Thermal Power Companies - From Air Pollution "Contributors" to Governer

2018 Environmental Disclosure of Thermal Power Industry —— An investigation Report

SIP Lvse Jiangnan Public Environment Concerned Centre

2019-03-01

Thermal Power Companies —— From Air Pollution "Contributors" to Governer

2018 Environmental Disclosure of Thermal Power Industry —— An investigation Report

Author: Jia Li, Yanting Fan

1. Abstract

The 2017 "Communique on the State of the Ecological Environment in China" issued by the Ministry of Ecology and Environment shows that only 99 of the 338 cities in the country and above have met the environmental air quality standards; 239 cities have exceeded the environmental air quality standards, accounting for 70.7%; these cities have suffered severely. There were 2311 days of pollution and 802 days of serious pollution. The days with PM2.5 as the primary pollution accounted for 74.2% of the days with severe pollution or above, 20.4% of the days with PM10 as the primary pollutant, and 5.9 of the days with O3 as the primary pollutant. Without deducting the impact of sand and dust, 72.8% of the 338 cities have over-standard ambient air quality.

Thermal power companies are undoubtedly one of the "contributors" to the problem of air pollution. During the whole process of producing electric energy, they produce a large number of dust particles, sulfur dioxide and oxynitrides, and other pollutants. Thermal power generation is the main force in the development of power in modern society. Although there are some hydropower and nuclear power plants in China, thermal power still occupies most of the electricity market. In 2018, the capacity of thermal power generators was 114.367 million kilowatts, accounting for 60.2% of the total installed capacity. From the perspective of power generation, thermal power generated 4,923.1

billion kilowatt-hours for the year, accounting for 70.4% of the total.

Thermal power specifically includes coal power, gas power, and oil power. my country's resource endowment of "rich coal, lack of oil, and less gas" has caused long-term dependence on coal power to occupy the core position of my country's power supply structure. The installed capacity of coal-fired power generation in 2017 was 1.02 billion kilowatts, accounting for 58% of the total installed capacity. In terms of power generation, coal-fired power is 4.200 billion kilowatt-hours for the year, accounting for 67% of the total.

In 2018, PECC conducted real-time supervision of online monitoring data information of 13,567 heavily controlled pollution sources nationwide. Through the Weibo platform, the 12369 platforms, and the telephone, 1,579 companies with online monitoring data exceeding the standard were reported to the local environmental protection departments, and 1,133 companies were actively responded to by the local environmental protection bureaus. Among them, 191 illegal emission companies were ordered by the environmental protection departments to rectify, and the administrative proceeded. File a case for investigation. A total of 147 thermal power plants were reported due to excessive emissions, accounting for approximately 9.3% of the total reported by PECC. For the first time, PECC conducted systematic statistics and analysis on the report information of online monitoring of heavy pollution sources nationwide in 2018.

2. Analysis of reports and responses of thermal power plants nationwide

2.1 Analysis of report volume and response rate

The thermal power industry is greatly affected by the geographical distribution of resources. Large-scale thermal power plants are mainly distributed in

important coal industrial bases and large cities with abundant coal resources. According to the "China Electric Power Annual Development Report" released in 2015, six of the top ten power plants with installed thermal power capacity in 2014 were located in East China and North China. Most of the power plants of my country's top five power generation companies are located in East China, North China, and Northeast China.

In terms of the number of reports, Shaanxi Province has a large number of reports, reaching 35 times. As a large province rich in coal resources, many coal power generation companies are naturally driven by their inherent advantages. Jiangsu and Zhejiang provinces also reported more than 25 times.

In terms of response rates, the response rates of Shandong, Jilin, Guangxi, Jiangxi, Inner Mongolia, and Anhui were 100%, while the response rates of Shaanxi, Jiangsu, Zhejiang, and other major reporting provinces did not exceed 60%, which needs to be improved.

With the continuous deepening of PECC's supervision and reporting work, we have found that in addition to the Weibo platform @ related local environmental protection official Weibo, reporting on the 12369 platforms also provides great convenience for supervision and reporting. The response of national reporting channels is shown in Figure 1 and Figure 2. The negative feedback reported through the 12369 platforms is significantly better than the feedback reported on Weibo. As the public's environmental protection has increased temporarily, people's willingness to seek participation in environmental protection channels has become stronger and stronger. 12369 is a unified national reporting platform for specific environmental issues. The more you love, the more familiar it is to the public, but there are also shortcomings. One or two is a long period because the 12369 platform's response needs to go through a series of processes before the response can be fed back to the public, and the public

often has to wait for a long period; the second is specific target feedback. The 12369 report is just feedback to the reporter, and other people cannot see the problem. This means that someone will report the same company at the same time or successively, which will increase the burden on the environmental protection department. Of course, the road for public participation in environmental protection is long, and we believe that the 12369 platforms will continue to improve in practice.

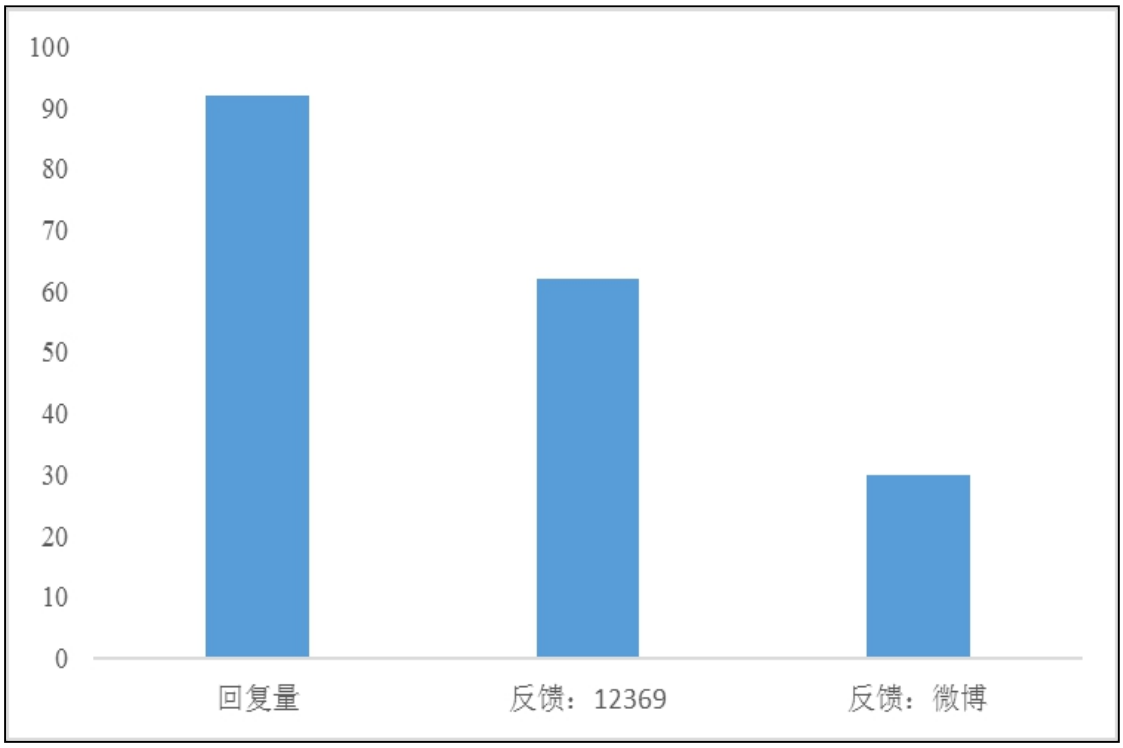


Figure 1 The amount of feedback from different reporting channels

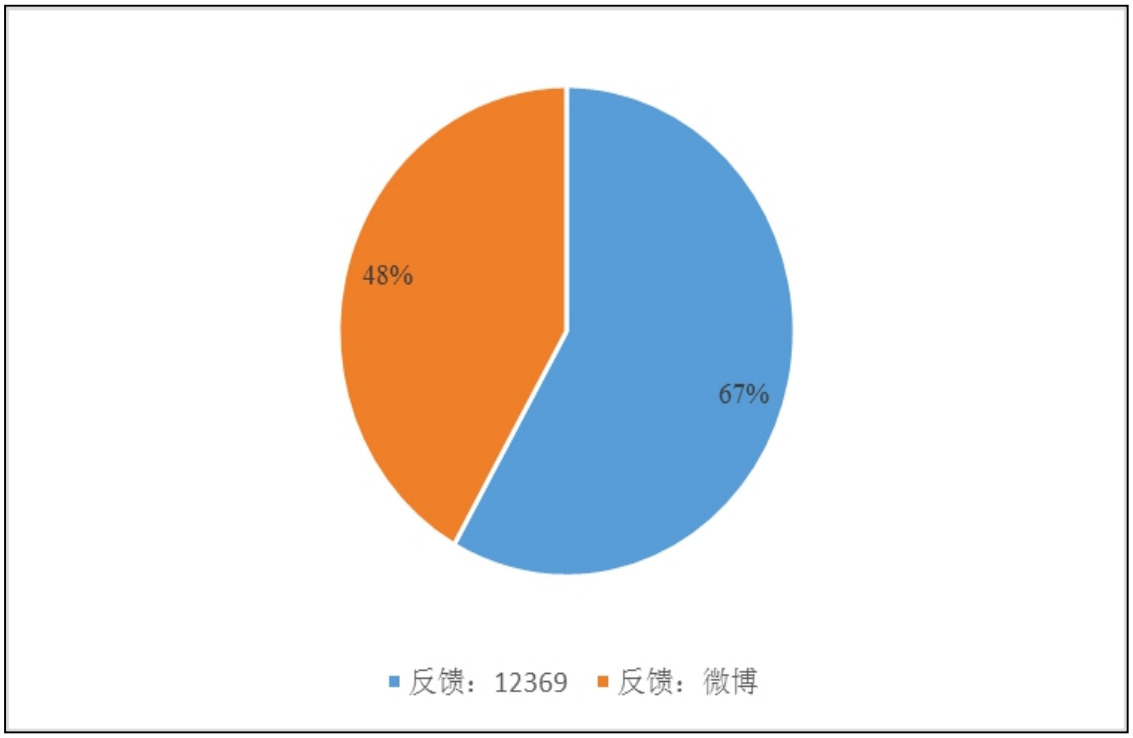


Figure 2 Percentage of feedback from different reporting channels

2.2 Analysis of representative pollutant

As shown in Figure 3, according to the analysis of pollutants from thermal power plants that were reported by the PECC in 2018, in the report records of excessive atmospheric emissions, the main factors that exceeded the standards were smoke and dust (particulate matter), nitrogen oxides and sulfur dioxide, of which the largest proportion was Smoke and dust are followed by nitrogen oxides and sulfur dioxide.

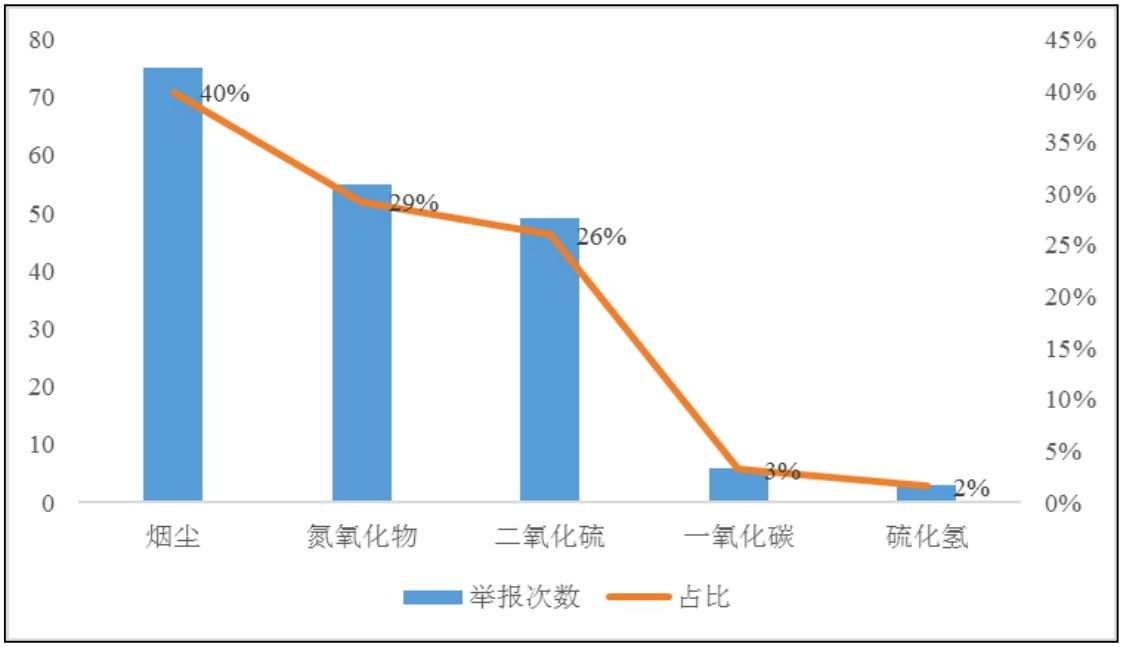
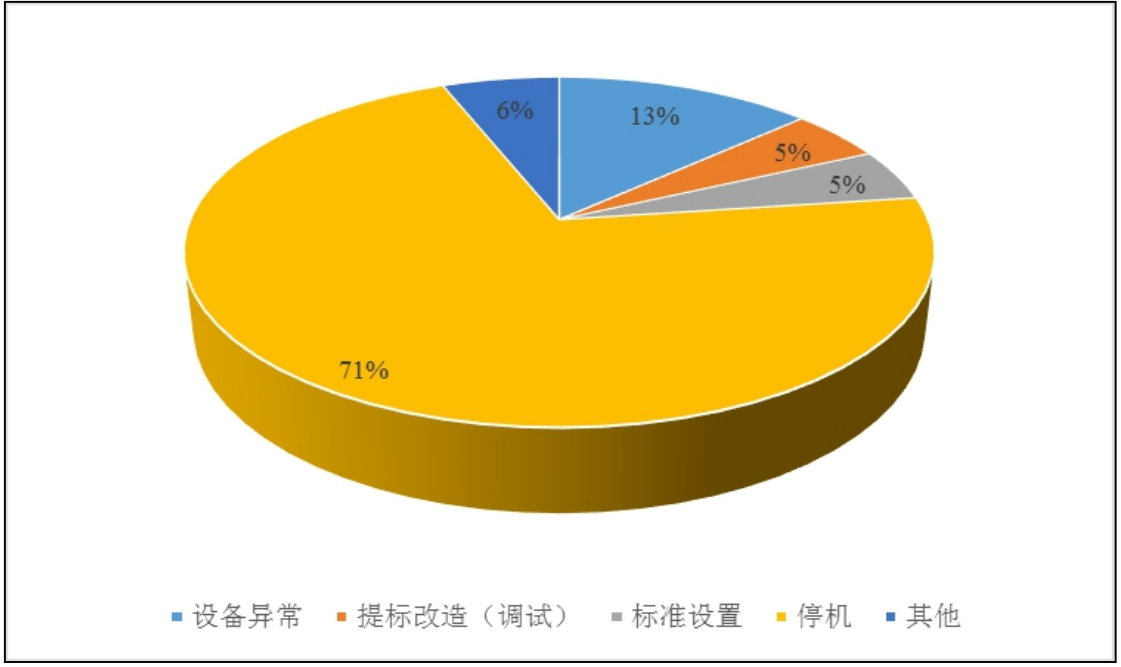


Figure 3 Distribution of representative pollutants in thermal power plants

Smoke and dust are solid particles emitted during coal combustion and industrial production, mainly silica, alumina, iron oxide, calcium oxide, and unburned carbon particles. The particles with a diameter of 0.5-5 microns will not only quiet down in the lungs but can also enter the blood directly to reach various parts of the human body. Nitrogen oxides mainly include nitrous oxide (N_2O), nitric oxide (NO), nitrogen dioxide (NO_2), nitrous acid, and nitric acid, which may produce a variety of secondary pollutants, closely related to sampling concentration and photochemical pollution. In addition, nitrogen oxides may also cause eutrophication of water bodies, acidification of soil, and formation of acid rain. When sulfur dioxide passes through the nasal cavity, trachea, and bronchus, it is absorbed and retained by the inner membrane of the lumen and becomes sulfurous acid, sulfuric acid, and sulfate, which enhances the stimulating effect; after sulfur dioxide enters the human body together with the suspended matter in the air, aerosol particles can Bringing sulfur dioxide to the deep lungs increases its toxicity by 3 to 4 times; vitamins in



the blood combine with sulfur dioxide and affect the body's metabolism.

In addition, the coal burning process may also produce solid waste. Fly ash is an inevitable product of thermal power generation. Usually, 1 ton of fly ash is produced for every 4 tons of coal consumed. It is conservatively estimated that the output of China's fly ash in 2009 reached 375 million tons, which is more than twice the total amount of urban life in China.

2.3 Analysis of the reasons for exceeding the standard and its handling

According to the response of the environmental protection department in 2018, the reasons for exceeding the standard are divided into equipment abnormalities, upgrading and modification (commissioning), standard-setting, shutdown, and other reasons. The classification of the reasons for exceeding the standard is shown in Figure 4.

Figure 4 Classification of Excess Reasons

As can be seen from the above figure, outages caused by shutdowns are the most frequent, followed by equipment abnormalities, and the smallest proportion of reports due to standard-setting problems and upgrades. Let’s

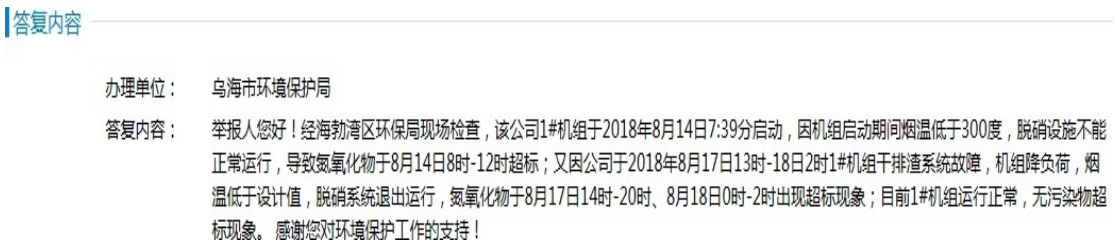
explain one by one below.

(1) Out of service

Exceeding standards caused by downtime accounted for 71%. According to environmental protection-related requirements, even if the unit is out of service, the second offline detection device cannot be deactivated. At this time, if the company does not note the production status on the online monitoring platform, it is easy to cause false reports.

(2) Equipment abnormal

Exceeding standards caused by abnormal equipment accounted for 13%. Take North United Power Co., Ltd. Wuhai Thermal Power Plant as an example. PECC reported that its nitrogen oxides had intermittently exceeded the emission standards. The Wuhai Environmental Protection Bureau replied on the 12369 platforms that it had conducted an on-site investigation of the company. On the 17th from 13:00 to 18th, the dry slag discharge system of unit #1 failed, the load of the unit was reduced, the flue gas temperature was lower than the design value, and the denitrification system was withdrawn from an operation.


答复内容

办理单位： 乌海市环境保护局

答复内容： 举报人您好！经海勃湾区环保局现场检查，该公司1#机组于2018年8月14日7:39分启动，因机组启动期间烟温低于300度，脱硝设施不能正常运行，导致氮氧化物于8月14日8时-12时超标；又因公司于2018年8月17日13时-18日2时1#机组干排渣系统故障，机组降负荷，烟温低于设计值，脱硝系统退出运行，氮氧化物于8月17日14时-20时、8月18日0时-2时出现超标现象；目前1#机组运行正常，无污染物超标现象。感谢您对环境保护工作的支持！

(3) Standard setting

Exceeding standards due to standard-setting problems accounted for 5%. Because the company did not update the standards on the online monitoring platform in time, its actual implementation standards were not consistent with the platform display standards.

(4) Upgrading and transformation (commissioning)

Exceeding standards due to upgrading and reforming accounted for 5%. Take Ningbo Zhongmao Yaobei Thermal Power Co., Ltd. as an example. PECC reported that its carbon monoxide data showed continuous emission exceeding the standard. The Yuyao Environmental Protection Bureau replied on the 12369 platforms that it had conducted an on-site investigation of the company. In June 2017, the first set of boilers (3# furnace) was transformed into grate furnaces, and it is planned to be put into operation by the end of October 2018; the third boiler (5# furnace) is planned to be put into operation before December 2019.

According to the response of the environmental protection department, we found that the environmental protection department has handled different enterprises that exceed the standard, and there are administrative penalties, and the case is filed for investigation and punishment.

Among them, administrative starting, rectification, and filing starting accounted for a total of 75%, and pending follow-up only accounted for 25%, which shows that the environmental protection department has a strong enforcement force against thermal power plants that emit excessive pollutants.

2.4 Changes in the "contribution" relationship between thermal

power industry and air pollution

China has abundant coal resources and good coal quality. Even with the cost of desulfurization and denitrification and electric dust removal, coal-fired power generation is an obvious economic choice. The cost of thermal power generation is around 0.25-0.45 yuan/kWh, which is lower than most power generation methods. In addition, compared with other power generation methods, thermal power has excellent peak-shaving performance. Compared with hydropower with strong peak-shaving capacity, it is not limited by reservoir conditions and is easier to obtain. Electricity is the basic energy source for large-scale industrial production, and its stable and low price guarantees the people's quality of life and foundation. Therefore, coal-fired power generation has always occupied an important position.

Since the smog outbreak in 2013, we have been talking about the "haze" discoloration. The smog is mainly composed of sulfur dioxide, nitrogen oxides, and inhalable particulate matter. According to the PECC big data, the ranking of the representative pollutants of coal-fired power plants that have exceeded the standard in 2018 is calculated. The existence of thermal power plants has contributed a lot to the production of smog. "contribute". Since the beginning of this century, my country’s thermal power plants have added desulfurization equipment at the end of flue gas emissions, and have also begun to carry out desulfurization transformations, but the process is still immature. There are related records in many documents: the higher the smoke temperature, the higher the smoke rises, and the easier it is to spread. Most of the power plants in my country adopt wet desulfurization, which causes the temperature to be greatly reduced, and thus cannot meet the emission standards.

After air pollution aggravated, coal-fired power plants became the target of allegations. According to its functional components, thermal power generation

is the simple power supply (power generation) and both power generation and heating (thermopower). During the whole process of producing electric energy, excessive emissions including dust, sulfur dioxide, and nitrogen oxides can cause environmental pollution. Deterioration of quality. Inadequate related environmental protection facilities in some thermal power plants at the initial stage have left hidden dangers to the environment.

However, in recent years, with the country’s increasing emphasis on environmental protection, the country’s total power generation has continued to increase, but the proportion of thermal power generation has declined. In terms of power supply structure, the state promotes the clean utilization of fossil energy, improves the quality and level of green and low-carbon development in the energy sector, and the scale of my country's non-fossil energy power generation is gradually expanding. As shown in Figure 5, affected by this, the proportion of thermal power generation from 2013 to 2017 has shown a downward trend year by year. According to the "Outline of the Thirteenth Five-Year Development Plan for National Economic and Social Development." By 2020, the proportion of non-fossil energy in China's total primary energy consumption will increase to about 15%. It is expected that the proportion of my country's thermal power generation will further decline in the future. In terms of the growth rate of installed capacity, the growth of downstream power demand is limited, and the increase in the proportion of energy generation in the plot has weakened the investment demand for thermal power installations, and the investment in thermal power sources has shown a downward trend. In addition, the country has accelerated the elimination of backward production capacity. Although the scale of domestic thermal power installations has maintained growth, the growth rate has slowed down significantly. In 2016, the growth rate of thermal power installed capacity in all regions was lower than the previous year.

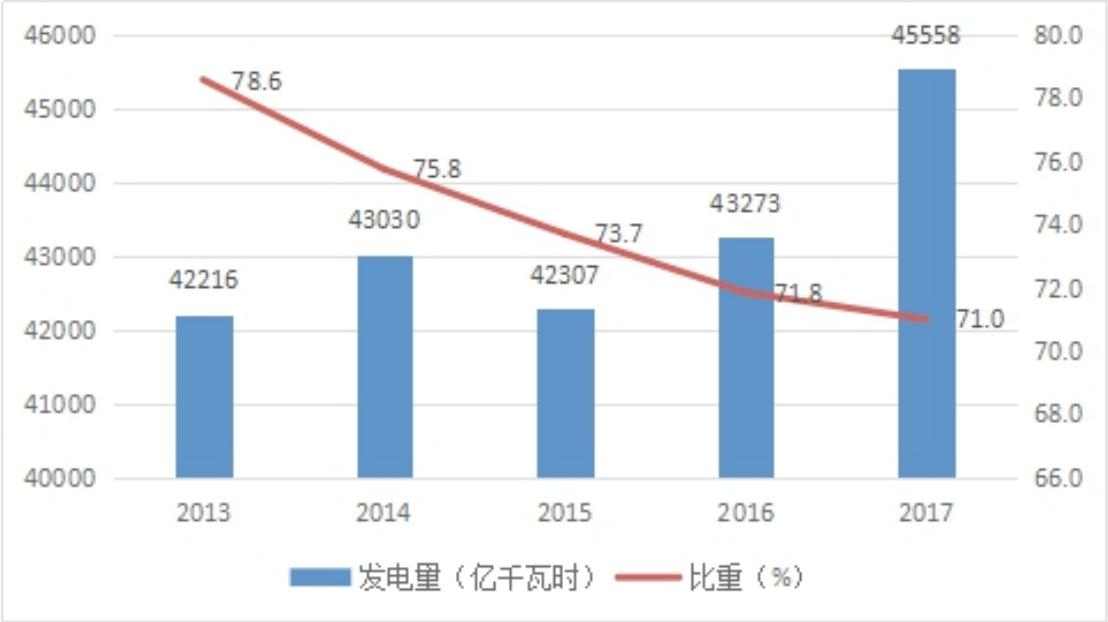


Figure 5 China's thermal power generation capacity and proportion in 2013-2017

Under the strong pressure of air pollution, the key areas of smog control are locked in the thermal power industry: the Ministry of Ecology and Environment released the list of major pollutants that seriously exceeded the standard in the third quarter of 2018 and the punishment and rectification status, and the design of two thermal power plants (power plants) was fined. 5 million; The 65-year-old Taiyuan No. 1 Thermal Power Plant was demolished by blasting on November 20, 2018; 9 power plants were included in the list of key pollutant emission units in Taizhou City in 2018 and other reports have come into our perspective. This all shows that the thermal power industry is not polluting.

3. Conclusion

After the 2018 annual PECC conducted real-time monitoring of emissions data from thermal power plants across the country, the company reported to relevant environmental protection agencies through Weibo, 12369, and other channels, and promoted local environmental protection bureaus to receive reports from companies that exceeded emission standards promptly, which is

not only beneficial to environmental supervision of government departments In addition, it promotes the public's awareness and participation in information disclosure and environmental management and grasps the situation of excessive pollutants discharged by sewage treatment plants, which can be used for public participation, environmental protection research, and policy study.

Combined with the analysis of the information disclosure data in 2018, we found the following problems:

(1) The thermal power industry is mostly concentrated in the important coal base cities in North China and East China;

(2) The reporting channel is single and there are shortcomings;

(3) The monitoring platform of key enterprises lacks a standardized mechanism;

(4) Most enterprises are exceeded due to downtime.

The following suggestions are given to these problems:

Recommendations to government departments:

(1) Standardize the platform mechanism: supervise each enterprise to standardize the upload of data to avoid missing data and lag;

(2) Widen public reporting channels and improve existing reporting channels;

(3) Actively promote the energy-saving transformation of enterprises, list the shutdown and relocation of thermal power enterprises with obsolete equipment and serious pollution as an important work item, increase law enforcement and supervision, and maintain a high-pressure situation of environmental law enforcement;

(4) Vigorously support and develop low-pollution and non-polluting environmental energy such as solar and wind energy.

Recommendations for thermal power companies:

(1) Ensure that the self-monitoring data is uploaded in a timely and effective manner. To avoid the risk of being reported, corporate personnel should promptly comment on the platform and inform the public of unexpected situations such as shutdowns, production shutdowns, and maintenance;
(2) Introduce advanced desulfurization and denitrification technologies, actively cooperate with national and local environmental protection policies, and accelerate ultra-low emission transformation;
(3) Assume the main responsibility of the environment, and complete the role change from a "contributor" to a governor of air pollution.

In the face of severe air pollution. The government, the public, and enterprises should cooperate in many ways to continuously promote the solution to environmental problems. On the one hand, the government strengthens law enforcement and severely punishes enterprises that exceed the standard. On the other hand, it should follow good temptations and guide enterprises to upgrade and transform; enterprises should formally take their environmental responsibility, respond to environmental protection calls, and save energy and reduce emissions; PECC acts as a bridge between the government and the people. It will also continue to actively guide public participation to realize the overall pattern of everyone participating in environmental protection.