

GGBP Case Study Series

The Moroccan Agency for Solar Energy and the Moroccan Solar Plan

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Country: [Morocco](#)

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This case study outlines the key role of the Moroccan Agency for Solar Energy in enabling the country to attract private investment for its first large concentrated solar power installation as part of a wider energy and industrial development strategy.

Context

In recent years Morocco has imported 95 percent of its energy as fossil fuels, providing subsidies on these fuels at a cost in the range of USD1-4 billion per year. With a growing population, rising living standards and increasing power demand from cities and energy-intensive industry, key priorities are to increase and diversify the energy supply, and manage public costs (Nabil, 2013).

Morocco's natural resources are suitable for wind, hydro, and solar energy, and renewables are recognized as offering the opportunity to

reduce dependence on imports while generating employment and cutting greenhouse gas emissions, with the potential for future green electricity exports to Europe (Dominguez, 2013). Concentrated solar power (CSP) is seen as a particularly important opportunity because of its ability for storage and the chance to build up a local supply industry in an emerging industry (African Development Bank, 2013).

The government set a goal of reaching 42 percent of installed capacity (or 6,000 MW) from renewable energy (hydro, wind and solar) by 2020, while doubling overall capacity (Norton Rose Fulbright, 2012). Through the

Morocco Solar Plan (MSP) it aims to install 2,000 MW of solar capacity by 2020, contributing around 14 percent of the energy mix in the country's electricity supply. The plan calls for the construction of five solar complexes, requiring an estimated investment of USD 9 billion (African Development Bank, 2012).

CSP is currently more expensive than fossil fuel based energy generation (even if fossil fuel subsidies are removed), thus requiring a blend of public subsidy and risk mitigation instruments to attract private investors.

The government's previous involvement in the development of CSP had been limited to a 20 MW plant (Ain Beni Mathar) developed by the national utility office (ONE, or l'office national de l'électricité), while existing privately financed CSP installations were small-scale and built for private use. The MSP (including Ouarzazate 1, 2,

and 3) are much larger developments which would place a large financial burden on the existing energy and fiscal system (see Table I) (CSP World, n.d.).

A number of donors were already active or had indicated their interest in supporting a catalytic large-scale renewables program in Morocco, for example through policy-based lending for reforms, concessional finance to buy down incremental costs, carbon finance, advisory services and infrastructure finance (Clean Technology Fund, 2011); however, this created a challenge of coordination, and additional complexity for private investors.

A new financing architecture was therefore needed which would blend domestic public funding with funding from international financial instruments (IFIs) while effectively aligning risks between the public and private sector partners.

Table I. Concentrated solar power installations in Morocco

Name	Project Owner	Status	Capacity	Technology	Domestic Public Finance	International Public Finance	Private Finance
Ain Beni Mathar ISCC	ONE	Operational since May, 2010	20 MW	Parabolic Trough	yes	yes	No(?)
Airlight Energy Ait Baha CSP Plant	Cimar, Italcementi Group	Construction	3 MW	Parabolic Trough	No	No	Yes
CNIM eCare Solar Thermal Project	CNIM	Development	1 MW	Fresnel	No	No	Yes
Ouarzazate 1	ACWA, Aries, SENER, Acconia, MASEN, TSK	Construction	160 MW	Parabolic Trough	Yes	Yes	Yes
Ouarzazate 2	MASEN, (Unknown)	Development	100 MW	Central Receiver	Yes	Yes	Yes
Ouarzazate 3	MASEN, (Unknown)	Development	200 MW	Parabolic Trough	Yes	Yes	Yes

Source: Adapted from (CSI, n.d.) and (World Bank, n.d.).

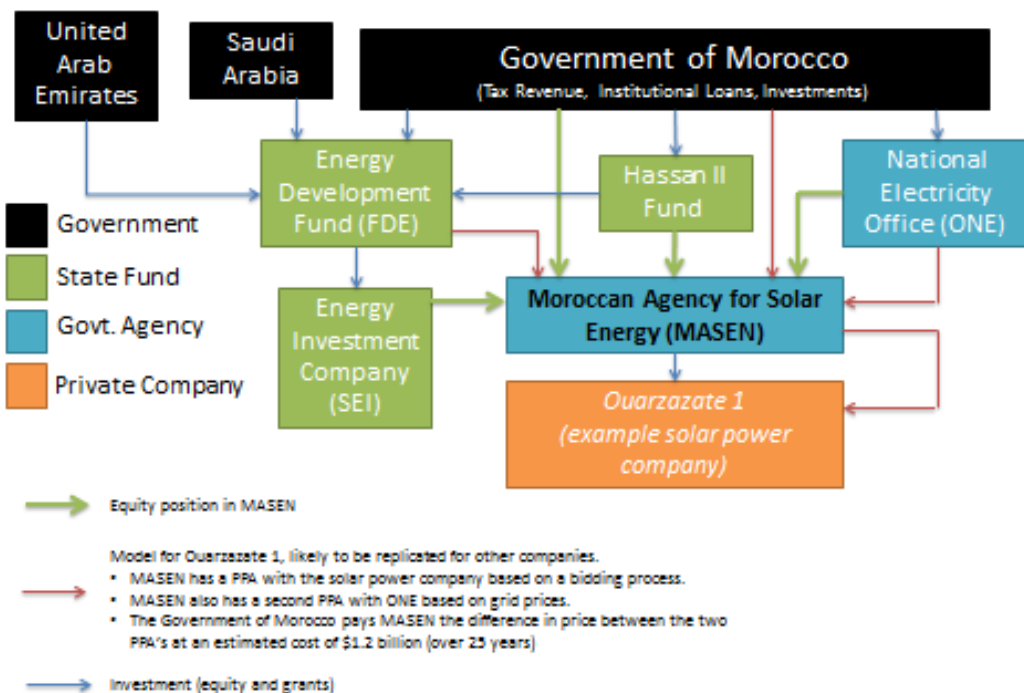
Approach

The government established the Moroccan Agency for Solar Energy (MASEN) in 2010 as the vehicle for mobilizing and blending resources and allocating risks to key players. It is a limited company which is 25 percent owned by the Government of Morocco, ONE, the Hassan II Fund for Economic and Social Development,¹ and the Société d'Investissements Energétiques (SIE)² (Moroccan Agency for Solar Energy, n.d.). The public investment is recorded as 'equity capital and

equipment subsidies' in the General State Budget, while MASEN itself is an extra-budget entity. (Ministere de l'Economie et des Finances, 2013).

MASEN is responsible for the feasibility assessment, design, development, and financing of solar projects in Morocco, along with contributing to expertise and research in the solar industry (Moroccan Agency for Solar Energy, n.d.). Its aims are both to develop energy and to support the development of a new industrial sector in Morocco through training, capacity building, and research and development (R&D) (Nabil, 2013).

Figure I. MASEN – Ownership and funding structure



¹ The Hassan II Fund is a financially autonomous public institution responsible for development and promotion of investment in Morocco and is managed by the Moroccan Investment and Development Agency. In addition to being a direct equity holder in MASEN, the Hassan II Fund has played a key role in the MSP by investing in specialized energy funds (Falconer & Frisari, 2012a).

² SIE is a Moroccan investment fund created in 2010 to facilitate the development and promotion of renewable energy projects, which takes minority shareholding interest

in project development companies (Norton Rose Fulbright, 2012). SIE was financed through the Fonds de Développement Energetique (FDE), another fund created to support the national energy strategy and strengthen Morocco's energy independence. FDE was established with domestic and international public funds, including a USD 1 billion grant by the Hassan II Fund, and financing from the United Arab Emirates and Saudi Arabia (Norton Rose Fulbright, 2012).

The first project to be developed using this model was Ouarzazate I. Bids were invited to develop a solar power company (SPC) to operate the plant on a 'build, own, operate and transfer' basis, supported by a 25-year fixed term power purchase agreement (PPA) between MASEN and the SPC. ONE is required to buy all energy from MASEN at grid price through a second PPA. The Moroccan government pays MASEN the difference between the two contracts. This arrangement guarantees a revenue stream for the SPC that is shielded from the volatility of energy prices. It is underpinned by a USD 200 million contingency loan facility from the World Bank to the Moroccan government, which mitigates against public funding shortfall risk.

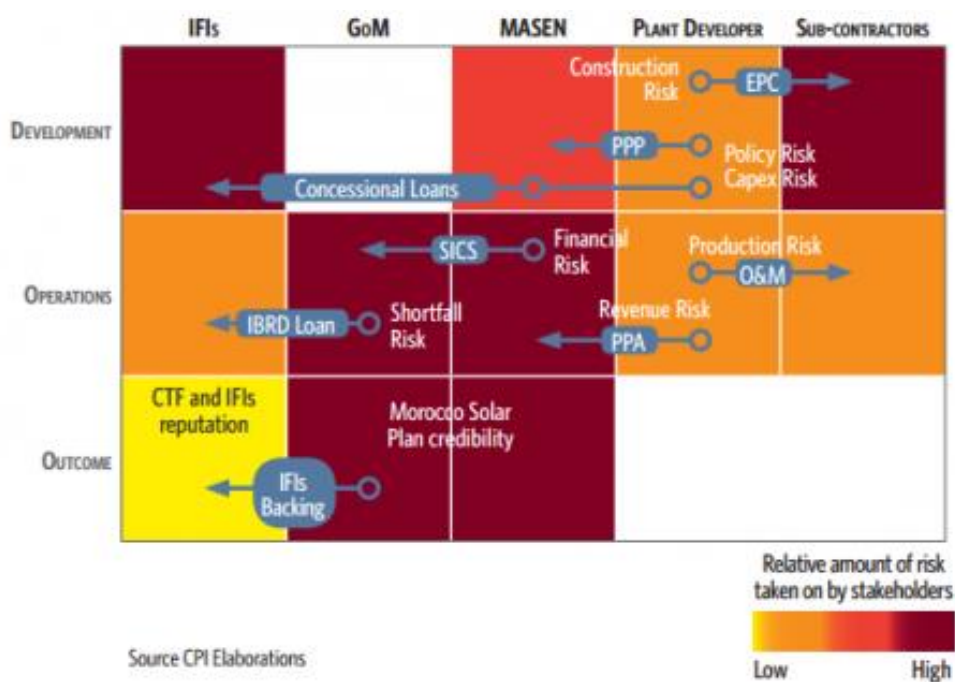
MASEN plays the role both of contract holder in the two PPAs and of an equity partner in the SPC along with the winning bidders. This is governed by a shareholder agreement which includes a put option allowing MASEN to sell back its share if the private partner defaults on

specified construction or performance obligations.

MASEN also acts as a consolidator of concessional loans provided by the Clean Technology Fund, the African Development Bank, the World Bank, and the European Investment Bank, which reduce the cost of capital for the SPC and lower the overall cost of energy generated. MASEN blends the terms of the IFI loans and offers a single financing package as part of the development and bidding process. (Falconer & Frisari, 2012a). Critically, this ensures adequate financing as part of the tender offer to the SPC, giving potential private investors clear information on the debt package of the project, and ensuring that the lower cost of capital is reflected in the bid price (Falconer & Frisari, 2012a).

These combined measures are designed to allocate risks across investors as shown in Figure 2 in order to make the deal viable, while incentivizing performance.

Figure 2. Dynamic risk matrix – Ouarzazate I



Source: Falconer & Frisari, 2012a.

Outcomes

The first project under the MSP (Ouarzazate 1) has gone from ‘idea’ to financial close between 2009 and 2013, which compares well with the average timeframe of six years for projects of this capacity (Falconer & Frisari, 2012a). Multiple companies bid for the project, and a Spanish-Saudi Arabian consortium won. At USD 0.184 the tariff offered by the winning bidder was 25 percent lower than initial cost projections, and even accounting for public capital subsidies the plant will be one of the least expensive contracted to date. This reduces the required revenue subsidy for the Moroccan government from the forecast USD 60 million to USD 20 million (Falconer & Frisari 2012b).

While the private sector members of the consortium provide critical mitigation of

performance and construction, 85 percent of investment finance was provided by public investors, including the Moroccan government and its partners in MASEN, and the IFIs.

The Moroccan governments’ investment amounts to 9 million per MW. This is a significant level of domestic public investment, and it remains to be seen whether the Moroccan government has the capacity to provide the same level of support for the balance of the CSP installations planned under the MSP. It will be important to understand whether this level of public support will be able to be scaled up across the balance of the 2,000 MW foreseen under the MSP, or whether over time less support will be needed as a result of falling costs of technology costs due to breakthroughs in R&D and/or more widespread deployment and uptake of CSP at a global scale.

Table 2. IFI contributions to Ouarzazate 1

Source*	Financing	Project	Notes
CTF	\$197m loan	Ouarzazate 1	\$100m administered through AfDB \$97m administered through IBRD
IBRD	\$200m loan	Ouarzazate 1	Loan facility covering risk of PPA default (assumption pg.4 CPI report)
EIB	\$307m loan	Ouarzazate 1	
AfDB	\$245m loan	Ouarzazate 1	
AFD	\$123m loan	Ouarzazate 1	
KfW/BMZ	\$123m loan	Ouarzazate 1	
EC/NIF	\$37m grant	Ouarzazate 1	supports the Moroccan government subsidy (footnote 19 CPI report)
KfW/BMU	\$19m grant	Ouarzazate 1	supports the Moroccan government subsidy (footnote 19 CPI report)

*Source: adapted from Falconer & Fisari, 2012a.

Lessons

A key lesson from Morocco's approach to green finance has been the critical role of MASEN as an institution designed to address specific investor risks, and in streamlining access to low-cost loans from a variety of sources.

It was crucial that that MASEN had the technical and project finance capacity to develop a clear understanding of solar potential, and to structure bankable projects in order to attract international finance. By entering into public-private partnerships, MASEN is able to protect existing energy and fiscal structures from construction and technology risk, while still involving the wide range of stakeholders, including ONE, government ministries, and industry representatives, needed to develop and implement a national industrial development strategy.

The sustainability of the model depends on whether the balance between falling incremental costs and rising domestic benefits enables domestic public support to be scaled up across the balance of the 2,000 MW foreseen under the MSP. International public support is likely to remain crucial for some time, and along with private investment will be dependent on whether Morocco continues to be seen as stable.

Further Information

Moroccan Agency for Solar Energy:
<http://www.masen.ma/en/masen/>

Climate Policy Initiative:
<http://climatepolicyinitiative.org/publication/san-giorgio-group-case-study-ouarzazate-i-csp/>

References

African Development Bank. 2012. Ourzazate Solar Power Station - Phase I. Project Report, African Development Bank.

African Development Bank. 2013. Morocco: Works on World's Largest Solar Plant Financed by AfDB. Retrieved 28 August 2013.
<http://www.afdb.org/en/news-and-events/article/morocco-works-on-worlds-largest-solar-plant-financed-by-afdb-go-underway-11775/>

Clean Technology Fund. 2011. Morocco: Ouarzazate I Concentrated Solar Power Project, Joint AfDB-WB Submission Document.

CSP World. (n.d.). CSP World. Retrieved 25 June 2013 from CSP World Map:
<http://www.csp-world.com/cspworldmap>

Dominguez, C. 2013. Inclusive and Green: Africa's economic 'makeover'. Retrieved 23 August 2013.
<http://www.ecoseed.org/business/other-markets/16515-inclusive-and-green-africa-s-economic-makeover>

Falconer, A., & Frisari, G. 2012a. San Giorgio Group Case Study: Ourzazate I CSP. Climate Policy Initiative. Climate Policy Initiative.

Falconer, A., & Frisari, G. 2012b. San Giorgio Group Case Study: Ourzazate I CSP - Update. Climate Policy Initiative. Climate Policy Initiative.

Ministere de l'Economie et des Finances. 2013. Ministere de l'economie et des finances. Retrieved 25 June 2013,
http://www2.finances.gov.ma/docs_internet/esp_doc/2013/depp/2370_1642_rapport_eep_2013_anglais_2_.pdf

Moroccan Agency for Solar Energy. n.d. MASEN. Retrieved 25 June 2013, from les energies renouvelables, un secteur d'avenir: <http://www.masen.org.ma/upload/communiqués/FichesVF.pdf>

Nabil, S. 2013 Interview with S. Nabil, Director of International Cooperation, MASEN.

Norton Rose Fulbright. 2012. Renewable Energy in Morocco Retrieved 25 June 2013. from Renewable Energy in Morocco www.nortonrosefulbright.com/knowledge/publications/66419/renewable-energy-in-morocco

World Bank. n.d. World Bank. Retrieved 25 June 2013. from Morocco - Concentrated Solar Power: <http://go.worldbank.org/IR6S864YY0>

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