Statistical Analysis and Control of Influencing Factors of PM2.5 in Xuzhou

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Abstract: Coal has been an important industry pillar in Xuzhou since ancient times. With the rapid economic growth of the whole country after the reform and opening up, Xuzhou is not willing to lag behind in developing its own industrial economy, but behind the rapid economic development. However, a large amount of pollution emissions seriously damage the environment. Especially in recent years, the data of pm2.5 has gradually entered people's eyes, which makes us realize that the air environment in Xuzhou is already very bad, and it is urgent to protect the local environment. In this paper, a multivariate linear regression model is established by collecting the pm2.5 data from 2009 to 2017 and six related factors affecting the air environment in Xuzhou City, and the specific relationship between them and pm2.5 is analyzed. On this basis, the pm2.5 governance policy, human and technical countermeasures. According to the actual situation of Xuzhou and the experiences of other regions and developed countries, the corresponding countermeasures and reasonable suggestions are put forward.

Keywords: Xuzhou; PM2.5; Environmental Pollution; Multiple Linear Regression Analysis; Environmental Pollution; Governance Countermeasures and Suggestions

1. Introduction

1.1 Research Background

In recent years, with the increase of population, deforestation, sandstorms and other bad weather attacking our living environment, the process of industrialization is accelerating, the number of cars is increasing day by day, and so on, the sustainable development of urban atmospheric environment is becoming more and more serious. In June 2009, there were media reports that the U.S. Embassy in Beijing, located in Chaoyang District, set up its own air monitoring station to monitor PM2.5 data and publish it on Twitter [1]. At that time, China's official air quality data only included PM10, and the term PM2.5 was stranger to Chinese people than Mars. It was not until October 2010 and December 2011 that the "machine explosion" of the PM2.5 measuring instrument at the US Embassy in Beijing caused widespread concern and discussion among Chinese people, and local officials began to gradually introduce PM2.5 data into their air quality data [2].

1.2 Research Objectives

PM2.5 refers to the concentration of dust or drifting dust with a diameter less than or equal to 2.5um in ambient air. Compared with TSP and PM10, PM2.5 is enriched with more harmful substances, penetrates the human respiratory system more strongly, persists in the air for a longer time, and poses greater harm to human health. PM2.5 is the main cause of weather haze, but also causes respiratory and cardiovascular diseases and other diseases, so the research on PM2.5 is of great significance [3-4]. This paper uses the method of multiple linear regression to analyze the influencing factors of PM2.5 in Xuzhou city over the years, in order to judge the main influencing factors, from the perspective of objective data, gives a reasonable evaluation, and puts forward the corresponding solutions and reasonable suggestions.

1.3 Research Significance

In recent years, the state has incorporated PM2.5 into the air quality evaluation system, conducted routine monitoring of environmental conditions, and then effectively assessed and studied the causes, and according to the causes, studied and adopted effective treatment measures to ultimately reduce or eliminate pollution, and protect national health and sustainable development of the country [5]. I have little knowledge, only based on the summary of domestic and foreign research and analysis of PM2.5, statistical analysis of various data, and a simple exploration of its influencing factors. I hope it can help to reduce the annual average PM2.5 value, contribute to the air quality and environmental protection of Xuzhou city, provides a theoretical basis, so that statistics can be integrated into life [6].

1.4 Research Status

1.4.1 Foreign research status

Since the industrial revolution in the 18th century, human beings have increasingly polluted the air environment. The "Fog Disaster" event in the 1950s sounded the alarm for us seriously. To this day, more than two million premature deaths each year are attributed to urban indoor and outdoor air pollution.

With the deepening of human understanding of the harm caused by PM2.5, various countries have established strict ambient air quality standards, especially in the past 30 years, many countries have carried out large-scale research on PM2.5. Mainly related to PM2.5 pollution characteristics, emission inventory, emission characteristic spectrum, source analysis, and PM2.5's impact on atmospheric visibility and human health, among which California is the place where the most fine particulate matter research has been conducted [7].

In 1997, the United States took the lead to list PM2.5 as one of the air quality tests, and promulgated the PM2.5 standard: the concentration of PM2.5 in the air should not exceed 65 micrograms/cubic meter · day. In 2006, it raised the standard to 35 micrograms. In 2005, the World Health Organization (WHO) set an average annual PM2.5 concentration of 10 micrograms per cubic meter and an average daily concentration of 25 micrograms [8]. At present, most developed countries and some developing countries, such as the United States, Japan, China, India, Mexico, as well as many countries in the European Union, have successively included PM2.5 into the national standard pollutants and have carried out mandatory limits.

1.4.2 Domestic research status

As early as the 1980s, domestic experts began to study the combined air pollution. In the 1990s, some cities began to measure PM2.5. At the same time, the China General Environmental Monitoring Station also pointed out the necessity and importance of increasing PM2.5 monitoring standards in a draft to the Ministry of Environmental Protection. Since the beginning of the 21st century, with the opportunity of the Olympic Games, World Expo and Asian Games held in China, Beijing, Shanghai and Guangzhou have carried out large-scale and high-level systematic research on the control of fine particulate matter - gray haze and precursors [9]. In 2012, the third revision of the Ambient Air Quality Standards added a monitoring index for the concentration limit of fine particulate matter (PM2.5). According to the arrangement, all cities at prefecture level and above will be covered by 2015. On July 31, 2018, Li Ganjie, Minister of Ecology and Environment, chaired an executive meeting of the Ministry of Ecology and Environment to review and adopt in principle the amendment to the Ambient Air Quality Standard (GB3095-2012), of which the PM2.5 monitoring standard has attracted much attention [10].

2. Test and Analysis of Multiple Linear Regression

2.1 Establishment of the Model

In order to study the influencing factors of PM2.5 in Xuzhou, this paper uses multiple linear regression analysis to discuss. Based on the analysis of data search and life experience, In this paper, six factors such as per capita GDP, private car ownership, permanent population, forest coverage rate, number of industrial enterprises and coal consumption of

$$\mathrm{Yi} = \mathrm{ß0} + \mathrm{ß1X1} + \mathrm{ß2X2} + \mathrm{ß3X3} + \mathrm{ß4X4} + \mathrm{ß5X5} + \mathrm{ß6X6} + \mathrm{ut} \quad (1)$$

industrial enterprises were selected for modeling analysis from 2009 to 2017 in Xuzhou area. Detailed data are shown in Table 1.

The initial model is set as follows:

Where Yi represents the average value of PM2.5 in the i year of Xuzhou (mg/m3),X1 represents the annual per capita GDP of Xuzhou (yuan/per person), X2 represents the annual private car ownership in Xuzhou (units), X3 represents the annual permanent resident population of Xuzhou (10,000 people), X4 represents the annual forest coverage rate of Xuzhou (%), X5 indicates the number of industrial enterprises above designated size in Xuzhou City each year (number), X6 indicates the comprehensive energy consumption of industrial enterprises above designated size in Xuzhou City each year (tons of standard coal).

Table 1. Data of Xuzhou City from 2009 to 2017

Year	Y	X1	X2	X3	X4	X5	X6
2009	0.057	27772	379842	868.19	32.78	2665	2174.77
2010	0.059	34421	432612	858.21	32.67	2412	2198.43
2011	0.060	41852	526776	887.26	32.18	2788	2223.59
2012	0.063	47388	624472	856.41	31.94	2859	2256.28
2013	0.065	53262	684546	859.10	31.53	2874	2277.40
2014	0.069	58308	756003	862.83	30.31	2861	2348.24
2015	0.073	62246	851541	866.90	30.05	2875	2352.90
2016	0.071	67701	916085	871.00	31.12	2992	2308.46
2017	0.066	75611	982546	876.35	31.47	3108	2258.57

Note: Y: Annual average PM2.5(mg/m3)
X1: GDP per capita (yuan/person)
X2: Private car ownership (units)
X3: Permanent population (10,000)
X4: Forest coverage (%)
X5: Number of industrial enterprises above designated size (units)
X6: Comprehensive energy consumption of industrial enterprises above designated size (10,000 tons of standard coal)
(Data from Xuzhou Statistical Yearbook, Xuzhou National Economic and Social Development Statistical Bulletin, Xuzhou Environmental Protection Bureau)

In order to facilitate the calculation of statistical data and various tests, the formula and data are processed logically, namely:

$$\ln Y_i = ß0 + ß1\ln X1 + ß2\ln X2 + ß3\ln X3 + ß4\ln X4 + ß5\ln X5 + ß6\ln X6 + ut \quad (2)$$

After the data in Table 1 is ln, the data statistics are shown in Table 2.

Table 2. ln of Table1

Year	lnY	lnX1	lnX2	lnX3	lnX4	lnX5	lnX6
2009	-2.8647	10.23178	12.84751	6.766411	3.489819	7.887959	7.684678
2010	-2.83022	10.44642	12.9776	6.754849	3.486457	7.788212	7.695499
2011	-2.81341	10.64189	13.17453	6.788138	3.471345	7.93308	7.706878
2012	-2.76462	10.76612	13.34466	6.752749	3.463859	7.958227	7.721473
2013	-2.73337	10.88298	13.43651	6.755885	3.450939	7.96346	7.73079
2014	-2.67365	10.97349	13.5358	6.760218	3.411478	7.958926	7.761421
2015	-2.6173	11.03885	13.6548	6.764924	3.402863	7.963808	7.763404
2016	-2.64508	11.12286	13.72786	6.769642	3.437851	8.003697	7.744336
2017	-2.7181	11.23336	13.7979	6.775766	3.449035	8.041735	7.722487

2.2 Regression test of the Model

2.2.1 Multicollinearity test

I used IBM SPSS Statistics 22 to analyze the model. The first thing to test is the multi-collinearity of the model and screen the influencing factors of PM2.5.

It can be seen from Table 3 that R2=0.997 approaches 1, and it can be seen from Table 4 that the T-values of many coefficients are not significant, so the model may have multicollinearity. Check the following table:

Table 3. Multicollinearity Test

Model summary[b]				
Model	R	R squared	Adjusted R squared	Errors in standard estimates
1	.999[a]	.997	.989	.00893
a. Predictor variables: (constant), coal use, population, enterprises, GDP, forests, automobiles				
b. Dependent variable: PM				

Table 4. Multicollinearity Test

Coefficients[a]								
Models		Nonstandardized coefficient		Standard coefficient	t	Salience	95.0% confidence interval for B	
		B	Standard error	Beta			Lower limit value	Upper limit
1	(Constant)	-32.181	9.826		-3.275	.082	-74.458	10.096
	GDP	- .552	.120	-2.111	-4.606	.044	-1.068	- .036
	Cars	.729	.131	2.832	5.542	.031	.163	1.294
	Population	.662	.385	.088	1.718	.228	- .996	2.319
	Forest	.933	.671	.331	1.390	.299	-1.955	3.822
	Enterprise	- .405	.107	- .342	-3.780	.063	- .867	.056
	Coal use	2.741	.778	.880	3.524	.072	- .606	6.089
a. Dependent variable: PM								

It can be seen from Table 5 that tolerance <=0.1 or VIF (variance inflation factor)>=10 indicates that there is serious collinearity among independent variables. It can be seen from Table 6 that when condition index >10 or variance ratio <0.5, there is severe collinearity among independent variables.

Table 5. Multicollinearity Test

Coefficients[a]										
Models		Nonstandardized coefficient		Standard coefficient	t	Salience	95.0% confidence interval for B		Collinearity statistics	
		B	Standard error	Beta			Lower limit value	Upper limit	Tolerance	VIF
1	(Constant)	-32.181	9.826		-3.275	.082	-74.458	10.096		
	GDP	-.552	.120	-2.111	-4.606	.044	-1.068	-.036	.006	154.539
	Cars	.729	.131	2.832	5.542	.031	.163	1.294	.005	192.192
	Population	.662	.385	.088	1.718	.228	-.996	2.319	.521	1.921
	Forest	.933	.671	.331	1.390	.299	-1.955	3.822	.024	41.789
	Enterprise	-.405	.107	-.342	-3.780	.063	-.867	.056	.166	6.035
	Coal use	2.741	.778	.880	3.524	.072	-.606	6.089	.022	45.896
a. Dependent variable: PM										

Table 6 Multicollinearity Test

Collinear diagnosis[a]										
Models	Dimensions	Eigen Values	Conditional index	Variance ratio						
				(Constant)	GDP	Cars	Population	Forest	Businesses	Coal use
1	1	6.999	1.000	.00	.00	.00	.00	.00	.00	.00
	2	.001	82.558	.00	.00	.00	.00	.00	.00	.00
	3	2.451E-5	534.416	.00	.01	.00	.00	.03	.02	.00
	4	1.706E-5	640.534	.00	.03	.00	.00	.01	.55	.00
	5	2.444E-6	1692.298	.00	.45	.46	.17	.03	.04	.00
	6	1.558E-6	2119.333	.00	.35	.41	.36	.01	.35	.03
	7	6.324E-8	10520.125	1.00	.16	.12	.47	.92	.05	.97
a. Dependent variable: PM										

Next, this paper uses stepwise regression to modify multicollinearity. In stepwise regression, the model adds or removes one variable at a time until a certain stop criterion is reached. Backward stepwise regression starts when the model includes all the predictors and removes one variable at a time until it degrades the model quality. The implementation of stepwise regression varies according to the criteria for adding or removing variables.

From Table 7, 8, 9, 10 and 11, the variables selected by the final model are X2 and X6, that is, private car ownership and comprehensive energy consumption of industrial enterprises above designated size, so the final model is as follows:

$$\ln Yi = -20.045 + 0.092X2 + 2.080X6 \quad (3)$$

2.2.2 Test of heteroscedasticity

After the revised model is obtained, this paper conducts a heteroscedasticity test on the revised model. The following two test methods are used to prove:

(1) Residual scatter plot to observe

From Figure 1, it can be seen that the scatter points are roughly evenly around both sides of the mean value, and it can be preliminarily judged that the model does not have heteroscedasticity. (2) White test

I used EViews 10 (x64) to perform the White test.

It can be seen from Table 12 that p value =0.390621>0.05, the null hypothesis is accepted, so there is no heteroscedasticity in this model.

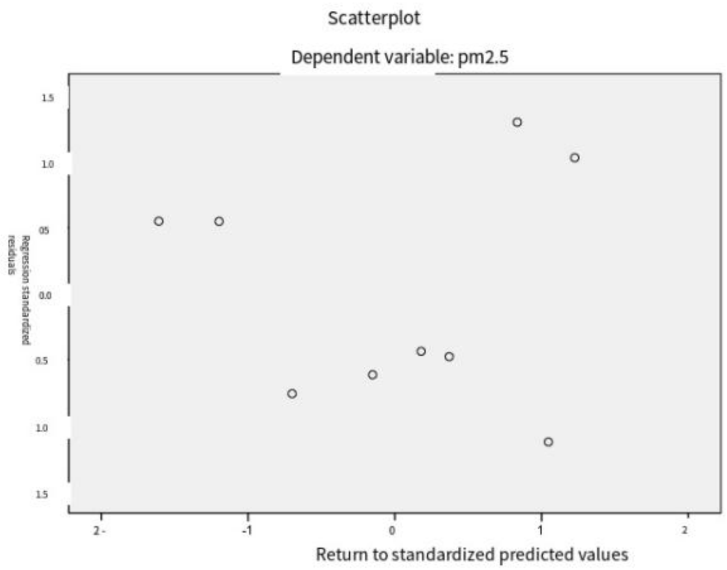

Figure 1. Residual Scatter Chart of Xuzhou PM2.5

Table 7. Multiple Linear Stepwise Regression Analysis

Variables entered/removed[a]			
Models	Entered variables	Removed variables	Methods
1	Coal Use	.	Step (Guideline: probability of F-to-enter <=.100, probability of F-to-remove >=.110).
2	Cars	.	Step (Criterion: probability of F-to-enter <=.100, probability of F-to-remove >=.110).
a. Dependent variable: PM			

Table 8. Multiple Linear Stepwise Regression Analysis

Model summary[c]				
Model	R	R squared	Adjusted R squared	Errors in standard estimates
1	.958[a]	.919	.907	.02613
2	.981[b]	.963	.950	.01913
a. Predictor: (constant), coal use				
b. Predictors: (constant), coal use, automobile				
c. Dependent variable: PM				

Table 9. Multiple Linear Stepwise Regression Analysis

ANOVA[a]						
Models		Sum of Squares	Degrees of Freedom	Mean square	F	Salience
1	Regression	.054	1	.054	78.927	.000[b]
	Residual	.005	7	.001		
	Total	.059	8			

2	The Comeback	.056	2	.028	77.174	.000[c]
	Residual	.002	6	.000		
	Total	.059	8			
a. Dependent variable: PM						
b. Predictive variable: (constant), coal use						
c. Predictors: (constant), coal use, automobile						

Table 10. Multiple Linear Stepwise Regression Analysis

Coefficients[a]										
Models		Nonnormalized coefficient		Standard coefficient	t	Salience	95.0% confidence interval for B		Collinearity statistics	
		B	Standard error	Beta			Lower limit value	Upper limit	Tolerance	VIF
1	(Constant)	-25.802	2.596		-9.940	.000	-31.941	-19.664		
	Coal use	2.985	.336	.958	8.884	.000	2.191	3.780	1.000	1.000
2	(constant)	-20.045	2.882		-6.956	.000	-27.097	-12.994		
	Coal use	2.080	.420	.668	4.952	.003	1.052	3.108	.343	2.916
	Cars	.092	.035	.358	2.658	.038	.007	.177	.343	2.916
a. Dependent variable: PM										

Table 11 Multiple Linear Stepwise Regression Analysis

Excluded variables[a]								
Models		Input beta	t	Salience	Partial correlation	Collinear statistics		
						Admissible	VIF	Minimum tolerance
1	GDP	.310[b]	2.138	.076	.658	.366	2.733	.366
	CARS	.358[b]	2.658	.038	.735	.343	2.916	.343
	Population	.070[b]	.615	.561	.244	.985	1.015	.985
	forest	-.091[b]	-.149	.886	-.061	.036	27.561	.036
	Enterprise	.154[b]	1.191	.279	.437	.656	1.524	.656
2	GDP	-1.265[c]	-1.820	.128	-.631	.009	107.283	.009
	Population	-.014[c]	-.144	.891	-.064	.838	1.193	.292
	Forest	-.098[c]	-.217	.837	-.097	.036	27.562	.034
	Enterprise	-.149[c]	-.899	.410	-.373	.236	4.246	.123
a. Dependent variable: PM								
b. Predictive variable in the model: (constant), coal use								
c. Predictors in the model: (constant), coal use, automobile								

Table 12. White Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.312308	1.314522	1.759048	0.1534
X1^2	0.002083	0.002496	0.834858	0.4508
X1*X2	0.051706	0.032718	1.580350	0.1892
X1	0.342576	0.192489	1.779724	0.1497
X2^2	0.045241	0.028901	1.565350	0.1926
R-squared	0.573448	Mean dependent var		0.000278
Adjusted R-squared	0.146895	S.D. dependent var		0.000215
S.E. of regression	0.000199	Akaike info criterion		13.90820
Sum squared resid	1.58 e-07	Schwarz criterion		13.79863
Log likelihood	67.58688	Hannan-Quinn criter.		14.14465
F-statistic	1.344378	Durbin-Watson stat		2.569804
Prob(F-statistic)	0.390621			

2.2.3 Autocorrelation test

(1) DW test

It can be seen from Table 13 that DW value =1.687, n=9, k' =2 of this model, and

d_L=0.629, d_U=1.699, and d_L<DW value <d_U can be obtained from the DW distribution critical value table, so the autocorrelation of this model cannot be determined.

(2) LM test

In order to determine the autocorrelation of the model, this paper uses EViews 10 (x64) to conduct LM test to judge.

It can be seen from Table 14 that p value =0.764555>0.05, the null hypothesis is accepted, so there is no autocorrelation in this model.

Table 13. DW Test

Model summary[b]					
Model	R	R squared	Adjusted R squared	Errors in standard estimates	Durbin-Watson(U)
1	.981[a]	963.	.950	.01913	1.687
a. Predictors: (constant), coal use, automobile					
b. Dependent variable: PM2.5					

Table 14. LM Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.144662	4.360237	0.491868	0.6486
X1	0.013852	0.045482	0.304568	0.7759
X2	0.301797	0.631763	0.477706	0.6578
RESID(-1)	0.076559	0.543948	0.140748	0.8949
RESID(-2)	0.776400	0.579863	1.338938	0.2516
R-squared	0.315217	Mean dependent var		3.16 e-15
Adjusted R-squared	0.369565	S.D. dependent var		0.017673
S.E. of regression	0.020683	Akaike info criterion		4.618871
Sum squared resid	0.001711	Schwarz criterion		4.509302
Log likelihood	25.78492	Hannan-Quinn criter.		4.855321
F-statistic	0.460318	Durbin-Watson stat		1.510052
Prob(F-statistic)	0.764555			

2.2.4 Goodness of Fit test

The modified model : $\ln Yi = -20.045 + 0.092X2 + 2.080X6$ was tested for the degree of fit.

It can be seen from Table 15 that R2=0.963 and adjusted R=0.950, indicating a high degree of fitting of the model.

Table 15. Goodness of Fit Test

Model summary[b]				
Model	R	R squared	Adjusted R squared	Errors in standard estimates
1	.981[a]	.963	.950	.01913
a. Predictors: (constant), coal use, automobile				
b. Dependent variable: pm2.5				

2.3 Final Model Analysis

After regression, test and correction, the final model is as follows:

$$\ln Yi = -20.045 + 0.092X2 + 2.080X6 \quad (3)$$

Where Yi represents the average value of PM2.5 in Year i of Xuzhou (mg/m3), X2 represents the annual private car ownership in Xuzhou (units), and X6 represents the annual comprehensive energy consumption (tons of standard coal) of industrial enterprises above designated size in Xuzhou. Therefore, the overall meaning of the model indicates that with the change of the percentage of private car ownership/comprehensive energy consumption of industrial enterprises above designated size, the annual average PM2.5 value in Xuzhou will also change by a corresponding percentage. The coefficients in the model are shown as follows:

ß2 : When other variables remain unchanged, when private automobile ownership increases by 1%, the annual average PM2.5 value of Xuzhou City will increase by 0.092% on average;

ß6: when other variables remain unchanged, when the comprehensive energy consumption of industrial enterprises above designated size increases by 1%, the annual average PM2.5 value of Xuzhou City will increase by 2.080% on average.

It can be seen that private car ownership and comprehensive energy consumption of industrial enterprises above designated size are directly proportional to the annual average PM2.5 value of Xuzhou City. The more private car ownership, the higher the annual average PM2.5 value; the higher the energy consumption of industrial enterprises, the higher the annual average PM2.5 value. At the same time, it can be seen that per capita GDP, permanent population, forest coverage and the number of industrial enterprises are also related to PM2.5.

3. Conclusions and Suggestions

Although the Xuzhou government has vigorously carried out corresponding remediation activities on PM2.5, the air pollution is not optimistic. In 2017, Xuzhou failed to complete the corresponding emission reduction targets, lagging behind the provincial average progress of emission reduction, and one enterprise was directly named and criticized by the province. Based on the analysis results of this paper, I believe that the following measures should be taken in the management of PM2.5:

First, while vigorously developing GDP, we should pay attention to the development of high-tech industries, reduce the proportion of traditional industries, and optimize industrial structure and layout. In particular, the proportion of heavy industry in Xuzhou is relatively large, so it should develop towards the tertiary industry and the knowledge-intensive industry of "advanced, sophisticated and new". At the same time, heavy industry factories should be transferred to the surrounding areas and these enterprises should be managed regionally.

Second, as a traditional coal old industrial base, according to the statistical yearbook of Xuzhou, from 1980s to 2012, the output of raw coal has been high at more than 20 million tons, until the last five years for the mining of coal gradually reduced. However, the output of other heavy industries such as iron ore and sulfuric acid has not decreased much. Therefore, if we want to change the label of Xuzhou as a traditional industrial city, we need to change the energy consumption structure, promote energy conservation and emission reduction, and increase the use of clean energy. Such as power generation, Xuzhou area has always been dominated by thermal power generation. Although it is difficult for Xuzhou to develop hydropower on a large scale, the new wind power generation, solar power generation and nuclear power generation can greatly reduce the amount of coal for thermal power generation, thus reducing the serious air pollution caused by coal combustion.

Third, from the perspective of large and medium-sized cities in developed countries, traditional industry is no longer the main cause of air pollution, and motor vehicles and buildings occupy a large part of energy consumption. In order to reduce the energy consumption and pollution emissions of urban buildings, countries have taken a lot of energy-saving measures, such as the upgrading of internal lighting electrical systems in buildings. On the other hand, the pollution exhaust of large cars or ships, trains and airplanes should be strictly controlled. In California, purifiers must be installed on all heavy-duty diesel trucks before driving. In New York City, local regulations strictly stipulate that the idling time of the engine should not exceed 3 minutes after the vehicle is stopped. For private cars and other small cars, although our country for electric vehicles and other energy saving means of transportation research and development strongly support, and give certain economic subsidies to buyers, but these new energy vehicles are still in the initial stage, for the general people are not willing to spend high prices to buy. It is expected that between 2020, the first subway in Xuzhou area will be opened, which will greatly reduce pollution emissions from private cars. Therefore, while vigorously developing new energy vehicles, the development of public transportation is also essential.

Fourthly, although the forest coverage rate of Xuzhou ranks first in the whole province almost every year, according to the forest coverage map, forests mainly grow in the hilly areas around Xuzhou. For the urban center and various counties and townships, the afforestation and environmental protection are not in place. In Germany, when building a house, it is necessary to establish a green belt on the roof to complete the decoration of the house. In combination with the local situation in Xuzhou, because most of the rooftops have people drying clothes and planting flowers and vegetables, it is particularly important for the construction of green belt in the community. At the same time, a large number of green belts should be planted in parks and roadside.

This will play an obvious role in purifying the air and beautifying our city at the same time.

The fifth and last point may not directly reduce PM2.5 and other related air pollution, but it is a crucial point, that is, to strengthen publicity and education, and guide the whole society to participate in the task of energy conservation and emission reduction. In this regard, the publicity of Xuzhou and even other major provinces and cities in China still needs to be strengthened. On TV, we can see more and more public service advertisements about energy saving, emission reduction and environmental protection. But in the community's publicity, newspapers, network environment, but it is difficult to directly see the relevant content of green environmental protection. The change of consciousness is not a temporary thing, but if the environmental awareness of energy saving and emission reduction is deeply rooted in the hearts of the people, then even without strict laws and regulations penalties, everyone will consciously, subconsciously to protect our living home. Perhaps this day is still a little far away, but for the current publicity of green environmental protection, it is necessary to further strengthen, give more economic subsidies and preferential policies, develop better new green technology, so that people are more willing to research and development and use.

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