НАУЧНАЯ СЕКЦИЯ «НОВЫЕ МАТЕРИАЛЫ. ПРОМЫШЛЕННАЯ ЭКОЛОГИЯ И ЭНЕРГОСБЕРЕЖЕНИЕ»

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THE OPERATIONAL EFFICIENCY OF CHINA'S ECONOMIC ENERGY SECTOR FROM THE PERSPECTIVE OF MARGINAL ANALYSIS

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Summary. *The article presents the trends in the development of China's energy construction and analyzes the reasons for significant technological advances in this field of activity. Based on marginal analysis, the efficiency and sustainability of the functioning of China's energy field is shown.*

The energy sector is crucial in the functioning and development of the economy. Since its inception, China has been conducting research in the field of energy. The Chinese invention has been adopted as the global highest UHV transmission technology by establishing in 2009 the world's first transmission line of the UHV with a voltage of 100,000 V in the country's central region. The cost of creating energy infrastructure is a serious problem for UHV technology, and over the past five years, the average annual cost of UHV transmission infrastructure has reached 109.2 billion yuan. Likewise, China has made significant investments in the development of "green" energy: in talents and infrastructure for the production of solar energy and energy construction. and as of the end of 2015, the production of four key components of photovoltaic production – polysilicon, silicon wafers, elements and modules – ranked first in the world. The main component of industrial investment in the solar energy sector is the cost of technological research and development. Excluding social investment resources from various components, the five-year investment plan for China's photovoltaic sector could amount to 120 billion yuan.

There are at least three motives that explain China's huge R&D costs in the sulfur energy sector.

1. The Chinese government is looking for the truth in the facts to solve the problem of the unbalanced distribution of energy supply and demand. The metropolitan agglomerations in China's capital, east, south and center have the strongest energy demands; the regions with the highest energy supply are primarily distributed, not concentrated. Natural gas and oil resources can be found in large, sparsely populated areas in northern and western provinces such as Heilongjiang and Xinjiang. Despite the fact that these areas have a strong industrial basis for extraction, on-site processing, and conversion, energy transmission is unquestionably the most effective and cost-effective technique. The UHV transmission system further reduces transmission costs while increasing transmission efficiency. Theoretically, the transmission length limitation and power loss per unit circuit length decrease with increasing voltage in the circuit. The Chinese government's investments have turned this hypothesis into reality. The successful transmission of Western electricity to eastern industrial cities with minimal losses has become possible thanks to a combination of ultra-high voltage AC transmission lines with a length of more than 1,000 kilometers and ultra-high voltage DC transmission lines with a length of less than 1,000 kilometers.

2. The Chinese Government recognizes the social and financial benefits of energy development. The development of new energy in China is still influenced by the country's excessive use of fossil fuels and the growing demand for energy. The new energy technology represented by solar energy, which also has a universal geographic distribution, is improving the structure of the energy supply. China recognizes the social benefits of the solar sector, which can help solve environmental problems caused by the excessive use of traditional fossil fuels. The development of photovoltaic technologies is encouraged and promoted by Chinese R&D investments in this sector. The creative research and development of Chinese scientific and technical personnel in the production of mod-

ules for the photovoltaic industry has led to an increase in production costs and efficiency to such an extent that they have become the standard for the industry. These are some of the internal reasons for China's energy construction, and it is extremely important to invest in high-tech energy construction with new technologies in order to optimize production capacity, increase contributions to national science and technology.

3. The energy sector of the economy is a highly profitable sphere of industrial and social infrastructure. The marginal cost of setting up energy infrastructure is decreasing yearly, despite the fact that the initial cost is significant. Long-term returns on investments in energy technology are positive. In addition, energy construction has a cumulative impact on other sectors of the economy. Because advanced energy technologies offer more reliable and flexible services to the energy supply, they can increase revenue and profit margins. The state-owned electric grid reported annual revenue of 2971.1 billion yuan in 2021, up 11.1 % from the previous year, and total profit was 69.1 billion yuan, up 9.8 % from the previous year. From a development point of view, when the energy infrastructure is almost stable and energy technologies are at the stage of maturity, the costs of technological investments are reduced, and energy revenues remain stable. The initial investment costs will amount to only a small percentage of the substantial return after sufficient electricity is provided. For example, the construction of a hydroelectric power station on a dam “Three Gorges” cost 203.9 billion yuan, but it generates 84.7 billion kWh of electricity per year, social value of over 50 billion yuan. The project will pay off after the twelfth year of operation. According to the marginal cost calculation method: the marginal cost per kilowatt-hour of electricity is equal to the sum of the power plant's annual maintenance costs and wage costs, then divided by the number of kilowatts generated per year, it does not exceed 0.0473 yuan per kilowatt-hour. After the saturation of demand for energy services, marginal income is relatively stabilized, is 0.25 yuan per kilowatt-hour. As a result, the project will continue to be lucrative as 17.3 billion per year and annual profit margin of 44 %. The development of electricity in the “Three Gorges” is unquestionably a high-return investment and other energy projects as well.

Based on the analysis above, we have reasons to draw the following three conclusions about China's investment in the energy sector.

1. The choice of whether the national energy technology level is progress or not, China has chosen positive, and leave no one behind. When it comes to addressing its own issue with the uneven distribution of energy supplies, China has decided to take a hard position and adopt a decisive approach. Similar to the way the Chinese power grid used dozens of poles per person to supply energy to the distant mountainous parts of China, The Chinese government is committed to overcoming practical challenges, just like electricity. Mathematics and statistics cannot be used to assess this form of problem-solving, the pursuit of truth from facts, and attitudes. In actuality, this high-coverage technological power grid will ultimately offer good news to the entire population, give the highest social and economic value, as well as serve as a strong basis for the growth of industrialization and support regional and national development.

2. Effective energy investment brings additional benefits of high-tech and scientific research talents. Throughout order to achieve the integration of production, education, and research, which is also a significant contributor to China's advancement in energy science and technology, the Chinese government established a large number of electrical engineering and energy research laboratories in colleges and universities at the beginning of the investment. China has taken up all four of the new technology committees overseeing the 36 international power standards after technological advancements and practical implementation. And the foundational technologies already in place, those which follow the top benefits, support the advancement of technology and speed up technological progress. The top edge effect may be followed by current energy technologies, accelerating the development of higher technologies.

3. China's energy construction investment is a favorable behavior to improve efficiency and reduce costs. A stable regular cycle will eventually arise as the yearly marginal cost steadily declines and the profit and profit rate gradually rise. We have no reason to doubt that the Chinese government's sizable investment in energy infrastructure will yield an infinite return, and we have

good reason to think that the nation's top electrical engineering technology will continue to benefit the power supply systems of all nations, enabling the international society to advance more quickly.

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ECOLOGICAL IMPORTANCE OF TRICHODERMA SPP. AND THEIR SECONDARY METABOLITES FOR ORGANIC FARMING

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Summary. *The development of organic farming around the world and in Belarus in the last 10–15 years has shown the importance of studying and introducing biological methods for combating plant diseases. For this, studies of various microorganisms are carried out throughout the world, which can become the basis for modern plant protection products that do not damage the environment and human health.*

The widespread occurrence of fungi of the genus *Trichoderma* attracted our attention due to the possibility of isolating and studying them to identify new highly active strains with a protective function, as well as useful for agriculture. For example, many people, including my family. Are engaged in composting plant residues in order to obtain organic fertilizer. Adding *Trichoderma* to such a compost would speed up its maturation and also give it the property of a plant protection product.

Therefore, the goal of our work was to create a collection of *Trichoderma* strains of various origins and conduct a comprehensive study of it in order to select isolates that are most promising for crop production. To achieve this goal, we solved a number of tasks:

1. Take samples of soils and other materials for the isolation of *Trichoderma*;
2. Carry out the isolation of mushrooms from the collected sources and take samples of *Trichoderma*;
3. To select homogeneous morphotypes of *Trichoderma* to create a collection of isolates;
4. Study isolates for a complex of morphological characters;
5. Study the growth rate of the collection isolates using different carbon sources;
6. To evaluate the antagonistic activity of *Trichoderma* isolates from the working collection in relation to a number of plant pathogens;
7. To identify in the collection of *Trichoderma* isolates producers of siderophores;
8. To evaluate the resistance of *Trichoderma* isolates to some fungicidal preparations;
9. To study the ability of *Trichoderma* isolates to grow at 37 ^{o}C.
10. To characterize the diversity of the collected collection of *Trichoderma* isolates according to the complex of the studied traits and to highlight the most promising for use in plant growing.

We have used a number of standard microbiological methods to locate, isolate, collect, maintain and preserve isolates of *Trichoderma* fungi. We also used special published methods to describe isolates and study their special characteristics: growth rate on various substrates and under various other conditions, the ability to release secondary metabolites, antagonism towards phytopathogenic fungi.

As a result of the experimental work, we have created a collection of fungi of the genus *Trichoderma* and described it according to different parameters. We have also identified the most promising isolates for creating a biological plant protection product.

The scientific novelty of the work lies in the collection and study of new, previously unexplored *Trichoderma* isolates. The practical and economical significance of the work lies in the collection and assessment of a wide range of *Trichoderma* isolates for some important economic traits,