Selected Case Studies

Yokkaichi's Air Pollution Control

Location: Yokkaichi City, Mie Prefecture, Japan

Time Frame: 1958-1987

Programme/Project Status: completed

Background:

For the purpose of restructuring the postwar economy, the Japanese Government issued the 'Petrochemical Industry Program – Phase 1,' in 1955, along with which Yokkaichi City was designated as one of the major petrochemical complex sites in the country. The first pollution phenomenon recognized in the area was marine pollution and smelly fish, while the following pollution was more severe in the field of air quality. Sulfur Dioxide emission from the petrochemical industry was highly concentrated along with the expansion of petrochemical plants by the national development policy. And this caused a number of patients suffering from 'Yokkaichi Asthma,' which was later designated as a public pollution diseases by a national law (see the Chronological Table below).

Measures taken:

The first initiative was taken by Mie Univeristy, with fact-finding survey, followed by those conducted by the local governments, with annual report of the situation (Yokkaichi City and Mie Prefecture). Although the 'Soot and Smoke Regulation Law' (National Law/ went into effect for Yokkaichi in 1966) were established it has no substantial results in curbing air pollution in the area. In 1965, as the earliest efforts, the enterprises began to heighten their stacks for the gas emission (around 150m). In 1967, a pilot plant for flue-gas desulfurization was launched, which were later wide spread into the many petrochemical plants. This was supported by Yokkaichi's designation by the Basic Law for Environmental Pollution Control (1970), which enabled local governments to directly regulate and control pollutions under its jurisdiction. Yokkaichi City and Mie Prefecture establish its own standards and directly execute the control on enterprises to reduce its SO2 emission, as describes in 1972's 'Areawide Total Pollutant Emission Regulation System.

Also, Yokkaichi City and Mie Prefecture took earlier measures to relief asthma patients, without any pre-existed legal backgrounds. After the Yokkaichi Lawsuits conclusion, the financial burden has been shared with the national governments.

Impact:

The first positive impact on the SO2 reduction was made by the introduction of higher stocks in the petrochemical plants in 1965 (see Table 1). Although this significantly contributed the concentration decrease, it caused expansion of pollution areas. Desulfurization facilities played a substantial reduction in the SO2 amount contained in the smoke (see Table 2 and 3). Following to those technical advancement and efforts made by enterprises, the number of air pollution-related patients also decreased (see Table 4 and 5).

Furthermore, denitrifying facilities also contributed to the enhancement of the air quality of the area.

Apart from the local air pollution control, in 1987, Yokkaichi City and Mie Prefecture established the International Center for Environmental Technology Transfer (ICETT), which contributes to enhancement of environmental condition in developing countries.

Essential Arrangement for the Programme Implementation:

The distinctive features can be characterized by the initiative taken by the local governments, before the legislative measures taken by the national government. However, it is also pointed out that the national laws later established, i.e., Basic Law for Environmental Pollution Control, made it officially possible that those local governments positively act in regulation and promotion toward local community and enterprises in question. Furthermore, to support the air quality control, technical advancement played important role, mainly conducted by the private sector side.

Information Source:

International Center for Environmental Technology Transfer Website
<http://www.icett.or.jp/lpca_jp.nsf>

Chronological Table

1955 Petrochemical Industry Program Phase 1 (Yokkaichi Complex No.1) with capacity: 22,000T/Y

1959 Yokkaichi Plant launched operation

1960 Petrochemial Industry Program Phase 2 (Yokkaichi Complex No.2) with capacity: 42,000T/Y

First field measurement of SO2 by Mie University (followed by annual reports)

1962 SO2 measurement upgraded by automatic analyzers

The Soot and Smoke Regulation Law (National Law/ went into effect for Yokkaichi in 1966)

1963 Yokkaichi Complex No.2 launched operation

1964 Medical Aid for the Relief of Pollution-related Patients (City of Yokkaichi)

1965 Taller smokestacks for the dilution of flue gas emission

1967 Yokkaichi Pollution Lawsuit started

Basic Law for Environmental Pollution Control (National Law/ Primary area designation in 1970)

Pilot Plant for flue-gas desulfurization was launched

1968 Air Pollution Control Law

Pollution Control Agreements between Yokkaichi City and enterprises

1972 Ptrochemical Industry Program Phase 3 (Yokkaichi Complex No.3) with capacity: 300,000T/Y

Yokkaichi Pollution Lawsuit concluded in favor of plaintiff

Areawide Total Pollutant Emission Regulation System was introduced

Prefectural Ordinance for Pollution pre-Screening Committee

1973 Prefectural Ordinance for Obligatory Installation of Digital Telemeter System (16 Plants)

1974 Desulferization facilities were put into practical use

Pollution-related Health Damege Compensation Law enacted (National Law)

Law for Prevention of Disasters at Petroleum Complex enacted (National Law)

1978 Denitrification facilities were put into practical use

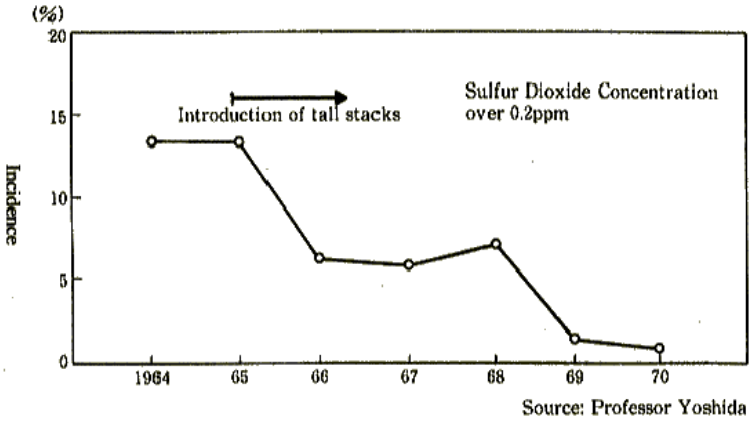
1991 Photochemical pollution predicting system were introduced

Stage 1(1958-1967): Construction of coastal industrial zone (petrochemical complex)

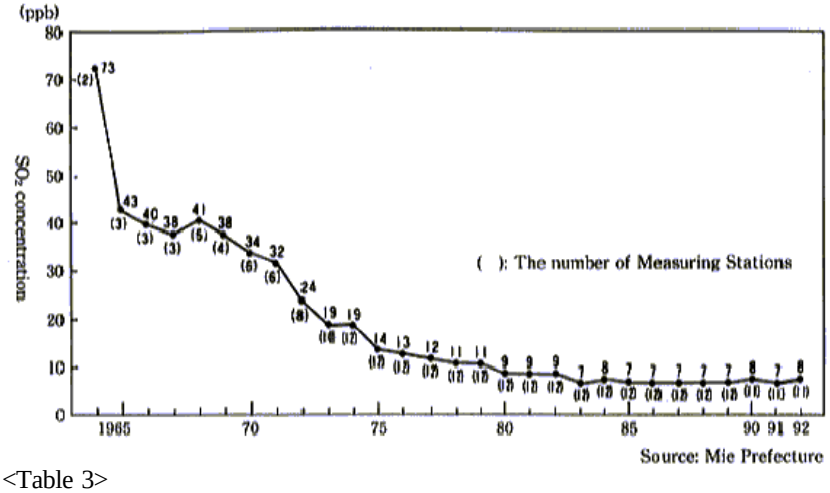
Stage 2(1968-1977): Outbreak of pollution due to pollutants derived from commercial activities in the process of industrialization and collaborative efforts extended by administration and industry to overcome pollution problems and to recover environmental quality

Stage 3(1978-1987): Preparation of international contribution for environmental control in developing countries together with ideal city planning based on advanced pollution control technologies and troubled experience over the past two years. Establishment of the Center for Environmental Technology Transfer (ICETT).

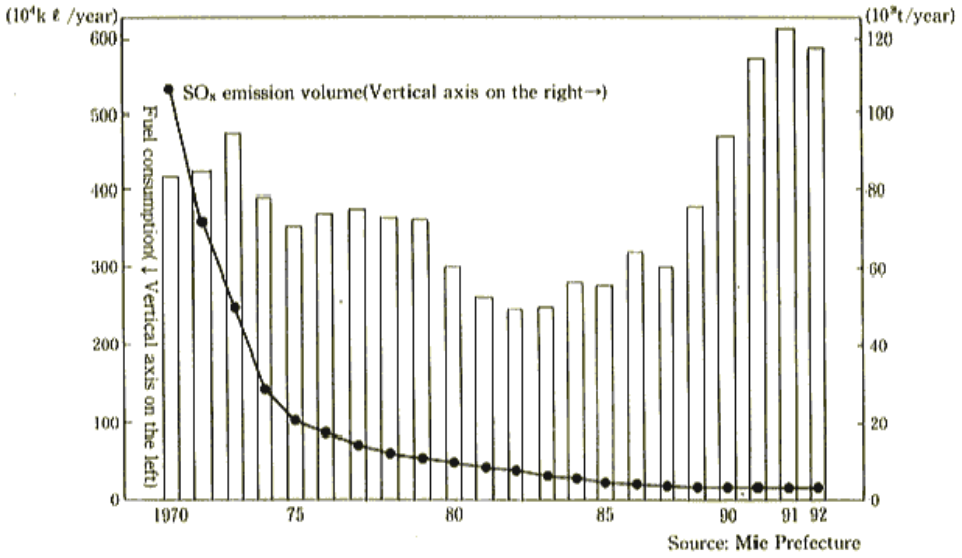
<Table 1>
Changes in Sulfur Dioxide Concentration Associated with Tall Smokestacks



<Table 2>
Yearly Changes in SO2 Concentration in Yokkaichi Area



<Table 3>
Yearly Changes in Fuel Consumption and Sox Emis sion



<Table 4> Incidence of Chronic Occlusive Respiratory Organs Illness

1. Brohchial Asthma

Year	1978	79	80	81	82	83	84	85	86	87	88	89	90
Target Areas	◎ 1129.5	◎ 961.3	◎ 1102.6	863.2	824.5	937.1	842.6	774.5	616.0	840.7	892.2	955.3	985.2
Other Areas	892.9	766.3	850.1	752.4	817.7	906.8	864.4	773.4	743.5	911.4	893.8	1160.0	1298.1

◎: With the difference at 1% level of significance

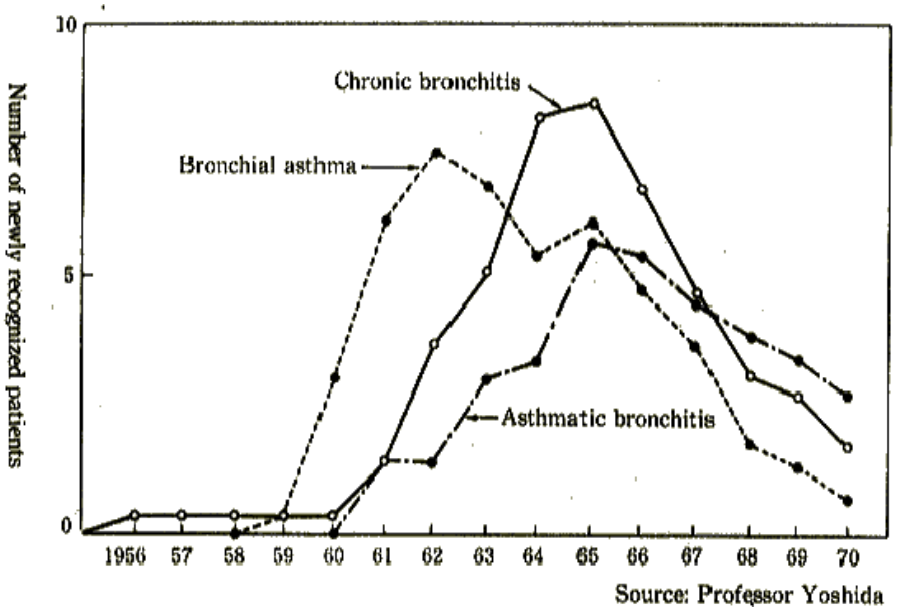
2. Chronic Bronchitis

Year	1978	79	80	81	82	83	84	85	86	87	88	89	90
Target Areas	○ 1169.1	○ 1090.1	952.8	922.6	993.0	836.4	1085.4	917.8	842.1	917.4	912.3	810.1	778.7
Other Areas	935.5	806.4	842.7	858.4	887.5	715.7	932.3	813.7	753.8	891.6	915.4	976.0	650.5

○: With the difference at 5% level of significance

(Notes) Sulfur oxides concentration has fulfilled the ambient standards at all measuring stations in Yokkaichi since 1976.
Significant difference was recognized in the incidence of bronchial asthma in target areas in 1979 and 1980.
Significant difference was recognized in the incidence of chronic bronchitis in 1979.
Significant difference has not been observed in both cases at present.
Source: Yokkaichi City

<Table 5>
Changes in the Number of Newly Recognized Patients of Respiratory Diseases



* All tables shown above are cited from the case study on Yokkaichi Air Pollution Control of ICETT; <http://www.icett.or.jp/lpca_jp.nsf>