

PureComfort 240 at UTM



Christopher Cheh

Director

Center for Emerging Energy Technologies

**Presented at the 6th Annual
Microturbine Applications Workshop**

January 17-19, 2006

Outline

- **Background**
- **Project Organization**
- **Installation Site Photos**
- **System Specification and Costs**
- **Approvals**
- **Performance**
- **Experiences**

Background



- **University of Toronto at Mississauga**
- **Grow Smart Grow Green**
- **Center for Emerging Energy Technologies**
- **PureComfort 240M**

University of Toronto at Mississauga

“Grow Smart, Grow Green”

Protected
Research

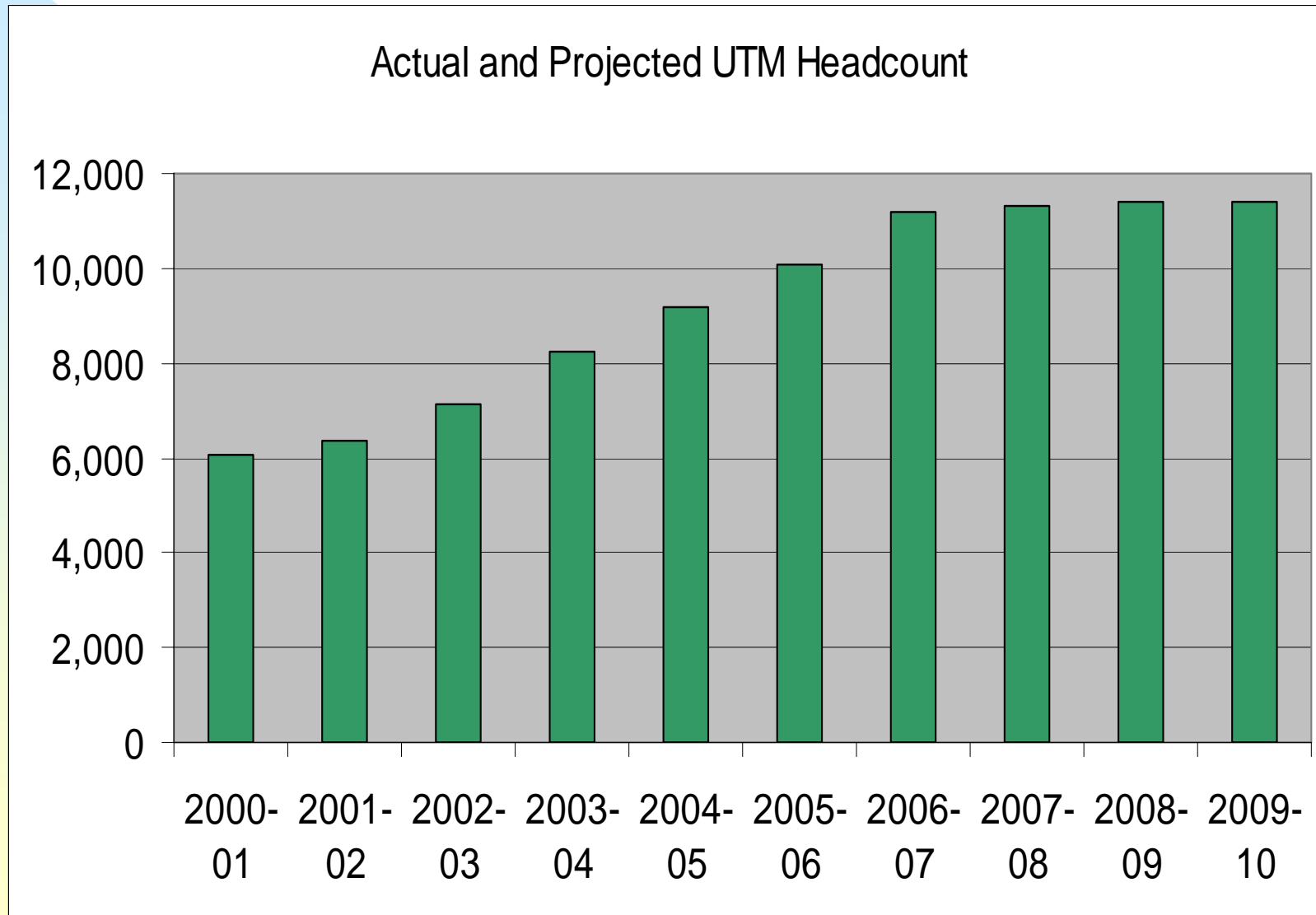
Protected Green Research Area

Protected
Research

Mississauga Rd



Expected Student Growth



Grow Smart Grow Green

A Holistic Approach “Institutionalized” *

Transportation

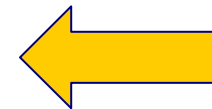


Energy
Conservation &
Infrastructure



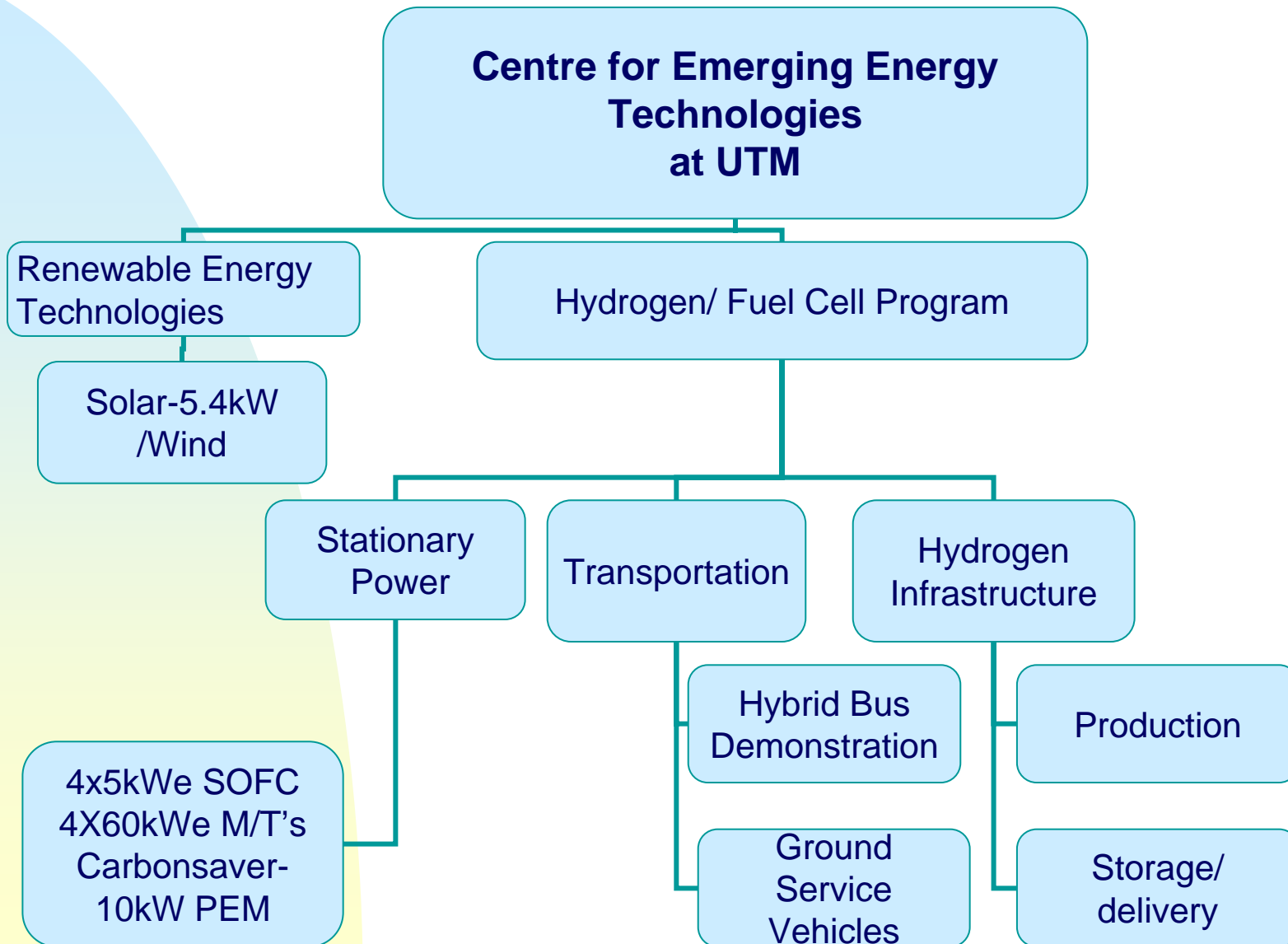
**GROW SMART,
GROW GREEN -
SUSTAINABLE CAMPUS**

Emerging Energy
Technologies



Campus
Sustainability

* Focused on Execution, not Documentation



Project Organisation



Project Manager

UTM/Carrier Canada

Funding Partners

OPG/UTM

Engineer

Carrier Canada

Project Plan/Actual dates

Plan

Actual

Equipment Delivery

Aug, 04

Aug, 04

System Commissioned

Oct, 04

Jan, 05

Monitoring Underway

Oct, 04

Jan, 05







System Spec. & Cost

Power	211 KW +/- 2%
Cooling Capacity	110 RT
Heating Capacity	900,000 BTU/h
COP (Chiller)	1.3
Noise	65dBA @ 10m
Harmonic Distortion (IEEE519 Compliant)	<5%
Cost-Turn Key	Can \$1,037,500

Electrical Performance (Preliminary)



Hours of operation to December 31 2005

8028 Hrs

Average Electrical Performance %

27(26.1-28.6)%

Power Delivered to Load/HV Fuel

240 KW/3 million BTU/h

Estimated Parasitic Losses in kW

Small (no fuel compressor)

Power Quality

Power Quality Tests not yet Done

Thermal Performance (Preliminary)



Thermal Output measured in kW(MMBtu/hr)

1.19

Average water return temperatures

43°F

Delta T across HX

9.2°F

Expected Peak Total System Efficiency

72% (ave. 65%) (Electrical + Thermal)

Cooling system performance COP

~100 ton

O&M Performance



Availability

Operated for **8028 hours** since
January 12 to December 31, 2005 or
94.55%

Current estimate of annual O&M costs
Covered by Service Contract

Emission Performance



To be determined

Institutional Experience

What approvals were required/obtained?

- TSSA – Fuel Safety, Pressure Vessel
- Electrical Safety Authority
- Local Utility (Enersource)
- Ministry of Environment

Any issues around electrical interconnection?

Compliance with IEEE 519 accepted by local utility

Supplier Support



Carrier provides continuing support for the operation of the system under the Service Contract Agreement

Future Plan

- Upgrade the heating capability by adding a heat exchanger to increase the hot water temperature to 175°F or higher to provide heating to the new library
- Comprehensive System Performance Testing for cooling and heating mode at full and partial loads