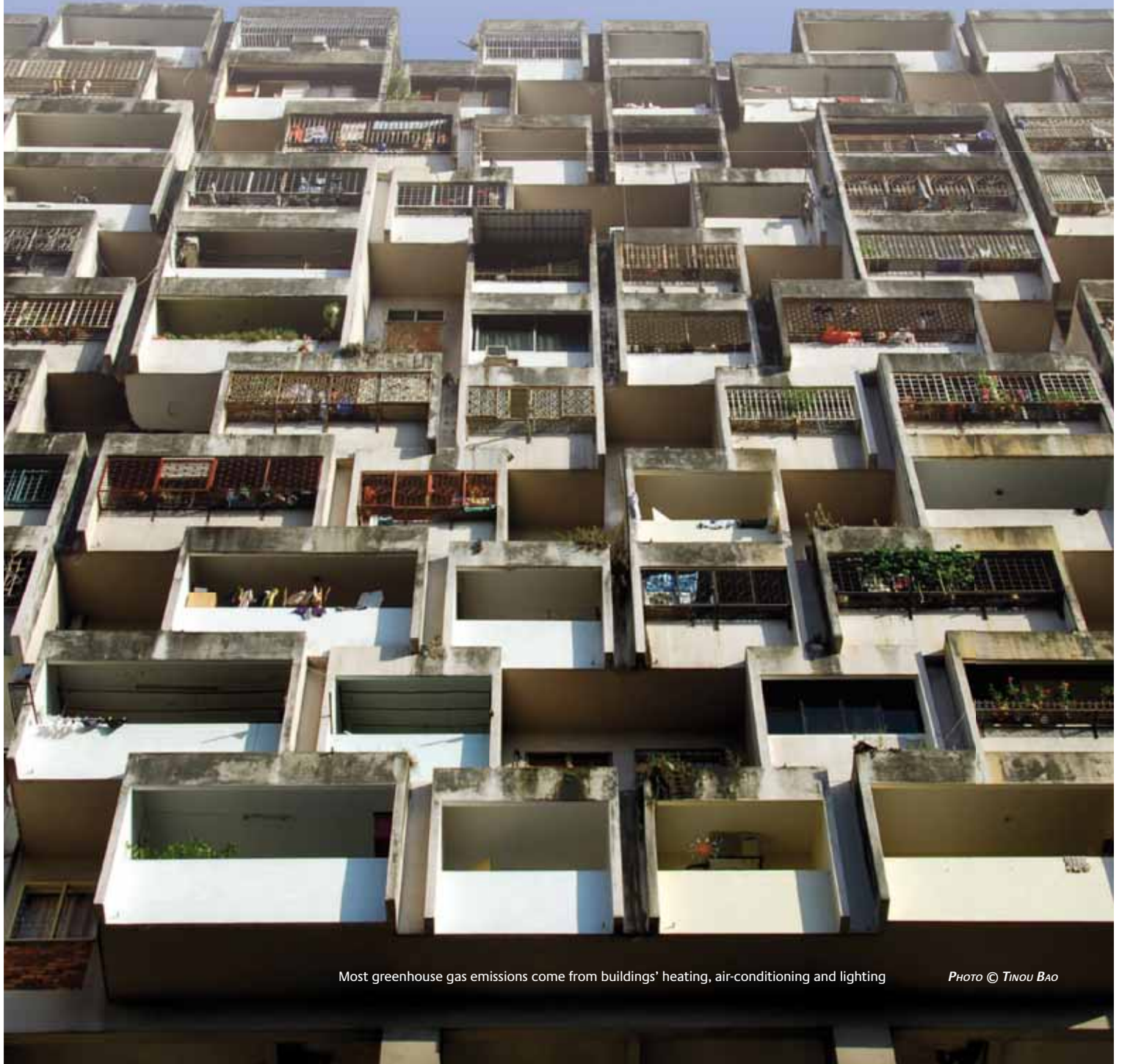


# How construction is vital to reducing emissions

UN-HABITAT has an important role in supporting institutions, professionals and the private sector in the housing and construction sector to mitigate climate change, writes **Mohamed El Sioufi**, Head of UN-HABITAT's Shelter Branch.



Most greenhouse gas emissions come from buildings' heating, air-conditioning and lighting

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Ministries of construction, municipalities, physical planners, architects and the construction sector have a pivotal role in mitigating climate change

Urban greenhouse gases (GHG) are emitted mainly from buildings, industry, and transportation. It is estimated that buildings use up to 40 percent of energy and emit about 30 percent of greenhouse gases during their life cycle.

### The building life cycle

Urban planning and design provide the framework in which buildings are set while architectural design is the conceptualization of how buildings are shaped, built and utilized. Buildings consume energy and emit GHGs during their life cycle.

Beginning with the excavation of raw materials, the production of building materials, the construction and, most importantly, the utilization of the buildings ending with their demolition. Climatic conditions are key in determining the amounts of energy used by buildings and their emissions.

### Urban environmental planning and design

Environmental urban planning and urban design play important roles in saving energy and reducing GHGs. Compact cities enable people to walk, use non-motorized transport, enjoy effective public transit systems and thus reduce commuting distances and emissions. Environmental issues, when taken into consideration during the urban design phase, impact more directly on buildings with regard to orientation exposure to or protection from the sun and wind depending on climate. Water and waste management also need to be considered in a more planned and efficient way.

Both urban planning and design are the responsibility of physical planners and are regulated by municipalities. All should strengthen urban climate change mitigation.

### Architectural design

Architecture has now moved to respond here. The new trends have a variety of names – Passive, Sustainable, Green, Emerald, Eco, Environmental.... Architecture or Buildings.

Some of these trends revive traditional indigenous wisdom used over the centuries to mitigate against harsh climatic conditions on buildings. Walls and roofs, for example, or

shading devices on buildings can be designed for better insulation to reduce heat loss in cold climates and keep it out in hot climates.

Architects and architecture schools are encouraged to produce new designs that will contribute to climate change mitigation. These new designs need also to address the issues of urban poverty and consider low-cost building materials and technologies. Municipal capacities should be strengthened to regulate the types of buildings under their jurisdiction through building licenses for new buildings or retrofitting those that are inefficient.

### Construction

When it comes to the selection and use of construction materials, importing those that need to be brought is a major cause of transport emissions. Therefore the use of local materials and the proper natural resource management are important. In the case of the use of concrete, about three-quarters of the carbon emissions emanate from on-site production, and efforts to convert cement plants so that this is reduced to one quarter must be studied.

In moderate climates, where most developed countries are located, there is little need for cooling and heating. But the use of energy and GHG emissions in the life cycle of the buildings peak in the construction phase. Where bricks and tiles are produced by burning clay for example, GHG emissions are significant. In fact there is usually a double jeopardy from this practice: firstly, wood or charcoal is frequently used to fuel inefficient furnaces. Secondly, vital carbon sinks are reduced because of deforestation. This situation is exacerbated in the case of displacement of large numbers of people in post-crisis situations where there is a need for shelter and the only materials available are trees resulting in deforestation and desertification.

Ministries of housing, construction and industry, bureaus of standards, the private sector, architects and others have an important role in promoting this agenda. Building material production licenses help ensure quality and thus lower emission during construction. Technologies such as stabilized soil blocks produced through labour-intensive hand presses achieve zero emissions and should be encouraged. Production of construction materials close to the building site reduces transport emissions. These concepts need careful planning and by architects and builders. In

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the case of population displacement, relief agencies have to provide sustainable shelter alternatives.

### Building use and management

Most greenhouse gas emissions come from heating, air-conditioning and lighting. If the previously mentioned phases of the building cycle are climate-change-mitigation compliant, then their performance should be efficient. In cases of existing buildings with high GHG emissions, retrofitting is a good idea.

This however, is not enough. The role of people using and managing a building is very important. A passive house needs active inhabitants who remember, for example, to turn out the lights. In developing countries, for example, high GHG emissions emanate from the use of wood and charcoal in inefficient cookers that fill homes where women and children spend a good deal of their time with unhealthy fumes. Utility companies should be encouraged to produce clean energy. Likewise energy efficient household electrical equipment. Municipalities are encouraged to utilize energy-saving bulbs in all public buildings. Penalties for wasting power could be levied through incremental billing.

### Incentives

While the solutions seem straightforward, there is always a cost involved. For example, renewable energy generation necessitates an initial cost that must be calculated through a life cycle analysis. Builders usually invest the minimum in construction leaving the high energy costs to the users.



Air-conditioning does not help buildings' efficiency

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Environmental costs are also not factored in these calculations which once accounted for would show a different picture. Retrofitting building material production units to use less polluting fuels also has cost implications.

In order to overcome this it is necessary to tap into available financial incentives. Paradoxically, despite the above, none or extremely few construction plans have benefited from the Clean Development Mechanism. There is a role for UN-HABITAT to explore this and help make these funds accessible to central and local governments as well as building materials industries. The highest impact would be to address the construction industries in

fast-growing countries where GHG emissions from the production of building materials and the use of buildings are significant.

The role of professionals in planning cities and designing and converting buildings using green principles can contribute significantly to mitigate climate change. On the regulatory side, ministries of housing and construction as well as local authorities that issue building licenses can all contribute positively to ensure that the state-of-the-art design concepts are applied and appropriate building materials, sources of energy and other measures are utilized to reduce GHG emissions and minimize the use of non-renewable energy.

UN-HABITAT through its Shelter Initiative for Climate Change Mitigation as part of the Sustainable Urban Development Network aims at supporting various partners mentioned above in achieving significant reductions in energy use and GHG emissions in buildings and urban settings. ♦

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