

# A study of pricing and trading model of Blockchain & Big data-based Energy-Internet electricity

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**Abstract.** The development of Energy-Internet is currently suffering from a series of issues, such as the conflicts among high capital requirement, low-cost, high efficiency, the spreading gap between capital demand and supply, as well as the lagged trading & valuation mechanism, any of which would hinder Energy-Internet's evolution. However, with the development of Blockchain and big-data technology, it is possible to work out solutions for these issues. Based on current situation of Energy-Internet and its requirements for future progress, this paper demonstrates the validity of employing blockchain technology to solve the problems encountered by Energy-Internet during its development. It proposes applying the blockchain and big-data technologies to pricing and trading energy products through Energy-Internet and to accomplish cyber-based energy or power's transformation from physic products to financial assets.

## 1. Introduction

In term of application, the essential advantage of the block chain is to establish the trust mechanism of the transaction process <sup>[3]</sup>, this trust mechanism is not based on the centralized credit guarantee (such as the national credit issued currency), but through Open and transparent intelligent contract to achieve chain and node information without loss of transmission <sup>[4,5]</sup>, so that both sides can fully grasp the transaction related to all the information, so as to make the optimal decision to reduce the transaction process of friction costs , To improve the transaction efficiency. In short, the block chain technology can effectively solve the information asymmetry problem in the transaction process.

For the current problems of the energy Internet, the huge investment cash flow required to purchase and manage energy storage equipment is contradictory to the energy Internet to reduce costs while improve the efficiency of endogenous requirements. How to effectively solve this issue, a breakthrough in the development of energy Internet bottleneck key. At present, the pricing mechanism of electric energy products basically belongs to the cost plus pricing under the overall control of the regulatory body. For the producers and consumers in the energy Internet, there is no flexible pricing decision system and the corresponding trading mechanism. In particular, For the distributed new energy network, micro-grid and other innovative energy products ecosystem, the development of pricing trading mechanism is a serious lag, which has become one of the bottlenecks restricting the development of energy Internet. For the energy of the Internet's new energy power generation side, the current implementation of the national subsidy policy, but with the new energy Power scale expansion,



subsidy costs easy to make financial difficult to pressure, how to effectively solve the energy Internet development needs of the funds problem, has become one of the important issues of energy Internet development.

Based on the above problems, this paper puts forward the application of the Big data technology to the energy Internet pricing transaction to realize the conversion of the energy power from the product to the asset according to the actual situation of the energy Internet and the future development needs. Through the establishment of the intelligent contract based on the block chain technology Mechanism, to give energy products to financial attributes, and put forward the corresponding pricing and trading model, with a view to the development of energy Internet to provide a useful reference.

## **2. The philosophy of employing block chain and big data mining techniques**

### *2.1. The likelihood of Block chains to reveal causal mechanisms in energy Internet products transaction*

In the energy Internet power products trading process, the electricity sales side need to explain the price changes, and the purchaser on the interpretation of this correct or not to make judgments<sup>[6,7]</sup>, both sides need to explain the causal mechanism of price fluctuations, the district Block chain technology may become a better solution.

According to Hume's definition of causal mechanism, "the causes and results of events in the time of the adjoining, the order of time, must contact" [8], in the energy Internet power product transaction structure, pricing, price fluctuations, bidding and other links are faced with "why The price of "this price", "why should I accept this price" problem, although the block chain technology does not directly give the reason, but its solution to the inherent nature of information asymmetry, from the side gives a causal mechanism to explain the possible way One of the foundations of its building is the consensus mechanism. In the consensus mechanism of the block chain, the price given and accepted belong to the result part of the causal event, and the pricing system established by the consensus mechanism (which will be given later) becomes the key to explain this causal mechanism.

At the same time, the big data mining techniques can give the causal induction methodology of pricing and price changes based on the Mill logic. In physical market transactions, price volatility often leads to uncertainties, and sometimes the consequences of such effects are even long-term and unpredictable, but based on block-chain technology to build pricing trading mechanisms, given by consensus mechanisms Price behavior of the prerequisites, making the price of energy products in the energy Internet is based on Mill's "seeking different law",

### *2.2. Block chains can change the collective action thresholds involved in energy interconnection*

The collective action threshold refers to whether the individual is involved in group action is the key factor in the number of individuals involved in group action. As Granovete said, "no restaurant is not a good restaurant." The causal mechanism of this is interpreted by Hertzam, Sveberg as the uncertainty of the information and the circumstances in which the behavior of other individuals around will determine individual judgment and behavior [8].

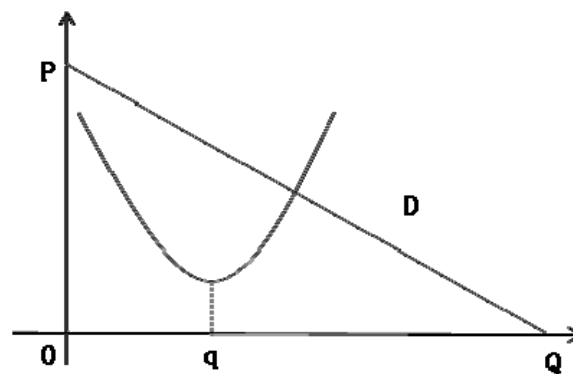
For the energy Internet, especially based on the green energy products distributed new energy network or micro-grid, etc., through the construction of block-based chain technology pricing and transaction payment mechanism, to solve the existing mechanism of pricing factors opaque, price changes are not clear , The future price trend is difficult to predict the problem, making the energy product prices through the energy Internet model really to market pricing rather than still in a government-controlled price system, will attract more and more users to join the energy Internet, and with the number of users Increase the addition of individuals to produce greater new gravity, so as to improve the overall energy and the Internet's competitive advantage and operational efficiency have a huge role in promoting.

### 3. The Pricing Framework of Energy Internet electrical products based on Blockchain

The concept of energy products in a broad and narrow sense, this article only discusses the narrow sense of electricity to the existing pricing unit 'KWH' or 'KVA' and other energy can be measured to provide a way.

#### 3.1. Structure analysis of traditional electrical power products market

For the traditional power industry, the investment in power products, power generation, transmission and distribution, sale of all aspects of the need for investment cash flow is huge, the construction of fixed assets and the formation of effective production capacity of the longer cycle, but because the energy products important Social property characteristics, making the price of electricity products by the strong constraints of regulators, even in Europe and the United States and other developed countries, there is no fully market-oriented pricing trading mechanism, which led to the power enterprise investment return cycle is longer, the financing cash Flow dependence is too heavy, which from the Chinese power generation enterprises up to 75% of the asset-liability ratio can be confirmed, high threshold, high the minimum efficiency scale, the market less the main business of the traditional power industry has become a significant feature, and thus The corresponding market structure can be expressed in Figure 1, where P is the price of the electricity product, Q is the yield, D is the demand curve, q is the output of the firm's smallest efficiency scale, and the huge minimum efficiency scale leads to the whole The traditional power products industry can accommodate a limited number of producers, Figure 1 shows only one The extreme situation of the manufacturer.

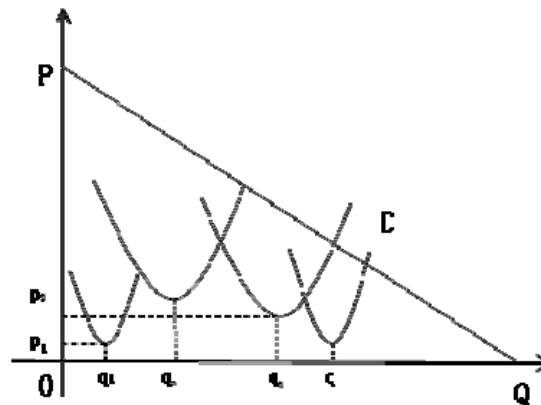


**Figure 1:** The Market Structure of monopoly

#### 3.2. Analysis on the Market Structure of Energy Products in Energy Internet

In the energy Internet, distributed power products providers (such as distributed photovoltaic power plants, distributed wind power plants, etc.), in the purchase and construction of long-term assets, does not require large-scale investment cash flow, especially with technological progress And the realization of large-scale production of power station equipment, making the scale of investment in distributed power plants tend to reduce [9-11], into the energy Internet to become energy products provider is not difficult; in the transmission and distribution process, the existing power transmission and distribution network For the energy interconnection provides the most important facilities foundation, do not need to build a new energy Internet dedicated transmission and distribution network; in the energy Internet, the energy product transaction through the block chain of intelligent contract information transmission, do not need similar to the existing Electric terminal business units such as promotion agencies and teams, greatly reducing the cost of electricity sales, the use of block chain technology to build the transaction payment system, make full use of the existing Internet to complete the corresponding function, do not need to build a new energy Internet transaction payment network , In improving the efficiency of the existing Internet at the same time, to achieve a new mechanism for payment of electricity products transactions. Energy Internet above the advantages of the corresponding market structure shown in Figure 2. As it can be seen from Figure 2, in the energy

Internet, due to the reduction of the minimum efficiency caused by the existing demand can accommodate a large number of small manufacturers (in order to simplify the four manufacturers instead), they provide different products  $q_1, q_2, q_3, q_4$ , And get different market prices such as  $p_1, p_3$  and so on. With this market structure corresponding to the pricing and trading mechanism, the market factors than the traditional power products market structure conditions are much more flexible.



**Figure 2** Energy market structure of Interconnection energy products

#### 4. Price forming mechanism underlying blockchain technology

##### 4.1. The pricing mechanism based on oligopoly

In the energy Internet, the block chain technology provides a solution to the problem of information asymmetry, through intelligent contracts and timestamps, etc., so that both sides of the transaction can fully grasp the required information. Although the energy Internet encourages many small-scale power product providers exist in the market, but based on the formation of large-scale traditional power products with good power quality, stable production, high market share in the two market structures together to play At the beginning of the role, the smaller energy products providers in the energy Internet, especially distributed power plants, were not able to have a completely independent pricing power, and it was certain that the only option for the price mechanism was still in the existing regulatory framework, In the sense that the traditional electricity market part can be regarded as a monopoly oligarchy, its related pricing mechanism and regulatory framework, we do not go into details here.

##### 4.2. Analysis of the surplus market of electricity products and its impact

The surplus market of energy products refers to the market for energy products that can be supplied to many small-scale power product providers in the early stages of the development of the energy Internet, based on the market structure and price mechanism dominated by oligopoly pricing. As a useful supplement to the energy Internet, the remaining market in addition to the ability to accommodate a large number of energy products manufacturers, the energy Internet in the hair, lose, with, sales and other aspects of innovation also has important significance, not only the operation of the various aspects of the way, And even may be the absolute volume of the traditional power market through price competition and other means to form a forced mechanism, such as power producers to the center, the new The development of the energy storage equipment market, a huge power products to push the shrinking system, etc. <sup>[12,13]</sup>. In this case, the pricing and trading mechanism of energy products based on block chains has played a key role in enabling the providers of energy products in the remaining markets to achieve effective docking with consumers and do not rely on traditional marketing links.

For regulators, the rest of the electricity market is not the focus of the existing energy products, and, in the light of environmental factors and technological progress, the introduction of incentive policies

for the development of surplus markets, Encouragement is based on the surplus market is very small, not fully developed as a prerequisite, this trend duration, by the expansion of the remaining market and the corresponding technological progress. In particular, it should be noted that in the traditional power product market structure, all aspects of the production and delivery of electrical energy products, due to the small scale of the largest efficiency caused by a serious monopoly, the regulatory authorities can not effectively determine the real cost of monopoly manufacturers, Government-controlled price model, but because the monopolist is operating at a price greater than the marginal cost, government regulation can not avoid the resulting monopoly inefficiency<sup>[14, 15]</sup>. But this situation will change in the energy Internet, especially for the remaining markets, the more likely structure is the competition pattern of many small firms, they can only choose to run at the price equal to the marginal cost.

#### 4.3. Multi-vendor Cournot Equilibrium Model for Energy Products in surplus Power Products

For the rest of the market in the energy product providers, limited to the energy Internet energy storage technology lag problem, the current regulatory agencies to take "full of" incentives, so that when these providers choose the appropriate power generation equipment, Which can provide the number of products that have been determined in the energy Internet pricing and trading mechanism design, should choose the model is the price decision rather than the production decision (although the current government to take the pricing of the regulatory framework), with the energy The development of the Internet, whether these energy product providers can take the price decision of the Bertrand competition model, or the two models work together, will be discussed in other studies. In the remaining market of energy products, there are n distributed small-scale power products manufacturers, the remaining market, the total output of the industry Q.

Assume that the demand function of the remaining market is:

$$P = a - bQ \quad (1)$$

For the n manufacturers in the first i manufacturers, the production conditions are marginal revenue MR and marginal cost MC consistent, expressed as (2).

$$P + \frac{\Delta P}{\Delta Q} Q_i = MC_i \quad (2)$$

Where p is the equilibrium price of the surplus electricity market, which is equal to the price coefficient of production b, which is the scale of the production of the power product of i manufacturers, and (2) the deformation processing.

$$P(1 + \frac{\Delta P / P}{\Delta Q / Q} \times \frac{Q_i}{Q}) = MC_i \quad (3)$$

Demand  $s_i = Q_i/Q$ , as the market share of the firm i (ie, the market share). Then formula (3) can be reduced to (4)

$$P(1 - \frac{1}{|\varepsilon(Q)| / s_i}) = MC_i \quad (4)$$

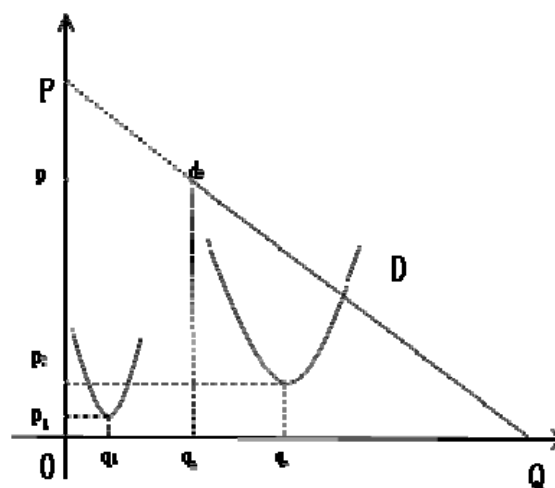
(Q) is the demand elasticity of the firm i, and the result is that the smaller the share of the firm, the demand it faces is the demand for the residual demand of the surplus market. The greater the

flexibility. This is exactly the same in the microeconomics of several manufacturers Cournot equilibrium model.

For the remaining markets in the energy Internet, under the current regulatory framework, its size and quantity do not account for the main part of the local electricity market, those areas where the new energy power generation is relatively large, due to the existence of constraints in the transmission and distribution links Strong, but also failed to achieve full of full <sup>[12, 16-19]</sup>, and similar to the distributed photovoltaic power plants and other power providers, the possibility of serving the micro-grid greater, which led to the remaining market in the total. A certain period of time can not be a threat to the entire electricity market, but also not conducive to change the rest of the market in a number of small manufacturers compete in the structure, so the multi-vendor Cournot equilibrium will continue for some time, the existing pricing mechanism is not prone to fundamental Sex change.

### 5. Based on the block chain of electricity products surplus market pricing model

As mentioned above, in the remaining energy products market, all small-scale power consumers take the production decision-making rather than price decisions, but from the current reality of China's energy Internet development situation, often can not form an effective The remaining energy products unified market, and the existence of (or the next period of time are), the block is divided into the main features of the regional energy Internet or micro-grid, etc., in such a market, we manufacturers of the competitive model And to incorporate consumer factors into the framework to see how the price mechanism works.



**Figure 3** Microgrid market structure model under given demand

#### 5.1. The elasticity of the surplus market demand as the exogenous variable market structure model

As an important part of the energy Internet, the construction of distributed new energy microgrid or regional power grid has become an important way. Through the trend of China's distributed new energy policy, taking the "Golden Sun" project as an example, the government has made some progress in the establishment of microgrid and distributed energy station through government subsidies, but because the subsidy policy and price can not be completely In place, the degree of promotion is unsatisfactory. This paper argues that the possible policy orientation should be to use the floating method to determine the power generation capacity of the remaining products of the energy products in a certain area and the residential area where the microgrids may be constructed, and to provide space for the development of the energy Internet. Under such a policy framework, the size of the remaining market can be given as an exogenous variable, given the D value (not yet considered the degree of floating and level), under this condition, the model shown in Figure 2 can be adjusted, As shown in Figure 3.

In the model shown in Figure 3, there are two constraints: (5) and (6), respectively.

$$\sum_1^n q_i \leq (q - q_0) \quad (5)$$

$$P_i < P \quad (6)$$

The formula (4) is deformed into the formula (7), which expresses more clearly in the microgrid energy product market, the product price can be provided by the manufacturer to determine the number of electrical energy products.

$$P(1 - \frac{1}{|\varepsilon(Q)|/si}) = MC_i \quad (7)$$

### 5.2. Cournot equilibrium and Bertrand competition model

In the regional energy Internet, especially in the microgrid, the energy product suppliers can choose the amount of products it offers, which is different from the current full of incentive policies, but more in line with the future market trend, the production capacity As an endogenous variable into the framework, it is more appropriate to adopt a two-stage competition model that first selects the production capacity and then carries on the price competition. In this two-stage model, the only sub-game refined Nash Equilibrium (SPNE) is the Cournot solution (ie, using the anti-demand function to solve the price in the Cournot model) As shown in (7), the producers in the microgrids always choose the output scale of the plant and then get the price based on the anti-demand function. Thus, the transition from the Cournot equilibrium to the Bertrand model was achieved.

In the Bertrand competition model of a given firm, the firm's demand curve is an infinite elastic demand curve at equilibrium, and consumers buy energy products from lower-priced producers, based on homogeneous energy products The hypothesis has been demonstrated in the traditional electricity market. But in the energy Internet, those small-scale power product providers only occupy a small number of remaining markets, especially in the current power generation industry, a serious excess capacity, and the new capacity is still increasing the case, the size of the remaining market can only Rely on government support under existing regulatory frameworks <sup>[19]</sup>. In this case, there is no real micro-grid system or online bidding and trading of energy interconnection trading platform, one of the important reasons is that the problem of energy product differentiation has not yet been resolved.

### 5.3. Differences in Productivity among Regional Energy Products Providers

In the traditional power products market, there is no significant difference in power products, power purchase links there is no evaluation and selection of electrical energy products, users do not know their use of electricity from thermal power, nuclear power, hydropower or new energy , The difference between these different types of energy products in a large existing transmission and distribution network system is completely removed, in addition to the system of power scheduling links, producers and users are not directly related to contact. With the development of energy Internet, this situation is likely to change. For example, in the micro-grid, consumers not only know where the producers of power products come from, but also to evaluate the quality of electrical products, including the stability of power supply, whether there is perturbation effect, the two transactions to p2p (peer to peer). This will inevitably put forward the requirements of the existing transmission and distribution network, and in the power production sector may require the introduction of energy storage equipment to purchase and build, increase the system investment scale and management costs, easy to become the bottleneck restricting the development of energy Internet The

Is it possible to use the existing transmission and distribution network to transform and omit the energy storage link? The development of block chain technology provides some useful possibilities for

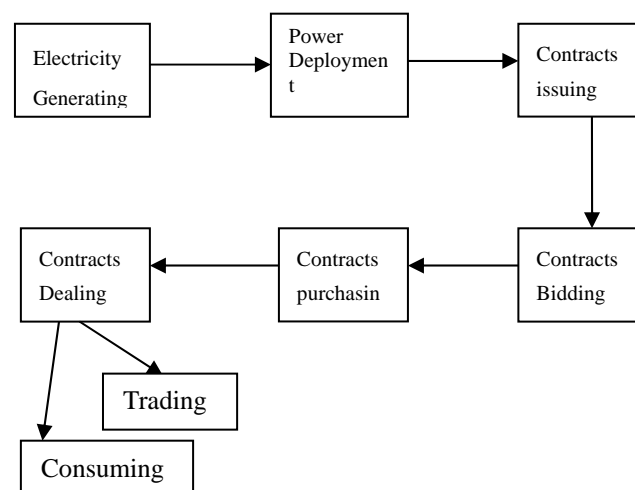
this solution. Producers and consumers connect through the intelligent chain of chain chains<sup>[20]</sup>, and through the network into the entire energy Internet, they can access information through the Internet and participate in the transaction process, consumers can not only get the power products. All information, and can evaluate the use of energy products, and become the future of energy products producers to participate in market competition reference information, which for the construction of intelligent contracts and decentralized evaluation module laid the foundation for the market. For producers, the production cost is limited to the size of the purchase and construction of fixed assets, the contribution of micro-grid capacity is not the same, those adjacent micro-grid users, may choose lower prices, power supply stability, power quality Power source, but such a cross-regional choice can not occur indefinitely, which by the cross-regional micro-grid transmission and distribution network cost decisions, in short, Beijing's micro-grid users can not use Shanghai's distributed photovoltaic power plant to provide products.

## 6. Energy - based Internet Transaction Mechanism Based on Block Chain Technology

Energy Internet as an important direction for the development of energy products, the key to solve the problem of reducing costs and improve the efficiency of the use of [21], if the electrical products can not immediately after the transaction into the transaction and consumption, must be required in the distribution of additional energy storage equipment, Which increases the investment cash flow and management costs, and may even become a regional power grid or micro-grid development of the important bottleneck. The development of block chain technology provides an effective reference for solving this problem, which is the key to the contract management of energy Internet energy products.

### 6.1. Trading framework

This paper presents a solution for the development of new energy, regional power grid and microgrid. Among them, the block chain technology as the bottom support can provide a mechanism for decentralized pricing and transaction, but it cannot be separated from the existing power distribution. The overall control of the system exists, the next period of time, this pattern will remain. Therefore, in the trading mechanism, the traditional power market allocation mechanism still plays an important role.



**Figure 4** Energy and Energy Technology Trading Framework in Energy Internet

As shown in Figure 4, the first link is provided by the producers of energy products, due to regional power grid or micro-power products in the production cycle characteristics of the obvious, such as

distributed photovoltaic power plant, with the solar energy acquisition cycle and electricity cycle. Strong correlation, so the distributed energy products have a clear time stamp, this time stamps constitute the first feature of the block chain contract, at the same time the power product characteristics generated by the number of electricity, can be expressed with the degree.

The second link, whether according to the size of the remaining market power adjustment or the existing "full of full" regulatory framework, as long as the transmission to the transmission and distribution network can be the traditional power transmission and distribution center to give confirmation, This is the most important part of the energy Internet. The power distribution center determines the producer, production time, and quantity of the product according to the source of the energy product and transmits the relevant data to the energy Internet management center. The energy product enters the power transmission and distribution process, but it is different from the ones mentioned in some schemes. If the purchasers confirm the consumption, the electricity is packed and distributed, mixed with the traditional electricity market products, and will not be treated differently. In this paper, the deployment of the system only to confirm the power product data attributes of the function.

In the third session, the management platform, according to the data characteristics produced by the deployment center, produces an intelligent contract containing the producer information, product information and related contract terms, and is placed in the online trading market. A variety of, in Jingdong, Suning, WeChat and other platforms to energy, electricity, coins and other forms of presentation, this article tentatively for the energcoin. At this point, the energy products only retain its digital properties, but has completed the product to the assets Change <sup>[22, 23]</sup>, the subject matter in the trading market is based on the interests of the content of the contract energcoin, rather than the physical product.

The third, fourth and fifth links are simple. Since energcoin has all the characteristics of the equity contract and can be produced, encrypted, transmitted and transferred through the block chain technology, it can be used in many ways and platforms as other similar financial products To trade <sup>[24-27]</sup>.

## 6.2. *The core role of block chain technology in the transaction*

In the framework of Figure 4, the role of block chain technology is mainly reflected in the certification of qualified producers, the capitalization of electrical products, transaction bidding, consumer disposal and so on.

For manufacturers who want to enter the energy Internet, how to determine whether the producer is qualified, there is no relevant accreditation mechanism, but only in accordance with the size of the power plant and equipment manufacturers to make some provisions, but if the producer Into the power of financial transactions, the contract capacity to become the key, especially in the process of securitization of power assets, the transfer may be the right to future electricity tariffs, under the conditions of its management of the power station to become the key. As a result, qualified producer certification becomes the first scene of the block chain application in the energy Internet, and the corresponding contract must contain producer certification information and stamped with timestamps so that it can not be changed.

For the national grid, it will not provide direct subsidies for the producers, only need to confirm its digital properties, and then the sale of electricity can be, in this sense, is only responsible for confirming the energy Internet manufacturers "power" can. For the management platform, such as the management platform, run in the exchange mode, the package contains the producer information and power products, the interests of the digital properties of the package can not participate in the auction and transaction process, only responsible for the management of electronic warrants and related Of the information security, and charge management fees. In the management platform sales of energcoin, can be divided into "real currency" and "currency" in two forms, temporarily can be called "hard coin" and "soft coin", the former for the existing power contract (including power station certification And power product certification), the latter for the future of the power contract (including the power station

certification, through the electronic e-platform to submit registration information to produce the underlying data of the smart contract, product certification in accordance with the different transaction time, type and "Future" manual settings, recognized by both buyers and sellers, p2p transactions, similar to futures).

Even for the traditional electricity market, block-chain technology is still effective. Traditional power manufacturers can directly in the e-treasure and other management platform to put a number of different sizes of "hard coin" and "soft coin", with the regional grid or micro-grid producers to participate in the trading framework, especially in order to avoid Cyclical production fluctuations, can sell a certain amount of "future contracts", which contains a large number of "soft coin", the peak when the sale, the trough repurchase, and to develop intelligent production plans to improve equipment efficiency, reduce production cost.

### 6.3. Contract model based on contract size

The energcoin, which is based on the block chain technique, has exactly the same financial characteristics as the bitcoin<sup>[28]</sup>. Because of its liquidity nature as a financial asset, this energcoin, based on the energy product, Do not distinguish between producers or consumers), in the holding or expired time, is to obtain the risk of premium or risk premium, and the liquidity of the contract has a direct relationship between those who have good liquidity risk The possibility of water and the larger assumptions can be consistent with the laws of the market<sup>[29]</sup>. Since the conversion of electrical energy products into electrical assets in the energy Internet has the function of transaction payment, the pricing mechanism may be slightly different from the formula (7) for contract holders.

In equation (7), it represents the market share of the firm  $i$  and, on the basis of which it obtains the right to speak in the price mechanism, the product can be sold at a price higher than the marginal cost (ie,  $P > MC$  Do not take into account the product differences caused by changes in the price elasticity of demand) to obtain excess profits. But this situation is very different in the smart contract transaction, the contract holder is not necessarily a producer, and is likely only one of the history of the contract transaction, or the producer does not own a physical power station, but A large number of contracts in the brokers, or even a "virtual power station" operators, in this case, refers to the number of contract holders of the contract number of the total contract market rather than the real market share of energy products, both (7) does not contain this part, so it can be transformed into formula (8),

$$P(1 - \frac{1}{|\mathcal{E}(Q)| / (S_1 + S_2)}) = MC_i \quad (8)$$

Where  $S_1$  represents the proportion of the current contract in the contract holder (based on the completed energy product),  $S_2$  represents the proportion of the future contract in the contract holder (based on future energy products that may be produced), dividing the  $S_i$  into different Part of the share of  $S_2$ , after the discount, the risk premium to get premium is relatively large, after all, the future contract uncertainty is greater, which is consistent with the basic logic.

$S_1$  and  $S_2$  in addition to the above considerations consider the discount factors, but also has important significance. For spot chain-based functional contracts, the spot price includes the transaction to the parties to the market expectations, if the expansion rate will be taken into account, from the financial point of view,  $S_1$  is a spot contract and  $S_2$  is far Contract, but the actual situation is extremely complex, it may also lead to the phenomenon, but this does not affect the expression (8) the meaning of expression.

### 6.4. Risk premium model based on volatility

As investors, how to treat the value of the contract? Compared to the traditional capital market, the energy products of the energcoin are block-based tradable, the real value of the decision is based on the level of electricity represented, but in the course of the transaction, due to contract holders, the

market Factors and so there will be some differences arising from price fluctuations, investors must be aware of this price risk and grasp. How to effectively examine the value of the contract and determine its volatility, there is no literature reported, this paper constructs the volatility model and the famous KMV model describes the asset price and its fluctuations in the simple idea to describe.

Assuming that a package containing energcoin, there are  $X_s$  spot contracts,  $X_f$  forward contracts, the value of which is expressed in  $V$ , can be expressed by the formula (9).

$$V = X_s + \beta X_f + \varepsilon \quad (9)$$

Because energcoin has equity attributes and futures financial product attributes. Previous studies on the yield of China's stock market show that the volatility of the financial products such as equity and futures in the domestic market is in line with the Garch (1,1) model. Therefore, this paper is based on Garch (1,1) The model is used to estimate the volatility of energcoin. which is:

$$\sigma_f = c + \phi \sigma_s + \phi \hat{\varepsilon}_s \quad (10)$$

$$\hat{\varepsilon} = \sigma_s - \sigma_{f,t-1} \quad (11)$$

$$\sigma_v^2 = \sigma_s^2 + \sigma_f^2 + \beta^2 * \text{cov}(X_s, X_f) \quad (12)$$

Where is the volatility of the energcoin contract for the  $t + 1$  period predicted in period  $t$ . Further, we can continue to calculate the default distance of the corresponding assets according to the relevant ideas of KMV, and make a judgment on the possibility of breach of contract. This article does not make any in-depth discussion, and the follow-up articles are discussed.

## 7. Conclusion

It can be seen that building energy grid pricing and transaction model based on block chain and big data can provide a solution for the establishment of relevant systems and mechanisms. The parties involved in the transaction, including producers, consumers and managers, form the energy Internet. The main body, provided by the management of trading places, that is similar to the electronic platform, producers and consumers free trade, product prices follow the market, fully embodies the Internet and the energy industry in-depth integration, and to achieve the power products to Pratt & Whitney financial products The substantive change. For producers, through the long-term contract price discovery function, according to the future price of the product to better arrange the production plan, and through the sale of the market demand for risk fluctuations hedge management, for consumers, through Contract acquisition and transfer to achieve asset circulation, for managers, the maintenance costs are very low and profitable, for government departments, to avoid the traditional power market to further the formation of excess capacity to curb the development of clean energy issues, and do not need to On the new energy and energy products to provide large-scale subsidies, it can be said that the block chain technology used in energy Internet products pricing and trading, to achieve win-win situation, and steadily promote the development of energy Internet goals.

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