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DESERT DEVELOPMENT CORRIDOR ENERGY SYSTEMS INTEGRATION

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INTRODUCTION

The systems integration issues involved in utilizing renewable energy sources such as wind, solar, hydroelectric and nuclear power in the contemplated Egypt's Desert Development Corridor proposed by Farouk El Baz[1], are considered. The conceivable estimate of energy outcome is provided for the currently pursued renewable energy projects. In addition to that the most promising regions based on solar and wind atlases are presented.

Qattara Depression Wind and Hydroelectric-Solar Electric Generation:

As a "shovel-ready" project, the proposal of utilizing the natural depression at Qattara in northern Egypt as a combined wind and hydroelectric-solar generation is discussed with pumped storage[2]. The configuration of the different components is presented in Fig. 1.

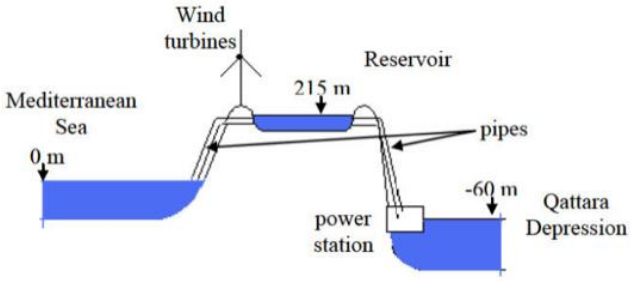

Figure 1. Proposed approach of using wind turbines and pipes at Qattara Depression[2].

Capital Cost Estimate

An economic assessment of the merits between the use of pipes and a pumped wind power energy storage system against the use of tunneling alone approaches for the Qattara Depression project is presented in Table 1.

Table 1. Economic comparison between the use of pipes and a pumped wind power energy storage system against the use of tunneling alone approaches for the Qattara Depression project[1]

	Tunneling Approach	*Proposed Pipes + Wind Farms*
Capital cost (excluding power block and pipes between reservoir and depression)	$1.98 billion	$5.52 billion
Average power output	338 MWe	1,250 MWe
Capital cost per installed kWe of capacity	5,860 $/kWe	4,416 $/kWe

Alternatives sources of Energy

Various methods of renewable energy storage systems are briefly considered as remedies to the major problem of intermittency of renewable energy sources. Considering the challenges in the difficulty of provision of water and energy in a desert environment, it is suggested that the northern corridors have a better chance to be implemented as a starting point in the project.

Discussion

The Qattara Depression project can supply about 1,250 MWe of hydroelectric power to the Egyptian electric grid. Integrated Solar Combined Cycle systems, and wind parks in the area west of the Gulf of Suez from south of Al Soukhna to Hurghada, especially the Gulf of Al Zait, could host up to 20,000 MW of installed wind farm capacity.

The economic, financial, social, and political framework of integration into the Desertec Project with the European Nations providing technology and financing and the Middle Eastern and North African (MENA) nations providing the Manpower, Land Mass and energy sources are discussed.

REFERENCES

1. Farouk El-Baz, “Development Corridor,” http://faroukelbaz.com/index.php?option=com_content&view=article&id=22&Itemid=5, accessed April 24, 2013,

2. Ragheb, M., “Energy Storage Options,” August 26th, 2012, http://mragheb.com/NPRE498ES Energy Storage Systems/Energy Storage Options.pdf, accessed on April 26 2013.