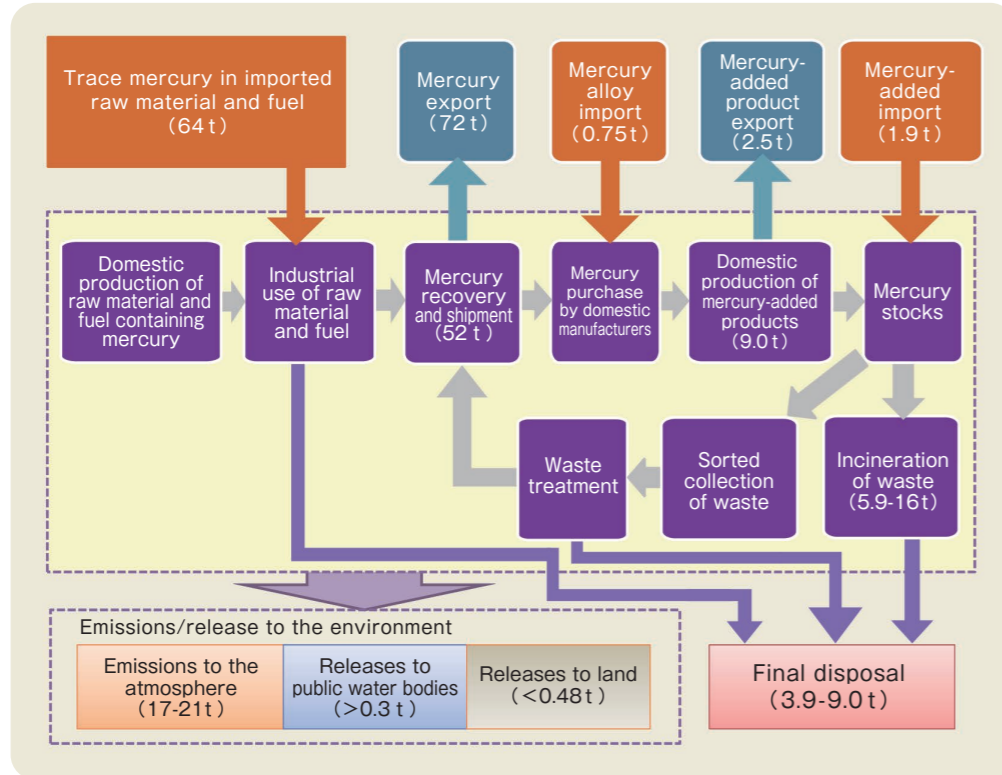


Column Material flow of mercury in Japan

Since 2007, the Ministry of the Environment has estimated mercury material flow such as mercury use in production activities and mercury release to the environment including air, water and soil, to grasp the domestic flow of mercury in Japan. It has provided the basic information for the study and discussion on domestic measures to implement the Convention. The Ministry will apply the findings obtained through the development of this flow study in supporting other countries, while aiming to improve the accuracy of the understanding of the domestic flow.

Material flow of mercury in Japan (FY2010 basis; updated in FY2015; simplified version)



Source : Ministry of the Environment

For more information:

## Lessons from Minamata Disease and Mercury Management in Japan

This document has been compiled, in the process of understanding the importance of mercury management, to examine the extent of damage if a pollution like Minamata Disease may cause, and to summarize the actions and initiatives that Japan has implemented for responding Minamata Disease and reducing mercury-related risks, thereby sharing Japan's experience and lessons-learned with as many countries as possible.

- URL
- [http://www.env.go.jp/chemi/tmms/pr-m/mat01/ja\\_full.pdf](http://www.env.go.jp/chemi/tmms/pr-m/mat01/ja_full.pdf) (Japanese)
  - [http://www.env.go.jp/chemi/tmms/pr-m/mat01/en\\_full.pdf](http://www.env.go.jp/chemi/tmms/pr-m/mat01/en_full.pdf) (English)
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  - [http://www.env.go.jp/chemi/tmms/pr-m/mat01/es\\_full.pdf](http://www.env.go.jp/chemi/tmms/pr-m/mat01/es_full.pdf) (Spanish)

All measurement unit of weight refers to metric ton (1ton = 1000 kg)

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# Japan's Commitment on the Minamata Convention on Mercury

~Voice from Minamata to the World~



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## Mercury use and emissions

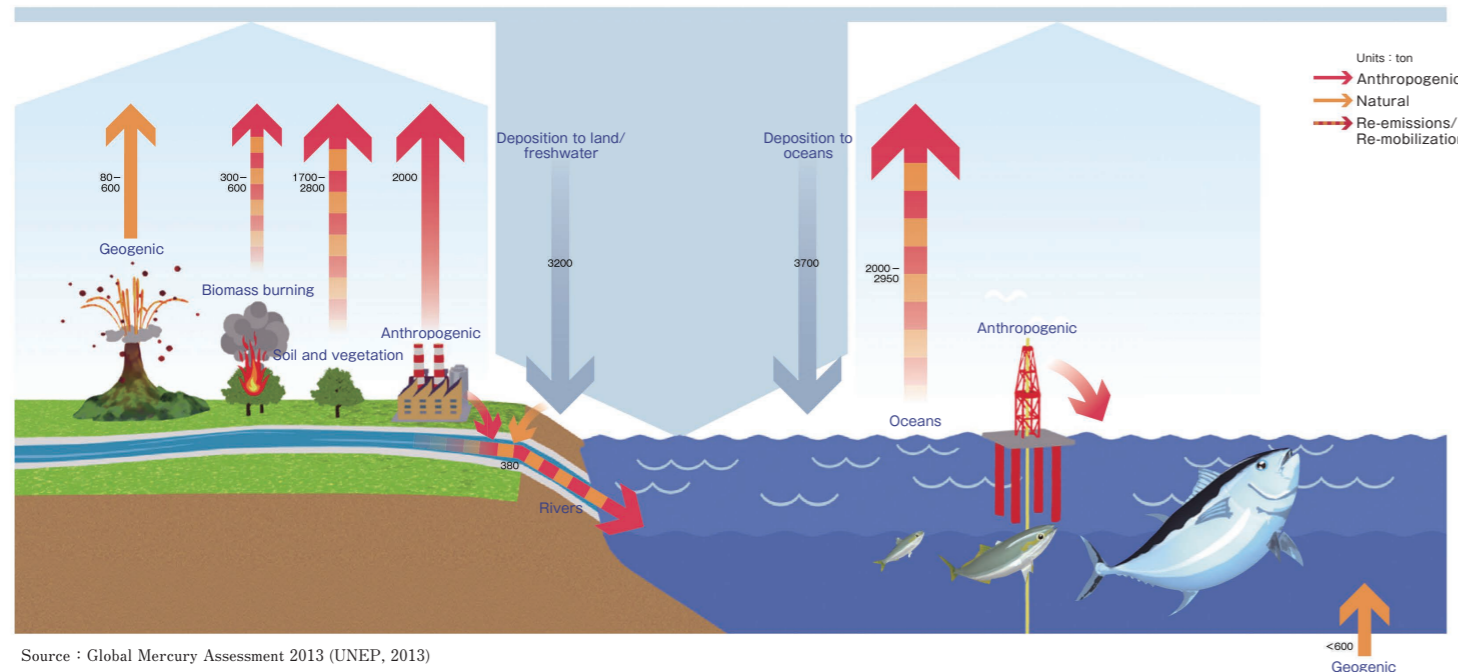
Mercury is used for various purposes globally, e.g. artisanal and small-scale gold mining (ASGM), vinyl chloride monomer and chlor-alkali production. Also various products such as dental amalgam, batteries and lamps contain mercury as an essential ingredient. Further, mercury is emitted into the environment from various sources including mercury-containing fuel combustion, which circulates on a global scale, making mercury management complicated and difficult.

United Nations Environment Programme (UNEP) pointed out the rapid increase of the mercury concentrations in marine species after mid-19th century, which is likely to be caused by anthropogenic emissions. Concerns on adverse health effects from mercury exposures are raised by some Arctic communities who live on fish.

## Growing international momentum toward mercury management

The first Global Mercury Assessment developed by UNEP in 2002 alerted the world to the state of global mercury pollution. This report triggered the international momentum of measures to reduce mercury release to environmental media, and eventually led to the commencement of the negotiation process toward the development of an international convention on mercury.

## Global mercury cycling



Source : Global Mercury Assessment 2013 (UNEP, 2013)

Japan has experienced serious damages caused by mercury such as the Minamata Disease, which was officially acknowledged in 1956. Since then, Japan has strengthened environmental protection measures, and engaged in mercury management through the concerted efforts of the national and local governments, industries and civil groups.

## Regulatory measures (examples)

- Establishment of environmental standards and emission reduction for public water bodies, ground water and soil
- Establishment of health risk evaluation guideline value for ambient air and emission reduction for atmosphere
- Establishment of special treatment standards for waste containing mercury above standard values

## Industrial achievements (examples)

- Mercury-free dry-cell batteries achieved in early 1990s; promotion of mercury-free button cells
- Reduction of mercury volume encapsulated in fluorescent lamps; promotion of LED (light-emitting diode) lamps
- Closure of all primary-mercury mines in Japan by 1974
- Discontinuation of the use of mercury in manufacturing processes

As a result of the measures and actions, domestic mercury demand has declined from its highest value of 2,500 tons to approximately 9 tons (approx. 1/400 of global total). Mercury emissions into atmosphere have also declined to approximately 20 tons (approx. 1/100 of global total).(2010)

## Column Environment-oriented community development in the Minamata area

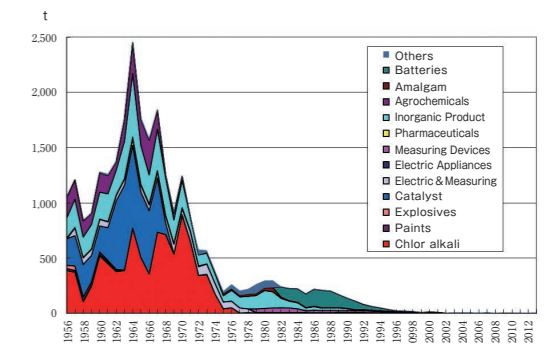
After the production of acetaldehyde-the cause of mercury release-was discontinued in 1968, mercury that had remained in the sediment of the Minamata area was dredged and filled into the containment landfill in an inner part of the Minamata bay. Today, the safety level of the local fish and shellfish having been confirmed.

Making the lessons of the Minamata Disease and the efforts toward regional revitalization as local assets, various initiatives have been carried out for the development of the Minamata area: the establishment of Minamata Environmental Academia (to be put into operation in 2016) that will strive to serve central roles in enhancing advanced education and research activities, fostering industry-academia-government collaboration and gathering knowledge; the promotion of low-carbon and community-based tourism, etc. These initiatives include various activities to implement a new regional development model while reducing the environmental effect.



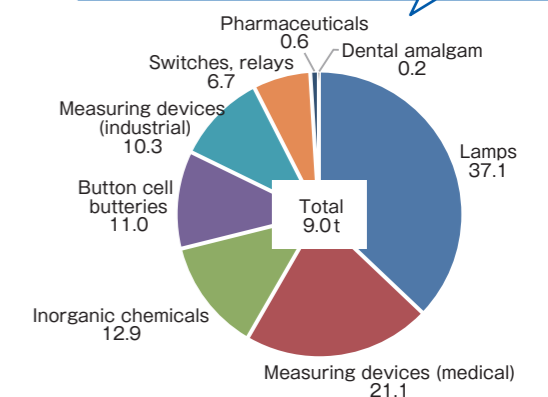
A school of pearl-spot chromis in Minamata Bay Minamata Environmental Academia

## Trends of mercury demand in Japan



Source : Prepared by the Ministry of the Environment, based on the Yearbook of Mining, Non-ferrous Metals, and Products Statistics, Non-Ferrous Metal Supply and Demand Statistics

## Mercury demand in Japan



Source : Material Flow of Mercury in Japan (FY2010 basis; updated in FY2015)

## Atmospheric emissions of mercury from major sources in Japan

Source	Atmospheric emissions (ton/year)
Coal-fired power plants	0.83-1.0
Coal-fired industrial boilers	0.21
Non-ferrous metal manufacturing	0.94
Waste incineration facilities	2.2-6.85
Cement manufacturing	5.3
Steel manufacturing	4.72
Pulp and paper (Black liquor) manufacturing facilities	0.23
Lime product manufacturing facilities	<math>< 0.22</math>
Volcanos	> 1.4
<b>Total</b>	<b>17-21</b>

Source : Mercury Emission Inventory (FY2010)

## Discussions at the Intergovernmental Negotiating Committee (INC)

Followed after the decision of the UNEP Governing Council in 2005, the Intergovernmental Negotiating Committee (INC) initiated the negotiation process in 2010 toward the development of an international instrument on mercury. Japan has actively engaged in the negotiation, serving as the coordinator for the Asia-Pacific region and hosting the INC2 session in Chiba in January 2011. At the INC5 session held in Geneva in January 2013, Japan proposed to hold a diplomatic conference for the adoption of the instrument in Minamata and Kumamoto, Japan. The INC Chair proposed to name the international instrument under negotiation the “Minamata Convention on Mercury,” which was adopted unanimously.

## Outline and outcome of the Diplomatic Conference of the Minamata Convention on Mercury

In October 2013, the Diplomatic Conference of the Minamata Convention on Mercury and the relevant meeting were convened in Kumamoto and Minamata for the adoption and signature of the Convention. More than 1,000 delegates including government officials from 139 countries/regions participated in the conference, and 92 countries (including EU) signed the Convention.

At the conference, Japan expressed its intention to support developing countries’ efforts toward the early entry into force of the Convention through the action titled “MOYAI\* Initiative”. Governor of Kumamoto prefecture stated “Mercury Free Declaration” to take leading actions at municipal level.

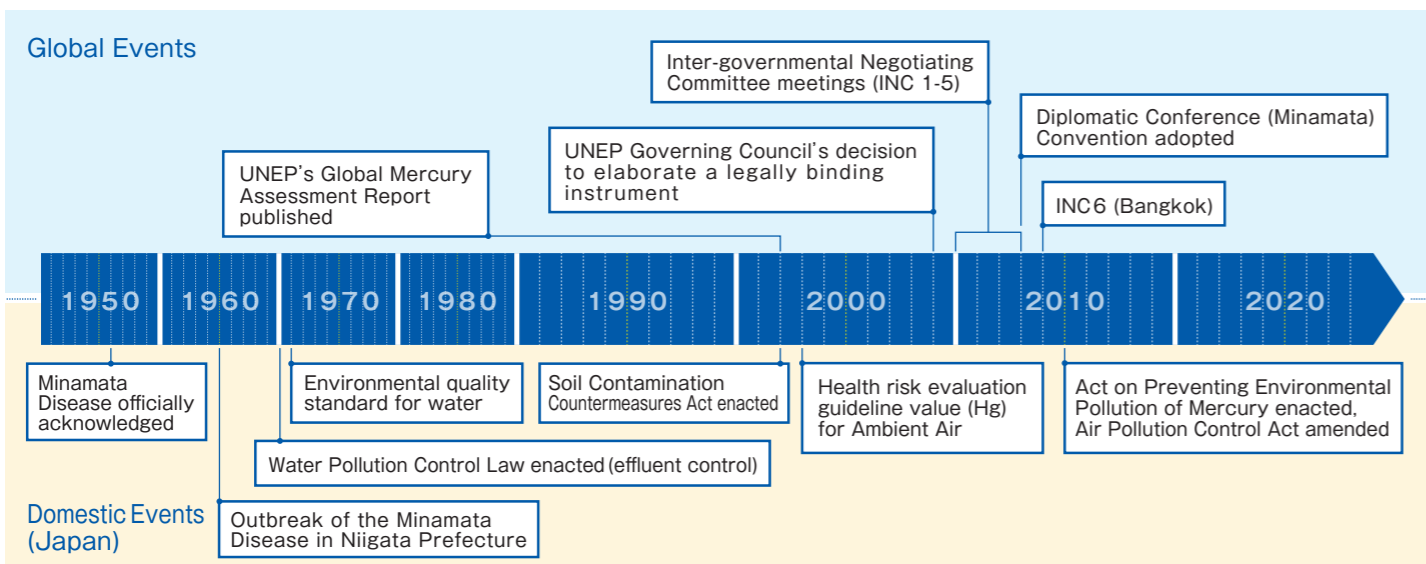
At the opening of the conference, a ceremony was held in Minamata. The participants visited the Minamata Disease Municipal Museum, attended the Memorial Cenotaph for Minamata Disease Victims for offering flowers and the memorial tree planting, and interacted with Minamata citizens and Minamata Disease patients.

\*Japanese term ‘Moyai’ literally means a bowline rope mooring boats together, it also refers to the cooperative works in local communities



The Diplomatic Conference convened in Kumamoto

## Mercury events timeline (domestic/global)



Source : Prepared by the Ministry of the Environment, based on Mercury: Time to act (UNEP, 2013)

Recognizing the substantial lessons of the Minamata Disease, Japan commits itself to lead the world to protect the human health and the environment from mercury. For the effective and timely implementation of the Minamata Convention, Japan promulgated the Act on Preventing Environmental Pollution on Mercury and the amendment of the Air Pollution Control Act. With these laws and other relevant legislation, Japan will carry out mercury management beyond the level required by the Convention.

### POINT 1

#### Regulation on the use of mercury or mercury compounds in products and manufacturing processes

- Prohibit the manufacture, import or export of specific mercury-added products (including assembled products in which mercury is incorporated, e.g. toys).
- Pursue replacement and products in mercury, and strengthen the regulatory standards for the specific mercury-added products of which the manufacture, import or export will be banned under the Convention (e.g. batteries and lamps) by lowering the mercury content thresholds and imposing an early phase-out date.
- Prohibit the use of mercury or mercury compounds in the specific manufacturing processes such as those for chlor-alkali and vinyl chloride monomer, and in gold mining include ASGM. (Japan has adopted mercury-free methods for these processes).

### POINT 2

#### Supply, export and import of mercury

- Ensure that mercury exported from Japan is properly recycled from waste and sludge, not derived from primary-mercury mining that is not running and will be prohibited in Japan.
- Total ban on export for the purposes prohibited under the Convention, also for use in ASGM or interim storage.
- Include specific mercury compounds from which elemental mercury component can be easily extracted for the subject to the export restriction to prevent loophole streams.
- Approve export only when the end-user and purpose can be confirmed in advance and require reports after the export to prevent the use of mercury or mercury compounds for improper purposes.

### POINT 3

#### Promotion of product-labeling and proper waste collection (obligation for the best efforts by relevant stakeholders)

- National government:** Should endeavor to provide municipal governments with technical advices and other supports necessary for them to properly collect mercury-added product wastes (by compiling information on best recovery practices and promoting the implementation thereof).
- Municipalities:** Should endeavor to take necessary measures to properly collect mercury-added product wastes.
- Manufacturers and importers:** Should endeavor to provide information to consumers that assists their separate disposal of mercury-added products, including labeling products that contain mercury.

### POINT 4

#### Atmospheric emissions control

- Establish a notification process for five types of facilities subject to the Convention (including both existing and newly constructed facilities) and impose the obligation to comply with the mercury emissions standards and to monitor the emissions for these facilities.
- Impose the duty of voluntary effort for emissions control on the facilities which are not subject to the Convention but emit a considerable amount of mercury (e.g. iron and steel manufacturing facilities).

Develop a national implementation plan and submit to the Secretariat of the Convention. Monitor the comprehensive follow-up measures covering the entire life cycle of mercury in Japan.

## MINAS: MOYAI Initiative for Networking, Assessment and Strengthening

At the Diplomatic Conference of the Minamata Convention on Mercury, Japan expressed its intention to support developing countries and promote voices and messages from Minamata, through the actions titled "MOYAI Initiative." As part of this initiative, the MINAS (MOYAI Initiative for Networking, Assessment and Strengthening) is being promoted. The Program is designed to support developing countries' efforts in mercury management by providing measures including the following activities with close cooperation and collaboration with relevant agencies such as USEPA, UNEP or JICA:

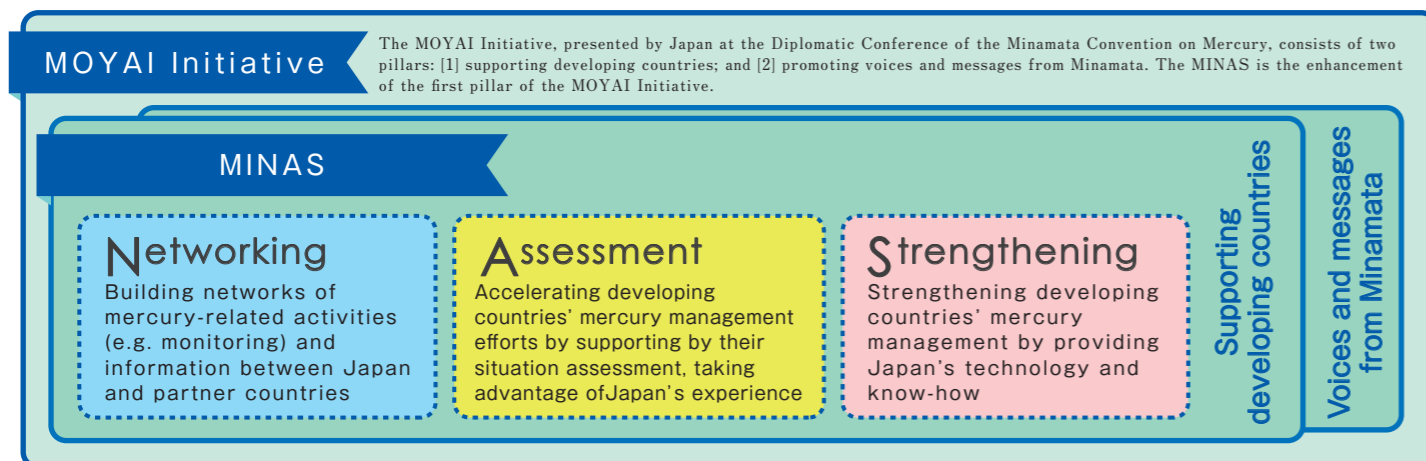
- Establishing a mercury monitoring network in the Asia-Pacific region;
- Supporting developing countries for the survey and assessment of their use and emissions of mercury; and
- Conducting surveys on development needs and capacity building in developing countries.

Japan will undertake various activities proactively to lead global mercury management.



A workshop held in Minamata

### MOYAI Initiative for Networking, Assessment and Strengthening (MINAS)



## Supporting developing countries for the implementation of the Convention

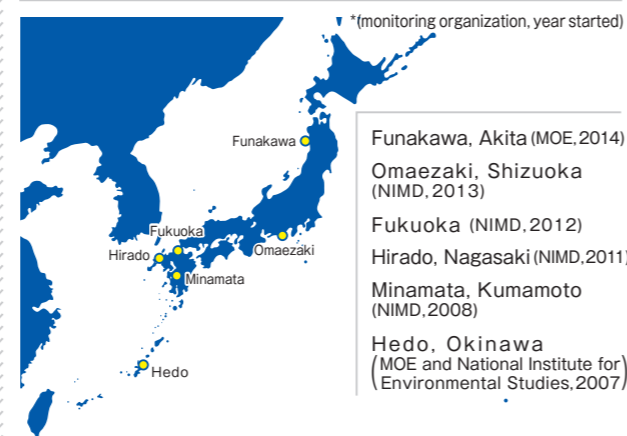
Source : Ministry of the Environment

### Column Atmospheric mercury monitoring network by the Ministry of the Environment

The Ministry of the Environment (MOE) and the National Institute for Minamata Disease (NIMD) conduct monitoring of mercury and mercury compounds in air, particulate matter and precipitation at six sites in Japan.\* Monitoring has been continuing since 2007 to collect information relevant to evaluate the long-term trends of the atmospheric mercury deposition, and the long-range atmospheric transport of mercury in the Asia-Pacific region. Monitoring data is planned to be used in the evaluation of the effectiveness of the Minamata Convention.

\* Observation items may differ depending on the monitoring sites.

### Mercury background monitoring sites



## National Institute for Minamata Disease

The National Institute for Minamata Disease (NIMD) is the only organization in the world that is specialized in comprehensive mercury research, and it has accumulated significant amount of mercury-related information as well as numbers of analytical technologies and research outcomes.

Minamata disease was caused by the environmental pollution due to methylmercury resulting from the lack of environmental awareness in the course of giving priority to economic growth. As the WHO Collaborating Center for studies on mercury, the NIMD conducts dissemination of information on Minamata disease via its information center, the Minamata Disease Archives, and the training programs it provides, hoping that such information will help people around the world learn from Japan's experience.

The NIMD is also engaged in surveys and research to assess the exposure to mercury and to prevent its impact in the countries suffering the environmental pollution by mercury.



National Institute for Minamata Disease



Technical transfer of the neurological diagnosis in Amazon basin (JICA Project)

## Recovery of Mercury from mercury-added product wastes

In Japan, mercury-added product wastes are collected through voluntary collection by manufacturers or through the sorted waste collection by municipalities and then treated in an environmentally sound manner. Most of the waste containing mercury is recycled at a former mining facility in Hokkaido. While primary mercury mining does not exist in Japan, the recovered mercury is used for necessary purposes.

### Recycling of waste fluorescent lamps at a domestic mining station



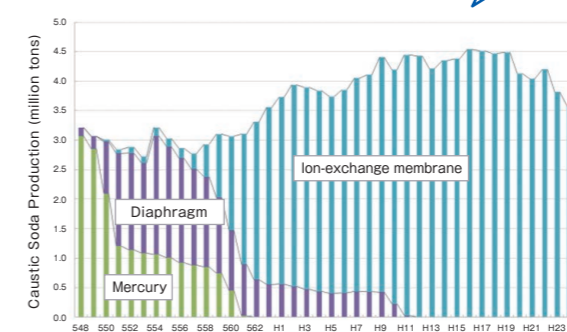
Used fluorescent lamps are collected and crushed by crushing machines. The recovered fluorescent powder containing mercury is roasted to vaporize mercury and the recovered powder is used as materials for recovering rare earth.

## Reduction of mercury use in manufacturing processes

Mercury is used in various manufacturing processes, e.g. chlor-alkali, vinyl chloride monomer and acetaldehyde. Japan has converted all of these manufacturing processes into mercury-free methods. Caustic soda can be produced by the ion exchange membrane process, diaphragm process or mercury process. During the post-war economic growth period in Japan, caustic soda was produced primarily by the mercury process, and the production of the caustic soda by this process accounted for more than half of the mercury use in Japan from the 1960s until the mid-1970s. By 1986, the mercury process was completely withdrawn for the production of caustic soda in Japan. As a result of the investment in technology development by the caustic soda industry, the ion exchange membrane process has become a principal technology of Japan. Since 1999, the ion exchange membrane process has been used for the entire production of caustic soda in Japan.

As it has many advantages, including high product quality and low energy consumption, this technology is exported to global market.

### Trends in caustic soda production in Japan, by production process



### Conceptual view of an ion exchange membrane method electrolysis

