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毒物及化學物質局
Toxic and Chemical Substances Bureau
Environmental Protection Administration
Executive Yuan, R.O.C.(Taiwan)

The 6th Asia-Pacific Mercury Monitoring Network Workshop

Management Strategies of Mercury in Taiwan

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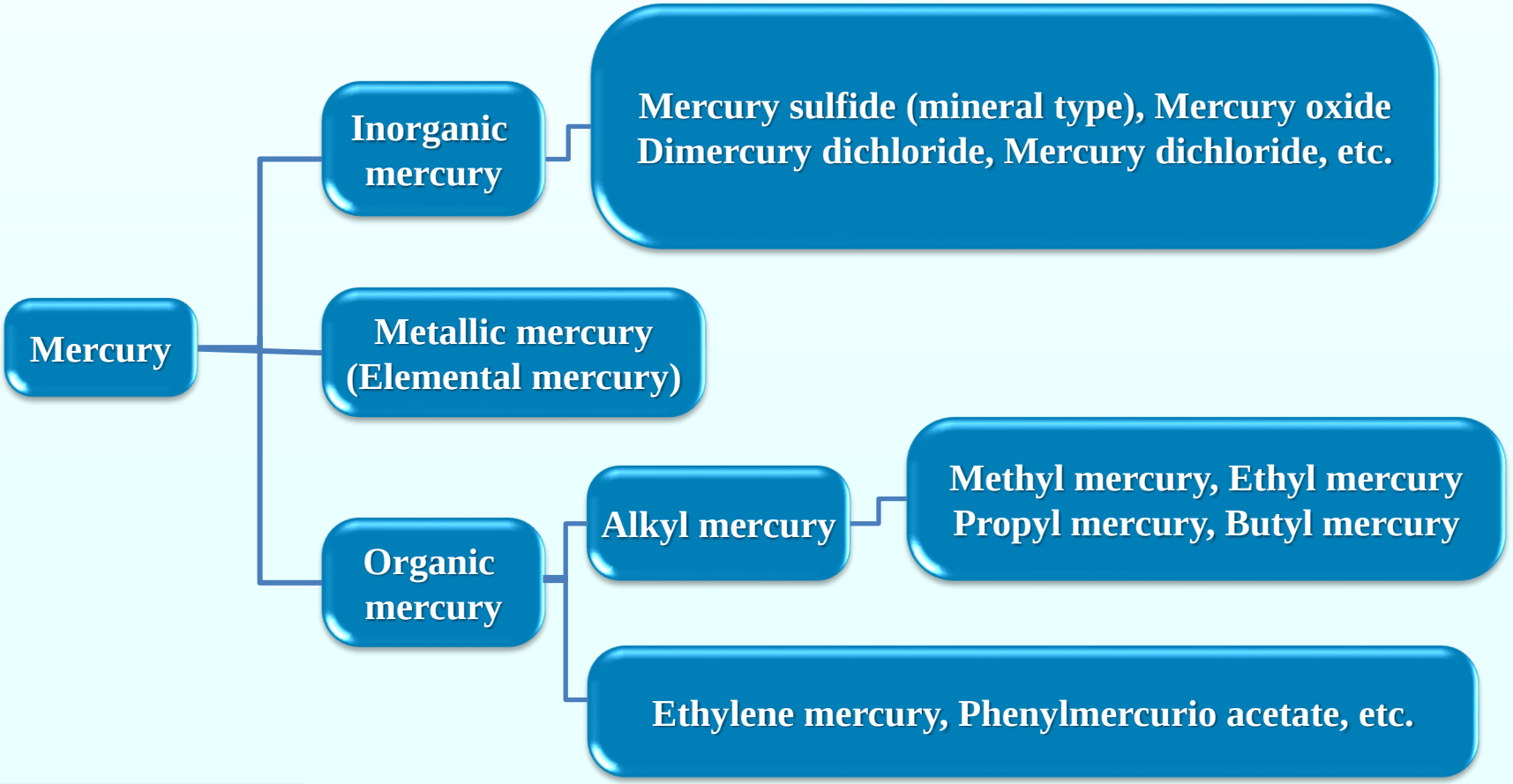
Outline

- **Mercury and it's health effects**
- **Introduction of Minamata Convention on Mercury**
- **Management strategies of mercury in Taiwan**
- **Conclusions**

Mercury pollution and health effects

- **Mercury is one of heavy metals; presents in many different types in the environment.**



Mercury pollution and health effects

Mercury toxicology

- ✓ **Exposure to inorganic mercury can result in kidney damage. Inorganic mercury is methylated through biological or chemical processes in the environment.**
- ✓ **Vapor inhalation is a major exposure route for elemental mercury and easily cross the blood-brain barrier that causes the central nervous system damage and behavioral disorder.**
- ✓ **Organic mercury such as methyl mercury are readily found in aquatic systems; exposure to organic mercury can result in brain and neurological symptoms, for example, Minimata disease is caused by methyl mercury.**

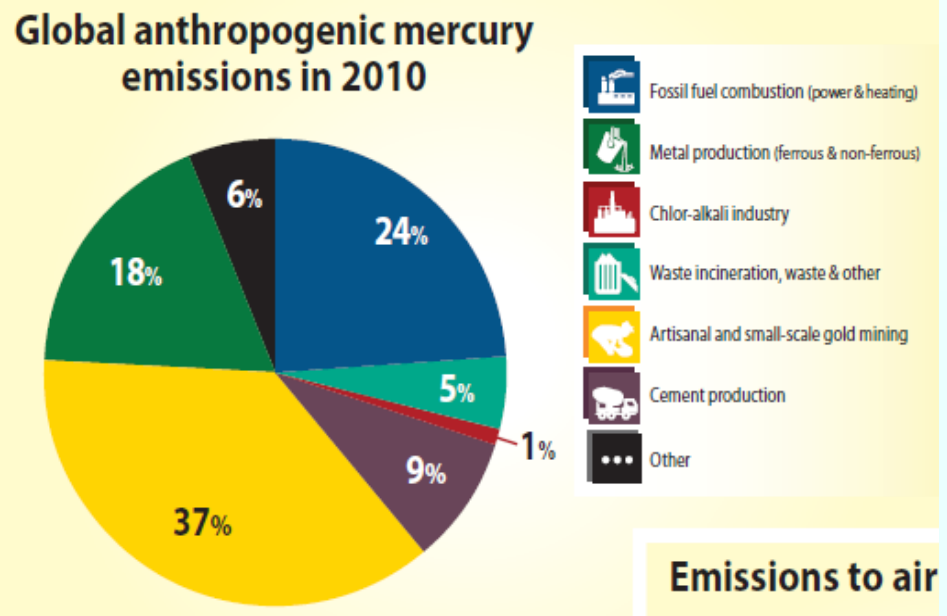
Minimata disease caused by methyl mercury in 1956

Mercury pollution and health effects

The sources of mercury

- **Natural sources：** **volcanoes, fumaroles and solfatara.**

- **Anthropogenic sources：**
  - **Major sources include artisanal and small-scale gold mining (ASGM)(37%), fossil fuel combustion (power & heating) (24%), metal production (ferrous & non-ferrous) (18%), cement production (9%).**
  - **Other sources include the manufacture and use of the mercury-added products etc.**

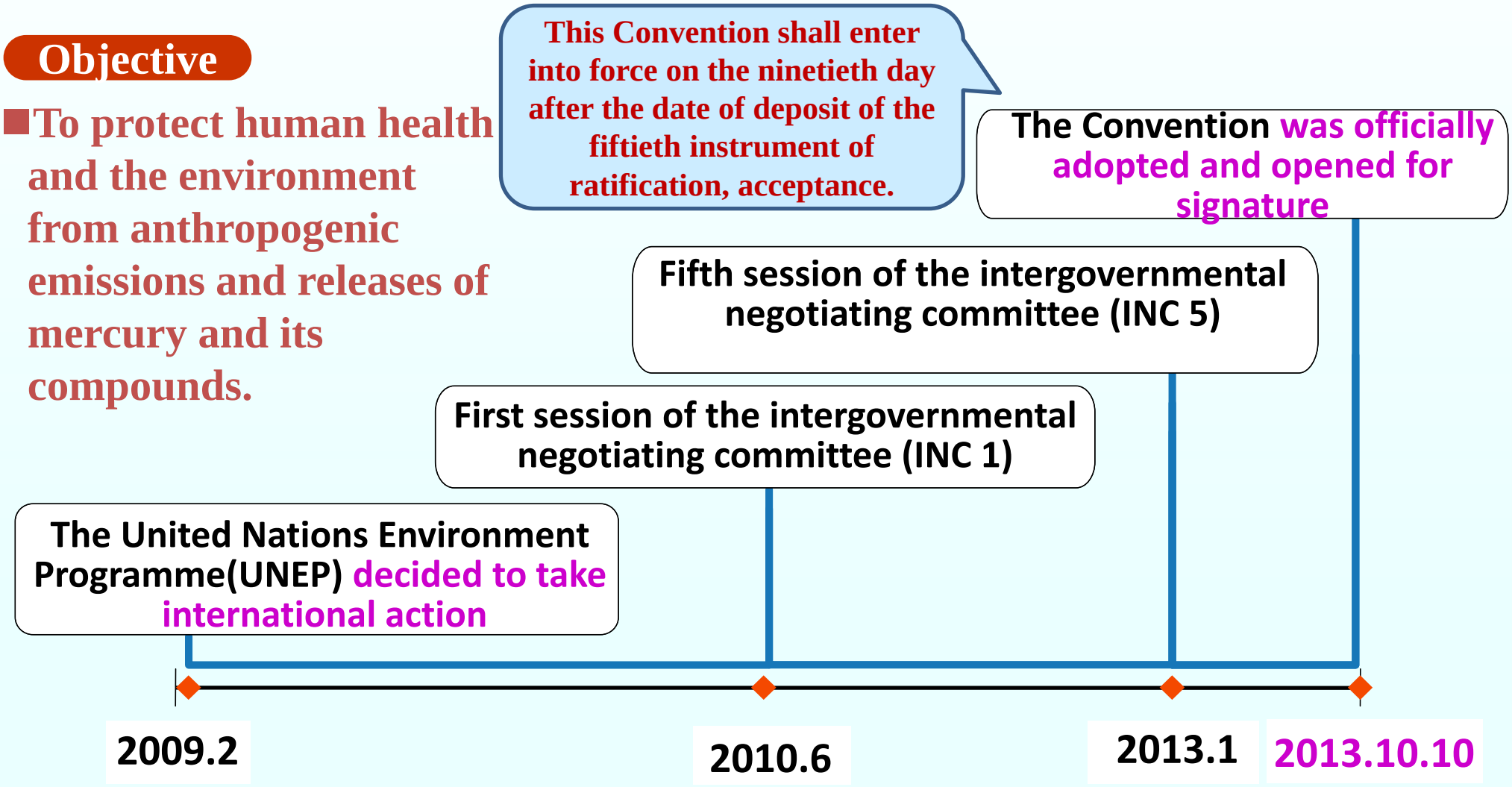


1960 tons/yr emits into atmosphere from anthropogenic sources

Introduction of Minamata Convention on Mercury

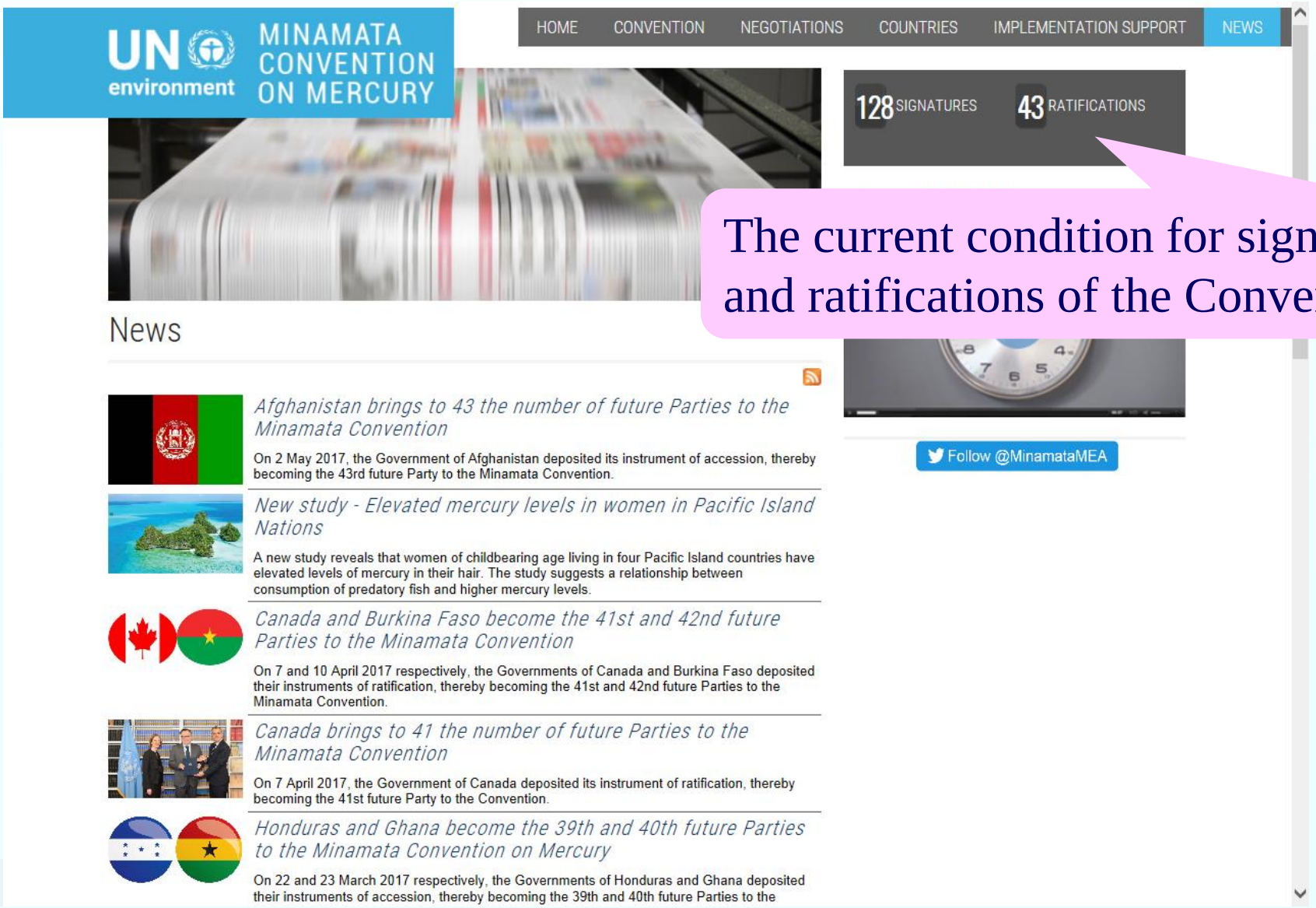
Objective

- To protect human health and the environment from anthropogenic emissions and releases of mercury and its compounds.



The United Nations Environment Programme (UNEP) adopted Minamata Convention on Mercury for global mercury pollution issue

Introduction of Minamata Convention on Mercury



Introduction of Minamata Convention on Mercury

Abstract - Minamata Convention on Mercury (1/3)

Content	Abstract
Mercury supply sources and trade	•Each Party shall not allow primary mercury mining that was not being conducted within its territory at the date of entry into force of the Convention. •Each Party shall not allow the export of mercury.
The manufacture, import or export of the mercury-added products shall not be allowed after 2020	•Batteries (except for button cell batteries with a mercury content < 2%)； •Switches and relays (except for special purpose bridge, switch and relay with a maximum mercury content of 20 mg per bridge, switch or relay)； •Compact fluorescent lamps (CFLs) for general lighting purposes that are L 30 watts with a mercury content exceeding 5 mg per lamp burner； •Linear fluorescent lamps (LFLs) for general lighting purposes: a.Triband phosphor < 60 watts with a mercury content exceeding 5 mg per lamp b.Halophosphate phosphor L 40 watts with a mercury content exceeding 10 mg per lamp； •High pressure mercury vapour lamps (HPMV) •A mercury content exceed the limit levels in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for electronic displays •Cosmetics (with mercury content above 1ppm), not including eye area cosmetics •Pesticides, biocides and topical antiseptics； •Non-electronic measuring devices (such as thermometers, sphygmomanometers, etc.) except non-electronic measuring devices installed in large-scale equipment or those used for high precision measurement, where no suitable mercury-free alternative is available •Products for military uses, research, vaccines containing thiomersal as preservatives and traditional or religious practices uses are excluded

Introduction of Minamata Convention on Mercury

Abstract - Minamata Convention on Mercury (2/3)

Content	Abstract
Dental amalgam	Measures to be taken by a Party to phase down the use of dental amalgam shall take into account the Party's domestic circumstances and relevant international guidance and shall include two or more of the measures from the following list: (1) Setting national objectives aiming at dental caries prevention and health promotion, thereby minimizing the need for dental restoration; (2) Setting national objectives aiming at minimizing its use; (3) Promoting the use of cost-effective and clinically effective mercury-free alternatives for dental restoration; (4) Promoting research and development of quality mercury-free materials for dental restoration; (5) Encouraging representative professional organizations and dental schools to educate and train dental professionals and students on the use of mercury-free dental restoration alternatives and on promoting best management practices; (6) Discouraging insurance policies and programmes that favour dental amalgam use over mercury-free dental restoration; (7) Encouraging insurance policies and programmes that favour the use of quality alternatives to dental amalgam for dental restoration; (8) Restricting the use of dental amalgam to its encapsulated form; (9) Promoting the use of best environmental practices in dental facilities to reduce releases of mercury and mercury compounds to water and land.
Mercury wastes and contaminated sites	• To develop and maintain global, regional and national capacity for the management of mercury wastes in an environmentally sound manner • To developing strategies and implementing activities for identifying, assessing, prioritizing, managing and, as appropriate, remediating contaminated sites

Introduction of Minamata Convention on Mercury

Abstract - Minamata Convention on Mercury (3/3)

Content	Abstract
Manufacturing processes using mercury or mercury compounds	• Acetaldehyde production in which mercury or mercury compounds are used as a catalyst shall not be allowed after 2018 • Chlor-alkali production in which mercury or mercury compounds are used shall not be allowed after 2025 • The parties shall take measures to reduce emissions and releases of mercury to the environment in the production of vinyl chloride monomer, sodium or potassium methylate or ethylate and polyurethane ✓ Vinyl chloride monomer production：reduce the use of mercury in terms of per unit production by 50 percent by the year 2020 against 2010 use ✓ Sodium or Potassium Methylate or Ethylate production：reduce emissions and releases in terms of per unit production by 50 percent by 2020 compared to 2010 ✓ Sodium or Potassium Methylate or Ethylate and polyurethane production：measures to reduce the use of mercury aiming at the phase out of this use as fast as possible and within 10 years of the entry into force of the Convention
Reduce emissions and releases of mercury	• Control emissions from the point sources：coal-fired power plants, coal-fired industrial boilers, smelting and roasting processes used in the production of non-ferrous metals, waste incineration facilities and cement clinker production facilities • For its new sources, each Party shall require the use of best available techniques and best environmental practices (BAT/BEP) to control and reduce emissions, no later than five years after the date of entry into force of the Convention for that Party • For its existing sources, each Party shall implement one or more measures, such as quantified goal, emission limit values and BAT/BEP, no more than ten years after the date of entry into force of the Convention for that Party • Each Party shall identify the relevant point source categories and take measures to control and reduce releases, no later than three years after the date of entry into force of the Convention for it

Management strategies of mercury in Taiwan

- **To progressively conform to the Convention, we have completed the "Promotion Plan for the Implementation of Minamata Convention of the United Nations", which serves as the basis for domestic implementation.**

Management strategies of mercury in Taiwan

1. Implementation Strategies

- To establish a cross-departmental collaboration
- Each agency/ministry review and revise relevant laws and regulations
- To reduce the uses and emissions of mercury, we should manage the mercury-added products, and strengthen and develop mercury recycling and waste disposal technology
- To encourage industries in the use of alternative items with less environmental impact
- To regularly determine mercury concentrations in products, foods and environmental matrix
- To strengthen public education and awareness

Membership

- Environmental Protection Administration, Executive Yuan (EPA)
- Department of Health and Welfare (DOH)
- Ministry of Economic Affairs (MOEA)
- Council of Agriculture, Executive Yuan (COA)
- Ministry of Finance, Ministry of Labor

Management strategies of mercury in Taiwan

2. Duties and Powe

To continuously implement and strengthen and progressively conform to the Convention

- Mercury-added batteries, switches and relays, lamps for general lighting purposes, sphygmomanometers shall not be allowed (EPA, DOH, MOEA, and Customs Administration, Ministry of Finance)
- To phase down the use of dental amalgam (DOH and EPA)
- Control mercury emissions of coal-fired power plants, coal-fired industrial boilers, smelting and roasting processes used in the production of non-ferrous metals, waste incineration facilities and cement clinker production facilities and establish inventories of emissions (EPA)
- To dispose of mercury wastes (EPA)
- To identify, assess, and manage contaminated sites (EPA)
- To monitor mercury concentrations in environmental and biological matrix, foods, and working environment (mercury drafting committee)
- To encourage industries in the use of alternative items with less environmental impact(MOEA)
- To encourage industrial to research alternative products and processes (MOEA)
- To strengthen public education and promote healthy diet for vulnerable populations such as pregnant women, breastfeeding women, and children (DOH)

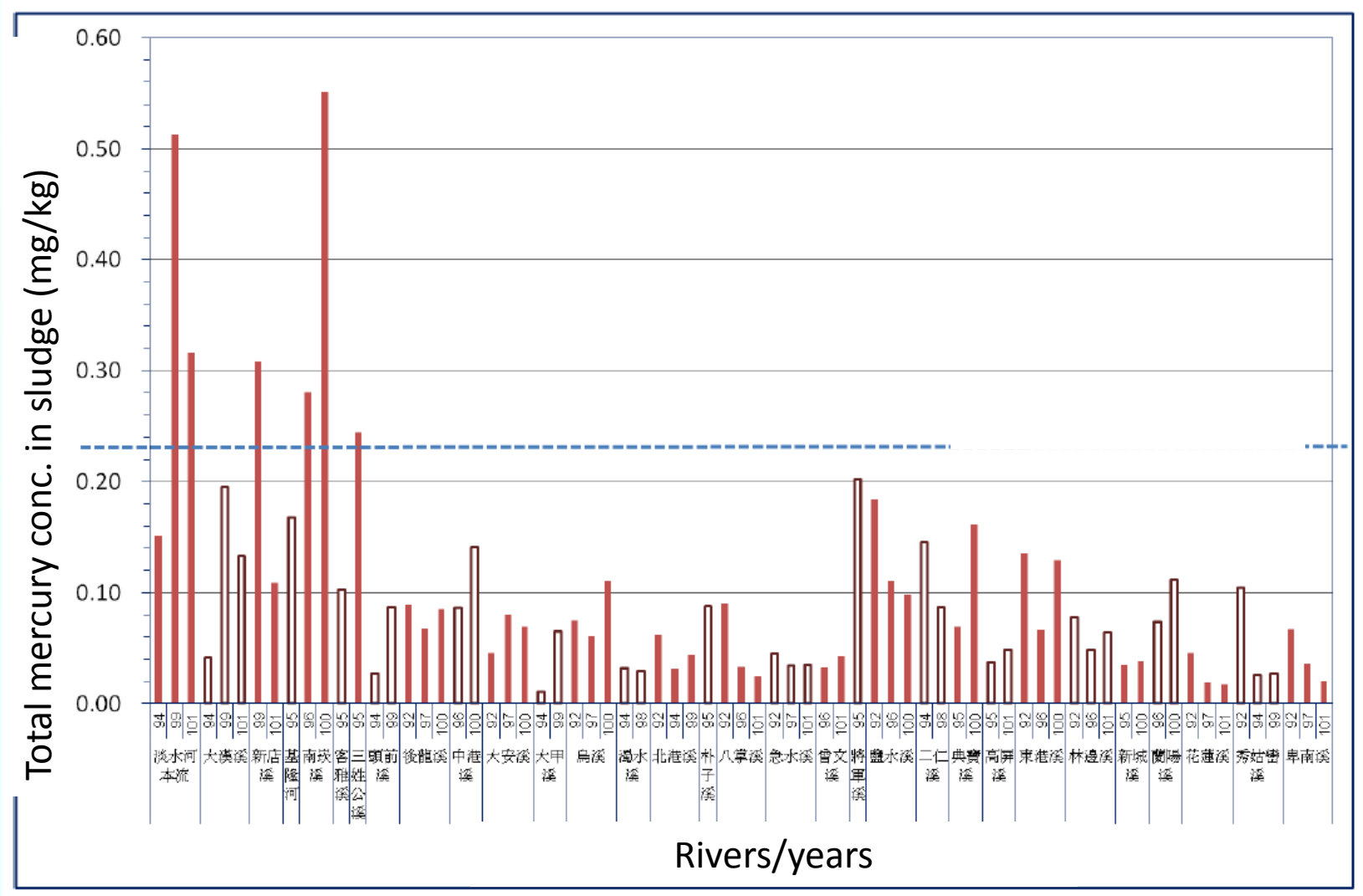
Conform to the Convention and continuously implement

- Prohibiting the use of fresh mercury from primary mining and gold mining (MOEA)
- Mercury-added cosmetics manufacturing have been banned and set up a mercury content limitation; therefore, commercial cosmetics should be continuously tested (DOH)

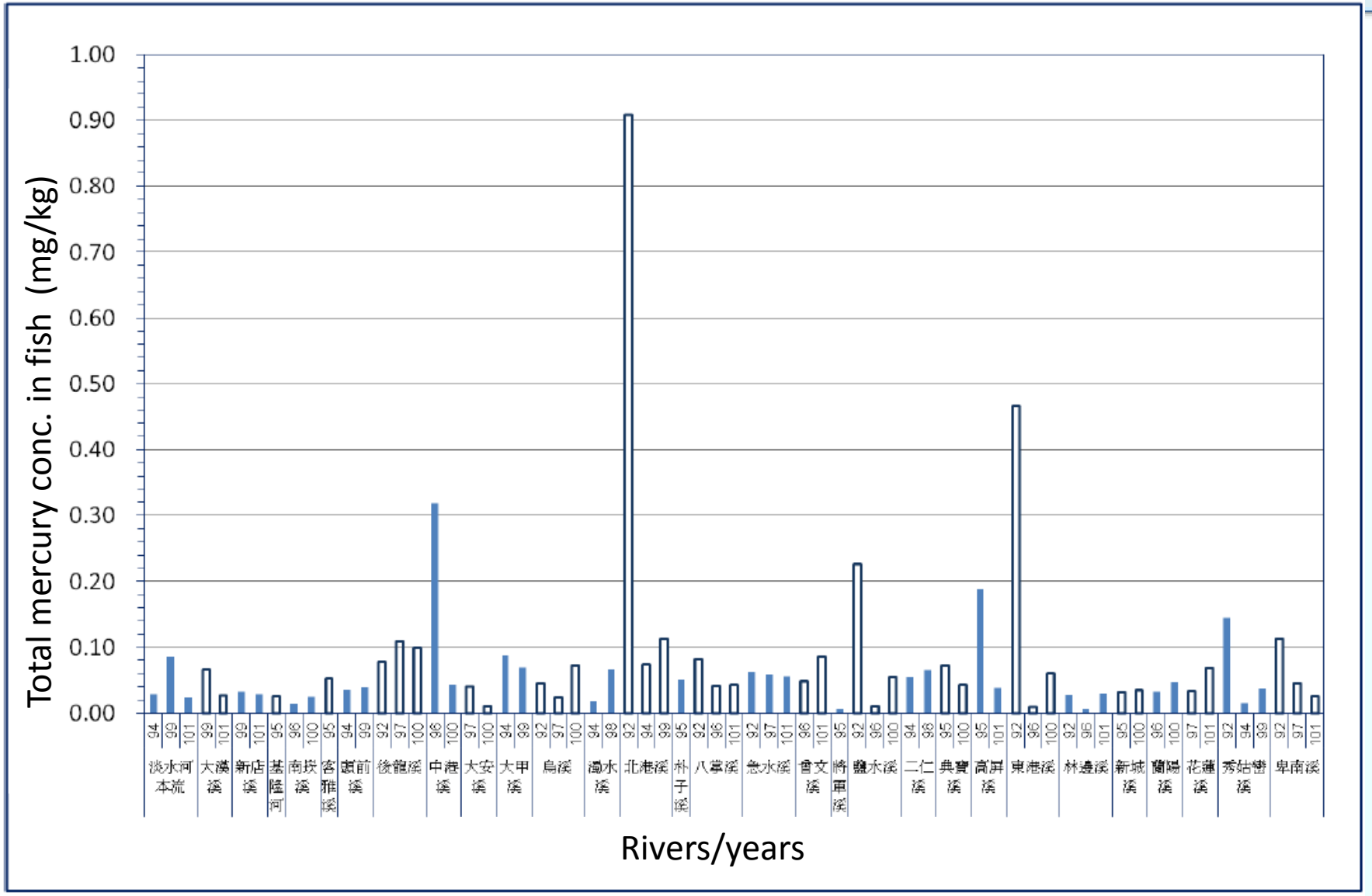
Conform to the Convention

- The manufacture, import or export of pesticides, biocides and topical antiseptics, and thermometers shall not be allowed
- Chlor-alkali and acetaldehyde production in which mercury or mercury compounds are used shall not be allowed

Total Mercury Concentrations in sludge



Total Mercury Concentration in Fish



Conclusions

- **We continuously revise the control strategy for chemicals in line with international control trends.**
- **To promote cross-departmental collaboration and strengthen vertical and horizontal communication between government agencies.**

Thanks for your attention !

Management strategies of mercury in Taiwan

1. Implementation Strategies

- To establish a cross-departmental collaboration
- According to the duties and powers of various competent authorities, they review and revise relevant laws and regulations
- To promote the uses and emissions of mercury reduction, manage the mercury-added products, and strengthen and develop mercury recycling and waste disposal technology
- To encourage industrial upgrading to foster the use of alternative items with less environmental impact
- To test and monitor products, foods and environmental matrix
- To strengthen public education and awareness

Membership

Environmental Protection Administration, Executive Yuan (EPA)	Dep. of Environmental Sa Management, Dep. of Ai Control, Dep. of Water Q Waste Management, Soi Remediation Fund Mana 考處、監資處、Environ 督察總隊
Department of Health and Welfare (DOH)	Food and Drug Administ Administration, 中醫藥
Ministry of Economic Affairs (MOEA)	Industrial Development Trade, Bureau of Standar Bureau of Mines
Council of Agriculture, Executive Yuan (COA)	Dep. of Animal Husband Agency, Fisheries Agency Health Inspection and Q Chemicals and Toxic Sub
Ministry of Finance, Ministry of Labor	Customs Administration Health Administration

Management strategies of mercury in Taiwan

- **To progressively conform to the Convention, we have completed the "Promotion Plan for the Implementation of Minamata Convention of the United Nations", which serves as the basis for domestic implementation.**

1. Introduction
2. Minamata Convention on Mercury
3. Plan Goals
4. Management Statutes and Situation of Mercury in Taiwan
5. Implementation Strategies
6. Membership Team and their duties
7. Expected Benefits
8. Source of Funding
9. Control Assessment

- Management Statutes
  - Competent authorities (environmental protection, agriculture, health, economy, finance, and labor) illustrate separately
- Management outcomes and situation
  - Management situation of mercury in Taiwan
  - Mercury mining and small-scale gold mining
  - Recently recycling outcomes of mercury-added products
  - Environmental distribution
  - Mercury in soil and groundwater pollution remediation
  - Biological matrix and commercial products monitoring

Conclusions

- 持續掌握公約國際會議，滾動修正國家推動策略或作法，以妥為因應未來國際規範並與國際接軌，減緩環境負荷與產業經濟之衝擊
- 持續推動跨部會合作，強化政府部門間縱、橫向聯繫協調