

# Application prospect of new sewage treatment technology in urban environment

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**Abstract:** This paper delves into the potential applications of novel sewage treatment technologies within urban environments. Initially, it offers a comprehensive overview by defining, categorizing, and delineating the characteristics and benefits of these innovative approaches to sewage treatment. Subsequently, it conducts a detailed analysis of their utilization in various facets of urban sewage management, including treatment plants, landscape water treatment, and rainwater drainage systems. By examining these applications in depth, the paper aims to highlight the efficacy and versatility of new sewage treatment technologies in addressing the complex challenges of urban wastewater management. Furthermore, it proposes a strategic framework for the promotion and widespread adoption of these technologies, emphasizing the need for collaborative efforts among stakeholders. Ultimately, the paper envisages a promising future for the integration of new sewage treatment technologies into urban environments, offering enhanced sustainability, resilience, and environmental stewardship in the face of growing urbanization pressures and water resource constraints.

**Keywords:** new sewage treatment technology; Urban environment; Application prospect; Promotion strategy

## 1. Introduction

With the acceleration of urbanization, the problem of urban sewage treatment has become increasingly prominent, and the traditional sewage treatment technology has been difficult to meet the increasingly stringent environmental protection requirements. Therefore, the research and application of new sewage treatment technology is of great significance for improving the urban environment and ensuring the safety of water resources. This paper aims to explore the application prospect of new sewage treatment technology in urban environment, analyze the advantages and disadvantages of different technologies, and evaluate their feasibility in practical application, so as to provide new ideas and methods for urban sewage treatment in China. Through this study, it is expected to contribute to urban sustainable development and ecological civilization construction.

## 2. Overview of new sewage treatment technology

### 2.1 Definition and classification of new sewage treatment technology

Compared with traditional sewage treatment methods, new sewage treatment technology has significantly improved or innovated in technical principle, treatment effect, energy consumption and environmental impact. With the increasingly strict requirements of environmental protection and the continuous progress of science and technology, new sewage treatment technology came into being, aiming at treating urban sewage more efficiently and environmentally to meet the needs of sustainable development. New sewage treatment technologies can be classified according to different standards<sup>[1]</sup>. According to the treatment principle, it can be divided into physical method, chemical method, biological method and their combined processes<sup>[2]</sup>. Physical methods mainly include filtration, precipitation, adsorption, etc., and remove suspended solids and particulate matter from sewage by physical means; Chemical method makes the harmful substances in sewage change chemically by adding chemical agents, so as to achieve the purpose of removal; Biological law uses the metabolism of microorganisms to transform organic matter in sewage into harmless substances. In addition, there are some emerging technologies, such as advanced oxidation technology and membrane separation technology, which realize the removal of specific pollutants in sewage through more efficient reaction

mechanism or separation means. These new sewage treatment technologies not only improve the efficiency and effect of sewage treatment, but also reduce the energy consumption and secondary pollution in the treatment process<sup>[3]</sup>. They have broad application prospects in urban environment, especially under the background of increasingly scarce water resources and increasing environmental protection requirements, new sewage treatment technologies will become an important development direction in the field of urban sewage treatment<sup>[4]</sup>.

## ***2.2 Characteristics and advantages of new sewage treatment technology***

Compared with the traditional methods, the new sewage treatment technology has a series of remarkable characteristics and advantages. Its core idea is to treat urban sewage more efficiently, more environmentally friendly and more sustainably. These technologies use advanced biological treatment, physical and chemical methods and advanced oxidation processes, which significantly improve the efficiency and effect of sewage treatment. The new sewage treatment technology emphasizes source reduction and resource recovery, and realizes sewage resource utilization by reducing sewage discharge and improving resource recovery rate in sewage<sup>[5]</sup>. At the same time, these technologies pay attention to eco-friendliness, promote the natural degradation process of microorganisms and reduce the secondary pollution to the environment by simulating the natural ecosystem. In the aspect of intelligent management, the new sewage treatment technology realizes the intelligent management of sewage treatment process by introducing automatic control system and remote monitoring technology. This not only improves the automation level of sewage treatment, but also reduces the labor cost and improves the operation efficiency. In addition, the new sewage treatment technology also pays attention to energy saving and emission reduction. By optimizing the treatment process and improving the energy efficiency, these technologies effectively reduce the energy consumption and carbon emissions in the sewage treatment process, which is in line with the current green and low-carbon development concept<sup>[6]</sup>.

The new sewage treatment technology has broad application prospects in urban environment because of its characteristics and advantages of high efficiency, environmental protection and sustainability. They not only help to improve the urban water environment and improve the quality of life of residents, but also promote the sustainable development of cities and achieve a win-win situation of economic, social and environmental benefits<sup>[7]</sup>.

## **3. Present situation and challenges of urban environmental sewage treatment**

### ***3.1 Analysis of the present situation of urban sewage treatment***

Analysis of the present situation of urban sewage treatment With the acceleration of urbanization, the problem of urban sewage treatment has become increasingly prominent. At present, China's urban sewage treatment has made some achievements, but there are still many problems and challenges. The construction of urban sewage treatment facilities has begun to take shape, and the treatment capacity has been significantly improved. Centralized sewage treatment plants have been established in most cities, and advanced technologies such as activated sludge process and A2O process have been adopted to effectively treat sewage, reaching the national discharge standards<sup>[8]</sup>. The operation of these facilities has greatly improved the urban water environment and protected water resources. However, urban sewage treatment also faces many challenges. First, the construction of sewage collection pipe network lags behind, which leads to the direct discharge of some sewage without treatment, seriously polluting the water environment<sup>[9]</sup>. Second, the operation and management of sewage treatment plants are not standardized, and there are phenomena such as excessive discharge and illegal discharge, which affect the sewage treatment effect. Third, the technical level and innovation ability of sewage treatment need to be improved to meet the increasingly stringent environmental protection requirements. In addition, urban sewage treatment is also facing problems such as lack of funds and insufficient policy support<sup>[10]</sup>. The construction and operation of sewage treatment facilities need a lot of capital investment, but at present, the government's investment is limited, and the participation of enterprises and social capital is not high, which leads to the shortage of funds as a bottleneck restricting the development of sewage treatment<sup>[11]</sup>.

Although some achievements have been made in urban sewage treatment, there are still many problems and challenges. In the future, we need to strengthen the construction and management of sewage treatment facilities, improve the technical level and innovation ability of sewage treatment,

increase capital investment and policy support, and promote the healthy development of urban sewage treatment<sup>[12]</sup>.

### ***3.2 Main challenges and problems faced***

In the field of sewage treatment in urban environment, there are many challenges and problems at present. With the acceleration of urbanization, the demand for sewage treatment has increased dramatically, but the existing treatment facilities are often difficult to cope with this growth trend. This leads to the difficulty in ensuring the efficiency and quality of sewage treatment, and a large amount of sewage is directly discharged without adequate treatment, which seriously affects the urban water environment and the quality of life of residents<sup>[13]</sup>. On the technical level, the traditional sewage treatment technology has been difficult to cope with the increasingly complex water pollution problem<sup>[14]</sup>. New pollutants, such as microplastics, heavy metals and drug residues, are difficult to be effectively removed in the traditional treatment process, which makes it difficult for the water quality after sewage treatment to meet the standards of ecological and agricultural water use. Economically, the construction and operation of sewage treatment facilities need a lot of capital investment, but many cities lack investment in this area, which leads to the aging of facilities and backward technology, and it is difficult to meet the growing demand for sewage treatment<sup>[15]</sup>. In addition, there are many problems in the collection and management of sewage treatment fees, which affect the sustainable development of sewage treatment industry. At the policy and management level, the supervision system of sewage treatment industry is still not perfect, and the implementation of policies is not enough, which leads to illegal behavior and illegal discharge in sewage treatment from time to time. At the same time, the lack of consideration for the layout and supporting facilities of sewage treatment in urban planning and construction also restricts the development of sewage treatment industry<sup>[16]</sup>.

Urban environmental sewage treatment is facing many challenges and problems in technology, economy, policy and management. In order to solve these problems, it is necessary to strengthen technical research and development to improve the efficiency and quality of sewage treatment; Increase capital investment and improve facilities; Improve the policy system and strengthen supervision; And fully consider the demand and layout of sewage treatment facilities in urban planning and construction<sup>[17]</sup>.

## **4. Application of new sewage treatment technology in urban environment**

### ***4.1 Application of New Sewage Treatment Technology in Urban Sewage Treatment Plant***

With the acceleration of urbanization, sewage treatment has become an indispensable part of urban environmental management<sup>[18]</sup>. Traditional sewage treatment methods often have problems such as high energy consumption, low treatment efficiency and secondary pollution to the environment. Therefore, the emergence of new sewage treatment technology provides strong support for the upgrading of urban sewage treatment plants. New sewage treatment technologies, such as activated sludge process, A2O process and MBR, have been widely used in urban sewage treatment plants because of their high efficiency, energy saving and environmental protection<sup>[19]</sup>. These technologies not only improve the efficiency of sewage treatment, but also greatly reduce the energy consumption and chemical consumption in the treatment process. At the same time, the new technology can effectively remove harmful substances from sewage, reduce the secondary pollution to the environment, and meet the requirements of sustainable development. In urban sewage treatment plants, the application of new sewage treatment technology is also reflected in intelligent management. By introducing automatic control system and data analysis technology, the sewage treatment plant can monitor the treatment process in real time, adjust the operation parameters in time, and ensure the stable effluent quality to meet the standard. This intelligent management method not only improves the efficiency of sewage treatment, but also reduces the labor cost, which provides a strong guarantee for the sustainable development of urban sewage treatment industry<sup>[20]</sup>.

The application of new sewage treatment technology in urban sewage treatment plants not only improves sewage treatment efficiency, reduces energy consumption and chemical consumption, but also reduces secondary pollution to the environment, and promotes the intelligent development of sewage treatment industry. With the continuous progress of technology and the expansion of application scope, new sewage treatment technology will play a more important role in urban environmental protection<sup>[21]</sup>.

#### ***4.2 Application of new sewage treatment technology in urban landscape water treatment***

With the acceleration of urbanization, urban landscape water treatment has become an important part of environmental protection. Traditional sewage treatment technology is often difficult to deal with the complex and changeable urban water pollution problems, and the emergence of new sewage treatment technology has brought new opportunities for the governance of urban landscape water bodies<sup>[22]</sup>. With its high efficiency and environmental protection, new sewage treatment technology is gradually playing an important role in urban landscape water treatment. Among them, bioremediation technology is a technology that has attracted much attention. It uses the metabolic activities of microorganisms, plants and other organisms to degrade and transform organic pollutants in urban landscape water, which can not only effectively remove pollutants, but also restore the ecological function of water. In addition, advanced oxidation technology is also widely used in the treatment of urban landscape water bodies<sup>[23]</sup>. This technology can rapidly degrade refractory organic matter in water and improve the self-purification ability of water body by producing highly active oxidant. In practical application, the new sewage treatment technology needs to be selected and combined according to the specific characteristics and pollution status of urban landscape water bodies. For example, for eutrophic urban landscape water, bioremediation technology can be combined with physical and chemical methods to realize water purification and ecological restoration. For the heavily polluted industrial wastewater discharge port, advanced oxidation technology may be needed to ensure the effective removal of toxic and harmful substances in the water body<sup>[24]</sup>. In a word, the application of new sewage treatment technology in urban landscape water treatment can not only improve the water quality, but also improve the urban environmental quality and promote the sustainable development of the city. In the future, with the continuous progress of technology and the expansion of application scope, new sewage treatment technology will play a more important role in urban environmental protection<sup>[25]</sup>.

#### ***4.3 Application of new sewage treatment technology in urban rainwater drainage and treatment***

In the urban environment, the application prospect of new sewage treatment technology is broad, especially in urban rainwater drainage and treatment. With the acceleration of urbanization, urban rainwater discharge has become a major environmental problem. Traditional rainwater drainage methods are often directly discharged into rivers or sewers, which is easy to cause water pollution and floods. The introduction of new sewage treatment technology provides a new solution for rainwater drainage. New sewage treatment technologies, such as activated sludge process, A2O process and MBR, can not only effectively remove pollutants such as organic matter, nitrogen and phosphorus from sewage, but also purify rainwater efficiently. These technologies remove and transform suspended solids, heavy metals and oil stains in rainwater by biological, physical and chemical means, so as to ensure that rainwater meets environmental protection standards before discharge. In urban rainwater treatment, the application of new sewage treatment technology not only improves the quality of rainwater discharge, but also helps to reduce the pressure of urban floods. Through rainwater collection, storage and purification, rainwater can be recycled and the dependence on natural water resources can be reduced. At the same time, after treatment, rainwater can be used for non-drinking water purposes such as urban greening and road washing, further improving the utilization efficiency of water resources. In addition, the new sewage treatment technology also pays attention to eco-friendliness and sustainable development. In the process of rainwater treatment, ecological elements such as microorganisms and plants are introduced to construct ecological systems such as constructed wetlands and ecological filters to realize natural purification of rainwater. This treatment method not only improves the effect of rainwater treatment, but also helps to maintain the urban ecological balance and promote sustainable development.

The application of new sewage treatment technology in urban rainwater drainage and treatment has broad prospects. Through efficient purification, recycling and eco-friendliness, it has provided strong support for urban environmental protection and water resources management.

### **5. Implementation strategy and prospect analysis of new sewage treatment technology**

#### ***5.1 Promotion and implementation strategy of new sewage treatment technology***

When popularizing and implementing new sewage treatment technologies, we need to adopt a series of comprehensive strategies to ensure that these efficient and environmentally friendly

technologies can be widely used in urban environment. First of all, the government should play a leading role in formulating relevant policies and regulations to promote the research and development and application of new sewage treatment technologies. This includes providing financial support, tax incentives and R&D funds to encourage enterprises and research institutions to invest more resources in innovation. At the same time, the government should also establish strict emission standards and supervision mechanisms to promote technological upgrading and transformation. Strengthening technology research and development and personnel training is the key. By establishing close cooperation with universities and research institutions, we will jointly promote the research and development of new sewage treatment technologies. At the same time, strengthen the training and introduction of relevant technical personnel to improve the technical level of the whole industry. In addition, it is also essential to strengthen public publicity and education. Popularize the importance of sewage treatment and the advantages of new technologies through media publicity and popular science lectures, and improve the public's awareness and participation in environmental protection. This will help to form a good atmosphere for the whole society to pay attention to and support the promotion of new sewage treatment technologies. Establishing multi-party cooperation mechanism is an important way to promote technology implementation. The government, enterprises, social organizations and the public should participate together to form a joint force. Through cooperative projects, technical exchanges and experience sharing, we will promote the wide application of new sewage treatment technologies in different cities and regions.

Popularizing and implementing the new sewage treatment technology requires the joint efforts of the government, enterprises and all sectors of society. By formulating policies, strengthening technology research and development, popularizing public education and establishing cooperation mechanisms, we are expected to see a cleaner and healthier urban water environment in the future.

### ***5.2 Application prospect of new sewage treatment technology in urban environment***

With the acceleration of urbanization, urban sewage treatment has become an important part of environmental protection. Traditional sewage treatment technology has some limitations in treatment effect, energy consumption and resource utilization, and it is difficult to meet the increasingly stringent environmental protection requirements. Therefore, the research and application of new sewage treatment technology is particularly urgent. The new sewage treatment technology has a broad application prospect in urban environment because of its characteristics of high efficiency, energy saving and environmental protection. Among them, the innovative development of advanced oxidation technology and biological treatment technology provides a new path for urban sewage treatment. Advanced oxidation technology can quickly decompose organic matter and improve sewage treatment efficiency by producing strong oxidant. The biological treatment technology utilizes the metabolism of microorganisms to realize the transformation and degradation of organic matter, which has the advantages of good treatment effect and low operating cost. In urban environment, the application of new sewage treatment technology can not only improve the efficiency of sewage treatment, but also effectively reduce the environmental pollution caused by sewage discharge. At the same time, these technologies can also realize the recycling of resources, such as using the treated sewage for urban greening and industrial water use, so as to realize the recycling of water resources. Looking forward to the future, with the progress of science and technology and the improvement of environmental protection requirements, new sewage treatment technology will be more widely used in urban environment. Through continuous technological innovation and practical exploration, the new sewage treatment technology will continuously improve its treatment effect, reduce operating costs and make greater contributions to urban environmental protection and sustainable development.

## **6. Conclusion**

In this paper, the application prospect of new sewage treatment technology in urban environment is deeply discussed. Firstly, the definition, classification, characteristics and advantages of new sewage treatment technology are summarized. Then, the practical applications of these technologies in urban sewage treatment plants, urban landscape water treatment and urban rainwater drainage and treatment are analyzed in detail. This paper probes into the promotion and implementation strategies of new sewage treatment technology, and looks forward to its application prospect in urban environment. Through the research of this paper, it aims to provide strong technical support for the improvement and sustainable development of urban environment.

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