

# URBAN VOCs CONTROL IN SHENZHEN

IN 2009, IN THE SOUTHERN CHINESE CITY OF SHENZHEN, VOLATILE ORGANIC COMPOUNDS (VOCs) EMISSIONS WERE AS HIGH AS 190,000 TONS. AFTER YEARS OF WORK, THE CITY HAS MADE SIGNIFICANT PROGRESS IN CONTROLLING VOCs, AND HAS SEEN A CONSIDERABLE REDUCTION IN EMISSIONS FROM KEY INDUSTRIES

## CONTEXT

Faced with a steady increase in complaints against VOCs emissions and complaints from the public on air pollution, the Shenzhen Municipal Government opted to sacrifice some short-term economic benefits for long-term urban development. The city government saw improving air quality as a way to enhance the competitiveness of the city and create green welfare benefits for the local citizens.

After years of work, Shenzhen has made significant improvement in controlling VOCs, and its initiatives provide many best practice examples for other cities throughout Asia. According to the 2014 ambient air pollutant emissions inventory, the total volume of VOCs emissions was 143,581 tons, a decrease of 5.3% compared with 2012. Starting from 2010, 565 out of more than 800 furniture enterprises in Shenzhen have removed or relocated their coating lines, and 112 unlicensed coating lines have also been shut down. Currently, all furniture enterprises in Shenzhen have completed the clean production retrofitting of their painting processes, reducing VOCs emissions by more than 30,000 tons a year.

At the end of 2015, Shenzhen had issued technical specifications on furniture manufacturing, architectural decoration material and vehicle maintenance industries, developed technical guidelines for VOCs control, and mandated the completion of control tasks in more than 10 key enterprises.

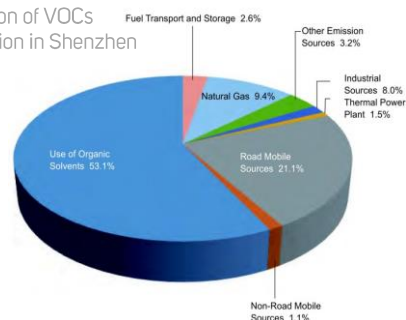
## POLICY AND TECHNICAL MEASURES

1. Rigorous environmental impact assessment and approval of new, renovated and expanded VOCs projects
2. Emission control requirements for enterprises
3. Inspections on enterprises rectifying VOCs emissions issues
4. Improving VOCs control through economic and administrative measures
5. Increasing public attention and awareness of VOCs
6. Publishing technical specifications and guidelines on VOCs control

<b>Architectural decoration:</b> Implement the technical specifications on hazardous substances in architectural coatings and forbid the use of solvent paints in the city
<b>Vehicle maintenance:</b> Launch technical specifications on industry VOC emissions to force the adoption of water-based paints by enterprises, and enhance regulations on VOCs emissions
<b>Furniture manufacturing industry:</b> Promote the use of water-based or low VOC coatings, and formulate emission standards that are in line with the European Union standards
<b>Printing industry:</b> Promote the use of water-based, alcohol, UV-curable and botanical-based ink
<b>Electronics manufacturing:</b> Enhance the rate of exhaust gas collection, recycling and purification, and encourage the use of low-VOC cleaners and cleaning technologies
<b>Plastics industry:</b> Promote the use of UV-curable paints, low-VOC coating technologies and coating-free manufacturing technologies, and enhance control over emissions

VOCs are found in a wide variety of products such as solvent-based paints, printing inks, organic solvents and petroleum products. VOCs play a significant role in the formation of ozone and fine particulates in the atmosphere. Under sunlight, VOCs react with Nitrogen oxides emitted mainly from vehicles, power plants and industrial activities to form ozone, which in turn helps the formation of fine particulates.

Distribution of VOCs Contribution in Shenzhen



WATER-BASED PAINTS HAVE BEEN ADOPTED BY 594 INDUSTRIAL AND 263 VEHICLE MAINTENANCE COMPANIES, 101 FURNITURE MANUFACTURERS HAVE BEEN PUT ON THE DIRECTORY OF ENTERPRISES THAT MUST UNDERTAKE OIL-TO-WATER REFORM, AND 48 ENTERPRISES HAVE BEEN PENALIZED FOR FAILING TO MEET EMISSION STANDARDS

## VOCS CONTROL SYSTEM

Through years of experimentation, Shenzhen has developed an effective system of VOCs control:

First, priority is given to control over sources, followed by control over emissions. Industrial coating enterprises are required to use low VOC coating to reduce organic solvents and VOCs emissions. And to improve the quality of inspections, enterprises are required to create inventories for raw and supplementary material use, the operation status of emission control facilities, and the joint transfer of dangerous wastes.

Second, the government released laws and regulations in conjunction with technical specifications. Documents such as the Standard for Hazardous Substance in Architectural Coating and Adhesive Products, Standard for VOCs in Paints and Emissions of the Vehicle Maintenance Industry have been released. Industry associations have also been called on to adopt the Joint Action Plan on Environmental Protection.

Third, control work is being carried out by industries to prevent a “wait-and-see” approach. Action is first taken by enterprises that are above the industry average, and then spread rapidly to the whole industry after the effects have been demonstrated. In this way, slow and stagnant progress caused by the “wait-and-see” phenomenon can be mostly avoided.

Fourth, the government has strengthened regulations on key enterprises under supervision. By focusing on these key enterprises for rectification, progress can be expedited.

Fifth, law enforcement has been enhanced. Environmental departments conduct multiple legal inspections. To ensure the effective implementation of different measures, penalties are imposed on enterprises that fail to finish on time.

## CHALLENGES

There are still a number of difficulties to achieve successful control of VOCs:

First, sectors generating VOCs emissions are not concentrated, making VOCs controls more difficult. VOCs emissions are evenly distributed across a number of sectors and there is no prominent industry. Therefore, control work must be carried out based on analyzing VOCs-generating production processes.

Second, the collection and removal rate of VOCs from industrial sources is still insufficient. Only 25% of the enterprises in Shenzhen have installed VOCs control facilities. In terms of collection facilities, external ones are the majority with a collection rate of 60% or below. Water spray, with no more than 5% of removal rate, is still the major emissions processing technology used by enterprises. About 35% of the enterprises adopt water spray and activated carbon combined processing facilities, but the VOCs removal rate is still below 25%. Also, only a small number of enterprises adopt technologies with high VOCs removal rates, such as photo-oxidation, direct combustion, and catalytic combustion.

Lastly, laws and regulations on the control of VOCs pollution from industrial sources are still incomplete, making enforcement more difficult. The reduction of VOCs emissions from industrial sources is dependent on supervision. However, relevant laws and regulations are not robust, posing challenges for environmental departments. Currently, there are only a few laws and regulations on VOCs prevention and control in China. For sectors without such standards, VOCs emissions control can only be completed based on the Standards on Comprehensive Ambient Air Pollutant Emission, which has lax requirements for VOCs emissions.

SHENZHEN'S TECHNICAL SPECIFICATIONS ON VOCs CONTROL
1. Standard for Hazardous Substance in Architectural Coating and Adhesive Products
2. Standard for VOCs in Paints and Emissions of the Vehicle Maintenance Industry
3. Standard for Hazardous Substance in Furniture and Furniture Materials
4. Standard for VOCs in Industrial and Household Products

For further information, see Clean Air Asia's "*China Air 2016 - Air Pollution Prevention and Control Progress in Chinese Cities*" report at <http://cleanairasia.org/wp-content/uploads/2016/08/China-Air-2016-Report-Full.pdf>

