

Quantum Computing in Energy Optimization for Sustainable Water Resource Management Systems

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Abstract:

Quantum computing is emerging as a transformative technology in optimizing energy consumption within sustainable water resource management systems. By leveraging quantum algorithms such as the Variational Quantum Eigensolver (VQE), researchers have developed hybrid quantum-classical approaches to enhance water flow control, particularly in systems like irrigation canals and pumping stations. These methods aim to minimize energy costs associated with water distribution while adhering to operational constraints, offering improvements over traditional optimization techniques. The integration of quantum computing in this domain not only enhances computational efficiency but also contributes to the development of more sustainable and resilient water management infrastructures. □

Keywords: Quantum Computing, Energy Optimization, Water Resource Management, Variational Quantum Eigensolver, Sustainable Infrastructure, Water Flow Control □

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