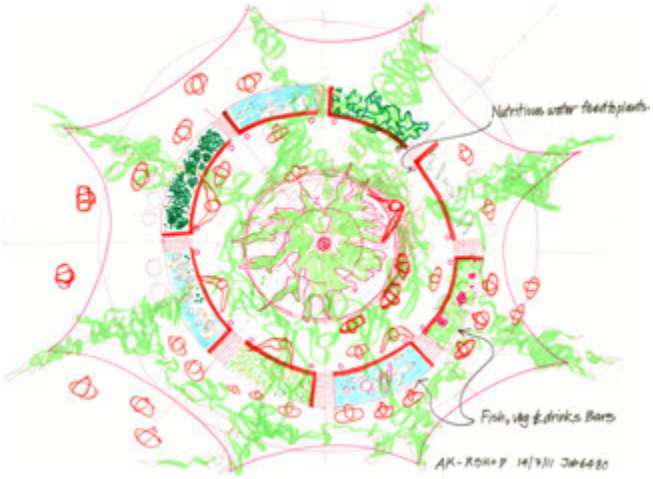
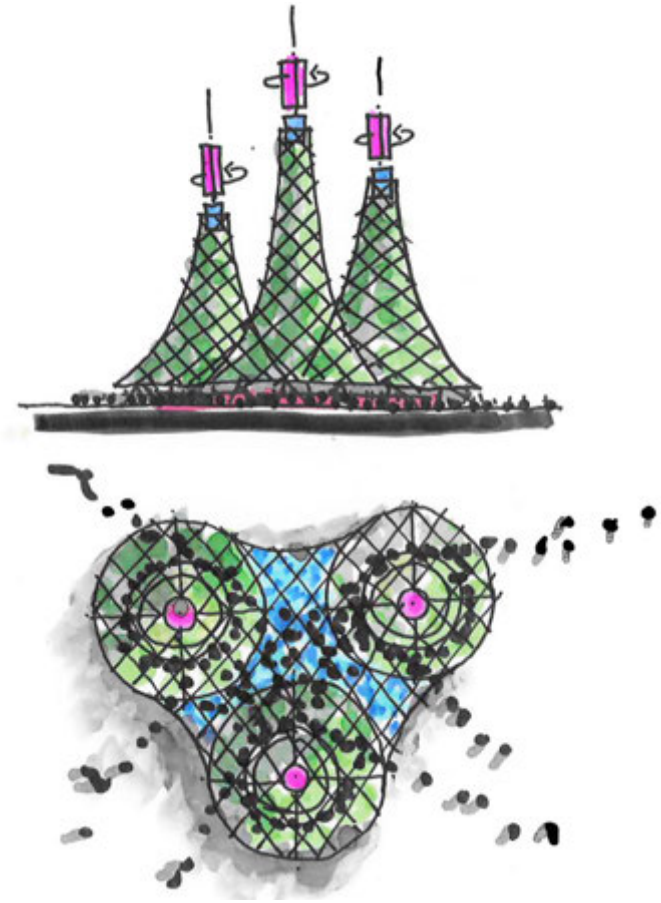
Skyfarm

Skyfarm represents a thorough, believable and beautiful project.

World Architecture Festival Awards Jury





Date
2014

Engineer
Arup

Awards

2014
Winner of the World Architecture Festival's Future Projects Experimental category

Skyfarm was initiated as a research project in response to the 2015 Milan Expo theme 'feed the world'. It is said that by the year 2050 nearly 80 percent of the earth's population will reside in urban centres. Over the same period of time (36 years), the earth's population is expected to grow by an additional 3 billion people. If we continue to use traditional farming practices, it is believed that an area of land larger than Brazil will be needed to feed these additional people.

Skyfarm proposed an alternative to the typical land-intensive farming systems. A vertical farm, it was designed to produce crops in multi-storey structures within high density urban areas or where there is insufficient land or poor quality soil. The multi-storey tensegrity structure (isolated components in compression delineated by prestressed tension members) was to made of light bamboo to create a rigid circular frame and maximise sun exposure onto the farm. These towers supported several layers of agricultural cultivation and an aquaponics system that enabled growth of crops and fish together in a re-circulating system; nutrients derived from fish waste would be fed to the plants and the plants provide filters for the fish to thrive in.

The structure was zoned to make the best use of water and nutrients, and to spread the weight of water efficiently across the tower. At ground level the proposal offered space for a market or restaurant to encourage the public into the farm and act as an education space or social hub, where all the growing parts of the tower were visible. Above this was a large transparent tank where freshwater fish such as bass, tilapia and barramundi would be farmed. In the middle of the structure, plants could be grown hydroponically in water rather than soil. Above this, an aeroponic system, where plants would be grown in a misty environment using minimal water and no soil used. The top of the tower housed water tanks and wind turbines.

The hyperboloid form of the tower enabled it to be easily scaled. A 10-metre version could be constructed in a school, or an 80-metre farm built in a larger urban area. Its geometry could also be adapted depending on the earth's latitude and the amount of sunlight available. In cooler climates, a double skinned enclosure and heating could be added to create optimum growing conditions.

While the upfront costs of Skyfarm were higher than standard industrial scale agriculture, the ability to grow produce with a short shelf life, such as strawberries, spinach and lettuce, around the year and close to market without costly air-freighting, makes it an attractive, sustainable proposition.