

**Bruno Faucher, P. Eng., M.Sc., M. Env.**



GREENHOUSE ENGINEER

EDUCATION

- 1990 B.Sc. (Agricultural engineering) Laval University, Quebec, Canada
- 1995 M. Sc. (Agricultural engineering) Laval University, Quebec, Canada
- 2003 2<sup>nd</sup> cycle Diploma, Environnement Management, Sherbrooke University, Québec, Canada
- 2004 M. Env (Environmental Science), Sherbrooke University, Québec, Canada

PROFESSIONAL ASSOCIATIONS

- Member of the **Quebec Order of Engineers**
- Member of the **Canadian Green Building Council**
- Member of **Association of Educational and Research Greenhouse Curators (AERGC)**

SPECIALIZATION

Greenhouse energy use analysis. Research greenhouse design. Commercial greenhouse design and feasibility studies. Development of new greenhouse systems and components.

PROFESSIONAL EXPERIENCE

2004-: DESIGN/PROJECT ENGINEER, as part of the design team of GREENHOUSE ENGINEERING, Toronto, Ontario, Canada

Design Engineer responsible for specific design work on various portions of projects. Carries out all attributed design tasks and collaborates in planning, designing and coordinating with other consultants, users groups and Client. Collaborates in developing drawings and specifications. Design work involves mechanical and control specialties. Carries out site visits and commissioning phase.

### **Institutional greenhouse projects**

- Agriculture and Agri-Food Canada, Horticulture Research and Development Centre, St-Jean-sur-Richelieu, Québec, Canada

Renovation of an existing research greenhouse complex. Design of the greenhouse systems, heating, ventilating, shading, lighting, controls. Renovation of 21 research zones. Shop drawings review, construction supervision. Renovation value of 1.5 M\$. Renovation project just completed.



AAFC St-Jean, Qc, Canada



- Agriculture and Agri-Food Canada, Southern Crop Protection and Food Research Centre, London, Ontario, Canada.

Research greenhouse complex of 6,400 ft<sup>2</sup>, divided into 7 research compartments. Greenhouse structure and cladding systems, radiant heating systems, ventilation, irrigation, shade, evaporative cooler units, A/C cooling, growing benches. Responsible for the programming phase, greenhouse design and specifications. . Project currently under construction.

- State University of New York, Syracuse, NY. Exterior Rehab Illick Hall Greenhouses

Research rooftop greenhouse complex of 7,200 ft<sup>2</sup>, divided into 12 zones. 4,000 ft<sup>2</sup> will be for Teaching & collections, 2,300 ft<sup>2</sup> of research greenhouses and 860 ft<sup>2</sup> of quarantine space. . Greenhouse structure and cladding systems, radiant heating systems, ventilation, irrigation, shade, growing benches. 5 zones are A/C. Responsible for the design of the greenhouse systems and components, specifications and coordination with the other consultants. Project currently under construction.

- Agriculture and Agri-Food Canada, Semi-Arid Prairie Agricultural Research Center, Swift Current, Sask, Canada.

Research greenhouse complex of 6,400 ft<sup>2</sup>, divided into 10 research compartments. Greenhouse structure and cladding systems, radiant heating systems, ventilation, irrigation, shade, evaporative cooler units, growing benches. « Design-build » project. Responsible for the programming phase, greenhouse design and specifications. . Project completed. .

- Agriculture and Agri-Food Canada, Harrington research farm, Harrington, PEI., Canada

Research greenhouse complex of 3,600 ft<sup>2</sup>, divided into 6 research compartments. Greenhouse structure and cladding systems, radiant heating systems, ventilation, irrigation, shade, evaporative cooler units, growing benches. « Design-build » project. Responsible for the programming phase, greenhouse design and specifications. . Project completed.

- University of Massachusetts, in Amherst, MA, Bowditch Greenhouse

Research greenhouse complex of 9,700 ft<sup>2</sup>, divided into 12 research zones. 4,600 ft<sup>2</sup> will meet the BL2P containment level. Greenhouse structure and cladding systems, radiant heating systems, ventilation, irrigation, shade, evaporative cooler units, growing benches. 2 zones are A/C. Responsible for the design of the greenhouse systems and components, specifications and coordination with the other consultants. Development of a greenhouse energy model for LEED certification. Project completed.



Bowditch greenhouses



- Agriculture and Agri-Food Canada, Southern Crop Protection and Food Research Centre, London, Ontario, Canada.

Programming phase for a new research greenhouse complex. Users need analysis, conceptual design, cost estimating, POR (program of requirement).

- Agriculture and Agri-Food Canada, Horticulture Research and Development Centre, St-Jean-sur-Richelieu, Québec, Canada

Programming phase for a new research greenhouse complex. 7 800 ft<sup>2</sup> of greenhouses in 20 research zones and 2 corridors. Estimated construction value of 5.7 M\$.

- ITA de Saint-Hyacinthe, Québec, Canada

Teaching Greenhouses for technology transfer, 5,000 ft<sup>2</sup> of new greenhouses. Construction cost analysis.

- Alberta Infrastructure, Brooks Crop Diversification Centre South, Brooks, Alberta, Canada

New greenhouse complex of a total area of 57,600 ft<sup>2</sup>. 11 600 ft<sup>2</sup> of research greenhouse up to BL2P+ containment level and 46,000 ft<sup>2</sup> of Venlo glass and polyethylene greenhouses for vegetable crops. Greenhouse structure and cladding systems, radiant heating systems, ventilation, irrigation, shade, evaporative cooler units, growing benches. Pre-production greenhouse with 10 heads fertilization system, 16 mixings for randomised irrigation nutrients. First research greenhouse project LEED certified even. Responsible for the LEED issues. Construction value of 11 M\$, construction to begin in 2008.

- Agriculture and Agri-Food Canada, Central Experimental Farm, Ottawa, Ontario, Canada  
14,000 square feet research greenhouse complex, divided in 16 individual zones. Greenhouse structure with insulated glass panel glazing, radiant heating, forced ventilation (evaporative coolers), supplementary lighting, shade systems and irrigation. 4M\$ project scheduled for 2007.



- Faculty of Agriculture and Faculty of Forestry, Laval University, Quebec City, Quebec, Canada  
30,000 square feet research greenhouse complex (new and renovation). Greenhouse structure with insulated glass panel glazing, radiant heating, forced ventilation (evaporative coolers), supplementary lighting, shade systems, irrigation and fog. 10M\$ project Commissioned 2007.



Forestry



Applied researches

2001-2003: ROCHE Ltée., Thetford Mines, Quebec, Canada.

**PROJECT ENGINEER**

Project Management. Business Development. ISO 9001 coordinator.

1994-2001: AGRITECHNOVE INC., St-Anselme, Quebec, Canada.

**DESIGN ENGINEER**

Design Engineer responsible for specific design work on all or various portions of a project. Carries out all attributed design tasks and collaborates in planning and tracking project costs. Supervises and collaborates in developing working drawings. Design work involves structural, mechanical and control specialties. Carries out site visits and commissioning as required by the contract.

Development of computerized tools for greenhouse design.



### **Institutional greenhouse projects**

- Agriculture Canada, Saskatoon Research Station, Saskatoon, Saskatchewan, Canada  
12,000 square feet, 27 zones for research in 5 greenhouses. A frame type structure polycarbonate and glass glazing, radiant heating (steam/hot water), forced ventilation with cooling pads, supplementary lighting, automated irrigation, custom benching. Commissioned 1997.



- Faculty of Agriculture, McGill University, Montreal, Quebec, Canada  
6,500 square feet, 8 zone, research greenhouse complex. A frame type structure with insulated glass panel glazing, radiant heating and forced ventilation, with supplementary lighting, shade curtain, drip and mist irrigation and custom benching. Including labs in basement. Commissioned 1995.



- Agriculture Canada, Pacific Agri-Food Research Centre, Agassiz, B.C., Canada  
14 zone research greenhouse complex. Venlo type structure with glass glazing, radiant heating and ventilation systems with irrigation, shading, fog systems and custom benching.



- Agriculture Canada, Lethbridge Research Centre, Lethbridge, Alberta, Canada  
24,000 square feet, in 35 zones of research greenhouse complex. Greenhouse structure with glass glazing, radiant heating and ventilation systems with irrigation, shading, swamp cooling and benching. Actively involved with a Value Engineering Workshop.  
Quarantine greenhouses: 1,130 square feet of level-3 greenhouses, divided into 4 individual zones. Heating load and cooling load calculations, glazing, shading, benching and irrigation design. Specifications writing.

- Agriculture Canada, Fredericton Potato Research Centre, Fredericton, New-Brunswick, Canada  
8,600 square feet, in 17 zones of research greenhouse complex. Greenhouse structure with glass glazing, radiant heating and ventilation systems with irrigation, shading, fogging, lighting and benching.



- Virginia Commonwealth University, Richmond, Virginia, USA  
2,000 square feet, 4 zone (for different climates), rooftop research greenhouse complex. A frame type structure with insulated glass panel glazing, radiant heating and forced ventilation, with supplementary lighting, shade curtain, drip and mist irrigation and custom benching. Commissioned in 1999.
- USDA/ARS Crops Research Laboratory, Fort Collins, Colorado, USA  
13,000 square feet over 15 zones in independent greenhouse. A-Frame greenhouse structure and isolator cubicles within some compartments. Programming phase, mechanical design, heating load and cooling load calculations, ventilation design. Specifications writing.
- USDA Miles City, Montana, USA  
Programming phase for a new research greenhouse complex.
- USDA/ARS BARC-West, Beltsville, Maryland, Montana, USA  
BL3-Ag Maximum Security Biocontainment Greenhouse and Laboratory. Heating load and cooling load calculations. Electrical and control points list. Greenhouse sequences of control.
- University of California at Riverside Insectary, Riverside, California  
2,700 square feet over 18 zones in independent greenhouse. Gothic type structure with double inflated Teflon film glazing. Heating and cooling load calculations.
- Ottawa Central Farm, Agriculture-Canada, Ottawa, Ontario, Canada  
Technical and financial feasibility study of a research greenhouse complex.

### Conservatory greenhouse projects

- The Governor General of Canada, Official Residence Tropical House, Rideau Hall, Ontario, Canada  
Renovation of existing tropical house. Design of mechanical systems: heating, irrigation, fogging, natural ventilation, controls. Project completed in 2010.



- Science North, Sudbury, Ontario, Canada  
Butterfly house for the Natural Science Museum. Design of mechanical systems: irrigation, fogging, natural ventilation.



- Butterfly House, Niagara Botanical Gardens, Niagara Falls, Ontario, Canada  
11,000 square feet butterfly conservatory. Heating, ventilating and cooling loads (HVAC) and lighting calculations.



**Other greenhouse projects of significance**

Various Feasibility Studies:

- City of Sainte-Foy, Quebec, Canada: Technical and financial feasibility study of a one hectare commercial greenhouses complex.

**Computerized development**

- Development of computerized software for greenhouse design, such as heating, cooling, solar gain, ventilation, fogging.

1993-94: LAVAL UNIVERSITY, Ste-Foy, Quebec, Canada.

RESEARCH ASSISTANT

Mathematical modeling of machinery circulation in Agricultural fields. (M. Sc. thesis)

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