

INFRASTRUCTURE

Understanding the concept and rating system of 'Green Buildings'



MOHAMMAD ABU SADEQUE

According to World Green Building Council, a green building is a building that in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment. Elements of Green Buildings are Materials, Energy System, Water Management and Health Components. Let's consider materials and energy system.

MATERIALS

Materials for a green building have to be obtained from natural, renewable sources that have been managed and harvested in a sustainable way, or obtained locally to reduce the embedded energy costs of transportation, or salvaged from reclaimed materials at nearby sites.

Materials are assessed using green specifications that look at their Life Cycle Analysis (LCA) in terms of their embodied energy, durability, recycled content, waste minimisation, and their ability to be reused or recycled.

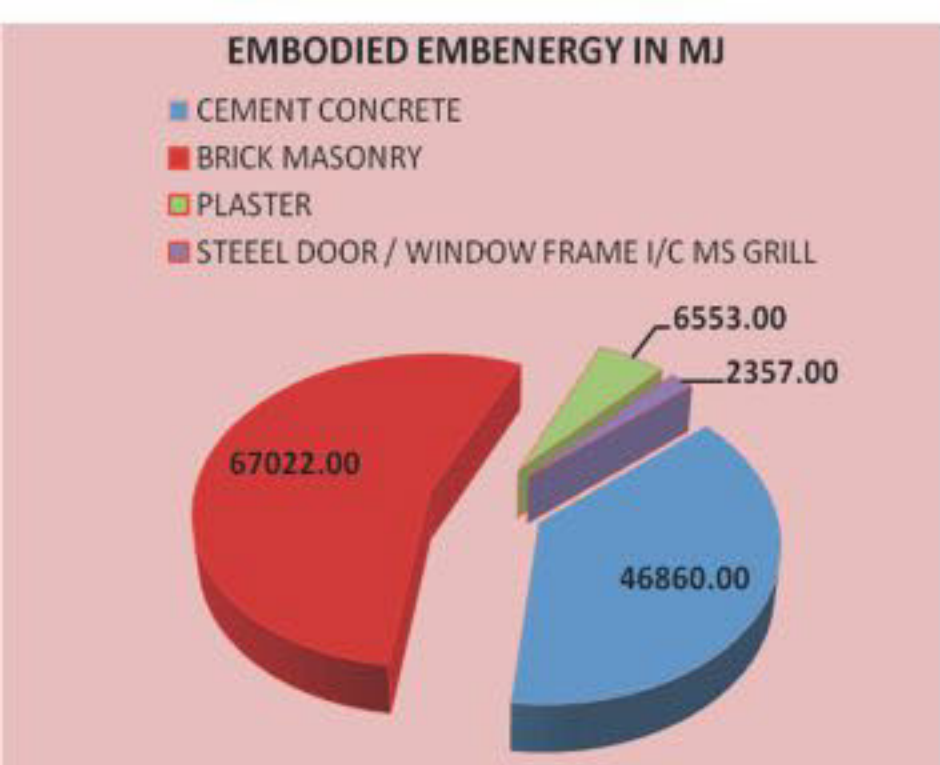


Fig.1: Amount of embodied energy for major construction activities, Bhopal, India

ENERGY SYSTEM

Passive solar design reduces the heating and cooling costs of a building, as do high levels of insulation and energy-efficient windows. Natural daylight design reduces a building's electricity needs, and improves people's health and productivity.

From the above discussion, we can conclude that energy efficient low carbon emission is the key issue surrounding Green Buildings. Various tools for rating the greenness of a building are available but do

we know which one is the most suited for Bangladesh? Is there any at all?

Most popular tools are Leadership in Energy and Environmental Design (LEED) developed by US Green Building Council and Building Research Establishment Environmental Assessment Method (BREEAM) by Building Research Establishment (BRE), a centre of building science in the United Kingdom. Similarly, lots of rating standards of other countries are available. To assess Bangladesh's buildings, we need to develop our own standards or adopt others' standards with the necessary tailoring as per our socio-economic, environmental and cultural needs.

As per energy consumption and carbon emission concerns, there are two types of energy consumption for a building structure. One is embodied and another is operating. Neither LEED nor BREEAM accounts for embodied energy.

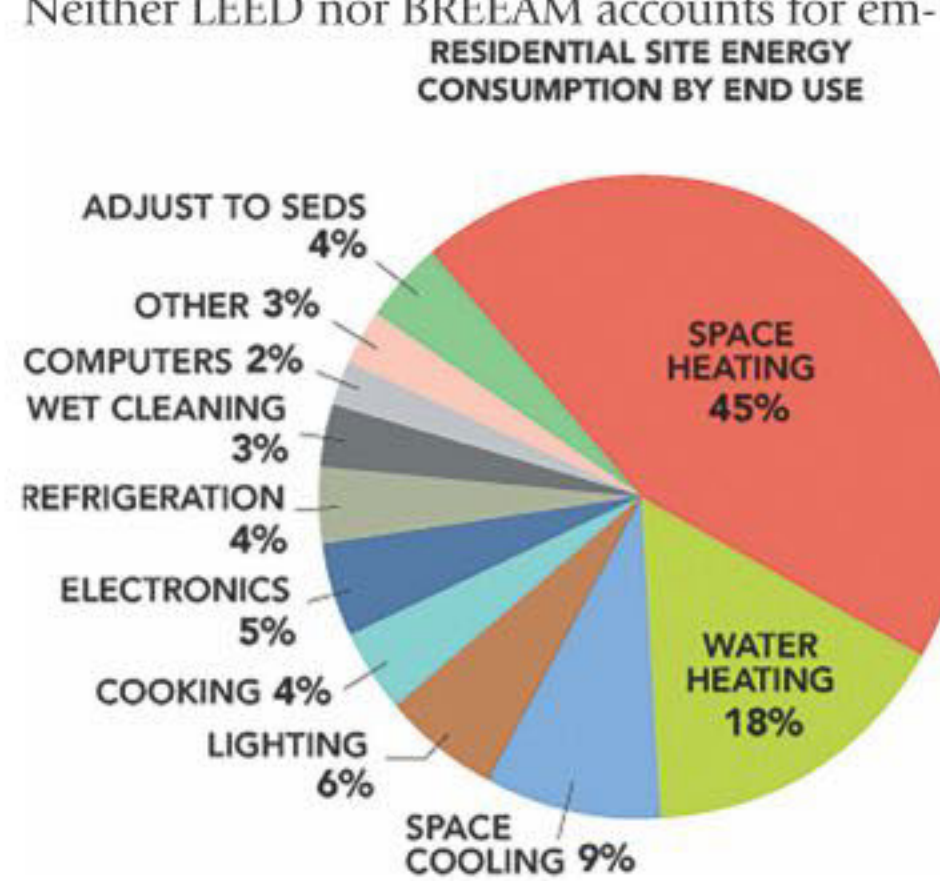


Fig.2: Operation Energy Use Source: US Department of Energy

bodied energy, an accounting method which aims to find the sum total of the energy necessary for an entire product life-cycle. As an example, LEED Green Building rating point distribution fields are as follows:

1. Sustainable sites-26 points
 2. Water efficiency-10 points
 3. Energy and atmosphere-35 points
 4. Materials and resources-14 points
 5. Indoor environment quality-15 points
 6. Innovation and design process-6 points
 7. Regional priority credits-4 points
- Total is 110 points.

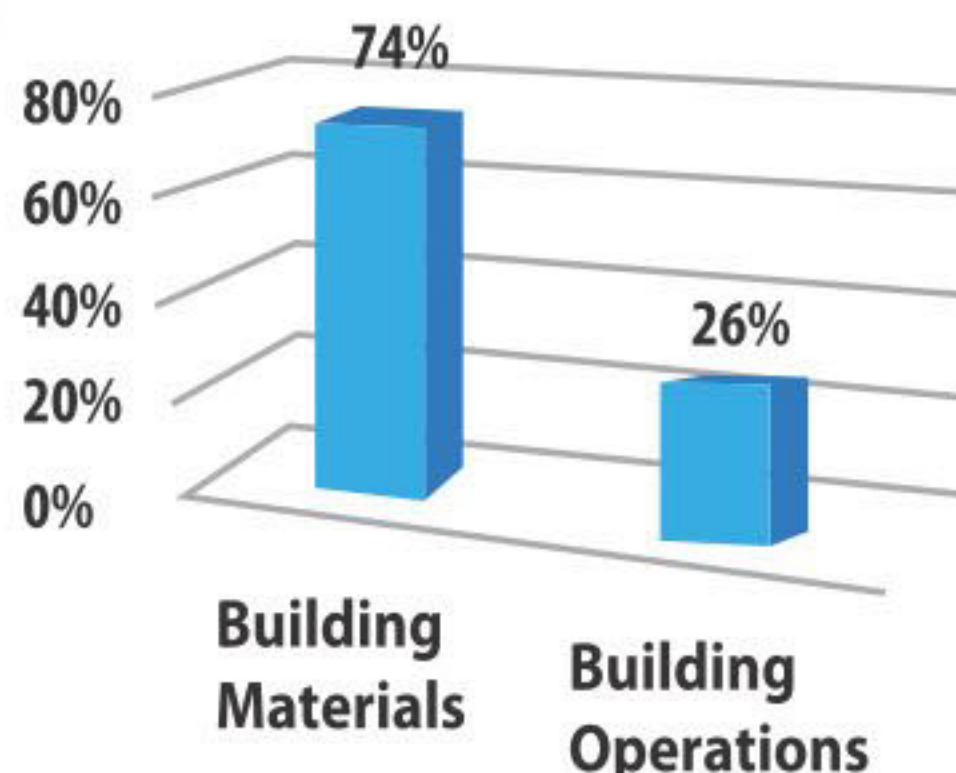


Fig.3: Energy Consumption Footprint of All Buildings Constructed Between 2015-2030

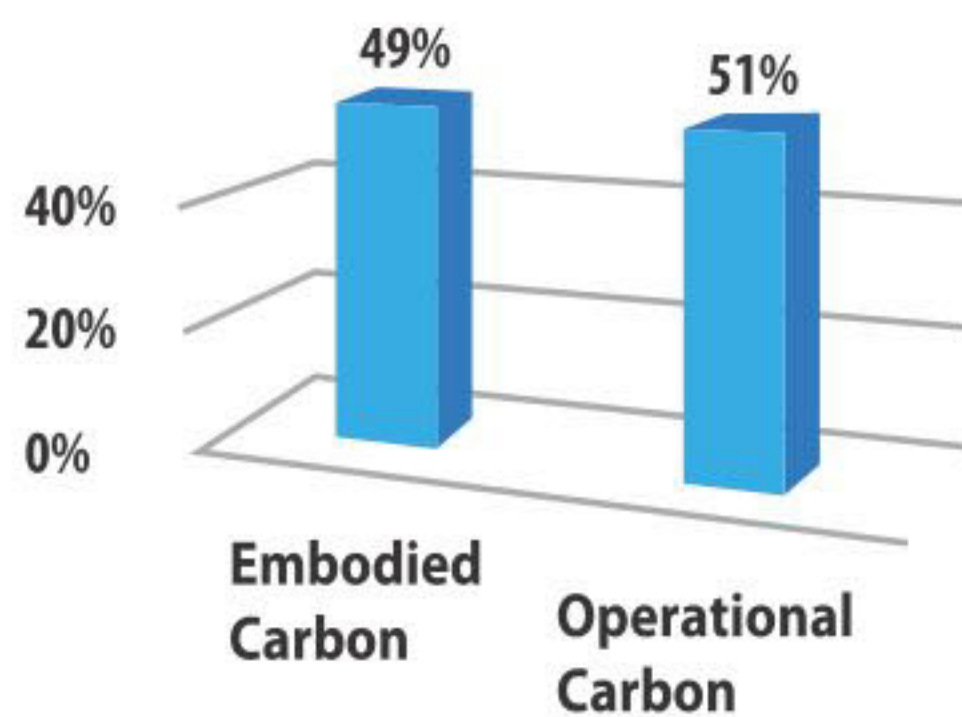


Fig.4: Total Carbon Emission of Global New Construction from 2020-2050

'Energy' in field 3 considers only operational energy and 'Materials' in field 4 addresses predominantly material recycling. It reveals that 'embodied energy' is not duly considered. Analyses of building energy systems are as follows.

Fig.1 shows that embodied energy due to brick masonry is 55 percent which indicates that countries like India or Bangladesh suffers from carbon emission due to brick masonry which does not account for present energy rating systems. Fig.2 shows that more than 70 percent of the total operational energy is due to heating and cooling alone which is not true for our country. We consume less than 30 percent of operational energy compared to that of the US. Fig.3 and Fig.4 show that 74 percent and 49 percent of energy consumption and carbon emission are embodied which is even more for Bangladesh. If we do not account for embodied energy in assessing carbon rating, results will be misleading. Therefore, analyses of energy systems for Bangladesh would be totally different from those of developed countries.

CONCLUSION

1. For a Green Building, associated embodied energy should be the prime consideration.
2. We have to develop our own tools for rating greenness of a building.
3. We should not follow western concepts because our socio-economic, cultural and climatic conditions are different.
4. Building materials responsible for high embodied energy should be avoided by replacing them with green materials.
5. No rating tool for assessing Green Buildings should be considered if it does not account for embodied energy with due importance.
6. Until LEED and BREEAM really start to focus on sustainable building certifications, meaning significant reductions in embodied impact, it seems unlikely that we will achieve much in the new building construction sector to reduce national as well as global impact.

Mohammad Abu Sadeque, Former Director, Housing and Building Research Institute (HBRI).

Fire protection in buildings: The state of our (un)preparedness

ISHTIAQUE AHMED, S.M. MAHBUBUR RAHMAN, IMAMUL HASSAN BHUIYAN, TANVIR MANZUR,ASHIKUR RAHMAN JOARDER, MD. ZAHURUL ISLAM, MD. ASHIQUR RAHMAN AND FERDOUS SARWAR

Fire incidents, in the last few years, seem to have been a common phenomenon in Bangladesh. A society becomes more vulnerable to fire-related accidents with an increase in economic activities and improvement in quality of life. In the context of recent economic development of Bangladesh, frequent occurrences of fire accidents are not surprising and can escalate in future. Almost all the fire incidents in the country are characterised by mismanagement, unpreparedness and negligence of the owners, users and regulators. Recent fire incidents, from Nimtoli to FR Tower to DNCC market, are examples of such laxity in ensuring fire protection measures. Recent fire incidents in the Election Commission building at Agargaon and Minister High-Tech Park at Gazipur clearly demonstrate lack of appropriate fire protection measures even in a nationally important structure such as the Election Commission. This is a clear indication that design professionals lack proper expertise and regulators don't have the capacity to ensure adequate fire protection in new expensive buildings. Such a degree of ignorance and carelessness is highly alarming and warrants immediate planning and execution of a sustainable fire protection strategy for the country.

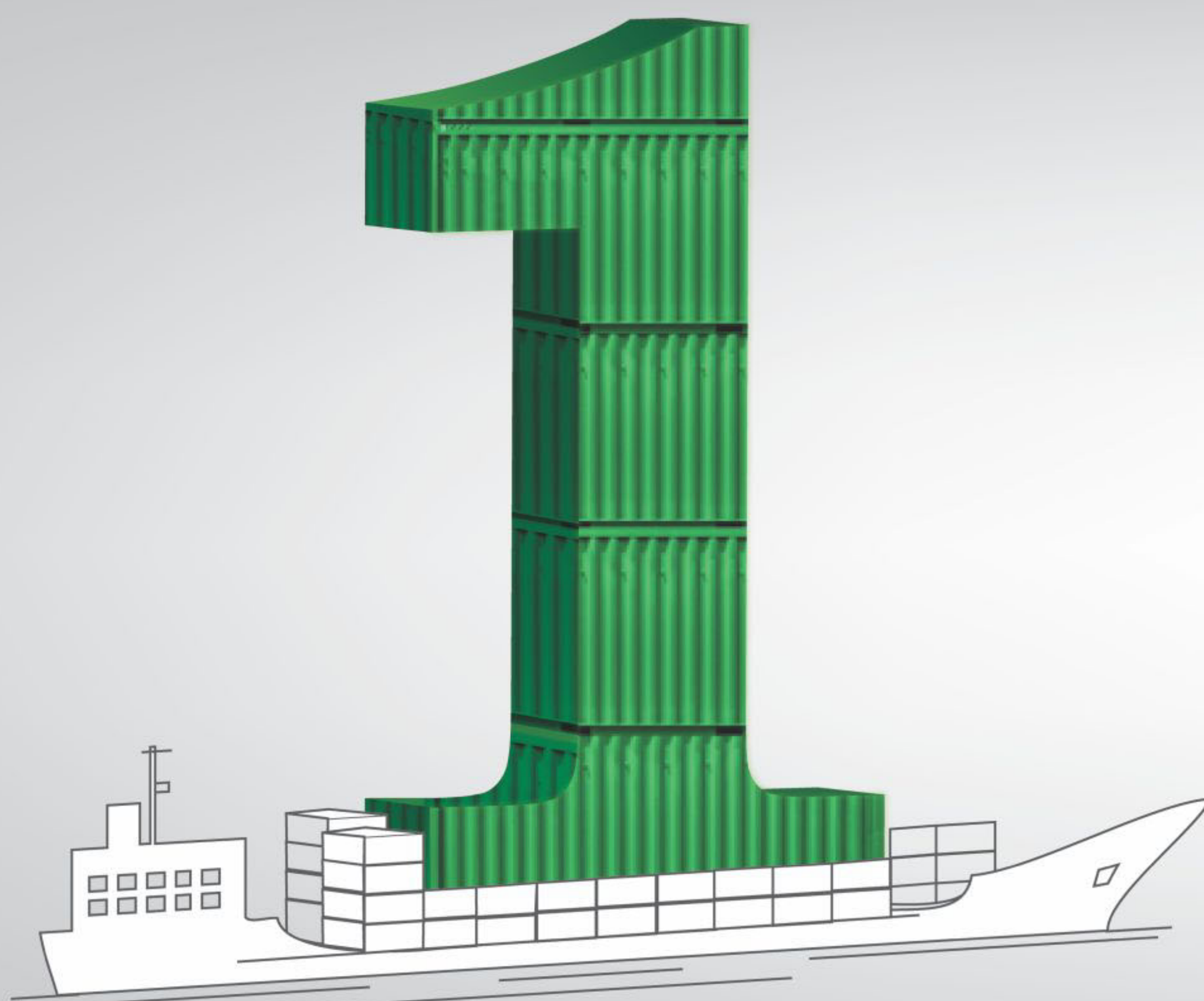
There is no separate fire safety code in Bangladesh. The provisions for fire design are incorporated in Bangladesh National Building Code (BNBC). The fire protection design guidelines in BNBC are based on the 'satisfy concept' which is a prescriptive concept of code. Such prescriptive design methods are usually satisfactory for new construction projects. However, hundreds or thousands of buildings (e.g. residential, industrial, and commercial) have already been constructed without considering fire protection design requirements. Consequently, the country is facing a unique challenge regarding fire safety. Strict implementation of the fire code in construction of new buildings is required and there is a need to develop and execute corrective measures for existing noncompliant buildings. In general, a performance-based design approach is necessary to transform a noncompliant building into a fire compliant one. Such performance-based designs, as against prescriptive ones, are extremely challenging and require specialist knowledge, skills and expertise of fire protection design. This calls for creating scope to produce fire protection engineers from multidisciplinary engineering backgrounds. No institution of the country currently offers any academic programme on fire protection. Accurate assessment of thermal properties of commonly used local construction, decorative and storage materials is another important requirement that is non-existent in the country. Fire rating of various fire separation and fire suppression

systems must also be evaluated properly before their use. Formal education infrastructure on fire protection discipline as well as standard laboratory and rigorous research facilities are of utmost importance to ensure fire safety in the country to prevent and reduce the occurrence of fire incidents in our infrastructures.

Establishing a fire safety institute with state-of-the-art laboratory facilities for fire-related teaching, research, design, testing and investigation is crucial in this regard. In the wake of deadly fire incidents across the country, it has become clear that Bangladesh requires a good number of fire protection engineers and professionals to work in the industrial and other sectors. It would further help to realise compliance with safety codes as well as their continual development, improve preparedness and emergency response, create more awareness among public and ensure the regulating body playing its proper role. If we are to produce our own fire protection engineers with adequate knowledge on fire protection system and safety, it cannot be done without adequate institutional facilities equipped with appropriate laboratories.

The fire engineering and standard laboratories can serve another very important purpose for the country. Due to the heightened hue and cry on the fire safety of different kinds of occupancies, huge quantities of fire protection equipment, such as sprinklers, fire pumps, fire doors, fire extinguishing agents, fire-proof coatings, fire-resistant cables and so on are either being imported or manufactured in the country. All this highly sensitive equipment for fire safety are being installed in different establishments without standard testing. Unfortunately, due to the absence of compliant laboratory facilities, a large number of cheap, non-standard, and non-compliant fire protection equipment is flooding the market. The consequence of our failure to ensure the quality and authenticity of all such fire safety equipment can be fatal and can cause serious setbacks in the economy. The regulators responsible for ensuring fire-safe buildings and installations do not have the required engineering know-how on fire protection. Therefore, in order to prevent this looming disaster, establishing a compliant fire engineering and standard laboratory is of immediate need. Initiatives by BUET faculties to establish a fire safety institute in BUET are yet to get enough attention by our leadership. The concerned authorities need to be proactive and should offer support to establish a dedicated fire safety institute with standard laboratory facilities with local experts under a leading technical university, such as BUET. Compatible with the present trends of economic growth, adequate preparedness for capacity enhancement of our institutions and regulators is extremely important. The nation cannot make sustainable growth without adequate preparedness in this field of engineering.

The authors are faculty members of BUET and members of BUET Fire Safety Program, a multi-disciplinary team.



THE EXPORT LEADER

Crown Cement has achieved National Export Trophy thrice for its outstanding performance in cement export. Demand for Crown Cement is gradually increasing at home and abroad for its quality. With the export of Crown Cement, Bangladeshi products are also getting the fame. In addition, Crown Cement is contributing to the national development through foreign currency earning. It's a pride for Bangladesh.

