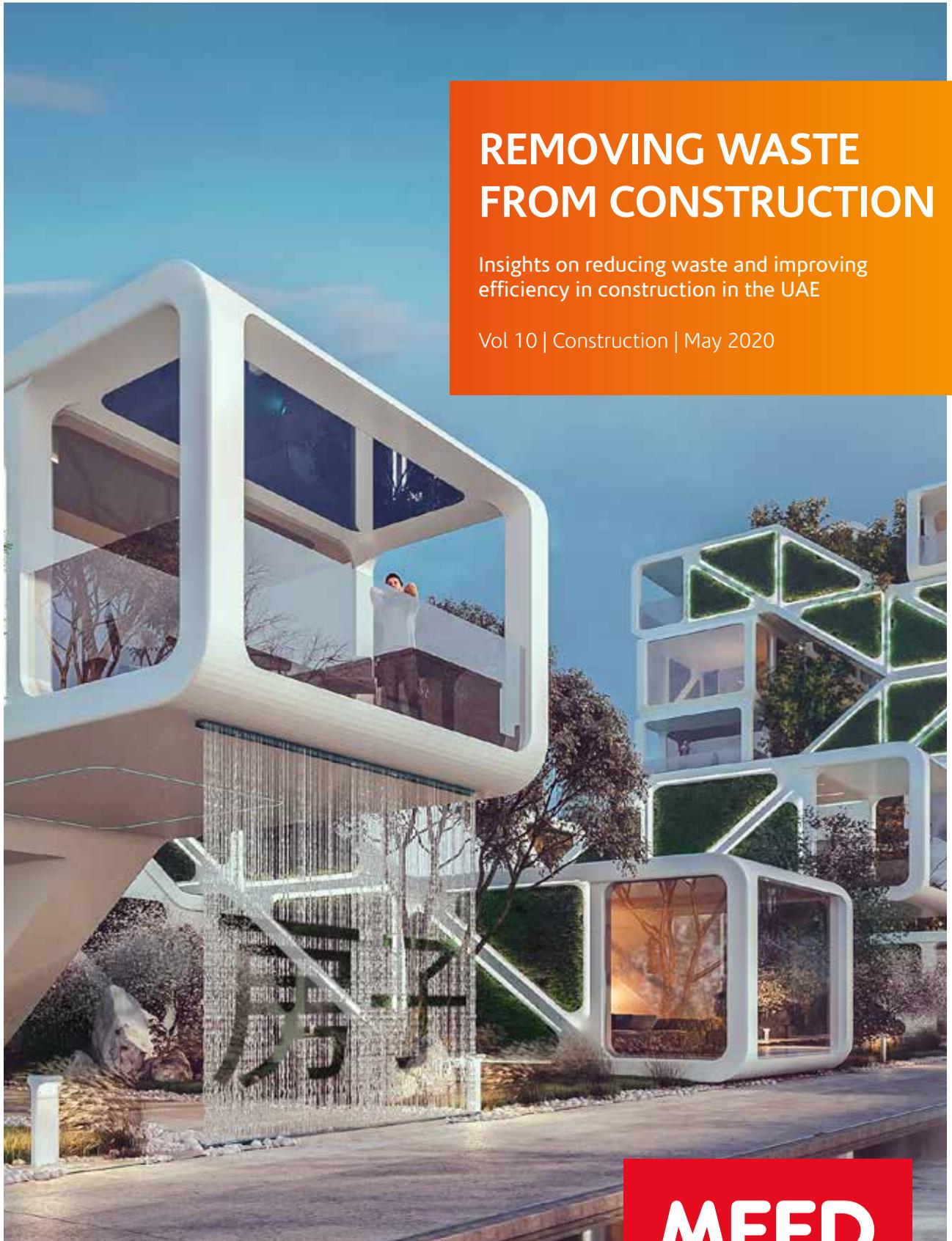


REMOVING WASTE FROM CONSTRUCTION

Insights on reducing waste and improving efficiency in construction in the UAE

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PLANNING TO MINIMISE

To cut down on the amount of time and materials wasted, the industry must engage in better planning from stage one of a project

The fundamentals of the GCC construction industry have changed dramatically in recent years. Contractors and consultants in the region are under increasing pressure not only to deliver projects with less waste at the end of it, but to design structures that continue to give good value to clients and end-users through their full life cycle.

But poor design has been cited as the major cause of construction waste, with an estimated 33 per cent resulting from architectural decisions made at the outset of a project. In addition, late changes to project scope along with document errors have been highlighted by contractors as major causes of time and cost overruns.

Early consideration of waste reduction during the design stage of a project development, along with meticulous planning, is essential to enabling resource-efficient construction in the long-term.

Many projects in the region are fast-tracked so developers can start generating income from their investments as quickly as possible. This means construction often commences before the plans are finalised.

Incomplete, poorly specified designs lead to errors and costly changes during construction. Estimates for the cost of rework on projects range from 6 to 15 per cent of the total budget. In addition, post-contract design variations are cited as a major cause of lost time on a project, along with delays caused by obtaining the requisite government permits and approvals.

“Absence of, or non-compliance with, regional building regulations, codes, and standards that govern the adequacy of design creates waste,” says Akram Ogaily, executive consultant at the US’ Hill International. “It is also necessary to provide an adequate design review, audit or assessment to avoid waste [at a later stage].”

Better contracts

Bad design choices and poor communication between the teams can lead to changes and errors that could have been avoided by early collaboration. The appointment of a construction manager or design-and-build contractor during the planning stage will result in better integration of design and construction.

“[They] could help to select the proper [procurement] method tailored to the project type, development objectives and the type of procurement contract awards,” says Ogaily. “The project manager or construction manager, through well-defined and planned procedures, could achieve better control of construction processes including site, logistics, quality of materials and waste control.”

A more detailed understanding of technical constraints during the building process would enable better design decisions from the outset.

“Waste comes from construction documentation produced by engineering consultants [without an understanding of the] technical capacity of [the] design consultants and services engineering practices,” says Ogaily.

An early agreement on the use of compatible systems and standards such as building information modelling (BIM), document management systems and a common data environment will help avoid misunderstanding and duplication, and will improve efficiency as the project progresses.

Less is more

“Waste can be attributed to poor or [excessive] design of structural, civil, mechanical and electrical works; over-done architectural design images; or incomplete detail design information,” says Ogaily.

Overcomplicated designs coupled with a lack of awareness of the standard dimensions of raw materials in the market leads to over-ordering and excessive cutting and trimming on site. As well as generating a large amount of solid waste through offcuts, custom sizing increases the scope for error and is slow and labour-intensive.

A simplified design adhering to industry-standard sizing will reduce this waste, but taking it one step further, modular construction methods offer the industry dramatic reductions in both time and labour.

Going modular

Prefabricated modules made offsite in factory conditions provide advantages such as predictability and efficiency, which are normally associated with the manufacturing industry. Accurately-produced components are quick to install, typically bringing a 30-50 per cent reduction in man hours according to the Modular Buildings Institute. And because production can be done in parallel with site activities, the overall project timeline can be significantly reduced.

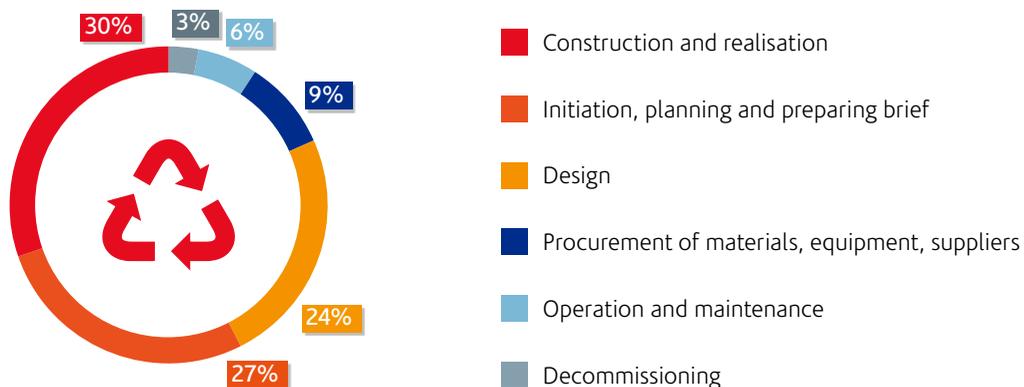
Prefabrication carries the benefits of scale: repeatable, optimised processes, centralised procurement and a concentration of specialist staff can deliver higher quality with less waste.

Circular thinking

Simple design decisions such as stipulating durable, recyclable materials, using bolts rather than adhesives, and minimising composites, coatings and finishes can make the difference between a component being reused after building demolition or being sent to landfill.

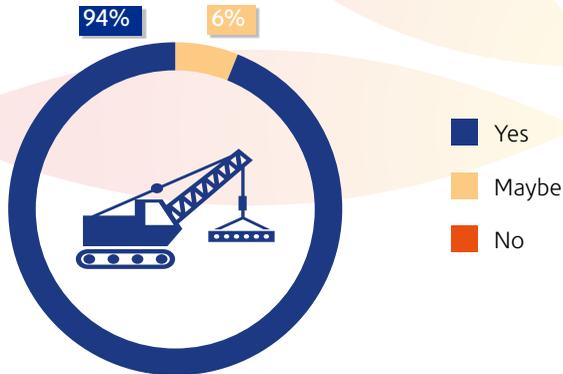
As well as re-using single components, flexible build-

Which project life cycle stage is most critical to reduce the overall amount of waste generated?



Source: MEED Mashreq Construction Industry survey

Can better management of waste on a construction project reduce its construction and lifecycle costs?



Source: MEED Mashreq Construction Industry survey

ings that can be adapted to suit different requirements to increase the lifespan of the structure are gaining popularity in the region.

A mixed-use tower in Dubai called Opus by Omniyat was set up for spaces to have different uses with only minor modifications, ensuring the building would be able to meet the needs of the end-user for as long as possible.

Optimising planning and encouraging ongoing feedback throughout the lifecycle of a building will give stakeholders the opportunity to reflect and learn.

“The best-laid plans can be laid to waste if monitoring and feedback are not effective,” says Manosh De, Middle East urban planning lead at US consultancy Jacobs.

“Many regional projects still suffer from a siloed delivery approach,” says De. “Knowledge gained from the operations, maintenance and how people use the infrastructure should feed into how [other projects] are planned and designed in the future. This is essential to help prevent both design and material wastage and to improve the development of sustainable, adaptable infrastructure that meets the needs of its users.”

Information modelling

For many years, proponents of innovation in construction have talked about the potential for BIM systems to transform the building industry.

“It stands to reason that the best way to minimise material waste is not to use it in the first place,” says Waseem al-Azeh, senior manager for sustainability at Lebanon’s Khatib & Alami.

“I would say that a 33 per cent reduction of waste at the design stage is a conservative figure, and that 50 per cent



should be achievable for most projects,” says Al-Azeh. “This is especially the case where projects are designed in BIM, because we can fully visualise what is being built well before construction work starts. So it should be perfectly possible to avoid purchasing excess materials, while rework due to misunderstandings can be reduced.”

Utilised fully, the technology provides a central design platform that can be accessed by stakeholders throughout the lifecycle of a project to improve communication and collaboration, minimise clashes, highlight errors at an early stage and streamline scheduling and procurement.

BIM also introduces the potential to track a development after completion to provide data for maintenance and future designs.

The adoption of BIM in the region has been patchy however, and the technology is rarely employed to its full capability. The UAE government has mandated its use on certain projects, but there are various interpretations of what constitutes BIM, and sometimes it does not go far beyond the use of a straightforward computer-aided design (CAD) model.

Collaborative approaches and compatible platforms, along with clear legislation and standards will open the door to all of the advantages that BIM modelling can bring to the construction industry.

“Digitalisation is starting to play a bigger role in waste reduction through the use of BIM and other technologies,” says Al-Azeh. “These are enabling even sophisticated buildings to be developed using modular construction, which [makes] ‘zero waste’ a realistic target within the next decade.”