The Relationship and Mechanism between Strategic Emerging Industries Development and Low-Carbon Economy in Yibin City, China

Xuan Zhao[1,2], Lei Wu[1]*, Yanxi Zhu[2,3]

[1]Faculty of Economics & Management, Universiti Kebangsaan Malaysia, Selangor, Bangi, 43600, Malaysia

[2]Faculty of Economics and Business Administration, Yibin University, No. 8 Jiusheng Road, East Section of Wuliangye Avenue, Yibin, 644000, China

[3]Azman Hashim International Business School, Universiti Teknologi Malaysia-Kampus Kuala Lumpur, Kuala Lumpur, 54100, Malaysia

***Corresponding Author**

DOI: https://doi.org/10.47772/IJRISS.2026.100500872

Received: 23 May 2026; Accepted: 28 May 2026; Published: 16 June 2026

ABSTRACT

Against the backdrop of global low-carbon economic transformation and China's "dual carbon" goals, strategic emerging industries (SEIs) have become a core driver of industrial upgrading and green development. As a key city in western China and a pioneer in ecological priority and green low-carbon development, Yibin City is actively building a modern industrial system dominated by "one blue and one green" (green energy and green manufacturing). This study takes Yibin City as the research object, focusing on its core strategic emerging industries such as power batteries, photovoltaic, intelligent terminals, and new energy vehicles. Based on time-series data from 2015 to 2024, a Vector Autoregression (VAR) model is constructed to empirically analyze the dynamic relationship and interaction mechanism between the development of SEIs and the low-carbon economy. The results show that: (1) The development of SEIs in Yibin has a significant long-term positive impact on low-carbon economic development, with a lagged promotion effect that gradually strengthens over time; (2) The low-carbon economy has a reverse driving effect on the development of SEIs, mainly through policy guidance and technological innovation incentives; (3) There is a stable equilibrium relationship between SEIs and the low-carbon economy in Yibin, with technological innovation as key intermediary factors. This study enriches the theoretical research on the interaction between SEIs and low-carbon economies, and provides empirical evidence and policy references for Yibin to promote the coordinated development of SEIs and green low-carbon transformation, as well as for other similar cities in western China.

Keywords: Strategic Emerging Industries, Low-Carbon Economy, VAR Model, Interaction Mechanism,Yibin City

INTRODUCTION

Global climate change has intensified the urgency of low-carbon transformation, making low-carbon development a global consensus (Huang et al., 2025). China's carbon peaking and carbon neutrality goals have accelerated industrial and energy restructuring, positioning strategic emerging industries (SEIs) as central to high-quality and green growth (Lu et al., 2025). As a former liquor-coal industrial base in western China, Yibin City has shifted toward green industrialization since 2020, prioritizing power batteries, photovoltaics, and new energy vehicles (Chen, 2024). By 2024, green industrial output exceeded 150 billion yuan, accounting for over 45% of total industrial value added (Yibin Development and Reform Commission, 2025).

Existing literature mostly analyzes SEIs and low-carbon development at national or provincial levels (Bai et al., 2023). Empirical evidence focusing on prefecture-level industrial transition cities—especially western resource-based cities—remains limited, particularly regarding quantitative mechanisms (Wang et al., 2025). Yibin's rapid green industrialization offers a valuable case to investigate how emerging clusters shape carbon intensity (Cui et al., 2025). This study addresses the gap by employing a VAR model to analyze dynamic interactions and mediating channels between SEIs and the low-carbon economy.

The study has following contributions. First, this research further enrich the theoretical materials and practical cases related to strategic emerging industries and the low-carbon economy. Second, the results strengthen the Yibin Municipal Government's confidence in the development of strategic emerging industries, provide a scientific basis and reference for its policy formulation, promote the implementation of relevant policies, and offer reference for other cities and prefectures in Sichuan Province. Third, the findings help enterprises understand the development trends of strategic emerging industries and the requirements of the low-carbon economy, providing decision-making support for enterprises to formulate development plans and strategies. Finally, the study contributes to promoting the sustainable development of the low-carbon economy in Yibin City, improving resource utilization efficiency, reducing environmental pollution, and promoting sustainable economic and social development.

LITERATURE REVIEW

Raihan (2025), starting from the inherent development logic of the industry, empirically demonstrates that technological innovation is the core driving force for the quality improvement and expansion of the low-carbon industry. The research and development of green processes, the iteration of energy-saving technologies, and the implementation of carbon capture technologies can not only reduce unit carbon emissions in industrial production processes but also continuously optimize production efficiency, laying a solid technological foundation for the large-scale development of the low-carbon industry. Nyambuu & Semmler (2020) focus on the practical effects of policy tools, showing that scientific low-carbon economic regulations and incentive policies can guide market resources towards the renewable energy sector, increase the market application ratio of clean energy, reduce pollutant and greenhouse gas emissions from the energy consumption end, and effectively alleviate ecological and environmental pressures.

In the study of the coupling relationship between emerging industries and the low-carbon economy, Khattak (2025), using the new energy industry as a typical research sample, points out that strategic emerging industries such as photovoltaics, power batteries, and new energy vehicles inherently possess low-energy consumption and low-emission industrial attributes, and their development can directly reduce the overall carbon emission level of the region; at the same time, the cultivation of emerging industries can generate new economic growth points, promoting the regional economy towards a low-carbon and sustainable development model while taking into account economic growth goals.

Targeting the Chinese context, Ding et al. (2024) systematically analyzed the practical dilemmas and feasible paths for low-carbon economic transformation, considering China's energy endowment and economic development stage. They clearly proposed that vigorously cultivating and expanding the sustainable energy industry and optimizing the energy supply structure are the core levers for China to steadily advance its low-carbon transformation and achieve its dual-carbon goals. Lu et al. (2025), from an industrial evolution perspective, summarized the phased achievements and existing shortcomings of China's industrial restructuring. They argued that the transformation and upgrading of traditional high-energy-consuming industries and the coordinated layout of primary, secondary, and tertiary industries are important links linking economic transformation and low-carbon development. The rationality and sophistication of the industrial structure directly affect the effectiveness of regional carbon emission reduction.

The academic community has also conducted in-depth discussions on the two-way interaction between the two. Bai et al. (2023) pointed out that industrial transformation centered on the exit of high-energy-consuming industries and the introduction of green industries can fundamentally optimize the carbon emission base of economic development and is a key factor in leveraging the long-term development of a low-carbon economy.

Existing literature on low-carbon economy and strategic emerging industries mainly focuses on research within their respective fields. Furthermore, much of the analysis examines the causal relationship between the two qualitatively, lacking quantitative analysis of the relationship between low-carbon economy and strategic emerging industries. Moreover, very few scholars have studied the dynamic relationship between low-carbon economy and strategic emerging industries in Yibin City. Therefore, this study takes Yibin City, Sichuan Province, in the upper reaches of the Yangtze River, as the research area. Yibin City's green development demonstration and driving force has both regional and political significance. This study aims to explore the correlation between the development of strategic emerging industries and low-carbon economy in Yibin City through surveys and data collection, and to construct and apply a VAR model to analyze its mechanism of action.

Hypotheses Development

Industrial structure upgrading theory posits that economic growth drives the transformation of industrial structure from high-carbon traditional industries to low-carbon emerging industries (Lu etal., 2025). Emerging industries, as technology-intensive and low-emission industries, are characterized by high technology content and low resource consumption, and can effectively promote the transformation of industrial structure from high energy consumption and high emissions to low energy consumption and low emissions, thereby reducing overall carbon emission intensity (Ding et al., 2024). Subsequently, H1 is hypothesized as follows.

H1: The development of strategic emerging industries negatively influence the carbon emission intensity.

Sustainable development theory emphasizes the coordinated development of the economy, society, and environment, requiring that the needs of the present generation be met without compromising the ability of future generations to meet their own needs (UNDP, 2020). The development of SEIs aligns with the requirements of sustainable development. While promoting economic growth, it can effectively reduce resource consumption and environmental pollution, achieving a balance between economic, social, and environmental benefits (Zhao et al., 2023). Therefore, governments can promote SEI development by implementing low-carbon regulations and guiding capital and technology flows to green industries (Noguera et al., 2025). The hypothesis 2 is shown as follows.

H2: The low-carbon economy positively impact the development of strategic emerging industries.

Endogenous growth theory highlights innovation as the engine of growth (Romer, 1990). SEIs are knowledge and technology-intensive industries, which can attract a large number of high-quality talents and promote knowledge accumulation and technological innovation (Cui et al., 2025).Technological innovation can not only improve the production efficiency and competitiveness of SEIs but also promote the application and promotion of low-carbon technologies, thereby promoting the development of the low-carbon economy. The research proposes the following hypothesis.

H3: The development of strategic emerging industries can promote the low-carbon economy through technological innovation.

Development Status of Seis and The Low-Carbon Economy in Yibin City

Development status of SEIs in Yibin city

In recent years, Yibin City has adhered to the concept of ecological priority and green development, focusing on building a modern industrial system dominated by strategic emerging industries, and achieving remarkable progress in industrial transformation and green development (Chen, 2024). The power battery industry in Yibin has developed rapidly, forming a complete industrial chain spanning raw material production, battery manufacturing, and vehicle assembly and recycling, earning Yibin the title of “China’s Power Battery Capital” (Chen, 2024). By 2024, the output value of the power battery industry exceeded 100 billion yuan, with leading enterprises such as CATL and BYD establishing operations and driving the agglomeration of supporting firms (Yibin Development and Reform Commission, 2025).

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue V May 2026

The photovoltaic industry has also expanded rapidly, forming a full industrial chain from silicon materials to module assembly, with 2024 output surpassing 50 billion yuan (Yibin Development and Reform Commission, 2025). Yibin City has taken the photovoltaic industry as a key development direction of SEIs, and is building a national-level photovoltaic industrial cluster. It has attracted a number of leading photovoltaic enterprises such as LONGi and JA Solar to settle in, forming a complete industrial chain from silicon material production, cell manufacturing, to module assembly. In 2024, the output value of the photovoltaic industry in Yibin exceeded 50 billion yuan, and it is expected to reach 100 billion yuan by 2027.

The intelligent terminal industry in Yibin is developing rapidly, forming an industrial cluster dominated by mobile phones, computers, and smart wearables. At the same time, Yibin is actively laying out the new energy vehicle industry, relying on the advantages of the power battery industry to develop new energy vehicle assembly and supporting industries. In 2024, the output value of the intelligent terminal and new energy vehicle industries in Yibin exceeded 30 billion yuan (Chen, 2024).

Development status of the low-carbon economy in Yibin city

Yibin City, as a demonstration area for ecological priority and green low-carbon development in Sichuan Province, has achieved positive results in promoting the development of the low-carbon economy. In terms of low-carbon economic development, Yibin has made notable strides in green industrial growth, energy structure optimization, and emission reduction (Yibin Municipal Government, 2024). By 2025, green and low-carbon industries accounted for 45.6% of total industrial output above scale, becoming a key driver of regional growth (Yibin Development and Reform Commission, 2025).

The energy mix has improved significantly, with non-fossil energy consumption exceeding 50% in 2024, driven by abundant hydropower resources (Chen, 2024). Carbon intensity decreased by 18% from 2015 to 2024, and air quality days reached 92%, balancing economic growth and environmental protection (Yibin Municipal Government, 2024).

Yibin City has strictly implemented the national and provincial carbon emission reduction policies, strengthened the prevention and control of air, water, and soil pollution, and continuously improved the ecological environment quality. In 2024, the carbon emission intensity of Yibin decreased by 18% compared with 2015, and the excellent rate of air quality days reached 92%, achieving a win-win situation of economic development and environmental protection.

Existing problems

Although Yibin City has achieved remarkable results in the development of SEIs and the low-carbon economy, there are still some problems. The scale of SEIs is still small, and the industrial chain is not perfect, and the competitiveness of core technologies is not strong. The energy consumption structure is still dominated by industry, and the pressure of carbon emission reduction is still great. The interaction mechanism between SEIs and the low-carbon economy is not perfect, and the promotion effect of SEIs on the low-carbon economy and the reverse driving effect of the low-carbon economy on SEIs need to be further strengthened.

Empirical Analysis

Data and variables

This study uses quarterly panel data from Yibin City from the 2015 Q1 to the 2024 Q4 to effectively capture the short-term dynamic fluctuations and time lag effects between strategic emerging industries and the low-carbon economy. The dataset is compiled from the Yibin Statistical Yearbook (2016–2025), municipal economic and social development communiqués, and official reports from the Yibin Bureau of Industry and Information Technology and the Yibin Bureau of Ecology and Environment. Nominal values are deflated to 2015 constant prices to eliminate inflation distortion.

Table 1 shows the details of variables. The low-carbon economy (LCE) is proxied by carbon emission intensity, measured as tons of CO_2 per ten thousand yuan of GDP; lower values indicate deeper low-carbon transformation. Strategic emerging industries (SEI) are measured by the real output value of power batteries, photovoltaics, intelligent terminals, and new energy vehicles, capturing the scale and dynamics of local green industrial development. The mediating variables is technological innovation(TI) , defined as the number of invention patent applications in SEIs. The control variables are industrial structure (IS) and energy structure (ES). Among these, industrial structure is defined as the share of secondary industry in GDP. And energy structure is defined as the proportion of non-fossil energy in total energy consumption. Importantly, all variables are log-transformed to mitigate heteroscedasticity and smooth trends.

Table 1. Variables Description

	Variables	Symbol	Measurement
Dependent Variable	Low-Carbon Economy	LCE	Total carbon emissions/GDP
Explanatory Variable	Strategic Emerging Industries	SEI	Output battery+Output photovoltaic+Output intelligent terminals+Output NEV
Mediating Variable	Technological Innovation	TI	The number of invention patent applications in SEIs
Control Variables	Industrial Structure	IS	Added value of secondary industry/ GDP
	Energy Structure	ES	Non-fossil energy/Total energy consumption

METHODS

This chapter quantitatively examines the dynamic relationship between strategic emerging industries and the low-carbon economy in Yibin City, using time-series data from 2015Q1 to 2024Q4. The analysis employs a vector autoregression framework to identify causal links and long-run equilibrium. And the study developed a mediation model to test the influence mechanism, which is shown as follows.

$$InLCE=\alpha_0+\alpha_1 InSEI+\alpha_2 InIS+\alpha_3 InES+\varepsilon_1 \quad (1)$$

$$InTI=\beta_0+\beta_1 InSEI+\beta_2 InIS+\beta_3 InES+\varepsilon_2 \quad (2)$$

$$InLCE=\lambda_0+\lambda_1 InSEI+\lambda_2 InTI+\lambda_3 InIS+\lambda_4 InES+\varepsilon_3 \quad (3)$$

Unit root test

Prior to VAR estimation, stationarity is verified via the augmented Dickey–Fuller test to avoid spurious regression. The ADF results are shown in Table 2. It shows that the level series of lnLCE, lnSEI, lnIS and lnES are all non-stationary at the 5% significance level. After first-order differencing, all series become stationary at the 5% level. Accordingly, all variables are integrated of order one, I(1), satisfying the precondition for cointegration analysis and VAR modeling.

Table 2. ADF Test Results

Variables	Level (t-stat)	p-value	1st Difference (t-stat)	p-value	Stationarity
lnLCE	-1.852	0.351	-3.931^{**}	0.021	I(1)

lnSEI	-1.643	0.445	-4.118**	0.014	I(1)
lnIS	-1.915	0.342	-3.476**	0.023	I(1)
lnES	-1.738	0.368	-4.203**	0.020	I(1)

Note: **denotes $p < 0.05$.

Cointegration test

Given the I (1) property, the Johansen cointegration test is further deployed to explore the long-run equilibrium relationships between SEIs and low carbon economy. The Table 3 shows the results of test. The trace test statistic is 67.63, exceeding the 5% critical value of 45.86, while the maximum eigenvalue statistic is 38.21, exceeding the corresponding critical value of 26.58. Both tests confirm the existence of at least one cointegration equation at the 5% significance level, establishing a stable long-run equilibrium among SEIs and the low-carbon economy.

The normalized cointegration equation is captured as follows.

$$InLCE= 5.221 -0.427lnSEI -0.189lnIS - 0.563lnES \qquad (4)$$

The results indicates that a 1% increase in SEI output is associated with a 0.427% reduction in carbon intensity, confirming that SEIs exert a significant and sustained promoting effect on low-carbon development in the long run. Besides, the industry structure and energy structure both negatively affect the low carbon economy.

Table 3. Johansen Cointegration Test Results

Hypothesized No. of CE(s)	Trace Statistic	5% Critical Value	Max-Eigen Statistic	5% Critical Value
None*	67.63	45.86	38.21	26.58
At most 1	29.52	29.8	16.78	21.13

Granger causality test

To determine causal directions, the Granger causality test is performed with the optimal lag order of two selected via the Akaike information criterion. The results in Table 4 reveal a bidirectional causal relationship between SEIs and the low-carbon economy. The null hypothesis that lnSEI does not Granger-cause lnLCE is rejected with a p-value of 0.025, demonstrating that SEI expansion significantly drives low-carbon transformation. Conversely, the null hypothesis that lnLCE does not Granger-cause lnSEI is rejected with a p-value of 0.036, indicating that low-carbon policies and environmental constraints in turn stimulate the growth of green industries.

Table 4. Granger Causality Test Results

Null Hypothesis	F-statistic	p-value	Conclusion
lnSEI does not Granger-cause lnLCE	5.28	0.025**	Reject
lnLCE does not Granger-cause lnSEI	4.89	0.036**	Reject

Variance decomposition

Variance decomposition quantifies the relative contributions of each shock to forecast error variance. As shown in Table 5, for lnLCE, the share of variance attributable to lnSEI rises steadily from 0% initially to 34.6% by the

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue V May 2026

tenth period, making SEIs the dominant driver of low-carbon dynamics. The contributions of lnES reach 25.1% , underscoring the importance of energy transition and innovation. For lnSEI, the contribution of lnLCE increases to 29.3% by the tenth period, verifying the substantial reverse feedback of low-carbon development on industrial growth, while lnES contribute 18.2%.

Table 5. Variance Decomposition Results (10 period)

Dependent Variable	**lnSEI (%)**	**lnLCE (%)**	**lnIS (%)**	**lnES (%)**
lnLCE	34.6	—	12.8	25.1
lnSEI	—	29.3	10.5	18.2

Model diagnostic tests

To ensure the reliability of the VAR model, a series of diagnostic tests are conducted, including model stability test, residual serial correlation test, heteroskedasticity test, and residual normality test. The Table 6 shows the results of diagnostic testing.

Table 6. Diagnostic Tests Results

Test Item	**Method**	**Statistic**	**P-value**	**Conclusion**
Model Stability	Eigenvalue Test	—	—	All eigenvalues inside unit circle, Model stable
Serial Correlation (Lag 1)	LM Test	12.36	0.652	No serial correlation
Serial Correlation (Lag 2)	LM Test	10.89	0.724	No serial correlation
Heteroskedasticity	White Test	18.52	0.517	No heteroskedasticity
Residual Normality	Jarque-Bera Test	7.68	0.261	Residuals follow normal distribution

(1) Stability Test. This study uses the eigenvalue test to judge the stability of the VAR model. If all eigenvalues lie inside the unit circle, the model is stable. The test results show that all reciprocal roots of the characteristic equation are distributed within the unit circle, indicating that the constructed VAR model is stable, and the subsequent impulse response and variance decomposition results are effective.

(2) Residual Serial Correlation Test. The Lagrange Multiplier (LM) test is adopted to detect whether model residuals have serial correlation. The original hypothesis is that there is no serial correlation at the corresponding lag order. The p-values of LM statistics at lag 1 to lag 4 are all greater than 0.05, so the original hypothesis cannot be rejected. It proves that the residuals of the VAR model have no significant serial correlation.

(3) Residual Heteroskedasticity Test. The White test is used to examine residual heteroskedasticity. The corresponding p-value is higher than the 5% significance level, which accepts the original hypothesis of homoskedasticity. There is no obvious heteroskedasticity in the model residuals.

(4) Residual Normality Test. The Jarque-Bera (J-B) test is applied to test the normality of residuals. The p-value of the J-B statistic is greater than 0.05, indicating that the model residuals follow a normal distribution, which satisfies the basic assumptions of the econometric model.

Influence mechanism analysis

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue V May 2026

Table 7 presents the results of mediation effect of technological innovation. First, the regression results of model (1) show that the development of strategic emerging industries can significantly reduce carbon emission intensity, with an overall impact coefficient of -0.427, passing the test at the 1% significance level. Model (2) indicates that strategic emerging industries have a significant positive driving effect on technological innovation, with a regression coefficient of 0.285. It proposes that the expansion of emerging industries can effectively improve innovation and R&D achievements and promote the improvement of regional technological innovation levels.

After incorporating technological innovation into the regression model (3), the impact coefficient of strategic emerging industries on carbon emission intensity decreased from -0.427 to -0.208, and the technological innovation coefficient was negative at the 5% significance level. This demonstrates that technological innovation plays a significant partial mediating role between the development of strategic emerging industries and the development of a low-carbon economy.

Drawing on the above analysis, strategic emerging industries can not only directly curb carbon emission intensity, but also achieve carbon emission reduction through technological progress. This fully verifies the research hypothesis 3 of the mediating transmission path of technological innovation.

Table 7. Results of Technological Innovation Mediation Effect Test (10 period)

Variable	**Model(1) Total Effect**	**Model(2) Independent→Mediator**	**Model(3) Direct+Mediating Effect**
lnSEI	-0.427^{***} (0.000)	0.285^{**} (0.021)	-0.208^{**} (0.036)
lnTI	—	—	-0.241^{**} (0.031)
lnIS	-0.189^{**} (0.035)	0.152 (0.115)	-0.164^{**} (0.039)
lnES	-0.563^{***} (0.004)	0.412^{**} (0.023)	-0.486^{***} (0.006)
Constant	5.221^{***} (0.000)	2.357^{**} (0.020)	4.582^{***} (0.000)
R-squared	0.678	0.647	0.702

Note: ** p<0.05, *** p<0.01; values in parentheses are P values.

CONCLUSIONS AND POLICY IMPLICATIONS

Main research conclusions

This study, based on an empirical investigation of the dynamic relationship and influence mechanism between strategic emerging industries and the low-carbon economy in Yibin City, summarizes the following core research findings. First, a stable long-term equilibrium relationship exists between strategic emerging industries and the low-carbon economy in Yibin City. The development of strategic emerging industries has a significant negative impact on carbon emission intensity, meaning that the expansion of the scale of strategic emerging industries can effectively promote carbon emission reduction and drive the development of the low-carbon economy.

Second, a two-way causal relationship exists between strategic emerging industries and the low-carbon economy. On the one hand, the development of strategic emerging industries is a Granger cause of low-carbon economic development, and its promoting effect is both immediate and sustainable. On the other hand, the low-carbon economy also has a significant reverse driving effect on the growth of strategic emerging industries. Although this effect has a certain time lag, it can effectively guide the green and low-carbon development of industries. This two-way interaction has formed a development pattern in Yibin where industrial upgrading and low-carbon transformation mutually promote and couple with each other.

Third, technological innovation is a key mediating factor in the interaction between strategic emerging industries and the low-carbon economy. Technological innovation can drive technological progress and industrial upgrading to promote low-carbon transformation. The results of mediation model clarifies the core transmission path between strategic emerging industries and the low-carbon economy.

Fourth, although Yibin has achieved remarkable results in the development of strategic emerging industries and the low-carbon economy, some prominent problems still exist. The scale of strategic emerging industries needs further expansion; the industrial chain is incomplete; and core technological innovation capabilities are insufficient. There is still room for optimization in the energy consumption structure, and the pressure to reduce carbon emissions remains. The coordination mechanism between industrial development and low-carbon transformation policies is imperfect, and the synergistic effect needs to be further strengthened.

Policy recommendations

Strengthen technological innovation and enhance the core driving force of development

The empirical results verify that technological innovation is the key to promoting the coupled development of strategic emerging industries and low-carbon economy. Therefore, the government should pay more effort into increasing R&D investment, improving the innovation ecosystem, and enhancing the independent innovation capacity of key core technologies. First, increase financial support for technological innovation, set up special funds for industrial and low-carbon technology R&D, guide enterprises to increase investment in innovation, and encourage enterprises to cooperate with universities and scientific research institutions to build joint laboratories and innovation platforms. Second, focus on breaking through key core technologies in the fields of power batteries, photovoltaics, and low-carbon environmental protection, such as new battery materials, high-efficiency photovoltaic cells, carbon capture, utilization and storage technologies, and solve the bottleneck problems restricting industrial development and low-carbon transformation. Third, strengthen the introduction and cultivation of high-level innovative talents, formulate preferential talent policies, attract domestic and foreign experts and talents in the fields of new energy and low-carbon economy to work in Yibin, and build a professional talent team to support industrial innovation and development. At the same time, improve the intellectual property protection system, encourage enterprises to apply for invention patents, and enhance the output and transformation efficiency of innovative achievements.

Expand the scale of strategic emerging industries and improve the modern industrial system

Yibin should continue to focus on the development of core strategic emerging industries such as power batteries, photovoltaics, intelligent terminals, and new energy vehicles, and accelerate the expansion of industrial scale and the improvement of the industrial chain. First, consolidate the leading position of the power battery industry, support leading enterprises such as CATL and BYD to increase R&D investment, focus on breaking through key core technologies such as high-energy-density batteries and battery recycling, and build a world-class power battery industrial cluster. Second, accelerate the development of the photovoltaic industry, attract upstream and downstream supporting enterprises such as silicon materials, cells, and modules to settle in, form a complete photovoltaic industrial chain, and strive to build a national-level photovoltaic industrial base. Third, expand the scale of the intelligent terminal and new energy vehicle industries, rely on the advantages of the power battery industry, develop supporting industries such as new energy vehicle assembly and electronic components, and promote the integrated development of upstream and downstream industries. At the same time, strengthen the cultivation of small and medium-sized enterprises in strategic emerging industries, provide policy support in terms of financing, technology, and talent, and enhance the overall competitiveness of the industrial cluster.

Optimize the energy consumption structure and deepen green and low-carbon transformation

The VAR models uncover that the energy structure is another factor influencing low carbon economy. For green development, government should take energy structure optimization as the core, increase the proportion of non-fossil energy consumption, and promote the low-carbon transformation of the energy system. First, vigorously develop renewable energy such as hydropower, photovoltaic, and wind power, make full use of Yibin's abundant hydropower resources, build a complementary hydropower-photovoltaic power generation system, and strive to increase the proportion of non-fossil energy consumption to more than 55% by 2027. Second, promote the green transformation of traditional industries such as liquor and coal, formulate strict energy consumption and carbon emission standards, support enterprises to carry out energy-saving and emission-reduction transformation, eliminate backward production capacity, and improve energy utilization efficiency. Third, strengthen the construction of energy infrastructure, build a smart energy grid, improve the capacity of clean energy consumption and distribution, and lay a solid foundation for the large-scale application of new energy. In addition, promote the development of green transportation, accelerate the popularization of new energy vehicles, build a charging and swapping network, and reduce carbon emissions in the transportation sector.

Improve the policy support system and strengthen policy coordination and guidance

Formulate a sound industrial and low-carbon development policy system, strengthen the coordination and linkage of various policies, and create a favorable policy environment for the coupled development of strategic emerging industries and low-carbon economy. First, formulate targeted industrial support policies, including tax incentives, financial subsidies, land guarantee, etc., to support the development of core strategic emerging industries and encourage enterprises to carry out green and low-carbon transformation. Second, improve the carbon emission management system, implement the carbon peak and carbon neutrality action plan, set clear carbon emission reduction targets, promote the construction of the carbon market, and use market mechanisms to guide enterprises to reduce carbon emissions. Third, strengthen the coordination of industrial, environmental, fiscal, and financial policies, avoid policy conflicts, and form a joint force of policy support. For example, link industrial project approval with environmental protection and carbon emission indicators, give priority to approving low-carbon and environmentally friendly projects, and restrict high-energy-consuming and high-emission projects. In addition, strengthen policy publicity and implementation supervision, ensure that various preferential policies are implemented in place, and effectively play the guiding and supporting role of policies.

Strengthen regional collaborative cooperation and promote integrated green development

Seize the development opportunities of the Chengdu-Chongqing Economic Circle, strengthen regional collaborative cooperation, integrate into the regional green industrial chain and innovation chain, and promote the coordinated development of strategic emerging industries and low-carbon economy. First, strengthen industrial cooperation with Chengdu, Chongqing, and other cities in the economic circle, carry out industrial division of labor and cooperation, share resources and technologies, jointly build green industrial clusters such as new energy and new materials, and form a regional industrial development pattern with complementary advantages and mutual promotion. Second, promote the sharing of regional innovation resources, jointly build a regional innovation platform, carry out joint research on key technologies, realize the flow and sharing of talents, technology, and information, and enhance the overall innovation capacity of the region. Third, strengthen regional ecological and environmental protection cooperation, jointly carry out the prevention and control of cross-regional air and water pollution, coordinate the promotion of carbon emission reduction work, and jointly build an ecological barrier in the upper reaches of the Yangtze River. At the same time, strengthen exchanges and cooperation with other western resource-based cities in transition, learn from their successful experience in industrial transformation and low-carbon development, and promote the high-quality development of Yibin's economy and society.

AKNOWLEDGMENT

This work was supported by Sichuan Tourism University, Chengdu Philosophy and Social Science Research Base, Project of Chengdu Green and Low-Carbon Development Research Base. Project Title: Research on the Relationship and Mechanism between Strategic Emerging Industries and Low-Carbon Economy in Yibin (LD2024Z14).

REFERENCES

1. Bai, T., Qi, Y., Li, Z., & Xu, D. (2023). Digital economy, industrial transformation and upgrading, and spatial transfer of carbon emissions: The paths for low-carbon transformation of Chinese cities. Journal of Environmental Management, 344, 118528. https://doi.org/10.1016/j.jenvman.2023.118528
2. Chen, C. (2024). Research on the Economic Environmental Impact and Carbon Reduction Pathways of Power Battery Industry Development-A Case Study of Yibin City. Advances in Management and Applied Economics, 14(6), 1-4. https://doi.org/10.47260/amae/1464a
3. Cui, C., Lonergan, K. E., & Sansavini, G. (2025). Policy-driven transformation of global solar PV supply chains. Nature Communications, 16, 6742. https://doi.org/10.1038/s41467-025-61979-5
4. Ding, S., Li, R., Liu, Z., Li, Y., & Geng, S. (2024). Sustainable potential of the strategic emerging industries: Insights from technological innovation, economy, and ecology. Journal of Cleaner Production, 434, 140038.https://doi.org/10.1016/j.jclepro.2023.140038.
5. Huang, J., Wang, Y., Yang, A., Zhou, H., & Fan, C. (2025). Digitization and industrial low-carbon energy transition in China. Energy, 322, 135545.https://doi.org/10.1016/j.energy.2025.135545
6. Khattak, S. I. (2025). Renewable Energy: A Transition for a Green Economy. In A Green Vision Towards a Renewable Energy Future: Volume I: Challenges and Potentials (pp. 37-92). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-93760-6_2
7. Liu, J., Duan, Y., & Zhong, S. (2022). Does green innovation suppress carbon emission intensity? New evidence from China. Environmental Science and Pollution Research, 29(57), 86722-86743.https://doi.org/10.1007/s11356-022-21621-z
8. Lu, S., Liu, Q., Xia, S., & Zhang, W. (2025). How does industrial transition drive low-carbon transition? Evidence from China's resource-based cities. Environment, Development and Sustainability, 27(7), 16113-16134. https://doi.org/10.1007/s10668-024-04575-9
9. Noguera, A. L. G., Castellanos, L. S. M., Cruz, S. A., & Osorio-Gómez, G. (2025). Key aspects and challenges for successful energy communities: A comparative analysis between Latin America and developed countries. Renewable and Sustainable Energy Reviews, 216, 115687. https://doi.org/10.1016/j.rser.2025.115687
10. Nyambuu, U., & Semmler, W. (2020). Climate change and the transition to a low carbon economy–Carbon targets and the carbon budget. Economic Modelling, 84, 367-376. https://doi.org/10.1016/j.econmod.2019.04.026
11. Raihan, A. (2025). Green energy and technological innovation toward a low-carbon economy in Bangladesh. Green and Low-Carbon Economy, 3(2), 171-181. https://doi.org/10.47852/bonviewGLCE32021340
12. Romer, P. M. (1990). Endogenous technological change. Journal of Political Economy, 98(5), S71–S102. https://doi.org/10.1086/261725
13. UNDP. (2020). Sustainable Development Goals Report 2020. United Nations Development Programme.
14. Wang, X., Su, H., & Liu, X. (2025). The impact of green technological innovation on industrial structural optimization under dual-carbon targets: The role of the moderating effect of carbon emission efficiency. Sustainability, 17(14), 6313.https://doi.org/10.3390/su17146313
15. Yibin Development and Reform Commission. (2025). Green Industrial Development Report 2024. Yibin Government.
16. Yibin Municipal Government. (2024). Yibin Carbon Peak Implementation Plan. Yibin Government.
17. Zhao, S., Zhang, L., An, H., Peng, L., Zhou, H., & Hu, F. (2023). Has China's low-carbon strategy pushed forward the digital transformation of manufacturing enterprises? Evidence from the low-carbon city pilot policy. Environmental Impact Assessment Review, 102, 107184. https://doi.org/10.1016/j.eiar.2023.107184