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ABSTRACT

**Introducing Pumped Storage in Lebanon:
Towards a Prospective National Master Plan**

by

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The Paper gives an overview of the power and energy sector in Lebanon which is currently under radical review for upgrading, modernization and privatization, with particular emphasis on the important role and potentialities of development of the hydropower and of introduction of the pumped-storage for the first time in the country.

Lebanon is typically a mountains' country with a national land of 10,452 km² along the Mediterranean Sea with considerable spatial diversity in terms of topography, rainfall and patterns of land use.

There are 17 major perennial rivers in Lebanon and the remarkable seasonality in rainfall – only 80 rainfall days per year – results in a significant stress on available surface water resources; the total average annual runoff is estimated to be 3,094 million m³.

The present power generation system consists on 8 thermal power plants with nominal capacity of 2,073 MW and on 13 hydropower plants with nominal capacity of 272 MW, all hydro plants were constructed during the sixties and their share declined to 11.6 % in terms of nominal capacity, there is an urgent need to add 1,000 MW up to year 2012. The burden of the recent fuel prices will cause an increase of 1.5 billion USD on the electricity bill for 2008.

No pumped – storage exists or is planned in Lebanon yet, despite an important development potential and an improvement need for operating control flexibility and reliability of the grid system.

The surface water development potential by direct intake from rivers (11.3%) and by storage facilities by dams and hill lakes (88.7%) amounts to 862 million m³ per year.

The author identified, assessed and studied 9 main potential representative sites for introducing and promoting the pumped – storage in the country:

- 6 sea-shore schemes along the Mediterranean cliffs,
- 1 inland scheme interrelated with the existing Litani – Aouali complex of Qaraoun Reservoir and its 3 hydropower cascades of installed capacity of 190 MW,

- 1 inland scheme interrelated with 3 river basins having high potential of surface water development by dams,
- 1 inland scheme interrelated with perennial springs and suitable sites for hill lakes.

The characteristics of these schemes are outlined and ranked-up for their pro and Cons key indicators (technical, financial, environmental, ...) towards the initiation and planning of a nation-wide prospective Master Plan of pumped storage, for a target generating capacity of about 900 MW.

Consequently, BOT'S, EPC, PPP and Carbon Trades perspectives are also outlined.