Climate Investment Funds

CTF/TFC.7/5
June 8, 2011

Meeting of the CTF Trust Fund Committee
Cape Town, South Africa
June 22, 2011

Agenda Item 7

MOROCCO: OUARZAZATE I CONCENTRATED SOLAR POWER PROJECT

Proposed Decision by CTF Trust Fund Committee

The CTF Trust Fund Committee reviewed the *Morocco: Ouarzazate I Concentrated Solar Power Project* (document CTF/TFC.7/5), and approves a CTF allocation of $197 million to the project, with $100 million to be channelled through AfDB and $97 million through the World Bank. This is the first project proposal under the Investment Plan for Concentrated Solar Power in the Middle East and North Africa region, which was endorsed by the Trust Fund Committee in November 2009.

The World Bank

African Development Bank

CTF Trust Fund Committee

Joint AfDB-WB Submission Document

Morocco: Ouarzazate I Concentrated Solar Power Project

June 2011

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Abbreviations

AfDB	African Development Bank
CSP	Concentrated solar power
CTF	Clean Technology Fund
CO_2	Carbon dioxide
DNI	direct normal irradiance
EIB	European International Bank
ESIA	Environmental and Social Impact Assessment
ESIAF	Environmental and Social Impact Assessment Framework
GoM	Government of Morocco
IFI	international financial institution
IP	Investment Plan
KfW	Kreditanstalt fur Wiederaufbau
LCOE	Levelized cost of energy
LLC	limited liability company
MASEN	Moroccan Agency for Solar Energy
MENA	Middle East and North Africa
NIF	Neighborhood Investment Facility
NO_x	Nitrous oxide
ONE	Office National de l'Électricité
PPP	public-private partnership
SO_2	Sulfur dioxide
SPC	Solar Power Company
WB	World Bank

Weights and measures

GW	gigawatt
KWh	kilowatt-hour
m^2	square meter
Mm^3	thousand cubic megameter
MW	megawatt
TWh	terawatt-hour

Currencies

€	Euros
$	United States dollars

A. Strategic Context

Global and Regional Context

The global community is seeking non-carbon technologies to generate electricity around the clock, to complement the limited number of options now available (e.g., geothermal and nuclear technology). Concentrated solar power (CSP) is one of the technologies with the highest potential to fill that gap, but it still has a long way to travel down the cost curve. Any project designed to help jump-start this process is therefore expensive and involves very high risks, and hence needs substantial financial support. The global rewards of that initial support could be extremely high, as viable non-carbon options are currently very few. The Ouarzazate I CSP project is set in that context.

CSP is a technology of particular interest to utilities, as production is more predictable than for most renewable energy options and storage is closest to economically viability—features that facilitate the technology's integration into conventional electricity systems. CSP also holds substantial cost reduction potential, in part because of unexploited economies of scale that concern manufacturing. Reducing costs would depend on scale effects (larger projects would produce larger economies of scale),[1] learning curve effects (the costs of CSP fall by 15% or so when deployed capacity is doubled), plant convoy effects (executing multiple identical projects in the same area can reduce capital costs by 5-15%), and improvements in technology (these are expected to reduce capital costs by up to 20%).

The Middle East and North Africa (MENA) is particularly promising for scaling up CSP technology because of the region's physical attributes: abundant sunshine, low humidity, and plenty of unused flat land close to road networks and transmission grids. These attributes, together with the possibility of better access to green electricity markets in the European Union, make MENA the world's most suitable place to reduce CSP costs and accelerate global CSP deployment.

In February 2011, the European Commission issued a roadmap to transform the European Union into a competitive low-carbon economy by 2050.[2] This roadmap indicates that the European Union's objective of reducing greenhouse gases by 80-95% of the 1990 baseline by 2050 can only be achieved by fully decarbonizing the power sector. Europe can meet these objectives more efficiently by tapping resources in neighboring countries, in particular countries in the Southern Mediterranean.

International cooperation, local development, technology transfer and climate change financing are key to achieving global climate change objectives. A principal outcome of the Cancun Conference of the Parties has been the establishment of the Green Climate Fund, which signals a commitment to scaling up funding to help developing countries cope with the effects of climate change and embark on a low-emission development path. The Cancun agreement restated the

[1] Source: Boston Consulting Group. 2010. *What's Next for Alternative Energy*. November.
[2] European Commission. 2011. *A Roadmap for moving to a competitive low carbon economy in 2050*. 8 March. COM(2011) 112 final.

commitment of developed countries to mobilize $100 billion[3] per year for climate change mitigation and adaptation activities. Developing countries may, on a voluntary basis, propose projects for financing. The European Union has already mobilized "fast start" financing of $2-3 billion per year for 2011-2013, but no project has yet been financed, as the mechanism has not yet been implemented.

The World Bank and the African Development Bank (AfDB) are working with other partners to accelerate CSP deployment in MENA. The MENA CSP initiative is a $5.6 billion program -- including $750 million from the Clean Technology Fund (CTF) -- to finance CSP across the region. The initiative has employment, climate change, energy security and export revenues objectives, as well as the goal of enhancing integration across the Mediterranean. The partnership includes a wide range of donors and promotes a mix of private and public investment. Deployment of highly concessional financing from the CTF, access to European green energy markets and a continued drive to fossil fuel substitution will all be key to success of the initiative. The initiative is one of the programs under the "New Partnership for Inclusive Growth in the MENA Region" launched at the G8 summit in Deauville in May 2011.

In addition to creating the conditions for a regional market spanning the north and the south of the Mediterranean Basin—a market that would optimize the use of resources—the MENA CSP program has strong synergy with other initiatives to develop the renewable potential of the Mediterranean Basin: namely, the Mediterranean Solar Plan, Desertec, Medgrid and the World Bank's Arab World Initiative. The vision of the Mediterranean Solar Plan, under the Union for the Mediterranean partnership, is to transform the world-scale renewable energy potential of the Southern Mediterranean and the green electricity needs of the Mediterranean Basin into a massive advantage by linking large-scale renewable power production to demand centers in the Mediterranean region through reinforced transmission grids. As it moves toward its ambitious objective of reducing greenhouse gas emissions, Europe will increasingly have to find more sources of low-carbon energy. Meanwhile, in the South, electricity consumption in MENA is among the fastest growing in the world: scaling up CSP will help meet this demand without increasing CO2 emissions, enhance energy security and diversify the power generation mix. To facilitate the scaling-up of CSP, MENA countries are already introducing regulatory and institutional reforms designed to attract investors and make projects more sustainable. MENA countries are also keen on pursuing "green growth" opportunities by encouraging the use of local equipment, components and services.

These initiatives support the creation of a Mediterranean electricity market connected to Europe. A regionally integrated electricity market would facilitate the large-scale development of CSP, and cooperation toward this goal could develop a Maghreb electricity market. Regional market integration results in larger and more diversified power generation capacity than that exists in isolated national markets; in this case, it would also promote the development of renewable energy as a way to enhance energy security and mitigate climate change. In addition, regional integration permits participants to share the back-up reserves necessary to guarantee the

[3] Note that all dollars figures in this report refer to United States dollars.

reliability of supply in the presence of intermittent sources of supply. Finally, it would create a market large enough to justify developing local industry at scale.

Country Context

Morocco is the MENA country for which the CTF Investment Plan (IP) proposes the most capacity. Morocco is the first country to launch the development of a concrete project. The proposed project would be larger than any existing CSP plant in the world. Morocco already has experience with CSP technology[4] and a transmission interconnection with Europe, which would make exports possible as soon as an off-take contract remunerating green electricity was arranged, without more investments in transmission. Moroccan authorities at the highest levels have decided to play a leadership role in the development of CSP and move forward with a 500 megawatt (MW) solar power complex in Ouarzazate for domestic supply and export to the European Union as soon as practical. The other countries in the region are watching closely to see whether Morocco succeeds before following suit.

Morocco is extremely dependent on imports (97% of its energy is imported), oil (61% of primary energy demand) and coal (28%). As a result, Morocco is highly exposed to international oil price fluctuations, which has a destabilizing effect on its balance of payments and a negative effect on its balance of trade. Morocco's dependency on imported fossil fuels is unlikely to decline, given fast growth in energy demand—especially the demand for electricity—unless its energy system is rapidly adjusted to support low-carbon growth.

Morocco's challenge is to meet fast-growing demand without endangering energy security or environmental sustainability. Two key objectives of the country's energy policy are to improve energy security and mitigate climate change while ensuring access to energy for all citizens and businesses at the lowest possible cost. To meet these objectives, Morocco has resolved to develop its huge renewable resources aggressively, become a reference in wind and solar energy, and promote CSP in MENA. Morocco's Solar Plan, launched in November 2009, is the cornerstone of the country's renewable energy and climate change mitigation strategy. The $9 billion plan calls for commissioning five solar power generation plants between 2015 and 2020 for a total capacity of 2000 MW, starting with the ambitious Ouarzazate 500 MW solar project. In addition to fostering the low-carbon development of the energy sector and enhancing energy security, implementing this plan will stimulate large investments and make Morocco more competitive. The plan is integrated in that it calls for local manufacturing as well as training, education and research and development activities, therefore boosting economic growth and creating jobs.

[4] The Ain Beni Mathar plant, one of the world's first operating integrated solar combined cycle hybrid solar-gas plant, was commissioned on 12 May 2010. The plant has a capacity of 470 MW, including 20 MW in CSP, and was partly financed by a Global Environment Facility grant of $43 million. The plant created dozens of new jobs, supports the local economy, and will help expand the skill base in Morocco to construct and operate such facilities. The success of the Ain Beni Mathar CSP plant will pave the way for deploying a pipeline of solar energy projects in Morocco.

Sectoral and Institutional Context

Electricity demand has been growing on average 6% per year since the 1990s and doubled from 11 terawatt-hours (TWh) in 1995 to 25 TWh in 2009. As capacity has not kept up with demand, Morocco has increasingly relied on imports from Spain (about 20% of energy consumed in 2009 came from Spain). Although the growth in demand slowed to 4.2% in 2009 because of reductions in the use of energy for irrigation, electricity demand is expected to continue climbing by 8-9% per annum, partly because of gross domestic product growth but also because of higher standards of living. Adding 700-800 MW of power-generating capacity per year will be necessary to meet this demand, prevent shortages, and avoid increasing imports.

Power generation in Morocco is dominated by coal (between 50 and 70% of all power generated over the last five years, depending on hydro availability). This makes Morocco a carbon dioxide (CO_2)-intensive country, emitting 50% more CO_2 per kilowatt-hour (kWh) than the world average, despite low CO_2 per capita. The only way Morocco can meet its fast-growing electricity demand without increasing its reliance on imports and augmenting its carbon intensity is to develop its vast renewable energy potential. A key objective of the country's energy policy is therefore to commission 6000 MW of renewable capacity by 2020 (2000 MW each for solar, wind and hydro), making up 42% of installed capacity.

Morocco has moved to set up a legal, regulatory and institutional framework by enacting several laws in 2010, including a renewable energy law; a law creating the Moroccan Agency for Solar Energy (MASEN), which will implement the country's solar plan; and a law setting up the Energy Efficiency Agency. The government has entrusted MASEN to develop at least 2000 MW of grid-connected solar power by 2020, inter alia, by conducting technical, economic and financial studies; by supporting relevant research and fund-raising, involving local industry in each solar project, and developing associated infrastructure. While the electricity thus generated must be sold in priority to Morocco's Office National de l'Électricité (ONE) for the domestic market, the law allows MASEN to sell electricity to other public or private operators in national or foreign markets under conditions specified in the agreement signed with the government. In October 2010, agreements were signed between MASEN and the Government of Morocco (GoM) on one hand—to stipulate government support for Morocco's Solar Plan—and MASEN, ONE, and GoM on the other hand, to set the conditions for connecting and operating solar power plants and selling the electricity thus generated.

Developing the country's solar and wind resources over the next 10 years will require investments of at least $13 billion, a large part of which will come from private investors. Morocco is taking steps to encourage private sector participation in the development of the country's renewable energy, most notably in three ways: (i) by gradually removing subsidies on fossil fuels to give consumers price signals that encourage energy efficiency, on the demand side, and to create a level playing field that makes renewable energy technologies competitive, on the generation side; (ii) by limiting the growth of electricity demand through demand-side management and other energy-efficiency measures (the strong growth in demand is partly attributable to the inefficient use of electricity: given that CSP and other renewable technologies have high capital costs, capacity should only be added when necessary, i.e., after implementing energy conservation measures); and (3) by creating a transitional support scheme until the cost of CSP is reduced, export is possible, and fossil fuel subsidies are removed.

B. Project Rationale for the Involvement of the Clean Technology Fund

On 2 December 2009, the CTF Trust Fund Committee[5] endorsed the IP for Concentrated Solar Power in the Middle East and North Africa Region, which seeks to mobilize $5.6 billion, including $750 million from the CTF, to accelerate the deployment of CSP through the CSP expansion programs of Algeria, Egypt, Jordan, Morocco and Tunisia. Specifically, the IP will equip MENA to capitalize on its unique geography to mitigate global climate change through the installation of about 1 gigawatt (GW) of CSP generation capacity, amounting to about 15% of the projected CSP global pipeline and therefore doubling global CSP installed capacity. The MENA CSP IP aims to act as a demonstrator: the project consists of cofinancing nine commercial-scale power plants capable of generating around 1 GW over three to five years and two transmission projects designed to improve the Mediterranean grid and increase exports. The MENA CSP IP has earmarked $197 million for Morocco, to be channeled by the World Bank and the AfDB.

Of the countries where the MENA CSP IP is to take place, Morocco proposes the most capacity and is the first to launch the development of a project, namely, the ambitious Ouarzazate solar power complex, which includes Ouarzazate I, one of the largest planned CSP plants in the world.

The World Bank, the AfDB, the European Investment Bank (EIB), the Agence Française de Développement (AFD), the Kreditanstalt fur Wiederaufbau (KfW) and other international financial institutions are involved with MASEN in the competitive selection of one or several qualified and financially robust private partners to establish a public-private partnership (PPP) that would be responsible for preparing and implementing the first phase of the Ouarzazate CSP plant (Ouarzazate I). Ouarzazate I consists of up to 160 MW CSP parabolic trough; potential private partners have already been prequalified. According to preliminary technical studies and recent comparable projects, the total financing required for the first phase would be close to $1 billion for the initial investment (about $6000/kW). This amount is substantially higher than was anticipated when the IP[6] was originally submitted to the CTF Trust Fund Committee, essentially because more has been learned about CSP costs as more plants are being developed and it has been assessed that storage is needed in order to maximize the benefits to Morocco's power system. Given a rapidly expanding and increasingly competitive market, this estimate is expected to be a ceiling on what bidders will propose. Analyses by ONE and the technical consultant, WorleyParsons, indicate that 3 hours of storage would optimize the coverage of peak demand, which occurs between 7 and 10 pm, and save the most fossil fuel consumption.

Because Ouarzazate I is the first project of the overall Moroccan plan and will not export electricity, a higher amount of concessional financing is necessary to make the project economically and financially viable, without unduly burdening the State budget. The CTF's full allocation to Morocco of $197 million needs to be blended with loans and grants from the World Bank, the AfDB, and other financiers so as to reduce government subsidies to an affordable level. The financial analysis of the proposed project indicates that government subsidies will be

[5] The MENA CSP CTF IP was updated and presented to the Trust Fund Committee on 12 November 2010.
[6] The unit investment cost used in the IP and the supplemental document was $4400/kW.

required to bridge the incremental cost gap because of the higher generation costs of CSP compared with coal.

The proposed loan and grant package from multilateral and bilateral donors, especially the CTF's portion, is essential for MASEN to initiate the implementation of Morocco's ambitious solar development plan. The financial support of the World Bank, AfDB, CTF and other financiers will establish MASEN as a solid partner for private developers, allowing the government to scale up solar development and reach its target of installing 2000 MW by 2020.

The financial analysis shows that the CTF contribution will lower the CSP LCOE by around 5%-15% depending on the assumptions made on the terms and conditions of the loans that would be replaced by the CTF.

Beyond its direct financial impact, however, the CTF will be instrumental in bringing in other donors. Together, they will strongly reassure private sponsor(s) about Morocco's willingness and capability to subsidize solar electricity over a long period of time. This reassurance will no doubt be especially useful in the current political context, and will help keep the equity rate of return required by the sponsor at a reasonable level. The sensitivities run with the Ouarzazate financial model show that the project's LCOE could vary by plus or minus 15%, depending on the equity internal rate of return, i.e., on the sponsor's perception of the level of risk. Valuating the CTF's direct and indirect financial impacts thus suggests that, without the CTF's contribution, the cost of a CSP-generated kilowatt-hour at the Ouarzazate I plant would be 15-20% higher.

The project was assessed with CTF investment criteria and that assessment is presented in Annex. The main points that justify use of the CTF funds are highlighted in this section.

The CO_2 saving is estimated at 240 000 tonnes per year for the first phase (160 MW) and 740 000 tonnes per year for the planned 500 MW. Over the 30 year-lifetime of a CSP plant, the cumulative emissions reduction of CO_2 is an estimated 7 million tonnes for the 160 MW first tranche, 22 million tonnes for the 500 MW Ouarzazate Complex and 90 million tonnes for full Moroccan Solar Plan. The CTF cost of each tonne of CO_2 saved would amount to approximately US$ 29 for Ouarzazate I. However, the CTF amount can be considered to contribute to the full 500 MW plant, in which case the CTF cost for each tonne of CO_2 saved is $5.4.

The potential for saving greenhouse gas emissions will be increased through replication. The proposed project is the first phase of the first site in Morocco's 2000 MW Solar Plan. The proposed project has high transformational potential. At the country level, it will help develop a sound foundation for the successful implementation of Morocco's 2000 MW Solar Plan. At the regional level, it is the most ambitious project to involve a PPP, and will serve as a model for the other countries participating in the MENA CSP CTF IP. And at the global level, Ouarzazate I is one of the largest CSP projects announced to date.

The development of solar energy will diversify the energy mix and enhance energy security. Morocco's Solar Plan will also contribute to industrial development, competitiveness and job

creation. A study of local manufacturing potential[7] indicates that the full 2000 MW program could create 11 000 jobs.

Public policies and institutional arrangements are very supportive of the Ouarzazate project. A renewable energy law was approved in late 2010 and an agency dedicated to solar energy (MASEN) has been created. In addition, both the AfDB and the World Bank are committed to enhancing the policy framework for the sector, supporting reforms to improve the sector's functioning, and promoting the development of renewable energy on a large scale.

C. Project Development Objectives

The project's principal higher-level objective is to help develop a globally-available, non-carbon power generation technology that ultimately may not require fossil fuel back-up capacity and reduce the costs of CSP for world benefit. By creating a new green industry and increasing the penetration of renewable energy in the country's energy mix, the project will contribute to Morocco's objectives of a more secure energy supply, energy diversification, CO_2 emission reductions, and increased employment. The project will also demonstrate the use of storage technology in CSP plants and will create a strong precedent for the use of the PPP business model to develop CSP power plants in Morocco and elsewhere. Finally, the project aims to help integrate the Mediterranean electricity market.

The project's more specific development objective is to support MASEN in initiating the development of the 500 MW Ouarzazate solar power complex. This will be achieved by financing the first phase (up to 160 MW gross) through a PPP, with a view to increasing the generation of power from CSP, reducing greenhouse gas emissions, and protecting the local environment.

D. Project Beneficiaries

The local population will benefit from the Ouarzazate I power plant in several ways. First there will be less local pollution from fossil fuels, resulting in better living environment for the local population as well as improved health. Second, the project will create local jobs during construction and operation. To fill some jobs, MASEN will encourage its partners to train job seekers, many of whom are expected to be young. Third, local enterprises, entrepreneurs and researchers in renewable energy and solar power will also benefit from the local manufacturing, local services, and knowledge transfer that will be induced by the construction and operation of Ouarzazate and the remaining phases of Morocco's Solar Plan. Finally, the country's entire population will benefit from less vulnerability to international oil market fluctuations

[7] Ernst & Young et Associés, Fraunhofer Institute for Solar Energy Systems ISE, and Fraunhofer Institute for Systems and Innovation Research ISI. January 2011. *Middle East and North Africa Region: Assessment of the Local Manufacturing Potential for Concentrated Solar Power (CSP) Projects*. The World Bank and the Energy Sector Management Assistance Program.

E. Project Development Objective Results Indicators

Indicators of project development objective results include the following:

- CSP power generation capacity installed in megawatts (MW)
- Local air pollution avoided, in tonnes of nitrous oxide (NO_x) and sulphur dioxide (SO_2) per year
- Greenhouse gas emissions avoided in tonnes of CO_2 per year

F. Project Description

The proposed project will support (i) the formation of a PPP between MASEN and a competitively selected private partner to develop up to 160 MW (gross) concentrated solar parabolic trough plant, the first phase of the Ouarzazate 500 MW complex; and (ii) the funding, through the World Bank's loan, of the GoM subsidy to cover the gap between the costs of CSP generation and conventional fossil fuel-fired generation, hence dampening the budgetary impact of the subsidy.

The project's first component will help finance a PPP for the construction of a power plant 10 km east-northeast of Ouarzazate. This site is well suited for the development of CSP because of its excellent solar resources, the availability of water, easy access, and the proximity to a robust power grid to transport the electricity to markets in Morocco and abroad for later phases. The construction is likely to start in 2012 for commissioning and full operation during 2014. In light of the results of the prequalification and the market response, the first-phase plant will use solar parabolic trough technology with 3 hours storage capacity. Later phases will remain open to any proven solar technologies.

In the project's second component (the feed-in tariff component), the World Bank loan will finance GoM's coverage of the difference in price at which MASEN buys from Solar Power Company (SPC) and sells to ONE, the kilowatt-hours produced by Ouarzazate I. The selling price by SPC to MASEN reflects the levelized Cost of Energy (LCOE) for CSP, once the grants—Neighbourhood Investment Facility (NIF) and grant element of the CTF loans—are factored in to reduce the investment cost through a capital subsidy.

The selling price by MASEN to ONE reflects the wholesale price of electricity in Morocco which is essentially driven by the levelised cost of coal generation. It is important to note that most of the substantial difference between the LCOEs of CSP and that of coal is due to the high capital cost of CSP (given that CSP operations and maintenance costs are very low compared to those of fossil fuel-based generation). Thus, the "feed-in tariff" component of the project is essentially financing part of GoM's coverage of amortization of capital cost in the CSP price during operations (and is therefore performance-based), while the upfront capital subsidy from the first component of the project effectively reduces that CSP price from the outset before operations commence.

GoM has in principle committed, through the renewable law and the MASEN-GoM convention, to cover the gap between the prices SPC-MASEN and MASEN-ONE from state budget. At the

request of MASEN, WB is offering a loan to cover the additional generation cost of CSP when the GoM decides to resort to this financing, instead of state financing, when economic and fiscal conditions warrant it. This solution provides flexibility to the GoM in deciding when to cover the cost gap from the State budget or from the WB loan, and additional comfort to private investors that funds will be available to MASEN to pay the CSP price agreed in the PPA.

This gapfill mechanism will be established through a scheme designed to be a prototype "feed-in tariff fund" (to help pay the incremental costs of CSP and other renewable energies) which could be extended and replicated in Morocco, and elsewhere in the world. If replicated, this mechanism would have the advantage of significantly reducing the transaction costs and risks to the private sector associated with making climate financing or development aid available to multiple renewable energy projects.

MASEN will implement Ouarzazate I by means of a PPP between MASEN and private developers. As mentioned earlier, this choice is motivated by the desire to gradually introduce private sector participation in the implementation of Morocco's Solar Plan. The PPP will also facilitate the implementation of contractual mechanisms ensuring that the private sector is incentivized, to the extent possible, to construct the power station without cost overruns or delays and to operate and maintain the power station adequately. A consortium of one or several private developers is being competitively selected to enter into long-term contractual commitments to ensure the construction, financing, and operation of the plant and the sale of solar-generated electricity at a competitively tendered price. The consortium will create the SPC, to carry out the construction and operation of Ouarzazate I and to sell its electricity to MASEN. MASEN will only be obligated to purchase the electricity if the plant has been constructed and is operating in accordance with MASEN's requirements, as specified in the Minimal Functional Specifications (MFS) in the bidding documents. The SPC will enter into a number of contracts (construction contracts, an operation and maintenance contract, power purchase agreements, financing contracts, etc.) to fulfill the obligations it undertakes under the PPP.

MASEN has initiated the selection of a private partner or partners to develop a minimum of 125MW of CSP (parabolic trough) and storage that will help cover peak load and displace hydrocarbon-based generation (currently diesel and fuel oil and possibly natural gas in the future). The prequalification phase was completed in December 2010 and four consortia have been selected on the basis of their technical and financial capabilities. All the prequalified consortia offer parabolic trough technology with 3-hour storage. The partner is being selected in a two-stage bidding process that allows for discussion of the technical bids and ensures the soundness of the technological and technical proposals. MASEN chose to avoid restricting plant configuration possibilities prior to issuing the bidding documents, to ensure that ultimate choices are made during the bidding process in consultation with the private partner(s).

G Project Financing[8]

The total investment cost of Ouarzazate I would be around $ 1 000 million. While MASEN decided to develop this project under an IPP (independent power producer) framework, it has nonetheless secured IFIs funds to reduce the LCOE as much as possible

In addition to the CTF resources (197M$), IFIs (AfDB, WB, AFD, BEI, KfW) expressed interest in providing a total financing amount that could exceed 900M$, in addition to a grant of at least 30M€ from NIF[9]. The funds would be used to finance both capex and part of the difference between MASEN's revenues and expenses (difference in PPA prices between MASEN-SPC and MASEN-ONE) The exact amount of financing by all IFIs will be finalized during the project's evaluation phase.

H. Lessons Learned and Reflected in the Project Design

The proposed project was designed to meet numerous challenges stemming from the client's goal of attracting concessional financing and initiating private sector participation in the development of a high-cost technology that promises high rewards in terms of energy security and climate change mitigation. The project design has benefited from lessons learned from using the independent power producer/PPP model to transfer technology, reduce the cost of new technologies, ensure operational performance, and reduce the risks of cost overruns and delays in construction. These lessons are as follows:

- A preliminary technological assessment to minimize technical risk
- The coordinated mobilization of donor co-financing to demonstrate the government's ability to gradually mobilize private sector contributions for solar power development
- A project design that recognizes that the private sector cannot raise all of the financing
- Introduction of a combination of capital and output subsidies to bring down initial costs while providing incentives for plant performance[10]
- Early market sounding to ensure sufficient investor interest and sound competition
- Alignment of the size of the project to MASEN's ability to mobilize financing to ensure project feasibility
- Selection of the best procurement approach (two-stage bidding with prequalification) to satisfy clients' needs and take technological uncertainties into account, and to develop clear and quantifiable evaluation criteria. Also, transparent and well-managed

[8] For confidentiality reasons, as the Ouarzazate RFP process is under way, detailed figures are not provided and will instead be presented at the Trust Fund Committee meeting.
[9] NIF=Neighborhood Investment Facility
[10] It is worth noting that many PPPs have tested the principle of financing services delivered (in this case the kilowatt-hours produced), as opposed to only financing capital costs. As a result, governments throughout the world are using this principle. The Government of the United Kingdom's Private Finance Initiative is the flagship for these mechanisms.

competitive bidding processes that have helped attract the interest of major international companies at the prequalification stage
- Performance-based operational support (the second component is linked to the actual production by Ouarzazate I).

The project design also benefitted from exchanges of information and knowledge with other large CSP programs around the world, in particular those in South Africa and India. An ESMAP funded study "Regulatory and Financial Incentives for Scaling-Up CSP in Developing Countries" compares regulatory frameworks and incentive schemes in MENA, South Africa and India, and analyses financing options to reduce LCOE which were used to inform the project. Coordination with teams working on other CSP programs will continue, largely through the knowledge platforms provided by the Climate Investment Funds (CIF), Mediterranean Solar Plan, Medgrid, Desertec Industry Initiative etc.

I. Implementation

Institutional and Implementation Arrangements

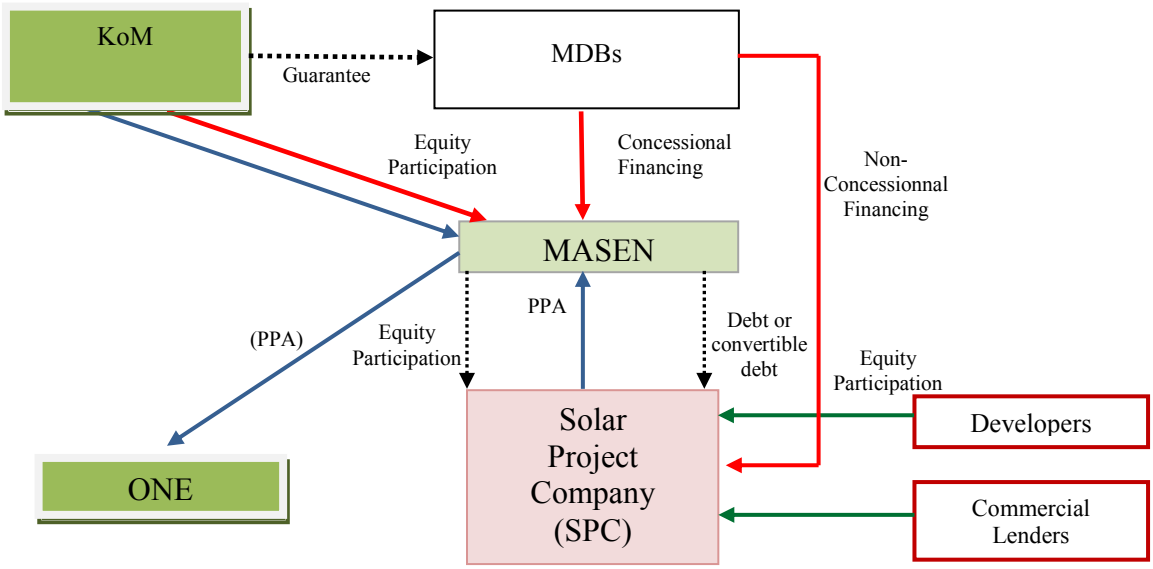
MASEN is responsible for implementing Morocco's Solar Plan. Together with the selected partner(s), it will create SPC to develop, construct and operate Ouarzazate I. MASEN, a limited liability company (LLC), was created on 26 March 2010 to develop at least 2000 MW of solar power capacity by 2020. MASEN is governed by a Board of Directors (the Directoire) and an Oversight Council (the Conseil de Surveillance). The functions and responsibilities of these entities are defined in MASEN's statutes as required by LLC law.

In terms of management and support functions, MASEN's organizational structure mirrors the main responsibilities entrusted to the agency by law. MASEN focuses not only on developing solar projects but also on supporting research and development, and promoting technology and integrated development (local development and industrial integration).

MASEN's Project Management Office aims to monitor the project's implementation deadlines associated with project teams' follow-up work plans, the use of resources, incremental progress, the anticipation and management of risk, the resolution of bottlenecks, and the convening of the arbitration panel.

The key institutional arrangement of the project is a structure involving MASEN, ONE and the SPC, where MASEN will sign a power purchase agreement with ONE (based on ONE's high-voltage tariff) and a second agreement with the SPC (based on the project's full cost of generation: see Figure 1). The Kingdom of Morocco will compensate MASEN for the gap between the two power purchase agreements as per the convention signed by it and MASEN on 26 October 2010.

Figure 1: Flow of Institutional Involvement



MASEN will be the sole offtaker of the SPC, as well as the provider of common infrastructure and the land for the site. MASEN will also act as a shareholder through its 25% equity in SPC and may be the sole lender to SPC. MASEN faces a variety of risks in its different roles:

- Risks borne by MASEN as offtaker: offtake volume risk, offtake price risk, transmission risk, common infrastructure availability and performance, etc.;
- Risks borne by MASEN as shareholder: construction delays, cost overrun, failures of other shareholders, failure of SPC to deliver or operate according to agreed performance, force majeure;
- Risks borne by MASEN as lender: construction delays, cost overruns, unsatisfactory performance, interruptions to operation, force majeure, etc.;
- Other risks linked to common infrastructures and land.

MASEN's multiple roles could be a source of conflict of interest. One of the purposes of the Shareholder Agreement, the PPA and the Loan Agreement with the SPC is to minimize the risk of conflict of interests.

Results Monitoring and Evaluation

MASEN will regularly monitor the SPC's implementation of the project as per contractual arrangements. It will also regularly monitor the project development objectives results and intermediate indicators, and will report the results to the World Bank and the AfDB in progress reports, which will be prepared at least once a year, and more frequently in the initial years of implementation. Among other items, the progress reports will cover financial statements, physical progress, and procurement.

Sustainability

The creation of MASEN, an agency staffed with highly qualified professionals dedicated to realizing Morocco's Solar Plan, and MASEN's association with financially strong and technically capable private developers, ensure that the plant will be constructed, operated and maintained according to best practice.

The law creating MASEN guarantees government support not only for Ouarzazate I but also for the entire 2000 MW program. MASEN will buy costly CSP production and sell it to ONE at a price equivalent to the cost of coal-generated power, which is currently lower than the anticipated cost of CSP. By law, the gap between the two prices will be covered by the Government of Morocco, which guarantees the sustainability of the project and of Morocco's entire solar program. However, the second component of the project makes it possible for GoM to call on WB financial support to cover the incremental cost whenever the State Budget is under stress, for instance because of drought or high imported commodity prices. This facility provides flexibility and comfort during a transition period until exports develop, CSP costs come down and the country becomes less dependent on subsidized fossil fuels. As solar and other renewable energy develops, state subsidies for fossil fuels will decline; as the economy becomes less dependent on imported fossil fuels, additional financial resources will be freed to subsidize solar energy if still needed.

Schedule

A request for Expression of Interest for Ouarzazate has resulted in 185 responses and the prequalification for Ouarzazate I received 19 applications. Four candidates were prequalified for the bidding process and notified on December 24th 2010. The request for proposals has been issued in May 2011, with first round technical proposal due in August. Second round proposals, including financial bids, are expected in November, with selection of the winning bidder due in December and financial closure expected in mid-2012. Plant construction would then begin in the third quarter 2012 and the plant would be commissioned for tests and full scale operation during 2014.

J. Donor Coordination

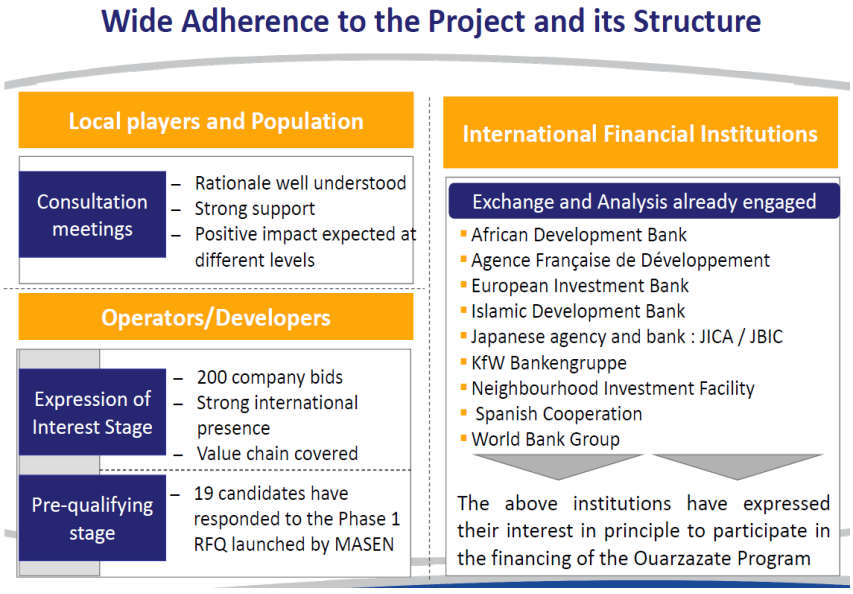
Several donors are active in the Moroccan energy sector, through both grants and loans. In particular, besides the AfDB and the World Bank, the Agence Française de Développement, Kreditanstalt fur Wiederaufbau, the European Investment Bank and the European Commission are involved. Coordination currently takes place through regular project-specific meetings of donors and executing agencies. These meetings are an opportunity to coordinate these parties' actions with the actions of other institutions.

The Ouarzazate project has raised strong interest and support from international financial institutions and other stakeholders (see Figure 2). The project will be co-financed by the World Bank Group, the AfDB, the CTF, the Agence Française de Développement, Kreditanstalt fur Wiederaufbau, the European Investment Bank, and NIF. These institutions initially raised around $1.9 billion (€1.4 billion) for the first phase, which had initially been set at 250 MW but was

subsequently reduced to 160 MW (gross) as recommended by the technical advisor based on the results of the prequalification, given there were not enough companies prequalified capable of offering a tower solution.

A steering group of representatives of these institutions has been meeting monthly to review the status of project preparation and all preparation missions have been joint. Collaboration among donors will be intensified during project implementation, especially in the period to effectiveness of the loans, as there will be numerous and complex effectiveness conditions. The donors have agreed to hire joint technical and legal advisors to review the effectiveness conditions. The disbursements conditions will be aligned and disbursement is expected to be triggered simultaneously and to be on the pro-rata of the loans.

Figure 2: Wide Adherence to the Project and its Structure



K Key Risks and Risk Management

The project carries a significant number of risks, the conjunction of which makes the project's risk rating, before completion of the development process, high. However, the project's transformational effect not only on Morocco and its energy security but on the entire region is substantial. The project is expected to catalyze the exploitation of Morocco's extensive solar potential and establish a regional model for the greater use of renewable energy. It is also expected to create jobs at a critical time of political and economic uncertainty for Morocco and other MENA countries. International financial institutions' support for the endeavor will demonstrate commitment to not only the region but also to the institutional climate change

agenda of developing countries. This commitment takes form in the proposed partnership between Morocco and the international community, a partnership to invest in Morocco's future, reduce the carbon footprint of the energy system, and scale up CSP.

There has been a lack of replicability due to insufficient concessional climate financing and discontinuation of the state support, while exports have not yet materialized. Sufficient financing has been secured for Ouarzazate I, with an overall attractive package. However this could prove more difficult for next phases if the Green Fund is not set up fast enough. By law, the State is committed to supporting the Moroccan Solar Plan, but changing social and economic conditions could erode that commitment. This is why export arrangements need to be secured as fast as possible. Several European countries are now working with Morocco to secure export contracts as soon as possible, and WB and AfDB management at the highest level are supporting this dialogue. The risk of lack of replicability is high until export contracts are secured for later phases of Ouarzazate.

Selection of financially or technically weak private partner(s) to establish the PPP, or a lack of bidders. The probability of this event is low, but its consequences could be very detrimental. This risk was very high in the initial stages of the project but was reduced after the completion of the prequalification process, which resulted in the selection of four strong consortia with experience in CSP and familiarity with PPPs. MASEN secured high-quality advice and assistance from reputable financial, technical and legal advisors in this regard, and subsequent phases of the selection process will continue to see strong involvement of the IFIs.

Weak implementation capacity on the part of MASEN and its partners. This risk was initially rated medium but it is decreasing because of two reasons: (1) MASEN is expanding and gaining experience (it is staffed with high-caliber experts and managers and is supported by highly qualified consultants and advisors); and (2) the choice of the private partner will be based on the partner's capability and experience in designing, preparing and implementing technologically challenging solar projects. However, given MASEN's lack of experience with the procurement practices of the WB, AfDB and other donors, procurement-related risks are rated high. Although these risks are growing more unlikely, problems with procurement could significantly hamper the project.

Technological risk. During the preparation of the preliminary technical report, MASEN's technical advisor carried out a thorough technological survey and concluded that the risk related to parabolic trough technology is lower than the risk related to central tower receiver technology. In light of the market response to the prequalification process, MASEN has selected parabolic trough technology for Ouarzazate I. Parabolic trough technology is rated less risky than tower technology, but it has less experience with storage. The risk of freezing the heat transfer fluid or the molten salt is much higher for parabolic trough technology than for tower technology. Therefore there is a greater need for back-up fuel, at least to protect against freezing, if not for reliability. This may affect the plant's performance. Therefore, at this stage, the technological risk is rated high. MASEN has formulated several mitigation measures. These include (i) a two-stage bidding process whereby the partner will be selected after thorough discussion of technical issues and risks; (ii) the requirement, as part of the technical bid, to demonstrate project implementation; (iii) the requirement of bonding arrangements and the provision of liquidated

damages, should the plant be unable to produce; (iv) an engineering, procurement and construction contract that will pass a significant amount of technological risk to the construction company and the supplier of the equipment.

Poor coordination among co-financiers. The joint co-financiers' mission that took place during project preparation showed that MASEN could find differences in procedures, evaluation methods and processing schedules to be challenging. In order to facilitate the interface with MASEN, the donors have agreed to hire joint technical and legal advisors to prepare the no-objection for the different phases of the consortium selection. The risk of poor coordination is high and requires tight, periodic coordination to ensure that the various financing arrangements converge and the client does not receive conflicting messages.

Tight schedule proposed by MASEN. The schedule adopted by MASEN for the transaction is highly challenging and could make it difficult to carry out the transaction according to donors' rules. To ensure that the procedures of the international financial institutions involved do not affect the schedule, the co-financiers and MASEN had a detailed discussion on safeguards and procurement procedures. This has reduced the likeliness of delays. However, the risk remains high and the parties should pay attention to striking the right balance between speed and adherence to technical/procurement/environmental and social/fiduciary safeguards during transaction processing.

Committing World Bank and AfDB financing before finalizing the project's financing plan and the contractual details of the PPP. MASEN expects to secure commitment from the World Bank, AfDB and other international financial institutions at an early stage of Ouarzazate I's development to reassure investors and facilitate the financial closure of the PPP transaction even in absence of export contracts. There is a risk that the transaction's contractual structure and economic rationale could change from their description herein as the project progresses. This could change the project's risk profile and, therefore, the World Bank's and AfDB's exposure. To mitigate this risk, the effectiveness of CTF/World Bank/AfDB loans would be subject to the completion to the bank's satisfaction of a list of actions. These actions include, inter alia, the execution and satisfaction of all conditions precedent to the key transaction documents in a form and substance acceptable to the banks. The risk is rated high and the impact of a poor structure could be serious. Only after substantial completion of the conditions to effectiveness will a proper assessment of the project's risks be possible.

L. Economic and Financial Analysis

CSP is still at an early stage of development compared to conventional generation technologies. In current market conditions, CSP projects are unlikely to be economically and financially viable as standalone projects. The proposed project is expected to have several quantifiable and non quantifiable benefits; the economic benefits accrue from: (i) the electricity produced sold locally, or exported, and (ii) the value of avoided global GHG and local environment emissions. However, more importantly, the proposed project is intended to launch Morocco's ambitious solar program, which is expected to create jobs and contribute to building a solar industry,

thereby adding to the country's net wealth. Utilizing traditional cost-benefit tools is very challenging for a transformational flagship project within a global program

Studies carried out by ONE do not show the proposed first project to be economically viable, even when factoring in local and global environmental benefits. Based on estimated project costs and prevailing fuel prices by end of 2010, the project is not part of the least-cost generation mix. ONE's studies show that including the solar program in the generation mix would increase the net present value of the investment and operating costs, including environmental externalities, by $3.5 billion. However, under certain conditions, CSP would be part of the optimal generation mix in 2017. Ouarzazate I is to start commercial operation by 2014, three years earlier than the optimum (2017).

A cost-benefit analysis has been conducted using ONE's valuation of emissions savings and assuming that energy is sold to ONE at a price equivalent to ONE's tariff for high-volume consumers. The economic rate of return has been calculated at 0.5%: although very small, this is positive. The project's net present value is positive only for a discount rate of 0%—a rate advocated by many economists for evaluating climate change mitigation projects. Optimistic assumptions for capital costs and the cost of electricity, CO_2 and fossil fuel would make the project break even or even—under the most optimistic assumptions—turn a profit. This justifies the use of low-cost funds from the CTF and international financial institutions during the present "take-off" phase of the CSP market. The storage value can be calculated in two ways: (1) through the monetary value of the saved fossil fuels and (2) through the PPA price which is differentiated according to peak and off-peak hours. ONE's analysis indicates that the amount of fuel oil saved justifies the storage cost. The storage value through differentiated PPA will have to be confirmed when the PPA level is known.

The results of the financial analysis indicate that even with concessional financing (especially that of the CTF), bilateral grants, and multilateral and bilateral financing, the project's financial viability is contingent upon a very high sale price of the electricity generated. This price is more than double the average wholesale price in Morocco and requires substantial government subsidies, external financing and/or exports to higher value markets, the latter of which is under discussion but is unlikely for this first project. The sensitivity analysis shows that the project's levelized cost of energy (LCOE) is very sensitive to technical parameters such as capital expenditures and actual generation, and is much less sensitive to operating expenses, which was to be expected for a capital-intensive project without fuel costs. This confirms that decreasing capital costs will be paramount to making CSP competitive, not only in Morocco or in the MENA region, but also globally. It also confirms that CSP projects should as often as possible be located in areas with the best solar radiation, like MENA. The sensitivities also show that the project's LCOE is sensitive to the average cost of capital (debt + equity), which is again to be expected, given the capital-intensity of CSP plants.

The AfDB, the WB and co-financiers support the proposed project despite this landscape because of the following considerations:

MENA countries have the greatest potential for CSP development and are close to markets where green electricity is highly valued: this holds great promise for exports, which are already

being considered at bilateral and regional levels. In addition, MENA countries could benefit greatly from the effects of scaling up CSP in MENA. A study[11] commissioned by the World Bank and the Energy Sector Management Assistance Program concluded that the potential to manufacture CSP components in the five countries of the MENA CSP Investment Plan is real and could significantly boost local manufacturing, add value to the economies, create jobs and increase foreign trade.

Deploying CSP technology on a large scale in the region and globally would help reduce the costs of the technology significantly. With thermal storage, this would contribute to meeting future regional demand reliably and competitively.

In the case of Morocco, this first CSP project, as well as subsequent projects of Morocco's Solar Plan, would substitute a local resource for imported fossil fuels, especially coal, therefore contributing to Morocco's energy security and reducing CO_2 emissions.

M. Technical Analysis

In light of the technological review carried out by its technical consultant, MASEN intends to develop the 500 MW Ouarzazate power complex considering all utility sizes and available solar technologies. MASEN followed the procurement procedures of multilateral and regional development banks in carrying out a technologically neutral prequalification process for a first phase project of at least 125 MW. This resulted in the prequalification of four consortia with extensive experience in CSP parabolic trough technology. Based on the results of the technical studies and the prequalification process, MASEN requested the financial support of the AfDB and other financiers to initiate the first phase development of the site with the installation of up to a 160 MW gross solar trough power plant in partnership with a private entity selected competitively from among the prequalified potential bidders. In the minimum functional specifications for the request of technical proposal, collectively reviewed and cleared by the financiers, MASEN gave the bidders the technical, health, safety, security, and environmental and social requirements that should be taken into account during the design, construction, operation and maintenance of the power plant.

The front-end engineering and design and the construction will be decided and/or carried out by a special purpose company to be selected in compliance with donor procedures and rules. Based on the results of the prequalification and the market response so far, the first tranche would be a CSP parabolic trough ranging from 125 to 160 MW.

[11] Ernst & Young et Associés, Fraunhofer Institute for Solar Energy Systems ISE, and Fraunhofer Institute for Systems and Innovation Research ISI. January 2011. *Middle East and North Africa Region: Assessment of the Local Manufacturing Potential for Concentrated Solar Power (CSP) Projects.* The World Bank and the Energy Sector Management Assistance Program. Study available on request. Note: Fraunhofer is the premier research institute for CSP technologies.

Technical due diligence during project preparation focused on ensuring that preliminary technical studies were sound and would allow the selected private partner(s) to construct, operate and maintain efficient, economic, reliable, safe and environmentally-sound solar-powered generation facilities.

This technical assessment is based on several presentations made by MASEN's technical advisor in the monthly donors' meetings held during the project identification and preparation phase and on the summary technical report provided to all financiers during the preparation mission. The conclusions of the preliminary technical studies are as follows:

- The site selected for the proposed power plant has an area of about 2500 hectares and is situated 10 km east-northeast of Ouarzazate. The site is presently a green field that has never known industrial use. It is easily accessible (it is well connected via national paved roads, and on-site access by unpaved roads is in place); it is close to the power grid, for the evacuation of all expected power generation; and it is close to a sufficient water supply. In case of wet cooling Environmental and social issues related to the site are discussed in Sections E and F, below.
- Direct normal irradiance (DNI) measurements have been conducted at the site since February 2010. Initially, the technical advisor used a weather file from an analogous site (similar latitude and DNI) to carry out the performance modeling of the technology. Available data to date indicate that the site-specific insolation DNI is significantly higher than typical site qualification limits; MASEN's technical advisor has rated the meteorological risk as moderate. This preliminary conclusion is based on comparisons of the Ouarzazate site data with solar radiation data from the Andasol site in Granada, Spain and the Solar Energy Generating Systems site in the Mojave Desert in California, the United States. Private partners will consider the full risk assessment relating to meteorological data during bid preparation.
- The technical advisor evaluated the technology thoroughly and concluded that only three solar power technologies have been employed in utility-scale plants that are in operation and have enough historical data to demonstrate a suitable level of technological maturity. These technologies are parabolic trough, central tower receiver and flat plate photovoltaic. Based on the results of the technical studies and of the prequalification process, MASEN decided to limit the first-phase request for proposal to minimum 125MW CSP modules. The technical advisor confirmed that solid companies able to design and construct such modules exist, even though the technical risk is higher for parabolic trough because of storage. Given the results of the prequalification process and the limitation of the first phase to CSP parabolic trough technology, the technical risk is still rated as high, only because of the molten salt thermal energy storage.
- The technical advisor studied various configurations based on (i) appropriate sizes of individual modules (to optimize the use of the site to develop 500 MW), (ii) technologies that can meet the restrictions of the site while capitalizing on its advantages, and (iii) supporting components that will optimize the plant production and water consumption rates of each configuration. The solar power plant configuration performance modeling was done using on-site measurements of DNI (6.6 $kWh/m^2/day$)

- To meet the requirements specified by MASEN and ONE, the technical advisor proposed a thermal storage system that uses hot and cool salt tanks to generate steam during peak hours. An auxiliary electric heat source would be used to keep the salt in a molten state during protracted maintenance outages.

The approach developed by the technical advisor and the decisions made by MASEN to date are sound. The technical advisor assisted MASEN in the preparation of technical specifications to ensure that the power plant would incorporate currently proven, commercially available utility-scale solar technologies and that the site is used optimally.

N. Financial Management

MASEN will conduct financial accounting consistent with international standards, using software acquired for this purpose. MASEN will establish a coherent computer system for financial management at the beginning of the project. MASEN's accounting system follows the rules applicable to state-owned enterprises and its annual financial statements are submitted to external audit.

Twice a year, MASEN will prepare interim unaudited financial reports that cover all the activities and sources of funds of the project. It will transmit these reports to the World Bank and the AfDB 45 days after the end of each period. MASEN will transmit the external annual audit report of the project accounts and the management letter recommending improvements to internal controls and to the accounting system to the banks no later than six months after the end of each exercise. The annual audit report of the project accounts will be carried out by an acceptable auditor in accordance with AfDB guidelines and according to terms of reference acceptable to the AfDB.

The SPC will build, finance, operate and own the plant. A private consortium will own 75% of the SPC. MASEN will also invest in the SPC, owning 25% of its equity. In accordance with its terms of reference, the SPC will maintain appropriate project accounts and will prepare annual financial statements and periodic expenditure reports by component, category and source of funding.

O. Procurement

The project includes partially financing a PPP for a design, build, own and operate contract to be granted to the SPC to develop the first phase (up to 160 MW) of the Ouarzazate CSP Plant (parabolic trough with 3 hours of storage). Procurement will be for the selection of private project sponsor(s) or independent power producer (s) that, in partnership with MASEN, will constitute the SPC(s). This selection will use international competitive bidding, preceded by pre-qualification. In accordance with the WB and AfDB's policies, because the project sponsor will be selected under open competitive bidding procedures acceptable to the AfDB, it will then be free, alone or as a shareholder in the SPC, to procure the goods, works, and services required for

the facility from eligible sources, using its own procedures. The procurement plan is limited to one contract for Ouarzazate I, of a capacity of up to 160 MW.

MASEN's law states that MASEN is responsible for putting in place renewable energy programs to (i) contribute to local applied research and promote technological innovation and (ii) help create entities for training, university education, and research. MASEN is to use each bidding process for the plants developed under Morocco's Solar Plan to promote local manufacturing to the extent possible. To comply with this mandate, MASEN has requested bidders to produce an action plan to ensure that local content reaches 30% of the plant's capital costs. This level is consistent with the findings of an Energy Sector Management Assistance Program study on local CSP manufacturing potential in MENA.[12] MASEN has suggested that respondents to the request for proposal can opt for one of three ways to meet that requirement: (i) indirect measures (the consortium bidding to develop Ouarzazate I has committed to invest, alone or in partnership, in a renewable energy equipment manufacturing facility, renewable energy operation and maintenance activities, an engineering facility, or a research and development facility), (ii) direct measures (local procurement of some of the goods and services necessary to develop and construct Ouarzazate I), or (iii) a combination of the two. Bidders would make this commitment on a voluntary basis,

MASEN's team is being trained in both banks' procurement procedures, and MASEN has hired a senior procurement specialist well experienced in these procedures.

P. Social Assessment

MASEN has produced an Environmental and Social Impact Assessment Framework (ESIAF) that incorporates comments from the WB and AfDB. The ESIAF describes the socioeconomic environment of the project area and includes a Framework Environmental and Social Management Plan. MASEN, through support from the Agence Française de Développement, recently finalized a socioeconomic impact study that has produced more comprehensive information and an analysis of the project's socioeconomic aspects, identifying potential impacts and proposing mitigation measures. This study will be integrated into the project- and technology-specific Environmental and Social Impact Assessment (ESIA), which will be developed at a later stage.

MASEN has finalized its acquisition of 2500 hectares of land owned collectively by the Aït Oukrour Toundout community (out of a total area of 64,000 hectares). The acquisition was carried out in accordance with Moroccan legislation and regulations governing collectively owned lands. These legislation and regulations specify the following procedures: (i) having a commission of experts establishes the purchase price, (ii) securing the required authorizations,

[12] Ernst & Young et Associés, Fraunhofer Institute for Solar Energy Systems ISE, and Fraunhofer Institute for Systems and Innovation Research ISI. January 2011. *Middle East and North Africa Region: Assessment of the Local Manufacturing Potential for Concentrated Solar Power (CSP) Projects.* The World Bank and the Energy Sector Management Assistance Program. Study available on request. Note: Fraunhofer is the premier research institute for CSP technologies.

(iii) signing and notarizing the decision regarding the sale of land, and (iv) transferring the property rights.

The project will not occasion any physical displacement, and the lands are not presently being used for any economic activity. However, the nature of the land acquisition required for the project means that the Ait Oukrour community will lose ownership of and access rights to the lands. This triggers the application of the AfDB's Involuntary Resettlement Policy. It also triggers the World Bank's Operational Policy on Involuntary Resettlement (OP 4.12). MASEN prepared a Land Acquisition Plan that describes the land acquisition process and means for obtaining the consent of the Ait Oukrour community. WB and AfDB have commented on the Land Acquisition Plan and stated the necessity for additional documentation describing the nature of the public consultation process carried out, as per the Involuntary Resettlement Policy.

A Social Development Plan for the communities in the project area is being developed through participatory mechanisms. The Social Development Plan involves the representatives of key stakeholders, such as MASEN, the Ministry of the Interior, and the local community. The plan seeks to identify community priorities and proposals with respect to education, sanitation, job creation and the rehabilitation of rural roads. The local population (the Ait Oukrour Toundout community, more specifically Tasselmant village) took part in local consultations organized by MASEN as part of the Social Development Plan process. The AfDB recommended integrating gender issues in the work underpinning the plan. The indicative plan will be disclosed before appraisal.

Q. Environmental Assessment

The project triggers the World Bank's Environmental Assessment Policy (OP 4.01). In accordance with the AfDB's Environmental and Social Assessment Procedures, the project is classified as Category 1. MASEN has prepared an ESIAF to inform the integration of environmental and social concerns in the design and preparation of the project. This ESIAF has been reviewed by the AfDB and other co-financiers.

The scope of the ESIAF covered the Ouarzazate solar power complex site and the various technologies (CSP parabolic trough, CSP power tower, photovoltaic, standard—with and without tracker—and concentration) under consideration by MASEN. The ESIAF will be followed by a project- and technology-specific ESIA to be carried out by the SPC once the SPC has been established. The ESIA will cover connected installations (transmission lines, water supply, etc.). The project-specific ESIA will also detail the institutional arrangements and the capacity-strengthening measures needed to ensure that the ESIAF is properly followed up. A project-specific Environmental and Social Management Plan will also be prepared by the SPC. The ESIAF was undertaken in a consultative manner and led to preparation of a Framework Environmental and Social Management Plan, which MASEN has disclosed.

The ESIAF explains how environmental considerations played a role in site selection and discusses water consumption, which could reach 6 million cubic meters per year, depending on the technology selected. The water needed by the facility will be transferred from the Mansour

Edhabi dam near Ouarzazate. The dam was commissioned in 1972; initial capacity was 560 thousand cubic megameters (Mm^3) and is currently 460 Mm^3. The annual average regulated volume is 420 Mm^3.

In addition to water consumption, the project's principal potential adverse environmental impacts are expected to be as follows:

- Construction impacts such as waste and noise, to be managed in the same way as for large construction projects (waste disposal, etc.)
- Possible leakage of transfer fluids, of anti-freeze, or of rust inhibitors. To protect from such release, relevant components should be leak-proof, regularly cleaned and maintained, and periodically replaced by appropriately trained staff.
- Thermal and/or chemical pollution of local waterways from cooling water and other waste water. Appropriate mitigation measures include sound wastewater management practices (e.g., effluent treatment techniques to remove contaminants from disposal water or reduce their concentration), the monitoring of discharge water (e.g., eutrophication, the effects on fish or other aquatic fauna, the oxygen content of local waterways), regular analysis of wastewater composition (temperature, chemical content, etc.), and compliance with pollutant emission standards for liquid effluents (local and/or national regulations or, in their absence, international standards).
- Fire risk from solar converters at high temperatures, including the risk of out-gassing from panel components. Responses include measures against overheating (coolants) and relevant warning and monitoring systems. This must be confirmed by the final ESIA.

Several measures will be implemented to mitigate and offset the negative impacts of the project. These include limiting water consumption, reducing the risks of pollution, treating effluent, and protecting biodiversity. Several positive impacts are also foreseen, notably the mitigation of greenhouse gas emissions in the order of one million tons of CO_2 equivalent per year.

Clean Technology Fund Annex
Morocco: Ouarzazate Concentrated Solar Power Project

Summary of CTF Impact Indicators

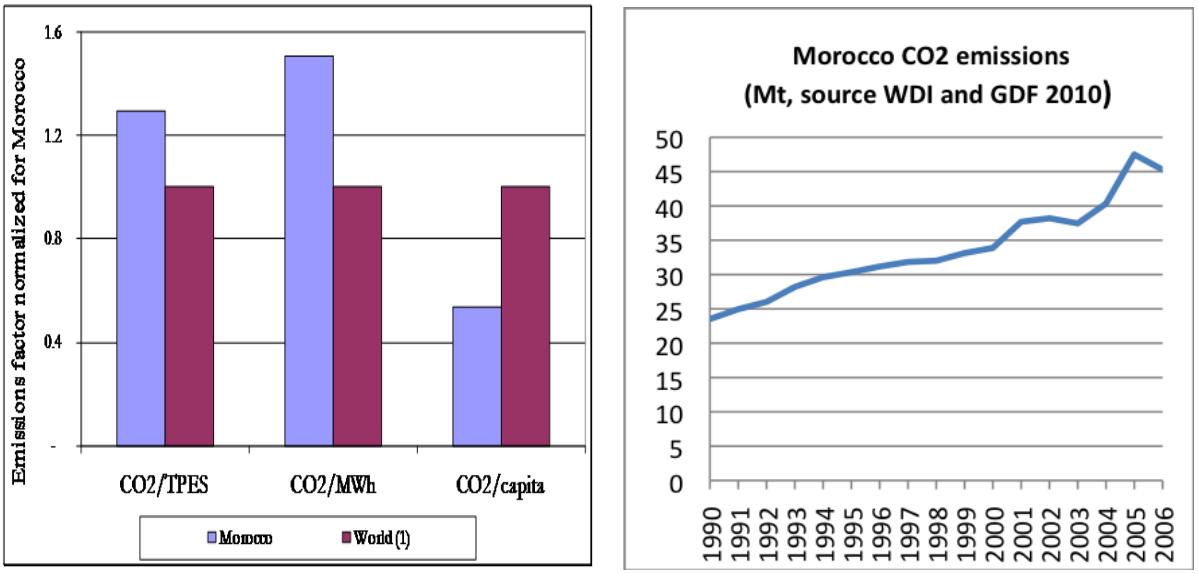
Key Indicators	CTF/World Bank Project Ouarzazate I	Ouarzazate I, II and III	Morocco's Solar Plan
Solar power generation capacity	160 MW gross 143 MW net	500 MW gross	2,000 MW gross
Power generation (GWh per year)	370	1,200	4,600
Avoided CO_2 - tons per year - lifetime (tons/30 years)	240,000; 7 million	740,000 22 million	3 million; 90 million
CTF Investment leverage ratio	7	15 (if no addl CTF for Ouarzazate)	
CTF Investment cost effectiveness (per tonne of CO_2 avoided)	$ 29	$ 5.4	
Environmental co-benefits in terms of avoided local pollution ($ million)	2.3	7.19	28.75
Improved energy security 1. RE share 2. reduction in el. imports	<2% small	8% of PG capacity Small reduction in imports	42% of PG capacity in 2020 No more imports, some exports
Other non-quantified benefits - Development of local industry - Increased employment - CSP cost reduction	Negligible	Initiation of local activities in Ouarzazate Local jobs for servicing and maintenance No cost reduction yet	Significant at both national and local levels 11 000 jobs created country wide Some cost reductions

I. Introduction

1. Morocco is experiencing strong real GDP growth. This raises challenges of long-run energy security and management of the country's increasing Greenhouse Gas Emissions (see Figure 1 (b)), given both that Morocco imports nearly all its energy needs (97%, excluding non-commercial forms of energy) and that its energy mix is dominated by fossil fuels (oil: 61% of primary energy demand; coal: 28%). Power generation in Morocco is dominated by coal (between 50% and 70% of power generation over the last five years depending on hydro availability), which makes Morocco a CO_2 intensive country, with CO_2 emissions per kWh generated, 50% higher than the world average despite a low total CO_2 per capita (see Figure 14 (a)).

Figure 1 - Morocco: CO_2 emission intensity (2008) and Emission Trend (1990-2006)

(a) (b)



2. Improving energy security and climate change mitigation are therefore two key objectives of the country's energy policy. This should be done without jeopardizing energy access for all citizens and businesses, and at the lowest cost possible. The commitment of Morocco to a low carbon growth is evidenced by its high level participation in the December 2009 COP-15 meeting in Copenhagen and the December 2010 COP-16 meeting in Cancun, with an explicit commitment to climate change mitigation. In preparation for the COP meetings, the Government of Morocco (GoM) released a National Action Plan against Global Warming, which lists adaptation and mitigation measures either already implemented or under consideration across a range of sectors.

3. To achieve these objectives, the key elements of Morocco's energy strategy are: (a) diversification and optimization of the energy mix using reliable and competitive energy technologies, in order to reduce the share of oil to 40% in primary energy consumption by 2030; (b) development of the national renewable energy potential by increasing the RE power generation capacity to 42% of installed capacity by 2020; (c) improvements in energy efficiency to induce energy savings of 15% from the "business as usual' scenario by 2020 and 25% by 2030; (d) development of indigenous energy resources by intensifying hydrocarbon exploration activities and developing conventional and non-conventional oil sources; and (e) integration into the regional energy market, through enhanced cooperation and trade with Maghreb and EU countries.

4. Morocco's Solar Plan, launched in November 2009, is the cornerstone of the country's renewable energy and climate change mitigation strategy. This $ 9 billion plan calls for the commissioning of five solar power generation plants between 2015 and 2020 for a total capacity

of 2,000 MW, starting with the ambitious Ouarzazate project structured as a public-private partnership (PPP). In addition to fostering low-carbon development of the energy sector and enhancing energy security, the implementation of this plan will stimulate large investments and enhance Morocco's competitiveness. This is an integrated plan in the sense that it calls for local manufacturing, as well as related training, education and research activities, therefore boosting economic growth and contributing to job creation.

5. Morocco has physical attributes that make it particularly promising for scale-up of solar technologies with particular focus on concentrated solar power (CSP): abundant sunshine, low humidity and plenty of unused flat land close to road networks and transmission grids. These attributes, together with access to EU electricity markets through the existing interconnection with Spain, makes Morocco one of the most suitable place globally to get cost reduction for CSP and accelerate global CSP deployment. CSP is a technology that is of particular interest to utilities as it is more predictable than most renewable energy options and is closest to economically viable energy storage, and therefore easy to integrate into conventional electricity systems. CSP is also a technology with substantial cost reduction potential, in part because of unexploited economies of scale in manufacturing. Cost reductions would be dependent upon: scale effects (larger projects would result in improved economies of scale), learning curve effects (history has shown that CSP costs fall by 15% or so for doubling of deployed capacity as a result of experience effects), plant convoy effects (executing multiple identical projects in the same area can drive a 5-15% reduction in capital costs), and improvements in technology (advancements in this area is expected to result in a reduction of up to 20% in capital costs across various technologies).

6. The implementation of the solar program was entrusted to the Moroccan Agency for Solar Energy (MASEN), a fully state-owned limited liability company created on 26 March, 2010 to develop at least 2,000 MW of solar power capacity by 2020. MASEN is governed by a Board of Directors (the Directoire) and an oversight council (the Conseil de Surveillance).

II. Morocco and the CTF MENA CSP Investment Plan

7. The World Bank Group and the AfDB, together with other donors, such as the European Investment Bank, the Agence Française de Développement, and Kreditanstalt fur Wiederaufbau, have worked together to accelerate CSP deployment in the region. A significant part of this initiative is the CTF MENA CSP Investment Plan (MENA CSP IP), endorsed on 2 December 2009 and updated on 12 November 2010. This plan aims to mobilize $5.6 billion (including $750 million from the CTF) to accelerate the deployment of CSP projects in Algeria, Egypt, Jordan, Morocco and Tunisia. The MENA CSP IP aims at act as a demonstrator: the project consists of cofinancing nine commercial-scale power plants capable of generating around 1 GW over three to five years and two transmission projects designed to improve the Mediterranean grid and increase exports. The MENA CSP IP has earmarked $197 million for Morocco, to be channeled by the World Bank and the African Development Bank (AfDB).

8. The MENA CSP IP has strong synergy with other initiatives that seek to develop the renewable potential of the Mediterranean Basin, while creating the conditions for a regional market linking the North and the South banks to optimize resource use - namely the

Mediterranean Solar Plan, Desertec, Medgrid and the World Bank's Arab World Initiative. The vision of the Mediterranean Solar Plan, under the Union for the Mediterranean initiative, is to take the world-scale renewable energy potential of the Southern Mediterranean, and the green electricity needs of the entire Mediterranean Basin, and transform it into a massive opportunity - by linking large scale renewable power production through reinforced transmission grids to demand centers of the Mediterranean region. As it moves toward its ambitious objectives of reducing greenhouse gas emissions, Europe will increasingly have to look for additional sources of low carbon energy. On the Southern side, electricity consumption in MENA is among the fastest growing in the world and scaling up CSP will help meet growing demand, enhance energy security and diversify the energy mix for power generation

9. Within the MENA CSP IP, Morocco is proposing the largest capacity and is the first one to launch the development of a project, the ambitious Ouarzazate complex, which is one of the largest CSP plants planned in the world.

10. The World Bank, the AfDB and other IFIs are involved with MASEN in the competitive selection of one or several qualified and financially robust private partners to establish a PPP, which would be responsible of the preparation and implementation of the first phase of the Ouarzazate CSP plant. This first phase Ouarzazate I consists of up to 160 MW of CSP parabolic trough—technology selected after a technology neutral prequalification process-- and potential PPP partners have already been prequalified. Based on the preliminary technical studies and the recent comparable projects in the MENA region, the total financing required for the first phase would be close to $ 1 billion for the initial investment (or approximately $6000/kW). This is substantially higher than anticipated when the IP[13] was originally submitted to the CTF Trust Fund Committee essentially because more has been learned about CSP costs as more plants are being developed and it has been assessed that storage is needed (in order to provide the maximum benefits to the Moroccan power system), which has not been considered in the IP. Given a rapidly expanding and increasingly competitive market for CSP plants, this estimate is expected to be a ceiling on what bidders witll offer. Analysis by ONE and the technical consultant WorleyParsons indicate that 3 h of storage would optimize the contribution of storage to cover peak demand, which occurs between 7pm and 10pm, and maximize fossil fuel savings.

11. Moreover electricity exports are unlikely for Ouarzazate I. Therefore the full CTF allocation to Morocco, i.e. $ 197 million, is required to blend with the World Bank, AfDB and other financier loans and grants to reduce government subsidies to an affordable level. The financial analysis that was conducted for the proposed project indicates that government subsidies will be required to bridge the incremental cost gap due to the higher generation cost of CSP compared to coal.

12. The proposed loan and grant package from multilateral and bilateral donors, especially CTF funding, is essential for MASEN to initiate the implementation of Morocco's ambitious solar development plan. The World Bank/CTF and other financiers support will establish

[13] The unit investment cost used in the IP and the supplemental document was $4400/kW

MASEN as a solid partner for private developers to scale up solar development and reach the government's ambitious target of installing 2,000 MW by 2020.

III. Assessment of the Proposed Project with CTF Investment Criteria

Potential for CHG Emission Savings

13. Absent any further development of renewable resources, greenhouse gas emissions from power generation have been forecast by the GoM to increase from an estimated 16 million tons per year in 2007 to an estimated 36 million tons by 2020 – an increase of 20 million tons. Using the underlying fuel savings estimated by ONE and the typical CO_2 emission rates of the different types of power plants[14], the CO_2 saving is estimated at 240 000 tons per year for the first phase (160 MW) and 740 000 tons per year for the planned 500 MW. Over the 30 year-lifetime of a CSP plant, the cumulative emissions reduction of CO_2 is an estimated 7 million tons for the 160 MW first tranche and 22 million tons for 500 MW.

Cost-effectiveness

14. Considering CTF support for the first phase and the projected emissions savings of about 7 million tons of CO_2, the cost of each tonne of CO_2 saved would amount to approximately $ 29 of CTF funding However, the initial $197 million will not only contribute to the up to 160MW Ouarzazate I, but also initiate the full development of the 500 MW plant. When measured against this, the CTF investment cost effectiveness is $ 9 per tonne of CO2 saved.

CTF contribution

15. The financial analysis and the sensitivities developed for this analysis show that the CTF contribution will have a substantial impact in bringing down generation cost of the project. The direct impact of CTF, although significant, is not huge, due to the current low level of interest rates: if the CTF contribution was replaced by conventional IFI funding, the project's LCOE would be increased by less than 5%. If such contribution was replaced by commercial loans, the impact would be approximately 10-15%.

16. 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 Morocco to subsidize solar electricity over a long period of time. 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. The sensitivities run with the Ouarzazate financial model show that the project's LCOE could vary in a plus/minus 15% range, depending on the equity internal rate of return, i.e. on the level of risk perceived by the sponsor. Combining direct and indirect financial impact of the CTF, one can reasonably assume that the cost of CSP generated kilowatt-hours at the Ouarzazate 1 plant could be higher by up to 15-20% without the CTF contribution.

[14] 900 kg/MWh for coal, 600 kg/MWh for oil and 400 kg/MWh for gas (combined cycle).

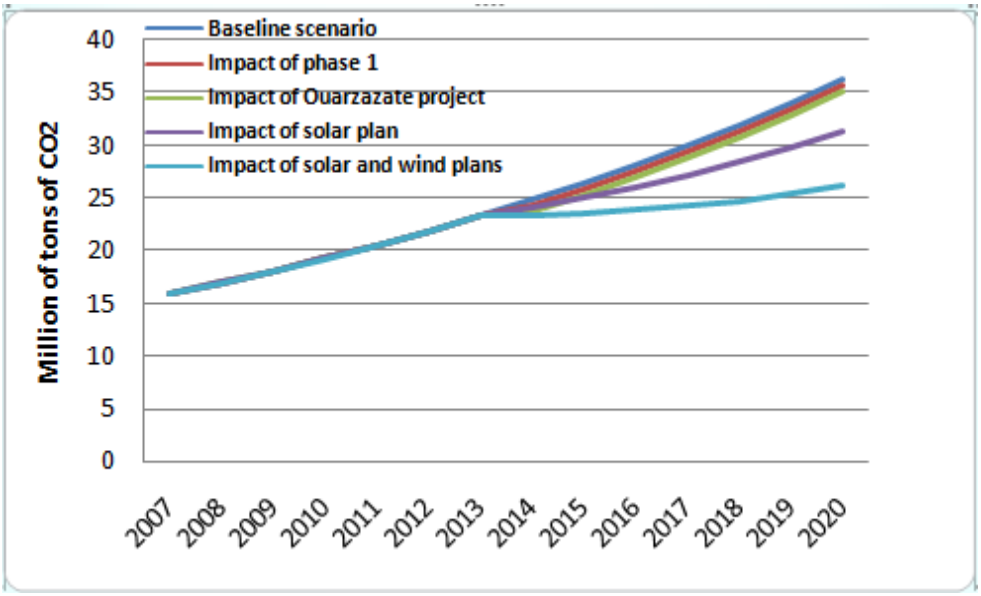
Demonstration Potential at Scale

17. *Scope of avoided greenhouse gas emissions through replication.* The country program calls for the installation of 2,000 MW by 2020, twelve times the size of the capacity to be installed under the first phase of Ouarzazate. This would lead to an important increase of emission reductions. If the Ouarzazate numbers were extrapolated for the capacity additions, the potential of greenhouse gas emission savings for the government's target would reach about 5.2 million tons of CO_2 emission reductions per year in 2020 and about 130 million tons during the lifetime of the program (see Table 1 and Figure 2 below).

Table 1 - Avoided CO_2 emissions

New Solar Capacity	Avoided CO_2 emissions	Avoided CO_2 emissions
	Million of tons per year	Million of tons on life-cycle basis
125 MW (Ouarzazate I)	0.25	7
500 MW (Ouarzazate plant)	0.74	22
2,000 MW (Morocco Solar Plan)	3	90

Impact of Large Scale Solar Developments on annual emissions



18. *Transformation potential.* The proposed project has high transformational potential at the country, regional and even global level:

- *At the country level,* the project will help in building a sound foundation for a successful implementation of the solar plan and installation of 2,000 MW of solar generation capacity by 2020: (a) a successful completion of the transactions envisaged under the proposed project will establish MASEN as a solid partner to private developers interested in CSP/solar development - this transformation is essential as the program requires funds well beyond the public sector financing capability and the country's capacity to raise debt; (b) the focusing of the management on one project and the selection of high level consultants combined with the assistance provided by all financiers during project

preparation and implementation will build MASEN's capability (learning by doing) to prepare, manage and implement complex projects and competitively select strong private partners to achieve its ambitious solar development target; (c) the contractual arrangements developed during the selection of the partner will set the standards for future transactions as they will adequately address possible conflict of interest by adequately ring fencing the different functions entrusted by the government to MASEN; (d) successful construction of the first phase of Ouarzazate will therefore build the foundation for achieving the government target, provide confidence to manufacturers and developers in the country's solar market leading to more investments locally and cost reduction.

- *At the regional level,* the proposed project is the most ambitious one and more importantly the only one involving private sector to date. Its success will provide other countries in the region with confidence to consider PPP as a reliable mean to raise the sizeable funds required for the development of CSP at the regional level. The financial close of the proposed PPP will reinforce interest of international developers in the development of local capacity in manufacturing and support services triggered by the MENA CSP IP. Furthermore, Morocco's ambitious solar program has been followed by the disclosure of ambitious development targets in many countries of the region such as Libya and Algeria.
- *At the global level,* Ouarzazate is one of the largest CSP project announced to date. It is particularly important because it attracted the developers' attention to the solar potential in the MENA region. The successful completion of the transactions under the proposed project will show that mitigation of institutional and market risks are possible through adequate contractual arrangements, even in developing countries. The project will contribute to achieving the 1.2 GW target envisaged under the MENA CSP IP, and to localizing manufacturing capacity in the region to reduce cost and contribute to local value creation.

Development Impact

19. The development of solar energy will have significant benefits in terms of the reliability and security of electricity supply to Moroccan consumers, which is a high development priority for the Government. Tapping the country's huge solar resources will help reducing the carbon intensity of power generation (the full 500 MW Ouarzazate plant would reduce CO_2 emissions by almost 1 million tons per year).

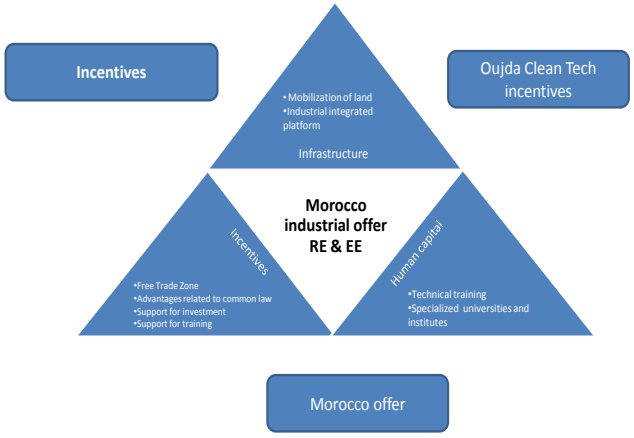
20. The development of this first project through a PPP is also a clear commitment of the government to involving the private sector in the solar program. This will provide confidence not only to foreign investors but also Moroccan private companies to increase their involvement and invest in goods and services to contribute to increased local industrial integration and job creation.

21. In terms of energy security, further development of renewable resources will increase energy security in a country that imports 18% of its electricity from Spain and is overall 97% dependent on imports. 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 Ouarzazate production will initially be for local consumption, a growing share of the electricity produced under Morocco's Solar Plan will be exported to Europe over the medium 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.

22. Scale-up of solar development will support industrial infrastructure and strengthen the foundation for sustainable development. The Government also intends to promote local manufacturing to increase local content of the solar program. The development of the solar sub-sector in Morocco would further strengthen the country's role as a leader in renewable energy development in the region. In this context, the Ministry of Energy and the Ministry of Industry are jointly developing an "Offre Maroc" which essentially consists of incentives and specialized training aimed at attracting local and foreign investments in the renewable sector.

Accompanying measures for the "Offre Maroc"



23. To support the MENA CSP IP and assess derived economic benefits, a study commissioned by the World Bank analyzed the potential for local manufacturing of CSP components across the five countries of the MENA CSP IP, namely Algeria, Egypt, Jordan, Morocco and Tunisia, and evaluated the potential economic benefits in particular with respect to the labor and the foreign trade impact. Below are the results for Morocco:

- ***Average share of local manufacturing in the CSP value chain:*** Assuming 2000 MW CSP capacity installed by 2020, the total potential of local content of CSP plants will increase constantly and could reach almost 50 % as average value for all CSP projects.
- ***The economic impact on GDP:*** Beyond electricity production, the economic impact of CSP development in Morocco is a function of local content and size of installed CSP capacity.

- ***Labor impact:*** Over the period 2010-20**,** the cumulated total jobs of full-time equivalent for construction, manufacturing and O&M of CSP plants for 2 GW will reach over 11,000.
  Foreign trade impact: Additional impacts on job creation and growth of GDP could come from export of CSP components.
  Environmental Benefits

24. With respect to environmental benefits, the generated power is expected to replace oil fired combustion turbines, coal fired steam power plants and gas fuelled combined cycle plants, which emit nitrous oxide (NO_x) and sulfur dioxide (SO_2), which are harmful to the environment and to health.

Table 2 - Estimated SO_2 and NOx Emissions Avoided by Morocco's Solar Plan

New Solar Capacity	Avoided NOx emissions tons per year	Avoided SO_2 emissions tons per year
Up to 160 MW (Ouarzazate I)	935	3500
500 MW	2922	10900
2,000 MW	11690	43750

MW=megawatt; $NO_{x=}$ nitrous oxide; SO_2=sulfur dioxide

Implementation Potential

25. *Public policies and the institutional set-up* in Morocco are very supportive for this project. The Government has 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 set up an institution specifically dedicated to implementing the Solar Plan (MASEN).

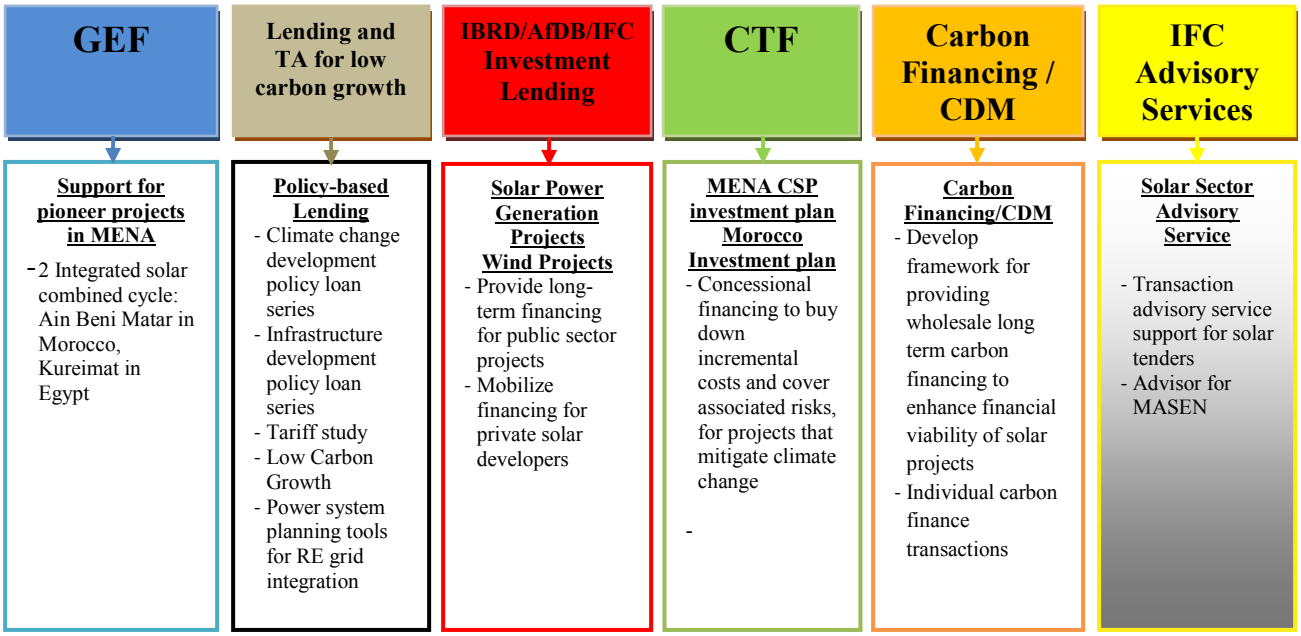
26. A renewable law 13-09 was approved in 2010. It provides a legal framework for the creation and operation of facilities producing electricity from renewable energy sources. It allows public and private corporations to compete with ONE, the publicly owned utility, in the production of electricity from renewable energy and have access to the electricity transmission system operated by ONE.

27. The Government is also undertaking extensive efforts to implement cost-reflective energy pricing and is launching energy conservation programs that will ease the transition to cost-reflective pricing by keeping consumer electricity expenditures steady.

28. *Sustainability of Transformation.* In addition, the World Bank and the African Development Bank are engaged with the Government to enhance the overall sector policy framework and advance reforms aimed at improving the sector's commercial environment and financial sustainability. The Government recognizes that ONE operates under tight financial constraints and has demonstrated its willingness to gradually increase tariffs toward covering costs, and provide budget and other support in the meantime. A study aimed at proposing a cost-

reflective structure for electricity tariffs has been launched. In parallel, a study was also launched to define the missions of a new regulatory authority to be created.

29. As illustrated below, the World Bank and the AfDB are leveraging a set of actions aimed at building capacity within Morocco and providing the adequate incentives for policy reforms enabling a higher penetration for renewable energy.



Utilizing Different Instruments Together to Make a Transformational Impact

30. *IFI and Donor Coordination*: Given the importance of solar energy in Morocco's development agenda and its significance to mitigating climate change, a number of IFIs and donors are assisting the GoM implement its national solar plan. There is already considerable coordination as well as collaboration of these efforts. This is exemplified by the various sources of financing expected for the Ourazazate I

31. *Leverage:* The CTF co-financing will directly lead to the development of up to 160 MW of CSP capacity that is estimated to cost about $ 1 billion in investments. The $ 197 million allocation from the CTF will be leveraged about 7 times.

Additional Cost/Risk Premium

32. The CTF and AfDB/World Bank loans are critical to enhancing the financial viability of the project. In the absence of the CTF funds, the resulting cost increase would place pressure on fiscal subsidies or burden electricity consumers in the unlikely case where additional costs could be passed on to consumers. Furthermore, the CTF funds will also enable MASEN to take greater calculated risks and look to achieving breakthroughs, where boundaries are being pushed in terms of development that go beyond what many private companies would be willing to undertake.

33. Technology risk is non negligible especially with the size of the plant targeted by MASEN and the very tight schedule for implementation.

Implementation Readiness

34. A request for Expression of Interest for Ouarzazate has resulted in 185 responses and the prequalification for Ouarzazate I received 19 applications. Four candidates were prequalified for the bidding process and notified on December 24th 2010.

35. The request for proposals has been issued by May 2011 and financial closure is expected to occur in mid-2012. Plant construction would then begin in the third quarter 2012 and the plant would be commissioned in 2014.