



BrightFarm™

BENEFITS OF BUILDING INTEGRATED FARMS

Hydroponic greenhouses are the best available technology for growing food in cities, offering a high yield from a small footprint. At New York Sun Works, our systems for sustainable urban farming combine rooftop greenhouses with water conservation and renewable energy, reducing the environmental impacts of agriculture and contributing to food security.

▶ SAVE LAND

Hydroponic greenhouses save land. Vegetable yields are 10 to 20 times the typical yields of field agriculture.

▶ CONSERVE WATER

Hydroponic greenhouses save water. With recirculating methods, irrigation consumes four to ten times less water than field agriculture. The greenhouse roof is designed to capture rainwater, which also eliminates storm-water runoff.

▶ NO POLLUTION

A correctly designed hydroponic greenhouse eliminates fertilizer runoff – a leading cause of global water pollution. Urban greenhouses bring the farm to the dinner table, eliminating the use of fossil fuels in tractors and trucks.

▶ BETTER HEALTH

Integrated pest management eliminates pesticides and uses beneficial insects to control pests. Access to fresh vegetables is improved by locating farms in urban communities.

▶ CLEAN ENERGY

With sustainable energy designed into every system, up to 1.5 kg of CO₂ emissions can be mitigated for each kg of produce:

- ▶ Solar photovoltaic power is an excellent source of power for the pumps and fans used in the greenhouse, because supply and demand both peak when the sun is shining. A grid-tie ensures reliability.
- ▶ In colder climates, waste heat can be recovered from buildings (e.g. bakeries, manufacturing plants, server farms) and used to heat the greenhouse.
- ▶ In many climates, the greenhouse can provide energy benefits to the building, shading the roof in summer and collecting solar heat in winter.
- ▶ Evaporative cooling controls indoor temperature in a natural way, with minimal energy. In a fully integrated design, a building and a greenhouse share one cooling system. The cooling effect is greatest in hot, dry weather.

Is Modern Agriculture Sustainable?

- ▶ It takes one ton of water to grow enough wheat to bake a loaf of bread.
- ▶ 70% of global fresh water withdrawals go to agriculture.
- ▶ The average food item in the United States travels 1500 miles (2500 km) from farm to table.
- ▶ Based on US farmland per capita, it takes an area larger than the state of Ohio to feed New York City.
- ▶ Agriculture accounts for 15% of the world's greenhouse gas emissions.
- ▶ Increasing global warming is expected to lead to wide spread food and water shortages by 2050.



Schools

A rooftop greenhouse teaches biology, chemistry, physics, and environmental science. Hands-on horticultural activities improve student focus and performance.

SCALE 250 m² (~2500 ft²) holds large classes and yields enough produce to boost lunch nutrition for hundreds of students.

OPERATION One full time operator, two assistants, and helping hands.



Commercial

Entrepreneurs can take advantage of efficient, high-yield, year-round production. Proximity to retail market reduces distribution costs. Ecological benefits may attract public sector support.

SCALE Operations of 2500 m² (~50000 ft²) and larger are more likely to be competitive.

OPERATION Cultivation staff of 3 or more, plus managers & marketing.



Community

In residential and office buildings, integrated greenhouse systems for power and water earn green building credits. Private greenhouse space and/or community agriculture can be offered to tenants.

SCALE 200 m² (~2000 ft²) will provide fresh vegetables for about one hundred people.

OPERATION Can be outsourced to a professional grower, or managed onsite by two or three staff.



Hotel and resort

Eco-resorts and luxury hotels can offer guests premium fresh produce grown onsite, reducing cost and impact of food imports in remote, ecologically-fragile destinations. Farms can be on rooftops grounds, or vertical surfaces.

SCALE 1000 m² (~10,000 ft²) is a good match for a hotel or resort with several restaurants.

OPERATION Can be outsourced or managed onsite.



Our services

PRIMARY SITE DEVELOPMENT

- Greenhouse siting, orientation, and design
- Crop and variety selection
- Plant production systems specification

RESOURCE DEMAND AND SUPPLY

- Electrical and heating load analysis
- Renewable energy supply options
- Water demand analysis and sustainable supply options

GREENHOUSE OPERATIONAL DESIGN

- Irrigation layout and design
- Climate control program specifications
- Crop scheduling

ADDITIONAL SERVICES

- Ecological cost benefit analysis
- Labor needs forecasting
- Educational curricula
- System commissioning

Note: Scale and staffing are estimates. System cost varies from \$100/m² (~\$10/ft²) to \$600/m² (~\$60/ft²) depending on scale, location, and design. Vegetable yields range from 5 to 15 lbs/ft² (25 to 70 kg/m²). Contact us to discuss licensing, food safety, insurance, and related matters.

New York Sun Works

New York Sun Works promotes sustainability by designing ecologically responsible systems for the production of energy, clean water, and food. The first design from New York Sun Works was the Science Barge, featuring a 120 m² (1300 ft²) greenhouse, recirculating hydroponics, water desalination, rainwater catchment, solar power, wind power and biofueled generators. The Science Barge currently operates in Manhattan.

The company's diversely qualified team has academic credentials and professional experience in environmental and mechanical engineering, controlled environment agriculture, renewable energy, ecological design, and sustainable building initiatives, both in the United States and internationally.

