



Sustainable Solutions for Energy and Environment, EENVIRO 2016, 26-28 October 2016,
Bucharest, Romania

Present and Future for Hydropower Developments in Kurdistan

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Abstract

Kurdistan, Iraq, has a huge hydropower potential. Even if large hydropower developments are already in use, there is enough space for new developments.

The paper presents the state of the art of hydropower in Iraq with emphasis on Kurdistan, the place in national power grid and further possible developments issued from a damsmaster plan accomplished this year.

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Peer-review under responsibility of the organizing committee of the international conference on Sustainable Solutions for Energy and Environment 2016

Keywords: hydropower, electricity, water use, dams, Kurdistan

1. Introduction

Tigris and Euphrates rivers were used since the ancient times for irrigation of the Mesopotamian lowlands, the canals were then rehabilitated in the 19th century for the same purpose at large scale [1]. In order to analyze the use of water of those transboundary rivers in Iraq there must be taken into account the two countries that affect water flows entering Iraq: Turkey and Syria, Fig. 1 [2].

In the '60s Iraq was the most developed among these three countries from the point of view of water use. Next ten years, other dams and canals have been added for various purposes as: irrigations, water supply, flood protection, electricity production. In 1984 the water use in Iraq was around 48 bcm/year of which 95% were used for irrigations [1].

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Over the time many problems rise from the mainly unstable situation in this area. On Tigris and Euphrates rivers there are 32 important dams, 8 more are under construction and more than 13 are planned; the total installed capacity in hydropower is of 11.35 GW [2].

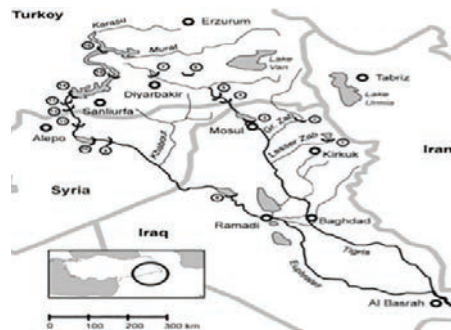


Fig. 1. Tigris and Euphrates rivers in Iraq, [2].

From an agricultural country exporting wheat and other crops until 1958, Iraq turns to an oil-producing, semi-industrial country importing most of its own food. In 1972 the Iraq government nationalized the oil companies starting to receive more income from oil and giving more importance to agricultural production and hydropower development. The evolution of hydropower politics at national level has begun with centralized policies for promoting hydropower development since the 1950 to the liberalization of the hydropower sector since 2003 [2].

2. Electricity production sector in Iraq with emphasis on hydropower

Before 1990, the installed capacity of power plants in Iraq was 10,200 MW in 32 thermal and hydropower plants (HPPs) [3]. The Iraq's electricity system, under the administration of the Ministry of Electricity, was one of the best in the region with the generation capacity exceeding the demand, with more power plants to be built. Because of the war, in time, about 90% of Iraq's power generating and distribution systems were destroyed [4].

In 2002 the structure of the electricity production in Iraq was the following: seven thermal power plants, producing more than 54%, two hydroelectric power plants producing 24%, and nine gas-turbine power plants generating 21% [5]. After 2003, the amount of electrical power demand increased rapidly; there is no problem for the transmission lines but of the power generation capacity in the national power system [6].

Rich in natural resources with a broad spectrum including water and oil, the main energy production is due to oil use. Using data from Index Mundi [7], in Fig. 2 it is represented, for the period 2000-2014, production, consumption and imported electricity. It can be observed that until 2004, there was no need for Iraq to import electricity from neighboring countries.

In a special report for Iraq Energy [8], it is underlined that hydropower and other renewable energy sources play a small supporting role in the energy mix for the Middle East region.

In the primary energy consumption mix presented in table 1, for 1980 and 2010 and estimated for 2020 and 2035 [8], it can be observed the major part covered by oil and the small contribution of the hydropower and also other renewable energy sources (RES). Small part of energy consumption is covered by imported energy from neighboring countries: Iran and Turkey [9].

In [10] it is specified that the consumption of electricity in Iraq is covered mainly by energy produced in fossil fuel power plants (approximately 80%), followed by electricity generated in hydropower plants (9.22%), and the difference by imported electricity respectively.

Even if the hydropower potential is estimated to be around 80 TWh/year, in energy strategy of Iraq for 2012-2017 period, from the 24,400 MW of new installed capacity only 400 MW will be from renewable energy sources (RES), the main part being allocated to gas, 13,000 MW, thermal, 7,000 MW and conversion to combined cycle power plants [11].

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