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3 zeros project, to solve water, energy and environment problems for a typical village in Libya.

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The problem of water and energy shortages and environmental pollution are one of the most important issues of scientific research in the world. It has become a priority for countries when setting their own development strategy in order to secure their future.

The human need for water is steadily increasing at a rate of 4% annually, and classical energy sources are rapidly declining. In turn, environmental pollution expands exponentially to land, water, and air on planet Earth.

In this study, "a desalination plant powered by renewable energy and under thermodynamic control was designed to feed a typical village in Libya." This village is located 50 km south of the Mediterranean shores (area = 1250 km²), in a depression 50m below sea level. It is completely fed with fresh water from the designed desalination plant, and electric power from available renewable sources to maintain its ecological balance.

The production rate of the desalination unit was about (8.75 liters / m². day), and the average per capita share of fresh water was about (320 liters / day). It was also found that the average per capita share of renewable energies is approximately (20 kw.h) per day. These rates of water and energy are sufficient compared to the global average and can be increased through system development.

To preserve the environment, the sewage treatment unit was designed for this village, and the amount of water extracted from it was used for some agricultural, industrial and service purposes, and the surplus feeds the underground reserves, while the sedimentary solids (sludge) were used as fertilizer for the soil after digestion and drying.