

## Original Paper

# Exploring the Transformation Mechanism of Ecological Value Realization by Property Right Trading of Rural hydropower

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### **Abstract**

*The transformation and upgrading of rural hydropower rely on the property right trading market, and the professional property right trading market serves as the foundation to truly transform lucid waters and lush mountains into mountains of gold and silver. The study believes that by using two means, namely, government regulation and market incentive, water resources can be turned into ecological hydropower resources to finally realize the economic value of green energy through the ecological value transforming mechanism. The transforming mechanism, impelled by green hydropower certification and evaluation and professional property right trading market, has realized the ecological values, which not only promotes the green development of the local economy, but also realizes the transformation and upgrading of the rural hydropower industry. With the hydropower property right trading center, the development of the hydropower industry has encountered historic opportunities. At present, it is necessary to strive to improve the corresponding system, mechanism and cultural environment of the trading center to achieve the predetermined goal, and further standardize and improve the transaction activities. There are in all three figures and three tables.*

### **Keywords**

*hydropower, property right trading, ecological value, transforming*

### **1. Problem Statement**

“Lucid waters and lush mountains are invaluable assets.” Guided by this conviction, how can rural hydropower industry develop ecologically and realize its transformation and upgrading? Our research team believes that there remain two main questions to answer. The first one is how to realize the ecological value of rural hydropower via transformation mechanism. Rural hydropower, which once

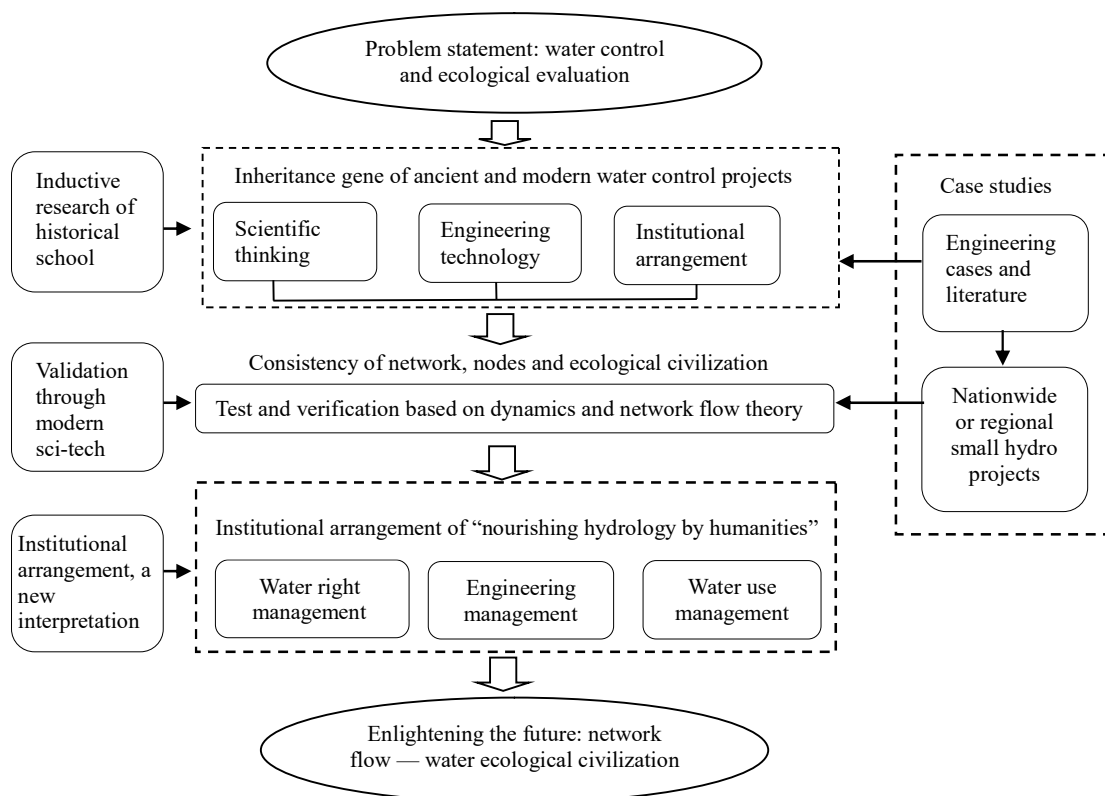
had a glittering history, is clean and renewable type of energy. It has promoted clean waters and green mountains by substituting small hydropower for fuel and contributing to the economic development in mountain areas. At present, the national economy has entered a new normal, and rural hydropower should make a demonstration in the practice of the conviction that “lucid waters and lush mountains are invaluable assets”. It is necessary to actively explore the mechanism for transforming the ecological value of rural hydropower. The second question is about the institutional innovation to promote the small hydro industry development. The lack of adaptive institutional innovation prevents excellent enterprises in the industry from standing out, thus resulting in primitive development of the industry over long time. Specifically, first, small hydro enterprises are small, and most of them have not established a modern enterprise system; second, rural hydropower investments are scattered, and private and illicit entity transactions are frequent; third, the property right constraint of hydropower stations is ineffective, and the boundary between power generation and ecological protection is not clear. These problems reflect in essence the low asset quality.

The above mentioned two problems are actually the two aspects of one problem that needs to be solved with a mechanism where institutional innovation is applied to help enterprises improve the quality of their assets, make explicit their ecological values, and find a platform to achieve their values.

## **2. Mechanism for Identifying, Transforming and Realizing Ecological Value**

### *2.1 Innovative Ways of Understanding Problems*

It has become the pursuit of our research team to use the existing research results to evaluate and guide actual rural hydropower engineering practices. Over the past two decades, we have studied the history of rural hydropower development in mountainous areas of China, the inheritance gene of ancient water ecological civilization, and the rules of practicing the conviction that “lucid waters and lush mountains are invaluable assets” in Zhejiang, and thus gained a deep understanding of water resource allocation standards. In order to scientifically evaluate the problems related to rural hydropower ecological civilization construction, the research team put forward a research method covering three perspectives, namely, science, technology and institution, as shown in Figure 1.

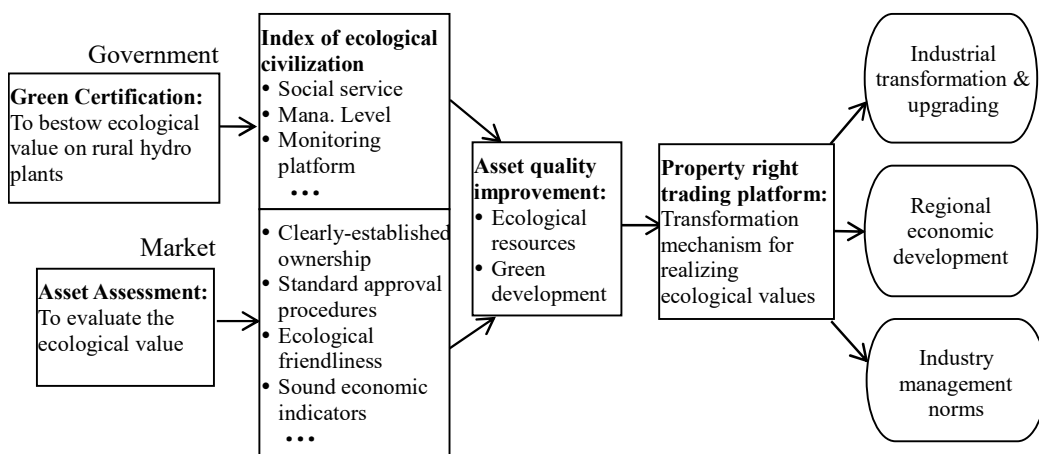


**Figure 1. Research Objectives and Roadmap**

The three-perspective research method proposes that the network and network flow are the inheritance genes of ancient water ecological civilization, and they are specifically implemented through the mechanism featured by “nourishing hydrology by humanities” based on the integration of the three perspectives, that is, to handle the relationship of technology and institution under the guidance of scientific concept. We found this in the study of water ecological civilization, and it has become an important tool for our research. In particular, in a large number of studies on ancient and modern water ecological civilization of China, we discovered the network and network flow as the inheritance gene. (Over the past decade, the research team has studied the historical evolution of Zhejiang Cao’e River Basin and Shaoxing Plain river network governance, the ancient water ecological civilization construction of Xuanping River Basin, Lishui Tongji River System Project, the historical evolution of the Grand Canal in China, etc.) Rural hydropower, as a part of water resources development, has been studied more at the technical level, whereas the scientific and institutional problems have long been neglected. The problems at the scientific level are often invisible as they are always at the source, unlike the technological problems. With professional division of labor and technology, the humanistic needs are more likely to be ignored. Although we have solved many problems after so many years, such as resource compensation, ecological compensation, economic compensation, etc., new needs have emerged in the continuous development, especially when the economy has entered the new normal.

### 2.2 Problem-Solving Mechanism

Based on the research framework formed by scientific, technological and institutional perspectives as mentioned above, we find that the rural hydropower industry only needs to solve a problem, that is, how to improve asset quality and upgrade ecological value. The solution to the problem is to integrate market mechanism with government regulation to promote institutional innovation. Government regulation means that the government urges small hydropower stations to carry out ecological transformation and conduct green certification in accordance with the requirements; market mechanism refers to the establishment of special trading platform to form interest expectations. The two interweave to promote owners to improve asset quality, increase the ecological connotation of rural hydropower, i.e. renewable energy plus green hydropower plants, and consequently enhance the space for ecological value appreciation, as shown in Figure 2.



**Figure 2. Diagram of Transforming Mechanism for Realizing Ecological Value**

The government regulations impel owners to ecologically transform their plants and gain green certification. In this way, an ordinary rural hydropower plant can be changed into a kind of ecological resources, transformed from a general asset into a high-quality asset. This process not only enables the transformation and upgrading of rural hydropower industry, but also promotes the green development of local economy. The market mechanism, giving full play to its incentive function, forms a coercive mechanism with the professional property rights trading market to effectively reach the goals that the government hopes to achieve. Thus the owners are forced by the market trading expectations to solve the problem in three ways. First, effectively restrict property rights by overcoming the current inadequacies, such as the asymmetrical relationship between the internal and external returns and cost asymmetry, lack of motivation among owners to protect or restrain their own behaviors, etc. Second, force the owners to take initiative to standardize their own behaviors which are not explicitly specified in rural hydropower approval procedures. Third, improve the quality and ecological value of hydropower assets, and attach green connotation to them. “Green” here means two things: renewable

resources and green power stations, where the former reflects water resources and the latter reflects the development approach and mode.

Both of the two aspects, government regulations on ecological rehabilitation and green certification, and the market mechanism of property right trading, are important. However, more attentions should be paid to the latter, i.e. establishing the property rights trading platform, while the former, ecological rehabilitation and green certification, is the premise. Therefore, exploring the ecological value realization transformation mechanism through property rights trading was initially regarded as the theme of study, and property rights trading and its platform construction are the main research tasks.

### *2.3 Locating Property Right Trading Center*

In order to realize the ecological value transforming mechanism, it is necessary to choose the appropriate location to settle in the hydropower property right trading platform. After thorough investigation and scientific verification, Lishui City has finally been selected as the first choice for setting up the trading center in consideration of its five unique advantages.

First, Lishui has a good political environment to practice the conviction that lucid waters and lush mountains are invaluable assets. During his tenure as Secretary of Zhejiang Provincial Party Committee, General Secretary Xi Jinping visited Lishui eight times to inspect and guide the work. Holding that the statement that clear waters and green mountains are mountains of gold and silver is especially true for Lishui, he sincerely hoped that the people of Lishui would protect the ecology well. He once made a special trip to the Tongjiyan water control project in Lishui, which owns a history of more than 1,500 years, and gave special instructions on its protection. On April 26, 2018, he specially praised the ecological protection work of Lishui at the symposium on further promoting the development of the Yangtze River Economic Belt.

Second, Lishui possesses abundant water and hydropower resources. It has six water systems, including Oujiang River, Qiantang River, Minjiang River, Saijiang River (Jiaohe), Feiyunjiang River and Jiaojiang River, of which Oujiang is its water system with a basin area accounting for 75.82% of its total. Annual average precipitation of Lishui reaches 1,733.5 mm; hydropower resources reserves in the area amounts to 3,963,600 kW, of which exploitable hydropower resources are of 3,278,300 kW, accounting for about 40% of Zhejiang Province. By the end of 2018, a total of 813 rural hydro plants had been built, with a total installed capacity of 2,804,500 kW, average annual output of 7 billion kWh, and power generation revenue of 4.21 billion yuan. Between 2003-2007, the hydropower industry contributed 8% to GDP in Lishui. The distribution and development of hydropower resources in all counties (cities, districts) in Lishui are listed in Table 1. See Table 2 for the rural hydropower installation and power generation of Lishui City and Zhejiang Province from 2001-2018.

**Table 1. Distribution and Exploitation of Hydropower Resources in Lishui**

County /Prefecture	Theoretical Reserves (10,000 kW)	Exploitable Capacity (10,000 kW)	Plants built by the end of 2018		
			Numbers	Installed Capacity (10,000 kW)	Power Output (10,000 kWh)
Liandu	28.50	26.90	105	15.72	42820
Longquan	38.00	28.07	107	22.24	58013
Qingyuan	28.00	25.00	60	21.08	62490
Yunhe	53.37	46.60	59	47.55	87174
Jingning	66.62	53.04	161	34.65	94516
Suichang	40.00	30.00	110	25.50	59760
Songyang	13.60	10.80	69	9.99	26027
Jinyun	8.27	7.66	46	6.36	14317
Qingtian	120.00	99.15	110	92.50	205993
<b>Total</b>	<b>396.95</b>	<b>327.22</b>	<b>827</b>	<b>275.59</b>	<b>651110</b>

Note 1. Data of Liandu prefecture in the Table covers that of Lishui county-level city.

**Table 2. Rural Hydropower Installed Capacity and Power Output in Zhejiang Province and Lishui City 2001-2018**

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Installed Capacity									
in Zhejiang (10,000 kW)	178.15	206	229.8	255	280.3	303.7	328.5	342.4	361
Power Output in									
Zhejiang (100,000,000 kWh)	49.93	56.2	40.1	39.6	69.3	67.6	67	77.4	74.5
Installed Capacity									
in Lishui (10,000 kW)	46.51	65	71.7	82	95.7	107.3	122.4	129.4	141.3
Power Output in									
Lishui (100,000,000 kWh)	12.24	15	12.9	14.6	25.7	25.3	27.8	31.7	30
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
Installed Capacity in Zhejiang	369.9	376.8	382.9	390	392.4	395.9	397.8	405.4	410

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(10,000 kW)									
Power Output in									
Zhejaing	109	84.1	117.4	96.1	106.1	115.6	122.2	85	83.4
(100,000,000 kWh)									
Installed Capacity									
in Lishui	147	150.9	152.9	153.6	154.2	155.9	157.1	160.6	162.9
(10,000 kW)									
Power Output in									
Lishui	43.3	31	49.7	42.6	44.3	49.9	50.4	37	33.4
(100,000,000 kWh)									

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Third, Lishui has the advantages of institutional innovation. Zhejiang is in the forefront of the country with a series of institutional innovations in hydropower resources development, including tariff policy reform, market allocation of hydropower resources, diversified sources of investment, the implementation of three-compensation mechanisms, and the management system reform by establishing industry associations. Lishui, as a pilot city for institutional innovation in Zhejiang, is renowned as the first city of hydropower in China. Jingning, a county within the jurisdiction of Lisui, is known as the hometown of rural hydropower in China. Therefore, Lishui has the advantages of industry reform and institutional innovation to establish a national hydropower property rights trading center.

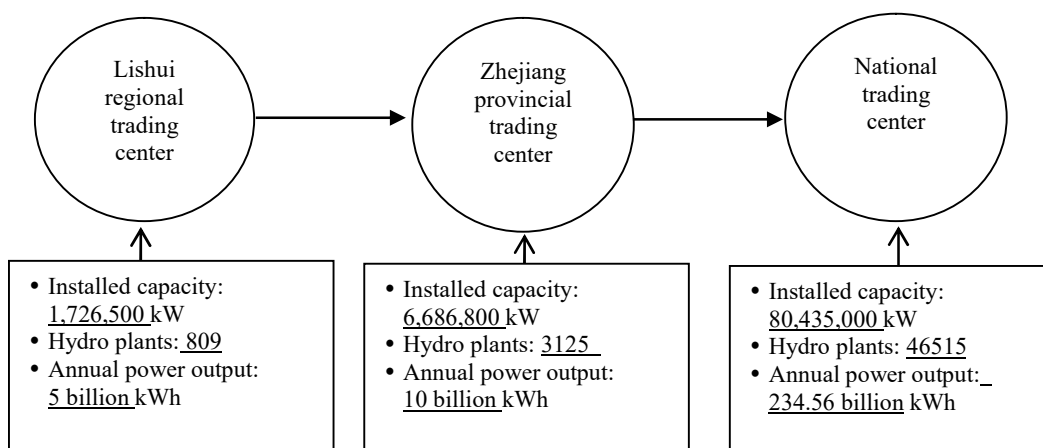
Fourth, there are already private investments on property rights trading in Lishui. According to the statistics of Lishui Water Resources Bureau, in recent years, 78 hydropower plant in the trading market has been successfully transferred, the transaction amount of which has reached 3.1 billion yuan. additionally, 151 hydropower plants have completed transaction in partial equity. These private transactions of hydropower property rights have well explored the ways for establishing the trading center. They also proved that the establishment of small and medium-sized hydropower property right trading center in Lishui City is not a groundless impulse, but an inevitable development with positive guidance. However, in order to reduce transaction costs, government supervision was evaded in some of the transactions, causing many conflicts, disputes, and even mass incidents. It is therefore in urgent need of institutinal innovation to build a new mode of transaction.

Fifth, the trading platform for rural property rights has accumulated experience for the reform. As a national pilot city of rural financial reform, Lishui first established a rural property right trading platform which has been running for many years by Lishui Agricultural Investment and Development Co., Ltd. and Lisui Agricultural Property Rights Service Co., Ltd. The transaction service system and a relatively perfect supporting system have already been established. By the end of December 2014, in all 284 public transactions of rural property rights were conducted with a turnover of 122 million yuan. At that time, while planning the reform of river rights, Lishui formulated the Implementation Measures of Lishui River Resources Management Reform to transfer small and medium-sized river rights to

households and encourage river right trading. These reforms have provided many experiences for the construction of Lishui small and medium-sized hydropower property right trading center.

### 2.4 Positioning and Goal Setting of the Trading Center

The goal of the trading center is to build itself a booster for Lishui to practice the conviction of lucid waters and lush mountains as invaluable assets, and to become an important platform to realize the ecological value of hydropower resources. A three-step approach was adopted. The first step was to establish Lishui Hydropower Property Right (Stock Share) Trading Center based on the existing Lishui Rural Property Right Trading Center. The second step was to obtain the support of the provincial government and develop Lishui Hydropower Property Right (Stock Share) Trading Center into Zhejiang Provincial Hydropower Property Right (Stock Share) Trading Center. The last step was to develop the provincial trading center into a trading center with supports from the relevant departments of the state. See Figure 3. This is an effective way to improve the overall management level of the rural hydropower industry, enhance the industrial competitiveness and practice the two mountains theory. The trading platform was successfully inaugurated on 28 December 2017 as planned, and 4 plants were transacted between March and April 2019, proving that the original vision was feasible and practical.



**Figure 3. Roadmap and Market Size of Hydropower Property Right Trading Center**

*Note 1.* The data in this figure are all from rural hydropower administration at all levels, aiming to illustrate the trading market scale of different stages of development.

## 3. Analysis of the Actual Operation of the Trading Center

### 3.1 Preliminary Preparation

In 2015, with the coordination of Municipal Government, Lishui Hydropower Property Right Trading Center, affiliated to Lishui Rural Property Right Trading Center and managed by Lishui Agricultural Investment and Development Co., Ltd. came into being. At the same time, a cooperation agreement has been reached with Zhejiang Property Rights Exchange Center to set up a sub-center in Lishui. In 2016-2017, the city extended its reform of hydropower property rights (stock shares) by carrying



forward green certification, promoting legal and compliance approval, and pushing on the approval of land and forest use, water intake permit and environmental protection. In November 2017, Lishui Municipal Government set up a leading group for the hydropower property rights trading center, with the mayor as the leader, deputy mayors as the deputy leader, and directors of relevant departments as key members. On December 28, 2017, under the leadership of the municipal government and after full preparation, Lishui Agricultural Investment and Development Co., Ltd. opened Lishui Hydropower Property Right (Stock Share) Trading Center affiliated to Lishui Rural Property Right Trading Center. Before its opening, it has been fully prepared for the standardized transaction operation, substantial service content, and equipped with professionals and related equipment and venues, committed to the development and construction of the hydropower trading and the reform of the hydropower equity and property rights in the city. In 2018-2019, 58 hydro plants in Lishui passed green hydropower certification, accounting for 17% of the national total.

### 3.2 Essential Transactions

In March 2019, four hydropower plants, including Hexi SHP in Songyang County, expressed their interests in transferring through the platform. The staff of the trading center, after getting the news, took the initiative to contact the owners, conducted in-depth investigation on the development status of enterprises and relevant policies, and fully excavated the hydropower value. On the basis of disclosing information via the platform, they maximized the information disclosure through Zhejiang Property & Stock Exchange, building advertising, WeChat public account and other ways to attract potential transferees from all over the country.

From March 6, 2019 when the first plant was listed to April 26, 2019 when the fourth plant was transferred, it only took about no more than two months. The four plants, namely, Yangkengyuan SHP, Qingshiba SHP, Hexi SHP, and Yaxikeng SHP, all general partnership enterprises in Songyang County, were successively transferred at the price of 25.8 million yuan, 29.2 million yuan, 190 million yuan, and 10.5 million yuan respectively. The total transaction volume reached 255.5 million yuan, with over 30 million yuan of taxes. See Table 3.

**Table 3. Transactions Index of the Hydro Plants Transferred Through the Trading Center**

Hydro Plants	Installed Capacity (kW)	Object of Transfer	Commi-ssioning Year	Number of Bidders	Starting Price (10,000 yuan)	Transac-tion Price (10,000 yuan)	Premium Rate (%)	Taxes Paid (10,000 yuan)
Songyang Hexi	11,400	aggregate assets	2009	7	14000	19000	35.71	2770
Songyang	1,200	100%	1988	14	1900	2920	53.68	431

Qingshiba		equity						
		interest						
		98.618%						
Songyang	960	equity	1999	7	650	1050	61.54	102
Yaxikeng		interest						
Songyang		71.2%						
Yangkeng	3,660	equity	2005/ 2004	12	2000	2580	29	247.8
yuan		interest						

### 3.3 Verification of the Theory by Transactions

(1) The trading platform has been functioning in four ways, namely, gathering information, discovering price, inciting competition and providing intermediary service. Each transaction was made open, fair and just, fully marketized. More than 40 bidders participated, and the final buyers and sellers both recognized and praised the transaction process. The hydropower property rights transfer platform explored the ecological value of the hydropower assets by market means. Finally, the transfer price was generally higher than the expected price, with the average premium reaching 45%, which was significantly higher than the hydropower property rights transaction price premium conducted by the Beijing Property Rights Exchange, reflecting the advantages of the professional market.

(2) The transaction price partly reflected the ecological value of green hydropower. Although only four samples were studied, not sufficient to make a comprehensive analysis of the ecological value realization mechanism, they have partially proved the fact. For example, the old power plants put into operation before 2000 had a higher premium, reaching 53.68% and 61.54% respectively, showing to some extent that these old plants were of more ecological value than the new one put into operation after 2000. The in-grid tariff reform started in 2000 in Zhejiang Province was the watershed of price formation mechanism. The government-led “one station, one price” policy was replaced by market-led tri-price policy based on the commissioning time. This reform unexpectedly resulted in a public welfare space between hydropower development, irrigation and ecological environment. Therefore, from 2002 to 2003, Zhejiang Water Resources Department introduced such policies as paid resource use, ecological flow, three compensations mechanism, stating clearly the requirements for the ecological responsibility of power plants.

(3) The market transactions have awakened the rural hydropower industry. Although it was only an exploration of Lishui on ecological resource transaction and ecological value realization, it has a great impact on the national hydropower industry. China Energy News has followed up the the exploration and reported several times. Over 70 enterprises, including Zhejiang Zheneng Huanya Songyang Company and Jiangxi Jingdezheng Jiulong Power Station, took the initiative to register on the platform for trading. The industry, owners and local governments have all seen the future prospects of ecological resources, which are of great significance for revitalizing hydropower assets, regulating hydropower

transactions, and promoting industry management.

(4) The transaction process dispelled the four major concerns of the research team. The four concerns were as follows. First, the substandard construction procedures in the approval process of hydropower plants would lead to the difficulty of defining property rights. Second, the complex process of property rights trading would affect the willingness to trade. Third, the premium of property right transactions would be not enough to cover the tax required so as to affect transaction willingness. Fourth, the policy differences in different administrative regions would hinder property rights transactions. The transactions conducted, nevertheless, proved that although the above concerns were not completely settled, the interest-driven market mechanism showed its incentive to solve these problems.

#### **4. Institutional Innovation Needed to Form an Institutional Environment**

The proposal, research, exploration and practices of Lishui Hydropower Property Right (Stock Share) Trading Center made a good start in 2019. However, it was just the beginning. To fully play its role of ecological value transformation mechanism and enhance the industrial transformation and development, it is necessary to create a good institutional environment through institutional innovation.

##### *4.1 Institutional Innovation for the Trading Platform Itself*

Lishui Hydropower Property Right (Stock Share) Trading Center has achieved initial success, but compared with the original design positioning and trading process, there still exists some insufficiencies as it has just started its operation. In April 2019, the Center suspended its trading activities, not because of the lack of trading demand, but because of the need of refinement. At present, there are more than 70 hydropower enterprises registered in the trading center for transference transactions, with heavy workload in the future and technical difficulties to deal with. The following issues also need to be taken seriously. First, to further clarify the development positioning of the trading center in a larger scale, transformation and upgrading of the regional economy should be considered. Second, it is necessary to clarify the system mechanism of the trading center, including trading places, staffing, institution and others. Third, for the four transactions that have been completed, experts should be organized to study the cases and find out common features so as to make policy and institutional improvements to particularly help and serve hydro enterprises. Fourth, it is necessary to establish a decision-making mechanism to deal with relevant problems. If these issues are not taken seriously, there will be great risks.

##### *4.2 Institutional Innovation for the Local Government*

For the local government, the purpose of establishing such a small and medium-sized hydropower trading center was to attract more idle rural assets and ecological resources. Through the platform, the intrinsic value of hydropower and other resource enterprises would be appropriately evaluated, and their financial attributes would be endowed, so that the transformation and upgrading of the local economy would be effectively promoted ecologically and financially. The center has become the first model in China to successfully realize the ecological and financial transformation of hydropower

resources. For Lishui municipal Party Committee and municipal government, the work to be further done include the followings. Firstly, improve the framework of leadership system. Although the leading group of the trading center has been set up, mainly consisting of administrative leaders, it needs to be adjusted and improved due to the change of municipal leaders. Secondly, the system mechanism of the trading center should be straightened out. Coordination with relevant administrative bureaus of water resources, finance, legal system, taxation, etc., should be taken to ensure that professional people undertake their due diligence. Thirdly, the guiding principles of the Fourth Plenary Session of the 19th CPC Central Committee should be implemented to strengthen the state governance system and capacity building. A sound institutional system should be established for the trading center. What's more, preferential policies of taxation, finance, and evaluation services should be provided in the initial stage.

#### *4.3 Institutional Innovation for Industry Management*

Hydropower industry authorities, from the Ministry of Water Resources, Zhejiang Provincial Department of Water Resources, to Lishui Water Resources Bureau, should take the construction of the trading center as a practice of the Two Mountains Theory and also a historic opportunity to promote the further development of the industry. The establishment and operation of the trading center requires a large number of professionals with their expertise in water resources, hydropower, operation and management of hydro plants, etc. Hydropower industry associations at all levels should, on the other hand, give full play to the professional expertise of their member units and invest them into the trading center.

First, study and explore the patterns of realizing the ecological value with transforming mechanism. Green hydropower certification will be continued, and the requirements of ecological flow and other relevant rigid indicators should be met. For the hydro plants without ecological certification, the risk rating assessment shall be carried out. The property rights trading should be promoted through the certification appraisal in the trading market. The hydropower industry associations shall establish a rigorous evaluation system with a strong evaluation team as soon as possible. Only by accurately evaluating the green hydropower assets and making the transaction prices significantly higher than that of ordinary hydropower, can the mechanism of realizing the transformation of ecological value be made prominent. At the same time, big data shall be used to carry out smart hydropower construction and incorporate the whole city's hydro plants into a system for management.

Second, establish an image of international green hydropower demonstration base. On the basis of international exchanges from 2018-2019, continuous efforts shall be made to strengthen international exchanges by study touring abroad, holding training courses, exchange meetings and forums, so as to form a sustainable development image of Lishui both at home and abroad. Exchanges and cooperation between Lishui, Belt and Road countries, university research organizations shall be promoted by taking the advantages of International Center on Small Hydro Power, the National Research Institute for Rural Electrification, and especially the green hydropower demonstration base. Technical consultation services can also be provided for international small hydro projects by making use of the expertise in

Zhejiang in this area and the Comprehensive International Small Hydro Service Platform introduced by Hangzhou Lide Technology Co., Ltd.

Third, set up a rural hydropower think tank compatible with the trading center. Lishui Ecological Hydropower Research Association to be established will play the role of think tanks, to study the mechanism for the realization of hydropower ecological value transformation. The research association will not only strive to study various practical problems encountered in policy implementation and trading center, but also work as a standing body responsible for establishing a national information platform for the hydropower industry, creating a website, publishing magazines, timely reporting the relevant information of the trading center, and publicizing new state policies.

## 5. Conclusion

The planning, researching, designing, unveiling and operating of Lishui Hydropower Property Right (Stock Share) Trading Center all aim at one goal: exploring transforming mechanism for realizing the ecological value of rural hydropower to promote the transformation and upgrading of the industry. All relevant parties of the trading center have reached the consensus that it is completely feasible to explore the ecological value realization mechanism through the ecological resource property rights trading. Property rights trading has formed a coercive mechanism to turn the common scattered and low-quality resources into ecological, concentrated and high-quality resources through integration. Three expectations have finally been realized: the transformation and upgrading of rural hydropower industry, the promotion of the green development of local economy, and improvement of rural hydropower industry management. It is an inevitable historical development for the rural hydropower industry to innovate institutionally with property right trading mechanism. The continuous promotion and improvement of the institutional innovation will mark the mature development of the industry.

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