

Vertical Farming system.

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Introduction

With rising population and purchasing power, demand for food and changing consumer preferences are building pressure on our resources. Vertical Farming, which means growing food in skyscrapers, might help to solve many of these problems. The purpose of this study was to construct a Vertical Farm and thereof investigate the economic feasibility of it. In a concurrent Engineering Study initiated by DLR Bremen, a farm, 37 floors high, was designed and simulated in Berlin to estimate the cost of production and market potential of this technology. It yields about 3,500 tons of fruits and vegetables and ca. 140 tons of tilapia fillets, 516 times more than expected from a footprint area of 0.25 ha due to stacking and multiple harvests. The investment costs add up to € 200 million, and it requires 80 million litres of water and 3.5 GWh of power per year. The produced food costs between € 3.50 and € 4.00 per kilogram. In view of its feasibility, we estimate a market for about 50 farms in the short term and almost 3000 farms in the long term. To tap the economic, environmental and social benefits of this technology, extensive research is required to optimise the production process.

Plant Factory: An Indoor Vertical Farming System for Efficient Quality Food Production, Second Edition presents a comprehensive look at the implementation of plant factory (PF) practices to yield food crops for both improved food security and environmental sustainability. Edited and authored by leading experts in PF and controlled environment agriculture (CEA), the book is divided into five sections, including an Overview and the Concept of Closed Plant Production Systems (CPPS), the Basics of Physics and Physiology–Environments and Their Effects, System Design, Construction, Cultivation and Management and Plant Factories in Operation. In addition to new coverage on the rapid advancement of LED technology and its application in indoor vertical farming, other revisions to the new edition include D and selected commercial PFALs & updated information on the status of business R (plant factory with artificial lighting). Additional updates include those focused on micro and mini-PFALs for improving the quality of life in urban areas, the physics and physiology of light, the impact of PFAL on the medicinal components of plants, and the system design, construction, cultivation and management issues related to

transplant production within closed systems, photoautotrophic micro-propagation and education, training and intensive business forums on PFs. Includes coverage of LED technology Presents case-studies for real-world insights and application Addresses PF from economics and planning, to operation and lifecycle assessment..