Illinois Tech scientists' aquaponics farm runs on food waste, is fully mobile

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Two Illinois Institute of Technology scientists have invented a fully containerized aquaponics farm that will use local food waste as the energy source instead of electricity, providing grid independence, lower cost than typical indoor farms, and mobility for use in food-poor areas.

Elena Timofeeva, research professor in chemistry, and John Katsoudas, senior research associate in physics, have started a company, AquaGrow Technologies, to design and build the farms.

By 2050, farmers will be asked to produce 70 percent more food than they do today. Indoor food production is increasingly needed because of global climate change and a growing population.

Aquaponics, a method of raising fish together with growing plants in a symbiotic environment, offers a number of benefits, including 90 percent less use of water. But indoor food production has a major challenge: the high energy requirements and cost of electricity needed to power the artificial lights to grow the plants, which makes it barely profitable.

AquaGrow's approach is intended overcome this challenge. Each AquaGrow farm will be housed in a 45-foot-long container with a new type of flat aenaerobic biodigester unit, developed in collaboration with Nullam Consulting, that is scaled tothe energy needs of the container. The biodigester will convert food waste to methane fuel, which in turn will power the farm operation, so the unit does not need to be connected

to the grid.

Besides significant savings on electricity, the biodigester will also provide additional profit streams through organic waste collection fees and sales of the high-value organic fertilizer that is a byproduct of the biodigestion process.

Because the farms will use food waste that otherwise would go to landfills, in addition to healthy food production they will also help to reduce greenhouse gas emissions.

Because the farms are containerized and do not need to be connected to the grid, they can be easily stacked, transported, and used anywhere food is required – after a natural disaster, in refugee camps, or in food-poor rural or urban areas.

Timofeeva and Katsoudas are working on the scaled prototype, and they calculate that a full- scale farm unit in a 45-foot-high cube cargo container will annually produce 14,500 pounds of fresh produce, 1,100 pounds of fish, 110 MWh of energy, and 45 tons of high-value fertilizer and will eliminate 155 tons of food waste and 40 tons of CO2, while generating $40,000 to $80,000 in profit.

AquaGrow is raising money to build was recently named a semi-finalist in the Cleantech Accelerator Open, a program based in Silicon Valley designed to identify and support promising early-stage cleantech companies.

Provided by Illinois Institute of Technology

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