

Emissions Reduction Alberta (“ERA”) Expanded Technology Pilot (ETP) Final Project Report | May 31, 2023

Project Information	
ETP Project ID:	ETP0161590
Project Title:	Greenhouse Energy Curtains
Recipient Organization:	Big Marble Farms
ERA Project Start Date:	Procurement Start Date: January 31, 2022 Eligible Project Start Date: July 18, 2022
ERA Project Completion Date:	December 31, 2022
Total Eligible Project Budget:	\$745,124
Total ERA Funding:	\$345,768

ABOUT ETP

The Expanded Technology Pilot (ETP) offered a new pathway for Alberta businesses to propose effective, commercially viable technologies that could offer high return on investment but were not supported through the Energy Savings for Business (ESB) program. Successful proposals received funding to support project implementation and will help expand ERA’s understanding of the technology’s performance, market potential, and how it could be best supported in future initiatives.

ETP was open to applications between December 2021 to May 2023.

PROJECT SCOPE

Alberta vegetable growers, Big Marble Farms and Rolling Acres Greenhouses, partnered together to increase the sustainability of their growing practices. They installed computer-controlled energy curtains in two greenhouses that automatically open or close based on the sunlight and temperature needs of the plants inside. This upgrade reduce their heating requirements and saves carbon emissions.

Below, Big Marble Farms has provided additional detail on the outcomes of their project.

PART 1: Commercialization & Technology Benefits

1. List and briefly describe any knowledge-sharing activities since the completion of your ERA funded project. For example, attendance and presentations at conferences or workshops, news articles, social media promotions, etc.

Leads from both Big Marble and Rolling Acres are Directors of the Alberta Greenhouse Growers Association (AGGA). Through this platform, they share learning opportunities with other greenhouse growers. The AGGA hosts annual greenhouse tours which rotate around the province. This is an opportunity for other greenhouse operators to view new technologies and approaches. In addition,

Big Marble and Rolling Acres regularly host informal tours with other greenhouse operators and offer advice and experience to the wider industry.

ERA's CEO is planning to visit Big Marble Farms in summer 2023 to learn more about the greenhouse energy curtains.

2. What is the plan for further commercialization of the technology? For example, what does the next 3-5 years look like, will the technology be used/exported outside of Alberta/Canada etc.

This is a commercially available technology and therefore no further commercialization efforts are planned. However, as described above, by sharing learning opportunities with other greenhouse growers it is expected that the technology will be further adopted.

3. List any additional benefits from the technology system (e.g., water use, land use, social benefits, etc.). Were there any other learnings from installing the technology? For example, any new insights into technology capability, difficulties or setbacks, what other markets the technology could be utilized in etc.

Not applicable. Big Marble and Rolling Acres both had experience with energy curtains prior to this project.

PART 2: Economic and GHG Impact

4. Provide your best estimate of the number of FTE's supported because of the ERA funded project since project completion:

When considering a Full-Time Equivalent, please include those employees allocating a portion of their time to the project (e.g. a full-time person working one (1) day/week on the ERA project = 0.2 FTE).

Created FTE	Preserved FTE
0	7 FTE part time on the project for installation

5. Provide updated estimated direct lifetime GHG emissions reductions in tCO₂e. Please provide any available evidence, calculations, or data to support this claim. For example, relevant activity date, verification report, assumptions or project plan.

	Total GHG reductions (tCO ₂ e)
Lifetime Savings	754 BM and 135 RA*

*Values calculated by ERA prior to project completion.

Please specify the number of years the equipment is expected to remain operational: 7 - 10

6. Provide any operational data required in the Contribution Agreement (indicate if there is an additional attachment(s)). For example., how much time the technology is operational, how much fuel it uses, etc.

Natural gas data for the period between October 2022 to April 2023 has been submitted to ERA. The data includes comparison to the period between October 2021 to April 2022.

As per the Contribution Agreement, for a period of two years ERA may follow up with Big Marble Farms to request additional follow-up information to evaluating the project’s outcomes or benefits.

7. Provide an update on the Technology Success Metrics identified in the Contribution Agreement:

Success Metric	Actuals
Natural gas usage reduction at Big Marble	9,945 GJ was saved in the comparison period*
Natural gas usage reduction at Rolling Acres	1,455 GJ was saved in the comparison period*

*Values calculated by ERA prior to project completion.

Comparison over one winter season is challenging as the weather plays a significant role in the heating load of the greenhouse, particular months of the 2022/23 winter were significantly colder than the comparison months in 2021/22. We expect that over a longer period of time, greater annual savings will be achieved.

PART 3: Technology Transfer Plan

8. Provide a brief overview of what problem the technology solves.

The installation of energy curtains results in lower natural gas consumption for greenhouse heating. This reduces energy costs for greenhouse operations, which helps to maintain competitiveness.

9. Describe what the customer currently uses to meet their needs that this technology addresses. What are the benefits of this technology over current options?

This project added an additional layer of energy curtains at Big Marble Farms in greenhouse 1 and replaced end of life curtains at Rolling Acres in the South greenhouse.

10. Describe where people can access the technology. Who is responsible for manufacturing, selling and servicing the technology?

The energy curtains were provided by Prins Greenhouses: www.prinsgreenhouses.com

11. Describe who will use the technology and what the target market is. For example, industry, geography, size, quantity of customers, etc.

Energy curtain technology is specific to the greenhouse industry. There are currently approximately 195 greenhouse operators in Alberta totalling 500 acres. Of these, approximately 51% are greenhouse vegetable producers, 38% are floriculture and 11% tree seedling producers. Energy curtains are utilized in all three areas of the greenhouse industry but have the best return on

investments in the year-round operations. The size of Alberta greenhouse operations varies significantly from small, seasonal operations of less than 1 acre, to larger operations up to 50 acres in size. The Alberta greenhouse industry consumes approximately 3 million GJ of natural gas per annum, so technologies which deliver reductions have a significant potential to reduce GHG emissions in the sector, due to the energy intensity of Alberta greenhouse operations.

We do not have data on the number of Alberta facilities who currently have energy curtains installed, but they are standard industry practise for the larger operations, over 10 acres in size, and for newer facilities.

12. Identify specific competitors for similar technologies and substitutes. Include a brief comparison of the technologies and strengths/weaknesses of each. Identify any advantages that might exist with this technology system or that of your competitors.

Prins Greenhouses is the leading greenhouse construction company, and as such they advise many greenhouses who are either in new construction, retrofit or expansions.

13. Describe the primary marketing mediums that either your company uses to market the technology or how you found out about the technology. i.e., advertising, industry contacts, word-of-mouth, public demonstrations etc.

Big Marble and Rolling Acres have a long-standing relationship with Prins Greenhouses.