

POTENTIAL SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS OF FUTURE CSP ELECTRICITY EXPORTS FROM MOROCCO TO EUROPE

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1- Overview

In order to meet the 2020 European Renewable Energy Sources (RES) target in a cost-effective manner and foster RES deployment in neighbouring countries, Article 9 of the Renewable Energy Sources (RES) Directive 2009/28/EC, allows Member States the possibility to partially meet their RES targets by developing new RES projects in Third countries and physically import the electricity to the European territory. A priori, Morocco and Concentrated Solar Power Plants with Thermal Energy Storage (CSP-TES) appeared as suitable candidate country and technology to develop a first Article 9 project mainly due to its large solar potential, the existing and future grid interconnections, its favourable regulatory environment as well as technology particularities like the possibility to deliver dispatchable solar power on demand. However, to evaluate this option it is necessary to go beyond the techno-economic feasibility of RES exports as well as geopolitical considerations. Particularly relevant for social acceptance of utility scale renewable plants in North Africa, are the associated impacts in terms of job creation, economic stimulation as well as environmental impacts. To shed some light to this issue, and based on the future electricity export figures estimated within the EU funded BETTER project¹, the environmental and socio-economic impacts associated to the electricity produced by CSP-TES plants in Morocco and exported to Europe are assessed taking into consideration various possible future local content scenarios.

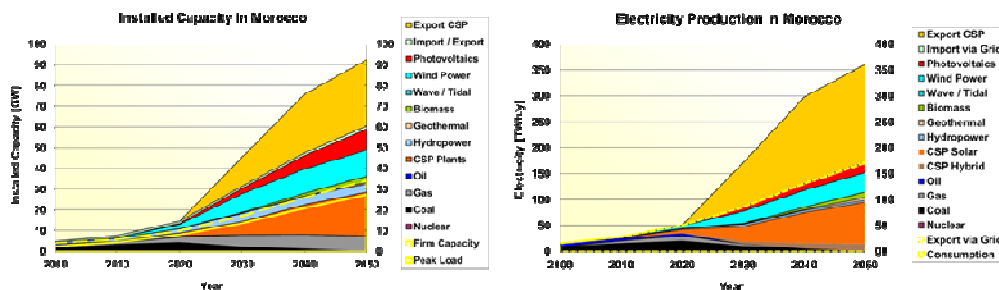


Figure 11: Future installed capacity and electricity production in Morocco under the two alternative scenarios

2- Methodology

Considering the Moroccan estimated future CSP electricity production and export figures from the BETTER project, this work has estimated the socio-economic and environmental impacts in Morocco associated to the electricity exports to Europe. In order to assess the socio-economic impacts, since Morocco does not have an updated Input-Output table, previous estimates from the CSP socio-economic impact literature and related employment factors have been reviewed, analyzed and adapted to the particularities of the Moroccan case while taking into consideration the techno-economic particularities of the studied plant and required HVDC interconnection infrastructure. As a result, total economic activity and job creation distinguishing between direct, indirect and induced effects across Moroccan sectors have been estimated. As for the environmental impacts, a Life Cycle Analysis (LCA) has been conducted in order to estimate the potential impacts on sixteen environmental impact categories. A sensitivity analysis on the local content share (table 1) has been carried out to assess the effects that different shares of local content in the different phases of the project will have on both socio-economic and environmental impacts.

¹ www.better-project.net

Sensitivity analysis on Local content	Implications for socio-economic impacts Domestic/Local content Share			Implications for environmental impacts
	Components manufacturing	Component installation	Components maintenance	
S1- Low	10%	20%	40%	Only pipes and cables produced locally
S2-High	80%	90%	100%	All components but the turbine and CSP generator produced locally
S3-Moderate	50%	60%	80%	Cables, electronics, controls, pipes, heat exch & solar field elements produced locally

Table 2: Assumptions considered under the three considered future local content scenarios.

3- Results

Considering a CSP electricity export potential from Morocco to Europe of 85 TWh/year in 2030 (BETTER D 3.2.4, 2015), the associated socio-economic impacts in Morocco in terms of economic activity as well as job creation could turn to be outstanding. As an example, under a high domestic/local content share scenario, the total economic activity and job creation in 2030 could reach up to 120.000 M € and 230,000 jobs respectively. Similarly, the average environmental effects in almost all assessed categories of the electricity mix per Kwh would be reduced due to the gradual substitution of coal, natural gas and oil plants by CSP-TES plants. However, both environmental and socio-economic impact results are highly sensitive to the local content share of the technology in Morocco.

4- Conclusions

Cooperation mechanisms can help neighboring countries like Morocco decarbonize their economies through a faster deployment of RES which will result in positive environmental effects. Additionally, such deployment could have important benefits in terms of economic stimulation and job creation. However, this work has shown that when considering the environmental and socio-economic impacts of RES, one must not take for granted that positive socio-economic and environmental impacts of RES deployment as the sign and, particularly, the magnitude depends on many factors. For example, it is important to take into consideration the whole life cycle of the project and the local content of the manufacturing, installation and maintenance of all components as both aspects have a remarkable impact on the magnitude of such effects. For this reason when conducting a feasibility study of any given project, it is important to go beyond the techno-economic feasibility and include an ex-ante socio-economic and environmental impact assessment. The results of such assessment may indicate the need to implement additional measures to foster the positive effects while minimizing the negative ones. For example, for the case of future CSP deployment in Morocco, examples of such measures could include the requirement for the CSP plant to have a dry-cooling system to minimize the consumption of water in already water stressed regions. Additionally, Morocco must continue to implement the right set of policies (education, industrial policies, etc) aimed at increasing the domestic capacities and thus the national content throughout the project life cycle (DIE, 2013). Finally, institutions like Germanwatch (2014), recommend to put in place some kind of sustainability safeguard measures to guarantee that local communities also benefit from the deployment of such large-scale projects.

5- References

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