Seasonal and Regional Clean Drinking Water Map for Kazakhstan

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The scarcity of drinking water is becoming a more urgent problem in the world each day. This problem is even more crucial for Kazakhstan due to its geographic location since the major sources of drinking water today are underground water and lakes, which will be close to their limits in the future, if they remain to be the primary origins of fresh water [1]. However, the progress in technologies of water harvesting enables us today to harvest drinking water from the use of renewable and unintegrated sources of water. The main aim of this work is to determine the most economically viable technologies for obtaining drinking water in Kazakhstan, on a regional and seasonal basis and with minimal environmental impact. Seven main technologies are considered, including traditional and emerging processes supported on clean power sources. The assessment is accomplished and presented in an interactive geographical map with most viable technologies for the 16 demographic regions in Kazakhstan, on a seasonal basis. Firstly, the integrated technologies are selected through construction of their economic models for each city and finding the minimum net present cost per liter of drinking water for each feasible technology in each region. Thus, every winning technology is placed in the form of labels on the map according to the season of the year. Furthermore, there are three labels for each region to demark also second- and third-place technologies. The necessary data (annual average temperature, wind speed, humidity, annual interest rate, different currencies' conversion values, etc.) are obtained from relevant sources [2, 3, 4]. Moreover, special accompanying sub-technologies (e.g., filters) and labor costs are included in the assessment of each technology. Despite technologies considered in the analysis are officially completed by their developers, some of them are emerging technologies which are deemed to be thoroughly tested in the future and their costs may vary (higher or lower) when mature. Therefore, this map may be considered as starting contribution that establishes a milestone that will surely be upgraded and updated as time passes.

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