan	May 2013 Investment Plan Update	June 2014 Investment Plan Update
Transformational Impact	Would provide the critical mass of investments necessary to attract significant private sector interest, benefit from economies of scale to reduce cost	No changes	No changes
Potential for GHG Emissions Savings	The proposed project pipeline will avoid or reduce about 1.7 million tons of carbon dioxide per year from the energy sectors of the countries.	The proposed project pipeline will avoid or reduce about 1.4 million tons of carbon dioxide per year from the energy sectors of the countries.	The proposed project pipeline will avoid or reduce about 1.764 million tons of carbon dioxide per year from the energy sectors of the countries.
Cost-effectiveness	Accelerating the realization of economies of scale for a technology that could be least-cost over the longer term and be replicated in other countries. Investment of 15 US$ per ton of CO2 reduced	Investment of 18 US$ per ton of CO2 reduced	Investment of 25 US$ per ton of CO2 reduced
Demonstration Potential at Scale	Cost reduction and institutional learning that will be achieved through this program will facilitate faster and greater diffusion of this technology in other countries	No changes. Avoided CO2 through CSP in these 4 countries could reach 5.6	No changes.

		million tons yearly by 2020.	
Development Impact	Increased reliability and security of supply, industrial development potential and improved trade balance through exports of green electricity or freed hydrocarbon resources	No changes.	No changes.
Implementation Potential	Countries in the region have been developing targets for renewable energy with explicit targets by technology and legal/institutional frameworks	No changes.	No changes.
CTF Additionality	To mobilize sufficient concessional and carbon finance to complement commercial and MDB lending, as well as sponsor equity, to bring the levelized cost of electricity of CSP power to within the range of wind power	No changes.	No changes.

Transformational Impact:

57. At the regional level, the proposed program is one of the most ambitious regional solar programs worldwide. It combines public and private sector projects. Its success will provide countries in the region with confidence to consider either public schemes, PPP or private IPPs as a reliable means to raise the sizeable funds required for the development of CSP at the regional level. The financial close of the proposed projects will reinforce interest of international developers in the development of local capacity in manufacturing and support services triggered by the MENA CSP IP. Furthermore, most countries of the region have now ambitious solar programs and objectives in place. The motivations behind these plans vary across countries and include energy security, exports potential, willingness to replace high-carbon fuels, and current use of particularly expensive fuels that make CSP use already attractive.

Potential for GHG Emissions Savings:

58. With the revised capacity generations listed for the 3rd IP update, the potential of GHG emission savings is 1,764,000 tons of CO_2 emissions per year, i.e. about the level in the original IP and higher than in the 2nd update. The difference with respect to the 2nd update report is mostly driven by an overall increase of installed MW capacity, from 550 MW in the 2nd update report to 960 MW in the 3rd update. An enhanced and detailed calculation had been applied to calculate the GHG emissions savings potentials for the 2nd update which includes updated energy efficiency parameters and load factors, and the same approach was used for the 3rd update.

Cost-effectiveness:

59. Accelerating the realization of economies of scale for a technology that could be least-cost over the longer term and be replicated in other countries. For the 3rd IP update report the figures have been revised to 25$ per ton of CO2 reduced.

Demonstration Potential at Scale:

60. The increase in installed CSP capacity both in the MENA region and worldwide will keep bringing its costs down. The Noor I bidding process shows that competitive prices can be reached when the project risks are allocated appropriately. The solar strategies of the four countries call for the installation of 2,500 to 3,000 MW by 2020, approximately four times the size of the capacity to be installed under this investment plan. This would lead to an important increase of emission reductions. With the revised capacity generations listed for the 3rd IP update, the potential of GHG emission savings has been increased to 1,764,000 tons of CO2 emissions per year.

Development Impact:

61. The development of solar energy will have significant benefits in terms of the reliability and security of electricity supply to consumers in these four countries, which is a high development priority for the Governments. Tapping the MENA countries huge solar resources will help reducing the carbon intensity of power generation.

62. The successful development of the first project through a PPP (Noor I at Ouarzazate) is also a clear commitment of one of the governments to involve the private sector in its solar program. This will provide confidence not only to foreign investors but also to Moroccan private companies to increase their involvement and invest in goods and services to contribute to increased local industrial integration and job creation.

63. In addition, further development of renewable resources will increase energy security. Supply diversity will also strengthen the resilience of the power sector to future shocks such as fuel price spikes or increased variability of hydro power generation due to climate change. While

part of the CSP production will initially be for local consumption, a growing share of the electricity produced will be exported to Europe over the medium term to long-term. In the longer-term, this share is expected to peak, and to decline when the CSP costs go down, therefore making the technology more affordable to serve local markets.

64. With the CSP plan, energy importing countries will develop indigenous resources and improve their energy security; energy exporting countries will free up valuable oil and gas resources for more value added utilization. In addition, exports of renewable energy will generate economic benefits through increased revenues.

65. Several studies show that scale-up of solar development will support industrial development, strengthen the foundation for sustainable development and promote local manufacturing to increase local content of the solar program.18 The development of the solar subsector in these countries would further strengthen the region‘s role as a leader in renewable energy development which will be complemented by initiatives such as the Climate Innovation Center in Morocco, a project for which a business plan is currently under preparation.

Implementation Potential:

66. Public policies and the institutional set-up in some of these countries are very supportive for CSP projects. Many governments have in recent years undertaken a substantial effort to promote renewable energy, establish an adequate legal framework, set up a dedicated agency for energy efficiency and renewable energy development, and in some of the countries set up an institution specifically dedicated to implementing their solar strategies (e.g. MASEN in Morocco). Some Governments are also undertaking extensive efforts to implement cost-reflective energy pricing and are launching energy conservation programs that will ease the transition to cost reflective pricing by keeping consumer electricity expenditures steady.

67. The World Bank and the African Development Bank, as well as other IFIs, are engaged with many governments of the MENA region to enhance the overall sector policy framework and advance reforms aimed at improving the sector‘s commercial environment and financial sustainability. There is a general recognition that electricity utilities operate under tight financial constraints and have demonstrated their willingness to gradually increase tariffs toward covering costs, and provide budget and other support in the meantime.

68. However, the specific conditions in the countries as described in Sections I, 2 and IV present limitations to the development of the above-mentioned implementation potential.

CTF Additionality:

69. The financial analysis and the sensitivities developed for the analysis of the projects included in this investment plan update show that the CTF contribution will have an impact in bringing down generation costs of the projects, thus diminishing the fiscal burden on the Governments. Beyond its direct financial impact, the CTF will be instrumental in bringing in the other donors. Together with such donors, the CTF will also bring strong reassurance to the private sponsor(s) about the willingness and capability of the countries of interest to subsidize solar

electricity over a period of time sufficient to ensure CSP cost declines to grid parity levels. Such reassurance will no doubt be useful, especially in the current political context. It will contribute to keeping the equity rate of return required by the sponsor at a reasonable level.

Risks and Mitigation Measures

70. The overall risk of the MNA Concentrated Solar Power Investment Plan remains high as shown in Table 4 below, which lists the key risk factors to the success of the MENA CSP CTF program.

Table 4: Risks and Mitigation Measures

Risk	Mitigation Measure	Residual Risk
High energy subsidies	Reforms are underway in Egypt, Tunisia and Morocco to reduce subsidies to fossil-fuels. If successful, these reforms could make investments in solar CSP plants more financially attractive.	high
High CSP capital cost as compared to alternative solutions	The recent review of CSP issues and options discussed in Section II indicates that costs are falling faster than initially expected. The IEA[12]estimated that, under certain scenarios, CSP would become competitive with coal-fired base-load power by 2020.	Moderate-high
Lack of regulatory framework to support "green" energy trade in both the EU and MENA countries	The EU Renewable Energy Sources Directive 2009/28 already provides a general regulatory framework enabling the "green" energy trade between the EU and MENA. The 2014 EU climate/energy package calls for enhanced cooperation with Mediterranean countries and the development of infrastructure to support energy supply diversification through green electricity imports	high
Lack of available grid infrastructure, interconnections for trading "green" energy	A 1,400 MW Morocco-Spain submarine interconnection already exists (an additional line of 700 MW is being studied). From a technical standpoint, up to 500 MW of « green » power could currently be exported from Morocco to France/Germany. Reinforcements in Spain's electricity grid would, however, be required. A new 1,400 MW interconnection line between Spain and France is to become operational imminently (work on the tunnel was completed in January 2014), further increasing interconnection capacity; but it will not be reserved for green electricity. There is no current interconnection infrastructure between Tunisia and Italy. The planned 1000 MW ELMED submarine cable is on hold and CTF support is not sought. However, a private sector project would link Tunisia to Italy. Moreover the Tunisia-Italy	high

[12] International Energy Agency (IEA), Technology Roadmap – Concentrating Solar Power, 2010.

	Interconnector is considered a priority project under the EU infrastructure plan, and financing by EIB is under consideration. Likewise, the reinforcement of the transmission network in Jordan to facilitate renewable electricity exports from Egypt and Jordan to the north is on hold for political and economic reasons and CTF support is not sought.	
Reduction in installed capacity in MNA CSP IP due to participating country not pursuing announced CSP project	Some countries participating in the MNA CSP IP face a particularly challenging political economy environment, i.e. Egypt. In case that one of these countries would finally decide to drop from the MNA CSP IP, the total installed capacity of the MNA CSP IP would be below 760 MW thereby reducing the IP's contribution to the technology's cost reduction through global economies of scale. However, this risk is now reduced compared to the May 2013 Update, as other projects have been added and the projects in Morocco are progressing faster than anticipated. The total capacity amount in the present Update amounts to 950 MW which is higher than the initial amount.	Moderate-high
Lack of private sector interest	CSP companies have shown strong interest in participating in bidding process backed by international finance institutions and strong government support. There was no lack of bidders for Noor I, II &III. Private sector involvement is high in the dynamic markets of India and South Africa.Commercial banks have been closely following the Noor I, II & III processes and are ready to jump in when concessional funding dries out. . Their involvement is needed in the mid-term to ensure replicability of the MNA CSP IP program.	moderate
Overall risk after mitigation	**High**	

SECTION VII: MONITORING AND EVALUATION

71. Table 5 summarizes the result framework for the MENA CSP IP Update. The total amount of leveraged financing is US$6 billion, compared to 5.6 billion in the original MENA CSP IP. This implies a leverage ratio of 8 for each CTF dollar, vs 7.5 in the original IP. This amount will serve to finance 960 MW of CSP power plants. The resulting GHG emission savings are expected to be 1.76 million tons per year

Table 5: Results Framework for CTF Core Indicators for CSP IP Update- June 2014

Results Indicator	**Target Value** (CTF Plan Update June 2014)
Co-financing of CTF funding (US$ million)	
- IBRD/IFC/AfDB	1320
- Other International Financial Institutions	2577
- Grants (mostly NIF)	280
- Public sponsors	632
- Private sponsors and commercial banks	1275
GHG Emissions Savings ($mtCO_2e$/year)	1.764
Installed Capacity (MW)	960

72. For each project, the monitoring and evaluation framework will be implemented by the implementing agency as part of the monitoring process put in place by the co-financiers of the project. Detailed project level monitoring will be done by teams established within each of the Borrowers and implementing agencies, which may be the same or different depending on the project. Monitoring arrangements and reporting procedures will cover aspects such as eligibility, safeguards compliance, monitoring requirements, etc. The implementing agencies will apply the CTF result framework, which will be used to measure the output, outcome and impact of the projects.

73. The result indicators will include:

- CSP/CPV capacity installed
- GHG emissions saved per year, and cumulative
- Other co-benefits including:
  - Environmental co-benefits
  - Improved energy security and reduced dependency on fossil fuels, measured by the share of renewable energy in total power generation
  - Socio-economic benefits, such as local industry development and job creation

ANNEX I: UPDATED/NEW PROJECT CONCEPT NOTES

Kom Ombo CSP Project in Egypt (AfDB/IBRD/EBRD)

Problem Statement

74. Demand for electricity in Egypt has been growing by about 7% per year on the average. In recent years, the rate has accelerated even further to reach about 10%. Almost the entire Egyptian population has electricity access, primarily through the national grid that is currently serving nearly 30 million customers. The total installed generation capacity is close to 30,000 MW, with additional 3,400 MW in the final construction phases and are planned to come online before summer 2014. About 90% of the current generation capacity is fossil-based (gas & fuel oil), whereas the rest is mainly hydropower and other renewables (wind and solar). All the domestic hydropower resources, primarily at Aswan, have almost been exploited, and as a result, the share of hydropower is continuously shrinking. The residential sector accounts for the largest share of electricity consumption at around 42%, followed by the industrial and commercial sectors at 31% & 8% respectively. The other main consumer sectors are government buildings, public utilities, public lighting, and the agriculture sector with close shares of consumption.

75. While acknowledging the recent focus by the government on energy efficiency, the heart of the government plans for the power sector still focuses on supply development. In this respect, the Egyptian Electricity Holding Company (EEHC) is currently implementing the 2012 – 2017 power generation expansion plan which aims at increasing the conventional capacity by 10,950 MW, in addition to 4,500 MW by the private sector. Although the implementation of this plan is going relatively well, EEHC is still facing challenges in meeting the full demand, especially during the peak summer months. Part of the problem has been attributed to the insufficient fuel supply to the power plants, especially natural gas. Impacted by the overall economic slowdown in Egypt since 2011, the energy sector has been in particular challenged with the recession of FDI, especially in the oil & gas sector. Limited development of both existing and new resources has created a gap between the supply and the growing demand.

Proposed Transformation

76. The government of Egypt has since 2008 adopted a strategy for diversifying the country's energy sources with focus on renewable energy in order to achieve the dual objectives of energy security and contribution to the global agenda on climate change. Endowed with ample resources of both wind and solar energy, renewable energy development in Egypt started with the decision of the government to reach 12% of the generated electricity from wind energy by the year 2020, which translates into 7,200 MW of wind power capacity to be developed by both the public and private sectors. To date, 550 MW of wind power have been installed successively along the Red Sea coast and are under operation by NREA. Another 440 MW are currently under development by NREA, whereas a bid for a 250 MW wind IPP has been launched, but has been facing long delays because of the political and economic situation in the country.

77. Furthermore, in July 2012, the government approved the Egyptian Solar Plan which sets a target of installing 3,500 MW of solar power by the year 2027, comprising 2,800 MW of CSP and

700 MW of PV. Similar to the wind plan, the government is aiming that the public sector develops one-third of the targeted solar capacity, and the private sector to develop the rest. Steps taken towards the realization of this plan include the preparations for the Kom Ombo 100 MW CSP project (as further elaborated below) and undertaking feasibility and environmental studies for 20 MW PV power projects at Hurghada on the Red Sea and at Kom Ombo in Upper Egypt. The PV project at Hurghada is more advanced as all preparatory studies have been completed, whereas the draft feasibility study for the PV project at Kom Ombo is expected in June 2014. The lands available to NREA in both areas are large enough to accommodate a much larger PV capacity. As such, procurement of a 10 x 20 MW PV IPP project at Kom Ombo has started with 13 developers short-listed for bidding. The project will be developed on a BOO basis using part of the land allocated to NREA for solar energy projects at Kom Ombo.

78. Egypt's encounter with the first utility-scale solar power project came through the full development and successful operation of the Kureimat Integrated Solar Combined Cycle (ISCC) power plant in 2011. Despite of the relatively small solar contribution of 20 MW out of the plant's 140 MW total capacity, the Kureimat ISCC project served as an important first experience for NREA, and for the entire Egyptian power system, as it provided the real practical experience with the CSP technology for power generation. Several lessons have been learned during project implementation, and subsequently during its operation that have provided NREA with the necessary practical "feel" of the technology that prompted it to plan for the much larger 100 MWe Kom Ombo CSP project.

79. The Kom Ombo project therefore builds on the experience already established in the country, primarily by the electricity sector but also by some of the local contractors and solution providers that were involved in the Kureimat ISCC project. More importantly, the Kom Ombo CSP project will be a milestone in Egypt's journey with solar energy as it will be the first pure solar energy project without any co-firing as was the case with the Kureimat ISCC. In addition, the final project design is also likely to adopt a dry-cooling technology in order to minimize water needs. These design features not only help the project become very green, but also establish CSP as an ideal technology for harnessing solar energy resources in Egypt that typically prevail in remote desert areas where access to water and fossil fuel infrastructure is not readily available.

80. Another design feature of the Kom Ombo CSP project is the selection of the parabolic trough technology for the solar field. In addition to its technical maturity and proven commercial viability, the parabolic trough is prospected to offer high value-addition to the Egyptian economy through local manufacturing and technology transfer. Again, building on the experience from the Kureimat ISCC, which also used parabolic trough, about 50% of the total solar field were successfully sourced, manufactured and installed domestically. Based on this practical experience, some studies (e.g. by ESMAP) suggest that solar energy, especially the CSP technology in the case of Egypt, offer good opportunities for technology transfer and local manufacturing. For instance, Cairo University is carrying out a research project to design and test the performance of locally manufactured solar components, and the project results so far are very promising. In fact, from a strategic perspective, the government of Egypt places high importance on seizing the opportunities that the scaling-up of the various renewable energy technologies, including CSP, could offer in terms of job creation in the more high-value jobs and technology transfer which would further

provide for local manufacturing and attraction of foreign direct investment to help revive the economy.

81. The above discussion clearly demonstrates that solar energy in general, and the CSP technology in particular, are foreseen to play a major role in fostering renewable energy deployment in Egypt as they could help meet various developmental objectives including energy security and diversification and job creation. Based on the figures announced by the government for the wind and solar energy targets, the new wind and solar energy capacities to be added would be on average 1 GW per year over the next decade or so. This capacity would represent about 50% of the targeted yearly capacity addition required to meet the demand growth, out of which solar energy would represent about 20%. This in turn would translate to a 50% reduction in the emissions that would be expected from the new capacity had it been fully based on fossil fuels.

82. While the primary project to be supported in Egypt is still the Kom Ombo plant, in a letter to the CTF trust fund committee dated May 13, 2014 the Government of Egypt is requesting funds to undertake a study assessing the viability of a thermal CSP hybridization in Egypt for the Oyoun Moussa and Kureimat steam-cycle power plants. The expectation is that the incremental cost of these plants would be significantly lower. If this feasibility proves to be promising, the Government of Egypt would like to reserve its right to utilize the CTF funds towards one or more of these plants rather than the Kom Ombo CSP project.

Implementation Readiness

83. The preparatory studies for the Kom Ombo CSP project – feasibility study supported by KfW and ESIA study supported by a CTF PPG through AfDB – have been completed. The site originally proposed for the project (at Kom Ombo, about 60 km north of Aswan in Upper Egypt) was abandoned because of construction restrictions (building height limit of 7 m, which is not feasible for CSP). Accordingly, a new site has been proposed by NREA in the same vicinity. The new site could be best described as untouched desert with no vegetation and of no visible use. It could allow the installation of a CSP plant several times larger than the proposed 100 MWe, or of several plants of that size. Transmission infrastructure is readily available near the site, with some different options for plant connection. The option proposed for grid connection will be through one of the 220kV overhead transmission lines that pass approximately 12 km from the site. The recommended design for the project comprises a parabolic trough solar field with 100 MWe steam-turbine-generator power block and four-hour full-load thermal energy storage using molten salt to enable power generation during the peak hours after sunset without the need for fossil fuel firing. Water needed for the steam turbine can either be supplied from the River Nile, which runs about 15 km to the east of the project site, or from the deep groundwater. However, in order to minimize the project water needs, the option of dry cooling has been selected for multiple reasons including eliminating the need for the water infrastructure, and its potential environmental and social impacts, that will be needed to supply Nile water to the project; and testing the performance of this technical solution for replication in similar environments with restricted water availability.

84. The feasibility study has been carried out using satellite solar (DNI) data due to non-availability of ground measured data for the project site. As such, the results of the feasibility study entail some relatively high uncertainty. In Nov 2013, NREA installed a DNI ground measurement station at the project site with support from the enerMENA project. Once data from the ground

station become available for a reasonable time period, correlation between the ground and satellite data would be carried out in order to improve the accuracy of the expected solar resource at the site.

85. Egypt has received a US$1.0 million project preparation grant from the CTF, through the AfDB, for Kom Ombo. The Grant is supporting the preparation of the ESIA study for the project, and procurement of the EPC contractor. The ESIA study has been completed and discussed with various stakeholders and the ESIA and Quantitative Risk Assessment (QRA) reports are ready. The project site is located in the Aswan region that occupies a portion of the extremely arid belt of Egypt where rainfall is negligible with exception of the occasional heavy torrential rainfall on the eastern high lands. The entire area of the project site is nearly flat hard sandy and gravel ground. The Nile River, the valleys and the man-made canals constitute the hydrological system of the area. Flora and fauna of the area are not rare or endangered. The fishing activities are also very limited. The ESIA addresses the main impacts of the projects (noise, traffic, air quality, biodiversity, soils, cultural heritage, residual impacts, etc.) during construction and operation phases.

86. Despite of the readiness of the Kom Ombo project to start implementation, the government of Egypt has decided to put it on hold due to its high incremental costs. The results of the feasibility study estimate the total project cost to be around Euro 628 M and the levelized cost of electricity from the project to be around 0.226 Euro/kWh. This cost substantially exceeds the revenues expected from the project[13] and will leave a gap of about US$ 1.7 billion over its 25 years of useful life. This revenue gap is too large for the government to be able to subsidize under the current economic situation and pressure on the central budget.

87. Nonetheless, the government of Egypt is still showing good commitment to CSP. Although the implementation of the Kom Ombo project is currently on hold, measurement of the solar resources at the project site is ongoing with the aim of refining the results of the feasibility study, which could potentially improve the project financial viability. The government is also interested in revising the project's financing plan with the target of mobilizing additional grant/concessional resources to bring the cost down. Another option that is under consideration is the hybridization of CSP with other power generation technologies, e.g. with gas, to again try to lower the cost.

Rationale for CTF Financing

88. The above discussion clearly reveals that the cost of the CSP technology is still among the most expensive renewable energy technologies. In particular, for the Kom Ombo CSP project, despite of the excellent solar resources at the project area and the proposed concessional financing from the CTF, and grant resources from the EU, the cost of the generated electricity is still considerably higher than conventional generation using natural gas and even other renewable energy sources such as wind. Although the current government has put the project on hold because of the need for a large subsidy in order to make it financially sustainable, without a highly competitive financing package that includes concessional funding, such as that from the CTF, it is very unlikely that Egypt will be able to afford the CSP technology. As concluded by a recent study

[13] Revenues are expected from energy sales to the national grid for domestic consumption only given that export to Europe is not foreseen in the near future.

commissioned by the World Bank for the purpose of informing this IP update[14], concessional financing has a key role in helping buy down the economic cost of CSP; hence scale-up its deployment, which should eventually help bring the technology cost down.

89. While it might be difficult to currently close the cost gap between CSP and conventional generation, preliminary discussion with the government indicated that they would be willing to invest in CSP should the cost of generated electricity be comparable to those from other cheaper renewable energy sources. In fact, it could be argued that given the concrete steps that the government has taken to start implementation of solar PV power projects, should a financing package for the Kom Ombo CSP project be able to bring the LCOE from CSP down to that from PV, the government would be in a much better position to take a decision to invest in the Kom Ombo CSP project.

90. The Egyptian Solar Plan is still at a very early stage and various efforts are needed in order to ensure that its implementation gains the momentum necessary to keep it rolling. Although some setbacks for such new plans are normal, the potential and prospects for solar energy in Egypt are so high to be disregarded or even slowed down. For these reasons, several international financing institutions, including the AfDB, WB, KfW, EIB, AFD and the EU are providing support to solar energy development in Egypt. It is crucial that those efforts be augmented with support from the CTF and other grant and concessional resources as possible.

91. The CSP technology has some technical merits that add strategic value to its application in Egypt. Thermal energy storage that is possible with CSP technologies currently provides a technological solution for power generation from CSP plants after sunset. This feature is in particular very important for Egypt given that the daily peak demand starts after sunset too. CSP plants with thermal storage could therefore not only provide the Egyptian grid with power during daytime, but also reduce the need for expensive peaking power plants.

Results Framework

92. The Kom Ombo project will act as a catalyst for solar energy development in Egypt. It will help support socio-economic development in the country by generating 375 GWh clean electricity each year, thus contributing to supplying part of the expected growth in the demand for electricity, while avoiding an average of 4,476 tons of CO2 emissions per year over its 25 years of useful life. The project itself will create direct employment opportunities estimated as 300 during construction, and 87 during operation.

Project Development Objective Indicators are: (i) installed capacity of CSP power generation; and (ii) annual CSP electricity generation.

Intermediate Results Indicators are: (i) procurement progress of the power plant; (ii) power plant construction commencement; and (iii) power plant commissioning completion.

[14] Concentrated Solar Power in the Middle East and North Africa Region: A Review of Issues and Options, May 2013

Financing Plan

93. The following table provides an indicative financing plan for the Kom Ombo project as indicated by the various sources in 2013. Obviously, with the project currently being put on hold, the financing plan will need to be updated when the government takes a decision to resume the project.

Table 7: Project Indicative Financing (US$ million)

Financing Source	Amount
CTF*	124
NREA – equity	[120]
AFD **AfDB** **EIB** **KfW** **World Bank – IBRD** **NIF**	75 170 70 180 170 37
Total	

* Including US$1.0 million project preparation grant channeled through AfDB
* CTF loan allocation will be channeled in equal proportion through AfDB and WB
† Total estimated cost of the project US$745 million

Project Preparation Timetable

Table 8: Project Preparation Timetable

Milestone	Date
GoE decision on project	4Q 2014
CTF TFC approval	2Q 2015
Hiring of consultant owner's engineer	September 2015
Appraisal by financiers	October 2015
IBRD and AfDB Board presentation	December 2015
Construction start	1Q 2016
Plant commissioning	2Q 2018

Noor II & III CSP Project in Morocco (AfDB/IBRD)

Problem Statement

94. Morocco's installed capacity has grown by about 50% in 10 years (2001-2011). The installed capacity at the end of 2011 was 6,377 MW. The technologies with a higher share in the energy mix are thermal coal steam (1,785 MW), hydropower (1,306 MW), and gas turbines and diesel groups (1,118 MW). In addition, 470 MW correspond to the thermo solar plant of Ain Beni Mathar. Electricity demand has been growing at an average of 6.8% annual growth rate since 2000, increasing almost threefold from 1995 to 2011 (from 11 to 28.7 TWh), with a spectacular 8.4% growth for the year 2011. Morocco has had to rely increasingly on imports from Spain to meet national demand as the commissioning of capacity additions has not kept up with the pace of growth in demand. The Government of Morocco is aiming at dramatically diminishing its use of fuel, increase its use of gas, and boost the share of wind from 4 to 15% and of solar from 0 to 14%. The latter will be done in the framework of the Moroccan Solar Plan, which aims at reaching 2,000 MW of thermo solar with five power plant sites by 2020, namely Ouarzazate, Ain Beni Mathar, Foum Al Oued, Boujdour, and Sebkhat Tah.

95. Morocco is the country with the largest proposed capacity in the MENA CSP CTF Investment Plan (IP) and the first to launch the development of one of the world's largest CSP plants with private sector involvement, the Ouarzazate Solar Complex. Among the MENA countries, Morocco is arguably the best placed for pursuing the development of CSP technology: (i) Morocco has already experience with the CSP technology through the operation of a 20 MW CSP plant at Ain Beni Mathar; (ii) Morocco has a transmission interconnection with Europe, which makes exports of solar electricity technically immediately possible; (iii) PPP engagements in the power sector have a long tradition in Morocco; and (iv) Morocco has an overall low country risk relative to the remainder of MENA and is open to integration with Europe.

96. Morocco has decided to take on a leadership role in the development of solar energy. Following commitments made during the Cancun and Durban Conferences of Parties (COPs) to the United Nations Framework Convention on Climate Change (UNFCCC) and under the Union for the Mediterranean, Morocco moved forward with a first tranche of 160 MW of the proposed 500 MW plant Solar Complex planned to be constructed in Ouarzazate in southern Morocco. While on January 2012 a new Government came into power, it has continued to pursue the implementation of the Morocco Solar Plan as launched by Morocco's King on February 2009.

97. The first phase of the Ouarzazate project consisted of 160 MW of CSP parabolic trough. From the original CSP MENA Investment Plan, this has been the project in which most progress has been done. Moreover, the contract for the Ouarzazate Phase I project was awarded in 2012 at a more competitive price than originally planned, and the works are due to start in mid-2013. This first phase was supported by the World Bank, AfDB, EIB, KfW and AFD. The project benefitted from concessional financing from CTF and grants from the European Union and the German Government. By June 2012, the first phase had been approved by the Boards of all co-financiers, following approval by the CTF Trust Fund Committee (TFC) in June 2011. The selection process for a private partner for Ouarzazate Phase I is complete, and the contract with the winning bid was signed in November 2012

98. This second phase will consist in around 300 MW of CSP, which will be composed of a 150 to 200 MW of parabolic trough and 100 to 150 MW of solar tower technology. A market sounding exercise was conducted by the implementing agency for the project, the Moroccan Agency for Solar Energy (MASEN), in 2012, and a Request for Prequalification has been published in January 2013 by them.

Proposed Transformation

99. 109. The proposed project aims to increase production of solar-based electricity in Morocco, to reduce carbon dioxide emissions, and to test the electricity export concept. The project will also contribute to Morocco‘s objective of reducing electricity import dependency. A global and regional objective is the mitigation of climate change (through the reduction of carbon dioxide emissions).

100. 110. In addition to fostering low-carbon development of the energy sector and enhancing energy security, the Moroccan Solar Plan aims to stimulate large investments, enhance Morocco‘s competitiveness and position the country as an _early mover‘ in the context of green technology by encouraging the development of domestic manufacturing capacity. In order to spur the development of a local manufacturing industry, Morocco has been using a combination of push and pull measures. Instruments such as (i) encouraging local content in Requests for Proposals (RFPs) for the plants of the Morocco Solar Plan; (ii) devising a communications strategy for the projects in the pipeline; and (iii) developing local R&D facilities and training programs, have been used to develop an conducive market environment for developing local manufacturing facilities in support of the construction of CSP plant. The World Bank supported these efforts through studies such as the ESMAP study on local manufacturing and its follow-up study on the competitiveness of the CSP industry in different manufacturing locations, and the creation of a Climate Innovation Center in Morocco.

Implementation Readiness

101. The project is ready for implementation. A consultant has been recruited and the market sounding for the two CSP technologies considered has taken place. The Request for Prequalification has been launched by MASEN in January 2013, and the result published in August 2013. The request for proposals (first stage) was launched in December 2013. The launch of the second stage of the request for proposals will take place in June 2014, and the preferred bidder would be awarded the contract by the end the year 2014.

102. As far as the World Bank pipeline is concerned appraisal and negotiations are envisaged for mid- 2014, and the Bank approval in September 2014. AfDB has held their evaluation mission in May 2014 and submission of the project to the AfDB Board is expected in October/November 2014.

Project Preparation Timeline

Table 9: Project Preparation Timetable

Milestone	Date	Status
Recruitment of **Financial Advisors** **Technical Advisors** **Legal Advisors**	April 2012 September 2012 November 2012	Complete
Market Sounding	August-October 2012	Complete
Preparation of RFQ documents	December 2012	Complete
IFIs non objection	March 2013	Complete
Launch of RFQ process	February 2013	Complete
RFQ submission	April 2013	Complete
Bids evaluation	May 2013	Complete
IFI non objection	June 2013	Complete
RFQ results	August 2013	Complete
Launch RFP First stage	December 2013	Complete
RfP Bids evaluation	May/June 2014	Ongoing
Launch of RFP second stage	June 2014	Upcoming
Preferred Bidder selection after IFIs non objection	November 2014	Upcoming
CTF TFC approval	June 2014	Upcoming
PPP Award	December 2014-January 2015	Upcoming
IBRD and AfDB Board Approval	IBRD (September 2014); AfDB (October/November 2014)	Upcoming

Rationale for CTF Financing

103. CSP capital costs remain high, even if they are expected to decline by between 40-50% in the next ten years. Any project inscribing itself in supporting the development of CSP technology is therefore expensive and high risk, and hence needs substantial financial support. As for all nascent technologies, the targeted use of policy instruments, including subsidies, is needed for scale up if the technology is to realize these cost reductions over the medium term.

104. In addition, exports of electricity generated by CSP from the MENA region to the EU could also help ensure cost recovery in the medium to long run. This way, benefits of CSP electricity trade accrue on both shores of the Mediterranean

105. Finally, one should take into consideration that the first part of this CSP power plant is already underway, that its implementation has been successful so far, and that not developing the second part of Ouarzazate would impede harnessing the economies of scale of the proposed 500 MW optimal size of the plant.

Results Framework

106. The key results indicators are (i) installed CSP power generation capacity (340 MW), (ii) electricity production in kWh by Ouarzazate Phase II (1 120 GWh per year), and (iii) avoided CO_2 emissions (521, 670 tons/year).

Financing Plan

107. A number of partners have already expressed a firm interest in co-financing Ouarzazate II, as can be seen in the table below.

Table 10: Project Indicative Financing (US$ million)

Financing Source	Amount
Borrower (MASEN/PPP)	585
IBRD	400
CTF*	238
AfDB	123
EIB	532
AFD	68
KfW	870
NIF	120
Total	3023

***CTF allocation will be channeled in the equal proportion through AfDB and WB**

New Project in Libya (AfDB/IBRD)

Problem Statement

108. Libya is an oil-rich middle-income country with a population of 6.4 million, emerging from revolution and civil war. Two years after the declaration of liberation, uncertainty continues to mark the political and economic transition. An interim parliament, the General National Council (GNC) was elected in July 2012 as the legislative authority to oversee the transition and draft a new constitution by end of 2013. However, due to political disagreements, a disruption in the country's oil exports, and security problems, the schedule to formulate the new constitution has been significantly delayed. Despite these challenges, the interim government continues to focus on restoring security and rebuilding government institutions to provide basic goods and services.

109. The country is highly dependent on the hydrocarbon sector, which represents four-fifths of GDP. In 2011-12, it generated about 95 percent of total fiscal revenue and 98 percent of export receipts. In 2012, the Libyan economy began to recover with oil production nearly reaching its pre-revolution levels of 1.6 million barrels per day (bpd). Oil accounted for over 60% of GDP in 2012 and 95% of revenue. The share of the non-oil economic activity has declined and accounts for no more than 22% of GDP and a negligible part of total exports. The non-oil budget deficit widened from 139.6 % of non-oil GDP in 2010 to 191% in 2012.

110. Libya currently has an electric power production capacity of about 8.3 Giga Watt (GW), with a peak load of around 5.98 GW. Total electric generation has reached 25.61 Giga Watt hours (GWh) in 2012. The electrification of Libya has reached almost 100% of the population. Most of Libya's existing power stations are gas-fired. The gas consumption in electricity generation plants has increased considerably because some turbines have been converted to gas to increase oil capacity available for export and other uses. In 2012, natural gas represented 61% of the total fuel consumed in the electric sector (10,197 Toe), the rest is covered by the light fuel (21%) and heavy fuel (9%) and kerosene (9%).

111. The Libyan grid is composed of approximately 1,900 km of mainly 220 kV double circuit lines and a few single circuit 400 kV lines that are divided among 4 geographic areas – East (Tripoli to Zawia), Central (Tripoli to Misrata), West (Misrata to Benghazi), and South (Misrata to Sebha). The grid is also connected to Algeria, Egypt and Tunisia, which have further connections to other networks in Turkey and Morocco with forward links to Europe. However, the only power exchanges are happening through the connections with Egypt and Libya and are very limited. They are not used on a regular basis because supply is seasonable and time limited (around 61GWh imported and 14 GWh exported in 2012).

112. The Ministry of Electricity (MoE) regulates and operates the electric power sector. The state-owned companies under its jurisdiction are: the General Electricity Company of Libya (GECOL) and the Renewable Energy Authority of Libya (REAOL) in addition to 10 other public consulting and engineering enterprises.

113. GECOL is a vertically structured power utility and is in charge of of generation, transmission and distribution of electric power throughout Libya. As for REAOL, its main

objectives are: i) mapping of renewable energy sources in Libya ii) implementation of renewable energy projects ii) raising the contribution of renewable energy in the national energy mix by 10% by 2020 iv) encouraging and supporting the industries related to renewable energy v) proposing the legislation and regulation necessary to support and facilitate the use renewable energy and vi) Promotion and implementation of the programs related to the energy efficiency. Apart from one wind farm under construction and public large-scale trials of solar water heating, Libya has little experience with renewable energy sources.

Proposed Transformation

114. As part of its policy to meet a mix of 10% renewables by 2020, Libya has expressed its interest in participating in the CTF MENA CSP program and has proposed a CSP project in Sebha, 750km South of Tripoli for a capacity of 50-100 MW using dry cooling as water is scarce in the south where DNI levels are very good. A feasibility study will be launched soon in order to be finalized by mid-2015. For the moment, an indicative envelope of US$20million has been added to the IP until there is better visibility on the projects and more certainty on funding availability because of other projects not progressing.

Implementation Readiness

115. A pre-revolution MOU with an interested investor in CSP is being reviewed and the IFC and the World Bank are assessing this possibility. Otherwise some DNI data exists for a number of locations in Libya as a result of the earlier MoU, which could serve as a basis for further analysis as part of a feasibility study. The next steps will be the preparation of technical and environmental/social feasibility studies and preparation of adequate legal and institutional framework.

Rationale for CTF Financing

116. CSP capital costs remain high, even if they are expected to decline by between 40-50% in the next ten years. Any project inscribing itself in supporting the development of CSP technology is therefore expensive and high risk, and hence needs substantial financial support. As for all nascent technologies, the targeted use of policy instruments, including subsidies, is needed for scale up if the technology is to realize these cost reductions over the medium term. Libya is also keenly interested in the know-how that the participation in the CTF can help leverage.

Results Framework

Results Indicator	Target Value (CTF Plan Endorsed November 2009)	Target Value (CTF Plan Update June 2014)
Co-financing of CTF funding (US$ million)	n/a	20

GHG Emissions Savings (tCO2e/year)	n/a	TBD
RE Installed Capacity (MW)	n/a	TBD
CTF Cost Effectiveness (CTF US$/tCO2e reduction over 20yrs)	n/a	TBD

Financing Plan

Financing Source	Amount (US$ million)
CTF	20
Government of Libya	Tbd
World Bank (IBRD/IFC)	Tbd
Other Private Sector	Tbd
Total	Tbd

Project Preparation Timetable

Milestone	Date
Feasibility and Environmental Studies	September 2014 – September 2015
Legal framework	September 2014 – September 2015
CTF TFC Approval (CSP project)	October 2015
MDB Board Approval (CSP project)	March 2016

Akarit CSP Project in Tunisia (AfDB/IBRD)

Problem Statement

117. In 2011, electricity consumption in Tunisia reached 12,900 GWh as compared to 10,868 GWh in 2006 with an average growth rate of 4.5% per year. Generation installed capacity was 4,025 MW in 2011 with 39% in combined cycle Gas turbines, 31% in single cycle gas turbines, 27% in steam turbines, and 3% in renewable energy (of which 52% hydro, 46% wind and 2% solar). Electricity generation was 15,200 GWh with natural gas as main fuel for producing electricity (99.9%).

118. As far as primary energy supply is concerned, the energy deficit has reached one million toe in 2011, equivalent to 13% of national energy consumption. This is mainly due to the decrease of oil production.

119. It is expected that natural gas resources (indigenous production, existing import contracts) will show not be sufficient to cover demand by 2020. In order to achieve security of supply, the Tunisian Government has adopted an energy policy consisting in diversifying energy supply sources and increasing the renewable energy share within the national energy mix.

120. This was translated by the adoption of the Tunisian Solar Plan (TSP) in 2009 with the following objectives by 2016 for wind and solar energy:

- Wind: additional capacity of 429 MW by 2016 (including the 215 MW already installed in 2011),
- Thermo-Solar: three projects of 140 MW total to be combined with gas power plants,
- Solar PV: eight projects with a total capacity of 57 MW including for electricity generation.

121. In relation with this TSP, the CTF considered in 2009 (with an update in 2010) to contribute to the following projects:

- 50 MW CSP power plant to be developed by STEG,
- 100 MW CSP power plant to be developed within the framework of the ELMED Project (1,200 MW IPP Project - including 100 MW from renewable energy - aiming at exporting 800 MW to Italy and allocating 400 MW to STEG),
- 5 MW CSP as part of a 50 MW power plant to be developed by SITEP (Société Italo-Tunisienne d'Exploitation Pétrolière) as an IPP in collaboration with STEG-Energies Renouvelables, a subsidiary of STEG.
- A transmission line (within the framework of ELMED Project) connecting Tunisia to Italy (1,000 MW capacity with 100 MW to be devoted to exporting renewable energy to Europe).

Proposed Transformation

122. As of today, allocating CTF funding is only considered for the 50 MW CSP project to be developed at Akarit site by STEG (with an option of upgrading it to 100 MW). The other projects are not moving and are not ready for absorbing this source of funding: (i) the ELMED generation project is on hold, (ii) the SITEP project is now financed under a Japanese grant. Currently the use of the existing gas turbine versus a coupling CSP component to new gas turbines is still being

debated, (iii) regarding the ELMED transmission line project, a study is being conducted with financing from the Robert Schuman Institute on how to mitigate the economic risk of this project by reformulating it from merchant/private project to a public interconnection project.

123. The proposed 50 MW Akarit CSP project in south-eastern Tunisia will increase power generation from solar energy and mitigate greenhouse gas emissions and local environmental impacts. A feasibility study has been conducted with KfW's assistance with a financing from the EU/NIF. Some fine tuning of the technical specifications is being conducted with the aim of reducing the costs of the project. The two main parameters considered for reducing the project costs are the storage duration and energy back up through natural gas. The option of reducing storage duration from the initial option of 4 hours to 2-3 hours is being evaluated in addition to the option of raising the level of natural gas back up from 5% initially to 15%.

Implementation Readiness

124. The preparatory studies for the Akarit project are well in progress. A feasibility study supported by KfW is near finalization. The Akarit site has been selected and can accommodate 50 to 100 MW of parabolic trough. Transmission infrastructure is readily available near the site, with some different options for plant connection. The collection of ground measured solar data (DNI) for the project site started in April 2012 and 2 years of data are now available. It indicates that solar insolation levels exceed the previous extimates.

125. The EPC bidding documents of the project have been prepared. The ToRs for the ESIA consultancy services have been validated by the World Bank. However, there have been delays in the bidding process of the study, which is now expected to be completed by mid-2014. Pending the final approval by the client, the project is ready to be implemented following the timetable indicated in the table below.

Table 11: Project Preparation Timetable

Milestone	**Date**
Feasibility study finished	June 2013
CTF TFC approval	2015 (TBC)
WB and AfDB Board Approval	Late 2015
Selection of contractor	2014
Construction	2015-2017
Commissioning	2018

Rationale for CTF Financing

126. CSP capital costs remain high, even if they are expected to decline by between 40-50% in the next ten years. Any project inscribing itself in supporting the development of CSP technology is therefore expensive and high risk, and hence needs substantial financial support. As for all nascent technologies, the targeted use of policy instruments, including subsidies, is needed for scale up if the technology is to realize these cost reductions over the medium term.

127. Against the background that CSP technology is promising as a component of the energy mix in the medium and long term, Tunisia is willing to prepare itself to integrate this technology into its power system. To that end, STEG is considering promoting, as a pilot project, the 50 MW CSP Akarit project with option to expand it to 100 MW. However, some barriers still restrict the scaling-up of the adoption of solar energy in Tunisia. The most significant of those barriers is the relative high cost of CSP as compared to conventional energy or even to other renewable energy sources such as wind. For the same amount of investment, the country could purchase about four times of the installed capacity of CSP in conventional energy.

128. Given the financial situation of STEG, the high cost of solar energy makes raising the necessary larger finance for project development more challenging, especially in times of decreasing credit risk ratings for Tunisia. So far, all renewable energy projects that have been developed in Tunisia were supported by very concessional financing. The estimated high price tag for the Akarit project would require financing from various sources including international financing institutions. Indeed, several development partners such as the IBRD, AfDB, AfD, EIB, KfW, and EU/NIF have expressed interest in the project and indicated their potential support. The role of the concessional CTF financing is vital in bringing down the energy cost from the project to a reasonable level that would be acceptable to the Government. This IP update therefore proposes to confirm the CTF allocation to Tunisia within the MENA CSP IP in order to capitalize on this opportunity and help the Government of Tunisia take the decision of contributing to the promotion of Akarit project.

Results Framework

129. The Akarit project is meant to be a demonstration project for facilitating CSP development in Tunisia. The project will contribute to achieving the TSP target for renewable energy by 2030, since CSP technology is expected to be a major component if its investment cost is reduced to a comparable level of alternative solutions. The project is expected to produce 132,4 GWh each year, thus contributing to supplying part of the expected growth in the demand for electricity, while avoiding 2,180,715 t of CO_2 over its lifetime of 25 years. In the case of the Akarit project, direct employment by the project itself will be modest. However, the scaling-up of solar power in Tunisia will eventually create more direct jobs by 2030. Other benefits include creation of new business opportunities for the existing local manufacturing of medium and low voltage equipment and cables, in addition to the possible introduction/strengthening of new industries for providing components of the solar fields for CSP plants such as the support steel structures, tracking systems, heat exchangers, and eventually the mirrors. A discussion is also taking place within the framework of COMELEC on adopting a regional strategy for developing RE technologies and the related impact on local industry.

Financing Plan

130. Various financing scenarios are being evaluated and a financing plan is expected to be adopted in the coming weeks at a workshop to be attended by the concerned stakeholders including the Ministry of Industry and Technology.

Table 12: Project Indicative Financing (US$ million)

Financing Source	Amount
CTF*	62
KfW	92
EIB	66
AFD	26
NIF	20
IBRD	51
AfDB	50
Total	**367**

***CTF allocation will be channeled in the equal proportion through AfDB and WB**

CSP/CPV Projects in Jordan (IFC)

Problem Statement

133. Guided by the 2010 Update on the CSP-MNA Investment Plan, Jordan and the two implementing MDBs—The World Bank and the International Finance Corporation—have had several discussions with the Government of Jordan (GoJ) on its indicative allocation of US$112 million for Jordan's concentrated solar power (CSP) program.

134. The GoJ has made a decision to request CTF Trust Fund Committee's support to allocate the US$112 million of CTF financing for Jordan to eligible private sector CSP and CPV generation projects. In parallel, the GoJ will take the lead in obtaining financing for other associated infrastructure for the Jordan's CSP program.

135. The Ministry of Energy and Mineral Resources (MEMR) is entrusted by the Renewable Energy and Energy Efficiency Law No (13) 2012 with the development of renewable energy sources for power generation through a direct proposal submission process. In May 2011, the GoJ, acting through MEMR, launched a Request for Expression of Interest (REOI) process for private sector renewable energy projects, under the new Renewable Energy Law. Following receipt of EOIs in July 2011, MEMR entered into five Memoranda of Understanding (MOUs) with private sector sponsors for the possible development of CSP projects. Moreover, MEMR also executed two MOUs for Concentrated Photovoltaic (CPV) projects in response to the REOI. Prior to the last CTF TFC it was confirmed that CPV technology would be considered a type of concentrated solar power (CSP) technology and therefore eligible for CTF support. IFC considered financing a private sector CPV project in Jordan utilizing CTF resources for co-financing in order to act as a pilot for the entire MENA region. However, both CPV MOU holders decided instead to convert their projects into conventional solar PV projects. This is as conventional solar PV projects were in line to receive approvals to proceed to implementation more quickly than the CPV projects would have been.

136. The next step in the process is the submission of a direct proposal (both technical and financial), by the MOU holders. The CSP MOU holders who are proposing solar thermal power plants (either parabolic trough or tower technology) were originally to have submitted generation proposals by the end of 2013. However, the deadline was extended into 2014. IFC remains interested in supporting both CSP projects depending on their meeting IFC financing criteria, individual project finance needs, project readiness, and consistent with any CTF MNA Update approved by the CTF Trust Fund Committee. Following discussions with project developers, IFC estimates a prospective need to retain at least US$50M of the US$112M that was originally allocated to Jordan. IFC has held discussions with the government, along with the World Bank. IFC has also engaged in discussions with the EBRD, which has only recently become active in Jordan and was not a party to the original MENA CSP Scale-up Program. EBRD has also indicated an interest in working with private CSP developers on a best efforts basis to identify additional sources of concessional financing to achieve a financially viable project structure. Subject to additional funds being available, EBRD is prepared to act as a direct channel for CTF funds. If successful, further details will be provided at an appropriate time .

Implementation Readiness

137.**CSP Projects:** IFC aims to target and apply CTF funds to support 1-2 private sector CSP projects. IFC's RE program will seek to retain flexibility (in terms of approach, project selection, and application of CTF funds) in structuring the best way to accelerate the implementation of these renewable energy investments with minimum concessionality on a project-by-project basis. One of the key risks in the sector is that NEPCO (the national power utility) will not be able to accommodate all requests to connect selected projects to its Transmission Network due to existing network technical constraints in the short-term. However, NEPCO is working to address these constraints through network upgrade in the medium- and long-term. There are also uncertainties about the credit-worthiness of the Power Purchase Agreements (PPAs) due to fiscal indebtedness and the ability to secure long-term land leases for adequate land parcels from the Ma'an Development Company where a number of prospective CSP projects will be located. If MEMR is able to decide on the selection of one or both of the CSP projects, which is expected within the second half of 2014, IFC should be able to address these issues in the project development phase, and Program Proposals for the CSP project or projects will be able to be submitted to the Trust Fund Committee by the end of 2014.

Rationale for CTF Financing

138.**CSP Projects:** The estimated cost of CSP based power in Jordan is 19-24 US$ cents per kWh . In the case of CSP, the cost is at least 20% higher than the average cost of power in 2011 for NEPCO at 16 US$ cents per kWh and significantly higher than gas-fired and wind power for which the generation cost is about 7 US$ cents per kWh and 12 US$ cents per kWh respectively. Concessional financing from CTF is therefore necessary to help buy down the higher economic cost of CSP projects. Moreover, the market remains relatively nascent for these technologies, and long-term financing remains difficult for private project developers to mobilize. CTF funds can be used to help support and overcome these financing gaps. Blended with other commercial financing, CTF funds can provide a concession to the overall financing package that will improve the risk-reward profile so that the project becomes attractive to private sector first movers who are prepared to be active in the Jordanian power market.

Results Framework

Results Indicator	Target Value (CTF Plan Endorsed November 2009)	Target Value (CTF Plan Update May 2013
Co-financing of CTF funding (US$ million)	72	40-50
GHG Emissions Savings (tCO2e/year)	n/a	TBD
RE Installed Capacity (MW)	n/a	TBD

CTF Cost Effectiveness (CTF US$/tCO2e reduction over 20yrs)	n/a	TBD

Financing Plan

Financing Source	Amount (US$ million)
CTF	40-50
IFC Financing	40-50
Other Private Sector	120-150
Total	200-250

Project Preparation Timetable

Milestone	Date
CTF TFC Approval (CSP project)	September 2014
MDB Board Approval (CSP project)	March 2015

ANNEX II: EXAMPLES OF INSTRUMENTS TO BUY DOWN THE COSTS OF CSP

Renewable energy technologies, such as Concentrated Solar Power (CSP), often present higher upfront capital costs in comparison to conventional energy generating technologies. These incremental costs can be justified on a number of bases, such as benefits to improved energy security, reduced greenhouse gas emissions, diversification of the energy mix, gaining an early mover advantage of a technology the cost of which are expected to decline in the future, etc. However, from a national budget perspective, the question arises as to the optimum structure of covering these costs to minimize the overall impact on the economy from investments in CSP. This is an especially pertinent question in the context of the MENA CSP Clean Technology Fund (CTF) program where Governments are faced with very immediate financing needs to support social development needs.

Countries around the world have explored and implemented different financing approaches to support their renewable energy policies with a view of harnessing their future benefits. Some of the option to buy down the costs include:

- **Mezzanine financing:** one option for addressing the subsidy gap is mezzanine financing which can be provided by investors (including public investors) to help organizations (notably SMEs and special purpose vehicles (SPVs)) obtain easier access to debt financing. Risk associated with this type of product is high for the investor who offers mezzanine funds because there is a higher risk of repayment default. Previous experiences of mezzanine funds which blend public finance have successfully attracted funds from private investors, when structured in a way whereby shares owned by public financiers carry most of the repayment risk. In this case, public finance is used as a risk mitigation mechanism. Countries of implementation for this type of mechanism include the European Union (Germany, France, Netherlands, and Sweden); an example of this type of financing is the FIDEME, a €45 million public private investment partnership that provided mezzanine finance to renewable energy companies in France.

- **Premium on tariff for green electricity:** another option for addressing the subsidy gap is applying a premium on tariff for green electricity. In this case a premium is paid to energy producers to compensate for the difference between the marginal costs of the technology and the market price. Risks and costs associated with this mechanism are high for a constant price premium and potentially lower for a sliding premium option, in which the premium varies with the market price. In terms of strengths, a sliding premium can help minimize overall policy costs by providing a more cost-based payment structure. In terms of weaknesses, it can be difficult to control overall policy costs, unless intermediate caps or capacity-based degression are fixed; producers could also develop a reliance on the policy. This type of system has been implemented in Spain, the Czech Republic, Estonia, Slovenia, the Netherlands, and Denmark; for example in Denmark an energy premium on tariff has been applied to onshore wind energy.

- **Tax credit and tax credit bonds:** an option for closing the subsidy gap is offering tax credits, or alternatively tax credit bonds. Tax rebates or credits can encourage investment in renewable energies and could be offered for production or investment. Investment tax credits can pose a risk to the government in terms of project performance and cost risk; taxable cash incentives can be more cost-effective for governments than tax credits. The strengths of a tax credit scheme include that it is easy to administer and that it channels the extra costs to the state budget, which can be important if electricity prices cannot be increased. Also, circumstantial evidence shows that tax credits have promoted wind energy development in the United States, by mitigating high risk (and the low profitability) of such investments. However, in terms of weak points, tax credits can include high regulatory risk (annual state budget), also renewable energy projects often have limited tax liabilities, meaning tax benefits can only be used many years after received. Furthermore, there can be difficultly with the transferability of tax incentives while the use of tax-equity financing is often costly and only enables developers to realize two-thirds of the tax-incentive value. Tax credits for renewable energy have been implemented in the U.S.A., Uruguay, Belarus, France, Belgium, Ireland, Finland, Sweden, and Canada. Notable examples include the Residential Renewable Energy Tax Credit (Personal Tax Credit, U.S.A.), Renewable Electricity Production Tax Credit (PTC; Corporate Tax Credit, U.S.A.), Tax exemptions for renewable energy (Uruguay), and the Tax Credit for Energy-Saving and Renewable Energy Equipment (France).

  An alternative to traditional tax credits is offering tax credit bonds, which offer bondholders a full or partial tax credit instead of interest payments. Such bonds can also be structured to provide a subsidy payment equal to the interest cost rather than a tax credit. Typically tax credit bonds are issued by state or local governments, with a specific amount of available funds authorized for each tax credit bond program; alternatively, specific projects which will receive tax credit bonds can be selected. The level of cost and risk associated with tax credit bonds depends on their design. In the United States, they are considered less costly than more traditional bonds but potentially more expensive than traditional borrowing by the Department of the Treasury. On the one hand, tax credit bonds can serve as a potential method of encouraging private individuals to invest in clean energy, while on the other hand, such tax credit bonds require a relatively mature and diversified financial system and can face a lack of appetite for tax credits in a recessionary economy. Tax credit bonds have been implemented in the United States as Clean Renewable Energy Bonds (CREBs), Qualified Energy Conservation Bonds (QECBs), and Build American Bonds (BABs). Between 2005 and 2009 these types of bonds funded over 900 clean-energy projects totaling to $1.2 billion.

- **Tax optimization schemes:** another option for closing the subsidy gap is the use of tax optimization schemes, thereby using tax conventions allowing foreign corporations or wealthy individual to obtain tax cut or other advantages by investing in renewable energy in a certain country. In the case of Morocco, while general tax-related policies are in place to encourage foreign investment, no specific tax regulations exist for renewable energy-related investments; however, there appears to be a potential demand for this type of mechanism. Costs and risks associated with this option are similar to those for more traditional tax credits or tax incentives, which can pose a risk to the government in terms

of project performance and cost risk. The strength of such a scheme is that it can encourage foreign investment. However, there are no existing precedents for this type of policy especially in relation to renewable energy investment and in the Moroccan case, large capital investments (multi-billion) may be needed rather than smaller contributions by a number of actors. While a number of countries have introduced tax-related incentives for renewable energy, no systems have been identified with specific tax incentives for foreign investment in renewables. Existing systems typically involve a tax credit for production or investment, or alternatively a reduction in custom duties, VAT or sales tax.