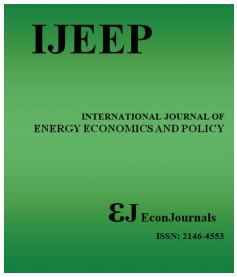

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Venture Financing and the Fuel and Energy Complex: Investing in Alternative Energy

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ABSTRACT

The purpose of this paper is to study the main features and trends of venture investment in renewable energy. The study is based on both quantitative and qualitative indicators of the development of venture financing in the fuel and energy complex through the prism of opinions of the main participants in this market. The data obtained during the expert survey is supplemented by supporting materials, including those taken from sources, such as EnergyTech, CB Insights, PwC, and Bloomberg, as well as information posted on the Internet portals of companies and other freely available sources. The study of expert opinions has revealed the main barriers and factors that favorably affect the growth of venture investments in alternative energy. In the interview, the authors have identified priority measures to attract venture capital (VC) to renewable energy projects, stimulating the flow of free capital for innovative startups and increasing the quantity and quality of high-tech energy projects. Moreover, the paper reviews effective mechanisms for attracting investments in renewable energy sources and their experience in applying countries with a developed VC market.

Keywords: Venture Capital, Renewable Energy Sources, Investments, Venture Financing, Startups, Energy Technologies, Innovations
JEL Classifications: Q40, Q43, Q48.

1. INTRODUCTION

The current high-carbon energy system is dependent on endless supplies of fossil fuels, the production of which is becoming more and more difficult and expensive, which raises concerns about national energy security in many countries. The current state of the energy sector makes many countries susceptible to significant fluctuations in oil import prices and also costs billions of government subsidies (Plenkina and Osinovskaya, 2018).

The greening of the energy sector will require improved energy efficiency and a significantly wider provision of energy services from renewable sources, which will lead to a reduction in greenhouse gas emissions and other types of pollution.

In most cases, improving energy efficiency brings net economic benefits. Global energy demand is likely to continue to grow to meet needs in the context of growing population and income levels (Zaripova et al., 2019). The greening of the sector is also aimed at ending the "energy poverty" for some 1.4 billion people who currently do not have access to electricity.

Modern renewable energy sources (RES) have significant potential for improving energy security at the global, national, and local levels. The need for a breakthrough in the field of clean energy is determined not only by the environmental consequences of energy consumption, but also by the need to ensure energy security, solve the growing problems associated with the balance of payments crisis, and as a potentially important source of domestic jobs (Nurgaliyeva et al., 2018). A key aspect of such a wide change is that these problems cannot be solved with one technology. Rather, technological change should be ubiquitous and will require several different products and processes to enter the market.

To realize the existing potential of RES, a stimulating policy is necessary to ensure investments in the greening of the energy sector.

Investments in renewable energy continue to increase every year, mainly due to developing countries: since 2004, the world has invested 2.9 trillion US dollars in green energy sources (BloombergNEF, 2019).

The most pressing issues are related to venture financing. As international experience shows, the concept of venture investment plays a significant role in enhancing innovation processes and accelerating the structural transformation of the economy, creating favorable conditions for the implementation of promising high-tech projects.

Unlike other forms of external financing, a key aspect of venture capital (VC) is that it facilitates the provision of financing to startup companies, despite the enormous risks associated with untested technologies (Bernstein et al., 2016).

Since startups with new technologies rarely have internal cash flow and are too risky to get debt financing, they are critically dependent on providing VC for their survival (Dudin et al., 2017; Dyussembekova et al., 2019; Kapranova et al., 2019).

In this paper, we study potential problems associated with venture financing of new startups in the renewable energy subsector.

2. LITERATURE REVIEW

In recent years, VC issues have been the focus of many researchers. The works of O. Bjørgum et al., (2013), Nagaraja and Srinivas (2013), Novoselov (2018), Benson and Ziedonis (2009), Daukantas (2010), Christensen et al., (2009), are devoted to attracting investment in new sectors of the economy.

Venture financing involves investing by large companies, banks, and the state in a new or developing business (Arvanitis and Stucki, 2014). That is why such an investment is associated with high risks of the investor losing their capital and, if successful, a high profit is expected (Chemmanur et al., 2014).

Venture financing is a hybrid form that provides innovative companies with the necessary investments (Chemmanur et al., 2011). At the same time, this form is a combination of the most effective functioning elements of both capital markets and banks (Caselli et al., 2009).

Table 1 shows the features of venture investment compared to traditional types of investment.

The key difference between VC and other sources of financing is that VC firms tend to focus on investments that face significant technological risk (Basu et al., 2016).

The problems of financing renewable energy projects are studied in the works of Saidmamatov et al., (2014), Musolino and Fu-Bertaux (2013), Donovan (2015), He et al., (2019), Barroco and Herrera (2019), Liu and Chu (2019), Luskatova et al., (2019), Abrell et al., (2019), and others.

Researchers highlight the following features of venture investments in alternative energy projects (Tsvetkov et al., 2019):

1. High capital intensity of projects
2. Weak management level
3. Absence of an established mechanism for the investor to exit the project
4. Competition from global commodities and political risks.

A literature review allows us to group key decision-making criteria into three general categories (Huang, 2016; Tian, 2018):

a. Internal factors (quality of management, results to date, risky funds, influence of other investors, portfolio adequacy, cost monitoring, evaluation)
b. External factors (size and growth of the market, competition, barriers to entry, likelihood of customer acceptance, conditions of the financial market, exit)
c. Complexity of execution (nature of producer technology and business strategy model).

This study hypothesizes that understanding the conditions of the VC market and studying the successful global experience of venture investment allows one to identify effective mechanisms for attracting venture financing to the development of the RES sector.

Table 1: Comparative characteristics of venture and traditional investment

Subject for comparison	Venture investment	Traditional investment
Distribution of the market	Venture investor shares the risk with the owners	The traditional investor has priority in making a profit and returning funds in the event of the owner's bankruptcy
Enterprises that receive investments	Small high-tech companies that start their businesses	Companies that have already received sufficient capital to cover potential losses and successful experience in the market
Enterprise selection criteria	Potential growth	High yield
Investor functions	The provision of capital and consulting assistance in management, the use of investor relations in the markets of supplies, finance, marketing, sales	Provision of capital
Provision of collateral	Without collateral	Collateral is provided
Profit gain	Sale of the company's shares after increasing their value	Fixed interest on invested funds or the implementation of an investment project

Source: (Shakhova and Rezanova, 2018; Sakouili et al., 2018; Shankar and Shepherd, 2019)

3. METHODS

To analyze the impact of VC investments on the technological development of the fuel and energy complex, we used various research methods. The statistical method allowed us to identify trends in venture financing of RES. A comparative analysis allowed us to conduct a study among the regions of the world. The study used credible empirically obtained data collected by official information services (EnergyTech, CB Insights, PwC, Bloomberg, etc.)

To assess the development trends and identify barriers and future directions for the development of VC investments of startups in the renewable energy sector, we used the method of expert assessments. The data presented in this study were obtained as a result of questioning and interviewing experts with more than ten years of experience in the field of investment.

The survey was conducted among representatives of three different target groups.

1. 17 investors (business angels and representatives of venture funds)
2. 9 specialists in sustainable development of energy companies
3. 11 experts from support organizations (representatives of business associations, incubators, technology parks, business accelerators, government organizations that support innovation in the fuel and energy complex).

The selected members of the expert group came from three countries with the largest economies in the post-Soviet space, namely Russia, Belarus, and Kazakhstan.

As a first step, we searched for venture capitalists on the EVCA website, the websites of the Russian Venture Investment Association (RVIA), Kazakhstan's QazTech Ventures, as well as by searching on the Internet using the Google search engine and on the websites of companies.

4. RESULTS

In 15 years, green energy has turned into the mainstream of the development of the fuel and energy complex around the world. By the end of 2018, 26% of global electricity had come from renewable sources and the growth rate of the capacity of such power plants had exceeded that of nuclear power plants and fossil fuel plants for the 4th year in a row (Gorlov et al., 2019).

Every year, green energy, which used to be expensive and meaningless, is becoming increasingly competitive. For example, the cost of a solar module since 2010 has fallen by 90%, which has made solar power plants more profitable than oil and coal power plants in many countries around the world.

In almost all countries, at the government level, one way or another, goals and objectives for the development of renewable energy are outlined (Chernysheva et al., 2019). All this is part of a single process of making green energy cheaper, which makes it more affordable and, therefore, more common.

The number of countries that have introduced or announced their intention to introduce such rules is constantly growing. As part of a global joint initiative, influential companies from around the world have created the RE100 association, whose members are committed to fully switching to renewable energy in the future.

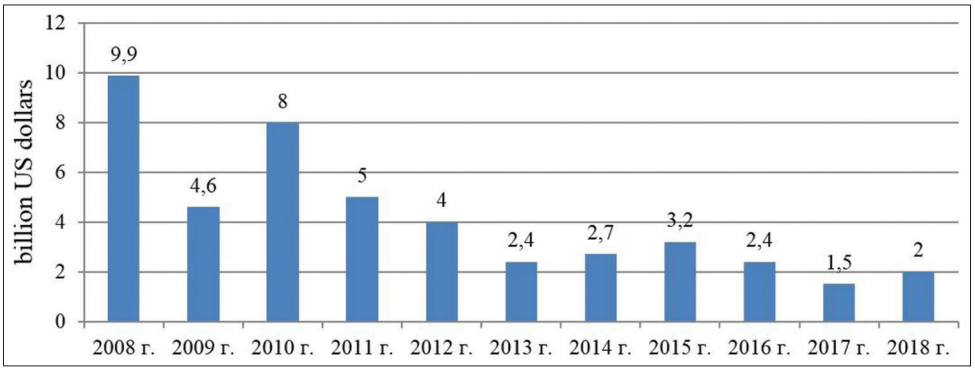
On the other hand, pressure from society and shareholders force even participants in the traditional energy market to invest in new technologies. In 2018, the global investment in green energy amounted to 289 billion US dollars, which is 11% less than in 2017 (Gurinovich et al., 2019).

In general, the global energy technology market remains one of the main factors in the development of the oil and gas sector and energy. Companies working in this field pay more and more attention to technologies that increase the efficiency, environmental friendliness, and security of the sector.

For the period from 2008 to 2017, the global VC investment and direct investment (VC/PE) in renewable energy have shown a steady outflow. Thus, in 2017, the volume of venture investments reached a historic low and amounted to 1.5 billion US dollars. However, in 2018, there was a significant increase in venture financing in the RES sector, which amounted to 2 billion US dollars (Figure 1).

RES are now largely a mature sector, with its core technologies performing well, even if equipment performance continues to

Figure 1: The dynamics of the venture and private investment in renewable energy in the world, billion US dollars (Frankfurt School-UNEP Collaborating Centre, 2019)



improve rapidly. Currently, R&D, as a rule, is funded directly by large companies and the opportunities for breakthrough startups are fewer than before. Small companies often receive funding from utilities, rather than from venture capitalists. As a result, in 2018, there was a sharp decrease in VC in the early and late stages.

Almost half of the global VC investments in RES are solar energy. About 598 million US dollars (about 30% of the total venture financing) was invested in biofuel production. A significant influx of venture investment was recorded in the biomass and waste sector: in 2018, their volume increased 11 times compared to the previous year and reached 241 million US dollars.

The volume of venture financing in wind energy, on the contrary, showed a significant decrease of 57% compared to last year and by the end of 2018, it occupies only a tenth of venture investments in RES.

The largest VC/PE investments in renewable energy are made in the US and Canada. Compared to these countries, the situation regarding the VC mobilization in RES in Europe and other countries of America is perceived as relatively weak, although there are signs of improvement. Venture investments in RES in Europe increased by 68% to 387 million US dollars while in other countries in America – by a factor of 3, to 473 million US dollars.

The gradual development of venture financing for RES projects is also observed in emerging markets. The highest growth of RES venture financing was demonstrated by China, where VC/PE increased more than 5 times to 120 million US dollars.

In the Russian Federation, as in many countries of the post-Soviet space, the venture financing market is in its infancy. However, in recent years, attention to the market from new players has been steadily growing: since 2013, the number of existing VC funds in the Russian Federation has grown by 14% and reached 189 funds (RAVI, 2018). At the same time, the capitalization of VC funds of the Russian Federation for the period from 2013 to 2018 decreased by 462 million US dollars.

At the same time, the volume of transactions with startups involved in the development of RES in countries with developing economies remains extremely low. New projects offering innovative working methods to energy companies continue to face traditional constraints in this market.

According to the experts, the main barriers to VC investments in the RES sector of emerging market countries are the following (Figure 2).

- Regulatory uncertainty in the RES sector
- Adverse macroeconomic environment, including sanctions against the Russian Federation
- Underdeveloped legislation in the VC market
- Insufficient number of interesting projects in the renewable energy sector
- The lack of instruments for structuring venture projects common in international practice (convertible loan, options, indemnities, tag along, drag along, etc.).

As other factors complicating the implementation of venture projects in the RES sector, the experts pointed to the following:

- Excessive interference of regulatory bodies in the activities of business entities
- Lack of confidence in the judiciary system
- Lack of startup support organizations in renewable energy.

As the most favorable factors for investing in new energy technologies, the experts named the following (Figure 3).

- Availability of natural resources and climatic conditions
- Growing demand for electricity
- Availability of RES support tools.

Figure 2: Barriers complicating the implementation of venture projects in the RES sector

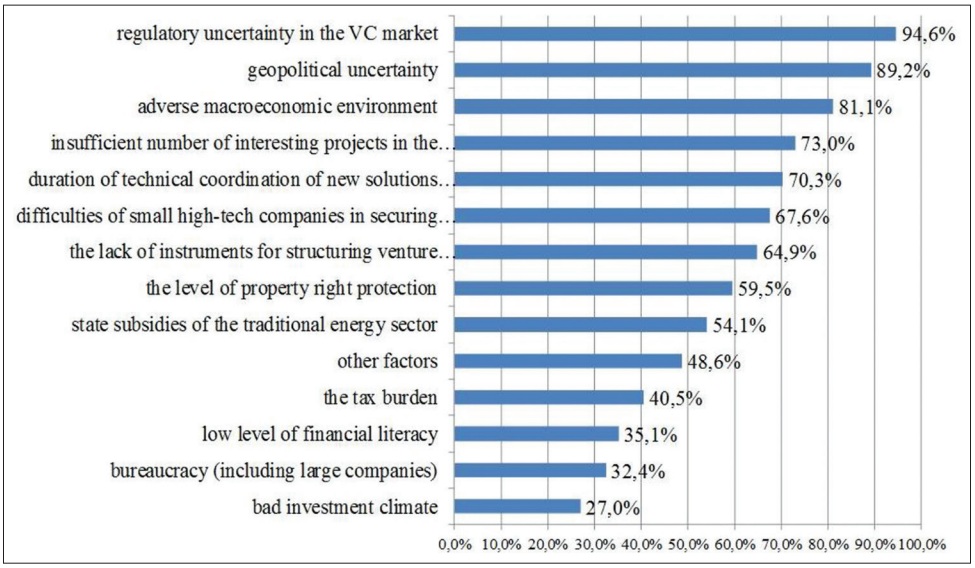
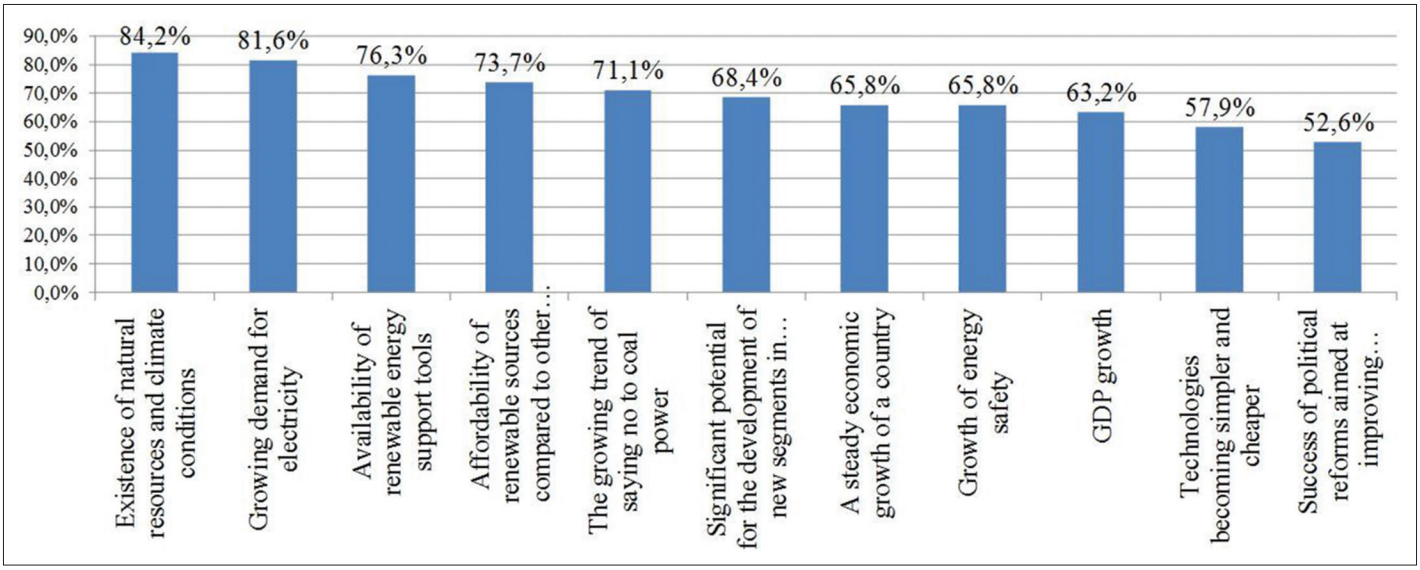


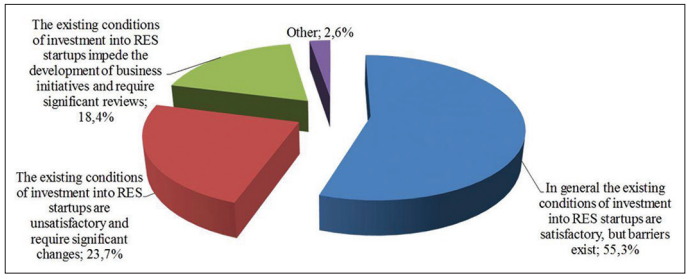
Figure 3: Favorable factors for investing in new energy technologies



On the whole, only 26.3% of the experts believed that a favorable investment climate has been created in the studied countries for investment in RES. More than 10.5% of the experts assessed the level of investment attractiveness of the sector as low (Figure 4).

Thus, the results of the study showed that the RES sector has a certain attractiveness for venture investors. However, the existing barriers pose a problem, and overcoming them requires additional resources.

Figure 4: Assessment of investment conditions in the RES sector



5. DISCUSSION

The results of the expert survey showed that the priority task of the industry energy strategy is to remove the barriers that impede the development of the VC market.

Most experts (73.6% of the respondents) agreed that to increase the volume of the VC market, it is first necessary to stimulate the attraction of free capital for innovative startups in the RES sector (Figure 5).

As the most promising VC sources, the experts identified: corporations, including in the form of corporate venture funds (39.5% of the respondents); private investment (31.6%), and non-state pension funds and insurance companies (23.7%).

Corporate investors and individuals are the most important sources of VC investments in RES sources. Large institutional investors, such as pension funds, insurance companies, banks, and endowment universities, which are the most important VC sources in the US, play, however, a less prominent role in Europe, except for the UK, the Netherlands, Sweden, and Denmark.

To engage corporations and private investors in the VC investment market in the RES sector, the experts suggest providing additional incentives. Among such incentives, it is possible to name, first of all, tax incentives by analogy with the incentives applied in developed VC markets (Figure 6).

For countries with developing VC markets, foreign experience in tax incentives and other government support measures may be of interest. An example of tax incentive schemes to stimulate investment in VC is the experience of leading European economies.

The "entrepreneur-investor account" scheme in France allows individual shareholders to reinvest profits from entering a new startup or venture fund without immediate taxation (deferred taxation). This scheme encourages reinvestment of funds by experienced entrepreneurs, which helps create a powerful network of business partners.

In the UK, individual shareholders (directors, partners, employees holding at least 5% of the shares) of a company can benefit from a 10% reduction in capital gains tax for the sale of their business for up to 10 million pounds.

The German Grant INVEST program provides advance assistance to private and corporate investors in the form of a 20% investment in starting shares. The novelty of this scheme is that the benefit is in the form of a grant, not a tax credit. This allows solving the problem of many cross-border investors who do not have tax obligations in the jurisdiction against which they could use the provided tax credit.

About 78.9% of the experts noted the importance of normative drafting and giving civil law status to VC investment instruments

Figure 5: Priority measures to increase venture investment in the RES sector

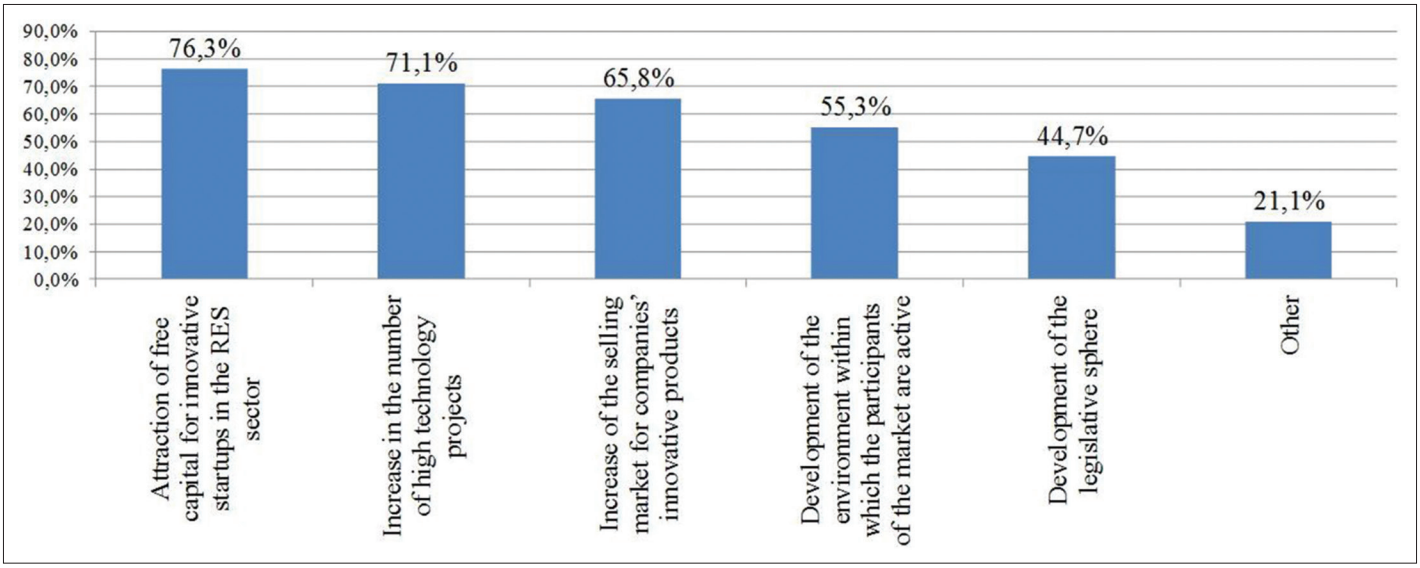
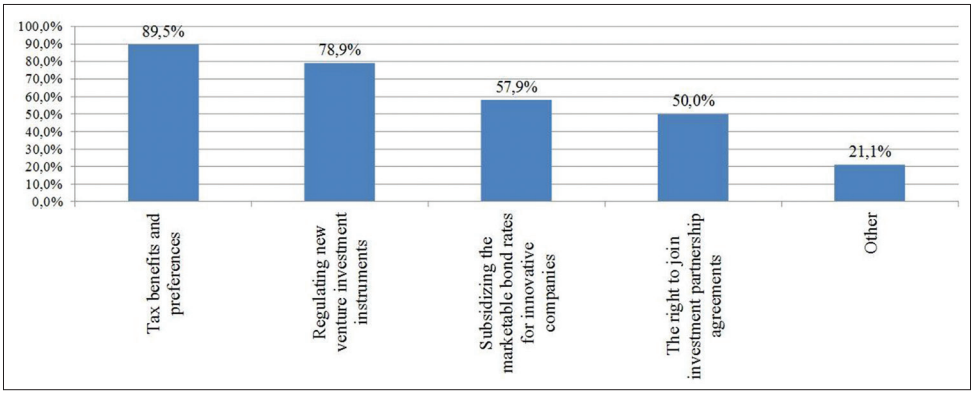


Figure 6: The main mechanisms for stimulating the influx of venture investments in RES sources



that have a widespread application in the global market, such as crowd funding, convertible loans, and convertible bonds, after completing a detailed study of the relevant initiatives.

Crowd funding, as a new financing channel, can provide greater financing flexibility for individuals and small business firms, as they usually face greater difficulties in accessing bank loans. Moreover, it provides new products to investors to diversify their investment portfolios, especially in new RES startups, which are considered to have greater growth potential.

It is necessary to study measures of state regulation of the experience of world leaders in the field of crowd funding. Global regulators tend to take a catalytic approach to crowd funding compared to existing securities regulatory regimes. Against this background, in recent years, regulatory regimes of crowd funding in many developed countries, including the US, the UK, Japan, South Korea, New Zealand, and Finland, have been weakened.

The US is widely regarded as a global pioneer in the field of crowd funding, supported by its powerful development in startups. The United States has introduced a new crowd funding regulation regime to reduce compliance requirements for platform operators and securities issuers while protecting investors. In April 2012, the Jumpstart Our Business Startups Act (the "Jobs Act") was passed to support startups. The main regulatory features are summarized below:

a. A new type of regulated intermediary: A new type of Internet intermediary (i.e., a financing portal) is being created to offer securities to the public. All crowdfunding portals must be registered with the Securities and Exchange Commission (SEC) and the financial industry regulatory authority (FINRA), although compliance requirements are less stringent than for brokers and dealers in the securities market
b. The top limit on funds raised by the company: fundraising companies must be registered in the US and the company can raise no more than 1.07 million US dollars through crowd funding platforms over (Research Office. Legislative Council Secretariat, 2017)
c. Exemption from the prospectus of securities and disclosure requirements: fundraising companies are exempted from preparing the prospectus of securities, but they must submit to the SEC and disclose to investors business information in the form of an application for placement, including the structure of capital, directors and officers, business plan and risks, intended use of funds and financial statements

d. Investors' investment limit: all US citizens can invest in crowd funding, but there is a limit on investment levels for any 12 months
   Those investors whose annual income or equity of assets to be invested below the threshold of 107,000 US dollars can invest up to a larger amount: (1) 2200 US dollars or (2) 5% of the lesser part of its annual income or net worth of invested assets. However, if their annual income and net worth of invested assets exceed the threshold, they can invest up to 10% of their annual income or net worth of invested assets, whichever is less but taking into account the upper limit of 107,000 US dollars.
e. Risk recognition and the right to withdraw funds: US investors investing in crowdfunding must fill out a questionnaire recognizing the potential risks of such investments. They also have the unconditional right to refuse investment for any reason no later than 48 h before the expiration of the period indicated in the placement materials.

According to a special SEC report, the new crowdfunding regulation regime in the US has proved its effectiveness and has significantly increased investment in startups in various industries (US Securities and Exchange Commission, August 2017).

According to the experts (71.1% of the respondents), the second most important priority area for attracting venture investments in the RES sector is to create conditions for ensuring the growth in the number of high-tech projects that are competitive in the global market.

Regarding priority measures to increase the number of high-tech projects, almost half of the experts (47.4% of the respondents) considered it necessary to expand the technological infrastructure to ensure the implementation of innovative developments. About 28.9% of the experts considered increasing the level of entrepreneurial competence of graduates of technical universities and representatives of the scientific community a priority measure. About 18.4% of the experts (7 respondents) noted the expansion of the set of elements of the service infrastructure as a priority measure, including on the "packaging" of projects available to innovative entrepreneurs.

Thus, the implementation of the above set of measures will eliminate the shortage of competitive ideas for implementing venture projects in the RES sector, and will also increase the number of entrepreneurs with sufficient competencies to launch their own business, develop it and present it to investors.

6. CONCLUSION

The study is of great importance for all participants in the venture market, which presents the results of a study of the opinions of key market participants on the existing barriers and success factors for venture financing of RES projects.

The results of the study confirm the hypothesis put forward on the need to study the successful global experience of venture investment to determine effective mechanisms for attracting venture financing to renewable energy projects.

By interrogating and comparing the views of key stakeholder groups in this study, we managed to identify the main barriers that complicate the implementation of venture projects in the RES sector, as well as to create a comprehensive picture of factors that influence the achievement of success in the VC market.

Studying the opinions of the experts allowed us to identify areas of work to increase VC investments in the RES sector, the priority of which are: raising free capital for innovative startups in the RES sector and increasing the number of high-tech projects.

The results of the expert survey allowed us to identify effective mechanisms for attracting venture financing, considering the best international practices of applying these mechanisms in countries with a developed VC market.

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