UN environment programme

CADMIUM

Assessment Report on Issues of Concern

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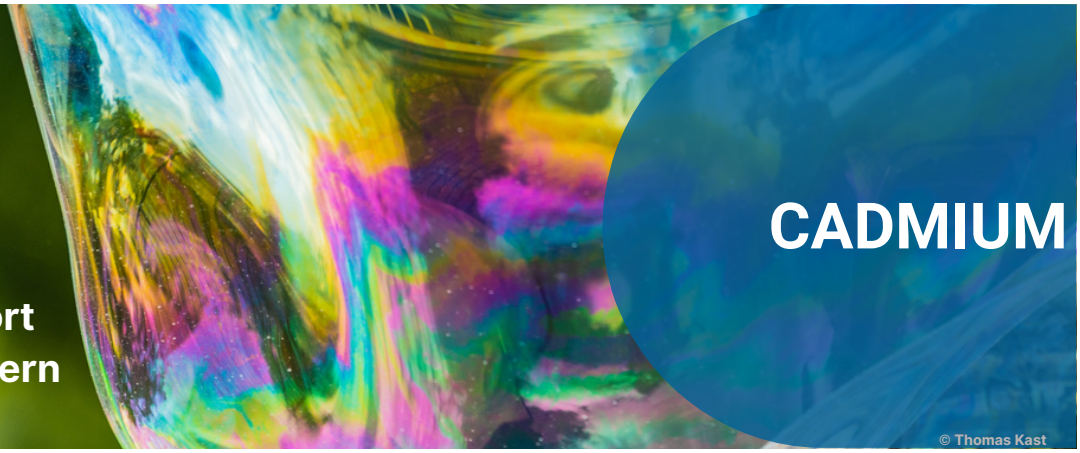

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1. Sources

Cadmium is a toxic metal that is naturally found in the Earth's crust, generally at low levels. Cadmium and cadmium compounds are mainly used in nickel-cadmium batteries, alloys, coatings and plating, pigments in plastics, glasses, ceramics and paints, solar cells, PVC stabilisers and others.

It has been produced, used and released in large quantities, and thus intentional human uses have caused widespread, persistent contamination and exposure.

2. Why is it relevant?

Cadmium is highly toxic to humans and the environment at very low exposure levels. Cadmium and cadmium compounds have been:

Identified as one of the 10 chemicals of major public health concern by the World Health Organization (WHO), and as an issue with emerging evidence of risks to human health and the environment by the Global Chemicals Outlook II;

Classified as carcinogenic to humans. Cadmium may also cause a range of other adverse health effects, mainly affecting kidney function where it accumulates with a biological half-life of 10-35 years in humans;

Linked to reduced lung function as well as damage to bones, with children particularly at risk;

Shown to cause animals exposed in the environment to suffer from cadmium-induced kidney damage. Cadmium is especially dangerous to animals because of its high bioavailability and bioaccumulation potential.

Exposure to cadmium and cadmium compounds may occur both from natural and anthropogenic sources, with anthropogenic sources contributing substantially to current emissions.

Anthropogenic releases include fossil fuel and coal combustion, mining and smelting of metals, and sources related to the production, use, disposal and recycling of cadmium and cadmium-containing products (including phosphate fertilisers with cadmium as impurities).

In air, cadmium is mainly emitted as particles, which may be transported up to thousands of kilometers depending on particle sizes

Once released, cadmium persists in the environment, and reaches wildlife and humans through contaminated air, water, soil and foodstuffs.

Humans may be additionally exposed through house dust, tobacco smoking and cadmium-related consumer products. For the general, non-smoking population, the main exposure lies in the ingestion of food (about 90%).

In occupational settings, the main exposure route is via the respiratory tract; incidental ingestion of dust from contaminated hands and food may occur as well.

For more detailed information on cadmium, please see Chapter 4.3 of the ***Assessment Report on Issues of Concern*** and Part B, Chapter 3 of the ***Annexes to the Assessment Report on Issues of Concern***. Available on the UNEP website.

3. Existing instruments and actions

At the international level, governments have recognized “the significant risks to human health and the environment arising from releases of lead and cadmium into the environment” and requested cooperative actions on cadmium (e.g., UN Environment Assembly Resolution 1/5 and 2/7).

Other detailed actions include the recognition of cadmium-related wastes as hazardous wastes under the Basel Convention, which establishes legally binding obligations for Parties to address such wastes according to the Convention provisions, and the development of international guidelines for cadmium levels, for example, in drinking water, air and food.

A number of countries and regions have taken actions to legally restrict, ban or set mandatory national standards for cadmium in specific uses, which are not being addressed internationally. For example, restrictions and bans on cadmium use in polymers, food-related items, specific electrical and electronic products and by setting legal limits for the unintentional presence of cadmium in different fertilizers.

Various other legally binding instruments and voluntary actions have also been used. For example, legal requirements to provide information to users and consumers, or voluntary limits on cadmium in fertilisers by the fertiliser industry. In addition, a large number of countries have looked at emissions and exposure media, and set up guideline values for different exposure media.

See Annexes for more

4. Challenges and opportunities

Cadmium has a capacity to cause significant adverse effects on human health and the environment at very low levels.

Efforts to date are likely to be inadequate to eliminate or minimize cadmium exposures from anthropogenic sources as a whole.

Addressing cadmium can be complex due to many other factors including the diversity and prevalence of sources around the world. Simply reducing cadmium demand by restricting or banning its use may not effectively limit its global production.

An increased demand for cadmium in some uses may help reduce its emissions in others. For example, as the demand for renewable energy sources increases, so will the use of photovoltaics and batteries that contain cadmium. This will in turn reduce the emissions of cadmium from burning fossil fuels. However, these could eventually become a source of cadmium-containing wastes at the end of their lifetimes. Thus, future international concerted actions need to take such trade-offs into consideration.

Much can be learned from the global sound management of mercury, arsenic and lead as the challenges associated with addressing global exposure them are generally similar. Further international concerted actions that cover all major sources are urgently needed to address cadmium in an integrated and holistic manner, possibly through legally binding instruments.

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