

Plastic containers

There are two main types of plastic container living walls: those consisting of a series of pots, each of which contains a single plant; and those consisting of a series of modular panels, each of which contains a number of different plants.

a) NemeC Cascade Garden system (CZ)

The system comprises individual plastic containers sized 100 x 100 x 150 mm which are mounted in rows on metal racks. The plants are planted into a substrate (soil). It is straightforward to remove individual dead plants; only a single container needs to be replaced. Irrigation is regulated through a system of channels underneath the planting containers and works on the principle of gravity (falling water) and capillary action over the soil. Excess water is gathered in a collection container underneath the wall. Watering frequency is regulated using a timer. Fertigation is carried out using controlled-release fertilisers for ornamental plants, which are released during appropriate weather conditions [10]. Similar systems include AgroSci External Grid system from the USA [11] and JKD Hortitech Greenwall system from India [12].

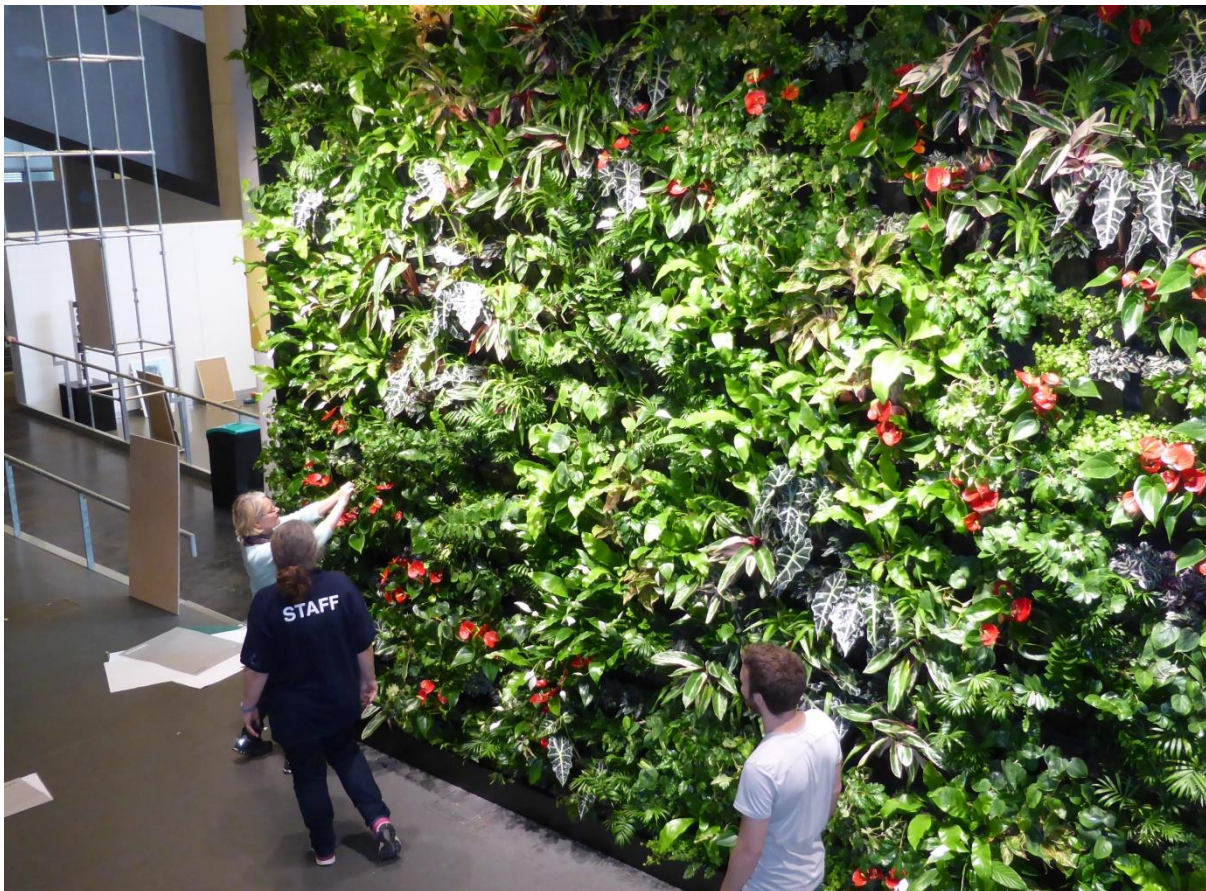


Figure 22: NemeC Cascade Garden system at the University of Greenwich (UK)
Source: https://greenroofslivingwalls.files.wordpress.com/2016/06/p1020913_c.jpg

b) AgroSci Aerogation Active Phytoremediation system (USA)

In the Aerogation system, air is pumped into the air purification unit (APU) where it picks up moisture from wicks fed with water from enclosed troughs. The moist air is then introduced into the root zone of plants held in individual planters where microbiological communities can break down pollutants. A 300-plant wall has the cleaning capacity of 60,000 house plants. The system comprises individual HDPT containers with a capacity of 1300 cc [13].

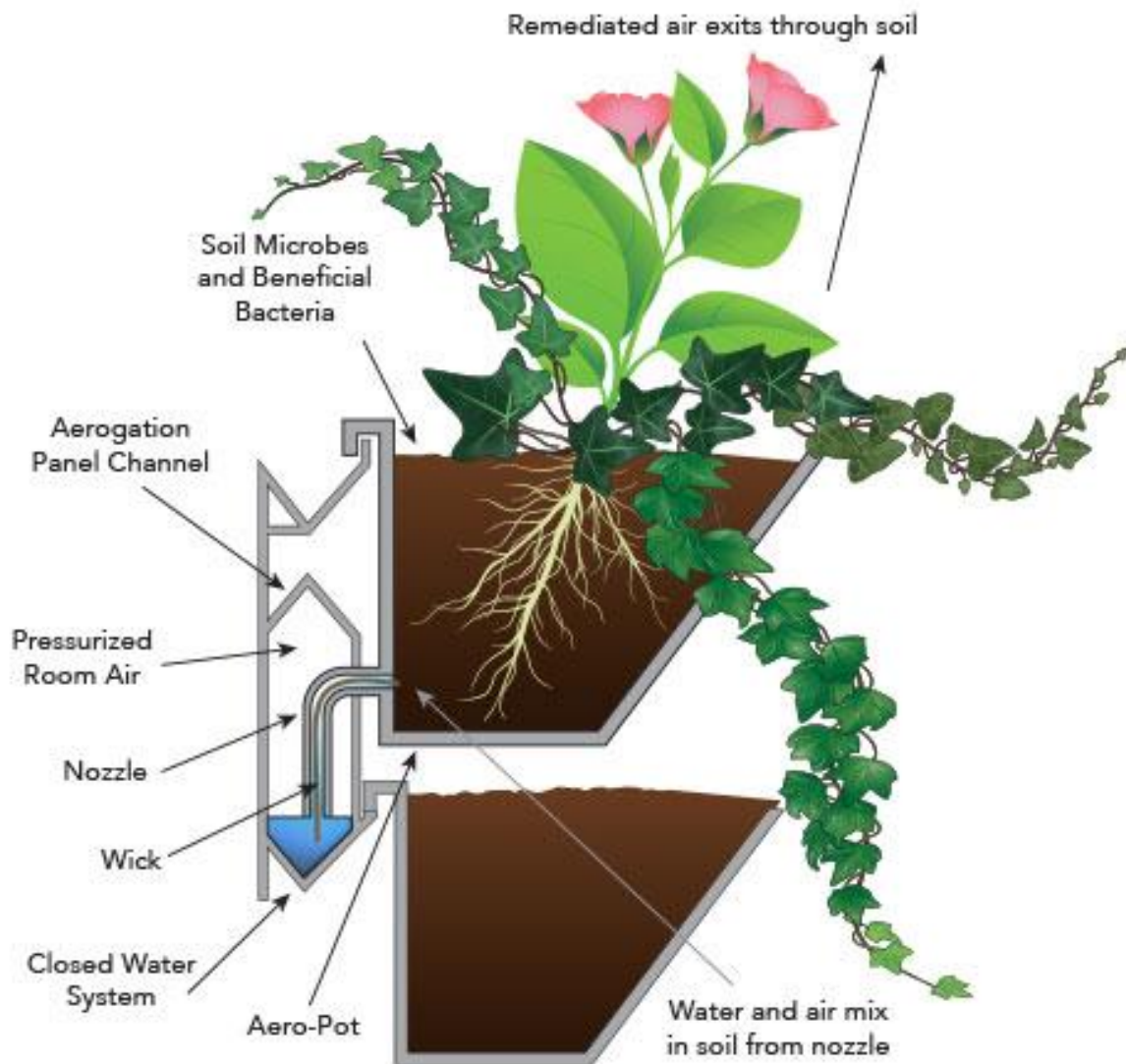


Figure 23: AgroSci Aerogation Active Phytoremediation system

Source: <http://gardencentermd.com/greenwall/wp-content/uploads/2014/07/system.jpg>

c) Humko system (SI)

The system is modular and assembled from panels (softshell and others) with dimensions of 900 x 535 mm, within which the planting containers are integrated. Each panel comprises several layers (from back to front: plastic, glass wool, membrane, plastic). The panels are affixed to metal racks mounted on the wall. The plants are then planted in a special substrate with a high concentration of pumice. Irrigation is regulated through a drip system in several levels between the panels, which enables zone watering. The watering is regulated by computer. Fertigation is carried out using a micronutrient solution which is supplied to a storage water container underneath the wall. Dosages are regulated by computer [14]. Similar systems are made in the UK by Mobilane [15] and ANS Global [16], in Hungary by Greenwall Pro [17] and in India by JKDHortitech [18].

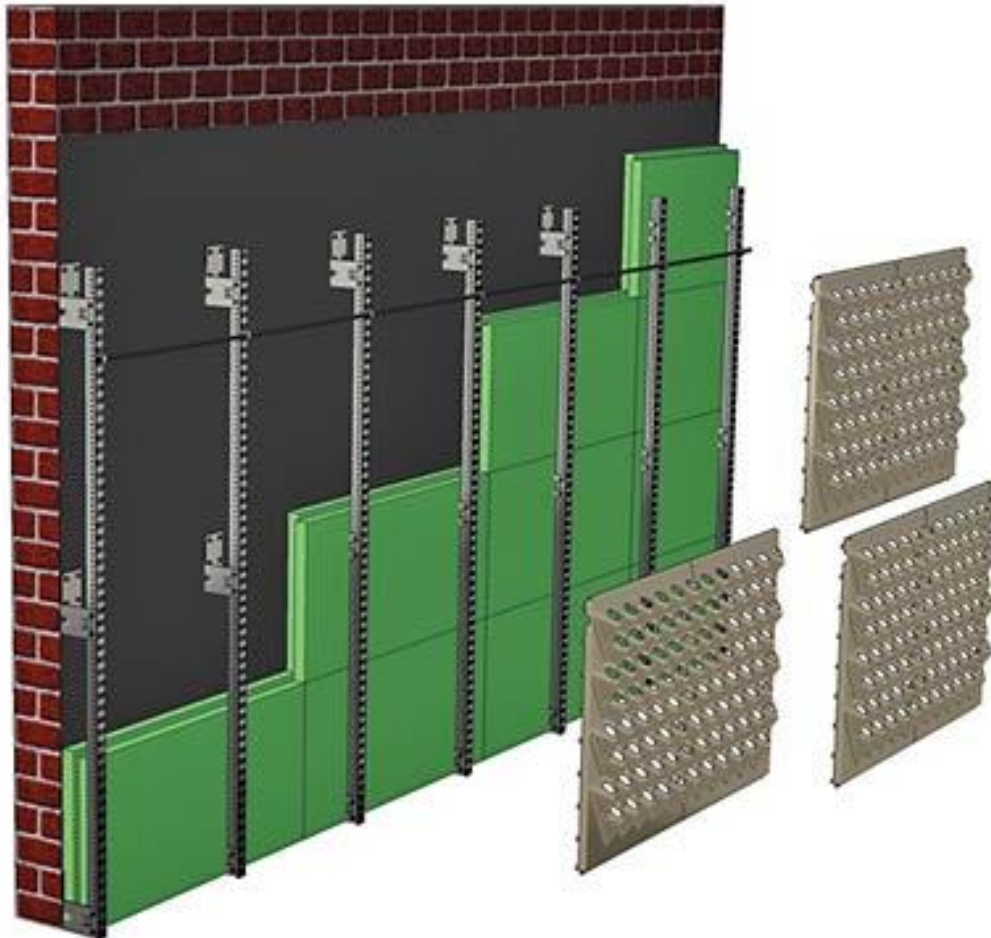


Figure 24: Modular assembly of the Humko system
Source: <https://www.humko.si>

d) Novintiss Vertiss Plus system (FR)

The module is made from lightweight high density expanded polypropylene which insulates the growing medium and the roots against extreme heat and cold. The modules are attached to a metal frame on the wall. Each module measures 760 x 590 mm and holds sixteen plants. The inside of the module is not partitioned so the 32 litres of compost benefit all 16 plants. The volume available for the roots and water (and fertiliser) circulation and distribution is therefore a major asset for the plants' successful growth. The replacement of plants, where necessary, is simple. The growing medium consists of pozzolan and clay balls, garden peat and water-holding agents (colloids). The irrigation station (primary system) controls frequencies and durations for watering and adding nutrients to the living wall thanks to a programmer and electrovalve(s). Each module in the living wall is watered by a drip line connected to the irrigation/fertigation station [19].

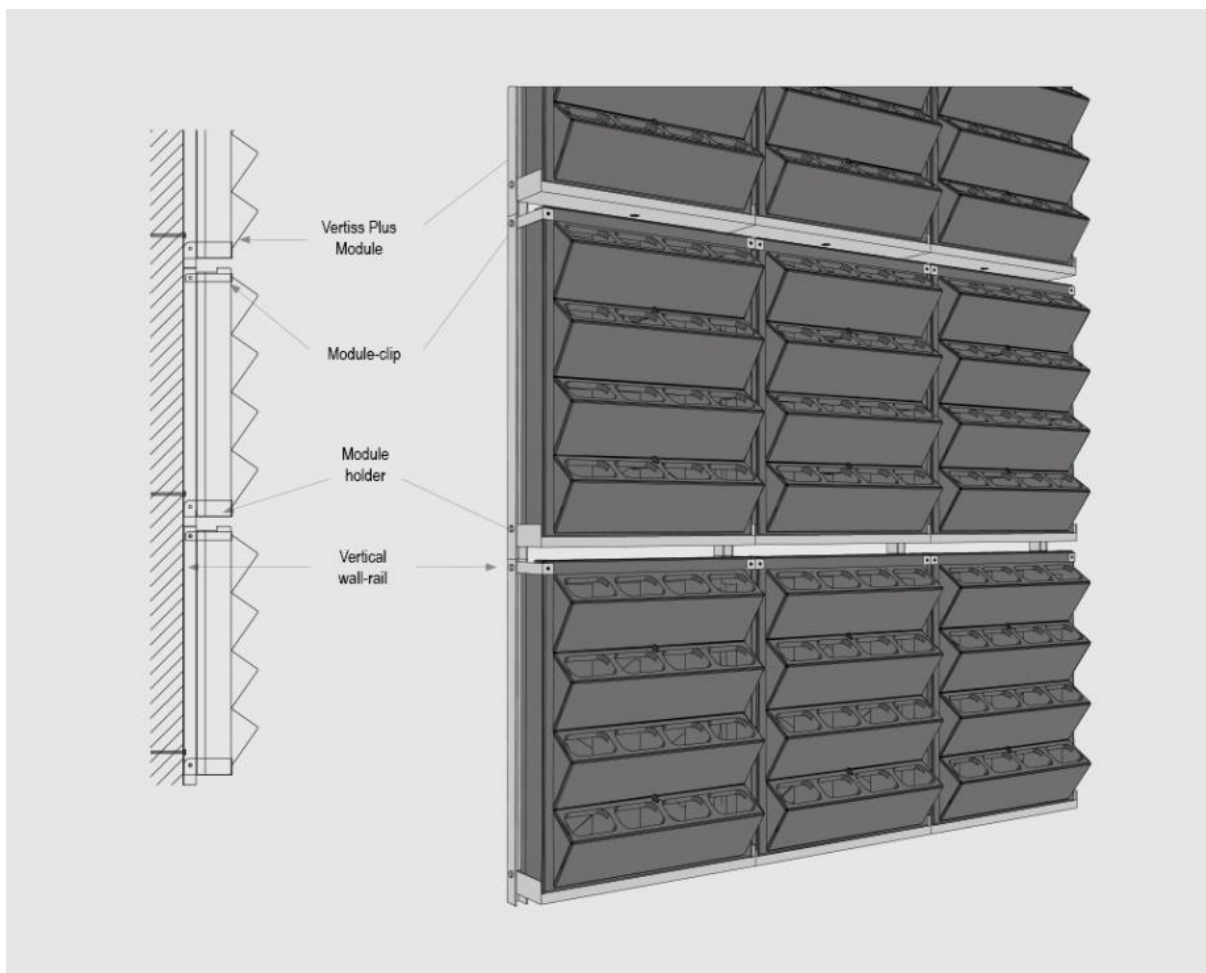


Figure 25: Novintiss Vertiss Plus system

Source: http://www.vertiss.net/media/copy_schemastructurevertissplus__085694900_1742_10082016.png



Figure 26: Novintiss Vertiss Plus system, Blomet, Paris (FR)

Source: http://www.vertiss.net/media/vertissplus__042093900_1729_10082016.jpg

A similar system is the Modulogreen living wall (PT). Made from polypropylene reinforced with fiberglass, the modules are resistant to temperature fluctuations and root pressure, and provide a large volume of substrate for plants, with approximately 4 litres/plant [20]. The Treebox Easiwall system (UK) has a similar design, and is made from 80% recycled materials [21].

e) Biotope BioWall system (UK)

The modular Biotope BioWall is a unique patented hydroponic system. 20 plants are contained within each 600 x 445 mm panel that contains an inert growing medium called Grodan (horticultural rockwool). The plants take root and anchor into the growing medium and each row of panels is irrigated and fertigated via precise pressure compensated dripline technology [22].

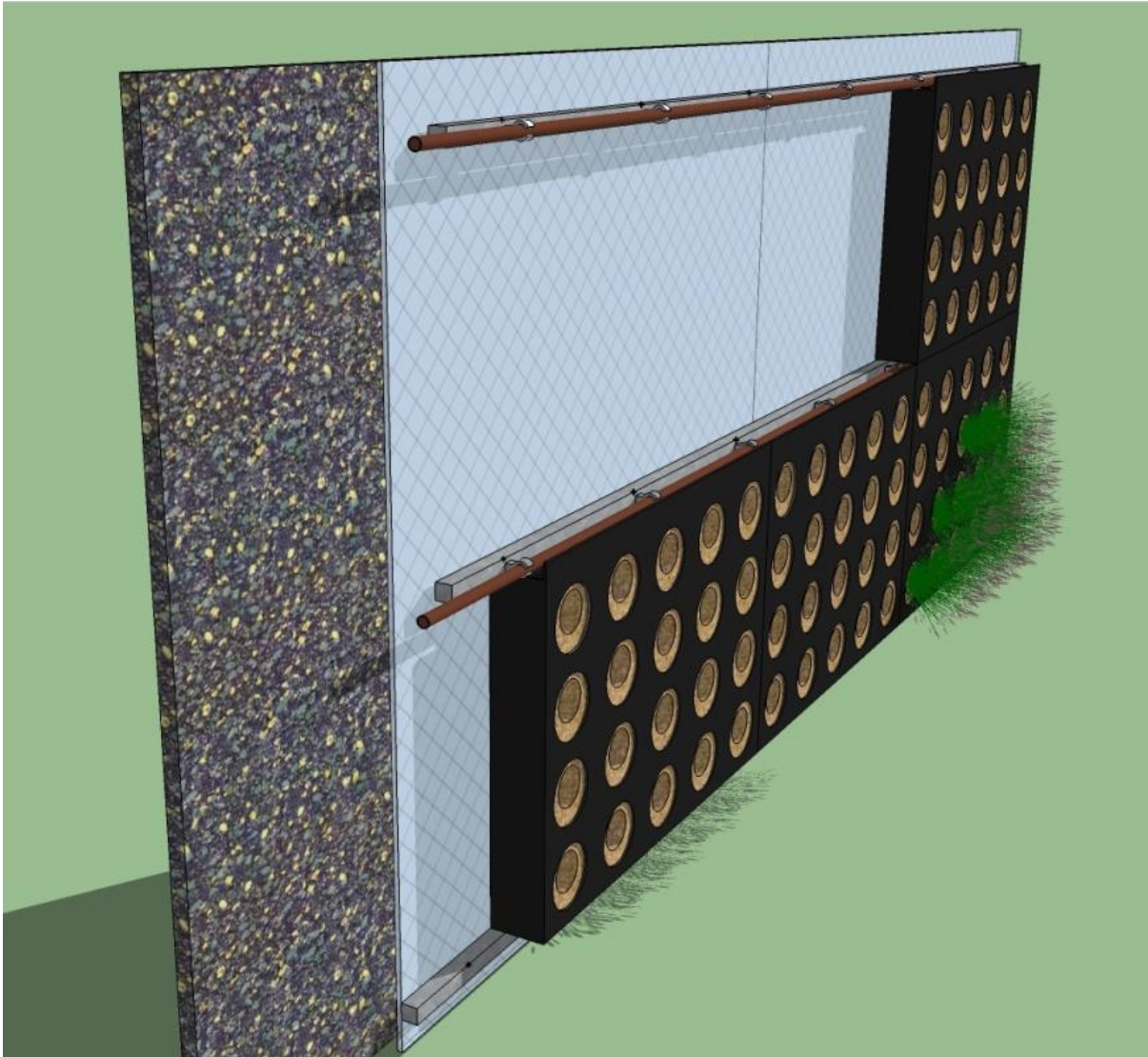


Figure 17: Biotecture BioWall system

Source: https://www.architectsjournal.co.uk/pictures/2000x2000fit/5/2/5/1305525_Biotecture-Wall_Assembly_no_rails.jpg

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