

EXECUTIVE SUMMARY

The client, Growing Power, is a national nonprofit organization which educates the community on sustainable farming, specifically vertical urban farming. The organization's goal is to provide those communities with high quality, healthy, safe, and affordable food.

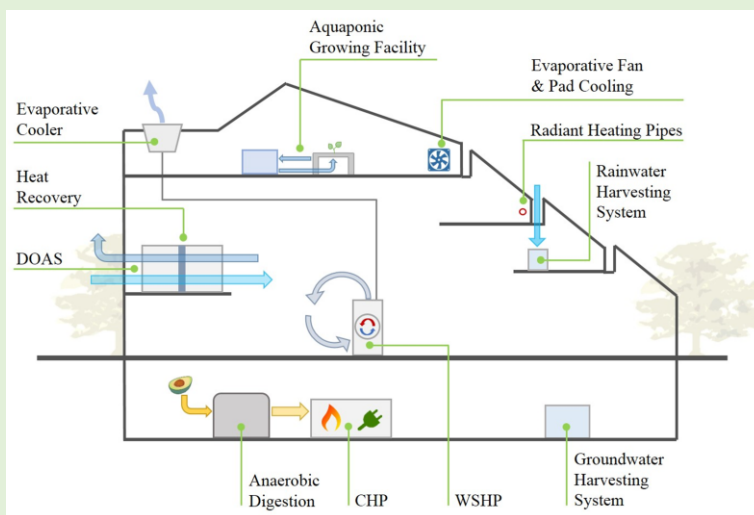
The design team of Total Building Design (TBD) Engineering was asked to develop and submit plans for the new Growing Power headquarters in Milwaukee, WI. The headquarters will be a five-story vertical farm that composes of greenhouse facilities, a market space, offices, and educational spaces for the community. Growing Power has also stressed that they planned to use the developed design as a prototype for future Growing Power facilities in other locations in the United States. The TBD design team investigated what makes a vertical farm successful and aligned that with Growing Power's goals to establish the goals for the project:

Community Outreach – The vertical farm should be an integral part of the community in which it is placed. The design team paid close attention to how decisions affected the community and how the community can benefit from the design of the systems.

Sustainability – The success of a vertical farm system relies heavily on the concept of self-sustaining technologies in order to justify the energy use associated with indoor farming. The design team therefore introduced renewable energy strategies as well as focused on a closed energy loop design.

Flexibility – In order for the facility to successfully impact other communities throughout the country, the design implements technologies that are easily relocated and conscious of the surrounding resources. TBD strives to produce a building that will give Growing Power a strong identity.

Closed Loop Mechanical Design



[PROJECT HIGHLIGHTS]

Combined Heat and Power Facility (CHP):

A CHP system provided the necessary heating and electric demand for the vertical farm.

86% CO₂ Emissions Reduction

On Site Primary Fuel Production:

Primary fuel is produced on site using anaerobic digestion and soybean oil alternatives reducing community emissions.

22 ton reduction in CH₄ produced in landfills per year

Water Source Heat Pumps (WSHP):

WSHP condition the building saving **11%** in energy use compared to the baseline model.

Dedicated Outdoor Air with Heat Recovery (DOAS):

A **29%** savings in energy use is achieved through heat recovery of ventilation air.

Aquaponic Growing Facility:

Aquaponic farming techniques are used to reduce water demand and educate the community.

98% Water Efficiency

Rainwater and Groundwater Harvesting System:

Rainwater and groundwater is collected to offset the water demand of the facility.

99% Reduction in Overall Domestic Water Demand