Ouarzazate I Concentrated Solar Power, Morocco

Financing model and risk allocation framework of a public-private partnership for a large-scale CSP plant

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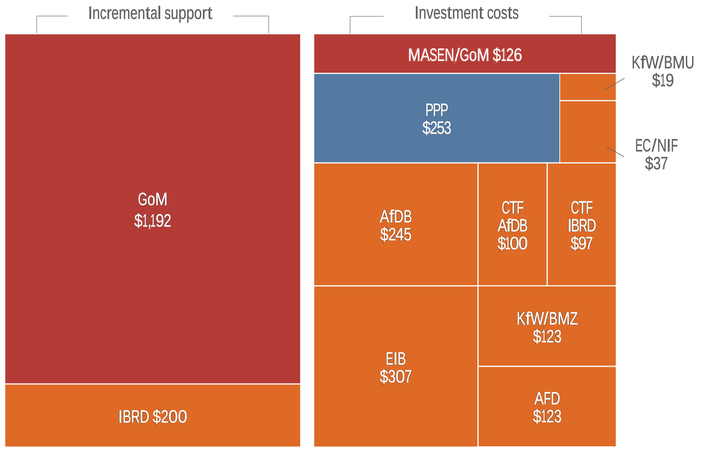
Introduction

Concentrated Solar Power (CSP) technology has enormous unexploited potential as a reliable source of renewable energy (IEA, 2010). This is especially true in the Middle East and North Africa (MENA) region, which has abundant solar resources and good proximity to E.U. energy demand. This places CSP technology at the heart of the Desertec's vision of an integrated E.U.-MENA power market dominated by renewable energy.

This case study analyzes how the Government of Morocco, a group of development banks, and private-sector developers came together to develop the first phase of a 500 MW Concentrated Solar Power facility: the 160MW, USD 1.3 billion, Ouarzazate I CSP plant (see Figure 1).

Figure 1: Attribution of project costs by source (millions of USD)



Ouarzazate I is one of the first large-scale CSP projects to be developed in the MENA region and has the potential to prove whether public private partnerships can efficiently gather the resources necessary to build CSP at a capacity able to deliver substantial economies of scale. If successful, the financial structure of Ouarzazate I could be a model for subsequent projects in the ambitious Climate Investment Funds' MENA CSP portfolio (CIF, 2009).

Questions

- Despite its long history of trials and its enormous potential, CSP remains in its early stages of development and is still not commercially viable. The competitiveness gap between CSP and less expensive carbon-intensive energy alternatives is particularly evident in markets — such as those in MENA — where fossil-fuel subsidies heavily distort energy prices.
- We ask then, how can policy and public resources mobilize private capital to finance installations at a scale able to trigger significant reductions in costs and close that competitiveness gap? If the financing model in Ouarzazate I CSP project is a possible answer, will it be scalable to meet the E.U.-MENA market's needs? Could it be replicated elsewhere?

Methods

Our research is split into three parts:

- An in-depth analysis of the complex web of relationships between all stakeholders necessary to make the project a reality;
- A detailed cash-flow analysis for each of the main stakeholders to quantify their contributions to the project and their expected outcomes;
- A risk assessment that identifies project risks and instruments deployed to mitigate these risks or to transfer them to the most suitable parties.

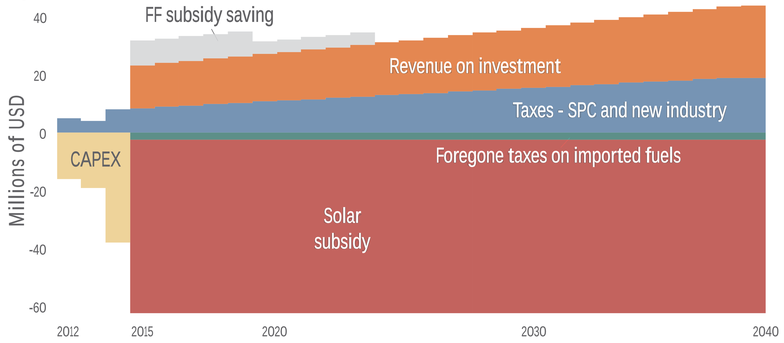
Main Results/Conclusions

Ouarzazate I is still in an early stage; however, our examination reveals that, so far, **Ouarzazate I has succeeded in attracting sufficient financing in its startup phase, through a public-private partnership model**.

The case study identifies five building blocks that were essential to get the Ouarzazate I project off the ground.

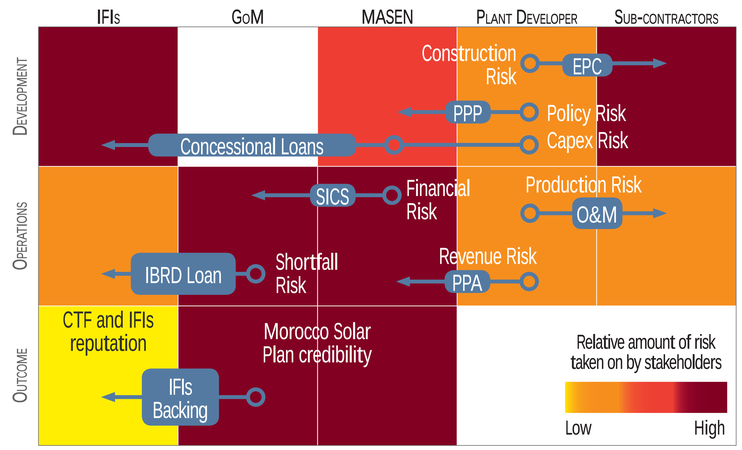
1. **Strong public support and the close alignment of key public partners:** The Government of Morocco tasked a dedicated agency, MASEN, to implement the ambitious Moroccan Solar Plan and has committed substantial resources to fund the additional costs of CSP (an estimated USD 60 million per year), betting on the possibility of longer term economic, environmental, and social benefits resulting from development of a CSP industry (see Figure 2).

Figure 2: Government of Morocco's cash flows



2. **Significant financial and technical contributions from IFIs:** Without high levels of international support, the project would not be viable. International donors and lenders provided around USD 1 billion of early concessional financing (in orange in Figure 1), driving down levelized costs by an estimated 25-30 percent. In addition, IFIs provided necessary institutional and specialized technical support.
3. **Strong donor engagement and coordination:** This allowed MASEN to clearly indicate the terms and costs at which capital would be offered, promoting competition among private investors, resulting in bids in line with or below projected levels. However, donor coordination and alignment of conditions, safeguards, and reporting rules was time-consuming and challenging.
4. **A carefully designed public-private partnership model:** Early signs show that the public-private partnership model has promoted an efficient risk allocation framework. As per Figure 3, the private developer bears construction and operational risk while the Government of Morocco bears electricity market risk (revenue risk). The role of concessional lenders in mitigating financing risks emerges clearly from the risk allocation framework. MASEN's role in the public-private partnership is innovative: It acts as both equity investor and power purchaser (off-taker) and thus has the ability to align public and private objectives.

Figure 3: Ouarzazate I CSP risk allocation framework



5. **A project design built on past lessons learned:** Ouarzazate I benefited from the experience gained from a CSP project supported by the Global Environment Facility. Learning from the design and implementation of other CSP projects helps reduce project costs and increase efficiencies. This in turn will support Morocco and the MENA region to develop a CSP portfolio.

Discussion

At today's technology costs, the Ouarzazate I model will only go so far in establishing a large-scale portfolio of CSP projects in Morocco and the MENA region. To reach the scale sought for CSP by the Moroccan and Mediterranean Plans — but also implied by the projections in the Desertec Strategic Framework, Desert Power 2050 (Dii, 2012) — CSP investments will require a significant amount of additional capital. Given the finite nature of public and international funds available for renewable energy investment, government and clean energy investors in the region should seek more commercially-oriented financing models. These commercially-oriented financing models will most likely require:

1. Reduced technology/project costs through economies of scale; and
2. Higher market revenues, such as E.U. export revenues.

By 2020, economies of scale are expected to reduce technology costs, but not to the level required to reach grid parity in Morocco and the MENA region. Were the Government of Morocco to succeed in phasing out fossil-fuel subsidies, this would further reduce — though not eliminate — the competitiveness gap between CSP and high-carbon alternatives.

It is feasible that renewable power exports to European markets could fill the remaining gap in the medium- to long-term. However, considerable political support will be crucial to secure E.U. Member States' demand and to broker specific agreements that make the exports a reality. Our analysis identifies several preconditions that must be met before this can be realized:

- *Bilateral and multilateral agreements:* The E.U. Renewables Directive (EU, 2009), Article 9, provides the legal basis for E.U. Member States to meet part of their renewable energy targets for 2020 by importing renewable power from neighboring countries. However, trade conditions have to be established in the form of bilateral or multilateral agreements.
- *Removal of subsidies:* The E.U. Renewables Directive outlaws domestic operational support (such as a FiT or the subsidized PPA in Ouarzazate I) for electricity that is exported, to avoid double subsidization.
- *Significant physical investments:* Interconnector capacity needs to be available to export renewable power to Europe.
- *Demand from E.U. Member States:* The final major precondition for exports to E.U. Member States is the willingness of the states themselves to purchase renewable power from the MENA region.

References

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