5.3 Technical Specification: Commercial Greenhouses Energy Retrofits

Small Premium Project Type:
For commercial greenhouse projects: Energy conservation improvements to the heating systems of a commercial greenhouse save significant energy.

Description:
Commercial greenhouses energy retrofits for energy conservation include the following four categories.

1. Condensing Boiler or Unit Heater.
2. Thermal Curtains.
3. Under Bench Heating.
4. Intelligent Greenhouse Controller with Night Setback.

Minimum Operation:
Must be used in a full time commercial operation for the full growing season.

For Intelligent Greenhouse Controllers with Night Setback: The unit must heat to at least 50°F for 30 days or more per year.

Equipment Type, Capacity and Performance:
To be eligible for a tax credit, the system must meet the following requirements within each component category.

1. High efficiency condensing boiler or unit heater must include:
    a. Fully condensing unit with electronic ignition.
    b. A minimum of 90% thermal efficiency.
2. Thermal curtains must include:
    a. Installed above the heated space and drawn closed automatically at night.
    b. Designed primarily to be a heat curtain.
    c. An energy savings rate of 40% or higher.
    d. A minimum life expectancy of five (5) years.
3. Under bench heating must include:
    a. Heating system must use hydronic heat distribution directly under the plant bench or under the floor if used as the plant support/growing surface.
    b. Remaining unit heaters must be controlled to turn on only as an emergency backup system.
    c. Must replace existing heaters as the primary heat source.
4. Intelligent greenhouse controller with night setback must include:
    a. Must have a night setback feature.
    b. Heating and ventilation equipment must be controlled by a single control temperature.
    c. Must allow for a dead-band zone of 5^{o}F or greater between heating and ventilation.
    d. Must heat to at least 50^{o}F for 30 or more days per year.
    e. Must have the ability to temporarily override set program temperatures.

f. Must control all heating and ventilation equipment in each greenhouse.
g. Maximum greenhouse size of 15,000 square feet per controller.

Incentive Estimate Worksheet:
The incentive worksheets shown in the following schedules are the prescribed tax credit amounts that small premium projects can receive for commercial greenhouses energy retrofits:

A Measure	B Units	C Incentive Rate ($/Unit)	D Incentive Amount ($) B X C
Under-Bench Heating	Square Feet (sq ft)	$1.00 /sq ft	
Intelligent Greenhouse Controller with Night Setback	sq ft	$0.03 /sq ft	
Thermal Curtain	sq ft	$0.05/sq ft	
High Efficiency Condensing Boiler or Unit Heating	1000 Btu (kBtu)	$2.00/kBtu	
		Total of Column D	