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Short Communication

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# Better Forty Times Once than Once Forty Times

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**Abstract**

*This study examines the security of quantum-resistant smart contracts for protecting data on blockchain networks, as quantum computing poses an increasing threat to traditional cryptography. As blockchain becomes a mainstay of critical digital networks, ensuring its security mechanisms are durable and dependable is crucial. The research aims to evaluate the effectiveness, efficiency, and practical feasibility of integrating post-quantum cryptographic algorithms, specifically CRYSTALS-Dilithium, into innovative contract frameworks to enhance quantum resilience. A hybrid research design was employed, incorporating theoretical analysis, simulation-based experimentation, and performance evaluation. Data was obtained from scientific studies, specialized blockchain platforms, and sources for cryptographic measurements. Every stage of the development and testing of smart contracts was conducted using Solidity, the Open Zeppelin libraries, and quantum-resistant cryptography routines, which were integrated through external frameworks. Information security tenets such as confidentiality, integrity, and availability were among the primary metrics. Other evaluation aspects included the system's efficiency (in terms of gas cost, latency, and computational requirements) and protection against quantum attacks. The results demonstrated that while quantum-resistant smart contracts incur higher computational costs and resource demands, they significantly outperform traditional contracts in security, particularly in the context of quantum threats.*

**Keywords:** Quantum-Resistant Smart Contracts, Blockchain Security, Post-Quantum Cryptography, Data Protection

The world community is concerned about energy. A product has been created - electricity, which is generated by powerful electric generators at special power plants with the combustion of various types of fuel - solid, liquid, gas, nuclear. Various thermal and nuclear power plants are being built and launched everywhere. Thus, in Kazakhstan, they are planning to build 3 nuclear power plants and three thermal ones. Rivers are being blocked and hydraulic power plants are being installed. Many dams in front of power plants on the planet have created vast water areas of artificial reservoirs that create evaporation (Hypothesis on the causes of climate change and the possibility of saving the planet | Publishing group "Opast"), affecting the climate of the Earth. Electric energy has become an object of production, trade, transportation. It is transmitted over thousands of kilometers. It must be distributed among consumers, transformed and provided with electrical networks with maintenance, metering, and security. The industry is multifaceted and requires materials, attention and costs.

The transition to renewable energy sources - solar, wind, wave does not eliminate such problems. All sources are built in certain points and distribute power to many consumers located in large areas. Construction and maintenance require specialized industries and investments. The growing needs of the planet's population require a constant increase in electricity volumes. And these devices are growing qualitatively - by increasing capacity and quantitatively - by building new power plants. And still this is not enough. Nature cannot increase the number of rivers, underground fuel fossils are also not infinite. Further growth in electricity generation becomes impossible. The limit has been reached. It is necessary to look for new ways of obtaining electricity. Or change the concept. So why is the method of installing thermal hydraulic, solar and wind power plants in point locations developing and spreading, generating gigantic capacities that need to be distributed over vast territories? Isn't this absurd?

Solar radiation and wind are distributed evenly across the entire planet. Each consumer can have its own power plant with a capacity sufficient for its needs. Solar and wind energy installations can be unified for each range of wind and solar radiation forces. Their capacities can be created and distributed proportionally to the needs of each consumer and directly near the consumer - there is enough wind and solar radiation for everyone. Such consumers do not need vast areas. They can be combined with building elements, such as roofs, walls. The capacity of such devices can be selected according to the needs of consumers. Unification and gradation by capacity is possible. It is not at all necessary to cover hundreds of hectares of area for solar panels and install giant blades for wind turbines. And then drive the electricity through wires for tens, hundreds, thousands of kilometers to consumers, reduce the voltage to the consumer nominal. Roofs and walls on the southern side of the house, building are enough. The energy received is enough for the needs of this house or enterprise.

Accumulators can smooth out fluctuations in wind, radiation, and consumption. And it is not at all necessary to convert everything into electric power. The mechanical energy of the wind can be used for washing machines, machine tools, and pumps. Solar energy can be used for ovens and heaters. Cooperation with sources of such energy from neighboring houses will smooth out these same fluctuations. It is possible to unite many houses or houses in a district, or the entire settlement. And there is no need to build high-voltage transmission lines and substations. Analysis and design of new devices can reduce and even eliminate electricity consumption. For example, it is absurd to operate a refrigerator using electricity when the air temperature outside the house is in the negative area and is often less than 2 degrees C, which is enough for a refrigerator. It is enough to connect the cavity of the refrigerator to the atmosphere and install a thermostat valve. Cold water pipes from underground channels carry water with a temperature of about 2 degrees C. This is the temperature of the main cooling zone in the refrigerator. Therefore, a coil can be placed in this zone and water can be run through it before consumption. Then the load on the cooler with freon decreases and the power consumption too. The same cooled water can be sent through the heating system and then, in hot weather, the power consumption in air conditioners will decrease. Power consumption in washing machines can be reduced if the laundry to be washed is placed in a sealed container, filled with water, a little washing powder and several billiard balls are put there. The container is installed in the trunk or on the back seat of the car. The balls, moving chaotically, wash the laundry when moving. If a river flows nearby or the house is located near the coastal zone of a lake or sea, this container is tied with a rope and installed along the current or surf area. The balls can also be set in motion by the blades of a small wind turbine.