Industries and companies have the option of voluntarily creating plans to take measures that suit their own circumstances. Industry groups set their target for emissions reductions in their VOCs Voluntary Emissions-Reduction Programs. Members of the industry group implemented actions that suited them and worked together with others by sharing effective methods for reducing VOCs emissions.

**What are VOCs?**

VOCs stands for “Volatile Organic Compounds”. Examples are toluene, xylene and ethyl acetate which are found in paint, printing ink, glue, detergent, gasoline or paint thinner, which are commonly known substances. Photochemical reactions involving these substances is considered to be one of the causes of photochemical smog.

**Why do we have to reduce VOCs emissions?**

When VOCs are emitted into the atmosphere, photochemical oxidants are formed in the lower atmosphere through photochemical reactions which cause photochemical smog. Smog is harmful to people’s health. Besides VOCs, substances like NOx, SO2 or NH3 are also known as components of photochemical smog. Besides smog, VOCs also cause health hazards including sick building syndrome (SBS) and multiple chemical sensitivity (MCS) in working environments and housing spaces.

**To reduce emissions of VOCs...**

**In FY 2010, emissions were reduced by more than 40% compared to FY 2000!** *(the target was 30%)*

**Legal regulations**

For the following six facility types, a minimum threshold for ventilation capacity was introduced. Reference values for VOCs concentration levels were established for facilities in which these thresholds are exceeded.

- Manufacturing facilities for chemical goods
- Painting and coating facilities
- Glue-related facilities
- Printing facilities
- Facilities using industrial detergents
- VOCs storage

**VOCs Voluntary Emissions-Reduction Programs**

Industries and companies have the option of voluntarily creating plans to take measures that suit their own circumstances. Industry groups set their target for emissions reductions in their VOCs Voluntary Emissions-Reduction Programs. Members of the industry group implemented actions that suited them and worked together with others by sharing effective methods for reducing VOCs emissions.

Let us show you some examples of the voluntary efforts.

In the revised Air Pollution Control Act (implemented from April 2006), the reduction of VOCs emissions is promoted through the combination of legal regulations and the VOCs Voluntary Emissions-Reduction Programs.
Effect of the Voluntary Emissions-Reduction Programs?

About 0.182 million tons of VOCs emissions were covered by the voluntary emissions-reduction programs in 2014, which was 66% less than the figure in 2000. The total amount of VOCs emissions in Japan for 2014 was 0.692 million tons. The reduction rate for the same period was 50%, demonstrating that the programs had an outstanding effect.

By reducing VOCs emissions, the program not only contributes to air pollution control, but has also positive impacts on the points listed on the right.

Costs
- Saving raw material expenses by avoiding evaporation of products containing VOCs

Work environment
- Reducing odor and hazardous gases
- Less risk of fire and other hazards

Neighborhood
- Less trouble with local residents due to odor

Public evaluation
- Efforts count towards corporate social responsibility

Here are some voluntary efforts by companies

Case 1: Change to VOCs-free Material

Company: A Ltd.
Industry: Chemistry

VOCs reduction target processes
- Metal and rubber adhesives
- Cleaning process for urethane foam products
- Coating process

Effects
- Usage of chlorine-based VOCs: Reduced by 74% from 2010-2015!
- Reduced risk!
- Improve working environment!

Key efforts
- Change to water-based adhesives
  Developed an emulsion adhesive in cooperation with an adhesive manufacturer and moved from organic solvents to water-based adhesives. This required new drying equipment, but in some cases it can be achieved without the equipment, if the process is reviewed appropriately.

- Change to VOCs-free detergent
  The reduced cleaning power of the VOCs-free detergent is compensated by buying stock parts and bathing the parts in warm cleaning water for several hours.

- Change to original water-based paint

Costs
- Saving raw material expenses by avoiding evaporation of products containing VOCs

Work environment
- Reducing odor and hazardous gases
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Neighborhood
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Public evaluation
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Chemistry Company: A Ltd.
Industry: Chemistry

Figure: VOCs emissions in units of 10,000 tons VOCs
(Source) Voluntary Emissions-Reduction Programs

50% reduction from FY 2000
66% reduction from FY 2000
Case 2: Development of portable VOCs-decomposition equipment

Company: B Ltd.
Industry: Coating line of automobiles and other products

VOCs reduction target processes
- Open-air paint and body work

Key efforts
- Installation of the in-house-developed VOCs-decomposition scrubber
  Installed a suction hood adjacent to car parts and body coating workspace.
  Placed an in-house-developed microbubble generator into the hood (cost about 4 mil. yen). This device decomposes the VOCs in exhaust gas.

Effects
- Cut VOCs emissions by 92% with the installation of the scrubber and other efforts. (2008)
- Better working environment due to less odor.
- Patent for the scrubber (sold over 30 devices)

Case 3: Installation of eco-friendly devices

Company: C Ltd.
Industry: Offset printing

VOCs reduction target processes
- Offset printing (especially printer cleaning)
- Volatilization from stock solutions and waste cloth

Main efforts
- Employee education on risks and the need to control VOCs, i.e. sealed containers.
- Installation of a new detergent dispenser which sprays the proper quantity.
- Measure the VOCs concentration every two weeks with a new device and keep the concentration below 200ppm.
- Installation of UV printers. Mainly for improving production efficiency but with a positive effect on VOCs emissions reduction.

Effects
- ISO14001 certification
- VOCs emissions reduced about 2/3 in 3 years from 30ppm to 10ppm
- Improvement of employee awareness
## Characteristics of the Japanese VOCs Voluntary Emissions-Reduction Programs

Legal regulations (direct or as frameworks), economic instruments and voluntary efforts are representative instruments for environmental policies. There are justifiable concerns that voluntary efforts don’t have similar binding power to legal regulations for companies, but there are advantages related to costs and applicability to individual circumstances.

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<th>Legal regulations</th>
<th>Economic instruments</th>
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<td><strong>Overview</strong></td>
<td>Restrictions and regulations</td>
<td>Taxes, Surcharges, Subsidies, Emissions trading</td>
<td>Voluntary approach, Negotiated agreements etc.</td>
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</table>
| **Pros**       | • Penalties for not following restrictions  
                 • Less margin for injustice  
                 • Predictable effects | • Economic efficiency and ecological effectiveness  
                 • Decision making limited only by budgetary constrains  
                 • Motivation for continuous efforts | • Lower operation and monitoring costs  
                 • Better fit to individual circumstances  
                 • Increased awareness of employees |
| **Cons**       | • High costs of legal action  
                 • Inflexibility  
                 • Possible economic damage | • Decrease in economic competitiveness with increased production costs  
                 • Taxes can be a heavy burden for low-income households  
                 • Less public acceptance and understanding | • Companies independently set their goals, which results in different goals for companies with different levels of commitment. |

Efforts to reduce VOCs emissions have had a great impact in Japan!!

In Japan’s approach to decreasing VOCs emissions, the VOCs Voluntary Emissions-Reduction Programs plays a significant role. It started in 2005 with 22 organizations participating. In 2014 the program included 40 organizations with 7,300 participating companies.