**Open Access Library Journal**
2024, Volume 11, e11851
ISSN Online: 2333-9721
ISSN Print: 2333-9705

# Research on the Reform of Pollution Meteorology Curriculum Based on Carbon Neutrality Goals

**Peidu Li, Xiaohang Wen, Shenglan Zeng**

School of Atmospheric Sciences, Chengdu University of Information Technology, Chengdu, China
Email: lpd@cuit.edu.cn

**How to cite this paper:** Li, P.D., Wen, X.H. and Zeng, S.L. (2024) Research on the Reform of Pollution Meteorology Curriculum Based on Carbon Neutrality Goals. *Open Access Library Journal*, **11**: e11851.
https://doi.org/10.4236/oalib.1111851

**Received:** June 20, 2024
**Accepted:** July 19, 2024
**Published:** July 22, 2024



## Abstract

In the global context of addressing climate change, carbon neutrality has become a common goal for countries worldwide. Carbon neutrality is not only a key measure for achieving sustainable development but also an important pathway for reducing greenhouse gas emissions and combating climate change. However, the current curriculum content and teaching methods in pollution meteorology do not adequately reflect the latest requirements and developments related to carbon neutrality, making curriculum reform particularly urgent. This study aims to explore curriculum reform in pollution meteorology based on the goal of carbon neutrality. By adjusting curriculum content, innovating teaching methods, and strengthening faculty training, the study seeks to enhance students' mastery and application of knowledge related to carbon neutrality and pollution meteorology. The expected outcomes include the development of a curriculum framework that aligns more closely with carbon neutrality goals and the creation of an effective teaching and evaluation system, thereby cultivating atmospheric science professionals with foresight and practical skills.

## Subject Areas

Atmospheric Sciences

## Keywords

Carbon Neutrality, Atmospheric Science, Pollution Meteorology, Climate Change, Curriculum Reform

## 1. Introduction

Carbon neutrality, which entails achieving net-zero emissions of carbon dioxide

and other greenhouse gases by reducing carbon emissions and increasing carbon sinks, is a crucial global strategy to combat climate change [1]. As global climate change issues become increasingly severe, countries around the world are setting carbon neutrality goals to mitigate global warming [2]. In September 2020, China also committed to achieving carbon neutrality by 2060 [3]. The vision of the carbon peaking and carbon neutrality goals elevates China's green development to a new height and becomes the core theme of China's high-quality economic and social development for the coming decades. The $14_{th}$ Five-Year Plan explicitly incorporates the carbon peaking and carbon neutrality goals into the overall layout of ecological civilization construction. As a pivotal stride towards sustainable development, achieving carbon neutrality holds profound significance for curbing global warming and safeguarding the ecological environment.

Pollution meteorology, which studies the transport, dispersion, transformation, and deposition of atmospheric pollutants under various meteorological conditions, plays a crucial role in understanding and addressing environmental pollution issues. Its research scope is extensive, encompassing the generation and emission of pollutants, the impact of meteorological conditions on pollutant dispersion, the environmental behavior of pollutants, and corresponding prevention and control measures. Pollution meteorology holds significant importance not only in academic research but also in environmental management and policy-making.

Currently, with the increasing severity of global climate change and environmental pollution issues, the importance of pollution meteorology is becoming more prominent. The goal of carbon neutrality, which involves achieving net-zero emissions of greenhouse gases by reducing carbon emissions and increasing carbon sinks, closely links pollution meteorology with efforts to combat climate change. Achieving carbon neutrality requires a deeper understanding of the behavior and impact of atmospheric pollutants, especially greenhouse gases like carbon dioxide [4]. Research findings in pollution meteorology can provide scientific evidence and technical support for achieving carbon neutrality.

However, traditional pollution meteorology courses are heavily focused on theoretical knowledge and lack a strong connection to carbon neutrality goals, with relatively weak practical teaching components. This limitation in course design results in students being inadequately prepared to address new environmental challenges. Therefore, it is necessary to update and expand pollution meteorology courses to better meet current and future environmental protection needs.

It is clear that the imperative to reform pollution meteorology courses is driven by the goal of achieving carbon neutrality. Curriculum reform is crucial for enhancing knowledge application and improving teaching practices to meet current and future environmental protection needs [5]. It also prevents overly test-focused teaching, fostering comprehensive student development [6]. By incorporating carbon neutrality-related content, strengthening practical teaching, and promoting interdisciplinary integration, the courses can better align with

contemporary developments and cultivate environmental protection professionals with advanced knowledge and practical skills, the article structure is shown in Figure 1. This study will explore how to systematically reform pollution meteorology courses in the context of carbon neutrality to enhance teaching quality and students' comprehensive abilities. This study reforms pollution meteorology courses by integrating carbon neutrality theories, enhancing practical teaching, promoting interdisciplinary approaches, and strengthening international cooperation to cultivate globally competent environmental and atmospheric professionals.

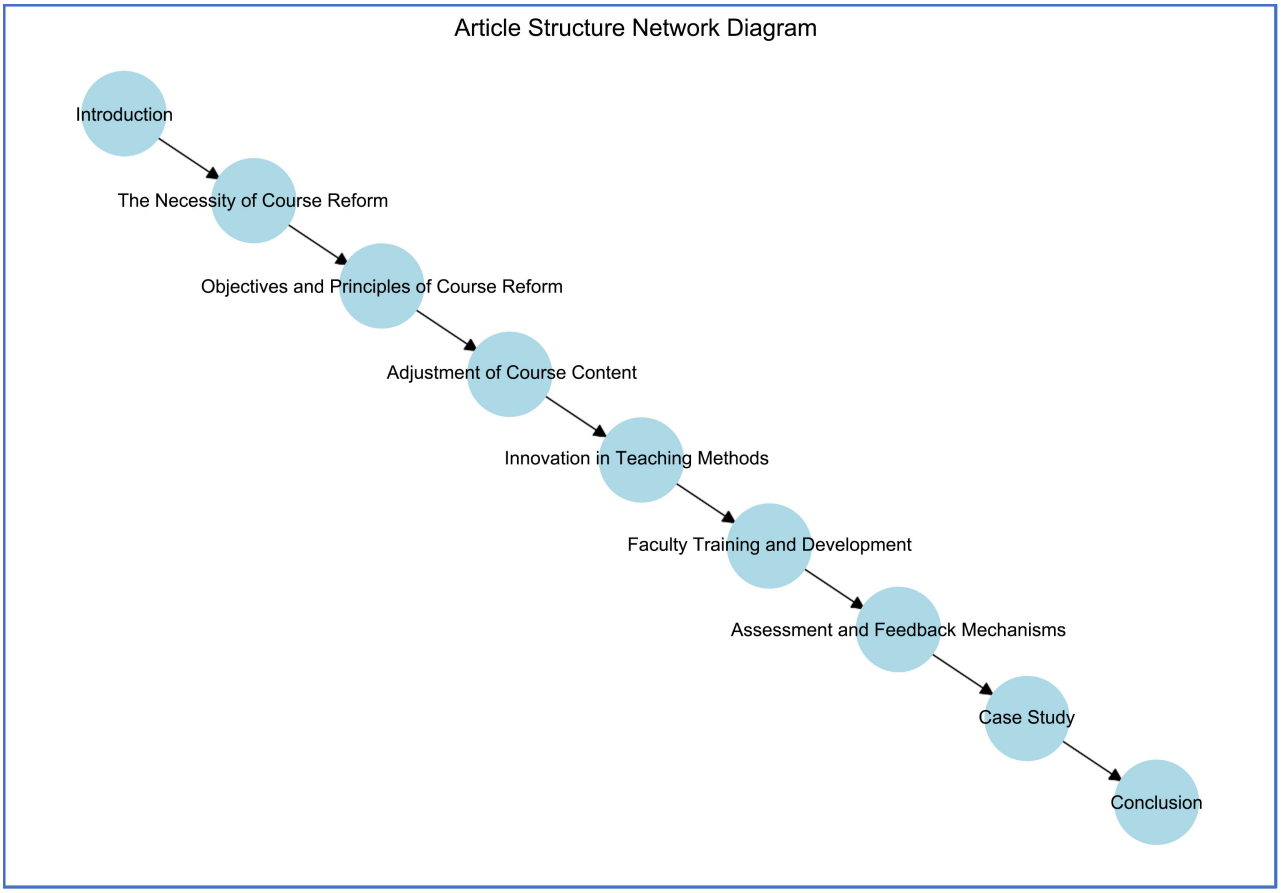


**Figure 1.** The structure network diagram in this study.

## 2. The Necessity of Course Reform

In the context of achieving carbon neutrality, environmental requirements have undergone significant changes [7]. First, the impact of carbon emissions on the atmospheric environment cannot be ignored [8]. Massive carbon dioxide emissions not only lead to global temperature rise but also significantly affect the chemical composition of the atmosphere and meteorological conditions [9]. These changes further influence the processes of pollutant generation, dispersion, and deposition, increasing the complexity of atmospheric pollution control. Additionally, changes in meteorological factors such as temperature, hu-

midity, wind speed, and precipitation directly impact the dispersion and transformation of pollutants [10]. For instance, extreme weather conditions can exacerbate the frequency and severity of pollution events [11]. Therefore, a comprehensive understanding of the relationship between carbon emissions and changes in meteorological factors is crucial for effectively managing environmental pollution.

However, the current pollution meteorology course content is significantly disconnected from carbon neutrality goals. Traditional courses mainly focus on the transmission of theoretical knowledge and lack attention to carbon neutrality policies, carbon emission control technologies, and the latest research findings. Additionally, the cultivation of practical application skills is relatively insufficient, leaving students without the comprehensive analysis and problem-solving abilities needed to tackle complex environmental issues. The weak emphasis on practical components in course design results in students often lacking adequate practical experience and innovative thinking when facing real-world environmental challenges.

Therefore, it is imperative to reform pollution meteorology courses to meet the requirements of carbon neutrality goals. By updating course content to emphasize the interaction between carbon emission control and meteorological conditions, strengthening practical teaching components, and enhancing students' practical application and innovation abilities, we can better train professionals who are equipped to meet future environmental protection and atmospheric management needs. This is not only significant for achieving carbon neutrality goals but also provides strong support for addressing increasingly complex environmental issues.

## 3. Objectives and Principles of Course Reform

The primary goal of reforming the pollution meteorology curriculum is to closely align course content with carbon neutrality goals. By introducing the latest carbon neutrality policies, technologies, and research findings, the aim is to enable students to understand the impact of carbon emissions on the atmospheric environment and the importance of carbon neutrality strategies. Simultaneously, the reform aims to significantly enhance students' practical skills and foster innovation awareness. This will be achieved by increasing laboratory sessions, field investigations, and project-based learning opportunities so that students not only grasp theoretical knowledge but also apply it in practical scenarios, thereby developing their abilities to solve environmental problems and think innovatively.

To achieve these objectives, curriculum reform should adhere to principles of integrating theory with practice, interdisciplinary collaboration, dynamic adjustment, and continuous improvement. In curriculum design, emphasis should be placed on the systematic and cutting-edge nature of theoretical knowledge, while reinforcing practical teaching components to enable students to apply theoretical

knowledge to real-world problem-solving. Carbon neutrality involves multiple disciplines such as meteorology, environmental science, and management, thus curriculum reform should focus on integrating interdisciplinary content to foster students' comprehensive competencies and interdisciplinary thinking skills [12].

By incorporating teaching resources and methods from multiple disciplines, students can gain a more comprehensive understanding and effectively address environmental issues. Given the rapid development of environmental science and technology, curriculum content and teaching methods need to be dynamically adjusted. Establishing mechanisms for continuous feedback, evaluating curriculum effectiveness regularly, and promptly updating course content based on the latest research findings and policy changes are crucial to ensuring the advanced and practical nature of teaching.

Guided by these goals and principles, reforming the pollution meteorology curriculum will not only enhance students' professional competence and practical skills but also cultivate more high-quality professionals capable of achieving carbon neutrality goals and effectively addressing complex environmental challenges.

## 4. Adjustment of Course Content

### 4.1. Adjustment of Theoretical Content

To better align the pollution meteorology curriculum with the goals of carbon neutrality, comprehensive adjustments are needed in the theoretical aspects. Firstly, there should be an expansion of theoretical content related to carbon neutrality, covering carbon emission mechanisms, carbon sink technologies, carbon trading markets, and carbon neutrality policies. This will enable students to gain a systematic understanding of various aspects of carbon neutrality.

Secondly, foundational theories in pollution meteorology should be reorganized with a focus on highlighting the impact of carbon emissions on meteorological conditions and the dispersion of atmospheric pollutants. This restructuring will help students establish connections between carbon neutrality and pollution meteorology.

Additionally, the curriculum will incorporate interactive content on climate change and pollutant dispersion. Detailed explanations of meteorological factors such as temperature, humidity, and wind speed and their influence on the dispersion and transformation of pollutants will be emphasized. This approach aims to provide students with a more comprehensive understanding of the dynamic processes of atmospheric pollution.

### 4.2. Enhancement of Practical Teaching

In the practical component, the course conducts carbon emission monitoring training where students gain hands-on experience in carbon emission monitoring methods and technologies through practical exercises. This aims to enhance

their practical skills and data analysis capabilities. Practical training will involve using portable and fixed monitoring devices for on-site sampling, data recording, and analysis, as well as learning data processing and analysis techniques.

Additionally, the course may incorporate case studies in pollution meteorology, focusing on selecting typical pollution incidents and carbon emission reduction cases from both domestic and international contexts. These case studies will help students apply theoretical knowledge to real-world scenarios. Through case analysis, students can learn from the experiences and practices of different countries and regions in addressing atmospheric pollution and carbon emissions issues.

### 4.3. Project-Based Learning and Cultivation of Innovation Skills

The course will design project-based learning experiences centered around carbon neutrality to encourage students to participate in practical projects related to carbon emission control and reduction technologies. These projects aim to cultivate innovation skills and problem-solving abilities among students. Examples of such projects could include community carbon footprint assessments and emission reduction plan designs, planning and implementation of green energy projects, and research on the application of carbon neutrality technologies in specific industries.

Through participation in these practical projects, students will not only apply their acquired knowledge to real-world issues, enhancing their overall competence and practical skills, but also develop teamwork and leadership abilities throughout the project process. These practical experiences will significantly enhance students' ability to apply their learning in real-world contexts, making them better equipped to tackle future environmental challenges effectively.

## 5. Innovation in Teaching Methods

### 5.1. Application of Interactive Teaching

To enhance teaching effectiveness and students' learning experiences, the application of interactive teaching will be a crucial strategy in the course reform. Through group discussions and collaborative learning, students will deepen their understanding of course content through mutual exchange, while fostering teamwork and comprehensive problem-solving skills. Group discussions encourage students to share their insights and knowledge, collaboratively addressing complex environmental issues, thereby promoting deep learning and critical thinking development. Additionally, instructors can design highly interactive classroom activities such as role-playing, simulated decision-making scenarios, and case studies. These activities allow students to apply their learning in simulated real-life situations, enhancing their engagement and practical application of knowledge.

To enhance teaching effectiveness and students' learning experiences, interactive teaching will be a critical strategy in the course reform. Through group dis-

cussions and collaborative learning, students will deepen their understanding of course content through mutual exchange, while developing teamwork and comprehensive problem-solving skills. Group discussions encourage students to share their insights and knowledge, collaboratively addressing complex environmental issues, thereby promoting deep learning and critical thinking development. Moreover, instructors can design highly interactive classroom activities such as role-playing, simulated decision-making exercises, and case studies. These activities allow students to apply their learning in simulated real-world scenarios, facilitating the practical application of acquired knowledge.

Field trips and laboratory experiments provide students with opportunities to interact with real-world environments, observe, and analyze the interaction between pollution phenomena and meteorological factors. This not only enhances students' sensory perception but also improves their hands-on skills and ability to collect and analyze data. For example, by visiting pollution sources and monitoring stations, students can gain firsthand insights into the emission processes of pollutants and monitoring technologies. Through field experiments, students can actively operate sampling equipment, measure meteorological parameters, and analyze pollutant dispersion patterns. In practical operations, students gain a more intuitive understanding of theoretical knowledge and can apply it to real-world situations, thereby enhancing learning outcomes.

### 5.2. Introduction of Information Technology in Teaching

The introduction of information technology is crucial for innovating teaching methods. By leveraging big data and cloud computing technologies, instructors can provide students with richer and more precise learning materials to help them analyze and understand complex pollution meteorology data. For instance, teachers can access and process real-time pollution monitoring data through big data platforms, incorporating them into classroom teaching and student research projects. Students can utilize this data for in-depth analysis, exploring patterns and influencing factors of pollutant dispersion.

Developing an online learning platform allows students to engage in learning anytime and anywhere, accessing a wide range of learning resources and interactive opportunities. An online learning platform can offer video lectures, e-books, interactive exercises, and online discussions, facilitating independent learning, review, and consolidation for students. Teachers can conduct real-time teaching and Q&A sessions through the online platform, enhancing interaction between students and instructors and improving teaching effectiveness.

The application of virtual laboratories and simulation technologies will provide students with realistic experimental environments to simulate actual meteorological and pollution scenarios. This allows students to conduct experimental operations and data analysis in a safe and controlled setting. For example, virtual laboratories can simulate the dispersion process of atmospheric pollutants, enabling students to observe the behavior characteristics of pollutants under different meteorological conditions. Simulation technologies can recreate

historical pollution events, aiding students in analyzing and evaluating the effectiveness of pollution control measures. These information technology teaching methods not only broaden students' learning channels but also enhance the flexibility and effectiveness of teaching.

### 5.3. Cultivation of Comprehensive Practical Skills

The combination of interactive teaching and information technology aims ultimately to cultivate students' comprehensive practical skills. Through diverse teaching methods and rich practical components, students not only gain a solid grasp of theoretical knowledge but also hone their ability to solve real-world problems through practice. For example, courses can include project-based practices based on real environmental issues, requiring students to apply their knowledge to design and implement pollution control strategies, thereby fostering their innovation and practical capabilities.

In addition, curriculum reform should also emphasize cultivating students' interdisciplinary thinking and comprehensive analytical abilities. For example, by introducing courses such as environmental economics, policy analysis, and management science, students can gain a multidimensional understanding of environmental issues and integrate knowledge from different fields for systematic analysis and problem-solving. Encouraging students to participate in academic exchanges, research projects, and social practice activities helps enhance their research capabilities and sense of social responsibility.

## 6. Faculty Training and Development

### 6.1. Diversified Faculty Team Development

To meet the needs of reforming the curriculum in pollution meteorology, it is crucial to develop a diversified faculty team. By inviting experts from relevant fields to give lectures at the university, teachers can stay updated on the latest research trends and practical experiences in carbon neutrality. This enriches the teaching content by providing valuable insights and guidance from these experts' cutting-edge perspectives and practical experiences. For instance, inviting top experts in fields such as carbon capture and storage (CCS), renewable energy, and climate policy analysis can allow them to share their latest research findings and practical experiences.

In addition, encouraging teachers to actively participate in carbon neutrality-related research projects is essential. This allows them to not only deepen their expertise but also integrate research outcomes into teaching, thereby enhancing the academic rigor and practical relevance of the curriculum. For example, teachers can engage in carbon emission monitoring and control projects with local governments or businesses, or apply for national and international research funding projects. By accumulating practical research experience, teachers can bring this knowledge into the classroom. Through these activities, teachers enrich themselves theoretically and gain practical experience, thus better guiding students in their learning.

### 6.2. Systematic Faculty Training

Faculty training is one of the key measures to improve teaching quality. Organizing regular teacher training sessions focuses on imparting new knowledge and technologies in the fields of carbon neutrality and pollution meteorology to enhance teachers' professional competence. For instance, inviting renowned scholars and experts from both domestic and international arenas to conduct special lectures and seminars covering various aspects such as carbon neutrality technologies, climate change science, and environmental policies. Additionally, organizing online courses for teachers to utilize internet resources for self-improvement.

At the same time, providing opportunities for further education and exchange, encouraging teachers to participate in domestic and international academic conferences and training programs, and exchanging experiences and insights with peers to learn advanced teaching methods and concepts. For example, encouraging teachers to attend professional conferences such as the International Meteorological Society and Environmental Science Society for academic exchange and collaborative research, broadening their perspectives and understanding international cutting-edge developments. Through these training and exchange activities, teachers can continuously update their knowledge base, and master the latest teaching methods, thereby enhancing their effectiveness in teaching and fostering high-quality talents aligned with carbon neutrality goals.

### 6.3. Interdisciplinary and International Collaboration

Promoting interdisciplinary collaboration among teachers and fostering international cooperation are also important pathways to enhance the level of teaching staff. Achieving goals in pollution meteorology and carbon neutrality requires knowledge and skills from multiple disciplines. Therefore, encouraging teachers to collaborate with experts from other disciplines such as environmental engineering, energy science, and economics to conduct interdisciplinary research projects and design courses can facilitate the integration of knowledge across disciplines.

At the same time, promoting collaboration and exchanges between teachers and international institutions and universities to conduct joint research and educational projects is also crucial. For instance, establishing partnerships with renowned foreign universities and research institutions allows for mutual exchanges of teachers, co-organizing academic seminars, and conducting training workshops. Through these international collaborations, teachers can not only learn advanced practices and technologies from abroad but also incorporate an international perspective into their teaching, thereby enhancing the international competitiveness and influence of their courses.

## 7. Assessment and Feedback Mechanisms

### 7.1. Student Learning Effectiveness Evaluation

To ensure the effectiveness of curriculum reform, establishing a comprehensive

student learning effectiveness assessment mechanism is crucial. Firstly, through various forms of assessment, it is possible to objectively measure students' mastery of course content and the development of their practical abilities. These assessment forms include regular exams, project presentations, lab reports, and classroom discussions. Exams can assess students' understanding of theoretical knowledge, while project presentations and lab reports evaluate their practical skills and ability to apply knowledge comprehensively. Classroom discussions and interactive sessions also serve as assessment tools to help teachers understand students' thought processes and problem-solving abilities. Furthermore, by introducing online tests and feedback systems, teachers can monitor students' learning progress and comprehension in real-time, providing timely personalized guidance and support.

### 7.2. Course Satisfaction Surveys and Feedback

Conducting course satisfaction surveys to collect students' feedback on course content, teaching methods, and practical components is a crucial means to improve teaching. Through anonymous questionnaires and group interviews, teachers can comprehensively understand students' evaluations and suggestions regarding the course. This feedback helps teachers grasp students' actual needs and perceptions, enabling targeted improvements and optimizations in teaching. For example, if students find certain theoretical knowledge difficult to understand, teachers can adjust their teaching methods by increasing explanatory examples and interactive sessions. Similarly, if students are dissatisfied with the arrangement of practical components, teachers can increase the number of experiments or enhance experiment design. Regular collection and analysis of feedback ensure that course reforms achieve the desired outcomes and enhance teaching quality.

### 7.3. Continuous Improvement and Dynamic Adjustment Mechanism

The mechanism for continuous improvement is crucial for maintaining the advanced nature and adaptability of the curriculum. Establishing regular feedback and adjustment systems involves holding regular teaching seminars, listening to teachers' and students' opinions and suggestions, and promptly identifying and resolving teaching issues. For example, teachers can organize teaching evaluation meetings at the end of each semester, where they discuss the strengths and weaknesses of the course based on student feedback and their own teaching experiences, and propose improvement measures. Additionally, integrating the latest research findings and policy changes, and continuously updating and optimizing course content ensures that it remains at the forefront of academia. For instance, with the development of carbon neutrality technologies and policies, course content should promptly reflect the latest research advancements and policy directions, ensuring students grasp cutting-edge knowledge and skills.

By dynamically adjusting course content and teaching methods, we ensure that the curriculum stays abreast of the latest developments in societal needs and carbon neutrality goals. For example, as new technologies are applied and new policies are enacted, the curriculum should promptly incorporate relevant content and organize students for specialized learning and discussions. This approach not only maintains the curriculum's cutting-edge and practical nature but also continually enhances and improves it in practical teaching, providing students with a superior educational experience.

## 8. Case Study

Analyzing successful course reform cases from domestic and international universities can provide valuable insights and references for the reform of pollution meteorology courses. For instance, the Massachusetts Institute of Technology (MIT) in the United States has integrated a carbon neutrality module into its environmental science curriculum, using real-life case studies to teach students about the concept and application of carbon neutrality. Similarly, Imperial College London in the United Kingdom fosters interdisciplinary project-based learning to equip students with the ability to apply their knowledge to real-world environmental issues. These institutions have implemented specific measures such as thematic lectures, field visits, and project-based learning.

The outcomes have shown that students gain a deeper understanding of carbon neutrality by the end of the course, significantly enhancing their practical skills and problem-solving abilities. In our curriculum design, we can draw lessons from these advanced cases to enhance course quality and improve students' overall competence through well-designed curriculum structures and innovative teaching methods.

In the subsequent phases of implementing reforms, the school can begin by conducting a comprehensive assessment of the existing courses to identify areas that need improvement. Following this assessment, the teaching team can integrate relevant theories and practical applications related to carbon neutrality. Collaborative agreements with businesses and research institutions can be established to design practical projects. Specific measures for reform include enhancing carbon emission monitoring training courses, conducting case studies in pollution meteorology, and involving students in real-world projects centered around carbon neutrality.

Through continuous evaluation and adjustments, the aim is to drive ongoing innovation and reform in pollution meteorology courses under the context of carbon neutrality. This approach seeks to cultivate highly skilled professionals who can contribute effectively towards achieving carbon neutrality goals.

## 9. Conclusions

Driven by the goal of carbon neutrality, the importance and urgency of reforming the curriculum in pollution meteorology are self-evident. Traditional course

content and teaching methods no longer meet the current demands for environmental protection and sustainable development. There is an urgent need to introduce theories related to carbon neutrality, enhance practical teaching methods, and integrate interdisciplinary approaches to elevate the curriculum's relevance and applicability. Through curriculum reform, it is anticipated that students will not only gain a deep understanding of the relationship between carbon neutrality and atmospheric pollution control but also significantly improve their practical skills and innovative thinking. This will empower them to contribute wisdom and strength to future environmental governance efforts.

Future research directions should focus on continuously optimizing curriculum content, exploring more effective teaching methods, promptly integrating the latest scientific research findings and policy changes, and establishing dynamic feedback and adjustment mechanisms to ensure the curriculum remains at the forefront of academic development. Additionally, it is recommended to strengthen international exchanges and cooperation, draw lessons from global best practices in teaching, and cultivate professionals in environmental protection and atmospheric environmental governance with a global perspective and comprehensive competence.

To achieve these goals, the curriculum should incorporate key theories related to carbon neutrality such as sustainability science, which integrates knowledge from various disciplines to promote sustainable development, and ecological modernization theory, which advocates for technological innovation and institutional reforms to balance environmental protection and economic growth. Systems theory should be used to view environmental issues as part of a larger, interconnected system, encouraging holistic thinking. Behavioral change theories can help shape student attitudes and behaviors towards sustainability.

Practical teaching methods should include project-based learning, engaging students in real-world projects related to carbon neutrality; service learning, which combines community service with academic learning; experiential learning through direct experiences such as field trips and hands-on activities; and simulation and role-playing to model complex systems and explore stakeholder perspectives. Interdisciplinary approaches should integrate science, technology, engineering, and mathematics (STEM) fields to solve carbon-related problems, environmental humanities to explore cultural and ethical dimensions, policy and economics to understand and influence carbon policies, and social sciences to study human behaviors and societal impacts.

By combining these theories and methods, the curriculum can become more dynamic and relevant, equipping students with the knowledge and skills needed to make a tangible impact on environmental governance and sustainability.

## Acknowledgements

This research was supported by Ideological and Political Education in Atmospheric Detection Studies Program (No. JYJG2023004), Construction Project of Meteo-

rological Environment and Health Micro-Meteorology (No. JYJG2024061), and Construction of Micro-Agricultural Meteorology (No. JYJG2024062).

## Conflicts of Interest

The authors declare no conflicts of interest.

## References

[1] Qu, J.S., Chen, W., Zeng, J.J., *et al.* (2022) Analysis of International Carbon Neutralization Strategic Actions and Technology Layout and Enlightenment Suggestions to China. *Bulletin of Chinese Academy of Sciences*, **37**, 444-458.

[2] Zhuang, G.Y., Bo, F. and Zhang, J. (2018) China's Role Positioning and Strategic Choices in Global Climate Governance. *World Economics and Politics*, **4**, 4-27.

[3] Su, J., Liang, Y.B., Ding, L., *et al.* (2021) Research on China's Energy Development Strategy under Carbon Neutrality. *Bulletin of Chinese Academy of Sciences*, **36**, 1001-1009.

[4] Lu, W., Li, Y. and Lee, Y. (2021) The Impact of the Paris Agreement on China's Carbon Reduction and Economy. *The Journal of Asian Studies*, **24**, 129-150. https://doi.org/10.21740/jas.2021.08.24.3.129

[5] Yang, B., Li, C., Chen, W., Chen, A. and Chen, J. (2023) Teaching Practice and Curriculum Reform of Housing Architecture Based on Knowledge Application Strengthening. *Creative Education*, **14**, 708-715. https://doi.org/10.4236/ce.2023.144046

[6] Zhao, M., Mu, B. and Lu, C. (2016) Teaching to the Test: Approaches to Teaching in Senior Secondary Schools in the Context of Curriculum Reform in China. *Creative Education*, **7**, 32-43. https://doi.org/10.4236/ce.2016.71004

[7] Jia, L.Y. and Wang, K. (2023) Low-Carbon Transition Pathways for China's Transportation Sector under the Background of Carbon Neutrality. *China Environmental Science*, **43**, 3231-3243.

[8] Liu, Z.H., He, H.S., Xu, W.R., *et al.* (2023) Impacts of Forest Fire Carbon Emission and Mitigation Strategies. *Bulletin of Chinese Academy of Sciences*, **38**, 1552-1560.

[9] Chipperfield, M.P. and Bekki, S. (2024) Opinion: Stratospheric Ozone—Depletion, Recovery and New Challenges. *Atmospheric Chemistry and Physics*, **24**, 2783-2802. https://doi.org/10.5194/acp-24-2783-2024

[10] Zhang, Y. (2019) Dynamic Effect Analysis of Meteorological Conditions on Air Pollution: A Case Study from Beijing. *Science of the Total Environment*, **684**, 178-185. https://doi.org/10.1016/j.scitotenv.2019.05.360

[11] Wang, Y.S., Zhang, J.K., Wang, L.L., *et al.* (2014) Researching Significance, Status and Expectation of Haze in Beijing-Tianjin-Hebei Region. *Advances in Earth Science*, **29**, 388.

[12] Zou, C.N., Chen, Y.P., Xiong, B., *et al.* (2023) Mission of New Energy under Carbon Neutrality Goal in China. *Bulletin of Chinese Academy of Sciences*, **38**, 48-58.