

# The Popularization of Blockchain NFT Needs to Abandon the PoW Consensus

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## Abstract

The full name of NFT is Non-fungible Token, which is a digital asset derived from the smart contract of the blockchain. NFT is widely used in the field of intellectual property rights, games, certificates, financial instruments, and taxation. However, many problems caused by the fierce competition of the PoW consensus protocol limit the popularity of this NFT. PoS and DPoS may be an alternative to PoW.

## Keywords

Blockchain; NFT; PoW.

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## 1. NFT Introduction

The full name of NFT[1] is the non-fungible token, which is a digital cryptocurrency derived from the smart contract of the blockchain. It is a kind of blockchain digital asset. It is recorded in the blockchain network in the form of a file with hash value encoding, and the content it points to is stored in other parts of the network. The nature of NFT is different from that of fungible tokens that are both cryptocurrencies. Fungible tokens (bitcoin, Ethereum, etc.) are homogeneous, that is, there is no difference between each token and it can be interchanged; NFT has unique and irreplaceable asset characteristics. Creators can use NFT in smart contracts to prove the ownership of digital assets such as videos and images, which is reliable proof of the authenticity of digital assets.

## 2. NFT Application Fields

Theoretically, NFT can be applied to any field requiring unique authentication. NFT is now most widely used in the fields of intellectual property rights and games.

### 1) Intellectual property protection

Any intellectual property rights[2], such as song copyright, film and television copyright, picture copyright, painting copyright, invention patent, etc., can be authenticated with NFT. In short, it is equivalent to pasting an unchangeable and unique bar code behind each thing to confirm and identify the copyright of the asset.

### 2) Game field

For game players, the importance of virtual assets in the game is increasing. NFT can be used to code pets, weapons, props, clothing, and other items in the game, to increase the uniqueness and facilitate the verification of ownership[3]. The popular encrypted cat in 2018 uses NFT technology to make it a unique cat by giving each cat a special tag number.

In addition, NFT can also be applied to the authentication of various certificates, financial instruments, and taxation.

### 3. PoW is the Pain Point of NFT Popularization

At present, the popular method of NFT is based on Ethereum, and PoW is the consensus protocol implemented by Ethereum. Unfortunately, PoW has many inherent shortcomings[4], which limit the popularity of NFT.

#### 3.1 High Energy Consumption

The energy consumption of bitcoin and Ethereum is increasing every year[5]. As shown in Fig. 1, Ethereum will increase significantly in 2022, possibly because the development of NFT based on Ethereum has accelerated the energy consumption of Ethereum.

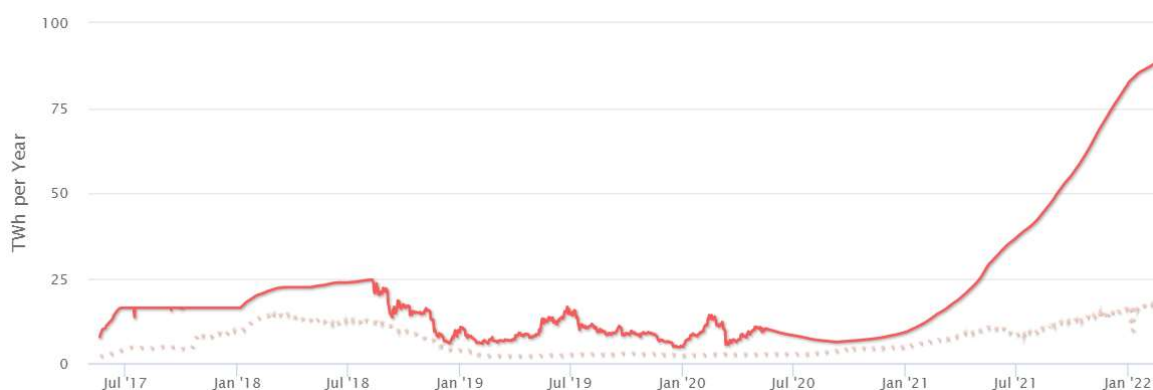


Fig. 1 Ethereum Energy Consumption Index

#### 3.2 Generate a Large Amount of E-waste

E-waste refers to abandoned mining machines. The life cycle of mining machines is generally two to three years[6]. Although they can continue to work after two to three years, the possibility of "mining" becomes very small. Since the difficulty coefficient of mining has been raised, if the old equipment is used to mine, the electricity cost can not offset the mining output, so these mining machines specially customized for PoW will be discarded and become e-waste. The e-waste generated by the cryptocurrency mining industry has become a problem that foreign countries attach great importance to.

#### 3.3 Carbon Emissions

Since mining needs to consume a lot of electricity, when high-carbon power generation methods such as coal and petrochemicals are still the main sources of electricity for human society, behind the electricity consumption are huge greenhouse gas emissions. Research shows that Ethereum's carbon emissions are already equivalent to the combined carbon emissions of Serbia and Montenegro.

#### 3.4 Transaction Fees are Expensive



CloneX #10673

Hooligan #1951

Fig. 2 Two photography NFT

NFT minting and NFT transaction is a special Ethereum transactions, and NFT minters and sellers need to pay Ethereum miners high transaction packaging fees. From the observed data, transaction fees range from tens to hundreds of dollars. The minting cost of "CloneX #10673" in Fig. 2 is \$19.2, and the minting cost of "Hooligan #1951" is \$31.11.

#### 4. Solutions

From the above four perspectives, PoW consensus hinders the development of NFT. PoS and DPoS are alternatives to PoW consensus currently recognized by the academic community, and they both improve consensus performance from the perspective of reducing fierce competition among miners.

Taking 140,000 mining participants as an example, if PoS is chosen instead of PoW, the energy consumption can be reduced by 99%. Due to the introduction of the "coin age" of PoS consensus, the mining difficulty is greatly reduced, so ordinary computers can be competent for mining, and one PC can run multiple mining clients at the same time, which greatly reduces energy consumption. The "retired" mining machine computer can be used for daily office use, which is different from the "non-mining or scrapping" situation of the PoW mining machine. At the same time, the PoS consensus also retains the high openness of the public chain.

In the experiment comparing PoW and DPoS, scholars concluded that since DPoS adopts the rotating mining mechanism, the orphan block problem in the PoW consensus is effectively avoided. When DPoS consensus is executed on an ordinary personal desktop computer, the block generation speed can reach 3 seconds per block or even 1 second per block, which greatly improves the throughput of the system and reduces transaction latency.

In conclusion, both PoS and DPoS will be suitable alternatives to PoW consensus from multiple dimensions such as social responsibility, transaction fees, and performance metrics.

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