Structural Elements, Synergy Mechanism and System Optimization of Atmospheric Environmental Self-cleaning Capability

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Abstract. On the basis of defining the connotation and structural elements of atmospheric environmental self-cleaning capability, this paper systematically analyses the synergy mechanism of atmospheric environment self-cleaning capability, and puts forward the system optimization of atmospheric environmental self-cleaning capability. The self-cleaning ability of the atmospheric environment mainly includes nature’s ability to cleanse itself and rationality of human design. The synergy mechanism of self-cleaning capability of nature mostly refers to the fact that pollutants in the atmosphere can be transformed chemically or scavenged by means of the dry deposition, wet deposition, transportation and dispersion of atmospheric hydrometeors, such as rain, snow, wind, geography, humidity and the like. The synergy mechanism of rationality of human design chiefly refers to the human ability to take a variety of comprehensive prevention and control measures such as reasonable urban planning, wind tunnel design, hydraulic facilities, pollution source layout and others to make the most of nature's self-cleaning capability and the ability to reduce the impact of the atmospheric pollutants. On this basis, seven measures have been proposed system optimization of atmospheric environmental self-cleaning capability. First, we should quicken the construction of artificial wetlands in areas with lower atmospheric self-cleaning capability; second, we should rapidly improve the vegetation coverage rate in the areas with low atmospheric self-cleaning capability; third, we should systematically plan urban construction in areas with lower atmospheric self-cleaning capability; fourth, we should scientifically construct urban air ducts in the area with low atmospheric environment self-cleaning capability; fifth, we should work out scientific production plans for the pollution intensive industries and gradiently transferring pollution intensive industries; sixth, we should vigorously propel the ecological migration work in areas with lower atmospheric self-cleaning capability; seventh, we should strengthen the construction of a linkage system of atmospheric environment self-cleaning capability.

1. Introduction
Since the reform and opening up, China's economic development has made remarkable achievements. However, for a long time, the extensive economic development mode has seriously damaged the atmospheric environment which is indispensable for human survival. Especially since 2012, there has been a large area with haze weather in northern China, affecting the local economic and social development and the people's health. In the face of such a severe air pollution problem, the government...
departments have worked out and implemented a number of environmental protection measures. At the end of 2017 and the beginning of 2018, in order to complete the Five-Year Air Pollution Prevention and Control Plan, almost all air pollution enterprises were shut down in the surrounding areas of Beijing, Tianjin and Hebei. Although haze pollution prevention and control has achieved certain results, this simple and extensive management method is unfavorable. The high-quality development of China's economy is not conducive to the harmonious coexistence of man and nature. The prevention and control effect of air pollution is closely related to the level of self-cleaning capability of the atmosphere. Only when the quantity and types of air pollution emitted by human beings match the self-cleaning capability of the local atmosphere can the prevention and control of air pollution go on continuously, and the coordinated development of local economy and environmental protection be possible. Therefore, this paper selects the collaborative mechanism and system optimization of atmospheric self-cleaning capability to provide some help for scientific prevention and control of air pollution in China.

2. Connotations and Structural Elements of Self-cleaning Capability of the Atmospheric Environment

Self-cleaning capability of the atmosphere mainly refers to the atmosphere's power to cleanse itself of air pollutants physically, chemically and biochemically, so that its concentration can be reduced, and toxicity can be lessened, or even disappear. The self-cleaning ability of the atmospheric environment mainly includes nature’s ability to cleanse itself and rationality of human design. The self-cleaning capability of nature mostly refers to the fact that pollutants in the atmosphere can be transformed chemically or scavenged by means of the dry deposition, wet deposition, transportation and dispersion of atmospheric hydrometeors, such as rain, snow, wind, geography, humidity and the like. Rationality of human design chiefly refers to the human ability to take a variety of comprehensive prevention and control measures such as reasonable urban planning, wind tunnel design, hydraulic facilities, pollution source layout and others to make the most of nature's self-cleaning capability and the ability to reduce the impact of the atmospheric pollutants. Rationality of human design can help increase nature's self-cleaning capability. The relationship between structural elements of atmospheric self-cleaning capability is shown in Figure 1.
Figure 1. Relationship of structural elements of atmospheric environmental self-cleaning capability.

The natural self-cleaning of the atmospheric environment is mainly to dilute, diffuse and deposit the air pollutants through the existing factors in nature. The impact of geography, humidity and temperature on the natural self-cleaning of the atmospheric environment is relatively small, while wind speed, wind direction, wind force, wind field and gale days, which are the main factors affecting the self-cleaning effect of the atmospheric environment, have a direct impact on the dilution and dispersion of air pollutants. Self-cleaning of atmospheric pollutants by precipitation is mainly achieved by wet deposition. The precipitation amount, time, days and intensity can have a more direct and obvious impact on the self-cleaning capability of the atmospheric environment. Temperature, humidity and other factors do exert an impact by way of the adsorption of air pollutants, though that impact is rather small. Geographical factors include mountains, rivers, lakes, oceans and other topographical structures. The impact of topography on the self-cleaning capability of the atmospheric environment works together with that of precipitation or wind blowing. Different terrain movements can change the way and intensity of precipitation and wind, so as to affect the natural self-cleaning capability of the atmospheric environment. At the same time, the geographical factors such as mountains, rivers, lakes and oceans can directly get involved in the regulation process of atmospheric water circulation, affecting the natural self-cleaning capability of the atmospheric environment from all aspects.

The rationality of artificial design is mainly through the reasonable planning of urban air ducts, pollution source distribution, artificial wetland, urban greening, urban construction and other urban construction, so as to promote the improvement of natural self-cleaning capability and final realization of the atmospheric environment. The urban air duct creates a convenient channel for the benign movement of wind in the city, which dilutes and diffuses the urban air pollutants by artificially changing the wind speed and guiding wind direction. The distribution of urban pollution sources also has a great impact on the rationality of urban artificial design. According to the reasonable distribution of urban design, the downwind of urban dominant wind in autumn and winter and the pollution sources in the downstream of rivers will minimize the urban pollution, and enhance the self-cleaning capability of the atmospheric environment. The artificial wetland has the similar function with the urban vegetation, which can regulate the urban microclimate, and different plant types have different regulatory effects.
on the urban atmospheric environment. The rationality of urban greening and construction is the basis of the rationality of artificial design. Only reasonable urban construction can ensure the distribution of urban air ducts and pollutants, as well as the area and arrangement of artificial wetlands, which play a positive role in air self-cleaning and promote the process of self-cleaning of the atmospheric environment.

3. Synergy Mechanism of Self-cleaning Capability of the Atmospheric Environment

The synergy mechanism of self-cleaning capability of the atmospheric environment refers to the synergistic mechanism between natural purification of atmospheric environment and rationality of artificial design on air pollution. The effects of natural self-cleaning of the atmospheric environment includes dilution, wet depositions of wind and snow, and adsorption and blocking of geographical factors, humidity, temperature, etc. The effects of rationality of artificial design and its role in atmospheric self-cleaning include the role of dry deposition in terms of urban greening and urban architecture, the regulatory role of artificial wetlands in the atmospheric water cycle, and the boosting role of urban planning, such as urban air duct design and urban architecture. The synergistic mechanism of self-cleaning capability of the atmospheric environment is shown in Figure 2:

![Synergy Mechanism of Self-cleaning Capability of the Atmospheric Environment](image)

**Figure 2. The synergistic mechanism of self-cleaning capability of the atmospheric environment**

3.1. Air Pollution Sources

3.1.1. Food and Beverage Industry and Household Stove Pollution. When using animal manure, firewood and coal as fuel, civil stoves will produce a large number of suspended particulates. Among them, the content of polycyclic aromatic hydrocarbons (volatile hydrocarbons) may exceed 75%, which will cause damage to the ozone layer and cause a series of atmospheric environmental problems. Food
stalls all over the streets mostly use coal as their main fuel, which will produce a large number of toxic and harmful substances such as smoke, SO₂, NOx and CO when burning, which is easy to cause smog pollution. Although most residents have installed exhaust devices in their kitchens, they still like to turn on the range hood when the stove is burning, and turn it off immediately after cooking in order to save electricity. This may easily cause the density of indoor SO₂ and NOx to exceed the standard within 30 minutes before being directly discharged into the atmosphere through the window. In addition, aldehydes and ketones contained in cooking oil fume are an important source of volatile organic compounds in the atmospheric environment [1], and they also affect the formation of peroxyacetyl nitrate and ozone in the atmospheric environment [2].

3.1.2. Industrial Enterprise Pollution. In the process of economic development, industrial development is bound to emit a large amount of exhaust gas. That means the pollution caused by thermal power plants, steel plants, cement plants and chemical plants is unavoidable [3]. In the process of production and processing, factories will emit quantities of polluting gases, mainly SO₂, CO, NO₂ and hydrocarbons, which are the main causes of air pollution. Among all these pollution sources, the dust and sulfide are directly discharged from the factory into the air, which will damage the atmosphere, or even lead to urban acid rain, harming people's living environment. With the rapid development of urban heavy chemical industry, a large number of volatile organic compounds, sulfur dioxide and nitrogen oxides have been emitted from the growing motor vehicles and industrial energy consumptions, resulting in more and more serious secondary pollution such as acid rain, ozone and fine particles [4]. Although in the past five years, China's air pollution prevention and control work has achieved remarkable results, but the emissions of SO₂, NOx, smoke and dust, VOCs and other air pollutants are still at the high level of 10 million tons, far exceeding the atmospheric environmental capacity. Obviously, the task of air pollution prevention and control still has a long way to go.

3.1.3. Transportation Pollution. Transportation pollution is one of the most influential pollution sources in the air environmental pollution. The main air pollutants discharged are: CO₂, SO₂, O₃, CFCs, CO, NOx, particulate matter, soot, lead, odor, etc. Among them, CO₂, SO₂, O₃ and CFCs cause relatively serious harm to the atmospheric environment, and their influence range is also relatively wide [5]. As trains, cars, ships and airplanes are powered by fuel, they consume energy resources during operation and emit more air pollutants, which not only worsen the quality of atmospheric environment, but also bring losses to human health and agricultural products. As the most important means of transportation of road traffic, motor vehicles are the source channel of NOx emission in the atmospheric environment; PM₁₀, NOx and SO₂ are mainly emitted from ships sailing, berthing and port loading and unloading operations; a large number of pollutants are emitted from aircraft taxiing, taking off and landing process and ground support equipment; diesel locomotive emissions are relatively low, but they can still cause apparent air pollution at the railway station. In the atmospheric monitoring of different regions in China, it is found that the contents of CO, NOx and HC emitted by motor vehicles account for 80% - 90% of the total amount of these pollutants in the atmospheric environment. Obviously, vehicle emissions will become one of the main air pollution sources in China.

3.1.4. Agricultural Air Pollution. With the rapid development of China's economy, the extensive use of pesticides and fertilizers, coupled with the non-degradable white garbage and heavy metal as pollutants, the industrial "three wastes" and the unreasonable discharge of domestic sewage, have not only destroyed the biological diversity and soil structure in the farmland, but also caused the polluted soil in the farmland to emit more CH₄ and N₂O into the atmosphere, which not only arouse greenhouse effect but also destroy ozone layer seriously. Nitrogen fertilizer used in agriculture can be directly evaporated or react with microorganisms in the farmland to produce nitrogen oxides before being evaporated into the atmosphere, which will reduce the ozone content, so as to affect human health and biological growth [6]. In addition to chemical fertilizer pollution, crop straw pollution cannot be underestimated. Due to the rapid development of rural economy, the comprehensive utilization of straw is seriously lagging
behind. For the sake of convenience or in order to catch up with time or for other reasons, farmers burn straw on site, resulting in the atmospheric pollution of straw burning from time to time [7].

3.1.5. Dust Pollution. Dust is mainly composed of larger particles, and contains a large number of carbon, hydrogen, oxygen, sulfur, chlorine, fluorine, heavy metals, bacteria and viruses, which move with the air flow. Dust pollution sources mainly include road floating soil, coal, bare ground, cultivated land soil, lime soil, mortar, plaster, engineering residue soil, sand and stone, construction waste and other particles which are easy to produce dust. Construction dust usually dissipates in a large area with the wind action, resulting in the rapid increase of PM$_{2.5}$ index in the air; many coal, coal gangue, coal cinder and other kinds of coal in storage yards around the city will also fly with the wind to produce a large amount of dust; a large amount of dust on the roads and streets of a city will also easily form road dust by the wind power, residents' activities or vehicle rolling; some areas with less vegetation and bare ground around the city are also prone to produce dust in autumn and winter, increasing the concentration of particulate matter in the city [8]. At the same time, the dust can be quickly absorbed by the lung and directly into the human body's blood without detoxification by the liver. The heavy metals and harmful gases in the dust can be quickly absorbed by the lung and directly into the human body's blood without detoxification by the liver. The heavy metals and harmful gases in the dust will dissolve in the blood and enter the blood circulation of the human body, thus affecting the health of a human body.

3.2. Natural Self-cleaning of Air Pollution

3.2.1. Dilution of Wind. The dilution of air pollution is mainly realized by the impacts of wind direction, average wind speed and turbulence and among others. Wind is one of the most important meteorological factors determining the transport and dispersion of air pollutants [9]. When the vertical and horizontal convection in the atmosphere is enhanced, the air pollutants are easily dispersed, so the wind field has a strong self-cleaning effect on the air pollutants. The impact of wind speed on air pollution mainly lies in its dilution ability. The higher the wind speed is, the greater the possibility of air environmental pollutants can be quickly blown away, and the stronger the dilution ability of the atmospheric environment. On the contrary, the lower the wind speed is, the weaker the dispersion ability of air pollutants, which is easy to cause the accumulation of atmospheric environmental pollutants. When the wind speed is small, especially when the maximum wind speed is small, the annual average wind speed will be smaller, which is not conducive to the dispersion of atmospheric environmental pollutants; on the contrary, it may incur dust generation. In addition, the wind speed near the ground will affect the atmospheric turbulence, which is conducive to the dispersion of high concentration pollutants. The higher the wind speed is, the stronger the dilution and dilution ability of atmospheric environmental pollutants is [10].

3.2.2. Wet Deposition of Rain, Snow and the Like. The cleaning effect of wet deposition is mainly realized by precipitation. It refers to the process of bringing air pollution from the air to the ground surface through rainfall and snowfall. It can be divided into snow washing and rain washing. Precipitation can lead to a certain degree of cleanliness of the air, and at the same time, gas and dust particles are mixed into the water droplets, which will then fall to the ground in the form of rainfall. This concept is often referred to as "rainwater" [11-12]. Rainwater can make the dust particles in the air dissolve and fall to the ground. The greater the rainfall is, the better the removal effect of dust particles in the air is. In other words, with the increase of humidity, the content of water vapor in the atmospheric environment also increases. The water vapor can make the air dust particles fall to the ground through the adsorption, so as to reduce the concentration of air pollutants. Although rainfall can reduce the concentrations of SO$_2$, NO$_2$ and PM$_{10}$ in pollutants, but their degrees are different, the order being heavy rain > light rain > moderate rain > light rain, and light snow ≤ moderate snow ≤ heavy snow [13]. However, the removal of organic pollutants from the air by snow is much better than that by rain, because in the process of snowfall, it is usually accompanied by the activity of cold air, and the relative humidity in the atmospheric environment is obviously decreased, which is conducive to the reduction
and dilution of pollutants, and then reduce the concentration of air pollution. Moreover, snow can also collect a large number of harmful gases such as PAHs produced in urban traffic.

3.2.3. Adsorption and Blocking of Humidity, Temperature and Geographical Factors. In addition to the purification of pollutants by dilution, dry and wet deposition, the atmosphere can also absorb and block air pollutants through humidity and geographical factors. Atmospheric temperature and humidity are important conditions for atmospheric circulation and chemical reaction of atmospheric pollutants, and good temperature and humidity of the environment can facilitate dilution and cleaning of air pollutants. The degree of atmospheric stability, from stable to unstable, determines the dispersion intensity of air pollutants. As the free flow velocities of air are different, the dispersion and transfer laws of air pollutants are also diverse. When the air velocity is low, the vertical dispersion range of air pollutants is large; when the air velocity is high, the vertical transfer and dispersion range of air pollutants is small. Different air flow velocity affects the horizontal dispersion of air pollutants. With free flow velocity of air increased, the position of the maximum concentration value of air pollutants will shift downstream [14]. Geographical factors mainly refer to mountains, rivers, lakes, oceans and other factors. The interface between land and sea, mountain terrains and other terrain characteristics affect the dispersion and concentration distribution of air pollutants. In coastal areas with complex terrain, due to the large impact of meteorological interaction at different scales on the overall advection and turbulent dispersion of atmospheric pollutants, it is necessary to adopt a sufficient scale of research to avoid the deviation of low-level simulation of pollutant dispersion in cities [15].

4. Rationality of Artificial Design for Air Pollution

4.1. Dry Deposition of Plants and Other Urban Greening

When the air pollutant particles disperse and move in the air, some particles fall to the ground under the turbulent mixing effect of air and gravity deposition, which is called dry deposition [16]. Therefore, dry deposition purification mainly refers to adsorption of air pollutant particles on the surfaces of water, snow, land, plants, and buildings and among others. The concentration of air pollutants in the atmosphere is reduced by physical processes such as electrostatic action, Brownian motion, turbulent motion, inertial effect and gravity sedimentation, or by chemical processes caused by dissolution, absorption, desorption, chemical reaction, or by biological processes such as vegetation growth and absorption, electrostatic properties and other biological processes to reduce the concentration of air pollutants, so as to achieve the effect of air self-cleaning. Therefore, the process of dry deposition plays an important role in the removal of acid sulfur and nitrogen oxides from the atmosphere [17]. Plant absorption is one of the most effective methods in terms of dry deposition. Plants play an important role in maintaining the balance of the environmental systems as well as preventing environmental pollution. Vegetation can absorb sulfur dioxide, fluoride, nitrogen oxides and other air pollution particles, and reduce their concentrations. In addition, plants can produce atmospheric negative ions through their growth activities. It can be seen that vegetation through its growth activities, in the form of adsorption, absorption and assimilation, can purify air pollutants. Therefore, to develop urbanization needs to increase the urban vegetation coverage by paying enough attention to the construction of green space and forests.

4.2. Regulation of Atmospheric Water Cycle by Artificial Wetland

The regulation of wetland in the atmospheric water cycle is realized by means of biological deposition and biological assimilation output. The artificial wetland can be used as a degradation system against pollutants and can convert energy into electricity for use [18]. Wetland soil and root zone microorganisms can respond to the changing air pollution types through the biotypes with purification and combination ability. Therefore, as long as the initial population diversity is sufficient, the wetland life system has the ability of self-cleaning and adaptation. Moreover, wetland plants have their unique aerenchyma. The gases produced in the matrix enter the atmosphere through the aerenchyma in plants,
which can adsorb and reduce heavy metals and toxic, harmful substances. The transport mechanisms of different types of plants are different. Plants themselves can release N₂O, and different kinds of plants have different release capacity, and the release rate is not only related to plant species, location, plant physiological stage, but also related to the environmental conditions. In addition, plants also have the ability to transform N₂O, which can effectively regulate air pollution. For example, the ability of a water hyacinth to absorb organic compounds in the artificial wetland proves the feasibility of its purification [19]. Jiaozhou Bay Wetland regulates the climate and acts as a climate regulator through continuous evaporation of water body and continuous heat exchange with the atmospheric environment [20].

4.3. Dispersion and Dilution of Urban Air Ducts
The air duct refers to an area with low aerodynamic roughness and low airflow resistance. Urban ventilation system can be divided into air duct, action space and compensation space. The air duct refers to the channel that delivers fresh air from compensation space to action space [21]. The compensation space can be divided into two kinds: one is the compensation space which can stimulate the air circulation, and act as the source of cooled air in the action space; the other is the compensation space which is to reduce pollution, that is, it has the function of purifying the inflow air. The urban air duct can make use of the urban heat island effect to combine the low-temperature air flow outside the city with the high-temperature air flow in the city to form convection, so as to disperse the air pollutants in the city and reduce the frequency of air pollution. The urban air duct can reduce the obstruction of urban buildings to the wind outside the city, so that the wind outside the city can blow into the city. In any case, it can effectively disperse the pollutants in the air of the city and achieve the purpose of purifying the air. Therefore, the scientific construction of a urban Ventilation corridor is conducive to the promotion of ventilation between the downtown area and its suburbs and, thus playing a role in alleviating atmospheric environmental pollution and urban heat pollution [22].

4.4. Dispersion and Dilution of Reasonable Distribution of Pollution Sources
The degree of air pollution is closely related to the distribution and emission of pollution sources. Its meteorological factors are in favor of pollutant dispersion, and the emission of pollutants is not very large in quantity, then the effect of dispersion is very good. On the one hand, it can dilute the pollutants; on the other hand, it can remove some pollutants out. However, the air pollution concentration of the same pollution source in the same place but at different time may vary by dozens of times, and the air pollution concentration of the same pollution source at the same time but in different places varies even greater. Generally speaking, it is in the areas where urban factories are excessively gathered together, or located in the upwind direction, or in the residential area with too many chimneys, or in the area with high traffic density that the concentration of sulfide and nitride in the air will increase enormously, causing bigger pollution. If the thermal power plant and steel plant are moved to the downwind suburbs far away from the urban area, it can not only ensure the full dispersion and dilution of air pollutants, but also ensure that the residents in the upwind direction are not affected by the air pollutants. Accordingly, it is advisable to have the pollution sources located in the city with fewer buildings, which will increase natural ventilation, eliminate the impact of buildings on ventilation rate, increase wind speed, and accelerate the dispersion of air pollutants. It is also advisable to have chimneys built in the middle of the gap between the eaves collar or increase its height so that the flue gas can better give off. In short, reasonable distribution of air pollution sources can reduce the concentration of air pollutants and effectively improve the atmospheric environment by dispersing and diluting pollutants.

4.5. Boosting Self-cleaning in Urban Construction
Urban construction is based on the requirements of urban development planning, targeted and purposeful construction of urban infrastructure, in order to achieve the integration of resources, environment and society, and achieve maximum benefits under the premise of ensuring good environment and urban development. Therefore, the construction of a city is an important means to improve the artificial environment and implement environmental protection. The height of urban buildings should be
decreased from the center of the city to the periphery of the city, which can ensure the inflow of fresh air and the dispersion of air pollutants in the city. Urban green belt can also be a good barrier to the diffusion of automobile exhaust and can carry out a good adsorption. At the same time, green space in the city can help to increase the wind speed near the ground, reduce a temperature inversion, facilitate the vertical distribution of air pollutants, avoid the accumulation of air pollutants, and improve the self-cleaning capability. Straight streets are conducive to atmospheric circulation, vertical streets are conducive to suppressing dust and sandstorm, and can reduce wind speed, etc. The improvement of urban road traffic, the adoption of vehicle diversion, the optimization and promotion of public transport system construction, the promotion of green public transport and the development of natural gas vehicles will also effectively reduce traffic exhaust pollution. Therefore, in the urban construction work, the street orientation, building height, green space pattern, traffic planning and among others can have a favorable boost effect on improving the environment.

5. System Optimization of Self-cleaning Capability of the Atmospheric Environment

According to the synergy mechanism of self-cleaning capability of the atmospheric environment, it can be concluded that self-cleaning capability of the atmospheric environment is a basis, and to realize it depends on strengthening of the rationality of artificial design. China should focus on building artificial wetlands, improving vegetation coverage, systematically planning urban construction, scientifically constructing urban air ducts, scientifically planning for pollution intensive industries, gradient transferring of pollution intensive industries, promoting ecological migration, and strengthening the construction of linkage system of atmospheric environment self-cleaning capability. In a word, it is desirable to utilize the rationality of artificial design to maximize the effect of atmospheric self-cleaning capability.

- The first step is to quicken the construction of artificial wetlands in areas with lower atmospheric self-cleaning capability. To be more exact, the numbers and areas of artificial wetland with low environmental self-cleaning capability, such as reservoirs, lakes, swamps and rivers, should be increased by way of wet season, rainwater collection, sewage treatment and south-to-north water diversion, so that the urban landscape can be beautified, the urban economy can be highly developed as well as the improvement of the environment. In addition marshes, lakes, reservoirs, beaches, paddy fields along the rivers in the area with low environmental self-cleaning capability can be added in line with wet seasons. All in all, enlarging the area of wetlands to affect the climate in the regions with low self-cleaning capability can gradually upgrade their self-cleaning capability of the atmospheric environment.

- The second step is to rapidly improve the vegetation coverage rate in the areas with low atmospheric self-cleaning capability. According to the needs of urban sustainable development strategic planning, urban forest parks, street green space, the green space attached to a particular work unit and other kinds of vegetation in these areas should be quickly increased, so as to ameliorate the urban atmospheric environment, beautify the urban landscape, reduce the impact of haze and other pollutants, and raise the high-quality development level of urban economy; on the other hand, we should reinforce the project of "returning the farmland to forestry, and grazing land to grasslands" in the areas with low environmental self-cleaning capability, provide ecological migrants with reasonable compensation, and try to keep the original workers in accordance with the bearing capacity of those areas with lower environmental self-cleaning capability.

According to the ecological environment carrying capacity of the area with lower self purification capacity, the number of workers in the areas of returning farmland to forest and returning grazing land to grassland should be appropriately reserved through for

- The third is to systematically plan urban construction in areas with lower atmospheric self-cleaning capability. On the one hand, it is necessary to scientifically layout air pollution intensive industries in the city, keeping pollution intensive industries away from the core of a city to lessen their impact on the urban atmospheric environment. On the other hand, the height of buildings should be taken
care of. Urban residential buildings should be disposed from low to high along the wind orientation, which can make the proportion of areas with low wind speeds smaller both inside and outside the community. A large area with high wind speeds is conducive to the dispersion of floating particles and nitrogen oxides produced by domestic stoves and catering industry in buildings, so as to avoid the impact of excessive atmospheric pollutants and ensure the smooth ventilation corridor, which has a good ventilation effect.

- The fourth is to scientifically construct urban air ducts in the area with low atmospheric environment self-cleaning capability. On the one hand, given the needs of the city's self-cleaning capacity and urban economic development, we are supposed to determine the overall industrial development layout and functional orientation of the city, take the relationship between the urban ventilation corridor and the layout of pollution intensive industries into comprehensive consideration, scientifically dredge the air pollutants emitted by the pollution intensive industries, and reduce the impact on the urban atmospheric environment. In addition, in terms of urban spatial layout, we should do our best to have high-rise and high-density buildings disposed within the city in the downwind direction of the dominant wind in autumn and winter, while have low-rise and low-density buildings disposed around the city, and have some high-rise and high-density buildings disposed in the core of a city.

- The fifth is to work out scientific production plans for the pollution intensive industries and gradually transfer pollution intensive industries. Based on the characteristics of different self-cleaning capabilities of different regions, combined with the analysis of the impact mechanism and effect of distinctive types of pollution extensive industries, such as thermal power, steel, heat, cement, petrochemical, metal smelting, pharmaceutical and among others, the bearing capacity of regional environment is analyzed by using such methods as location analysis and SWOT analysis during the basic process of pollution intensive industry planning. Based on the regional environmental self-self-cleaning capability, the development plan of pollution intensive industries is formulated from the spatial layout. On this basis, the transfer route of pollution intensive industries is scientifically planned according to the differences of regional environmental self-cleaning capability. The pollution intensive industries to be transferred are selected by using the gradient coefficient of pollution intensive industries and the dynamic agglomeration index of industries. And the undertaking capability and gradient coefficient of pollution intensive industries are used to select the new places for these industries.

- The sixth is to vigorously propel the ecological migration work in areas with lower atmospheric self-cleaning capability. On the one hand, ecological migration in the "enclosure transfer" mode should be carefully studied. The areas that have been crossed out of the ecological environment can serve as ecological public welfare forests. Measures such as grazing prohibition, mountain closure, fence enclosure, artificial replanting and the like should be taken in order to return farmland to grassland and return farmland to forest. Through a comparative analysis a suitable ecological migration mode for a different region can be found. On the other hand, according to the plans to promote individual self-cleaning capabilities of atmospheric environment in different regions, combined with regional environmental bearing capacity, regional economic sustainable development strategy, etc., the number and proportion of people to be transferred in different areas with atmospheric environment self-cleaning capability should be explored.

- The seventh is to strengthen the construction of a linkage system of atmospheric environment self-cleaning capability. If we want the atmospheric self-cleaning capability to fully prevent and control air pollution, we can't keep other factors from application; instead we should actively build a linkage system based on the in-depth research on dry wet deposition and wind cycle dilution. What is more, we should actively explore the collaborative applications of various elements of atmospheric self-cleaning capability; for example the effect of wind on the formation of rainfall in the process of dilution can lead to the realization of rain washing. Again, dry deposition of forest vegetation and wet deposition of rain and snow can promote each other. On the other hand, we should actively build a four-level linkage application system of "Central committee-province-
municipality-county” so that air pollution control can be carried out on a larger scope, which exactly accords with the characteristics of open flow in terms of the atmospheric system.

6. conclusion
Generally speaking, the natural purification ability and the rationality of man-made design are indispensable. Natural purification ability is the basis of the self purification ability of atmospheric environment, and the rationality of man-made design is the basis of the self purification ability of atmospheric environment, which is the key to improve. The synergetic mechanism of self purification capability of atmospheric environment shows that the system optimization of self purification capability of atmospheric environment should combine the natural purification ability and rationality of man-made design.

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