

Policy Brief

May 2019

Hydropower, Renewable Energy, Economic Transition, & Societal Change



INTRODUCTION

This policy brief addresses the role of hydropower and its potential for development in the Euphrates and Tigris River Basin (Euphrates-Tigris). The development and use of hydropower are also assessed in relation to other sources of renewable energy, both now and in the future.

The study was carried out by the Task Force Hydropower (TF-E) under the Collaborative Programme Euphrates and Tigris (CPET). Recommendations made are consolidated views generated by the taskforce members.

Renewable energy sources (hydropower, solar, and wind) were all part of the brief of TF-E. All these sources have been reported upon regionally for the basin, and country by country. The full report prepared under the CPET is entitled *Renewable energy potential and development in the Euphrates-Tigris Region*.

Key Messages

The riparian countries of the Euphrates-Tigris basin need to plan hydropower development and use at all political levels if renewable energy generation is to be maximised and, indeed, all energy generation optimised. Only negotiation and cooperation can bring about a degree of equitable sharing of water, and of energy through water.

The CPET Programme has been successful in getting the riparian countries within the Euphrates-Tigris Basin to share knowledge and information. This is a region of on-going conflict; this has had major socio-economic impacts. Governance, science, the environment, and the monitoring and management of natural resources have all been affected. The impartial and neutral forum provided by CPET has been fundamental in bringing the countries together to share data, provide direction for regional development under the ethic of shared rivers, and towards collaborative future research. This cannot be achieved without the support of the international community.

HYDROPOWER, RENEWABLE ENERGY, ECONOMIC TRANSITION, AND SOCIETAL CHANGE

APPROACH

This has been a desk study, but with the key being that of collaborative information sharing between Country Partners and Task Force Members. With water being such a scarce and valuable resource, and with natural sensitivities between riparian countries regarding its equity and use, data acquisition and sharing has been critical in this initiative. Hydropower generation is dependent on suitable sites (storage and distribution) and, if well managed, need not be a large user of the resource. Disruption of the resource (storage and release) is, of course, an issue.

This study has looked at existing sources, availability, the major users of hydropower – and at the potential for its future development within the Euphrates-Tigris Basin. The study has also researched the theoretical potential for both solar and wind energy and how these new energy networks could support and ultimately replace a dependency on fossil fuels. Most important has been to consider intermittence and variability in energy sources, how these can be balanced by hydropower. This will depend on regional energy transmission and sales, with energy cooperation essential in achieving the optimal use of renewable resources and the goals of COP 21.

SITUATION ASSESSMENT

Hydropower

The Euphrates and Tigris rivers (Euphrates-Tigris) are part of a transboundary basin that includes Iraq, Turkey, Iran, Syria, Saudi Arabia, and Jordan. This study has focused on the main riparian countries of Iraq, Turkey and Syria, which represent 80% of the total area of the basin.

Hydropower plays a crucial role in energy generation in the basin countries, with a string of dam developments undertaken since the 1960s. These dams were aimed primarily at irrigation and hydropower generation, but also at water supply and flood protection. With large annual and seasonal and fluctuations in water flows from both rivers, there is great difficulty in ensuring sufficient sharing of water resources in the Euphrates-Tigris basin.

Both the Euphrates and Tigris rivers originate in eastern Turkey. The riparian countries of Turkey, Syria, and Iraq are heavily dependent on the Euphrates and Tigris rivers for meeting their water requirements. Turkey has had the most opportunity to develop these resources for hydropower. Turkey has achieved remarkable growth in hydropower capacity

and continues to do so, aiming to increase this to 34 GW by 2023 through the Southern Anatolia Project (GAP). Iraq also has significant hydropower potential while that of Syria is very limited.

Pumped storage is a useful way of storing energy, especially in smoothing out peak demands. This is an important variant to hydropower but is, in reality, a secondary form of energy generation. It could be used in capturing and storing wind or solar energy - but only in times of excess where that energy would otherwise go unused.

Solar energy

The Euphrates-Tigris Region has a very high value for Global Horizontal Irradiance (GHI), and solar power could be developed as a major source of energy, with few theoretical limits. The southern stretches of the region show best potential, normally ranging between 1600-2200 kWh/m²/year. Larger parts of northern Turkey and smaller swaths of northern Iran have typically lower values so generation could be regionally located and shared for optimal efficiency.

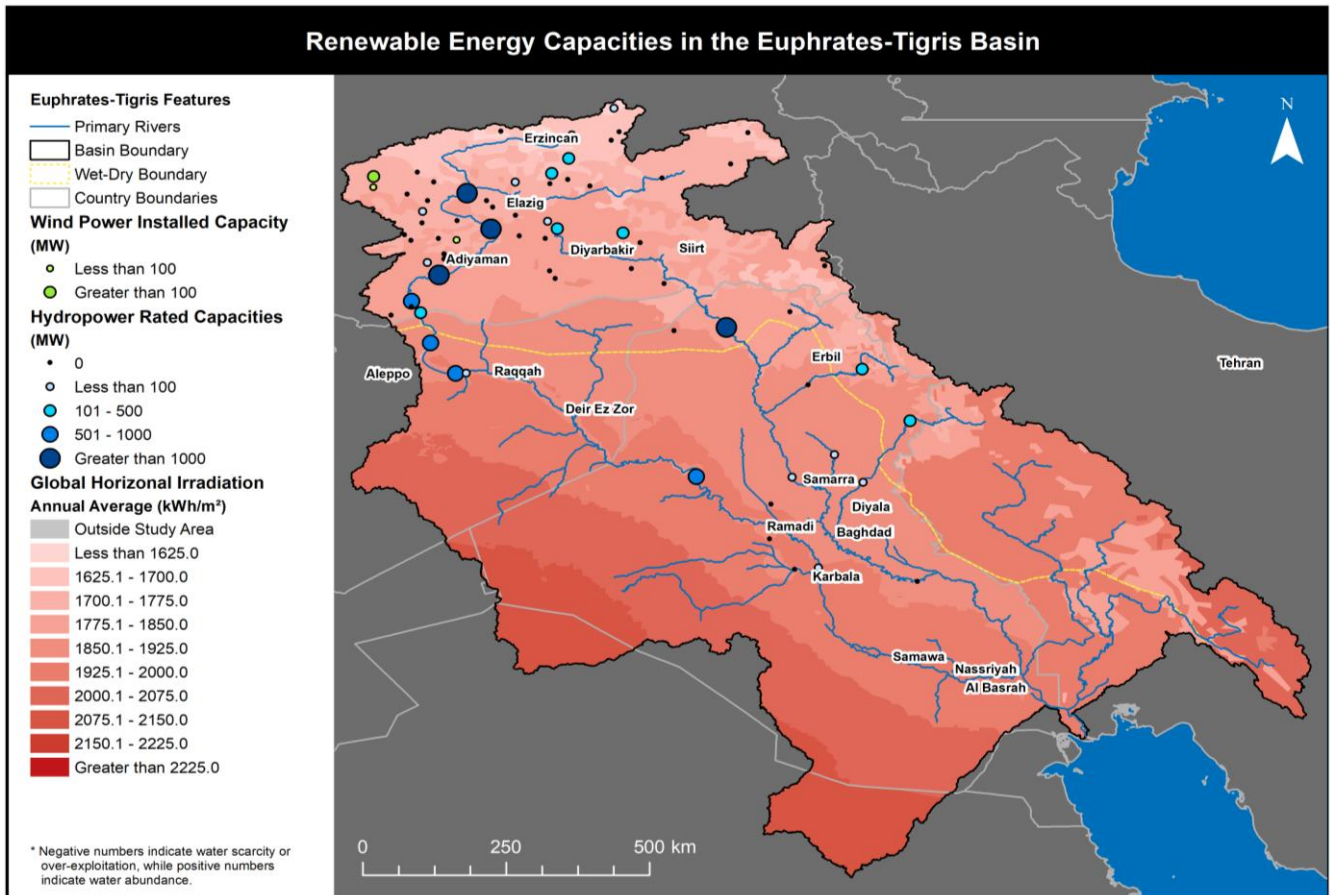
Wind energy

As in the case of solar power, there is great potential for wind power although more restricted to certain areas of the Euphrates-Tigris region, particularly along the coast. Wind power is seeing substantial development in the region, particularly in Iran and Turkey. Being an intermittent energy resource increasing shares of wind power in the energy mix will require sources of backup power to make up load differences in the electrical grid. Hydropower offers that backup source, with grid connectivity fundamental to rapid energy sharing.

CONCLUDING REMARKS AND RECOMMENDATIONS

Despite the status of these countries as relatively oil and gas rich, and their proximity to other oil rich nations, the countries of the Euphrates-Tigris basin have made a commitment towards the development of renewable energy and to the goals of reducing the world's reliance on fossil fuels made at COP 21.

There is an obvious capacity for the development of both solar and wind energy across the basin in growing renewable energy sources and it is here that hydropower really comes into its own. In addition to the supply of some base-load power the advantage lies primarily in the value of hydropower as a balancing source. This can be both in the supplementing of peaking power and in the upscaling of other renewable



sources when conditions do not favour these – typically when there is a local or regional inability to generate either solar or wind energy – which by their very nature tend to be intermittent.

Two key factors come into play:

1. **There needs to be a shared system for electricity transmission that allows countries with surplus capacity to support deficits elsewhere in the region.** This requires regional cooperation and adds another layer to the concept of shared rivers. While energy storage and balancing power can to some degree be addressed by individual countries, grid and energy sharing will depend heavily on the political situation in the Euphrates-Tigris Region.
2. **Hydropower relies on the release of stored water, but that water also serves many other purposes.** The use of hydroelectric energy as a source of peaking and balancing power, particularly if this is to be at a regional and trans-boundary level, requires both sufficient upstream and downstream storage and a very well managed operations plan. Water released for hydropower needs to be timed as far as possible so that it can serve agricultural, urban and industrial, and environmental goals.

Further Steps

Research, develop and utilise hydropower as a source of balancing energy in support of an expanding renewable energy focus

Monitor and share monthly water balances in the Euphrates-Tigris countries in order to estimate the potential for further hydropower development in the region

Evaluate Pumped Storage Hydropower schemes as a means of balancing power

Develop operational rules for all dams, and notably for hydropower releases, to ensure that water is optimally used

Hydropower is not a harmless form of renewable energy. Impacts on the resource, on the land required for storage dams, on the timing of releases as this affects downstream users (urban and agricultural) must be assessed as part of the cost of hydropower

The impact of both water storage and its release on the ecology of rivers is often ignored. The environmental water requirements of rivers, so that these can continue to provide their natural ecological functions (often of high economic value), must also be brought into account

Increase the transition to renewables by building solar and wind energy plants in line with national plans and the commitment to COP 21

Grid connectivity is essential. Plan a cooperative energy-sharing grid that optimises the use of renewable energy across the Euphrates-Tigris Basin.