



MARKET DRIVERS SUCH AS VENTURE CAPITAL ARE PROMOTING RENEWABLE ENERGY INNOVATION AND DEVELOPMENT IN CHINA

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SUMMARY

China’s renewable energy development is transforming from an industry of government support to one of market dominance.

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MARKET DRIVERS PLAY AN INCREASINGLY IMPORTANT ROLE IN CHINA'S DEVELOPMENT OF RENEWABLE ENERGY

Under the present conditions of increasing resource constraints and environmental pollution, it is urgent that China promotes an energy production and consumption revolution. As a key point of the energy revolution, the renewable energy industry has received substantial government subsidies during the past few years. However, the scale of expansion of renewable energy, the government's fiscal tightening, and, to a certain extent, long-term government intervention distorts the factor price and reduces the efficiency of the allocation of resources,^{1,2} so the traditional pattern that relies on subsidies to develop renewable energy is not feasible. The renewable energy industry is one of the high-tech industries, and its ability to be innovative is important to healthy development as China's renewable energy capacity grows. However, there are still some problems facing innovation efforts in renewable energy enterprise, such as insufficient funds, a low tendency towards innovation, and a poor environment for it. There is the structural maladjustment that low-end products in the field of renewable energy are superfluous while the key components rely on import, which weakens the inner development of the enterprise and increases its dependence on subsidies.³ The 19th National Congress of the Communist Party of China (CPC) stressed a "market-oriented system for green technology innovation." There is no denying the fact that government subsidies played an important role in the renewable energy industry's early development, but further healthy development of the industry needs to be dominated by a market approach.⁴

THE VENTURE CAPITAL MARKET FOR CHINA'S RENEWABLE ENERGY IS BEGINNING TO TAKE SHAPE

Venture capital, a highly market-oriented mode of capital operation, is the link between a capital market and the real economy. It is also the main source of capital promoting the development of renewable energy industry innovation by market drivers. As Figure 1 shows, in terms of both investment amount and the number of projects, venture capital in the renewable energy industry in China has grown rapidly for 15 years (since 2001). Even a short decline in 2013 was followed by a decent rebound. In 2016, 24 venture capital projects were funded in the renewable energy industry with a total amount of 8.6 billion Yuan, almost as great as the peak value in 2011 (9.202 billion Yuan). Among all the investments, around 35 percent of the companies receiving capital were listed companies and they received more than 50 percent

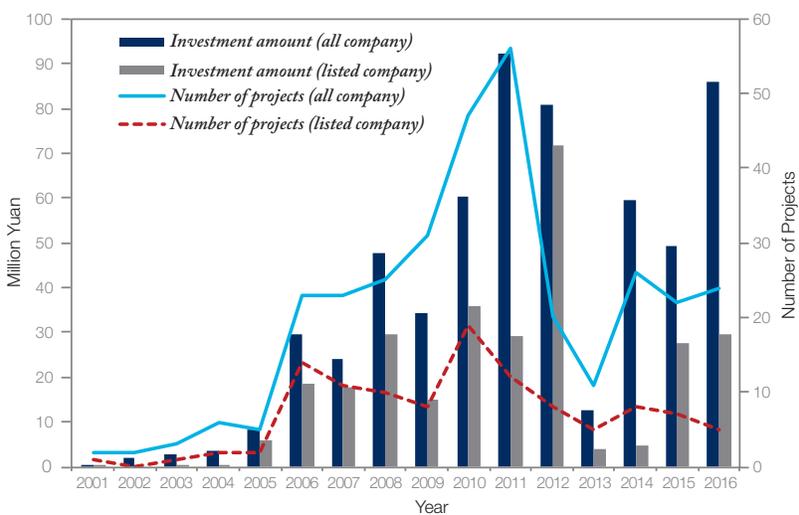


Figure 1. The venture capital trend in the renewable energy industry (2001-2016)

Source: www.chinaventure.com.cn

of the investment. This trend was in accordance with the overall data and is to some extent representative. In the years 2011 and 2016, listed companies accounted for a relatively lower portion of total investment. This is because many renewable energy companies that obtained venture investment successfully listed in 2010 and 2015. So, the capital turned to unlisted companies in the following year. We believe that the data of the listed companies from the 2002 to 2015 period could serve as a good representation of the life cycle of venture capital in the renewable energy industry and is thus worth studying.

According to the primary business area (Figure 2) of all listed renewable energy companies that received venture capital, photovoltaic companies were the most favored. They accounted for 58.9 percent of the total number of companies while receiving 72.4 percent of the total investment amount. In contrast, companies that focused on wind energy, biomass power generation, and new energy vehicles received less investment from venture capital.

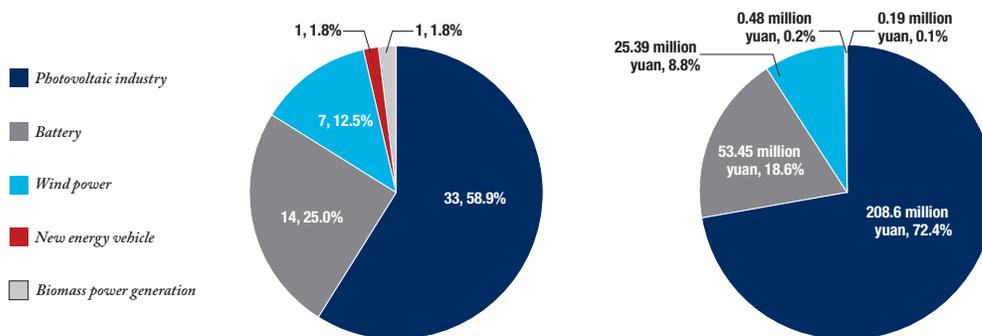


Figure 2. Primary business of companies in the renewable energy industry that received venture capital. (Left, the number of listed renewable energy companies that received venture capital and their corresponding percentage of the whole. Right, overall investment amount per company type in percentages, with corresponding figures in yuan.)

Source: www.chinaventure.com.cn

One interesting highlight is that venture capital prefers private companies over state-owned companies. This is demonstrated by the character of the companies that received venture capital (Figure 3); 50 out of 56 companies were non-state-owned and they received 67.9 percent of the investment. Only six of them were state- or partially state-owned companies. Therefore, venture capital, especially in the renewable energy industry, did not favor state-owned companies. On the other hand, most state-owned companies tend to be well funded and enjoy more favorable government policies. This would lead to a lower private capital presence within the companies.

VENTURE CAPITAL CAN SIGNIFICANTLY PROMOTE RENEWABLE ENERGY ENTERPRISE INNOVATION ABILITY

We matched the venture investment data with the financial and patent data from listed companies. The data trend is shown in Figure 4.

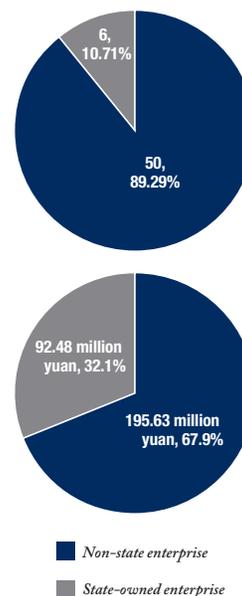


Figure 3. The nature of the companies that received venture capital in the renewable energy industry

Source: www.chinaventure.com.cn

We see that the R&D expense and the number of patent applications of listed companies increased every year in a similar pattern. In 2013, the number of patent applications experienced a short period of decrease similar to the venture capital investment itself. Based on our empirical study, venture capital can significantly promote renewable energy enterprises' ability to innovate; in contrast, the government's high subsidies do not have the effect of promoting renewable energy enterprise innovation, which indicates that we should further encourage the development of venture capital in the renewable energy industry and form a benign complementarity with government funding.

Venture capital's incentive effect in renewable energy enterprise innovation is demonstrated in three aspects: First, it increases enterprise currency and provides direct financial support for business development and innovation;^{5,6} second, it improves the enterprise's enthusiasm for R&D innovation and enhances the technological competitiveness of enterprises in the industry; third, it improves the operation efficiency of enterprises through management and decision-making and improves the internal innovation environment for enterprises.^{7,8}

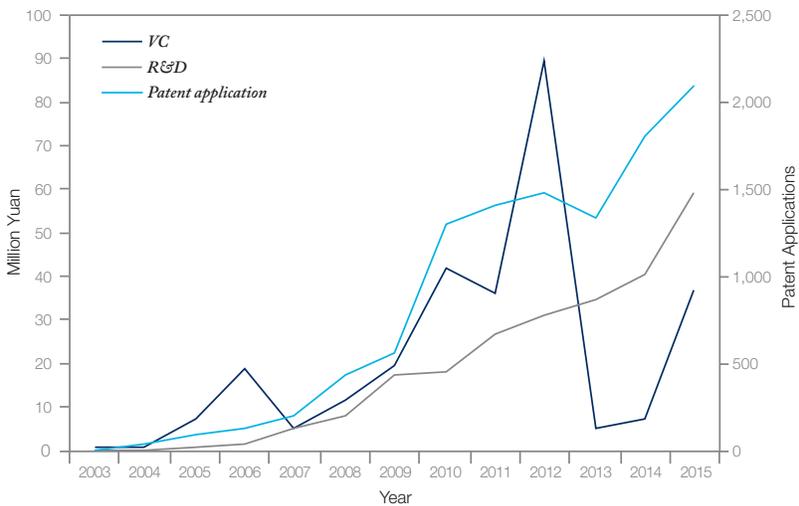


Figure 4. Venture capital received, R&D and patent applications of listed companies

Source: www.chinaventure.com.cn, cpquery.sipo.gov.cn

As a special means of external financing, venture capital is able to provide management experience and external resources for development, so a renewable energy enterprise's absorption ability will also affect the use of venture capital.⁹ Venture capital has a more apparent effect on renewable energy enterprises with a good development base that are large scale and have higher levels of financing. Venture capital likes private enterprise of a certain scale and with a better financing situation. It pays little attention to an enterprise's current profit and loss and pays more attention to the potential for future development.

RECOMMENDATIONS: MARKETIZATION REFORM IS THE MAIN POLICY DIRECTION FOR CHINA TO DEVELOP RENEWABLE ENERGY

China's renewable energy development is transforming from an industry of government support to one of market dominance. On the one hand, the market should play a decisive role in the allocation of resources so that the invisible hand can promote renewable energy enterprises' strengthening of technological innovation and enable them to develop in healthy competition. On the other hand, China should give full play to the functions of the government, and with the orientation of national development strategy and planning, deepen the marketization reform of the electricity system to break up the monopoly and coordinate the incentive mechanism of renewable energy in different regions and sectors so as to create a good institutional environment for innovation and development of renewable energy.

(1) Expand the scale and strength of market drivers such as venture capital.

Market drivers such as venture capital, rather than fiscal subsidies, should play a key role in optimizing the supply structure and regional distribution of renewable energy industries. It is possible to enhance the vitality of the venture capital market through tax allowance and exemption, government guarantees, credit incentives, and the creation of flexible exit mechanisms. Through market drivers such as venture capital, capital may flow to enterprises with a high technical level, strong innovation ability, and great development potential, so as to realize the survival of the fittest and optimize supply structure and regional distribution of the renewable energy industry, and thus, the optimal resource allocation.

It is important to promote healthy interaction between renewable energy enterprises and venture capital. Venture capitalists should build a highly effective management system after investment by providing timely assistance to renewable energy enterprises to adjust their development strategy and integrate resources. Renewable energy enterprises should increase communication with venture capital institutions and fully absorb the beneficial experience and suggestions to expand their scale and efficiency and seek a suitable path of development.

(2) Deepen the reform of “delegate power, streamline administration, and optimize government services” to provide a sound institutional environment for the development of venture capital and the innovation of renewable energy enterprises.

The government should change its current subsidy policy, which is based on output, and improve intellectual property laws and other relevant laws and regulations to correct the externalities of innovative behaviors, build up the incentive mechanism within the market, and accelerate the transformation, application, and promotion of innovative results. It should also focus on the cultivation of innovative talents in renewable energy fields and deliver high-quality R&D for renewable energy enterprises. Further, it can encourage orderly competition among renewable energy enterprises and improve their capacity to cope with risks and integrate resources through mergers and reorganization.

(3) Marketization reform of the electricity system.

Both the monopolization of the state electricity system, especially the power transmission and distribution system, and the interest protectionism of regions and sectors hinders the trans-regional consumption of renewable energy power. These should be broken up to increase the power generation trans-regional absorption. Downstream marketization reform can serve as a strong driver for upstream investment in and innovation of renewable energy.

Endnotes

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