

GREEN BLOCKCHAIN

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ABSTRACT

The increasing adoption of blockchain technology, particularly in energy-intensive applications like cryptocurrency mining, has raised concerns about its environmental sustainability. Traditional blockchain systems, such as Bitcoin, rely on energy-hungry consensus mechanisms like Proof of Work (PoW), which contribute significantly to carbon emissions. In response to these challenges, green blockchain emerged around the mid-2010s, with a focus on reducing the environmental impact of blockchain operations while maintaining security, decentralization, and transparency.

Green blockchain leverages energy-efficient consensus algorithms like Proof of Stake (PoS), which significantly reduces the energy consumption of blockchain networks. The concept gained substantial attention and development starting in 2021-2022, particularly following Ethereum's transition to Ethereum 2.0, which adopted PoS and reduced its energy consumption by over 99%. Green blockchain also incorporates renewable energy sources, carbon offset programs, and sustainable practices to create a more eco-friendly infrastructure.

This technology finds application in areas such as carbon credit management, sustainable supply chains, peer-to-peer energy trading, decentralized finance (DeFi), and smart cities. Green blockchain aligns with global sustainability efforts, offering a scalable solution for reducing the carbon footprint of blockchain systems.

OBJECTIVE

1. Reduce energy consumption and carbon footprint: Utilize energy-efficient consensus mechanisms like Proof of Stake (PoS) and renewable energy sources to significantly lower blockchain energy usage and carbon emissions.
2. Promote sustainable practices and e-waste reduction: Minimize electronic waste by reducing reliance on mining-intensive hardware and incorporating sustainable resources for blockchain infrastructure.
3. Increase transparency and accountability: Provide decentralized, immutable records to track energy usage, carbon offsets, and sustainability efforts in real time, ensuring accountability.
4. Foster a positive reputation and community engagement : Addressing environmental concerns enhances brand image and builds trust among eco-conscious communities and stakeholders.
5. Develop scalable, interoperable, and secure green blockchain solutions: Design blockchain systems that are energy-efficient, scalable, and secure, enabling adoption across various industries while maintaining sustainability.

FUTURE TRENDS

1. Increased adoption of renewable energy sources.
2. Development of energy-efficient consensus algorithms.
3. Integration with Internet of Things (IoT) devices.
4. Growing use of green blockchain in supply chain management.
5. Emergence of sustainable blockchain-based business models.

APPLICATION

1. Environmental Sustainability: Green blockchain promotes eco-friendly practices.
2. Finance and Economics: Green blockchain enables sustainable investing.
3. Healthcare and Pharmaceuticals: Green blockchain secures medical records.
4. Food and Agriculture: Green blockchain ensures food safety.
5. Smart Cities: Green blockchain optimizes urban infrastructure.