MODELS OF ECO-INDUSTRIAL PARKS FOR THE PURPOSES OF SUSTAINABLE DEVELOPMENT IN VIETNAM: STATUS QUO AND REGULATIONS

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ABSTRACT

Sustainable development is the objective of every country in the world since it calls for solutions being addressed simultaneously for socio-economic development and environmental protection. As a result, eco-industrial parks are introduced as to realize the stated goal in process of developing the industries. This model is essential for Vietnam to develop sustainable industrial development while protecting the environment through resource and energy use efficiency. With this approach, the paper will refer to the reality in forming and implementing eco-industrial parks as well as Vietnam's regulations applied in this scenario. Based on the stated foundation, the paper will also propose several solutions to improve the related laws and enhance the capacity in constructing as well as developing the eco-industrial parks in Vietnam in the near future.

Keywords: Eco-industrial Parks, Vietnam, Sustainable Development, Industrial Development, Environment.

INTRODUCTION

In 1987, the World Commission on Environment and Development, which had been set up in 1983, published a report entitled "Our common future". Sustainable development is defined as follows: Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The above opinion mainly focuses on the aspects of optimizing the efficiency in using natural resources and in maintaining the living habitats for humans during the process of development. Currently, the features of the ecosystems and the economies are commonly intertwined on local, national, and international scales. Therefore, sustainable development acts as a model that optimizes the economic and social benefits in the contemporary society without causing harms to the potentials of similar opportunities in the future. The comprehension of sustainable development was reaffirmed in the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 and was completed at the World Summit on Sustainable Development in Johannesburg in 2002. Accordingly, sustainable development is the process with harmonious and reasonable combination of three aspects of growth: economic, social development as well as environmental protection, especially in tackling pollution, recovering and improving environmental qualities; preventing wildfire and deforestation; exploiting and using natural resources economically (United Nation, 2002). In order to realize the objectives of sustainable development, handling ongoing problems thoroughly in economic, social, and

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environmental fields is strictly required (Hoang, 2017; Maho, 2008). With such approach, the introduction of eco-industrial parks is widely considered as one of the most effective existing models that contribute substantially to the economic growth since the connection and the harmony of all three aforementioned factors are assured.

The eco-industrial park is the common space, if not a community, for manufacturing and service companies, in which the members seek to heighten the efficiency of the environment, of the economy, and the society by cooperating in managing issues related to the conditions of the environment and natural resources. By working together, member enterprises strive for collective benefits instead of pursuing individual ones by optimizing their own productivity (Matteo, 2015). On the other hand, in the eco-industrial parks, industrial infrastructure is well-designed as the chain of ecosystems with harmonious compatibility with the contemporary natural ones, which minimize the amount of incurred pollutants while maximize the possibility of recycling materials and sources of energy. Additionally, the objective of eco-industrial parks is to build industrial systems containing vast numbers of independent, self-sufficient factories, yet with voluntary cooperation, to form the "*symbiotic relationships*" with each other and with the surrounding environment (Nguyen, 2005).

In the current era, eco-industrial parks are commonly categorized in different sections including ones for agriculture, renewable natural resources, and renewable energy. The stated variation exists based on the distinctness of each country's policies in national developments, features of natural as well as socio-economic conditions in the designated constructing areas or in the existing traditional industrial zones with future reconstruction. No matter which sections are chosen, factories in the eco-industrial parks always seek economic benefits and efficacy in protecting the environment by supervising the capacities of energy, water, and available materials for uses.

According to Ernest A. Lowe, there are seven fundamental rules for building an industrial park into eco-industrial one: Harmony with nature; Energy systems; Management of materials and waste; Water supply and drainage; Effective general management; Construction / Renovation; merge with the local communities (Ernest, 2001). With such approach and under the perspective of environmental protection as well as sustainable development, eco-industrial parks provide numerous benefits such as: preserving natural resources and financial sources; reducing costs for manufactures, energy, and materials; improving productivity, qualities of products, and environmental conditions; making positive impressions to the customers; raising the incomes of each factory by lessening the consumptions of raw materials, minimizing costs for handling disposals; generating profits from the sources of discards or scraps (Monre, 2013; Nancy, 1998).

Therefore, developing eco-industrial parks closely links to the growth of green industry, in which it helps save inputs of energy and materials, increase the usage efficiency, lessen the fuel imports while lifting the burden of trade deficit for the economy, create more job opportunities in contribution to poverty reduction as well as assure the sustainable well-being of the environment for future generations (Nguyen, 2019).

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RESULTS AND DISCUSSION

Reality of the Development of Eco-Industrial Parks in Vietnam

With the benefits from eco-industrial parks and the purpose of sustainable development, until now, Vietnam has industrial areas following the eco-industrial model and here are the most noteworthy ones:

Nhon Trach 2 Industrial zone was established in 1997 in zone 2 of Hiep Phu and Phu Hoi communes with 347 hectares in area and carries out several industrial fields in sewing, engineering, manufacturing construction materials and wooden products, food, chemicals and chemical cosmetics, household appliances, etc. Nhon Trach 2 has formed a system of using waste, carton papers to make carton boxes; using silks and scrap yarns to produce rags and cotton dust, etc. Aside from that, the external system is also built to recycle scrap plastic, papers, and carton while solid waste, toxic exhaust, and polluted water are processed to be reused in toilets for workers (240 cubic meters/day), in watering plants (500 cubic meters/day) and the resulting liquid waste is estimated to be 7.500 cubic meters/day (Tien, 2014).

Bourbon An Hoa Industrial garden was established on the 30th of October in 2009 and is considered as the first industrial zone in Vietnam that meets all the requirements of eco-industrial parks. The scale of this zone reaches up to 1.020 hectares in area and it is able to hold hundreds of enterprises. In details, industrial land only occupies approximately one-third of the whole and 15% of the total area is strictly required for trees. Additionally, investors are forced to secure 30% of the whole for planting grass and trees, which leads to the increasing spaces of green grass. Besides, an A-tier centralized wastewater treatment plant is built with the obligation of processing partly-cleansed waste water from nearby manufacturers in the zone in order to dispose safely to the surrounding environment with the total capacity of 30.000 cubic meters/full days (Nguyen, 2020).

Nam Cau Kien eco-industrial Park was opened in Haiphong by Shinec JSC currently being a highly-appreciated investor in the market. This zone follows the model of industrial area – park, which has proven to be eco-friendly. Not only that, the surrounding land is well-planned into a buffer zone and also serves the purpose of providing fresh food to the industrial park. With the remaining spaces after land acquisition, farmers are still well-off by receiving guidance from the investors in cultivation, cattle and poultry husbandry, fishery, etc. Furthermore, the resulting products are consumed by the industrial park at a stable rate.

With the reality in forming and developing the eco-industrial parks and the purpose of spreading the model on a larger scale, since 2012, the Ministry of Planning and Investment cooperating with the United Nations Industrial Development Organization has constructed the project called “Implementing the ideas of building eco-industrial parks toward the model of sustainable industrial parks in Vietnam.” Until 08/2014, the project was approved by the Prime Minister and funded $4.5 million of non-refundable aid by the Global Environment Facility and Swiss Federal Economic Bureau. The main objective of the project is to reconstruct the existing industrial parks into the eco-industrial ones and Khanh Phu, Hoa Khanh, Tra Noc 1 and 2 industrial parks were chosen as the testing samples. The project also assists the enterprises in adopting the necessary technology and cleaner methods of production in order to make cutbacks in greenhouse gas and enhance the efficacy in energy usage. Another highlight of the project lies

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on the network among businesses in contribution to minimize not only the negative effects on the environment but also the costs of production. Currently, the project has finished re-evaluating the past manufacturing activities and processes as well as the reality in technological foundations in companies with potential participations. Besides, handbooks on how to approach Green Credit fund for members are also drafted while future activities are being planned and soon to be carried out (Tam, 2015). Recently, the Ministry of Planning and Investment in collaboration with the United Nations Industrial Development Organization and the State Secretariat for Economic Affairs of Switzerland officially launched the project "*Eco-industrial Park Intervention in Vietnam - Perspective from the Global Eco-Industrial Parks Programme*" at the inception workshop in Ho Chi Minh City on 22 Nov. 2020. The project has a total budget of USD 1,821,800, out of which USD 1,638,000 is official development assistance from the Government of Switzerland, through its Swiss State Secretariat for Economic Affairs, and a co-funding of USD 138,800 from the Ministry of Planning and Investment. The Project will be implemented in Hanoi and 5 provinces/cities, namely Ho Chi Minh City, Can Tho, Dong Nai, Da Nang and Hai Phong in 36 months (United Nation, 2020). The above examples show that, until now, the number of eco-industrial parks in Vietnam is still insignificant compared to the total amount of traditional ones so, for the objective of exponentially scaling up the model, creating an appropriate legal system with details and consistency is highly recommended.

Vietnam's Regulations about Eco-Industrial Parks

In terms of legal aspect, with the ongoing environmental problems caused by industrialization, Vietnam has clarified the policies in sustainable industrial development toward the direction of greening the existing industries by laws. Accordingly, on 25/09/2012, the Prime Minister has enacted 1393/QĐ-TTg to approve the national strategy on green growth, which considers green growth as one of the key points of sustainable development. Aside from that, the responsibility to accelerate the pace and efficiency to contribute to the national strategy on climate change is also assigned strictly. To be more specific, the goal of 2011 – 2020 is to cut back 8% to 10% the amount of greenhouse gas in 2010, to reduce energy consumption in GDP by 1% - 1.5% each year and, by 2030, to lessen the amount of greenhouse gas by 1.5% - 2%. In addition, the strategies for industrial development of Vietnam until 2025 and until 2035 are authorized by the Prime Minister (according to 879/QĐ – TTg on 09/06/2014), in which the importance of developing green industries sustainably and protecting the environment as well as focusing on promoting supporting ones are emphasized to help Vietnam join the Global Value Chain. Therefore, the model of eco-industrial parks needs to be examined thoroughly and well-adjusted in order to better tackle environmental issues, to develop supporting industries, to play a role in realizing the strategies of green growth and of industrial growth.

However, until May in 2018, implementation is facing the fact that regulations in Vietnam about operating and running industrial parks are limited with rules on planning and on the system of policies on development. In fact, the lack of specific regulations on eco-industrial parks has raised questions in the scenario that a few eco-industrial parks are

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already put into work in several areas. On 02/11/2016, the Prime Minister assigned the tasks to the Ministry of Planning and Investment (written on the 9461/VPCP-KTN document), in which Decree No. 29/2008/NĐ-CP on industrial parks, export processing, and economic zones are replaced; Decree No. 164/2013/NĐ-CP on 12/11/2013 modified with additions the Decree No. 29/2008/NĐ-CP; Decree No. 114/2015/NĐ-CP on 09/11/2015 improved parts of Decree No. 29/2008/NĐ-CP on industrial parks, export processing, and economic zones. Accordingly, regulations on new model of industrial parks including eco-industrial ones would be taken in consideration. As a result, on 22/05/2018, Decree No. 82/2018/NĐ-CP on managing industrial and economic zones was approved and announced. This event marked the crucial change in approaches of environmental laws in Vietnam about forming a connection between sustainable developments and greening industries. For the first time, problems related to eco-industrial parks are officially addressed in a legal document.

The aforementioned decree has clearly stated three objectives in developing eco-industrial parks:

1. Improving the economic efficiency of businesses in the parks by applying clean methods of production, using resources with efficacy, and building the "industrial symbiotic relationships."
2. Improving the efficiency in protecting the internal and external environment regarding the parks by reducing the pollutants and waste, encouraging the uses of clean technology and eco-friendly methods of production.
3. Forming enterprise communities in the parks with fair competitiveness in the market, protecting and development the living habitats for the surrounding communities, and putting the goals of sustainable development in practice.

In order to achieve the objectives, four groups of regulations stated in legal documents are formulated:

First Group: Regulations on Promoting the Development Eco-Industrial Parks

For the purpose of expanding the scale of eco-industrial parks, the government of Vietnam has encouraged and supported the organizations and individuals in investing in establishing, both wholly or partly converting the industrial parks approved by the competent authority into eco-industrial model. More specifically, investors who develop infrastructure, rent as well as sublease the existing land in the parks are granted benefits on their future investments in industrial zones, which include the help in paperwork, technical consultation, investment promotion, and information on investment cooperation.

The government of Vietnam also encourages enhancement and completion on infrastructure of not only the parks but also of the social and technical aspects from the aforementioned investors. Besides, providing high-quality services and assisting enterprises in executing the "industrial symbiosis" for better conversion from traditional industrial zones into eco-industrial ones are also promoted. Additionally, companies in the industrial zones are urged to improve management and operational systems while keeping the technological foundation up-to-date with cleaner practices, fewer pollutants, more efficient waste recycling, and more effective uses of resources. More than that, the stated enterprises are also fostered to cooperate

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with each other and with the third parties for not only using shared spaces for services but also for partaking materials and other manufacturing inputs. Furthermore, each enterprise is allowed to recycle wastes, scraps, and redundant energy to reduce the required costs while strengthening the operating efficacy as well as competitiveness (Articles 33 and 44 of Dicree No. 82/2018/NĐ-CP on regulations to manage industrial parks and economic zones).

Second Group: Regulations on Benefits for Enterprises in the Eco-Industrial Parks

The eco-industrial parks are exposed to several incentives such as priority in loaning capitals from the Environmental Protection Fund of Vietnam, Vietnam Development Bank, and other finance organizations as well as from both foreign and domestic sponsors for building technical infrastructure, implementing cleaner methods of production, using resources and carrying out the idea of *"industrial symbiosis"* more efficiently. Furthermore, companies developing infrastructure of the eco-industrial parks are prioritized in participating in programs for technical supports, investment promotions organized by the government. Additionally, enterprises in the eco-industrial parks are also granted early access to information on technology market and on the possibilities of cooperation to execute the plans of creating "*industrial symbiotic relationships."*

Third Group: Regulations on Criteria of Eco-Industrial Parks

Similar to other enterprises, eco-industrial parks require not only strict compliance of laws in business, environmental protection and labor but also thorough basic services as the first criterion. Additionally, several other specific criteria are laid out:

1. At least 90% of the enterprises in the parks need to be aware of the effective usage of resources and cleaner production. Besides, at least 20% of them apply the provided solutions for both the aforementioned former and latter factors while renewing and improving management as well as technology for production in order to minimize wastes, pollutants, and scraps.
2. At least 25% of the industrial land needs to be secured for green constructions, traffics, and service infrastructure in accordance to the standards approved by the Ministry of Construction.
3. At least one "industrial symbiotic relationship" is established and at least 10% of the total amount of enterprises participates in the "*industrial symbiotic*" network.
4. Solutions to ensure accommodations and other types of social, cultural, sporting constructions for the laborers in the parks.
5. Supervising system to manage the inputs and outputs of the parks in using energy, water, production materials, intoxicate chemicals. Besides, annual reports on achieved outcomes in the effective usage of resources as well as supervision on handling wastes of the industrial zones are asked to be submitted to the management board of the zones and the local economic ones.
6. On a yearly basis, investors are obliged to submit reports on environmental protection, social responsibilities, and contribution to the surrounding community, to the management board of the parks, to the economic zones in the local areas and to the websites of the related companies (Article 42 of Dicree No. 82/2018/NĐ-CP on regulations to manage industrial parks and economic zones).

The aforementioned criteria not only prove their importance in assisting investors and the government to have necessary foundations to plan, to invest in construction, and to manage eco-

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industrial parks but also serve as the basis to differentiate them from their existing traditional counterparts.

Fourth Group: Regulations on Procedures and Registration to Approve the Eco-Industrial Parks

First step: Preparing paperwork: Investors and developers of the industrial infrastructure need to prepare 04 dossiers of registration for approval and submit them to the boards of management of the parks and the local economic zones. More specifically, in the stated sets of documents, investors are asked to specify their competence in satisfying the pre-requisites and the criteria of the eco-industrial parks.

Second step: Receiving and processing applications: The board of management of the industrial parks and the economic zones is responsible for assigning the tasks to the permanent departments. Within 03 business days since the dossiers are received, the management board of the parks and economic zones is obliged to submit the documents to the Ministry of Planning and Investment, Ministry of Natural Resources and Environment (2013) Ministry of Industry and Trade, and Ministry of Construction for further directives.

Within 07 business days since the proposals from the management board of the parks and the economic zones are received, the stated agencies will justify the eligibility of the applicants in regarding whether or not the criteria of the eco-industrial parks are met. Within 15 business days since the directives from the above ministries are received, the management board of the parks and the economic zones is responsible for preparing reports and evaluations of whether or not the criteria are met.

Third step: Returning results: In the case that all criteria are met, the management board of the parks and the economic zones needs to report to the Provincial-level People's Committees to grant certifications to the industrial parks as eligible to be eco-industrial ones. On the other hand, if all criteria are not met, within 03 business days since the results are returned, the management board of the parks and the economic zones is obliged to send written announcements to the enterprises with reasons included (Article 44 of Dicree No. 82/2018/NĐ-CP on regulations to manage industrial parks and economic zones).

In conclusion, with four groups of regulations above, we can see that the current laws only build the initial principled foundation in order to assure the legal basis for the establishment and the development of the eco-industrial parks. Therefore, detailed regulations for future implementation, especially for the problems in the conversion process from traditional industrial parks to the eco-industrial ones, are highly needed.

Suggestions for Improvement

From the above analysis, in order to guarantee the strict, specific, and consistent legal system for the establishment and the development of the eco-industrial parks in Vietnam, solutions to timely tackle the ongoing issues are laid out below:

Firstly: Complete the regulations to promote constructing and developing the eco-industrial parks:

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1. Complete the regulations to promote constructing and developing the eco-industrial parks in the Environmental protection laws. This is a general code on protecting the environment in all fields, including all production-related activities to achieve sustainable development. Even though this law recently modified in 2020 and in effects since 2022 encouraged activities on protecting the environment, constructions and developments on the eco-industrial parks are still not included.
2. Adding more investment projects to promote the eco-industrial parks as the recipients of extra incentives and additional assistance on protecting the environment stated in the Environmental protection laws in 2020. This is an important legal basis to implement forms of incentives to support the construction as well as to encourage investment and development of eco-industrial parks.
3. Enacting detailed regulations on the land rental fees and exemptions for businesses and land tenants when investing in the construction of eco-industrial parks.
4. Enacting supportive regulations on searching and applying systems of green technology, eco-friendly technological processes such as providing assistance on capitals and on technical aspects.

Secondly: Specifying the forms and levels of incentives for activities of converting traditional industrial parks into eco-industrial ones.

The key features of industrial ecology may be resumed as follows: the interacting eco-systems, cycling of materials and energy, networking and cluster building and sustainable development (Gibbs & Duetz, 2007). Therefore, the locations for eco-industrial parks hold crucial roles. However, it is not that simple. Additionally, in the case in which brand new eco-industrial parks are built, the costs for this system are excessively high and heavily dependent on the potential of the technical infrastructure of the whole region. In the scenario that the number of the current traditional industrial parks is relatively high and the occupancy rate is not, converting them into eco-industrial parks is more appropriate (Monre, 2013). However, this solution faces many obstacles such as:

1. Difficulties in building industrial ecosystem for semi-finished products, by-products, waste materials and energy input, output, transported in several existing enterprises and converted into environmental protection technology.
2. Difficulties in solving conflicts among the members and newly-joint businesses in the eco-industrial parks.
3. Difficulties in accurately evaluate the capabilities of the technical infrastructure and other service systems for the purpose of converting into the new technical infrastructure with environmental theme. Therefore, it will propose challenges for ineligible businesses since leaving or changing production fields to fit in the system are required.

In order to tackle thoroughly the stated challenges, unified legal framework for the conversion from the traditional industrial parks into the eco-industrial ones is needed. As a result, several specific regulations should be enacted such as:

1. Regulations on criteria of the conversion from the traditional industrial parks into the eco-industrial ones and on the requirements of participation for businesses who apply for places in the eco-industrial parks.
2. Regulations on the forms, levels of incentives in terms of taxes, land, and capitals for conversion as well as on the amount of financial aid for the process of technical changes, staff training, etc. to satisfy the requirements of conversion.

Thirdly: Simplifying the regulations on the orders of procedures to speed up the reform of administrative work.

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The development of the model of eco-industrial parks requires the need to reform administrative procedures in the aspect of managing the country and the industrial parks for the more favorable environment for businesses and investments, especially the application of the "*inter-agency one-stop-shop mechanism*" in the management board of the industrial parks and the focal agencies in the province/city regions. At the present time, following the regulations, the management boards of the industrial parks are authorized to implement specialized functions and tasks such as construction, labor, environment, and commerce. However, the authorization processes in many local areas are not consistent, which proposes many challenges in implementing state management toward the industrial parks as well as in assisting, handling obstacles for the investors. In the situation of the current authorization processes and of the present administrative procedures in the traditional industrial parks, developing the eco-industrial model likely faces many difficulties in attracting investors, for instance. Therefore, executing the administrative reforms in state management of the industrial parks requires close cooperation among departments of all levels in order to generate promising results.

Fourthly: Strengthening the financial and technical assistance in the development of the eco-industrial parks.

Regarding the investments in the eco-industrial parks, the initial costs are usually higher and the amounts of time to recover the capitals and to generate profits are longer compared to the counterparts in the investments in the traditional industrial parks. Consequently, investors need to assure their financial commitment for longer periods. Simultaneously, At the same time, there must be a certain number of enterprises investing in production technology and it is mandatory to constantly consult the most up-to-date technology when evaluating the technical and financial feasibility (Edward & Judy, 2003; Romana, 2008). As a result, in the current conditions, the investment capacities of the businesses in Vietnam are relatively limited so the decision of whether or not to invest in the eco-industrial parks remains a major challenge. Hence, assistance from the government in policies and solutions are highly needed such as:

1. Promoting technological transfers; applying clean technology; reducing emissions of carbon; securing safe production methods; and using resources effectively for the enterprises in the eco-industrial parks.
2. Providing technical support and accessing financial incentives for the applications of clean technology and efficient usage of resources for the enterprises in the eco-industrial parks.

Fifthly: Innovating the investment attraction policies: The features of the model of sustainable industrial parks lie on the connection and cooperation among secondary investors in the industrial parks and on the specialized development in several industrial fields. Accordingly, attracting secondary investors to the new model of industrial parks should be more selective compared to the old ones with multi-industry development. Besides, the technical infrastructure of the new industrial parks also needs to follow stricter standards of planning while the construction quality requires more investment capitals, which call for competence in financial capacity and experiences in developing industrial parks from the investors. With the above requirements, the investment attraction and investment promotion policies need to be innovated, in which applying focuses for investment promotion policies helps pick out strategic investors for the eco-industrial parks and generating solutions to attract large-scale, high-tech investors and source technology. In addition, the investment attraction policies need to focus on attracting

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foreign investors since, according to the reality of the recent formation of eco-industrial parks in Vietnam; foreign industrial park developers have been leading the model of developing eco-industrial parks in Vietnam. This is caused by the fact that environmental-protection factor is considered one of the main conditions to attract production projects from international enterprises, which have been complying strict standards as well as regulations on environmental affairs.

CONCLUSION

Eco-industrial Park is still a new model in Vietnam so the number of eco-industrial parks operated nationwide is relatively unsubstantial. With the objective of sustainable development, this model needs to be expanded in scale in order to enhance the efficiency in managing the environmental affairs in industry. Based on the research results, two conclusions drawn are:

Firstly: Vietnam needs to continue completing the regulations in the current laws on eco-industrial parks in order to create unified, specific, and feasible legal environment for the construction and the development of the eco-industrial parks nationwide. Besides, converting traditional industrial parks into eco-industrial ones requires proper and thorough calculations combined with the system of capital assistance, land incentives, and taxes reduction as well as exemption in specific conditions.

Secondly: Technical support, administrative reforms, and investment attraction policies to develop eco-industrial parks need to be implemented soon, which likely create impressions to investors, especially foreign ones with strong financial capacities, experiences, and deep knowledge on environmental protection.

Despite the challenges, the development of eco-industrial parks is in fact an indispensable need of Vietnam during the integration trend and sustainable development. Furthermore, it will play a pivotal role in the contribution of mankind to protect the environment for the current and future generations as well.

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