Review of Air Quality Management in Hangzhou

Hangzhou EPB

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Forewords

Two features of Hangzhou air quality trend:

※ No effective control of air quality deterioration;

※ Integrated, complex and regional pollution, multiple pollution sources and complicated formation mechanism.

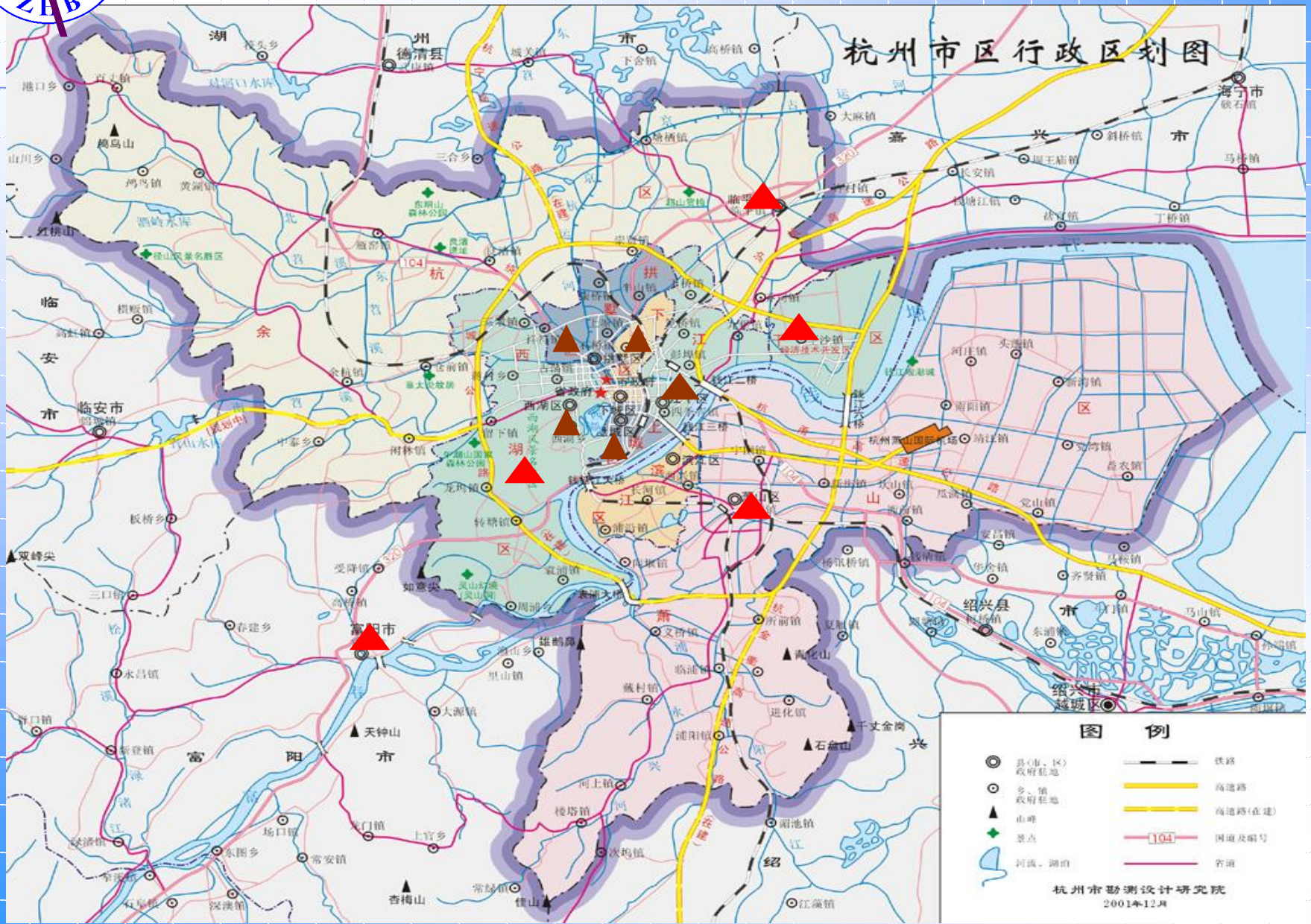
Main Contents

- Air quality status
- Effect factor analysis
- Management measures
- Policy recommendations

Part I

Overall air quality status

Automatic air quality monitoring sites distribution in Hangzhou



★ air quality trend

Hangzhou air quality witnesses different trends before and after the year of 2000 when Hangzhou had the best overall air quality. After the drop trend, the annual concentrations of PM_{10} and SO_2 have begun to mount from 2000 and the concentration of NO2 has begun to rise from 1996.

Hangzhou ranks between 30th and 40th concerning the air quality in all of the 47 key cities. If compared with developed countries, the gap is even bigger, with a pollution level equivalent to that of 1980s.

★Acid rain

The acid rain frequency of 70% to 80% has been well controlled while the pollution coverage has been expanded.

The acid rain pollution is correlative with PM pollution. The most important pollutant of acid rain is sulfate while the share of nitrate is in the trend of increasing.

Air pollution evolvement

Air pollution evolvement:

- 1970s -1980s: smoke dust →TSP and SO2→acid rain, coal-smoke type;
- 1990s: SO2 and NOx →acid rain, smoke dust and blown-up dust →TSP, complex type
- Now: SO2 and NOx→ secondary particle, aerosol→PM10、PM2.5, NOx and VOC→ the photochemical smog (O3) , complex type.
- Future: O3、PM2.5、VOC、CO, smog type.

★ Hangzhou air pollution features

◇ The pollution feature has been changed from coal-smoke type to complex type [characterized by low visibility (fine particle), strong air oxidabillity (ozone), high frequency of acid rain, and regional pollution with the city as a center];

◇ The major PM sources have been changed from coal burning and construction sites (the sum of contribution shares was above 80% in 1996) to the mix of construction sites, vehicle exhaust, coal burning and secondary particles.

◇ the size of PM is tending to be smaller. The auspice of photochemical smog and secondary aerosol can be seen.

◇ The regional pollution has been formed.

Part II
Effect factor analysis

№1 the natural conditions

Hangzhou city is surrounded by mountains from three sides. So the air pollutants are difficult to disperse. The inversion temperature days are as many as 220 a year on average. Moreover, under high temperature and high humidity, SO2 and NOx are easier to produce secondary aerosols. In sum, the environmental capacity of Hangzhou is limited due to the disadvantageous geographic and meteorologic conditions. It is a big challenge to improve the air quality of Hangzhou.

№2 Energy consumption

Country or city	Energy consumption per unit GDP Tons of standard coal/10,000 yuan
Japan	0.18
France	0.24~0.30
Britain	
USA	About 0.41
Shanghai	1.03
Beijing	1.53
Guangzhou	0.84
Nanjing	2.09
Wuxi	0.81
Hangzhou	0.95
China	1.44

As many cities in China, Hangzhou has a rising energy consumption along with the rapid economic development. The energy structure of coal as domination (account for 60% in the primary energy), however, is difficult to be changed in the short term. The huge emission from coal burning has consequently brought heavy pressure on the environment.

№3 Urbanization

The rapid urbanization and population explosion (annual population increase: 6%—7%) has offset the efforts of existing air pollution control measures. The environment is quite fragile due to the laggard infrastructure construction, dense population and intensive human activities. The contradiction of fast development and insufficient protection is outstanding. On one hand, the vehicle emission pollution is pricking up. On the other hand, the blown-up dusts from construction sites and roads add more pressure to the air quality. These human activities have offset the effects of some measures such as coal to oil (gas) switch.

№4 Urbanization

The rapid motor vehicle increase results in pollution of PM, NOx, VOC, CO and O_3. The urban planning failed to catch up the automobile development, which can be seen from insufficient parking space and limited road capability, leading to ineffective control of vehicle emission pollution.

№5 Urbanization

the unique urban weather feature such as phenomenon of hot island has great impact on the dispersion of air pollutions.

№6 Challenges

※ Legislation: far to be perfect

※ Technology: Source apportionment and systematic control are the major concerns; Breaking the new ground in innovative environmental technologies is significant; The practical control technologies of coal and oil burning, vehicle exhaust and blown-up dusts are required when facing the complex and regional air pollution.

※ Research: insufficient surveys and researches on emission inventory and pollution mechanism

№7 Total emission amount

The effective technologies of removing fine particles from waste gases of pollution sources are needed;

The monitoring methods in point, area and line sources should be strengthened.

emission of air pollutants >> environmental capacity

Mobile sources **Construction sites** **Coal burning**

Part III

Measures

1 Comprehensive control measures

- The phase I, II, III and IV of measures have been implemented.

- Government's responsibility document (The document include the big coal consumers' desulfurization and dedust projects and the industrial waste gases processing projects)

2 Industrial structure adjustment

296 enterprises, which have impact on ecological environment, have been closed.

The polluting enterprises relocation plan have been put forward.

3 Dust control zone and no burning zone

☆ Dust control zone（area: 510.55KM2 , coverage rate: 100%）

☆No burning zone（The short and medium term plans have been implemented）

4 Vehicle emission control

- Old vehicles scrappage
- Buses upgrade
- Road inspection and annual inspection
- Exposure of non-compliant vehicles to public
- Repair in the limited period

5 Blown-up dust control

1）The municipal government issued ‘The management methods of blown-up dusts control (The municipal government decree No.190）;

2）Road cleaning upgrade by increasing the coverage of mechanical cleaning;

3）Improve the management of transport trucks by promoting slag transport without leaking;

4）Strengthen the management of dusts from construction sites and roads

6 Total emission control

1）Emission allocation to various pollution sources after total emission control goal set （emission performance）;

2）Investment of 10 million yuan in establishing on-line air pollutants monitoring system in pollution sources;

3）Improved law enforcement;

4）Three-Synchronization system for new projects;

5）Comprehensive management of cooking pollution.

7 Green area expansion

The annual green area expansion: above 5 million sq km

8 Investment in scientific researches

1) Invest 1 million yuan in PM10 and NOx source apportionment research

2) Investment 5 million yuan in a mobile monitoring vehicle

9 Regulations

1）《Hangzhou management methods of pollution emission permit》

2）《Hangzhou management methods of blown-up dusts》

3）《Hangzhou management methods of environmental protection of service industry 》

4）《Hangzhou ordinance of vehicle pollution prevention and control》

Part IV

Next steps

Air pollution control measures

1）Industrial pollution control: fine particles, secondary aerosols, SO_2, NOx; industrial structure adjustment;

2）Vehicle emission control: no control of ownership but control of use; I/M; NOx、PM and VOC emission control;

3）Blown-up dust: transport trucks; road cleaning; construction sites.

Public access to information

——The power of mass and media will be used in power balance and government's responsibility improvement ;

——More groups will be attracted as players instead of audiences in the environmental protection in order to enhance the work transparency

——The violating behaviors of enterprises will be harshly exposed so as to improve their self-control;

——The environmental commonweal suit system will be established to implement 'pay for the past misfeasance' .

Regulations and standards

In the short term

Ordinance

----《Hangzhou ordinance on pollutant emission permit》

Regulations

----《Hangzhou management methods on emission trade of main pollutants》，SO_2 emission trade is in the plan

----《Hangzhou management methods on continuous emission monitoring of pollutants》

Standards

----《Hangzhou standard of air pollutants emissions for boilers》

Technical support and policy research

Technical support

----plan to establish central database of pollution sources and decision-making system

----plan to develop on-line emission report system on big coal consumers

----plan to improve on-line pollution sources monitoring system and expand the installation of continuous emission monitoring system （CEMS）

Policy research and promotion

----environmental audit

----environmental credit system of enterprises（ environmental behavior classification)

Thank You ！