

7. Greenhouse Heating

Greenhouse heating is one of the most common uses of geothermal resources. Because of the significant heating requirements of greenhouses and their ability to use low-temperature fluids, they are a natural application in Montana. A wide variety of plants are grown in geothermal greenhouses, including roses, tomatoes, lettuce, cucumbers, and other vegetables; tree seedlings; poinsettias; potted plants; and bedding plants.



Flowers and bedding plants are popular choices for geothermal greenhouse production.

Photo by Jeff Birkby

Most greenhouse operators estimate that using geothermal resources instead of traditional energy sources saves about 80 percent of fuel costs — but keep in mind this is only about 5 to 8 percent of total operating costs for a greenhouse business. The relatively rural location of most geothermal resources in Montana also offers advantages for geothermal greenhouse operations, including clean air, lower labor costs compared to big cities, and lower land costs. However, the distance to markets can be a big barrier to greenhouse operations in Montana, no matter whether they are heated with geothermal energy or fossil fuels.

The growing interest in local food production had helped open up new opportunities for Montana greenhouse operations. A geothermal greenhouse near Silver Star in southwestern Montana has been producing tomatoes year-round for more than a decade, and has found a market niche selling those tomatoes at local farmers' markets and restaurants in Bozeman and Butte.

In late 2011 a community organization in Ennis completed the construction of two large greenhouses that will use water from a 190 degree F hot springs to provide year-round heating for growing vegetables for the local market. And Chico Hot Springs Resort, just north of Yellowstone National Park, has had a geothermally heated greenhouse in operation for several years. The fresh herbs, flowers, and vegetables grown in this greenhouse are featured in many of the menu items in Chico's gourmet restaurant.

7. Greenhouse Heating - *continued*



A banana tree grows year-round in the geothermally heated greenhouse at Chico Hot Springs Resort north of Yellowstone National Park.

Photo by Jeff Birkby

Geothermal Greenhouse Feasibility Checklist

- ✓ What plants do I want to grow? (Tomatoes, herbs, cut flowers, other vegetables are most common.)
- ✓ How much can I produce in my geothermal greenhouse, given my local climate, available daylight, and the greenhouse temperature I can maintain with the geothermal heating system?
- ✓ Do I have experience growing greenhouse crops? Who will I rely on for growing expertise?
- ✓ Do I have the business and marketing skills to run a greenhouse operation? Can I learn them or hire experts?
- ✓ What is the market for my product? Do I have a special market niche (organic, low-spray, specialty crops, local)? How far away is the market? Is it a local Montana market? Is it seasonal? Year-round?
- ✓ Who is my competition? What makes my product different, better, unique?
- ✓ How much will I be paid for my product? How much are others with similar products paid? Do I need to guarantee delivery of a certain amount of product?
- ✓ How much will it cost to produce this product? Do I clearly understand the total costs of running a greenhouse operation?
- ✓ Finally, given the costs, resources, market, and projected sales, will I make enough money to make a profit?

(Adapted from *Geothermal Greenhouse Information Package*, Tonya Boyd, Oregon Institute of Technology, 2008)



Exterior view of geothermally heated greenhouse at Chico Hot Springs Resort, a few miles north of Yellowstone National Park.

Photo by Jeff Birkby