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Environmental Administration in Japan

— Air Environment Conservation Administration —

Itsuki (Suki) Kuroda

Deputy Director

Ministry of the Environment, Environment Management Bureau

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SUSTAINABLE DEVELOPMENT GOALS　Re-Style　デコ活 くらしの中のエコろがけ　つなげよう、支えよう 森里川海　Plastics Smart

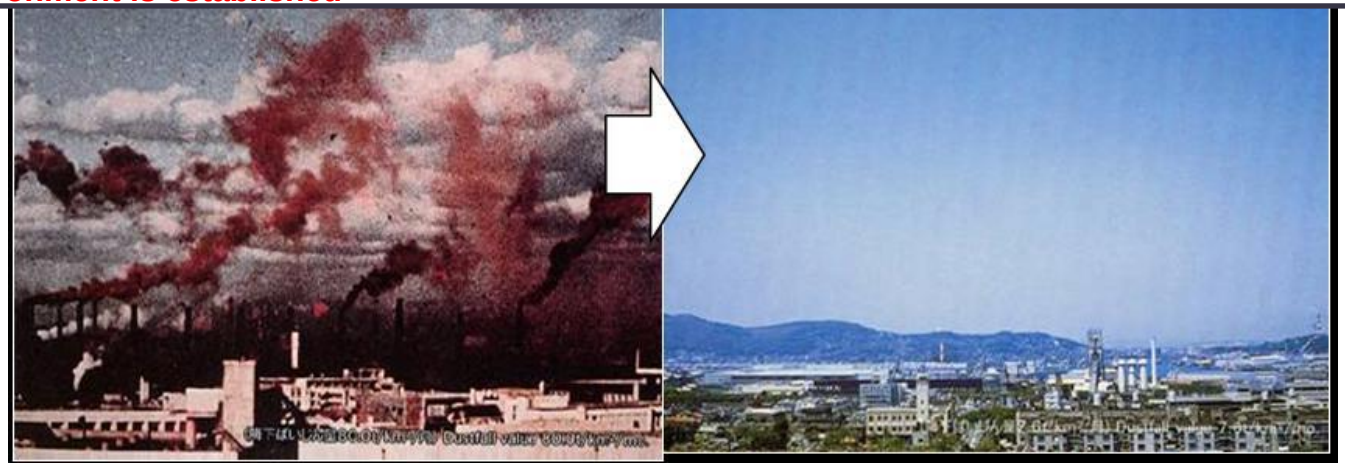
目次

1. The History of the Ministry of the Environment

Historical Background of the Emergence of Environmental Laws and Regulations

1960s onward: Period of High Economic Growth — Worsening of Pollution Damage

1970: Pollution Diet — Drastic Overhaul of Laws Concerning Pollution Issues *1971: The Ministry of the Environment is established



Historical Background of the Emergence of Environmental Laws and Regulations

Seven Typical Pollution Issues	Corresponding Regulatory Law	Year Enacted
Air Pollution	Air Pollution Control Act	1968
Water Pollution	Water Pollution Control Act	1970
Noise	Noise Regulation Act	1968
Vibration	Vibration Regulation Act	1976
Offensive Odor	Offensive Odor Control Act	1971
Land Subsidence	Industrial Water Law	1956
Soil Contamination	Soil Contamination Countermeasures Act	2012

History of the Ministry of the Environment

1971
Establishment of the Environment Agency

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Ministry of the Environment

2001
Establishment of the Ministry of the Environment

原子力規制委員会
Nuclear Regulation Authority

2012
Establishment of the Nuclear Regulation Authority

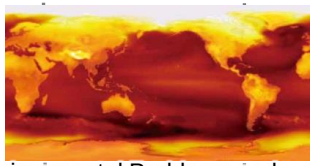
1967
Enactment of the Basic Law for Environmental Pollution Control

Occurrence of Severe Pollution Problems and Environmental Destruction

1973
Enactment of the Pollution-Related Health Damage Compensation Act

1992
Rio Summit
Enactment of the Species Preservation Act

1997
Adoption of the Kyoto Protocol



Manifestation of Global Environmental Problems and Urban Pollution

2000
Enactment of the Basic Act for Establishing a Recycling-Based Society

Occurrence of the Great East Japan Earthquake

2015
Adoption of the Paris Agreement

1990s 1960s | 1970s | 1980s | 1950s | 2000s | 2010s

2. Japan's Air Environment Conservation Scheme

Air Environment Protection Scheme

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Goal

Goal: Achievement of environmental standards based on the Basic Environment Law

Environmental Standards: Standards that are desirable to be maintained to protect human health

Measures

■ Fixed Source Measures (mainly based on the Air Pollution Control Act)

Regulated Substances

Particulate matter (general particulate matter, specified particulate matter)	Smoke and soot (sulfur oxides, soot and dust, hazardous substances such as nitrogen oxides)	Volatile Organic Compounds (VOC)	Mercury	Hazardous air pollutants

Regulatory Content

- Regulations on generating facilities and discharge operations (structural standards, operational standards, etc.)
- [Fixed Source Measures] Emission regulations for generating facilities (emission standards, total emission control standards)
- **Voluntary initiatives** by operators (with control standards for specified substances)

■ Mobile Source Measures

In addition to the Air Pollution Control Act, implement individual regulations under various laws

[Air Pollution Control Act]
Set permissible limits for new vehicles (e.g., NOx)

[Automobile NOx/PM Act]
Implement vehicle type regulations, including in-use vehicles, in certain regions (Tokyo metropolitan area, Chukyo area, Kansai area)

[Off-road Act]
Implement exhaust gas regulations for off-road special vehicles (construction machinery, etc. that do not run on public roads)

[Marine Pollution Prevention Act, etc.]
Regulate air pollution from ships (Marine Pollution Prevention Act)
Regulate air pollution from aircraft (Aviation Act - not under Ministry of the Environment jurisdiction)

■ International Cooperation

Implement international cooperation from the perspective of transboundary pollution measures and international contributions

Monitoring

Continuous monitoring of air environment by national and prefectural governments (Monitoring)

About Environmental Standards and Emission Standards

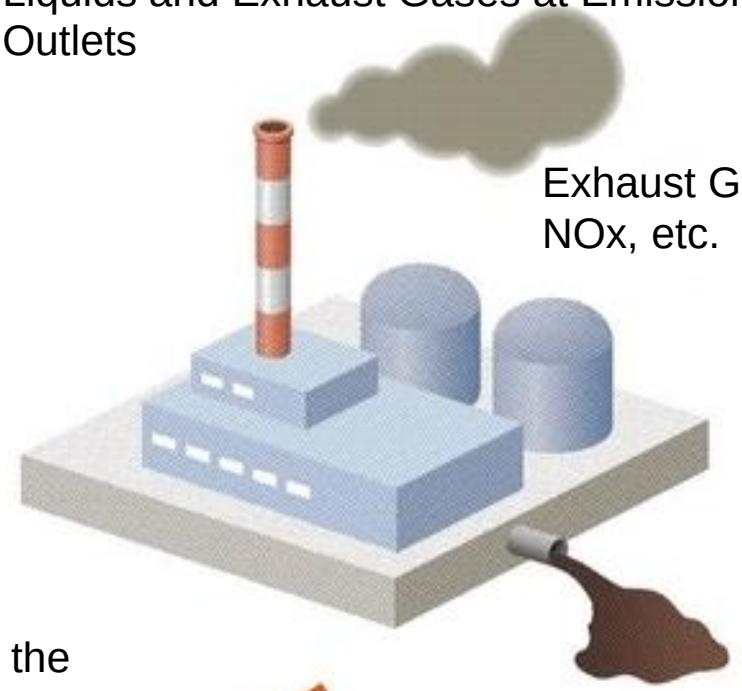
Environmental Standards

Standards Considered Desirable for the Purpose of Maintaining the Living Environment and Health

Groundwater

Emission Standards

Regulate the Concentration of Waste Liquids and Exhaust Gases at Emission Outlets



Exhaust Gases
NOx, etc.

Benzene, etc.

Diluted in the environment

No penalties even if target values are exceeded

Guidance or penalties if regulatory values are exceeded

Status of Setting Environmental Standards for Air Pollutants

For air pollutants such as NO_2 and photochemical oxidants, which are widely emitted by combustion of materials and affect human health (so-called classical air pollutants), and hazardous air pollutants like ethylene oxide, defined in the Air Pollution Control Act as "substances that may harm human health when continuously ingested and cause air pollution," it is necessary to set and re-evaluate environmental standards and guideline values.

◆ Environmental Standards Related to Air Pollution (Examples)

Substance	Environmental Conditions	Year Established	Main Health Effects
Sulfur Dioxide (SO_2)	The daily average of 1-hour values is 0.04 ppm or less, and 1-hour values are 0.1 ppm or less.	May 1973	Increased respiratory diseases such as bronchitis and asthma (known as a cause of Yokkaichi asthma)
Carbon Monoxide (CO)	The daily average of 1-hour values is 10 ppm or less, and the 8-hour average of 1-hour values is 20 ppm or less.	February 1970	Combines with hemoglobin in the blood, inhibiting oxygen transport function
Suspended Particulate Matter (SPM)*1	The daily average of 1-hour values is 0.10 mg/m^3 or less, and 1-hour values are 0.20 mg/m^3 or less.	January 1972	Short-term effects: Increased deaths among the sick and elderly Long-term effects: Increase in chronic bronchitis, decreased respiratory function in school children
Nitrogen Dioxide (NO_2)	The daily average of 1-hour values is within or below the zone from 0.04 ppm to 0.06 ppm.	May 1973 (Revised July 1978)	Long-term effects: Chronic respiratory diseases, increase in persistent cough and sputum Short-term effects: Increase in acute respiratory diseases
Photochemical Oxidants (Ox)	1-hour values are 0.06 ppm or less.	May 1973	Acute effects such as irritation of eyes and respiratory tract
Fine Particulate Matter (PM2.5)*2	The annual average is 15 μg/m^3 or less, and the daily average is 35 μg/m^3 or less.	September 2009	Concerns about effects on the circulatory system in addition to lung cancer and respiratory system impacts

*1 Particulate matter suspended in the atmosphere with a diameter of 10 μm or less.
*2 Particulate matter suspended in the atmosphere collected after removing larger particles using a particle separator that can separate particles with a particle size of 2.5 μm at a rate of 50%.

Smoke Countermeasures

Emission Regulations for Smoke

Regulated Substances: SOx, Soot and Dust, Hazardous Substances (Cadmium, Chlorine, Fluorine, NOx, etc.)

High

Degree of Regional Pollution

Low

Total Emission Control Standards
Plant-specific standards (SOx, NOx) applied to large-scale factories in areas where it is difficult to ensure environmental standards solely through facility-specific standards.

Stricter Emission Standards
In regions where general and special emission standards are insufficient to prevent air pollution, more stringent standards (soot and dust, hazardous substances) set by prefectures.

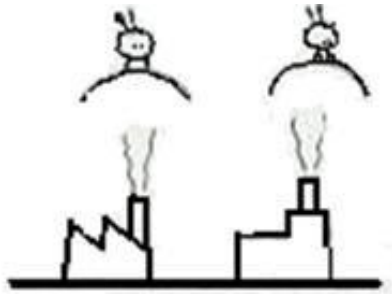
Special Emission Standards
More stringent standards (SOx, soot and dust) applied to newly established smoke-emitting facilities in areas with severe air pollution.

General Emission Standards
Standards set by the national government for each smoke-emitting facility.

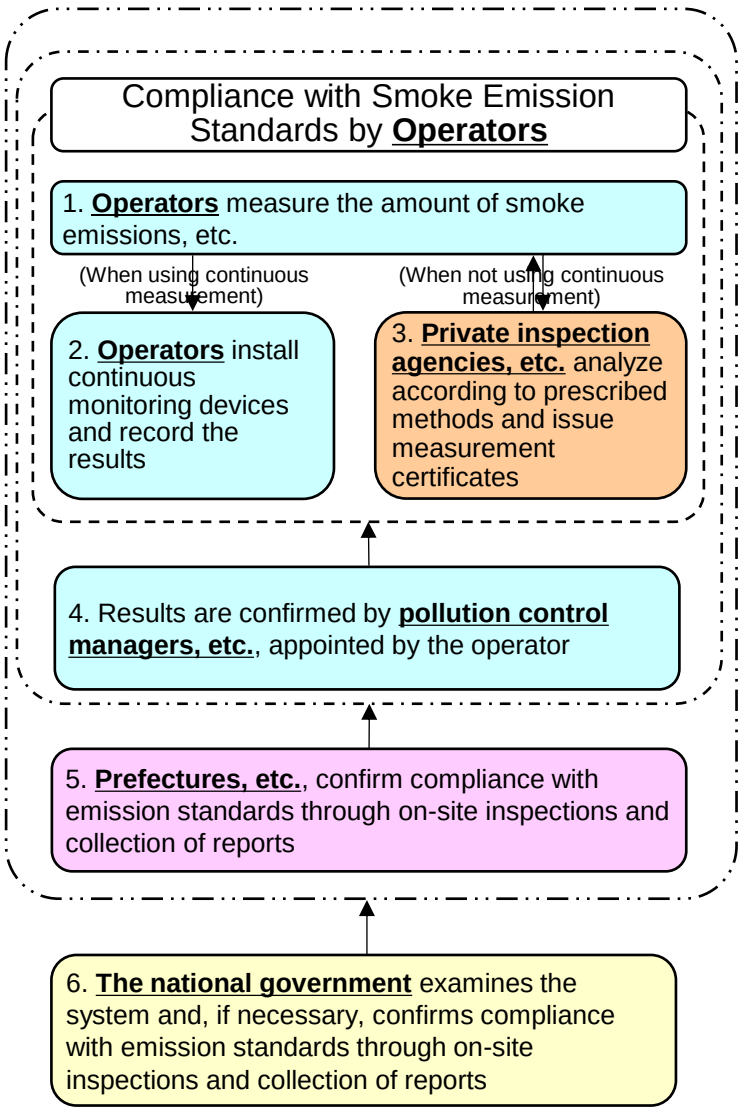
Only Certain Regions — Regulated Areas — Nationwide

All Factory Facilities Total Emission Regulation

Emission Regulation per Facility



Actual Conditions of Smoke Inspection on Site



- Operators emitting smoke and other substances are obliged to comply with emission standards and to conduct measurements according to methods and frequencies specified by the Ordinance of the Ministry of the Environment. **Prefectural governments and other authorities confirm compliance with emission standards through on-site inspections and collection of reports.** (See steps 1, 2, 5)
- In addition, **many measurements by operators are entrusted to private inspection agencies**, and measurement results and methods are **guaranteed by measurement certificates** based on the Measurement Act (Act No. 51 of 1992). (See step 3)
- Furthermore, operators above a certain scale are **obliged to appoint pollution control managers** under the Act on the Improvement of Pollution Prevention Systems in Specified Factories (Act No. 107 of 1971). Pollution control managers are responsible for inspecting fuels or raw materials used and for measuring the amount of smoke emissions, etc. (See step 4)

VOC Countermeasures

VOC Emission Reduction Measures

○ Overview of the VOC Emission Reduction System

It was proposed to reduce VOC emissions by about 30% compared to FY2000 by FY2010 by implementing VOC emission reduction measures through an appropriate combination of legal regulations and voluntary initiatives.

Based on this, the Air Pollution Control Act and related government and ministerial ordinances were amended, and the revised law was enforced in April 2006.

○ Follow-up on VOC Emission Status

A follow-up on the achievement status of the reduction target was conducted, and in December 2012, a report was compiled by the expert committee of the Central Environment Council.

It was estimated that VOC emissions in FY2010 were reduced by more than 40%, exceeding the target.

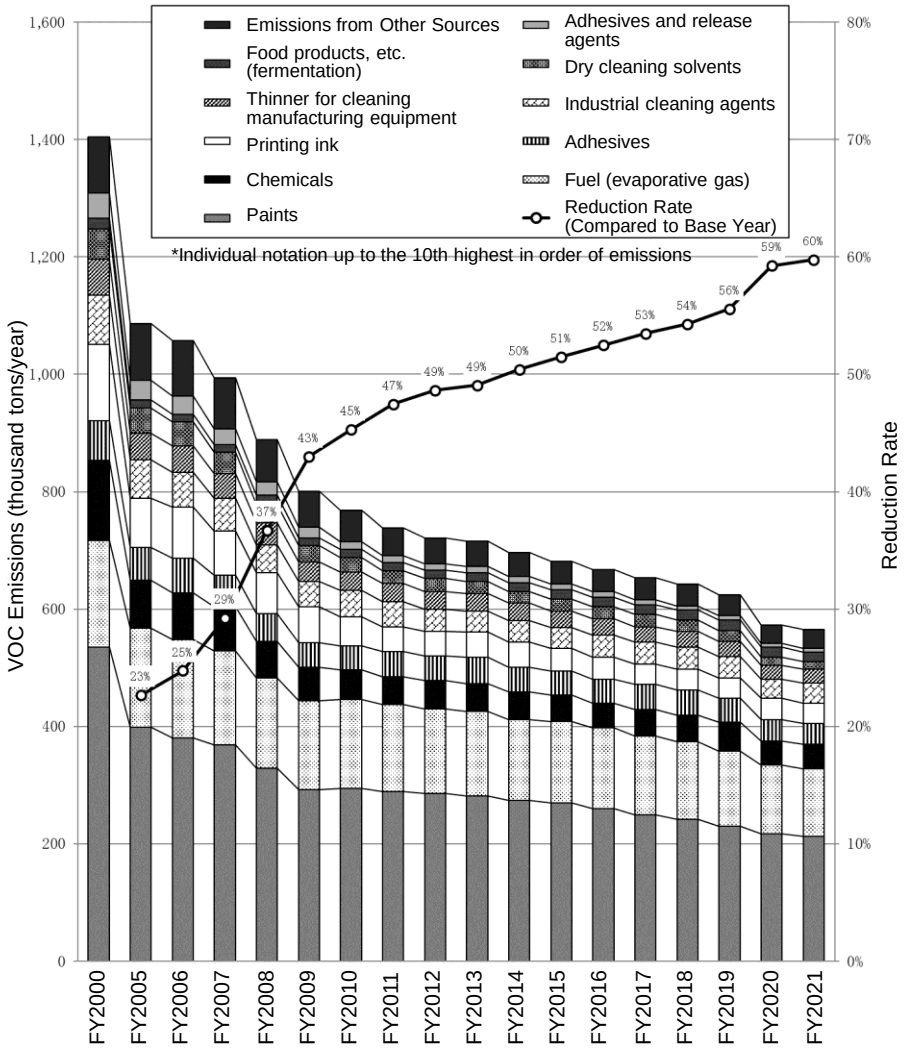
Follow-up on VOC emission status is currently being continued by the VOC Emission Inventory Study Group.

By FY2014, VOC emissions have been reduced by more than 50% compared to FY2000.

Main Contents of the Report (December 2012):

1. It is appropriate to continue the current VOC emission reduction system.
2. A new expert committee should be established to conduct comprehensive studies, including not only VOCs but also photochemical oxidants and PM2.5, etc.

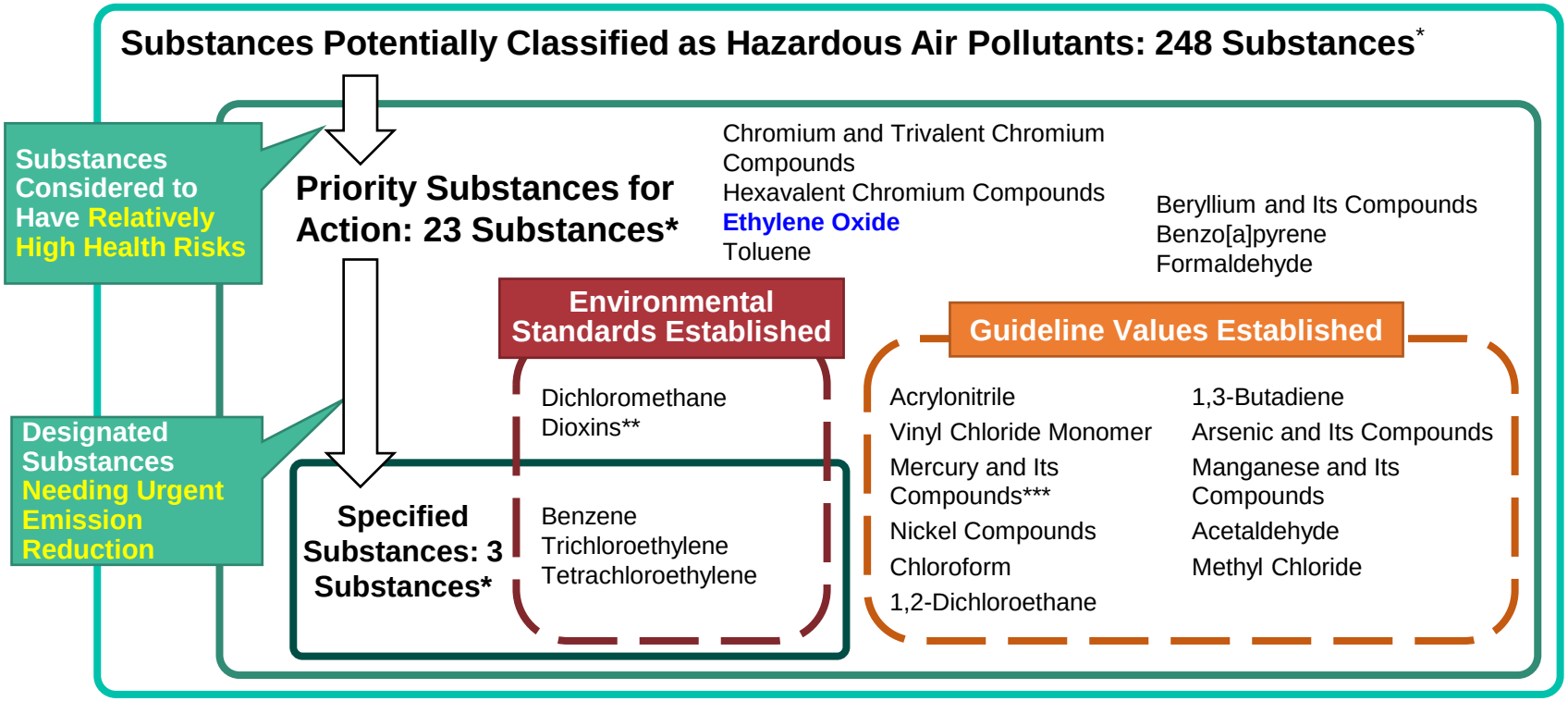
Estimated VOC Emissions by Industry



Hazardous Air Pollutant Measures

Hazardous Air Pollutant Measures

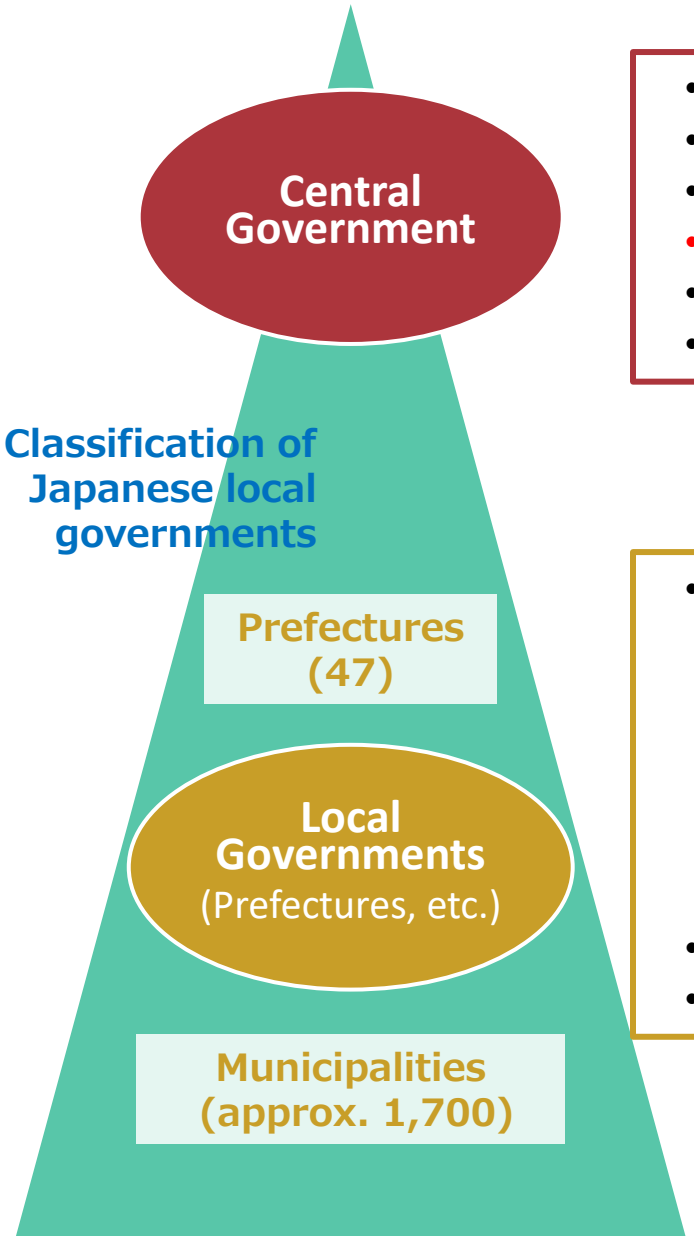
Hazardous air pollutants are defined in the revised Air Pollution Control Act enforced in April 1997 as **"substances that may harm human health when continuously ingested and cause air pollution."** Substances are selected based on the report of the Central Environment Council.



* Number of substances as of the end of FY2022.
** Emission reduction measures are implemented based on the Act on Special Measures against Dioxins.
*** Regulatory measures are currently being taken in light of the Minamata Convention on Mercury adopted in October 2013.

3. Air Environment Continuous Monitoring System

Roles of central and local governments



- Enactment of laws
- Accumulation of scientific knowledge about toxic air pollutants
- Development of environmental/emission standards
- **Development of guidelines and manuals**
- Support for personnel training
- International cooperation

- Implementation of laws
  - ➢ **Constant ambient air monitoring**
  - ➢ Notification of new emission facilities, report of exhausted smoke and its collection, on-the-spot inspection(checking compliance with emission standards, etc.)
  - ➢ Announcement of warnings
  - ➢ Order for improvement to polluters
- Development of pollution prevention ordinance/agreement
- International cooperation

Monitoring are generally implemented by prefectures.

Online system from monitoring stations to the public

Ambient air pollution monitoring stations (about 1,400 stations)

Roadside air pollution monitoring stations (300~400 stations)

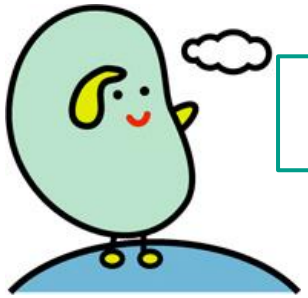
Prefectures server

Goverment server

Atmospheric Environmental Regional Observation System (SORAMAME)

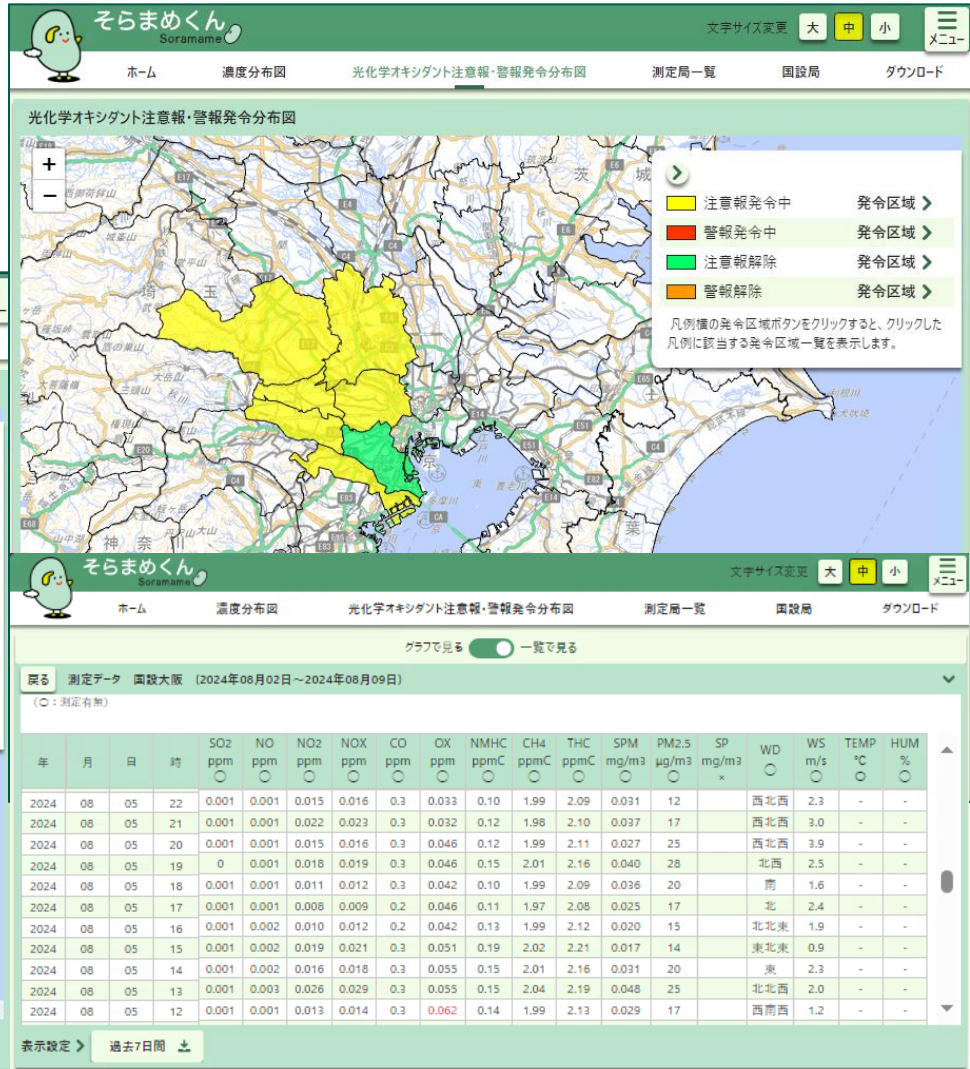
Atmospheric Environmental Regional Observation System : SORAMAME (https://soramame.env.go.jp/)

(Japanese version only)



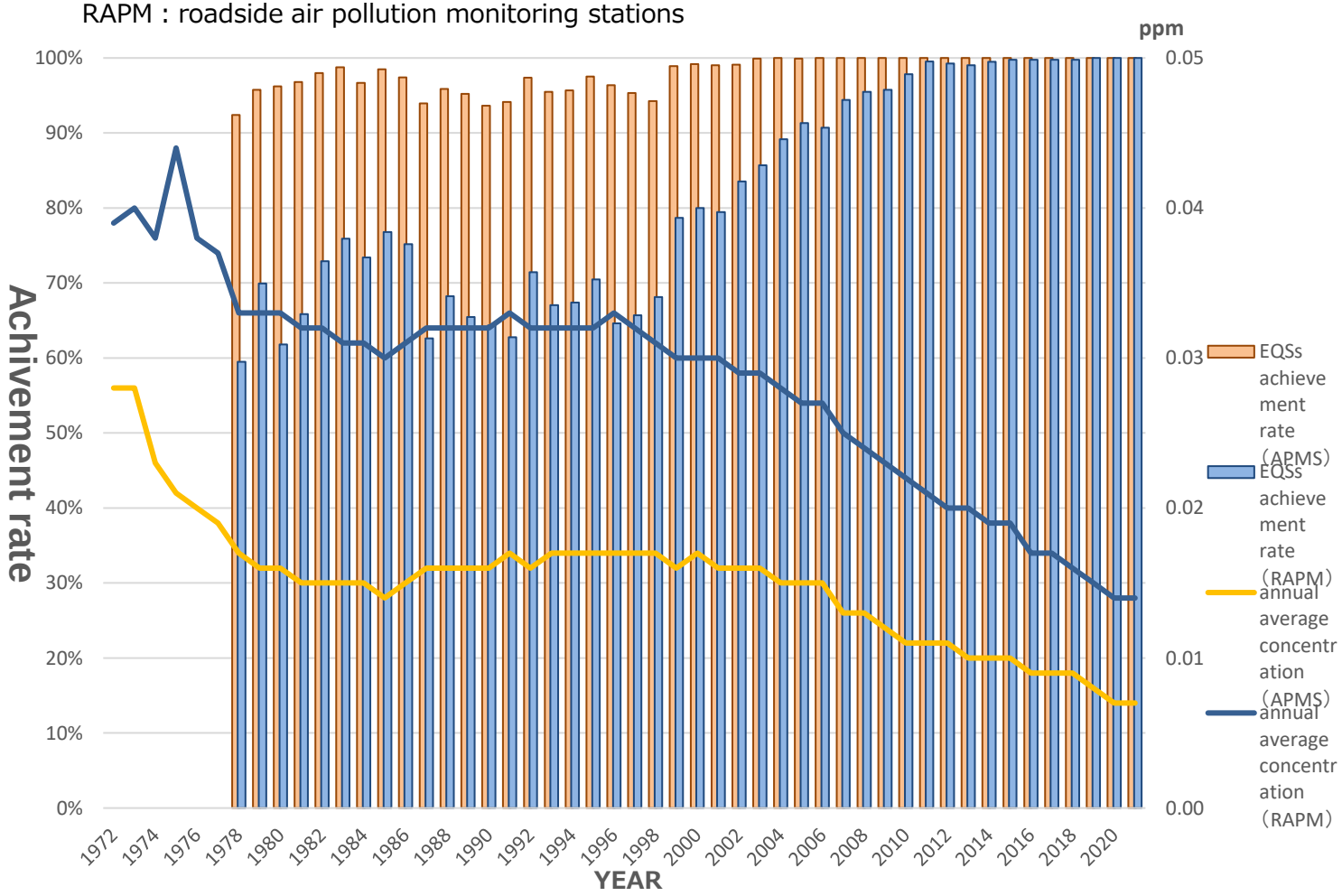
■ It shows real time data which is measured at stations at any time.

- Left : Concentration Map (Photochemical Oxidant)
- Right top : Photochemical oxidant cautions/alerts map
- Right down : Latest 7 days data list



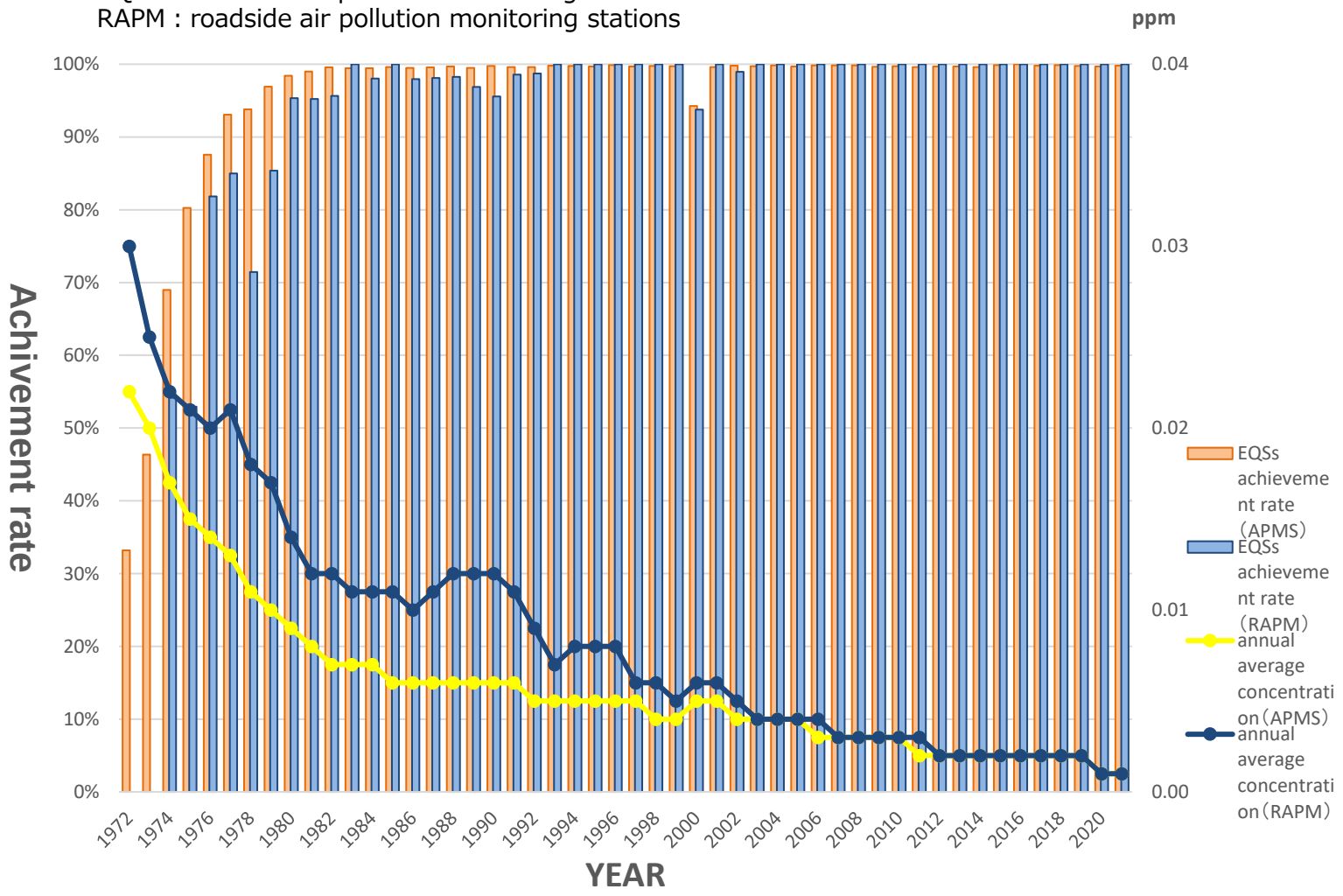
Environmental quality standards achievement rate（NO2）

AQMS : ambient air pollution monitoring stations
RAPM : roadside air pollution monitoring stations



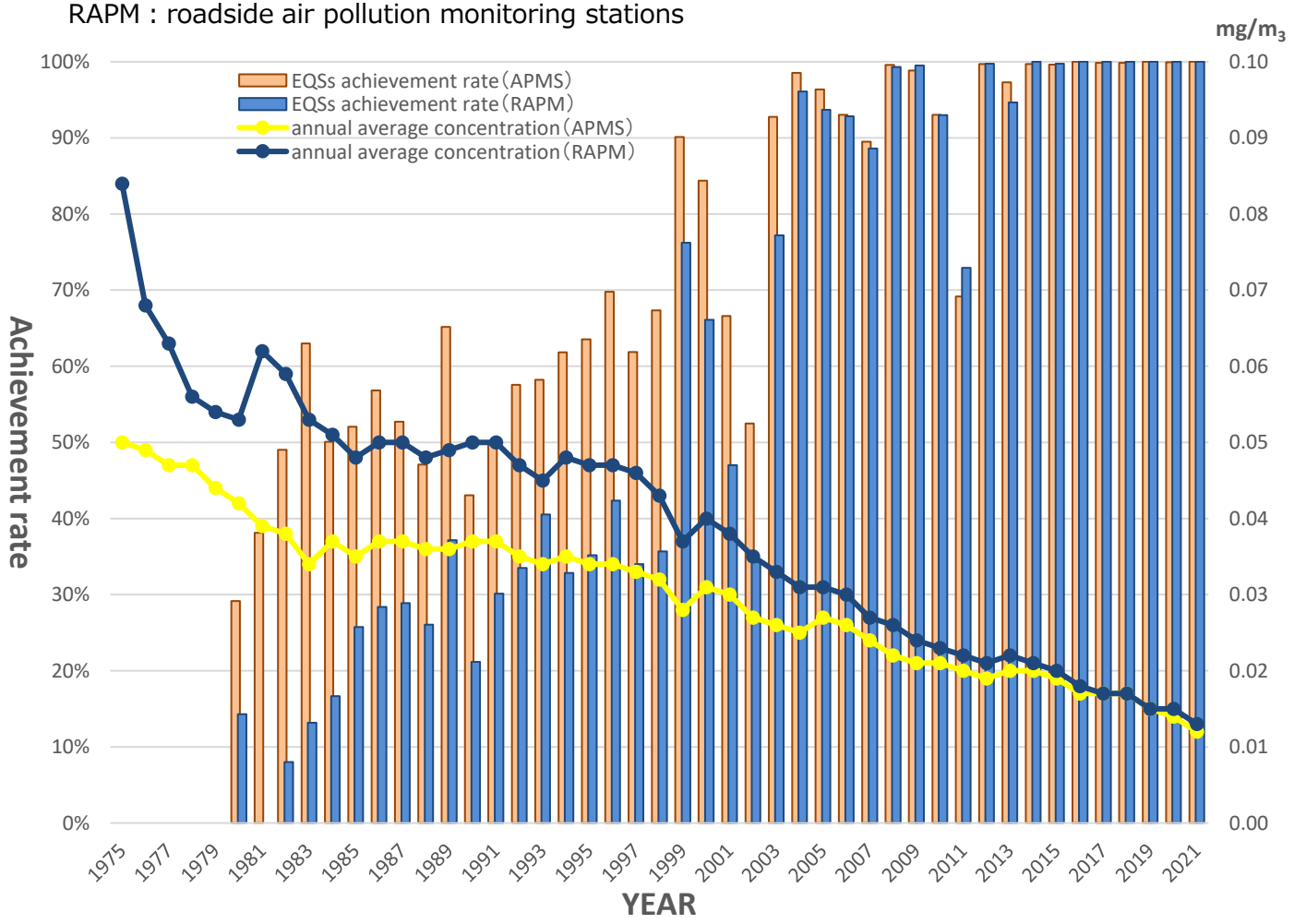
Environmental quality standards achievement rate (SO_2)

AQMS : ambient air pollution monitoring stations
RAPM : roadside air pollution monitoring stations



Environmental quality standards achievement rate（SPM）

AQMS : ambient air pollution monitoring stations
RAPM : roadside air pollution monitoring stations



4. The Status of Air Pollution (Environmental Standards Achievement Rate)

Environmental Standards Achievement Rate for Fiscal Year 2022

Substance	General Stations*1	Automobile Stations*2	Environmental Conditions
Fine Particulate Matter (PM2.5)	99.9%	100%	The annual average is 15 μg/m^3 or less, and the daily average is 35 μg/m^3 or less.
Photochemical Oxidant (Ox)	**0.1%**	**0%**	**1-hour values are 0.06 ppm or less.**
Nitrogen Dioxide (NO_2)	100%	100%	The daily average of 1-hour values is within or below the zone from 0.04 ppm to 0.06 ppm.
Suspended Particulate Matter (SPM)	100%	100%	The daily average of 1-hour values is 0.10 mg/m^3 or less, and 1-hour values are 0.20 mg/m^3 or less.
Sulfur Dioxide (SO_2)	99.5%	100%	The daily average of 1-hour values is 0.04 ppm or less, and 1-hour values are 0.1 ppm or less.
Carbon Monoxide (CO)	100%	100%	The daily average of 1-hour values is 10 ppm or less, and the 8-hour average of 1-hour values is 20 ppm or less.

*1 General Air Pollution Monitoring Stations: Targeting residential areas
*2 Automobile Exhaust Gas Monitoring Stations: Targeting roadside areas

- **PM2.5: In 2021, the achievement rate reached 100% for the first time; since then, it has maintained an achievement rate close to 100%.**
- **Ox: The achievement rate is still almost 0%.**
- SO_2: The general stations that did not achieve the standard were affected by the eruption of Sakurajima.

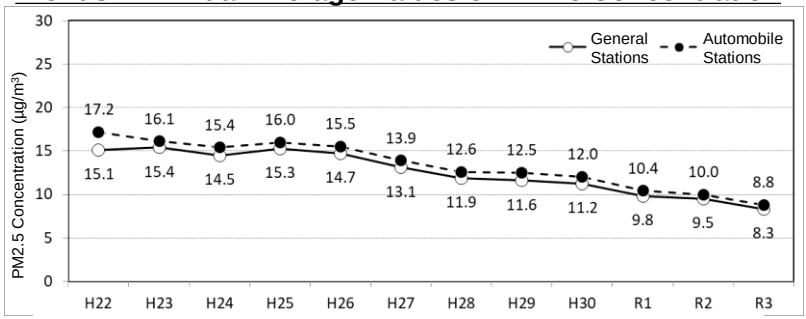
About PM2.5

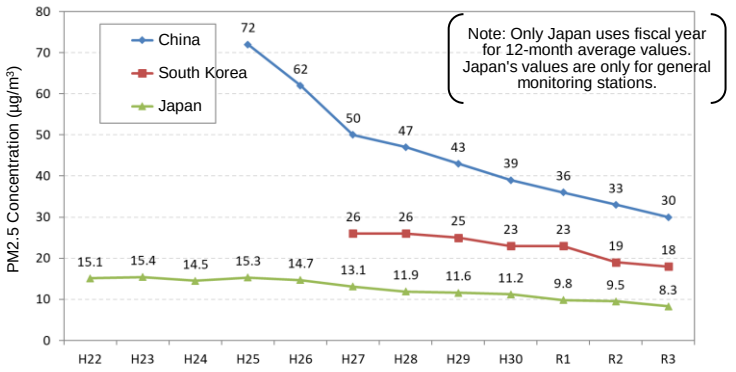
Current Status and Measures of Fine Particulate Matter (PM2.5)

Air Pollution Status Related to PM2.5

- Among particulate matter suspended in the atmosphere (SPM), those particularly small particles with a particle diameter of 2.5 μm (1 μm = 1/1000 millimeter) or less.
- Concerns about effects on the respiratory system, as well as effects on the circulatory system and increased risk of lung cancer.
- PM2.5 has various sources and complex formation mechanisms, including not only primary formation but also secondary formation. (Main sources include facilities that emit smoke such as boilers and incinerators, automobiles, ships, aircraft, etc.)
- PM2.5 concentrations in our country are improving due to the effects of various measures and initiatives domestically and in the East Asian region. (In FY2021, the environmental standard achievement rate reached 100% for both general and automobile monitoring stations for the first time.)
- In past trends, regions with relatively low environmental standard achievement rates were Kanto, Kansai, regions facing the Seto Inland Sea in Chugoku and Shikoku, and Kyushu.

Trends in Annual Average Values of PM2.5 Concentration





Status of Domestic and International Measures

- In 2013, an **"Interim Guideline for Alerts"** was formulated separately from the environmental standards. When it is expected that the interim guideline value (daily average of 70 μg/m^3) will be exceeded, prefectures, etc., issue alerts.
- The Expert Committee on Fine Particulate Matter of the Central Environment Council is enhancing the monitoring system and scientific knowledge, and **is considering and implementing comprehensive measures together with photochemical oxidant measures, which share many common issues**.

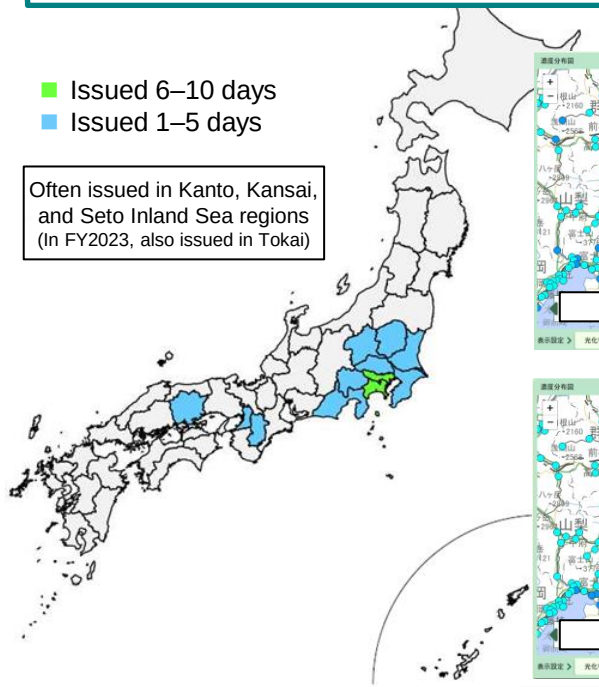
- Under the framework of the Tripartite Environment Ministers Meeting among China, Japan, and Korea (TEMM), **a trilateral policy dialogue on air pollution** is conducted to share information on **PM2.5 and photochemical oxidant measures**.
- As a multilateral initiative, **the East Asia Acid Deposition Monitoring Network (EANET)**, in collaboration with the United Nations Environment Programme (UNEP) and the Asia Center for Air Pollution Research (ACAP), is positioned as a core initiative for air pollution measures including acid rain. Efforts are being made to enhance activities by strengthening cooperation with international development financial institutions like the Asian Development Bank (ADB) and international organizations. Furthermore, regarding EANET, the expanded scope of activities from acid rain to air pollution was included in the new medium-term plan (2021–2025).

About Photochemical Oxidant

Characteristics and Trends of Photochemical Oxidant (Ox) Concentrations

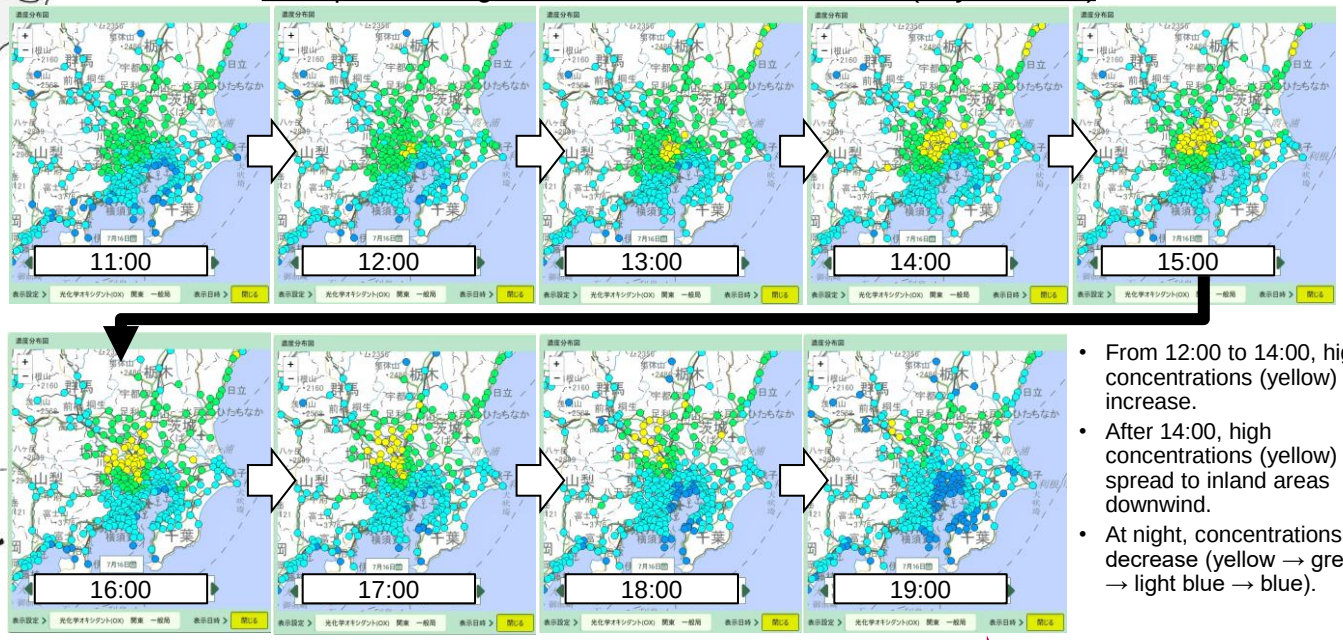
Photochemical oxidants are generated by chemical reactions of nitrogen oxides (NOx), volatile organic compounds (VOC), and ultraviolet rays.

- The main component is ozone (O_3). High concentrations are particularly likely to occur on sunny days with light winds from spring to summer.
- When Ox concentrations become high, so-called "photochemical smog" occurs. Symptoms include eye irritation and throat discomfort.
- Monitoring stations where Ox concentrations reached the advisory level (1-hour value of 0.12 ppm or higher) are mainly located in the Kanto, Tokai, Kansai, and Seto Inland Sea regions.
- Because NOx and VOCs generated in coastal areas slowly drift downwind and react chemically to become Ox, there is a tendency for Ox concentrations to be higher inland than in coastal areas.



Number of Days of Photochemical Smog Advisories Issued by Prefecture (FY2021)

Example of Changes in Ox Concentrations in Kanto (July 16, 2023)



- From 12:00 to 14:00, high concentrations (yellow) increase.
- After 14:00, high concentrations (yellow) spread to inland areas downwind.
- At night, concentrations decrease (yellow → green → light blue → blue).

- High Ox concentrations can occur away from the main sources of NOx and VOCs (coastal areas of Tokyo Bay).
- High Ox concentration areas may cross prefectural borders due to advection effects.

⇨ Necessity for wide-area measures rather than prefecture-based measures.

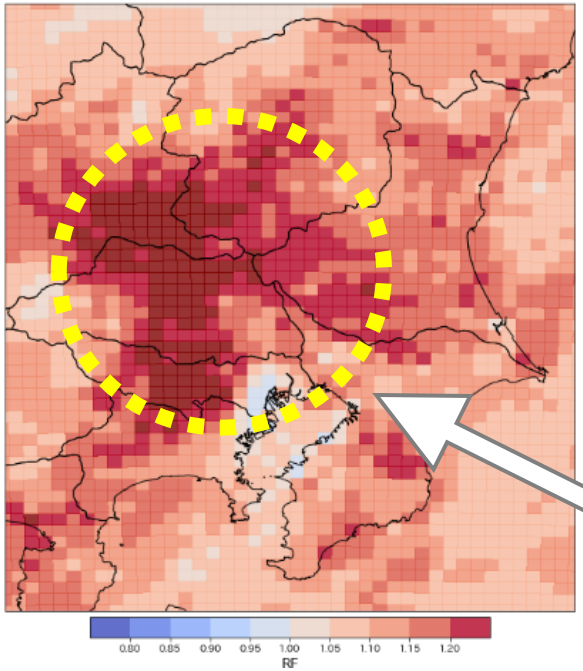
Verification of Ox Countermeasure Effects Through Simulation

- It has become clear that reducing both NOx and VOC effectively prevents the increase in Ox concentrations.

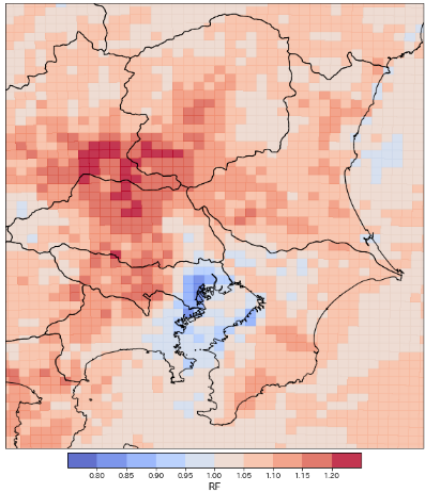
Calculation Results of the Suppressing Effect on Ox Concentrations by Controlling Emissions of Primary Pollutants

The darker the red, the higher the reduction effect on Ox concentrations.

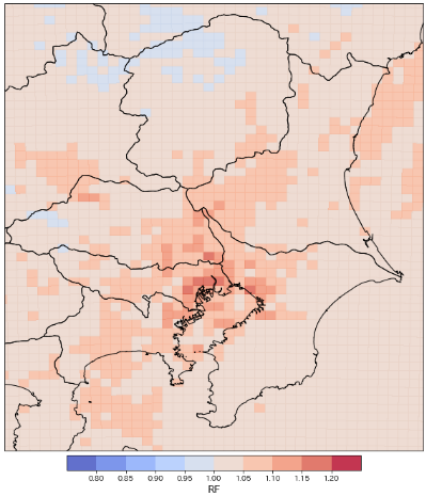
When both NOx and VOC are reduced



When only NOx is reduced



When only VOC is reduced

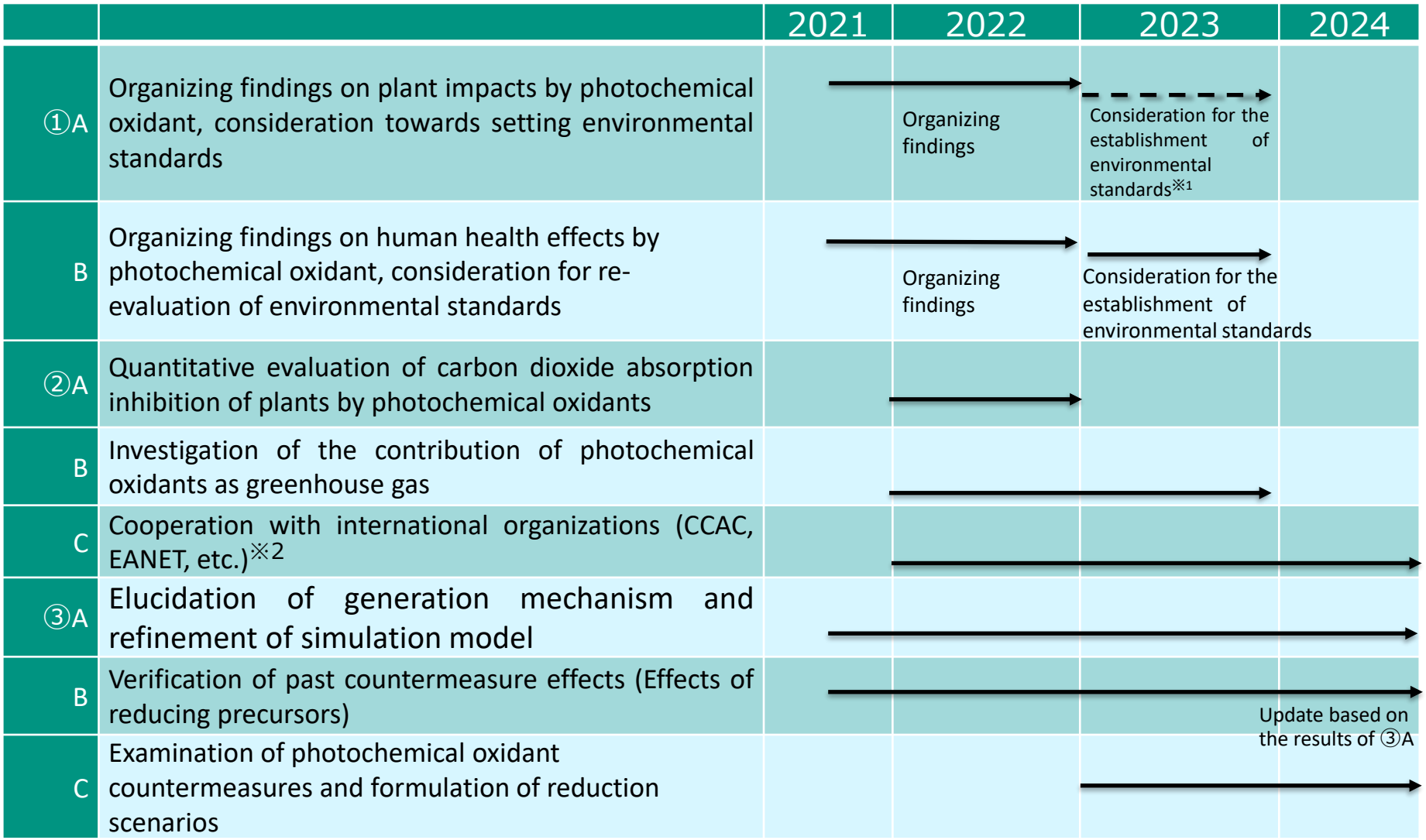


The area of dark red is larger.

↓

The effect is higher when both NOx and VOC are reduced.

Working Plan of Photochemical Oxidant Countermeasures (Jan. 2022)

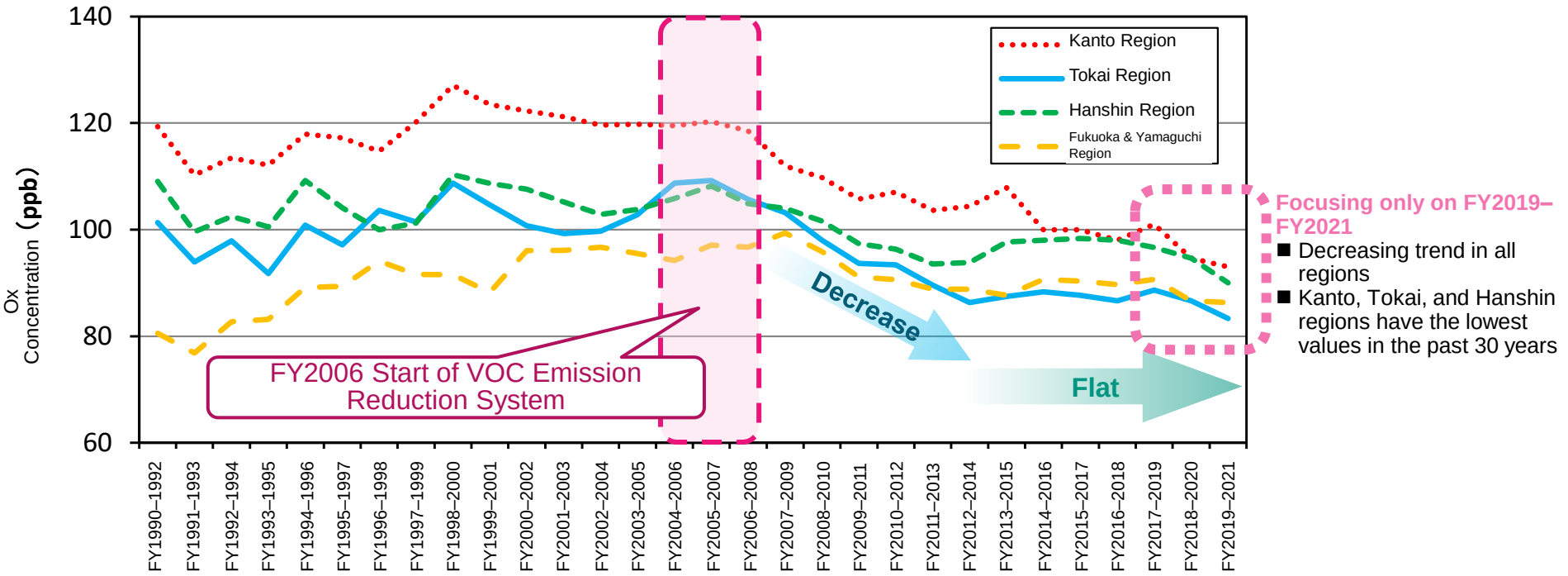


※1：Based on the status of the organization of knowledge, consider a specific schedule.
※2：CCAC (Climate & Clean Air Coalition), EANET (Acid Deposition Monitoring Network in East Asia)

Changes Over Time in High Concentration Areas of Photochemical Oxidant Concentrations

Changes over time in the highest values within the region using indicators for evaluating long-term improvement trends

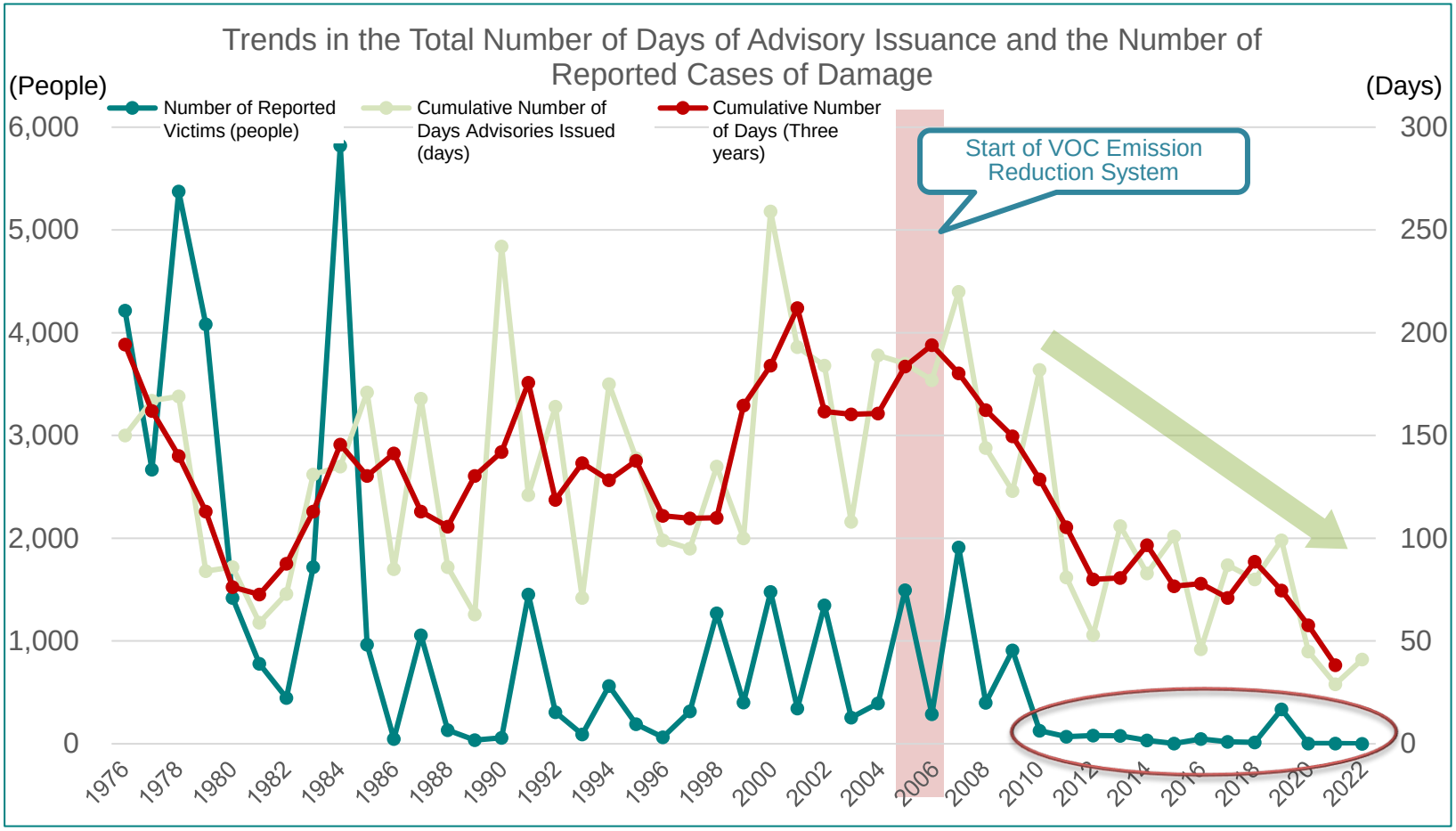
(three-year average of annual 99th percentile of daily maximum 8-hour values)



Immediately after the start of the VOC emission reduction system, a decreasing trend in photochemical oxidant concentrations was observed, but around FY2013, all regions showed a flat trend.

Trends in Total Number of Days Photochemical Oxidant Advisories, etc., Were Issued and Number of Damage Reports

- Since the start of the VOC emission reduction system (2006), the total number of days advisories were issued has been steadily decreasing.
- Around FY2012 to FY2019, it remained flat at about 80 days.
- After that, it may be decreasing again. In FY2022, the number of damage reports was zero days (the lowest in half a century).



5. International Cooperation

International Cooperation on Air Pollution Countermeasures

Multilateral Frameworks

- Under **the Tripartite Environment Ministers Meeting among China, Japan, and Korea (TEMM)**, hold air pollution policy dialogues and working groups, share Japan's knowledge and experience, and conduct joint research on yellow dust.
- Regarding **the Acid Deposition Monitoring Network in East Asia (EANET)**, it expanded the scope from acid rain to overall air pollution and introduced a new financial mechanism to enhance synergies with other initiatives.
- Implement project formation for the Joint Crediting Mechanism (JCM) through a co-benefit approach to air pollution and climate change measures in collaboration with **the United Nations Environment Programme (UNEP) and Clean Air Asia (CAA)**.
- Conduct joint research with **the International Institute for Applied Systems Analysis (IIASA)**.

Bilateral Frameworks

- **Promotion of the Co-benefit Approach**

Based on bilateral environmental cooperation memorandums with Asian countries such as Mongolia and Vietnam, implement projects to promote the co-benefit approach to air pollution and climate change measures.

Share Japan's knowledge and experience, conduct capacity building for officials of partner countries, and perform model demonstrations for the utilization of JCM, thereby improving air quality and contributing to the construction of a decarbonized society.

Initiatives for Improving the Air Environment Under the Tripartite Environment Ministers Meeting among China, Japan, and Korea (TEMM)

Started joint research from 2008. Mongolia also participates.
WG1: Monitoring and Modeling of Yellow Dust
WG2: Countermeasures for Sources of Yellow Dust

Countries Participating in the Acid Deposition Monitoring Network in East Asia (EANET)

Example of a Model Project Using Co-benefit Technology

Implementation Location: **Ulaanbaatar City, Mongolia**

Gas Boiler
(372 kW)