

# Materials & Waste Aspects

## Off-site construction the way to go

Prefabricated prefinished volumetric construction (PPVC) is one of the game-changing technologies that support the Design for Manufacturing and Assembly (DfMA) concept to significantly speed up construction.

### WHAT IS PPVC?

PPVC is a construction method whereby flats or modules made up of multiple units complete with internal finishes, fixtures and fittings are manufactured in factories, and are then transported to work site for installation in a Lego-like manner.

### WHAT ARE THE BENEFITS OF PPVC?

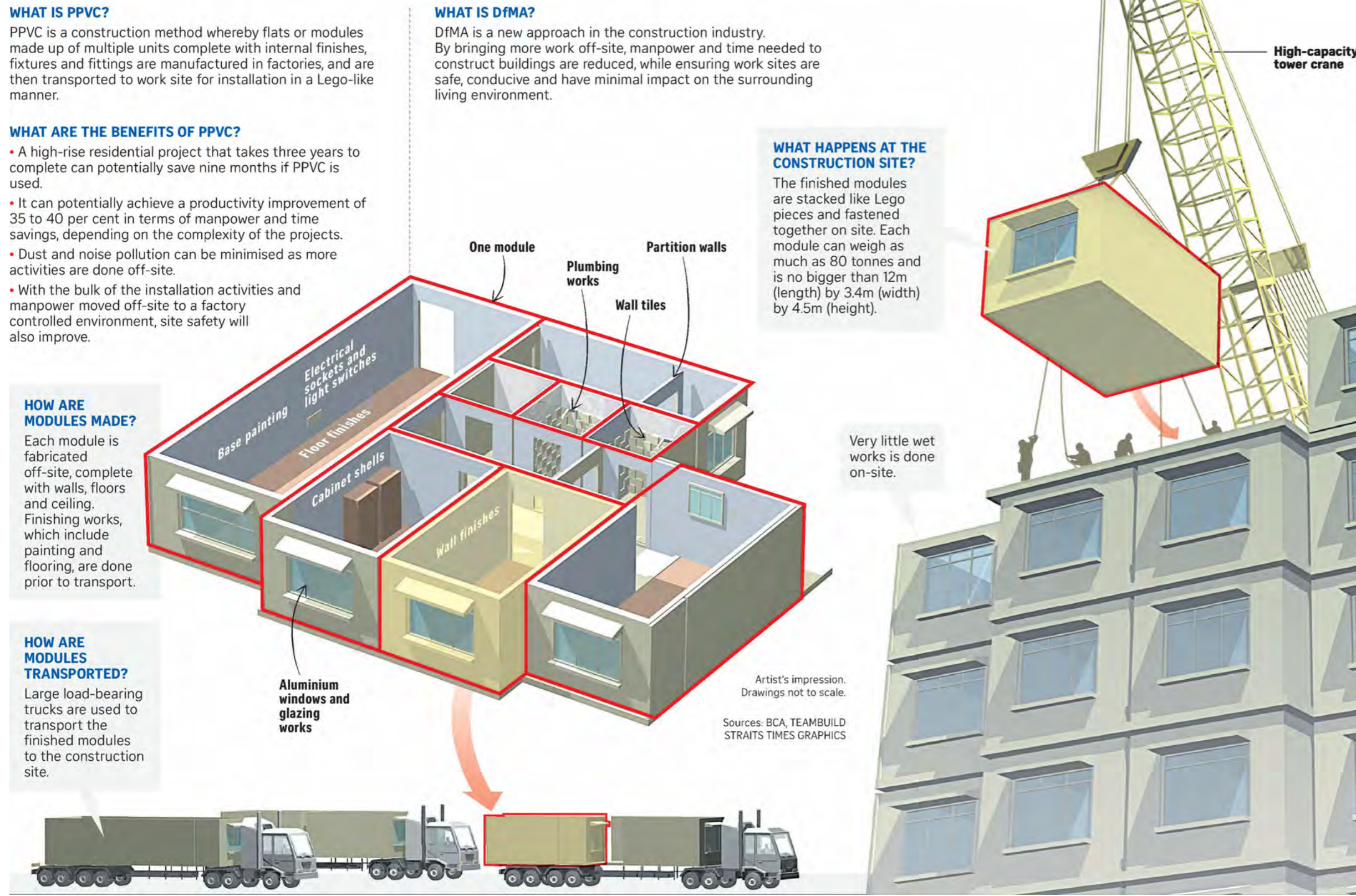
- A high-rise residential project that takes three years to complete can potentially save nine months if PPVC is used.
- It can potentially achieve a productivity improvement of 35 to 40 per cent in terms of manpower and time savings, depending on the complexity of the projects.
- Dust and noise pollution can be minimised as more activities are done off-site.
- With the bulk of the installation activities and manpower moved off-site to a factory controlled environment, site safety will also improve.

### HOW ARE MODULES MADE?

Each module is fabricated off-site, complete with walls, floors and ceiling. Finishing works, which include painting and flooring, are done prior to transport.

### HOW ARE MODULES TRANSPORTED?

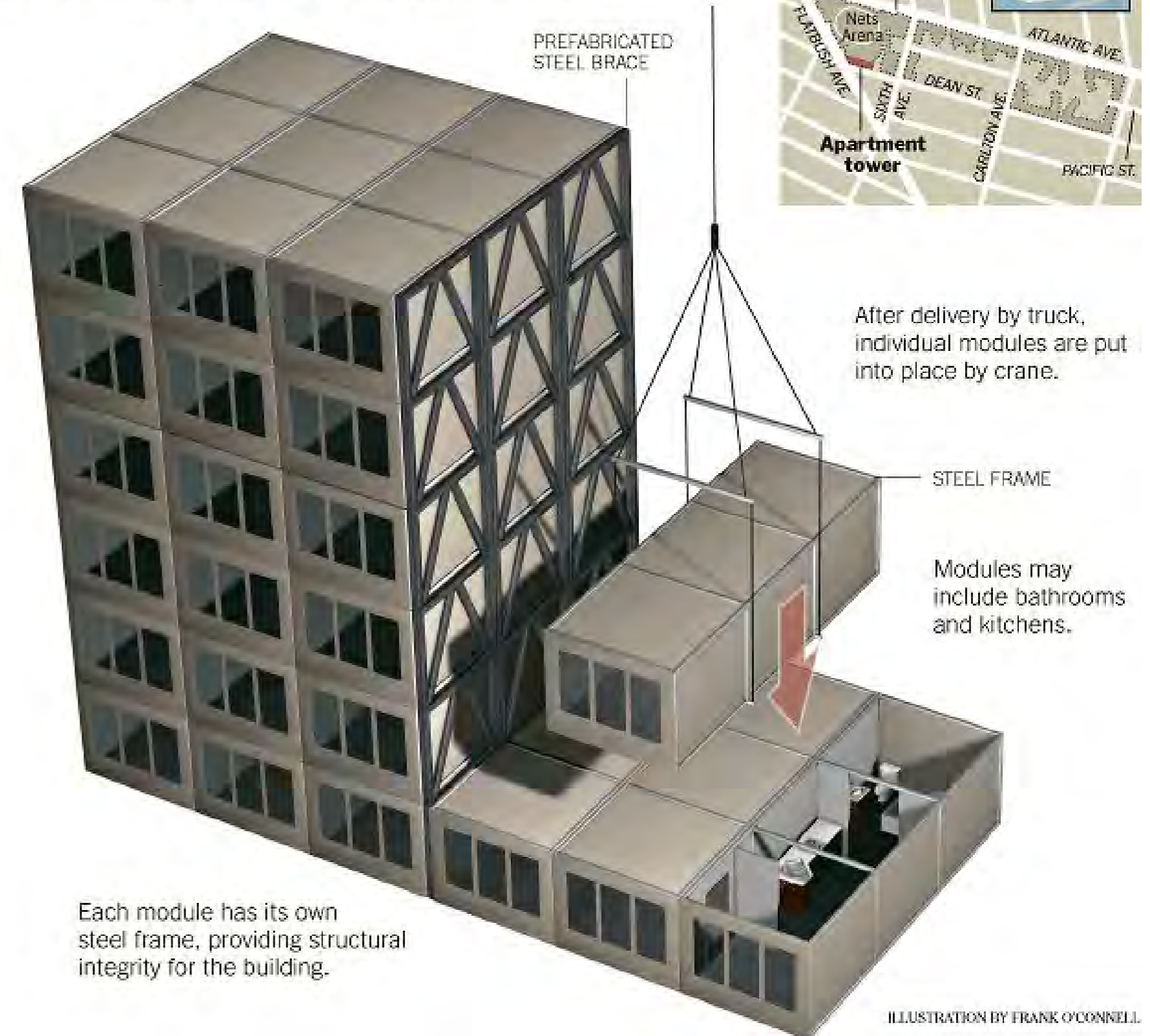
Large load-bearing trucks are used to transport the finished modules to the construction site.



PPVC Off-Site Construction

## A Modular High-Rise

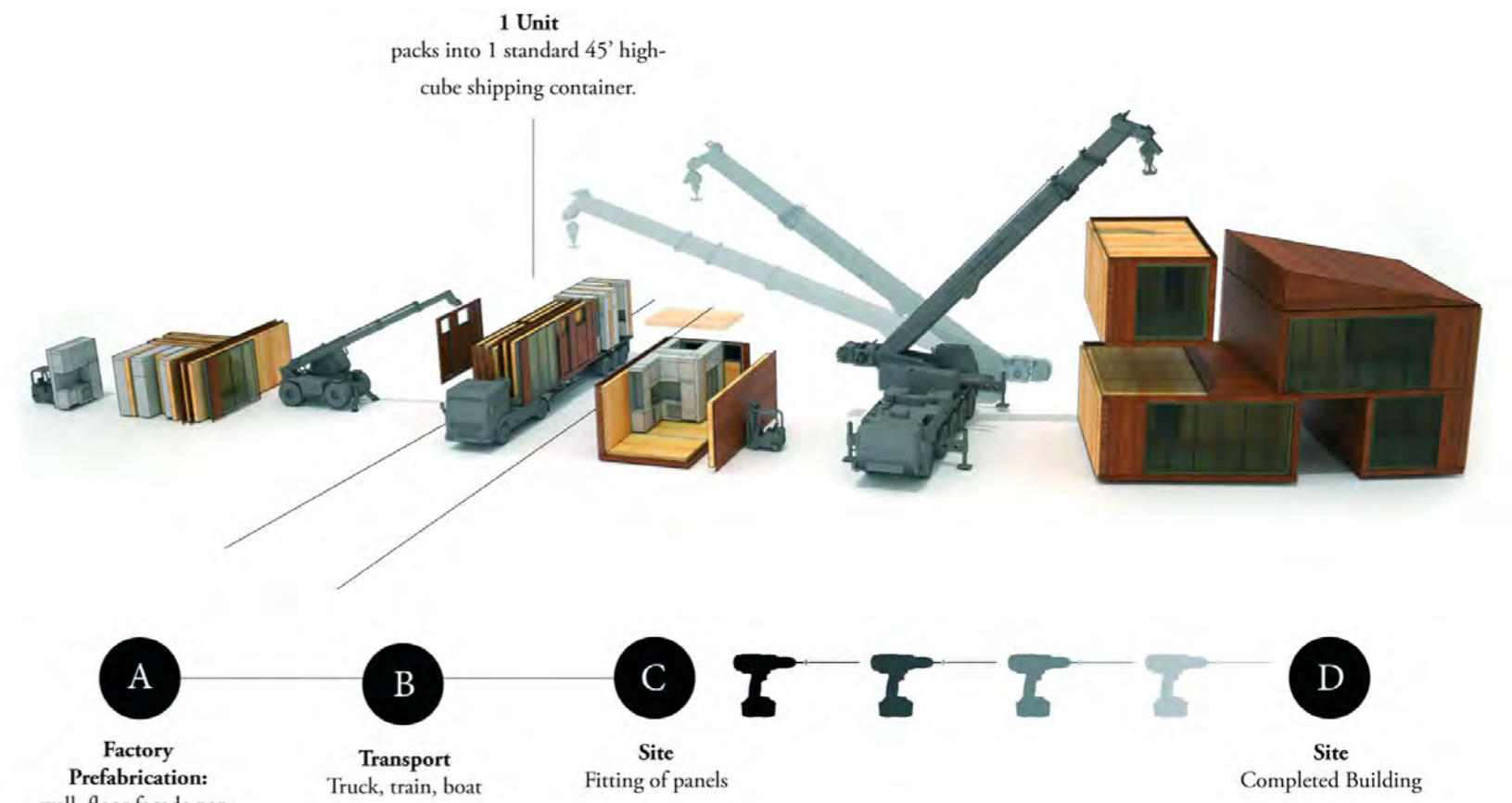
The developer of Atlantic Yards in Brooklyn is exploring plans to build what would be the tallest prefabricated steel structure in the world, a 34-story apartment building. The "modules" could be built in a factory and bolted together on-site, as in this hypothetical section:



Each module has its own steel frame, providing structural integrity for the building.

ILLUSTRATION BY FRANK O'CONNELL

Prefabrication of Modular Units in Mid-Rise Residential Construction

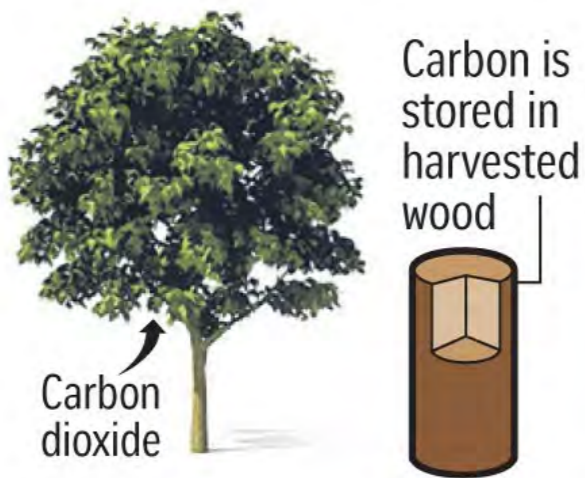


Assembly Process of Timber Panels

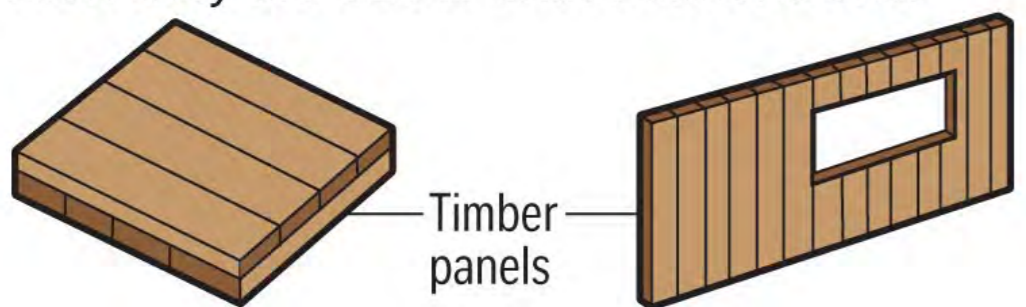
**1 Harvest**  
Wood is harvested from sustainably managed forests. New trees are planted to replace harvested trees.

Carbon dioxide

Carbon is stored in harvested wood



**2 Fabrication**  
Layers of timber panels are glued together for strength and structural stability. Then they are cut to exact dimensions.



**3 Assembly**  
The cut timber components are delivered to the site and assembled.



Timber Used for Prefabrication Units



Recycled Bricks in Ningbo History Museum

Upcycling of Waste Material



Wasted Waer Bottle as Recycled Constuction Material

Sustainable Material



Bamboo Architecture Sustainable Building Material