Indoor Air Quality Management

In the past, environmental concerns were mainly focused on outdoor environment degradation, such as water, air, soil, and waste. However, in recent years, citizen's rising interests toward a "well-being" lifestyle together with research contributions are accelerating the concerns regarding indoor air pollution making **indoor air quality management** an emerging environmental challenge of the era.

Having experienced the energy crisis in the 1970s, efforts were made to save energy while enhancing energy efficiency through improvements in adiabatic and airtight mechanisms. However, these strategies resulted in decreasing amount of air circulation, which meant a degradation of indoor air quality. For example, research showed that residents in newly built houses often experienced Sick House Syndrome, which causes eye irritation, nasal congestion, severe headache, and/or bloating. In particular, considering that most people spend more than 80% of their daytime indoor - such as in offices, indoor markets, schools, and hospitals - measures for efficient indoor air quality management were urgently called for. In this recognition, the Indoor Air Quality Management Act has been in effect since May 2003, with MOE giving one of the top priorities to the effective indoor air quality management and gearing various policy measures to protect citizens against the health risks of air pollution in their daily lives.

■ Indoor Air Quality Management in Public Facilities

The number of facilities subject to the **Indoor Air Quality Management Act** has been gradually expanded to 17 facilities whereas only subway stations and underground markets were subjected to the system under the previous Underground Air Quality Management Act of 1996.

Facilities subject to the Act ('04)
Subway Stations, Underground Markets, Libraries, Museums, Medical Centers, Indoor Parking Lot, Waiting rooms in Bus Terminals, Railway Stations, Airports and Ports Childcare Centers, Medical Centers for Elders, Funeral Houses, Saunas, Maternity Recuperation Centers, Large-Scale Markets

Korea enforces air quality standards on PM10 (particulate matters), CO2 (carbon dioxide), HCHO (formaldehyde), TBC (total bacteria counts), and CO (carbon monoxide) among others, with stringent control measures such as imposing charges to those who fail to comply with the standards. Also, indoor pollutants generated from outer sources or those with comparably less risk than the abovementioned pollutants, including NO2 (nitrogen dioxide), Rn (radon), TVOC (toxic volatile organic compounds), Asbestos and Ozone are controlled voluntarily by the industries according to the suggested emission levels.
Furthermore, MOE mandates the managers of public facilities to conduct annual monitoring on the pollutants subjected to mandatory air quality standards and to conduct semiannual monitoring on other pollution sources. They are required to report the monitored outcomes to the mayor and/or governor by the end of January every year.

Indoor Air Quality Standards

<table>
<tr><th>Facility \ Pollutant</th><th>PM10 (㎍/㎥)</th><th>CO2 (ppm)</th><th>HCHO (㎍/㎥)</th><th>TBC (CFU/㎥)</th><th>CO (ppm)</th></tr>
<tr><td>Subway stations, underground markets, libraries, museums, galleries, funeral houses, saunas</td><td>Under 150</td><td rowspan="3">Under 1,000</td><td rowspan="3">Under 120</td><td>-</td><td rowspan="2">Under 10</td></tr>
<tr><td>Medical centers, childcare centers, medical centers for elders, maternity recuperation centers</td><td>Under 100</td><td>Under 800</td></tr>
<tr><td>Indoor parking lots</td><td>Under 200</td><td>-</td><td>Under 25</td></tr>
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Additionally, MOE mandates the installation of air ventilators and air purification devices at in order to maintain fresh indoor air quality through sufficient air circulation.

■ Restrictions on the Construction Materials of high pollution discharge

Development of the chemical industry led to the use of new construction materials and adhesives, which resulted in the soaring release of pollutants such as formaldehyde and volatile organic compounds, the major contributors to the Sick House Syndrome. Therefore, MOE takes precautionary measures to encourage the production of materials with less pollutant release while restraining the use of high risk materials.

Indoor Air Quality Standards

Pollutant \ Type	Adherers	General Materials
Formaldehyde	Over 4	Over 1.25
Volatile Organic Compounds(VOCs)	Over 10	Over 4

■ Indoor Air Quality Management in Newly Built Apartments

The constructors of new apartments with over 100 units are enforced to measure 7 toxic substances (formaldehyde and VOCs including benzene, toluene, ethyl benzene, xylene, 1&4 dichlorobenzene, and stylene) in prior to the moving in of tenants. Those results are submitted to the heads of local governments while being posted for 60 days on the bulletin boards in convenient location for citizens. A fine is imposed on those who fail to submit and/or post the measurement results as well as those who expose false information. There are no restrictions in terms of selecting construction materials, however the constructors are invited to make voluntarily contributions to the environment by choosing the materials of least pollutant release.

Overall, MOE plans to further promote a variety of policy measures and adopt new strategies to reduce indoor pollution while effectively managing indoor air quality.

First, MOE will work **to expand the number of public facilities subjected to the Air Quality Management Act** by conducting environmental surveys on facilities that have not been controlled by

the law up until now.

Second, in order to develop appropriate standards on indoor air quality management for citizens, MOE will conduct nation-wide surveys, risk assessments, analyses on the standards of Korea in comparison to other countries. To this end, Korea will **strengthen the set of indoor air quality standards** tailored to national conditions by the latter half of next year.

Third, **Mid- and Long-term Comprehensive Measures for Indoor Air Quality Management** will be established by October 2004, which will convey the blueprint of Korea's future endeavors in the upcoming five years. Among the features will include the measures to control each public facility, prevention measures against Sick House Syndrome in apartments, and expansion of environment-friendly building materials.

Fourth, **guidelines with useful information on the indoor-air quality** will be developed and distributed to citizens on the Bake-out Strategy, a countermeasure against Sick House Syndrome, and adequate ventilation methods.

Bake-out strategy involves sealing up the building as best as possible (closing all windows and doors, sealing up airbricks, gaps under doors, etc.), raising the internal temperature to their highest setting for 48 hours, and afterwards, thoroughly airing out the space. By doing this the pollutant chemicals are rapidly released and diffused, reducing their subsequent risk over a longer period.

In a long run, the Ministry will provide active support towards conducting mid- and long-term studies on the special characters of indoor air pollution including their source and hazardous impact on the human body and developing advanced technologies to eliminate indoor air pollution at source, in particular, the utilization of air ventilation and purification techniques. Lastly, MOE will further strengthen Korea's indoor air quality management infrastructure by supporting research efforts and improving monitoring capacities in the private sector.