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UPDATE ON THE CSP-MNA INVESTMENT PLAN

CTF Investment Plan for Concentrated Solar Power in the Middle East and North Africa Region

Supplemental document
October 28, 2010

Table of Contents

Executive Summary

The MENA Concentrated Solar Power (CSP) scale-up Investment Plan (MENA CSP IP), endorsed by the CTF Trust Fund Committee on December 2 2009, lays the foundation for a landmark climate change mitigation program starting with the largest CSP generation project in the world to be located in Ouarzazate, Morocco. This supplemental document updates key information of the MENA CSP IP and responds to the request of the CTF Trust Fund Committee to further elaborate on the following: a) roadmap for project implementation; b) update on policy and regulatory framework in MENA and Europe; c) assessment of export potential and domestic consumption and related need for concessional funding; d) focus on risk premium associated with transmission projects: and e) progress report on project preparation.

The MENA CSP IP (updated) aims at co-financing nine commercial-scale power plants totaling around 1.2 gigawatt and two strategic transmission projects. The vision is of the Mediterranean MENA (and Gulf) countries ultimately becoming major suppliers and consumers of CSP-generated electricity. The MENA CSP IP is conceived as the first step towards the installation of several gigawatts of CSP capacity in MENA by 2020. The first projects are expected to start commercial operations by 2014 and initially supplying to domestic markets in MENA countries.

By 2016, exports of green electricity to European Union (EU) countries will progressively take off due to the removal of existing regulatory uncertainties and will reach 50% of MENA CSP generation by 2020. By then, the cost of CSP technology is expected to decrease due to the larger demand of CSP components and the economies of scale achieved in their manufacturing. This cost reduction will close progressively the gap between the high cost of solar generated electricity and the generation cost from conventional power plants in MENA countries. Future CSP projects beyond the scope of the MENA CSP IP will therefore require less concessional financing and export revenues to cover the cost gap.

MENA countries have introduced regulatory and institutional reforms to attract investors and to provide a better framework for the sustainability of the projects presented in the MENA CSP IP. With regards the export potential, there are three driving forces: (i) a political desire to use MENA exports to the EU as an instrument for greater economic integration (Mediterranean Solar Plan), (ii) a commercial rationale to earn revenues through sale of green electricity and (iii) an environmental/energy security rationale to utilize the comparative advantage of MENA to supply Europe's green energy needs.

In this context, the 2009 EU Renewables Directive (RES Directive) creates an incentive framework to stimulate EU countries' demand of CSP-generated electricity in MENA. The RES Directive allows EU countries to comply with their national mandatory renewable energy targets by importing green electricity from MENA countries. So far, Italy has unveiled a plan to do so and other EU member states could follow within the framework of the Mediterranean Solar Plan.

The two transmission projects in the MENA CSP IP, the Tunisia-Italy ELMED project and the Mashreq transmission corridor, form the backbone of the export and regional optimization strategy. CTF support to these projects will buy down the risk of reserving the necessary transmission capacity for CSP generation projects that would otherwise be taken by competing

power from fossil-fueled fired plants.

Transmission developers and CSP operators face a "chicken-and-egg" situation that concessional financing support can help solve. From a transmission developer's perspective, the demand in EU countries of CSP-generated power in MENA is still uncertain due to the evolving EU regulatory framework; therefore the transmission developer faces a risk that there is no guaranteed export market for CSP, and hence the generation capacity will not be built. The developer of CSP generation faces the risk that the transmission capacity will not be built because of that uncertainty. In addition, the intermittent nature of CSP-generated power makes it more difficult for CSP operators to compete for capacity on interconnection infrastructure. CTF concessional financing to such infrastructure will compensate these risks and potential loss of revenue.

As part of the preparation of the original investment plan, the participating countries proposed a pipeline of generation projects for around 900 MW. Based on this pipeline, the indicative CTF contribution was worked out as US$0.725 million/MW of generation capacity (plus allocation for the two transmission projects). This resulted in a pipeline of projects amounting to: Algeria – US$ 160 million, Morocco- US$ 197 million, Tunisia- US$ 186 million, Egypt – US$ 95 million and Jordan – US$ 112 million.

However, it was indicated that these allocations were likely to change depending on the progress of project preparation and justification for support to be made at the time of submission of individual projects for CTF review. Countries could therefore draw more or less funds than originally indicated depending on progress of project development. As expected, projects have been significantly modified since the endorsement of the MENA CSP Investment Plan by the CTF Trust Fund Committee on December 2, 2009.

The current indicative pipeline stands at about 1200 MW with several countries announcing ambitious projects. In particular, Morocco has substantially increased the capacity of its solar program with the launching of the 500 MW Ouarzazate flagship project (the largest solar plant in the world). It is anticipated that some projects in other countries will follow suit, particularly if Ouarzazate continues to make good progress, and the pipeline would rise even further[1].

The ***Table*** below provides an update based on the changes that have taken place since the original investment plan, as confirmed by the authorities of all beneficiary countries, except Algeria.

[1] This increase in the pipeline implies that, once projects have been finalized, CTF support may be lower on average than the original US$ 0.725 per MW.

Updated MENA CSP IP Project List

Country	CTF Investment Plan[2]			CTF Investment Plan Update		
	Project (Name)	Capacity (MW)	CTF financing (US$ million)	Project (Name)	Capacity (MW)	Status
Algeria[3]	Megahir	80	58	Megahir	80	Feasibility (Megahir)/pre-feasibility (Naama) studies launched for PPP projects, but unclear whether Algeria will seek CTF financing.
	Naama	70	51	Naama	70	
	Hassi R'mel II	70	51	Hassi R'mel II	70	
Egypt	Kom Ombo	70	51	Kom Ombo	100+	Government requested AfDB/CTF/IBRD support in May 2010. Pre-feasibility study is completed. Feasibility study to start in early 2011 and will explore storage as well as size options larger than 100MW, based on financing indications. There is strong interest from other donors including KfW, EIB, EU-NIF, AFD and IsDB.
	Marsa Alam	30	44			
Jordan	Ma'an Province	100	72	Ma'an	100	Pre-feasibility study has been completed. Government organized investor/donor conference in June 2010 for this IPP project that demonstrated support of donors, in particular EIB, AfD and JBIC. RFP process expected to start by early 2011.
	Mashreq CSP Transmission	-	40	Mashreq CSP transmission	-	Terms of reference for feasibility studies, technical specifications and ESIA have been prepared and funding from EU- NIF has been secured for financing. In addition to IBRD, EIB and AFD have also expressed interest in financing support.
Morocco	Tan Tan	50	35	Ouarzazate	500	Prequalification for the first phase of the Ouarzazate PPP has been closed on October 4 2010 with 19 candidates. RFP to be launched
	Ain Beni Mathar	125	90			
	Ouarzazate	100	72			

[2] As approved by CTF Trust Fund Committee on December 2, 2009.
[3] Algeria's intentions vis-à-vis CTF financing are currently unclear, and the earmarked funds may be reallocated.

						before end 2010 to prequalified bidders with selection of partner(s) targeted for Q2 2011. There is strong interest from donors including KfW, JICA/JBIC, EIB, EU-NIF, IsDB, AFD and Government of Spain.
Tunisia				STEG-CSP	50	Feasibility study is currently underway. EPC contract to be awarded in 2012. Donors including KfW have expressed interest in financing along IBRD and AfDB.
	ELMED-CSP	100+	73	ELMED-CSP	100+	Prequalification process launched in April 2010, with 11 submissions received by the deadline of July 26. Prequalification completed by end of October and RFP to be launched in December 2010. Several donors including EIB, AFD, KfW and, IsDB have expressed interest.
	IPP-CSP Project	100	73	STEG renouvelables/SITEP	50	Feasibility study is currently underway. RFP will be launched in early 2011 for this proposed private sector project.
	Tunisia-Italy transmission	-	40	Tunisia-Italy transmission	-	Studies are underway by a joint venture of STEG and TERNA.
Total		**~ 900**	**750**		**~ 1,170**	

I. Background

On December 2 2009, the Clean Technology Fund Trust Fund Committee (CTF TFC) endorsed the document ***CTF Investment Plan for Concentrated Solar Power in the Middle East and North Africa Region CTF/TFC.IS.1/3****. The Committee also requested that a supplementary document responding to the questions raised by the Committee be prepared by the Governments concerned and the MDBs for review by the Committee in 2010.*

This document, prepared in response to the questions, elaborates upon the following points: (a) roadmap for implementation of the projects under the investment plan to maximize impact and learning; (b) update on the evolving policy and regulatory framework in MENA and Europe; (c) analysis of the mix between exports and local consumption, and the related need for concessional funding; (d) focus on the additional cost and risk premium associated with the transmission projects included in the Investment Plan; and (d) progress report on project preparation.

II. CSP in MENA: Roadmap to 2020 and Beyond

Vision

1. The MENA Concentrated Solar Power (CSP) scale-up Investment Plan lays the foundation for a landmark climate change mitigation program that could forge an international partnership, starting with the Ouarzazate 500 MW CSP generation complex in Morocco (scheduled to be commissioned by 2014-2015), the largest one in the world. This program will contribute significantly to the global effort to reduce costs of this technology by achieving scale economies in equipment manufacturing. The vision is of the Mediterranean MENA countries (and the Gulf) ultimately becoming a major consumer and supplier of CSP energy, and being a launching pad for a globally important climate change mitigation technology.

2. The Investment Plan will reduce MENA CO_2 emissions by about 1.8 million tons/year while creating economic development benefits, in the form of reduced dependency on volatile international fossil fuel markets (oil, natural gas and coal), ensuring reliable electricity supply in MENA, earning export revenues, promoting technology transfer and creating local employment in manufacturing of components. From close to full dependence on fossil fuels today, the MENA countries in this investment plan are targeting to reach 10-15% renewable energy in their supply mix by 2020, mainly from wind and CSP. During this timeframe, the installed power capacity in these countries will double to about 110 GW.

3. By realizing exports to Europe and MENA eligibility for climate financing, this enhanced energy security and related economic benefits can be achieved without excessively burdening MENA taxpayers or consumers. The implementation of this Investment Plan will create global benefits by stimulating economies of scale in CSP construction in the least expensive manner, utilizing MENA's unique combination of optimal physical conditions (high isolation, availability of suitable flat land, low labor cost, etc.) and optimal economic/financial conditions (European willingness to pay a "green premium", availability of concessional finance).

4. Beyond Ouarzazate or any other individual project, the development of new CSP plants must be seen in a regional, rather than country-by-country, context. Developing a critical mass of CSP plants in the region will create a much more powerful demonstration effect than doing so within one country. In addition, a regional approach will maximize economies of scale by creating substantial manufacturing demand - with the potential of supply generation - for critical CSP technology components such as mirrors, tubes and control equipment. Finally, enhanced interconnections within the MENA countries and between MENA and the EU are critical to improve the program's operability (as it is easier to integrate significant renewable capacity in a larger system) and its viability in a regional context (through the possibility of maximizing exports to a higher paying market) - see *Annex 1* for more detail on international interconnections in the Mediterranean region that would be essential to facilitate development of this program.

5. The potential demonstration effect of the proposed MENA CSP investment program is strengthened by strong coordination with the Mediterranean Solar Plan (MSP) whose vision[4] is to take the world-scale **renewable energy** potential of the South, and the green electricity needs of the entire Mediterranean Basin, and transform it into a massive opportunity - by linking large scale power production from **renewable energy resources (including solar)** as well as suitable energy efficiency and demand side management options through reinforced transmission grids to demand centers of the Mediterranean region, both in the North and the South.[5]

Roadmap

6. There are three principal driving forces for CSP exports: (i) a political desire to use MENA exports to the EU as an instrument for greater economic integration (Mediterranean Solar Plan), (ii) a commercial rationale to earn revenues through sale of green electricity and (iii) environmental/energy security rationale to utilize the comparative advantage of MENA to supply Europe's green energy needs. Exports could be kick-started by the European 20% renewable energy targets for 2020 but Europe's (contingent) commitments to targets greater than 20% make a big difference to CSP export prospects

7. In 2014, when the first projects are expected to come on line, given the relatively limited export opportunities at the current time, generation would be essentially focused on domestic markets. Given the high capital costs of the technology, the concessional financing needs for the first set of projects will be substantial.

8. The first project would be the initial 250 MW tranche of the 500 MW Ouarzazate complex in Morocco. This project will be a model for the global development of large scale CSP projects. It would be followed by the Kom Ombo (100 + MW) project in Egypt, the first STEG-led CSP project (50 MW) in Tunisia, the second phase of Ouarzazate (the remaining 250 MW) and possibly Meghaïr (70 MW) in Algeria. Those should all be commissioned by

[4] The European Council approved in principle the Union for Mediterranean (UfM) in 2008, presided over concurrently by France and Egypt. Proposed regional initiatives under the UfM to enhance regional cooperation include de-pollution of the Mediterranean, maritime and land highways, civil protection, Mediterranean Solar Plan (MSP), higher education and research and the Mediterranean business development initiative.

[5] Demand-side management and energy efficiency measures may also be needed to facilitate the grid integration of solar power.

2015, adding about 700 MW. The learning from each of the country experience is being shared across the region to accelerate implementation by maximizing learning across the portfolio. This is being done through facilitation of bilateral exchanges, organization and participation in multilateral learning events and through close donor coordination.

9. Progressively by 2016, domestic sales would reduce from over 90% to 60-70% of production, as exports to Europe take off and cooperation among MENA markets increases. The two IPP projects in Tunisia (for a total of 150 MW) and the 100 MW Ma'an in Jordan (although this could be accelerated) would come on line within this timeframe, leading to the completion of around 900 MW.

10. By 2018, possibly two Algerian projects (about 150 MW in total) would be commissioned, leading to full implementation of about 1.2 GW.

11. By 2020, installed CSP capacity in MENA could reach several gigawatts (up to 5 GW), including impact of multiplier effect in the GCC countries and of steadily increasing exports, as interconnections between MENA countries and with EU are reinforced. By 2050, while the proportion of exports will remain significant (ca.30%), most of the CSP generated in MENA will be used locally (ca.70%). The main parameters of the 2050 CSP roadmap are shown in *Table 1* below:

Table 1: CSP Roadmap in MENA
Driving forces

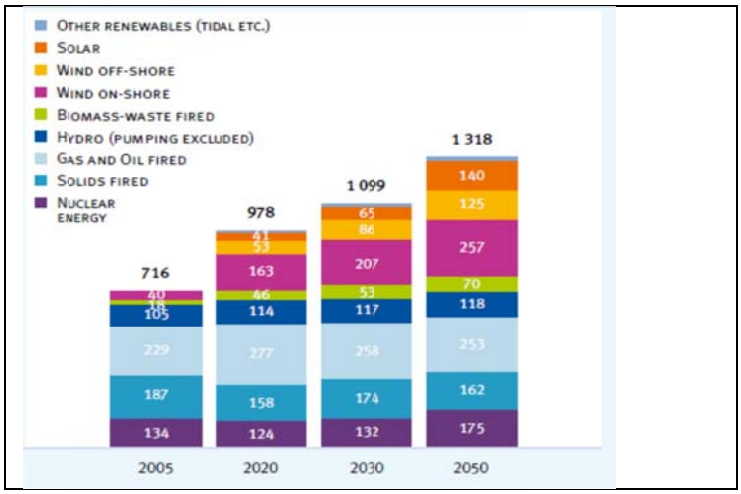
Driving forces	2015	2020	2050
Concessional financing	+++	+	0
Export to EU	+	+++	++
Cost of CSP	+++	++	+
Cost of fossil fuel/CO2	+	++	+++

Note: + = Low, ++ = Medium, +++ = Strong

12. After 2050, CSP could make up to 50% of the 140 GW of solar needed in Europe (see *Figure 1*). Initially, European imports from MENA will be sourced in the Maghreb, but increasingly, as interconnection develops and networks get reinforced, all MENA countries will have access to the European market. They would fully participate in the decarbonisation of Europe, as well as in their own decarbonisation, with a strong CSP manufacturing sector, possibly adding equipment exports to electricity exports.

13. The MENA CSP program will play a key role in the commercialization of the CSP technology in the developing world together with the ongoing ambitious efforts in South Africa, India and other markets (See Box 1). Implementation of the MENA regional CTF investment plan is closely coordinated with the CTF financed CSP project being implemented in South Africa. The African Development Bank (AfDB) and the World Bank group are working together closely to maximize the learning across the MENA countries and South Africa in the implementation of projects. In addition, learning and technical assistance activities are also being undertaken with donor support across the group of countries on strategic areas such as local manufacturing opportunities for CSP.

Figure 1: European Power Supply by 2050 (in GW)



Source: Eurelectric Power Choices Scenario

BOX 1- Global CSP Industry Trend

The total worldwide installed capacity of CSP plants in operation is 540 MW and around 1 GW is under construction. A share of 85% of the current installed capacity is concentrated in the US, followed by Spain with 15%. These two countries will continue to be crucial for the development of the industry into the next decade, with Spain accounting for the largest share of projects under construction with almost 87%. The dominating technology is parabolic trough, which accounts for 92% of operating plants and 98% of projects under construction.

A pipeline of projects worldwide in the range of 6-7.5 GW has been announced, including new CSP plants in US, Spain, MENA countries, China, India, South Africa, and Australia.

In the last year, the CSP industry has experienced a rapid transformation. The US and European solar energy companies have significantly expanded their businesses in key emerging markets. In January, for example, US company eSolar signed a master licensing deal with the private Chinese electrical power equipment manufacturer, Penglai Electric, for the development of at least 2 gigawatts (GW) of solar thermal power plants in China over the next 10 years.

Large energy companies have also strategically positioned themselves in the solar energy market by buying flagship CSP companies. German industrial conglomerate Siemens AG acquired the Israeli Solel Solar Systems, which developed the UVAC 2010 state-of-the-art receiver, and also a 28% stake in the Italian Archimedes Solar Energy, a pioneer in molten salt receiver technology. This strategic move has placed Siemens AG in a duopoly position with the only other major receiver manufacturer, Schott AG. Moreover, French nuclear energy company AREVA bought the US-based CSP technology developer, Ausra, to take a leadership position in the global CSP market. Japanese Mitsubhishi corporation is collaborating with Acciona, a key Spanish company with strong CSP expertise to develop projects.

The First Gigawatt

14. In order to achieve a 2020 vision with several gigawatts of installed CSP capacity in MENA, three elements are required: (1) significant domestic markets for CSP generated electricity in MENA countries, (2) emerging export markets for CSP into EU countries, and (3) significant concessional finance during the initial stages of market development which will make the projects bankable while policy and regulatory reforms gain momentum in MENA and EU. In light of these initial investments and reforms, investment costs are expected to start to decrease, and adequate transmission infrastructure are to be developed within MENA and between MENA and Europe. In the context of this vision, the MENA CSP Investment Plan will support the development of the <u>first gigawatt</u> of installed capacity.

15. <u>Balance between domestic markets:</u> As projects are implemented under the MENA Investment Plan, domestic energy markets as well as export energy markets will need to be targeted. While some projects such as the 500 MW Ouarzazate project could be designed to export at least part of their output from the date of commissioning itself, others such as the 100 MW Tunisia ELMED project could only consider exports in parallel with the development of the transmission infrastructure and, during an initial period, remain focused on domestic markets. The level of export could reach over 50% by 2020, as CSP capacity in MENA expands. Domestic markets will grow over time and require decreasing levels of support, as cost reduction of CSP is achieved by manufacturing at scale, while the cost of fossil fuel-based electricity will keep increasing.

16. <u>Export markets regulatory reform:</u> In order for a significant level of exports to be achieved, and to thus support a faster deployment of the Investment Plan, appropriate development on the European markets is essential. A key step in this regard will be the roll out of the EU Directive on Renewable Energy Sources (RES) into the national plans of the member states. If suitable National policies in EU states are put in place, some exports through existing links to Europe could be undertaken as early as 2014 when the first projects are commissioned. The trade will increase as more aggressive climate change and renewable energy targets are pursued by the member states, and as more infrastructure projects are implemented. By 2020, there could be a well functioning MENA-EU integrated electricity market.

17. <u>Need for concessional financing</u>: In view of the high capital costs and the existing uncertain policy and regulatory framework, a high level of concessional financing/risk mitigation will be necessary in the early stages. By 2015 or so, as there is more clarity in the policy framework for CSP development in the MENA countries and for imports by EU countries and capital costs start to decrease, the need for concessional financing will be reduced. It is projected to gradually reduce further beyond 2020, when sufficient economies of scale are achieved globally, in large part through the MENA experience.

III. Policy, Regulatory and Institutional Reforms Needed in MENA

18. In order to position themselves as technology and market leaders in the CSP industry, MENA countries are taking steps that demonstrate commitment to reforms in the electricity sector, in particular in regards to favoring greater integration of renewables in their energy system. Notably:

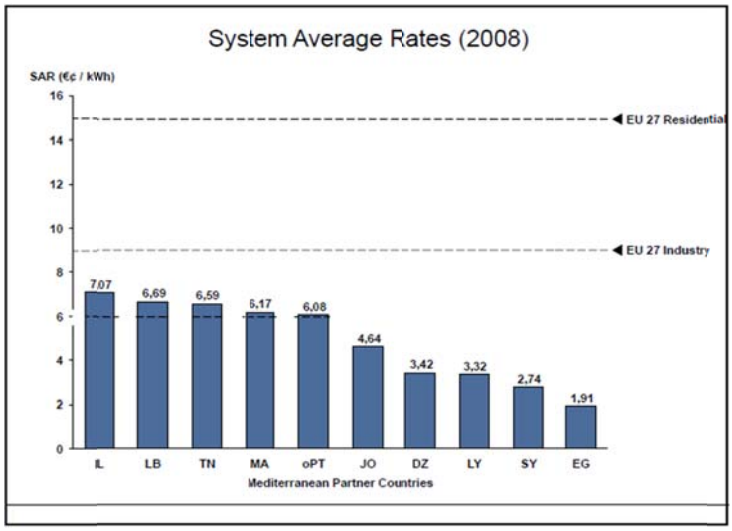
- Gradually removing subsidies on fossil fuels to provide price signals to consumers to encourage energy efficiency on the demand side and creating a level playing field on the generation side to make renewable energy technologies competitive;

- Limiting electricity demand growth through demand side management (DSM) and other measures: demand is growing at 6-9% p.a. in most countries, partly because of inefficient use of electricity. Given that CSP and other renewable technologies have high capital costs, capacity additions are to be undertaken in an optimal manner, duly considering rational use of energy to limit demand growth;

- Creating a transitional incentive scheme until cost reduction in CSP is achieved, exports are possible and fossil fuel subsidies are removed.

19. In MENA countries, energy is subsidized at different levels, ranging from a relatively low subsidy such as Tunisia (TN) (see *Figure 2 and Table 2*), to a high level of subsidies such as in Algeria (DZ) and Egypt (EG). These subsidies represent a significant burden on government budgets.

Figure 2: System Average Rate of MENA Countries



Source: MEDEMIP

20. The following paragraphs summarize recent developments in each of the countries participating in the MENA CSP scale-up initiative. *Table 2* below provides selected data on macroeconomic and energy indicators for the five countries. As shown below, all the countries have substantially completed their basic electricity access objectives with most of the population having access to electricity.

Table 2: Selected Economic and Energy Indicators

2007 data, unless specified otherwise	Algeria	Egypt	Jordan	Morocco	Tunisia
GDP per capita (current US$)	4,027	2,450	3,829	2,865	3,852
GDP per capita, PPP (int'l $, 2009)	6,869	6,123	5,620	4,604	8,254
Total unemployment (% total labor force)	14%	9%	12%	10%	14%
Energy subsidies (% of GDP)	7.5%	11.9%	2.8%	1.3%	1.5%
Electrification rate (2009)	98%	98%	99%	96%	99%
Energy production (kt of oil equivalent)	164,300	82,270	277	654	7,901
Energy use (kt of oil equivalent)	36,863	67,246	7,201	14,361	8,837
% coal	*2%*	*1%*	*0%*	*23%*	*0%*
% oil & products	*37%*	*46%*	*66%*	*67%*	*45%*
% gas	*61%*	*48%*	*34%*	*3%*	*41%*
% other	*0%*	*4%*	*0%*	*6%*	*14%*
Energy imports, net (% of energy use)	-346%	-22%	96%	95%	11%

Source: IEA, WB, IMF

Algeria

21. The combination of strong oil prices and higher net exports since 1999 have resulted in significantly higher oil and gas export revenues for Algeria. However, due to the recent global economic crisis, hydrocarbons revenues dropped by over 40% in 2009, down to USD 43 billion (compared to 76 billion in 2008 and USD 59 billion in 2007) decreasing the fiscal space for energy subsidy adjustments.

22. Energy prices are heavily subsidized in Algeria, which has been a key driver promoting inefficient use of energy and resulting in high energy intensity. In view of the increasing energy intensity, the government has emphasized energy efficiency and renewable energy options while considering energy pricing issues as appropriate and creating funding mechanisms. The resources of the fund include taxes on natural gas and electricity, and an initial government contribution. Additional resources may include taxes on energy intensive equipments, penalties, loan reimbursements, and government or other contributions.

23. The Government has also taken steps to support renewables and CSP in particular. Under a 2004 Decree, premiums are granted for electricity produced from renewable energy resources. For hybrid solar-gas power plants (when solar accounts for at least 25% of the plant's production), the decree states that the premium will be 200% of the average system price; for pure solar plants, the premium will be 300% of the average system price. The actual level of the premium will be updated based on data from the plants that become operational.

Egypt

24. The prices for energy products in Egypt are generally below economic cost and the resulting implicit subsidies to the economy are quite large. In FY 09, such energy subsidies were US$ 11 billion. In order to bring sector finances and energy consumption to a more sustainable path and to reduce the fiscal burden of energy consumption, the government has initiated a series of price increases, starting in 2004. The future pace of these adjustments remains

uncertain at this stage, though, as the economy is coming out of the 2008/09 slowdown, but some adjustments to gas and electricity for the industrial sector were made in July 2010.

25. In addition to the steps on reforms, the Government is also facilitating renewable energy development through specific policy interventions. The Supreme Energy Council has already approved (March 2010) key policy steps related to wind and CSP scale-up in the country, proposed under the new electricity law but yet to be submitted to Parliament. These include:
    - approval of the need to cover additional costs for renewable energy projects through tariffs,
    - approval of zero customs duty on wind and CSP equipment,
    - finalization of the land use policy for wind and CSP developers,
    - acceptance of foreign currency denominated Power Purchase Agreements (PPA)s and confirmation of central bank guarantees for all Build Own Operate (BOO) projects,
    - permitting support for developers with respect to environmental, social and defense permits.

Jordan

26. Jordan is one of the first countries in the region to initiate fundamental reforms in the electricity sector and has made significant progress in carrying out these reforms including phase out of subsidies and the introduction of private sector. Currently, although electricity tariffs are largely cost reflective, some cross-subsidies embedded in the tariff structure remain. The regulatory commission plans to integrate an automatic fuel price adjustment mechanism to tariff calculations after the relevant studies are completed to ensure end-user tariffs are appropriately cost-reflective.

27. In addition to these reforms that will help level the playing field for competing energy technologies, the Government is also taking other steps to create favorable policy environment for renewables. In February 2010, a Renewable Energy and Energy Efficiency Law (REEE Law) was ratified. The REEE Law established a Jordan Renewable Energy and Energy Efficiency Fund (Jordan REEF) which will help mobilize financial and technical support for renewable energy and energy efficiency efforts, including from the government's budgetary contribution. The REEE Law commits to introducing a minimum of 500 MW of renewable energy generated power, a registry of land available for use based on resources maps and measurements, the purchase of all renewable power and interconnection benefits, among others. Moreover, the Government of Jordan has granted an import tax exemption for renewable energy equipment. Currently the Government is preparing a renewable energy transaction strategy which is expected to be approved by the cabinet by the end of the year.

Morocco

28. Both petroleum products and electricity are sold to consumers at below cost of supply, through a compensation system administered by the State in the case of petroleum products or through State support to the national electricity company ONE in the case of electricity. Recent price increases on international oil markets have led to a ballooning of the energy import expenditures and the exhaustion of the compensation funds by mid-2010. A reform of the energy price system is becoming an imperative to lessen the burden on state finances,

especially at a time when the GoM is committed to financing solar energy and the process was initiated in 2009-10. Work is under way to identify efficiency improvements in the petroleum distribution sector to reduce the level of subsidies. An electricity tariff study was launched in order the assess the cost of serving different categories of customers and a full reform of the electricity pricing system will be undertaken when the tariff study is completed.

29. On November 2nd 2009, the HM King Mohammed VI announced a landmark US$ 9 billion Solar Plan which intends to have 2,000 MW of solar power generation capacity installed by 2020, starting with the ambitious Ouarzazate 500 MW CSP project, which is being developed based on a Public-Private business model. 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.

30. The legal, regulatory and institutional framework is being set-up with several laws enacted in early 2010, including the renewable energy law, the law creating the Solar Agency to implement the Solar Plan and the law setting up the Energy Efficiency Agency.

Tunisia

31. Electricity prices are subsidized in Tunisia, as there is a significant gap between Société Tunisienne de l'Electricité et du Gaz (STEG's) average selling price and the company's supply cost (about 20-30% in the last four years). The company receives a subsidy to make up for the difference. In addition, power prices are indirectly subsidized through low gas transfer prices to the STEG. As regards petroleum product prices, a system of indexation, with caps and floors to limit the extent of price fluctuations both upwards and downwards has been put in place.

32. Rational use of energy has always been a priority in Tunisia. A Presidential program covering the period 2010-2014 has recently reinforced the objectives, with a target of 10% reduction in energy intensity by 2014, the addition of 430 MW of renewable power generation capacity (a fivefold increase in installed capacity) and complete elimination of fluorescent lamps by 2014.

33. The Tunisian Solar Plan (TSP) was launched in December 2009 for the period 2010-2016 and aims at increasing the share of renewable energy and energy efficiency: 40 projects have been identified (in solar, wind, biomass, etc.), for a total investment amount of EUR 2 billion, 1.4 of which to be provided by the private sector. Over the period 2010-2030, Tunisia expects to save 10 mtoe of fossil fuels through its energy conservation efforts, 80% from energy efficiency and 20% from renewable energy. Interconnection with Europe to facilitate exports is a key element of the TSP, as is the development of a local equipment industry to contribute to economic growth and job creation.

IV. Policy and Regulation in Europe - Rationale for Exporting from MENA to the EU

Integrating Mediterranean Energy Markets: a Mutually Beneficial Move

34. As it moves toward its ambitious objectives of reducing GHG emissions, Europe will increasingly have to look for additional sources of low carbon energy. There are three principal driving forces for CSP exports: (1) a political desire to use MENA exports to the EU as an instrument for greater economic integration (Mediterranean Solar Plan), (2) a commercial rationale to earn revenues through sale of green electricity and (3) environmental/energy security rationale to utilize the comparative advantage of MENA to supply the region's green energy needs. Exports could be kick-started by the European 20% renewable energy targets but Europe's (contingent) commitments to targets greater than 20% would make a significant difference to CSP export prospects.

35. The 20% overall target for RES translates into a 31-36% share of renewable energy in the power generation sector, or approximately 1,000 terawatt-hours (TWh) in 2020, according to various estimates developed for the European Commission.

Table 3: Penetration of RES in Power Generation to Reach the Overall 20% Target

		RES-Electricity TWh	*Total Electricity TWh*	*% of RES-Electricity*	*% RES in final energy consumption*
2006 EUROSTAT *(actual)*		537	3361	**16%**	9.2%
2020 *projections* to reach 2020 targets	***POYRY***	1209	3350	**36.1%**	20%
	EC PRIMES	1097	3638	**30.8%**	20%

Source: Eurelectric

36. The renewable energy capacity that will be required by the "20-20-20" RES Directive to be available by 2020 is approximately 100 GW. As reported in their National Renewable Energy Action Plans (NREAP)[6], most EU countries forecast the achievement of their interim and 2020 renewable energy targets through domestic action only. Italy and Luxembourg are the only two countries that have unveiled plans to use the cooperation mechanisms established by the RES Directive (See Annex 1) [7]. Italy, in particular, estimates that the country will need to import renewable energy from the Balkans, Albania and Tunisia –using Art. 9 of the RES Directive- to fulfill its mandatory target by 2020. Other countries, such as

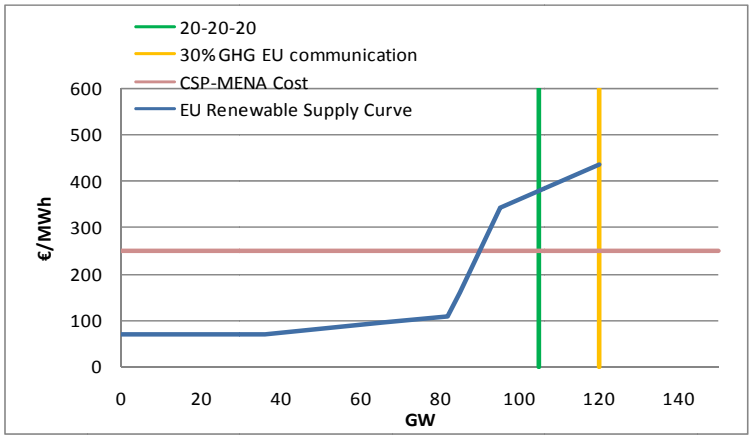
[6] Article 4 of the renewable energy Directive 2009/28 required Member States to submit national renewable energy action plans by 30 June 2010. Not all EU Member States have submitted them at the moment of writing this document. These plans provide detailed roadmaps of how each Member State expects to reach its legally binding 2020 target for the share of renewable energy in their final energy consumption.

[7] Cooperation mechanisms are: statistical transfers between EU member states (Art. 6), Joint projects between EU member states (Art. 7, 8), and Joint projects between member states and third countries, e.g. MENA (Art. 9). Each mechanism is explained in detail in paragraph 48 below.

France, Germany, and Spain have expressed an interest in contributing to the development of the cooperation mechanisms in view of the future needs.

37. The levelized generation cost of CSP in Europe is estimated at around 34 c€/kWh (or 340 €/MWh) in 2020 (Eurelectric). The supply curve in *Figure 3* indicates that electricity generated from CSP projects in Europe would hardly be competitive at that cost. However, in view of the better physical conditions, CSP from MENA could reach the European market at a level 20-30% below the European CSP generation cost of 34 c€/kWh: (i.e. around 24 c€/kWh or 30 cUS$/kWh). This would establish CSP from MENA as a reliable and competitive source of renewable energy in Europe, and pave the way for increasing imports for 2030 and beyond, as targets become more stringent. In view of the upcoming prospects of stringent targets, EU member states are exploring the MENA import option carefully.

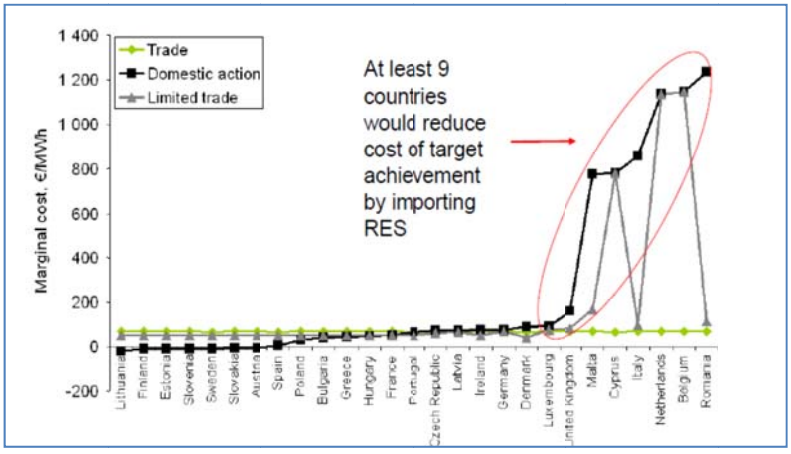
Figure 3: Supply Curve for RES in Europe



Source: Adapted from EC communication

38. However, it is also possible that even with tailored national support schemes in place, not all EU countries would have the possibility to fulfill their 2020 RES obligation purely with domestic action. Countries with RES "deficit" could therefore comply with the RES Directive by importing CSP-generated electricity from MENA countries. *Figure 4* illustrates that the marginal cost for achieving renewable targets of some countries can significantly increase without the use of cooperation mechanisms.

Figure 4: Domestic Action vs. Trade



Source: Eurelectric

Decarbonisation in Europe, an Opportunity for CSP Scale-up in MENA

39. The introduction of ambitious climate-friendly policies and legislation provides the necessary regulatory framework for MENA exports of CSP-generated electricity to higher-paying EU markets over the coming years. In June 2010, the EU executive[8] launched a consultation on a new energy strategy, in which "fostering the development of low carbon technologies" is identified as an issue that has to be addressed as a matter of priority. The new strategy covering the period 2011-2020 needs to be fully compatible with the long-term objective of 80-95% reduction in greenhouse gas (GHG) emissions by 2050 from the 1990 levels, set by the European Council in 2007. In parallel, the EU executive is preparing the "Decarbonisation of Energy Roadmap to 2050" which will investigate a range of development paths for energy production in Europe in line with EU long-term climate targets and will explore cost-effective transitions.

40. On May 26, 2010, the EU executive issued a communication[9] presenting an analysis of the impacts of a move from the current 20% to a 30% GHG emission reduction, if and when the conditions are met. The document set out options for meeting the 30% reduction target and estimates the cost of reaching that target at EUR 81 billion per year by 2020, i.e. EUR 33 billion more than the cost under the 20% reduction target (0.2% of GDP).

41. Moving to the 30% target would be a smooth way to prepare for the longer-term objective of 80-95% GHG reduction compared to 1990 levels. On July 15 2010, the Ministers of three EU member states, United Kingdom, Germany and France, expressed their support to a 30% GHG target in a joint-declaration[10] and stated that they would seek support from other EU countries to raise the EU target unilaterally by the end of 2010 without conditions.

Need for Concessional Financing in CSP Scale-up

42. For the MENA country governments, a key consideration would be how much strategic importance to place on the MENA CSP program. From their point of view, they must weigh the budgetary cost of their expenditure on infrastructure and tariff subsidies against the benefits of power exports, increased domestic power supply, improved energy self-sufficiency and reduce fuel cost volatility as well as other development impacts (e.g, employment generation through increased demand for local services).

43. Donors providing concessional financing for the MENA CSP program are interested in ensuring that their financial contribution achieves their policy objectives of: (i) reducing global greenhouse gas emissions, and (ii) contributing to growth and poverty reduction in MENA countries (the aid effectiveness question). There is a strong case for enhancing the concessional financing for the early stage projects to mitigate the policy and regulatory risk by providing upfront financing.

[8] Stock taking document: Towards a new Energy Strategy for Europe 2011-2020. Available at ec.europa.eu/energy/consultations
[9] COM(2010) 265 final- "Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage"- Brussels, May 26 2010
[10] Borloo J-L, Huhne C., Röttgen N., "Europe needs to reduce emissions by 30%", Financial Times, July 15 2010.

Generation

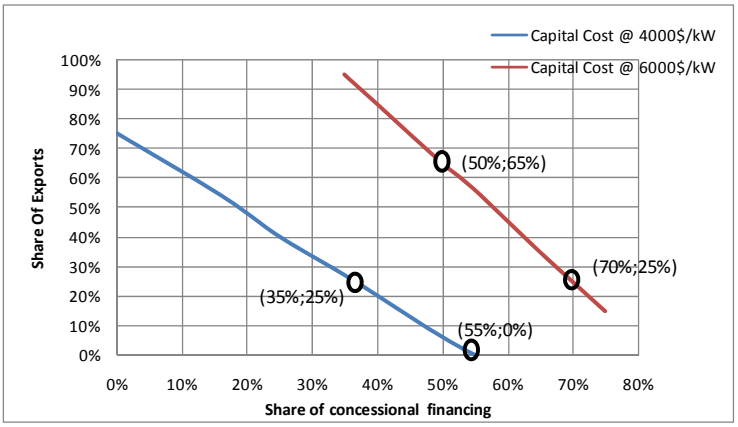
44. For generation projects, the required level of concessional funding depends on the share of the output which is exported, on the local and export sale prices, and on the weighted average cost of capital (WACC), i.e. debt interest rate and rate of return sought by investors.

45. The following analysis assumes 8% equity internal rate of return (EIRR) and uses the following assumptions:
    - 25% equity and 75% debt,
    - 25 c$/kWh for export price (approximately 30% below European generated CSP),
    - 15 c$/kWh for local price (approximate marginal cost of generation in the MENA region).

46. Two levels of capital cost are analyzed, US$ 4,000 and 6,000 per kW. Results are shown on *Figure 5*. For example, with 4,000 US$/kW, concessional financing would have to amount to:
    - 35% of total investment cost when exporting 25% of the production, or
    - 55% of total investment cost with no exports.

47. If the capital cost is 6,000 US$/kW, concessional funding would for example amount to:
    - 50% of total investment if 65% of production is exported, or
    - 70% of total investment cost if 25% of production is exported.

Figure 5: Concessional Funding Needed for Different Levels of Export



48. With 25% export and a capital cost of 4,000 US$/kW, the 1 GW CSP capacity covered by the investment plan for a total investment of US$ 4 billion requires 35% of concessional funding, which amounts to US$ 1.4 billion for generation only. The same 1 GW investment but with a targeted 15% EIRR and 25% of exports requires about 50% of concessional financing, which amounts to US$ 2 billion for generation only. Thus, with concessional funding required for transmission estimated at US$ 200 million, the required amount of concessional funding that would be needed for the total investment plan in addition to the US$ 750 million from CTF is in the range of US$ 1-1.5 billion.

49. A higher level of concessional funding would be necessary for the early plants that have limited access to the export market and would need to import most of the plant components. Further analysis was carried out to assess the viability of the Investment Plan, as well as its impact and benefits on both MENA and the EU (see *Annex 2* for details and assumptions).

Benefits from CSP electricity exports to EU are valued at the levelized cost of CSP electricity supply produced in MENA (including generation, transmission and distribution). Costs include capital expenditures (inclusive of generation, transmission and distribution), and operation and maintenance expenditures. External costs of CSP electricity are not quantified (ex: water consumption, heating transfer fluid environmental impact).

50. At this generic level of analysis, the added value for MENA stimulated by concessional funding is equal to US$ 2.2 billion in NPV (net present value) terms. EU benefits by acquiring expensive CSP energy at 25 c$/kWh instead of 30 c$/kWh, which is the levelized tariff for CSP in MENA without concessional financing: the benefits for EU would be US$ 400 million in NPV terms.

51. MENA would also derive several other benefits linked to the economic development generated by these investments, including: job creation, technology transfer or improvements in local environment. The construction of new power plants may not generate large net creations of low skilled jobs in the short run. Those jobs would in any event be created whether the power plants being constructed are solar or natural gas fueled. However, scaling up solar investments will require new skills that will contribute to improving the quality of the labor force. CSP plants being essentially large accurate optical sun tracking / fluid heating facilities, their development and construction will lead to a build-up of new capacities in the MENA countries in a variety of engineering fields (resource evaluation, optics, software, high-temperature materials, etc.).

52. MENA countries are also especially keen on increasing local manufacturing capacity for CSP, in view of the economic development impacts and cost reduction possibilities. A preliminary assessment shows that the potential of MENA countries to manufacture components of the CSP plants is high (see Box 2 below).All construction works at the plant site, including the basic infrastructure works, installation of the solar field and construction of the power blocks and storage systems, could be undertaken by local companies. This accounts to roughly 17% of the total CSP investment. Similarly, the mounting structure could be supplied locally if local companies can adapt manufacturing processes to produce steel or aluminum components with the required accuracy. For the more complex components, local industry development will largely depend on the anticipated growth in the size of the solar electricity market in MENA and globally since such components would require joint-ventures or foreign direct investments to install new production facilities in MENA. The current investment scale-up of 1GW already offers multiple opportunities to be explored.

53. Each of the projects under the investment plan will present detailed economic and financial analysis that is likely to include (i) Economic analysis at the plant level and the calculation of the subsidy requirements; (ii) Comparison of the subsidy savings due to reduced use of fossil fuels and the subsidy needed to integrate the high cost CSP energy in the system(further, macroeconomic impacts, such as on the level of foreign direct investments, government budget and trade, would be assessed) ; and (iii) Exploratory analysis on broader spillover development effects including the impacts on job creation and increased local content in manufacturing would be included.

Box 2- Local Manufacturing

Major manufacturers for the CSP sector are currently not located in MENA. However, it is likely that selected manufacturing will relocate to MENA countries to take advantage of local manufacturing capabilities, to adapt to specific local conditions, and to reduce transport and labor costs. This will take place through new investments by the current manufacturers, joint ventures with local companies, and new investments by local companies.

When this relocation happens, it will boost the case for donor-funded subsidies to MENA CSP as a means of stimulating employment and growth in MENA; in addition, donor activities could also assist countries to encourage local manufacturing activities. Selected relocation in MENA will also be beneficial for European manufacturers, as: (i) the key trigger for such relocation will be the growing local market which will offer plenty of opportunities for all suppliers, and: (ii) a solid local CSP industry will provide international system providers and EPC contractors with a competitive manufacturing base for selected components. It will help them improve their offer in the MENA market as well as in other markets.

The MENA CSP industry could very well become an international exporter, the way the Indian wind turbine industry, which took off based on local demand, became an international exporter, including to Europe and the US. This potential in MENA can be exemplified by other industries, like the automobile industry or even the aerospace industry, where major European manufacturers use North African suppliers and subcontractors for some components, in order to be more competitive with other international manufacturers. Since many technologies and processes are common or comparable (glass manufacturing, metal fabrication, mechanical engineering, electrical equipment…), many of these auto/aero suppliers to Europe will be able to diversify into CSP related components and systems.

A study is being undertaken with donor support from the Energy Sector Management Assistance Program (ESMAP) to assess the local manufacturing potential for CSP components in the MENA region, with special focus on the five countries of the Investment Plan.

A stakeholder workshop was conducted on September 30^{th,} 2010 in Cairo. It was very well attended by companies and institutions from all over the region, including GCC countries. Many participants were from the local and international manufacturing industry, which demonstrates the industry's strong interests for developing local manufacturing in MENA when the market takes off. Following the workshop, feedback was received from the industry as well as from the client countries and donors. The AfDB and World Bank teams will actively participate in the review and finalization of the study. The final report will be released by end 2010. Dissemination will be organized in the five countries of the Investment Plan, and will determine whether further activity is needed.

Early findings of the study indicate that there is certainly a potential for local manufacturing in the MENA region, provided that the local market is robust. Top candidates for local manufacturing are relatively labor intensive, medium or low technology components. They include mirrors, steel components and frames, electrical equipment, cables, piping, etc. Energy intensive materials and components, which are also expensive to transport, such as raw glass, could also be produced in energy producing countries like Algeria and Egypt.

Already in Egypt, the solar field of the 20 MW Kureymat project was tendered to a local company, Orascom Construction. The company's bid was based on its capability to locally manufacture the frame of the solar parabolic trough in its subsidiary company National Steel Manufacturing (NSF). Orascom had to subcontract for both the mirrors and the tubes; nevertheless the company has gained huge experience in the assembly and testing of both components. Orascom also implemented the civil and electrical works. The local component represented 50% of the total solar field work.

54. Besides viability and the related export and concessional finance issues, water availability would need careful consideration during project preparation as this could pose an issue for further scale-up of CSP in the region (beyond the ~ 1 GW that is proposed in the Investment plan itself).

55. The water issues for a CSP plant are broadly similar to those in steam cycle based conventional power plants (except for mirror cleaning). However, this does need careful consideration for each project because of the likely siting of CSP plants in arid locations (with some notable exceptions, e.g. on the Nile like Kom Ombo, on a reservoir like Ouarzazate) and their less efficient operating characteristics compared to conventional thermal power plants (i.e. consumption of cooling water per MWh may be greater for CSP). It is worth noting that coal-fired power plants tend to have higher water consumption than gas- or oil-fired plants, so where the conventional alternative to CSP is coal (as in Morocco), water consumption will be relatively less of a concern for CSP investments than otherwise.

56. A key decision to be taken for each prospective CSP project will be that between wet, hybrid and dry cooling. Initial data suggest that the water savings to be achieved with hybrid and dry cooling are substantial (up to 97% when switching from wet to dry cooling, according to the German Institute for Thermodynamics), even though they carry performance and cost penalties (of 1-5% for hybrid cooling, and 5–9% for dry cooling). Performance and costs will likely be further impacted by the number of 'hot days' (air temperatures above 100 degrees F). Thus, the water availability and cost, best technology choice and 'hot days' issues all will require further study with data from the specific project areas (including LCE calculations), which will be carried out as project development progresses.

Transmission

57. Access to transmission infrastructure is ensured through upfront payments to reserve capacity regardless of actual flows. In this context, a CSP operator is disadvantaged compared to a conventional power plant operator, even if generating costs are exactly the same because CSP energy is not continuous.

58. The bulk of the power generated by CSP plants occurs during the day, when solar resources are available. With a storage system, power generation can be extended by a few hours, but not yet enough to cover the whole 24 hours. On the other hand, a fossil fuel fired power plant, such as a combined cycle, can generate power continuously with a high load factor and predictability.

59. If a CSP operator (operator A) and a conventional operator (operator B) are competing on reserving the same transmission capacity for the whole day, or even for a given period of the day, then for a given capacity price per MW, transmission costs per MWh will be higher for A, due to lower load factor (cost of transmission per MWh = capacity fee per MW / amount of MWh transmitted). It means that operator B can bid at higher price than operator A, and end up always winning the auctions. Operator A would therefore need specific transmission arrangements (priority reservation, payment per MWh instead of payment per MW, etc.), which would result in a revenue loss for the transmission operator.

60. The transmission company also faces another type of issue if there is no guaranteed export market for CSP: no CSP operator will book and pay for capacity that may not be needed. As a consequence, dedicated capacity will only be built and made available to CSP plants if such plants are able to secure contracts under the EU regulatory framework: the issue for the transmission developer is whether to take the upfront risk of building and reserving capacity for CSP. A vicious circle (or a "chicken-and-egg" issue) could thus develop, also delaying the development of new generation, as both generation and transmission developers fear a stranded asset, should the other fail to materialize as planned.

61. The vicious circle could turn into a virtuous one through some form of concessional financing for the transmission developer, to make up for the period of regulatory uncertainty. The level of concessional funding for the transmission company (assuming it builds, owns and operates the line) would be equal to the net present value of the difference between (i) the firm capacity payment it would receive from a standard transmission user, and (ii) the payment for quantity transmitted from the CSP operator (for which the flow is uncertain, due to intermittency of solar generation, and to uncertainty in export regulation/demand). *Box 3* below provides details on the two transmission projects proposed, including how much concessional finance would be needed in the case of the Tunisia-Italy ELMED interconnector to help solve the "chicken-and-egg" problem.

Box 3 – Transmission Projects in the Investment Plan: Breaking the Vicious Circle

In the case of the Tunisia ELMED project:

- The overall cost of the transmission line is around US$ 1 billion,

- The typical assumption used to calculate return on investment for transmission lines is an average of 50% for the load factor,

- The load factor for CSP generated electricity is likely to be around 30%, taking into account both uncertainties on generation and export market,

- If the CSP generator only pays for transmission services it uses (i.e. a variable transmission payment per MWh), there would be a loss of revenue of 40% compared with a conventional power generator having booked capacity for the same annual flow on the transmission line,

- With 200 MW of the 1,000 MW transmission capacity allocated to intermittent CSP, the amount at risk for the transmission operator for which compensation is necessary is 40% x US$ 1,000 million x 200/1,000 = US$ 80 million: this is the amount of concessionary funding which would be necessary for the project to be viable.

In the case of the 400 kV Egypt-Jordan-Syria transmission strengthening project:

- The reinforcement of the transmission network in Jordan is critical for future development of solar and wind power in the country and the Eastern Mediterranean. In particular, the South-North transmission corridor segment has been identified critical for integrating renewable energy resources to the Jordan national grid, including planned solar and wind power plants, and in the medium/long term facilitating renewable electricity export from Egypt and Jordan to the North,

- This transmission corridor has also been identified in various studies in the MEDRING context as posing a severe constraint for increasing the electricity trade within the region. As such, this reinforcement project will enhance power transfer and trading among the Mashreq interconnected countries and in future Turkey and EU markets,

- Transmission analysis performed by the Jordan National Transmission Power Company (NEPCO) has shown that reinforcement of the corridor segment candidate for CTF Financing, i.e. the Qatraneh - Amman 400 kV segment will be necessary to connect to the national grid planned Ma'an 100 MW CSP project and Fujiej 70-90 MW wind project. In the medium and long term, it will also support development of larger scale solar and wind power in the southern part of Jordan, and increase regional transfer capability necessary for development of integrated regional electricity markets as envisaged by the MEDRING.

V. Implementation of the CTF CSP Investment Plan Update on Projects

Projects' Current Status by Country

As part of the preparation of the original investment plan, the participating countries proposed a pipeline of generation projects for around 900 MW. Based on this pipeline, the indicative CTF contribution was worked out as US$0.725 million/MW of generation capacity (plus allocation for the two transmission projects). This resulted in a pipeline of projects amounting to: Algeria – US$ 160 million, Morocco- US$ 197 million, Tunisia- US$ 186 million, Egypt – US$ 95 million and Jordan – US$ 112 million.

However, it was indicated that these allocations were likely to change depending on the progress of project preparation and justification for support to be made at the time of submission of individual projects for CTF review. Countries could therefore draw more or less funds than originally indicated depending on progress of project development. As expected, projects have been significantly modified since the endorsement of the MENA CSP Investment Plan by the CTF Trust Fund Committee on December 2, 2009.

The current indicative pipeline stands at about 1200 MW. In particular, Morocco has substantially increased the capacity of its solar program with the launching of the 500 MW Ouarzazate flagship project (the largest solar plant in the world). It is anticipated that some projects in other countries will follow suit, particularly if Ouarzazate continues to make good progress, and the pipeline would rise even further[11].

It is expected that substantial co-financing resources will be leveraged through AfDB and the World Bank group. In addition, co-financing from AFD, JIBC, JICA, KfW, EIB, EU-NIF, Government of Spain and IsDB is also expected for different projects. Given the large size of the projects in question, it is expected that AfDB and WBG will have shared access to CTF resources to sustain their respective leverage targets, with AfDB being expected to intermediate one third of the total MENA CSP CTF allocation to the different projects.

The *Table* below provides an update based on the changes that have taken place since the original investment plan, as confirmed by the authorities of all beneficiary countries, except Algeria.

[11] This increase in the pipeline implies that, once projects have been finalized, CTF support may be lower on average than the original US$ 0.725 per MW.

Table 4: Updated MENA CSP IP Project List

Country	CTF Investment Plan[12]			CTF Investment Plan Update		
	Project (Name)	Capacity (MW)	CTF financing (US$ million)	Project (Name)	Capacity (MW)	Status
Algeria[13]	Megahir	80	58	Megahir	80	Feasibility (Megahir)/pre-feasibility (Naama) studies launched for PPP projects, but unclear whether Algeria will seek CTF financing.
	Naama	70	51	Naama	70	
	Hassi R'mel II	70	51	Hassi R'mel II	70	
Egypt	Kom Ombo	70	51	Kom Ombo	100+	Government requested AfDB/CTF/IBRD support in May 2010. Pre-feasibility study is completed. Feasibility study to start in early 2011 and will explore storage as well as size options larger than 100MW, based on financing indications. There is strong interest from other donors including KfW, EIB, EU-NIF, AFD and IsDB.
	Marsa Alam	30	44			
Jordan	Ma'an Province	100	72	Ma'an	100	Pre-feasibility study has been completed. Government organized investor/donor conference in June 2010 for this IPP project that demonstrated support of donors, in particular EIB, AFD and JBIC. RFP process expected by early 2011.
	Mashreq CSP Transmission	-	40	Mashreq CSP transmission	-	Terms of reference for feasibility studies, technical specifications and ESIA have been prepared and funding from EU- NIF has been secured for financing. In addition to IBRD, EIB and AfD have also expressed interest in financing support.
Morocco	Tan Tan	50	35	Ouarzazate	500	Prequalification for the first phase of the Ouarzazate PPP has been closed on October 4 2010 with 19 candidates. RFP to be launched before end 2010 to prequalified bidders with selection of partner(s) targeted for Q2 2011.
	Ain Beni Mathar	125	90			
	Ouarzazate	100	72			

[12] As approved by CTF Trust Fund Committee on December 2, 2009.
[13] Algeria's intentions vis-à-vis CTF financing are currently unclear, and the earmarked funds may be reallocated.

						There is strong interest from donors including KfW, JICA/JBIC, EIB, EU-NIF, IsDB, AFD and Government of Spain
				STEG-CSP	50	Feasibility study is currently underway. EPC contract to be awarded in 2012. Donors including KfW have expressed interest in financing along IBRD and AfDB.
Tunisia	ELMED-CSP	100+	73	ELMED-CSP	100+	Prequalification process launched in April 2010, with 11 submissions received by the deadline of July 26. Prequalification completed by end of October and RFP to be launched in December 2010. Several donors including EIB, AFD, KfW and, IsDB have expressed interest.
	IPP-CSP Project	100	73	STEG renouvelables /SITEP	50	Feasibility study is currently underway. RFP will be launched early 2011 for this proposed private sector project.
	Tunisia-Italy transmission	-	40	Tunisia-Italy transmission	-	Studies are underway by a joint venture of STEG and TERNA.
Total		**~ 900**	**750**		**~ 1,170**	

Algeria

62. It is still unclear at this point whether Algeria will seek CTF financing or not.

63. Three CSP plants being developed have been included in the CTF investment plan. SPP2, 3 and 4 will be hydrid plants, with total capacity of 400-450 MW, of which 70-80 MW each will be based on CSP technology. The feasibility study for the Meghaïr plant (SPP2) has been launched. It is financed by the Spanish government and is being carried out by the Spanish consultant Socoin. It is likely to be completed at the beginning of 2011, and will determine, among other things, whether the desalination option (brackish water) is chosen or not. SPP2 is expected to be commissioned in 2014.

64. Discussions are under way with donors including German agencies regarding the financing prefeasibility study for Naama (SPP3), and possibly Hassi R'mel 2 (SPP4). The prefeasibility study for SPP3 is expected to be launched very soon. SPP3 should be commissioned in 2016 and SPP4 in 2018.

Egypt

65. In May 2010, the Government requested AfDB/CTF/IBRD support for the implementation of the 100 MW Kom Ombo CSP project. The pre-feasibility work for this project is underway (as part of the Empower program executed by UNEP and the BMZ) and was completed in July 2010. This project is proposed to be implemented as a public sector project and will be fully owned and operated by the New and Renewable Energy Authority (NREA). NREA will enter into a contract with the Egyptian Electricity Transmission Company (EETC) to sell the power from this plant. The preparation of the feasibility study is expected to start in early 2011 financed by the KfW. World Bank group and AfDB are working closely with other donors in the preparation of this project (EIB, KfW, AfD have expressed strong interest).

Jordan

66. Since the endorsement of the MENA CSP Investment Plan, the government of Jordan has been mobilizing private sector and donor interest in developing CSP projects. The government expects installed solar power capacity of 600 MW by 2020, much of it likely to come from CSP. Tangible steps in this regard are being undertaken by the government and private sector alike with the government currently developing a transaction and financing strategy for achievement of the target.

67. Pre-feasibility work (as part of the Empower program executed by UNEP and the BMZ) has been completed for a site in Ma'an for a 100 MW CSP project and different storage configurations have been examined. The Government also organized an investor/donor conference in June 2010 to mobilize private sector and donor interest in CSP development in Jordan. As in the case of thermal power generation, CSP development in Jordan will be private sector-based with the National Power Company (NEPCO) as the off-taker under a long-term power purchase agreement. The request for proposal (RFP) process is expected to begin by early 2011. In addition, private sector projects are under active development by CSP developers.

68. For the Mashreq transmission corridor project included in the Investment Plan, NEPCO, in cooperation with EIB, AFD and the World Bank, has made progress in initiating activities for the project development. Terms of reference for the project feasibility studies and technical specifications, and Environmental and Social Impact Assessment have been prepared. The EU Neighborhood Investment Facility has also recently approved a EUR 2.2 million grant to finance these studies.

Morocco

69. Since the endorsement of the MENA CSP Investment Plan, Morocco has announced a Solar Plan for the commissioning of 2,000 MW of solar power generation capacity by 2020. This is an integrated plan in the sense that it calls for local manufacturing, as well as related training, education and research activities, therefore creating a green stimulus package for the economy and contributing to job creation. The Moroccan Agency for Solar Energy (MASEN) has been created to implement the Solar Plan.

70. Work has started on the first plant under the Solar Plan, the 500 MW Ouazarzate plant, the largest one in the world, with hiring of financial (IFC), tax (Deloitte) legal (Linklaters) and technical (WorleyParsons) advisors. MASEN launched the project at a donor/investor conference on April 12, 2010 and monthly meetings are held with potential financiers.

71. The Moroccan Government has requested use of the CTF financing for the Ouarzazate plant. Other concessional financing is likely to come from the European Neighborhood Investment Facility (NIF) as well as from other donors. Requests have been made for loans from several donors, including the World Bank, EIB, KfW, AFD, and the AfDB. An expression of interest was launched in March 2010 and attracted 180 responses. A prequalification was launched in the summer and closed on October 4 with 19 submissions. A short list will be established in November and the RFP will be launched before the end of 2010. Construction is expected to start early 2012 for a commissioning in 2015. A pre-feasibility study for a smaller plant had been done under the Empower program (UNEP/BMZ). The environmental impact study is under way, as are insolation measures and various other related studies (seismic, water, etc.).

Tunisia

72. Since the endorsement of the MENA CSP Investment Plan, the Tunisian Solar Plan was announced. The first plant under the CTF Investment Plan would be a 50 MW plant to be developed by the Tunisian state owned utility STEG. A pre-feasibility study was conducted in 2009. A feasibility study (KfW financing) is currently underway. The study will recommend the site out of five under investigation and the technology (hybrid or pure CSP). Work on construction is expected to start in early 2012 for a commissioning in 2014. This plant will be dedicated to the national market.

73. The second one is part of the ELMED generation complex. The Expression of Interest process carried out in 2008 for this complex (conventional and renewable altogether) attracted 16 submissions. A prequalification process was launched in April 2010, with 11 submissions received by the deadline of July 26, and the selection is expected to be completed by the November 2010. Construction is expected to start in early 2012 for a commissioning in 2015-16, at the same time as the ELMED interconnector.

74. The third one would be a 50 MW plant at El Borma under a joint venture between STEG Energies Renouvelables, SITEP and other partners to be selected. Feasibility studies are under way. Construction is expected to start in 2012 for a commissioning by 2015.

75. Tunisia has also requested CTF funding for the ELMED interconnector, for which studies are under way by a joint venture of STEG and TERNA. Commissioning is expected by 2015-16.

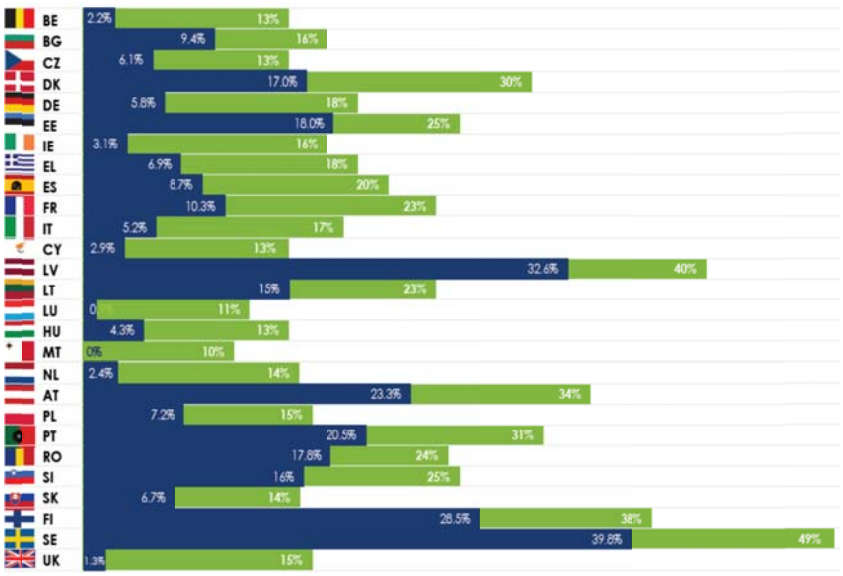
Annex 1: The EU RES Directive

1. The EU's Renewable Energy Sources (RES)[14] Directive 2009/28 and the "20-20-20" Energy and Climate Package signal a key step to put emissions on the path toward 30% reduction by 2030, and then 80-95% by 2050. The new strategy identifies the 20% renewable target of the Directive as key to shift to a low-carbon energy system.

2. The Directive stems from more than a decade of policy initiatives and legislation at the EU level to address concerns about security of supply and environmental protection. The RES Directive 2009/28 sets a common framework across the 27 EU member states for the production and promotion of energy from renewable sources. The EU member states are required to integrate[15] the Directive in their respective national laws by December 2010.

3. The Directive sets an ambitious EU global target of 20% of energy share from renewable energy sources in gross final consumption of energy[16] by the EU-27. This target is not explicitly broken down into sub-targets for electricity production, heating, cooling, and transport and member states can decide on the allocation by sector. To reach the 20% target, the Directive allocates differentiated sub-targets to each of the 27 EU countries (see Figure 1) to share the effort taking into consideration the 2005 RES share and two additional factors: first, a flat rate, which is the same for all EU countries, and second, a weighted factor to take into account the country's economic situation. Starting from a share of 9% renewable energies in the overall EU final energy consumption in 2005, an increase of 11% is needed until 2020. Half of this increase, 5.5%, has been added as a flat rate to the 2005 RES share of each member state. The other half has been assigned to each country weighted by GDP per capita.

Figure 1: EU Member States' Targets by 2020

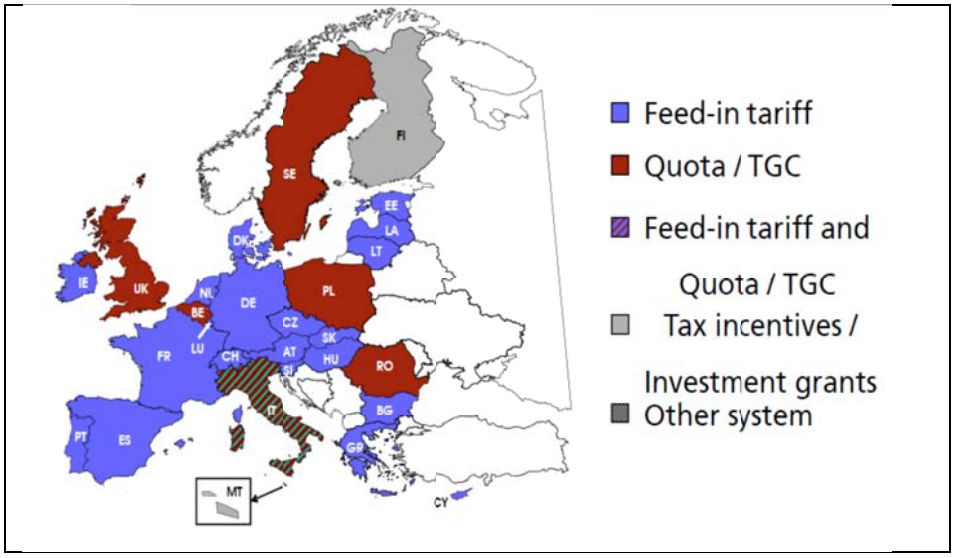


In blue, RES share in 2005; in green, RES share in 2020
Source: EU Commission

[14] Energy from renewable sources is defined as energy from: wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases (Article 2.a).
[15] EU directives lay down certain end results that must be achieved in every Member State. National authorities have to adapt their laws to meet these goals, but are free to decide how to do so.
[16] The gross final consumption of energy is the sum of: gross final consumption of electricity, gross final consumption of energy for heating and cooling, and final energy consumed in transport.

4. The RES Directive allows the EU-27 member states to use two sets of measures to reach their targets: national support schemes and cooperation mechanisms between different member states and with third countries (Art. 9). Member states are free to decide the scheme to promote renewable energies in their own territory (see Figure 2).

Figure 2: Supporting Schemes for Renewable Electricity in EU-27



Source: Fraunhofer ISI

5. The Directive gives the possibility to EU member states to use three cooperation mechanisms to reach their respective targets more cost-effectively:

- Statistical transfers between member states (Art. 6) allow those that did not reach their targets to acquire renewable energy statistically from member states that exceeded their targets. Only countries that exceed their interim RES target will be allowed to sell their excess RES share. The Directive does not establish a market of renewable energy, but proposes a mechanism of bilateral contracts between member states. The price and quantity of statistical transfers will be decided in the framework of an international agreement between two member states;

- Joint projects between member states (Art. 7, 8) allow them - including private operators - to cooperate on all types of projects relating to the production of electricity, heating or cooling from renewable energy sources. The terms of the joint agreement and the design of the joint project mechanisms are left completely to the member states;

- Joint projects between member states and third countries (Art. 9), allows member states to import renewable electricity, for example from MENA. Article 9 of the Directive defines the conditions that have to be fulfilled in order for RES electricity produced in non-EU countries to count toward the national target of the EU importer country. The conditions are: the electricity has to be physically imported from third

countries and consumed[17] in the European Union; the electricity imported has to be produced by a new plant in operation after June 25, 2009; and the same cannot benefit from a support scheme of a third country other than investment aid.

6. The Directive explicitly recognizes the possibility of counting the flows of RES towards the EU national targets in the context of the construction of an interconnection, e.g. Tunisia-Italy. The construction of the interconnection must, however, start before December 31, 2016, and the interconnection must be operative before December 31, 2022.

[17] In this context the renewable electricity generated in third countries is recognized to be consumed in the European Union if:

- an equivalent amount of electricity to the electricity accounted for has been nominated to the allocated interconnection capacity by all responsible Transmission System Operators in the country of origin, the country of destination and, if relevant, each third country of transit;
- an equivalent amount of electricity to the electricity accounted for has been firmly registered in the schedule of balance by the responsible Transmission System Operator on the Community side of an interconnector; and
- the nominated capacity and the production of electricity from renewable energy sources by the installation concerned by the transfer refer to the same period of time.

Annex 2: International Interconnections in the Mediterranean Region

1. Currently, the only interconnections that exist between south and north of the Mediterranean are the Morocco-Spain interconnection (which is not sufficient to fully support CSP scale-up), and the Mashreq interconnection where physical links exist and a limited exchange is possible on a non-synchronous basis with Turkey. Key issues are as follows: (see *Figures 1 and 2*):

   - By 2015 or so, Morocco would be the only country in the region to substantially benefit from the Western part of the Medring interconnection as the network across the Maghreb regions is currently not sufficiently robust to support transit of several hundred megawatts of solar energy. Nevertheless, recently the Algeria-Morocco has been reinforced (2009-2010) with a double 400 kV circuit with a thermal capacity of 1,200 MVA each, and the synchronization test between Tunisia and Libya was positive in April 2010;
   - The Morocco-Spain interconnection gives access to the Iberia peninsula and not the whole EU as the France-Spain interconnection is congested. In 2013, a new transmission line between Spain and France will help ease congestion on this line, and open up the EU continental market to the Southwest of Europe and the Maghreb region- however, Morocco could also directly establish a link with France;

   - Countries like Egypt and Jordan are unlikely to use the Morocco-Spain interconnection, as there are many bottlenecks to overcome before reaching that interconnection (Libya-Tunisia, Egypt-Libya and the Maghreb network). In addition, network losses that would occur through this path would make it uneconomical.

2. Gradually, lines will be built to interconnect the Northern Mediterranean and the Southern countries, as foreseen by EU programs and the Desertec initiative (see Box 3). The ELMED line between Tunisia and Italy is expected in 2016 and would be the first HVDC line between the two shores of the Mediterranean. New HVDC lines are also planned between Algeria and Spain and Italy.

3. In parallel, the networks connecting countries of North Africa are being strengthened:
   - Expected operation of a 400 kV Algeria-Tunisia line: 2011,
   - Expected operation of a 400 kV Tunisia-Libya line: 2012,
   - Expected operation of a 500 kV Libya- Egypt line: 2015.

4. This would reinforce the Maghreb transmission network, but also open the way for integration of Mashreq with Maghreb through Egypt (see *Figures 1 and 2*). The reinforcement of the Mashreq transmission network will open a corridor for solar energy, not only from Jordan and Egypt, but also from GCC countries that will be interconnected to Mashreq through the Egypt-KSA HVDC line.

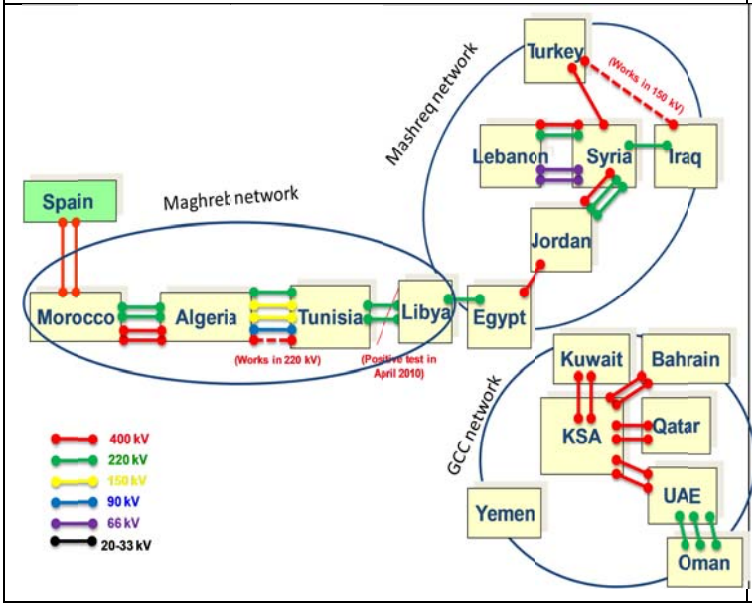
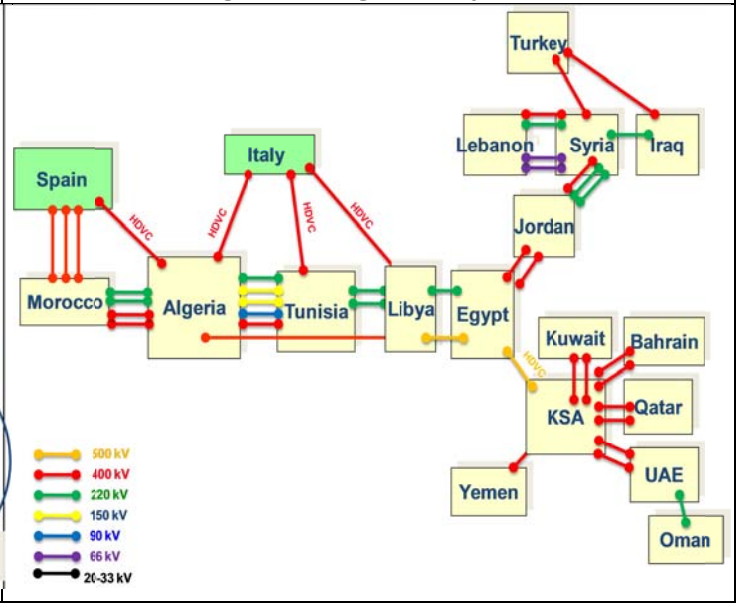
BOX 1- DESERTEC Industrial Initiative

The Desertec concept is based on the idea to provide Middle Eastern, North African and European countries with a sustainable supply of renewable energy by 2050. Since 2003, the Club of Rome, a global think tank dealing with a variety of international political issues, has spearheaded the Desertec concept through the creation of the Trans-mediterranean Renewable Energy Cooperation (TREC) initiative and the Desertec Foundation. The Desertec concept inspired decisively the design of the Mediterranean Solar Plan, one of the six key initiatives of the Union for the Mediterranean, founded in July 2008.

To implement the Desertec concept, 12 companies and the Desertec Foundation created the consortium Desertec Industrial Initiative (DII) on October 30 2009. Started with German, Spanish and Algerian shareholders, the consortium has been striving to enlarge its nationality base. As a result of these efforts, Italian power provider Enel, French building materials maker Saint Gobain, Spanish power grid operator Red Electrica, Moroccan group Nareva, and US solar cells producer First Solar have recently joined the consortium. The DII will be staffed with twelve full-time specialists under the direction of CEO, Mr. Paul Van Son, and is expected to be fully operational during the second semester of 2010.

From 2010-2012, DII's main goals will be to finance feasibility studies and to advocate for an appropriate regulatory framework for the promotion of the Desertec concept vis-à-vis the EU institutions. During this period, DII member companies will contribute up to € 3 million per year to finance the consortium's operations.

The World Bank Group has had regular meetings with DII members to discuss the projects in the pipeline of the CTF MENA CSP Investment Plan. DII and the World Bank Group share the vision that the development of CSP in the Middle East and North Africa region will have positive benefits worldwide because of the cost reduction achieved with CSP technology through economies of scale.

Figure 1: Existing Interconnections	Figure 2: Reinforcement of Interconnections and Regional Integration by 2020
	

Annex 3: Impact of Concessional Financing on Project Viability

1. An analysis on the impact of concessional financing on project bankability was carried out for the CSP scale-up. The analysis is done for a 1 GW CSP scale-up in the MENA region. Electricity to be produced by CSP plants located in MENA is to be used by MENA consumers but could also be exported beyond MENA borders to EU consumers. In the EU, CSP electricity from MENA will compete only against renewable energy. Benefits from CSP electricity exports to EU are valued at the levelized cost of CSP electricity supply produced in MENA (including generation, transmission and distribution). Costs include capital expenditures (CAPEX), inclusive of generation, transmission and distribution, and operation and maintenance expenditures (OPEX). External costs of CSP electricity are not quantified (ex: water consumption, heating transfer fluid environmental impact).

2. The cash-in flows are the following:
   - Debt proceeds
   - Local sales (at a local tariff)
   - Carbon credits
   - Export revenues

3. The cash-out flows are:
   - Capital expenditure (CAPEX)
   - Operating expenditure (OPEX)
   - Debt repayments
   - Interest expenses

4. The main assumptions regarding capital cost, etc., are provided in *Table 3a* below[18]. Fuel costs are not considered, instead a local tariff for CSP energy is equal to 15 c$/kWh. For the financing, commercial banks charge 7% interest rate, whereas concessional financing such as CTF provides loans at 0.3% interest rate and 10 year grace.

Table 3a - Main assumptions

Capital Cost	6,000 $/kW
Load Factor	25%
CO2 price	30 $/ton
Discount factor	10%
Variable Opex	3.8 c$/kWh
Export tariff	25 c$/kWh
Project life	25 years

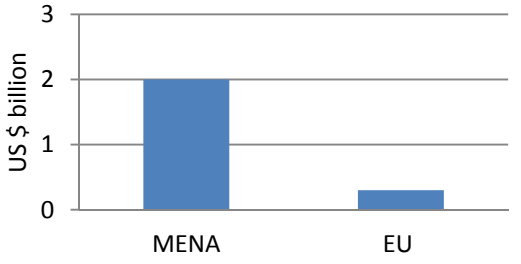
[18] CO_2 intensity equals 400 ton/GWh.

Table 3b - Net Present Value of Cash Flows for Different Scenarios

MUS$	No exports, no concessional funding	50% exports, no concessional funding	No exports, 40% concessional financing	50% exports, 40% concessional funding	50% exports, 70% concessional funding
-CAPEX	-5,157	-5,157	-5157	-5,157	-5,157
-OPEX	-624	-624	-624	-624	-624
+Local Sales	2,464	1,232	2,464	1,232	1,232
+Export revenues	0	2,054	0	2,054	2,054
+Carbon credits	197	99	197	99	99
+Loan	3,868	3,868	3,868	3,868	3,868
-Debt repayment	-1,441	-1,441	-963	-963	-623
-Interest expenses	-1,784	-1,784	-860	-860	-205
Equity Cash flow	-2,477	-1,754	-1,074	-352	+643
Equity IRR	< 0	< 0	< 0	+6%	+18%

5. The main conclusions are (see *Table 3b*):
   - The project is not bankable without concessional financing: the NPV of equity cash flow is US$ -2.5 billion,
   - 40% concessional financing would reduce interest expenses by US$ 0.9 billion, and would reduce debt principal repayment by US$ 0.5 billion,
   - 50% exports would provide US$ 2 billion but reduce local revenues by US$ 1.2 billion, thus the impact of exports is positive and accounts for US$ 0.8 billion,
   - 50% exports and 40% concessional financing combined is the threshold above which projects become bankable (return on equity of 6%: public projects would go through). Not only concessional financing has reduced the project cost, but it has also a multiplier effect since exports to Europe become possible only with the contribution of concessional financing. The added value for MENA stimulated by concessional funding is then equal to US$ 2.2 billion (see *Figure 3c*),
   - EU benefits by acquiring expensive CSP energy at 25 c$/kWh instead of 30 c$/kWh. The benefits for EU would be US$ 400 million in NPV terms (see *Figure 3c*),

Figure 3c - Splitting of Concessional Funding Added-Value Among EU and MENA



MENA benefits from the expansion in power generation capacity. MENA would also incur benefits that were not quantified in this study (job creation, technology transfer, local environment improvement…)