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Case Report

Overview of Green Building Material (GBM) Policies and Guidelines with Relevance to Indoor Air Quality Management in Taiwan

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Abstract: The objective of this paper was to offer a preliminary overview of Taiwan's success in green building material (GBM) efforts through legal systems and promotion measures, which are relevant to the contribution to indoor air quality (IAQ) due to sustainability and health issues. In the first part of the paper, the IAQ regulations are summarized to highlight the second nation (i.e., Taiwan) around the world in IAQ management by the law. In addition, the permissible exposure limits (PEL) in Taiwan for airborne hazardous substances were first promulgated in 1974 to deal with occupational health issues in the workplace environment. In the second part of the paper, the developing status of the GBM in Taiwan is analyzed to unravel its connection with the Indoor Air Quality Management Act (IAQMA), promulgated on 23 November 2011. By the end of September 2017, a total of 645 GBM labels have been conferred, covering over 5000 green products. Due to the effectiveness of source control, the healthy GBM occupies most of the market, accounting for about 75%. The IAQMA, which took force in November 2012, is expected to significantly increase the use of healthy GBM in new building construction and remodeling, especially in low formaldehyde (HCHO)/volatile organic compound (VOC)-emitting products.

Keywords: green building material; indoor air quality; occupational exposure; volatile organic compound; source control

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1. Introduction

Most people spend over two thirds of their time indoors. The indoor air at home or in an office building, school and other workplaces could be contaminated by a variety of gaseous and particulate contaminants that are sometimes present in concentrations above those which cause adverse health effects. These indoor air pollutants (IAP) are mainly emitted from building materials, furnishings, office appliances/equipment, consumer products, cleaning/maintenance materials, combustion processes (e.g., tobacco smoking, fuel-fired cooking or space heating), and outdoor air pollution. Regarding the regulations for ambient air quality, for instance, the Clean Air Act Amendments of 1990 in the USA was enacted and revised to make the law more readily enforceable. Based on the field investigations, the concentrations of individual volatile organic compounds (VOC) in the indoor air are often higher than those outdoors because many building materials emit VOCs over their extended periods of time [1]. As a consequence, the indoor air quality (IAQ) has become an important health issue for the public and the decision makers because of its adverse impact on acute or chronic symptoms or illness [2,3]. The sick building syndrome (SBS) has been used to describe building-related symptoms [4], which include respiratory irritation, headache, dry cough, dry or itchy skin, dizziness and nausea, difficulty in concentrating, fatigue, and sensitivity to odors [5]. In addition, formaldehyde (HCHO), a potent mucous membrane irritant and a widespread IAP, has been listed as a Class 1 carcinogen (confirmed as a human carcinogen) by the International Agency for Research on Cancer [6].

Therefore, many national/federal competent authorities (e.g., the Environmental Protection Agency, the Consumer Product Safety Commission, the Department of Housing and Urban Development, and the Occupational Safety and Health Administration in the United States) have stipulated legal standards and/or voluntary guidelines that involved in indoor/workplace air quality management, and dangerous/defective products [7].

In response to the global trends in climate change mitigation and IAQ-based health issues since the 1980s, the industry, officials and universities have jointly committed to promote the green building (GB) or sustainable building concept [8]. Thereafter, the GB certification system was developed in the United States and European countries [9]. To achieve sustainability and resolve health issues, GB schemes usually include several prevention and control measures for building design and construction. Among them, the adoption of certified healthy green building material (GBM) is an efficient scheme because the sources of IAP come originally from a variety of building materials. With the use of low-emission products, the problem buildings, especially in new building construction and remodeling, can be significantly reduced [10]. For instance, alternative products with low levels of HCHO can be used instead of HCHO-emitting products such as particleboard and hardwood plywood paneling. As described later [11], based on the regulatory definition in Taiwan, healthy GBMs have better IAQ than conventional building materials, or so-called green, natural or organic products or materials because the latter cases can contain toxic or hazardous constituents [12].

Through the media's reports on the monitoring results of IAQ by academic scholars and non-profit organizations, Taiwanese people have been increasingly paying attention to the adverse impact of IAPs on human health since the early 2000s. This has led to the necessity of legislation for the purposes of protecting public health and also improving work performance. The Indoor Air Quality Management Act (IAQMA) was promulgated on 23 November 2011, and took effect one year after promulgation. In the Act, the central competent authority refers to the Environmental Protection Administration (EPA). Also, the IAPs refers to substances that are normally dispersed in indoor air, and which may directly or indirectly affect public health or the living environment after long term exposure, including carbon dioxide, carbon monoxide, formaldehyde, total volatile organic compounds (TVOC), bacteria, fungi, airborne particles ($PM_{2.5}$ and PM_{10}), ozone, and other substances designated and officially announced by the EPA. On the other hand, the Ministry of Labor (MOL) has committed to the Occupational Safety and Health Administration (OSHA) to deal with IAQ-related issues in the workplace environment. Therefore, the permissible exposure limits (PEL) in Taiwan for airborne hazardous substances in workplace were promulgated since the 1970s, and recently revised in 2014. Meanwhile, the Architecture and Building Research Institute (ABRI) under the Ministry of Interior (MOI) drafted the GBM labeling system in 2003, and formally implemented it in 2004. The core value of the GBM is based on the non-toxicity, harmlessness, and relevant specification standards met. Currently, there are four GBM categories, covering the features of ecology, health, recycling, and high-performance.

This paper offers a preliminary analysis of the IAQ improvement through of the joint efforts of the cross-ministries in Taiwan, including the EPA, the MOL and the MOI. In the first part of the paper, the IAQ regulations are summarized to highlight the features of the IAQMA because Taiwan became the second nation when South Korea introduced their regulations dedicated to IAQ control. In line with the international trends in GB and/or sustainable building in recent years, the developing status of the GBM in Taiwan is analyzed in the second part of the paper to unravel its connection with the IAQ.

2. Indoor Air Quality Regulations in Taiwan

2.1. Environmental Protection Administration

In order to define the IAQ within a built environment, the IAQ guidelines and/or standards have been developed by several national and international agencies [7,13]. In some countries (e.g., South Korea), the IAQ standards are adopted by the regulatory authorities as an enforceable act or law. By contrast, the IAQ guidelines are designed by several countries or international organizations to offer only guidance to reduce adverse health impacts resulting from IAP in the living environment. For example, the World Health Organization (WHO) first published the IAQ guidelines for Europe in 1987, which contained health risk assessments of 28 air contaminants (especially formaldehyde and VOCs) [14]. The guidelines aim to provide a scientific basis for public health professionals, as well as specialists and authorities. However, it should be noted that the IAQ guidelines and/or standards for VOCs (except for formaldehyde) are generally described as the total volatile organic compounds (TVOCs).

In the past decades, it has been reported that the IAQ in Taiwan was not good [11,15], causing a large number of problem buildings. Their poor performance may be attributed to the crowed living space, poor air circulation, lack of ventilation, building materials, and humid subtropical climate. This problem has attracted much attention because most people spend about 90% of their time indoors, thus exposing to a variety of IAP that may be harmful to human health. In 2005, the EPA announced its "Suggested Values for Indoor Air Quality" and began research and preparations for a draft of the IAQMA in the following year. Through the public hearing and legislative procedures, the act aims to improve IAQ and to protect public health; it was promulgated on 23 November 2011, and came into effect one year later. Thereafter, the EPA announced five new regulations to accompany the implementation of the IAQMA. They include the "Indoor Air Quality Act Enforcement Rules", the "Indoor Air Quality Standards", the "Regulations Governing Dedicated Indoor Air Quality Management Personnel", the "Regulations Governing Indoor Air Quality Analysis Management", and the "Fine Determination Criteria for Violations of the Indoor Air Quality Act". In Taiwan, the IAQ standards, as listed in Table 1, provide compulsory guidelines. It shows 1000 ppm for CO_2, 9 ppm for CO, 0.06 ppm for formaldehyde, 0.56 ppm for TVOC (a combination of 12 different VOCs), and 0.06 ppm for ozone. Figure 1 shows a schematic block chart regarding historical development of IAQ codes and standards in Taiwan.

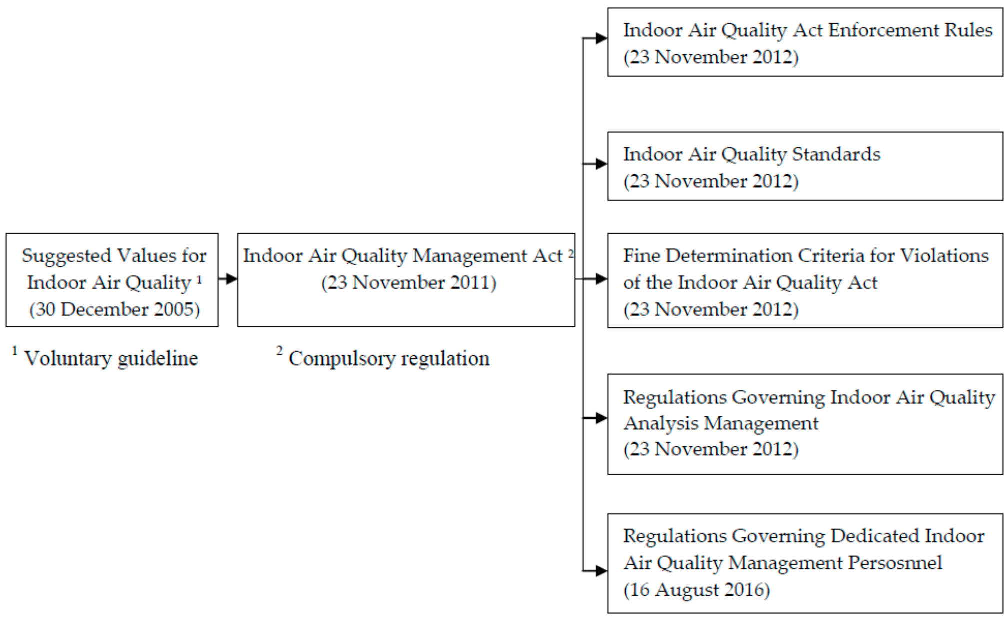

Figure 1. Indoor air quality (IAQ) regulations in Taiwan, providing the authority for the Environmental Protection Administration (EPA).

To facilitate the implementation of the IAQMA, the EPA announced the premises that shall comply with the Act, including libraries, hospitals and clinics, social welfare premises, government offices, railway/civil aviation/subway mail halls, exhibition centers, shopping malls, and so on. The owners, managers or users of officially announced premises shall commission certified analysis agencies to regularly perform analyses of IAQ based on the standards in Table 1, and shall regularly make public the analysis results and make records. On the other hand, the premises that have been officially announced by the EPA shall install automatic monitoring systems for continuous monitoring of IAQ, immediately make public the latest automatic monitoring results inside the premises or display them in a prominent place at the entrance, and shall make records.

Table 1. Indoor air quality standards as compulsory guidelines in Taiwan.

Indoor Air Pollutants	Standard	
	Concentration	Sampling Time
Carbon dioxide (CO_2)	1000 ppm	8 h
Carbon monoxide (CO)	9 ppm	8 h
Formaldehyde (HCHO)	0.06 ppm	1 h
TVOC [a]	0.56 ppm	1 h
Bacterial	1500 CFU/m^3 [b]	Ceiling
Fungi	1000 CFU/m^3 [c]	Ceiling
Particulate matter (PM_{10})	75 μg/m^3	24 h
Particulate matter ($PM_{2.5}$)	35 μg/m^3	24 h
Ozone (O_3)	0.06 ppm	8 h

[a] 12 volatile organic compounds, including benzene, carbon tetrachloride, chloroform, 1,2-dichlorobenzene, 1,4-dichlorobenzene, dichloromethane, ethyl benzene, styrene, tetrachloroethylene, toluene, trichloroethylene, and xylenes. [b] Colony-forming unit (CFU). [c] Not limited to the ratio of outdoor fungi concentration to indoor fungi concentration less than or equal to 1.3.

2.2. Ministry of Labor (MOL)

As described above, inhalation and skin (e.g., Beko et al. [16]) are the main routes of exposure to VOCs and other air contaminants in indoor environments, including workplace environment and living environment. Therefore, a healthy indoor environment plays a vital role in the prevention of damage to public health from health risks because these IAP are known or potential human carcinogens, or may be reasonably anticipated to pose a threat of adverse human health effects, including respiratory illness and neurological symptoms. Therefore, many national competent authorities (e.g., the Occupational Safety and Health Administration in the United States) and non-profit scientific organizations (e.g., the American Conference of Governmental Industrial Hygienists) have stipulated the standards or guideline levels which aim at limiting exposure to certain hazardous air contaminants in the workplace environment. Regarding the occupational exposure limit (OEL): this is defined as an acceptable concentration of a hazardous substance or class of hazardous materials in workplace air for the purpose of protecting the health of workers during their work. Among them, the most common OELs are the permissible exposure limits (PELs) and the threshold limit values (TLVs), which are developed by the U.S. Occupational Safety and Health Administration (OSHA) and the American Conference of Governmental Industrial Hygienists (ACGIH), respectively.

In Taiwan, the OEL ("Standards of Permissible Exposure Limits of Airborne Hazardous Substances in Workplace") was promulgated in August 1974 and was recently revised in June 2013 by the Ministry of Labor (MOL) under the authorization of the Occupational Safety and Health Act (OSHA) [17]. According to the definition by the OSHA, the workplaces referred to places where work for specific purposes takes place. However, the OEL standards in Taiwan apply only for industrial workplaces, plants, or factories. Initially, most of the PEL values in Taiwan were directly adopted from the data on the ACGIH-TLV and the OSHA-PEL. Thereafter, the Institute of Labor, Occupational Safety and Health (ILOSH), a national research & development organization under the supervision of the MOL, organized the Committee to recommend regularly the revised OEL for candidate chemicals based on the updated toxicological and epidemiological literature, policy need, and economical & technical feasibility. Currently, 487 chemicals have been listed in the PEL values as compulsory guidelines, including the time weighted average for an eight-hour workday, the time weighted average for short term exposure, and the ceiling. Because the TLV values are mainly based on health factors, nearly all workers may be repeatedly exposed to conditions below the PEL values without adverse effects. According to the IAQ standards in Table 1, Table 2 further lists the corresponding PEL and TLV values for these designated IAP. Table 2 also summarizes their TLV basis, representing the adverse health effects upon which the TLV is based [18]. In brief, the target organs or systems for human exposure to these designated IAP in the workplace air include respiratory tract, central nervous system (CNS), kidney and liver.

Table 2. Occupational exposure limits for designated air pollutants in indoor environment.

Contaminant	PEL (Taiwan) [a]	TLV (USA) [b]	
	Concentration (ppm)	Concentration (ppm)	Basis
Benzene	1	0.5	Leukemia
Carbon dioxide	5000	5000	Asphyxia
Carbon monoxide	35	25	Carboxyhemoglobinemia
Carbon tetrachloride	2	5	Liver damage
Chloroform	10	10	Liver & embryo/fetal damage; central nervous system (CNS) impairment
1,2-Dichlorobenzene	50	25	Upper respiratory tract (URT) & eye irritation; liver damage
1,4-Dichlorobenzene	75	10	Eye irritation; kidney damage
Dichloromethane	10	50	Carboxyhemoglobinemia; CNS impairment
Ethyl benzene	100	20	URT & eye irritation; kidney damage (nephropathy);cochlear impairment
Formaldehyde	1	0.3	URT & eye irritation
Ozone	0.1	0.05–0.2 [c]	Pulmonary function
Styrene	50	20	CNS impairment; URT irritation; peripheral nephropathy
Tetrachloroethylene	50	25	CNS impairment
Toluene	100	20	Visual impairment; female reproductive; pregnancy loss
Trichloroethylene	50	10	CNS impairment; cognitive decrements; renal toxicity
Xylenes	100	100	URT & eye irritation; CNS impairment

[a] Compulsory guidelines. [b] Source [18]. [c] Depending on work types (i.e., heavy, moderate, or light work). PEL: permissible exposure limits. TLV: threshold limit value.

3. Green Building Materials (GBM) in Taiwan

3.1. Governing Regulations

In order to achieve sustainable, comfortable and healthy living environments, the central competent authorities in Taiwan, including the Ministry of the Interior (MOI) and the Environmental Protection Administration, promulgated the regulations for promoting their recognized green-mark products [19]. In 2004, the Architecture and Building Research Institute (ABRI) under the MOI established and launched the Green Building Material Evaluation and Labeling System. These promulgated measures were originally based on the Basic Environment Act (BEA) passed by the Legislative Yuan (the Congress) at the end of 2002. For example, the BEA requires the government departments to adopt necessary measures to promote the use of renewable resources and other materials, products or services that beneficially lessen environmental impact. In addition, the Legislative Yuan passed the Government Procurement Law in 1997, in which it requires the official organizations to adopt environmentally preferable products certified by the EPA.

The GBM system aims at both taking into account a sustainable built environment and a healthy living quality. In order to attain the achievable goals, the MOI promulgated the Green Building Guidelines by several enforcement stages:

- Effective 1 July 2006

The percentage of GBM usage must be raised up to 30% for all decorating materials used in the interior furnishing and flooring of new and/or retrofitted buildings for public use.

- Effective 1 July 2012

The minimum requirement for the application ratio of GBM has to exceed 45% of the total indoor surface area for interior decoration materials, floor materials and windows, and 10% of outdoor surface area (deducting car lane, buffer space of car access, activity space of fire truck disaster relief, and part of laying ground material not needed) for the ground materials.

According to the definition by the Building Technique Regulation under the authorization of the Building Act, the constituents of the GBM shall meet one of the following requirements:

- Recycled plastic or rubber products (not containing toxic chemical materials designated by the EPA).
- Insulation materials for building use (not contain the substances controlled under the Montreal Protocol, and toxic chemical materials designated by the EPA).
- Water-based coatings/paints (not contain formaldehyde, chlorinated solvents, heavy metals such as mercury, lead, hexavalent chromium and arsenic; not use triphenyl tin and tributyl tin).
- Recycled wood products.
- Recycled bricks (kiln-burned) for building use.
- Recycled building materials (not kiln-burned).
- Other building materials certified by the central competent authorities (MOI or EPA).

Based on the above-mentioned regulations, the GBM must be non-hazardous to the environment, non-toxic to human health, and be in accordance with the national specifications/standards. Therefore, the evaluation items of the GBM include the following restricted substances:

- The concentrations of heavy metals involved in any part of non-metal materials must meet the "Toxicity Characteristic Leaching Procedure (TCLP) of Industrial Waste" set by the EPA (Table 3).
- Not contain asbestos.
- Not contain radioactive materials or constituents.
- Not contain the toxic chemical substances designated by the Toxic Chemical Substances Control Act (TCSCA). Under the designation of the act, there are currently 323 toxic chemical substances.
- Not contain the ozone-depleting substances controlled under the Montreal Protocol.
- Total chlorine ion content in the cement-based products must be less than or equal to 0.1%.
- Chlorine-containing polymers shall not apply for healthy GBM and ecological GBM labels.
- Interior decoration materials should be carried out the emission tests of total volatile organic compounds (TVOC) and formaldehyde by GBM performance testing agencies, which should be certified by the MOI. Their emission rates should at least meet the E3 rating of healthy GBM (Table 4), in which the rating standards are less than 0.05 and 0.19 $mg/m^2 \cdot h$ for formaldehyde and TVOC, respectively.

Table 3. The limits of heavy metals involved in green building material (GBM).

Heavy Metal	Detection Standard (mg/L) [a]
Total mercury (T-Hg)	0.005
Total cadmium (T-Cd)	0.3
Total lead (T-Pb)	0.3
Total arsenic (T-As)	0.3
Hexavalent chromium (Cr^{+6})	1.5
Total copper (T-Cu)	0.15
Total silver (T-Ag)	0.05

[a] According to "Toxicity Characteristic Leaching Procedure (TCLP) of Industrial Waste" set by the Environmental Protection Administration (EPA) in Taiwan.

Table 4. Rating system of healthy GBM in Taiwan.

Rating System	Emission Rate (mg/m^2·h)	
	TVOC [a]	Formaldehyde (HCHO)
E1	≤ 0.005	≤ 0.005
E2	$0.005 < \text{TVOC} \leq 0.06$	$0.005 < \text{HCHO} \leq 0.02$
E3	$0.06 < \text{TVOC} \leq 0.19$	$0.02 < \text{HCHO} \leq 0.05$

[a] Total volatile organic compounds (TVOC) include benzene, carbon tetrachloride, chloroform, 1,2-dichlorobenzene, 1,4-dichlorobenzene, dichloromethane, ethyl benzene, styrene, tetrachloroethylene, trichloroethylene, toluene, and xylenes.

Currently, there are four GBM types, including:

- Ecological GBM

They refer to those which are made of renewably natural resources (e.g., woody materials) with easy biodegradation, low manual processing (low power input), and in conformity with the local industry (carbon footprint thus reduced) or the international certificates like the Forest Stewardship Council (FSC).

- Healthy GBM

They refer to those featuring low emissions of formaldehyde and total volatile organic compounds (TVOC). Based on their emission rates (Table 4), the rating system of healthy GBM further categorizes the E1, E2 and E3.

- High-performance GBM

They refer to those that display high performance of sound-insulation (noise prevention), energy-saving (heat insulation) or permeability (water drainage) without traditional defects of building materials/accessories.

- Recycled GBM

They refer to those which are remanufactured from local recycled materials to meet waste reduction, reuse and recycling (3R) requirements without causing secondary pollution or having a bad effect on human health.

Due to its acute/chronic toxicity and widespread uses in a variety of indoor products such as particleboard, fiberboard and hardwood plywood, many countries adopted IAQ guidelines or standards for formaldehyde (HCHO) exposures [12]. In addition, a large variety of synthetic organic compounds are found in indoor air because they are also emitted from a variety of commercial commodities, including underlayment, paneling, furniture, cabinetry, cleaning products and consumer products [1]. Because of their variety, relatively low concentrations and potential to cause sick building syndrome or building-related illness symptoms, the effect of the TVOC on human health have received much attention in connection with its IAQ guidelines or standards. As listed in Table 4, the rating system of healthy GBM in Taiwan is thus based on the emission rates of HCHO and TVOC, grouping building materials (including floor, wall, ceiling, gap-filler & putty, painting & coating, adhesive & bonding agent, and wooden door/window) into the E1, E2 and E3. Although TVOC as a health risk index or indicator was debatable [20], it is often used as a guide to determine whether VOC levels are elevated in indoor air, implying the potential for occupant irritation and discomfort [7].

3.2. Developing Status of GBM

The history of green building (GB) must be briefly described prior to the information about the developing status of GBM in Taiwan. The GB began in the late 1980s when the United Nations' World Commission on Environment and Development addressed the concept of "sustainability" in 1987 [21]. In the early 1990s, many developed countries developed the GB certification systems, including the Leadership in Energy and Environmental Design (LEED) certification in the United States and the BRE Environmental Assessment Method (BREEAM) certification in the United Kingdom [9].

In response to the international GB trend and the promotion of indoor environment quality, the central competent authority in Taiwan, (MOI) established the Green Building Evaluation System in 1998. Subsequently, the MOI launched the Green Building Labeling System in 1999, which was also called the EEWH labeling system. The GB labeling system involves the principles of ecology, energy-saving, waste-reducing and health. Currently, the system comprises of nine evaluation indicators, including greenery (vegetation planting), water infiltration and retention, daily energy conservation, water conservation, CO_2 emission reduction, construction waste reduction, sewage and waste disposal facility improvement, biodiversity, and indoor environment quality. On the other hand, the Executive Yuan ratified the Green Building Promotion Plan in 2001 to extend its implementation to the government entities at all levels and private sectors under the funding support of the MOI.

In order to accelerate the development of GBM, the ABRI, combining with the architecture department of national universities and non-profit organizations (e.g., Taiwan Architecture & Building Center), has been assisting the industry upgrading to create a green environmental-friendly subtropical Taiwan. According to the statistics surveyed by the MOI (Table 5), some significant points were further addressed as follows:

- Over the 6 years, the certified GBM number indicates an increase of 38.0%, increasing from 474 by the end of July 2011 to 645 by the end of September 2017. This change could be attributed to the official promotion and validation for the reduction of indoor HCHO concentration [22], and the cost-down of GBM in Taiwan. Currently, a total of 645 GBM Labels have been conferred, which cover over 5000 green products.
- Among these certified GBM, the percentage distributions indicate no significant change in recent years due to the market demands and/or consumer preferences. The healthy GBM occupied most of the market, accounting for about 75%. With the IAQMA promulgated in 2011, it is expected to significantly increase the use of the healthy GBM in the near future.
- Under the encouragement of government policy for procuring the domestic green-mark (environmentally preferable) products (including energy-saving products, and water-saving products), the certified high-performance and recycled GBM products indicates significant increases of 55% and 47%, respectively.

Table 5. Statistics on certified GBM in Taiwan.

Category	May 2011 [a]		September 2017 [c]	
	Certified Number	Percentage [b]	Certified Number	Percentage
Healthy GBM	364	76.8%	487	74.4%
High-performance GBM	71	15.0%	110	16.8%
Recycling GBM	38	8.0%	56	8.6%
Ecological GBM	1	0.2%	1	0.2%
Total	474	100.0%	654	100.0%

[a] Source [11]. [b] The percentage is based on the ratio of the number of certified products per category to total certified GBM products. [c] Surveyed by the author using the official database of the ABRI (http://www.abri.gov.tw/).

4. Conclusions

In this paper, the recent legislations on IAQ management and GBM in Taiwan were reviewed and coupled. The following conclusions can be drawn below:

- The Indoor Air Quality Management Act (IAQMA), promulgated on 23 November 2011, took effect one year after promulgation. Under the authorization of the IAQMA, the IAQ standards provide compulsory guidelines in the non-industrial sectors.
- The permissible exposure limits of airborne hazardous substances in the indoor workplace were recently revised in June 2013 under the authorization of the Occupational Safety and Health Act (OSHA), providing compulsory guidelines in the industrial sector.

- According to the voluntary guidelines by the Building Technique Regulation under the authorization of the Building Act, the Green Building Material (GBM) was established and launched since 2004. Currently, a total of 645 GBM Labels have been conferred, accounting for about 75% by the healthy GBM occupied in the market. With the IAQMA promulgated in 2011, it is expected to significantly increase the use of the healthy GBM in the near future.

People spent most of their lifetime in indoor environments. Thus, the indoor air quality has a significant impact on human health, because many VOCs and other air toxins exist indoors, at concentrations even exceeding those in outdoor air. Therefore, the regulatory and ventilation measures to reduce indoor emissions and exposure concentrations in the densely populated indoors (e.g., hospitals, hairdressing salons, or metro system), and also investigate the relationship between human health risk and long-term exposure to VOCs, should be imperative. On the other hand, we should develop criteria to classify all detectable VOCs emitted from all types of GBM.

Conflicts of Interest: The author declares no conflict of interest.

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