



China's VOC Management and Impact on the Chemical Industry

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Volatile organic compounds (VOCs) are organic chemicals that have a low boiling point (below 250°C) at atmospheric pressure. While most of them are not acutely toxic, they are known to have negative long-term effects on human health.

According to a study published in 2017, in China the use of VOC-containing products is the main source of VOC emissions, contributing about 75% of total emissions. Other sources are the production of VOCs (10%), the use of VOCs as raw materials (9%) and storage/transportation of VOCs (5%).

Several studies show that the concentration of VOCs in China is much higher than in Western countries such as the United

States and Germany, indicating that China's regulatory system for VOCs is lagging behind global standards. As a consequence, China has in the past few years started a number of policies to control VOC pollution.

Unfortunately, there is no regulation that specifically focuses on VOCs in China. However, government efforts to regulate VOC have found their expression in a number of policy documents:

- 13th Five-Year Plan - Prevention and Control of Volatile Organic Compounds Pollution (2016-2020), with the addition of a target to reduce VOCs. This is the first time this target has appeared in a five-year plan. The plan aims to reduce VOCs nationwide by

10 percent or more

- In 2018, a newly designed environmental protection tax replaced the pollution discharge fee, thus increasing the cost of VOC emission and improving its supervision
- From October 2018, special limitations on air pollutants were imposed strictly for “2+26” cities in Beijing-Tianjin-Hebei region
- February 2019 “Three-Year Action Plan for Winning the Blue Sky Defence War”, a detailed plan to improve the prevention and control of air pollution in 2019
- June 2019 comprehensive three-year plan to reduce emissions of volatile organic compounds in key industries, published by the MEEP. Key points are



to promote the substitution of high VOC content raw materials, improve standards for VOC content in materials, and improve implementation of existing VOC regulation and oversight

- In July 2019, three national standards for airborne volatile organic compound emissions took effect

In addition, individual provinces have their own regulations and plans, e.g.,

- At the end of 2018, a number of government departments jointly issued an action plan to combat autumn/winter air pollution in the Yangtze river delta area, requiring local governments to urge industrial enterprises to continually upgrade pollution treatment facilities and to specifically control emission of VOCs

- In Tianjin, the use of water-based coatings has been mandatory for motor vehicle maintenance companies since the beginning of 2019

- The government of Xinjiang Uygur Autonomous Region started imposing fees on emissions of VOCs from petrochemical and package printing industries

Among industrial emission of VOC, the chemical industry contributes a substantial share of 47% and thus is clearly in the focus of any government activities to reduce VOC emissions. In particular, chemical parks have been marked as a priority in VOC emissions.

Which chemical segments will be particularly affected by the tightened VOC regulation? Obviously, those with high VOC emissions will be hit hardest. This includes petrochemicals, industrial coatings, adhesives, packaging, and printing. For example, a draft standard for low-VOC coatings is currently circulating. To some extent, the regulation is shifting from end emission to the use of input materials (e.g., coatings and inks) with lower VOC emissions. As a consequence, enterprises will not only aim to reduce their own VOC emissions but also be required to use low VOC raw materials.

For some materials such as coatings, complying with VOC regulation seems to be an almost never-ending story. For example, benzene was one of the earliest materials regulated in coatings. As a consequence, many producers replaced it with methyl benzene. Once methyl benzene was restricted, it was replaced by xylene. And nowadays this again is replaced by ethyl toluene.

What are the longer-term consequences of tightened VOC regulation? Obviously, chemical plants will need to invest more in VOC control facilities, and they have in fact already started doing that. However, often substantial reduction of VOC emission depends on the overhaul of the whole production process and design. This may mean shifting technologies, e.g., from

solvent-based to water-based, UV or powder coatings. Similarly, it may mean shifting from urea-formaldehyde adhesives in plywood production to MDI technology, as currently explored by Huntsman. Chemical companies may also react by extending their portfolio of services related to VOCs. For example, in 2018 Covestro established a testing laboratory for VOCs in its Shanghai R&D center. This is also partly due to consumer preferences, as Chinese car buyers are much more sensitive to indoor odor in cars than Western buyers. So, in some areas, China may well take a pioneering role. Those companies that have not taken efforts to reduce their VOC emissions – for example, those still relying on the production of solvent-based coatings – are likely to suffer in the long term.

For the near future, we are not expecting any specific additional VOC regulation. However, currently there are some important national standards being developed that will impact specific chemical segments, such as the standards of VOC content limit for coatings, inks, adhesives, and some other VOC containing products. These standards will not only apply to the companies producing these products, but also those using them. Compliance with these new standards is likely to be the main challenge for companies in the next few years. ■