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**Atmospheric water generation in Qatar: a sustainable approach for extracting water from air powered by solar energy**

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**ABSTRACT**

In alignment with Qatar National Vision 2030's commitment to sustainable energy and a clean environment, this study is being carried out to review and investigate several sustainable water harvesting techniques from atmospheric humidity, fog, and dew. This investigation will show how well different fog/dew collectors function in collecting water. Furthermore, a feasibility study will be carried out to obtain the technical details of the fog collector and efficiency enhancements. Of course, the prevalence of fog globally restricts fog harvesting technologies. Dew water harvesters, on the other hand, are universally accessible but call for a cooled condensing surface. The dew water collection systems will also be investigated in this study. The main goal of all these strategies is the creation of an atmospheric water collector that can produce water regardless of the humidity level, location, cost, or materials available. This project aims to adapt the Atmospheric Water Harvesting (AWH) system design and material to ensure excellent performance and reliability of AWH in harsh conditions such as in Qatar. It will be particularly focused on the development of a passive system. High-efficiency solar cell technologies are proposed here as selected candidates for desert AWH development. Furthermore, a comprehensive Technoeconomic Environmental Risk Analysis (TERA) study will be conducted to investigate the cost-effectiveness of the proposed solar-powered AWG, compared to the desalination power plant and assess the environmental footprint of the solar-powered AWG system, considering water usage, carbon-based emissions, and other relevant factors.

**Keywords:** Atmospheric water harvesting; Material; Passive system; Solar energy; Sustainability

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