

UPOPs control in the Secondary Copper Production Sector in China

Persistent Organic Pollutants (POPs) are chemicals that adversely affect human health and environmental quality when released into the air, water or soil. These pollutants persist in the environment, bio-accumulate through the food web, and cause great damage to human and animal tissue even in small quantities. This leads to damage in the nervous, immune, and reproductive systems or can cause developmental disorders, such as cancer.

Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs), as a family member of the Dioxins, are listed in the Stockholm Convention Annex C¹ as unintentionally produced Persistent Organic Pollutants (UPOPs). They occur as a by-products of many industrial processes, including waste incineration, papermaking, and metallurgical processes and in the production process of non-ferrous metals.

Secondary Copper Industry and POPs Overview

Secondary copper refers to copper that is generated from all non-primary sources, including: e-waste, consumer wastes that contain brass and bronzes, industrial waste as well as metallurgical waste. With the steady depletion of the world's primary copper reserves, secondary copper processing has become increasingly important in the global copper industry. In 2010 it contributed to around 35% of the copper supply in the world, as per the International Copper Study Group².

The production of secondary copper increased rapidly from 2004 to 2013 in China³, and reached 2.16 million tons in 2013, accounting for 58 percent of global production. Although international prices of copper have continued to decline in recent years, the production of secondary copper is still rising in China.

Studies have indicated that UPOPs emissions from secondary copper smelters are higher than those from primary copper smelters, iron foundries and secondary aluminium smelters. The PCDD is not only released in the production workplace during the secondary copper production process, but throughout the environment, including ambient air, water, soil and sediment⁴. It was estimated that the total PCDD/Fs emission from secondary copper production sector was 1,133.8 g TEQ/a, including atmospheric emissions of 403 g TEQ/a and fly ash emissions of 730.8 g TEQ/a, respectively in China in 2007⁵.

The copper-containing material used in secondary copper production vary greatly, and often contain different compounds, such as plastics and chlorines from the electronic waste parts. These parts include cables and coils, which are the

cause for the high POPs emissions in secondary copper production.

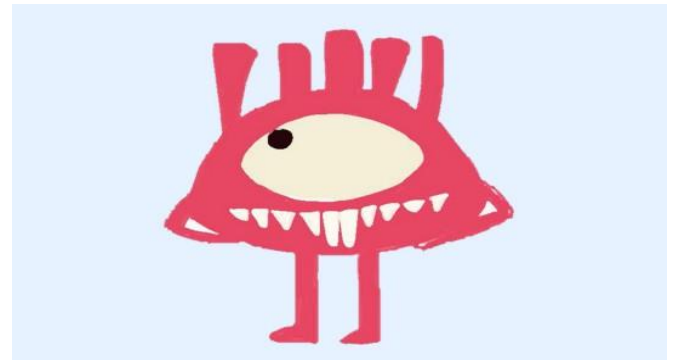


Figure 1 PCDD Cartoon Featured in the UNDP China #Stop POPs# Communications Campaign

The two most relevant processes with respect to POPs emission control are the scrap pre-treatment and smelting processes, in particular the smelting reduction step. In the secondary copper production industry in China, there are two types of process scales: large-scale and regulated production plants, and unregulated, small-scale enterprises.

It has been estimated that 60% of refined copper has been produced from the 5 largest enterprises in the country (IISD 2010). Yet only about 3% of the large scale enterprises have adopted the advanced equipment which helps to control releases of conventional pollutants. However, such technologies do not control/reduce emissions of PCDD/Fs, and some of the mid-scale enterprises only utilize the very basic production and scrap pre-treatment technologies without further measurements for pollutants control.

The situation is even worse in the informal and small-scale processing units. The informal and small-scale processing enterprises usually engaged in the scraping and smelting of the e-waste treatment, is often dismantled in informal, unregulated and small-scale manner. With limited financial resources and knowledge about optimizing process, they often perform banded activities such as copper smoldering without control.

Aside from releasing UPOPs, the smelting of secondary copper also produces P.M 2.5, which has become a major environment and health hazard in China. It was reported that up to 80% of PCDD/Fs were distributed in PM2.5.

Current Institutional and Legal Arrangement for POPs Control in the Secondary Copper Processing Sector in China

The *Stockholm Convention on Persistent Organic Pollutants*, signed in 2001 and effective from May 2004, is an international environment treaty that aims to eliminate or restrict the production and use of POPs. China has rectified the Stockholm

Convention and has been working to fulfill its commitment ever since.

There are three governmental agencies playing a key role in the legislation, management, monitoring and communication in the secondary copper production sector in China; Ministry of Environmental Protection (MEP), National Development and Reform Committee (NDRC), and Ministry of Industry and Information Technology (MIIT). Over the past decade, the Government of China has issued a variety of environmental laws, regulations, standards, technical guidelines and norms related to POPs control in the non-ferrous industry, including in the secondary copper sector, alongside the *Guidance on Strengthen Dioxin Pollution Prevention and Control* (2010[123]), which listed Secondary copper as one of the key control industries, and set up a comparative dioxins pollution control system with long-term supervision mechanism in 2015. In addition, the newly enacted *Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution* has ensured the prevention of atmospheric pollution, and improved the living environmental and ecological environment, which urged the standard production process in the secondary copper processing industry. A series of national technical documents and standards on industrial quality and technical requirements has also been set up by the government to control the carbon discharge, environmental pollutants emission, and clean production.

While it is evident that China has placed great importance on POPs control, to effectively manage the secondary copper production sector, the following existing barriers need to be overcome in order to reach greater efficiency:

➤ **Incomplete legal/regulatory framework**

Although the secondary copper industry is covered under various relevant laws, regulations and standards, the industry has no targeted institutional and legal framework to refer to for proper management. In addition, the entire industry has not yet considered specific provision and standards to address the POPs related issue. While there are standards regarding scraping copper recycling, there are no technical/environmental standards for production from the source of copper sludge recycling

➤ **Lack of access/Limited access to international Best Available Techniques/Best Environmental Practices (BAT/BEP)**

According to the requirements of the *Stockholm Convention on Persistent Organic Pollutants*, the parties have an obligation to promote or require the use of Best Available Technologies (BAT), and to promote the wide use of Best Environmental Practices (BEP). However, as the Dioxin control is a relatively new area, there are no specific technical standards available. In addition, dioxin emission have not been falling under the local EPB's regular monitoring due to lack of awareness and capacity. What's more, most enterprises are privately owned and have small production scale, the use of BAT/BEP for prevention of UPOPs emission in sector of non-ferrous metal production is rare in China. In addition, it is lack of guidance on how to carry out BAT/BEP practices in these sectors.

➤ **Lack of capacity**

China does not have a strong capacity in monitoring and enforcing related environment control/insurance in the UPOPs control of the secondary copper production at the government,

industrial or the local levels. Furthermore, limited attention has been paid to proactively supporting and coaching the existing secondary copper production sector to improve the pollution control and environment management, as most of the focus in the past have been on the sector's growth, and on its operation as a resource renewable industry in China.

In addition, China has not established any pilots to demonstrate the international best available techniques/ best environmental practices (BAT/BEP) related to secondary copper processing technologies, therefore the potential effective environment management models have not be widely adopted in China.

Suggestions for the way forward

To address the above mentioned barriers and to fulfill China's commitment towards the Stockholm Convention, the following suggestion aim at helping China to effectively improve the UPOPs control in this sector:

The first step would be to develop the related environmental policy, technical standards and management documents as well as industry entry conditions to formulate and improve the sector-specific governance and regulatory framework, with the goal of increasing control and reducing UPOPs emission. Effective coordination and collaborations among different government agencies, as well as the industry are required to ensure the sustainable development within the sector.

Furthermore, the supervision and management measures, methods for all the relevant stakeholders in this sector, including the civil society organizations, institutions, agencies, researchers, and private sector, and industrial groups, local and indigenous communities should be established. The supervision and monitoring capacity, especially at local level should be improved.

Alongside the institutional and legal framework construction, before introducing the international BAT/BEP, an estimation of the up-to-date status about UPOPs emission in this sector should be conducted to gain better understanding about the baseline situation.

While introducing and demonstrating BAT/BEP, it is important to establish an effective public-private partnership model to better engage the private sectors to adopt the new practices.

The demonstration of the BAT/BEP, information regarding the effectiveness, benefits and feasibilities of the pilots, alongside the lessons learned and experiences, should be shared nationwide for replication and scale up with a detailed national replication plan, which can contribute to the progress of UPOPs control in the secondary copper processing sector at the global scale.

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1. PCDD was listed in the Annex C of the Stockholm Convention, which means that parties signed the convention must take measures to reduce the unintentional releases of the listed chemicals with the goal of continuing minimization and, where feasible, ultimate elimination http://www.outotec.com/imagevaultfiles/id_567/cf_2/secondary_copper_processing.pdf.
3. The Yearbook of Nonferrous Metals Industry of China (2014)
4. Jicheng Hu et al. (2013)
5. China's National Implementation Plan on POPs (NIP) (2007 version), a UPOPs inventory ("National Dioxin Inventory of China") based on the UNEP toolkit was undertaken