

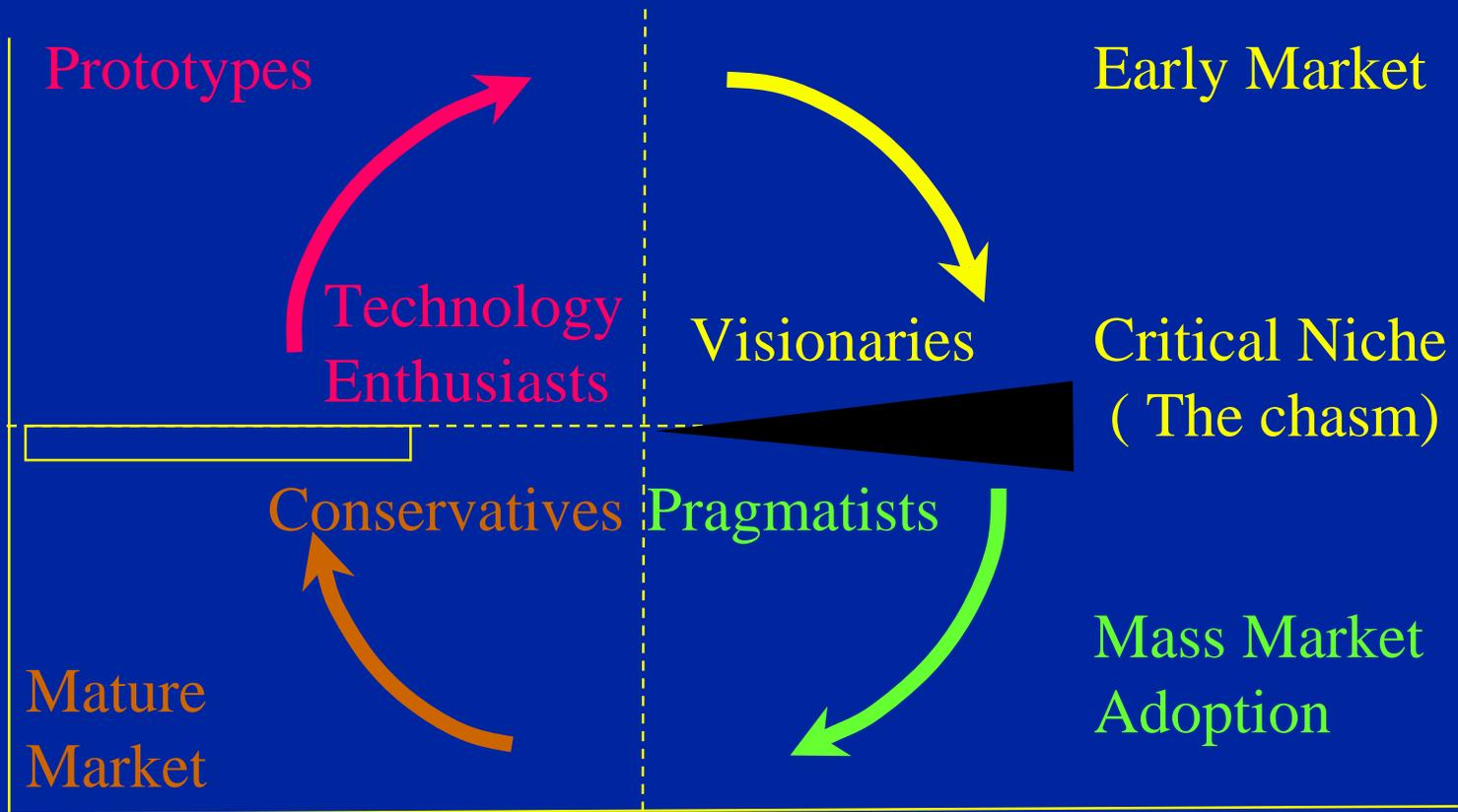
# CETC Distributed Generation Program

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# CETC Distributed Generation Program

- CANMET is the Federal Energy R&D Laboratory located at Bell's Corners
- CETC has been involved in distributed generation R&D focussing on microturbines since 1998
- Have assisted in the development of the Unifin heat recovery system and Mariah integrated CHP system
- Have several field trials of microturbine CHP with gas and electric utilities
- **Rationale:** The utility sector contributes 15% of Canada's GHG emissions and gas flaring is a significant environmental issue

# Technology Adoption Life Cycle



Adapted from **G.A Moore**  
 "Inside the Tornado"

# Funding Levels and Program Allocation

- Four year funding from PERD at \$1.1 million/a
- Four year funding from Climate Change Action Fund at \$350,000/a
- Staffing 3PY
  - Residential Generation CETC Buildings Group (2yr)
  - Commercial/Institutional and Waste Fuels CETC Community Energy Systems Group (3 yr)
  - Inverter Based Technology Issues CETC-V (just starting)
  - Interconnection Issues Mitigation CETC-V (1 yr)

## CES/CETC's CHP Program Vision

- To assist in the development of a packaged microturbine Combined Heat and Power unit that can be installed by a HVAC contractor with little or no consulting engineering requirement.

### OR PUTTING IT ANOTHER WAY

- A commercial package boiler that produces electricity.

## Other Government Department Linkages

- **Public Works** Co sponsor of field integration of Microturbine CHP at Health Canada Building Toronto, PERD partner
- **Environment Canada** Partner in the use of LFG in Microturbine, CCAP funding
- **MOU with US DOE** in the area of Distributed Generation, co organize Annual workshop on Microturbine Applications. Collaboration with Oak Ridge National Lab on new materials for heat transfer applications

## Industry partners

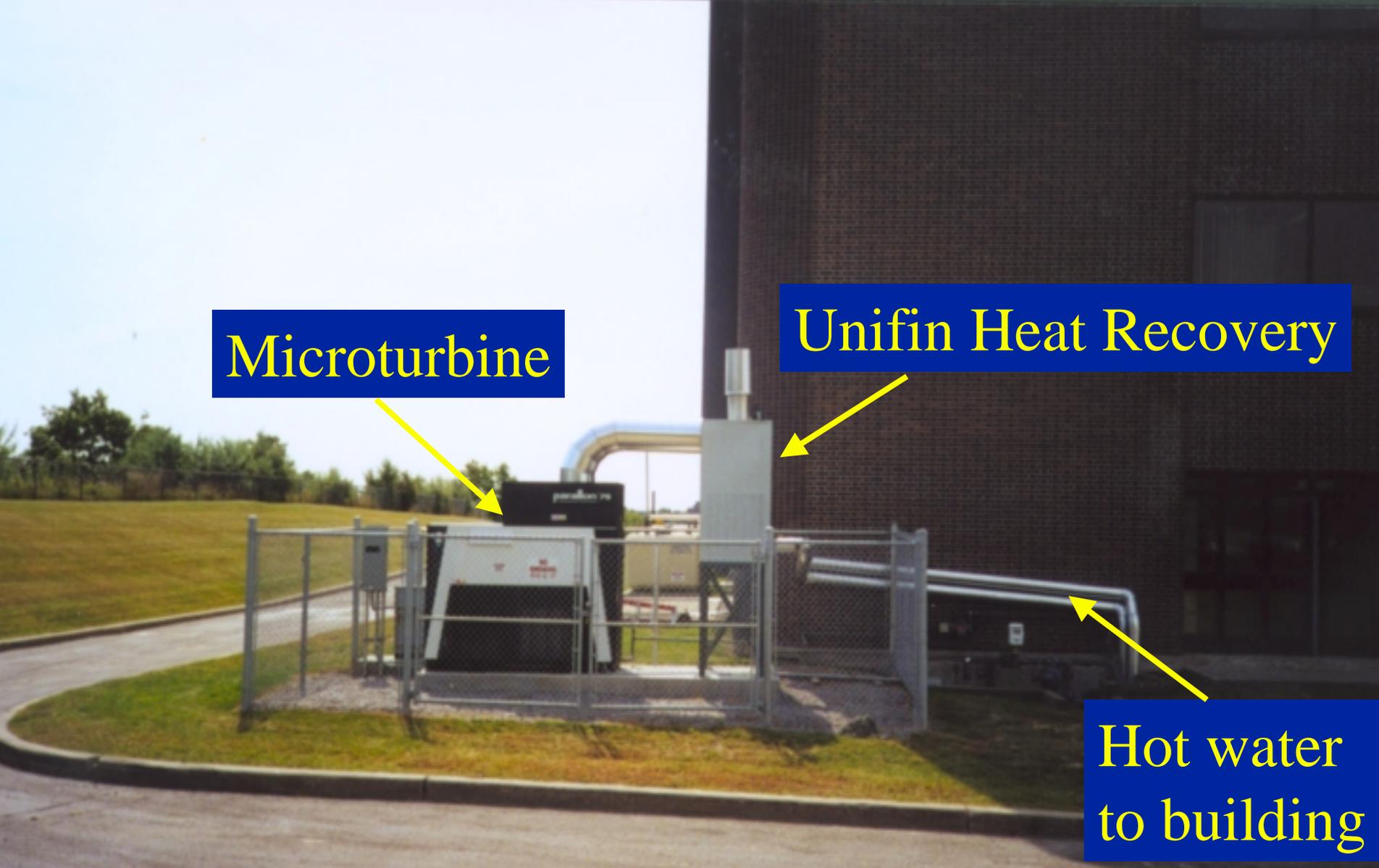
- **Unifin International, London Ontario.** Fabricator of Micro Turbine heat recovery systems
- **Mariah Energy Systems, Calgary, Alberta.** Fabricator/developer of integrated Micro Turbine heat recovery system.
- **Enerflex Power Systems, Calgary, Alberta.** Fabricator of integrated system for multiple Microturbines Turbines using landfill gas. Consultant C2MHill
- **International DY Refrigeration China** Adsorbtion chilling

## University Partners

- **University of Carleton**. Co developer of a new low NOx duct burner concept
- **University of Nottingham (UK)** Co development of new low cost cooling system using waste heat.
- **University of Western Ontario**. Investigation of new materials for heat transfer applications( in discussion)

## Utility/City Partners

- **Enbridge Gas Distribution** 60 kW Capstone CHP at Health Canada, 30 kW Capstone CHP at Ottawa Hotel
- **BC Hydro** 75 kW Honeywell CHP
- **Nova Scotia Power** Oil fired Mariah 30 kW CHP
- **Hydro Quebec/Gaz Metro** 60 kW Mariah
- **NW Power Corp** 2x30kW Mariah CHP
- **City of Calgary/ENMAX /OPG** Capstone 30 kW using LFG



Microturbine

Unifin Heat Recovery

Hot water  
to building

Honeywell 75 kW and Heat Recovery unit  
Midland Rd, Toronto. 5400 hrs operation



**Cummins Capstone 60/Unifin, Toronto**

## Field Trials (Active)

|                             |   |   |                                       |                    |
|-----------------------------|---|---|---------------------------------------|--------------------|
| Halifax<br>NS Power<br>CETC | Toronto<br>CETC,<br>Enbridge<br>Public Works<br>Ontario Hydro | Ottawa<br>CETC<br>Enbridge<br>Toronto Hydro<br>Bldg Owner | Montreal<br>Hydro Quebec<br>Gaz Metro | Inuvik<br>NW Power |
| Capstone 30<br>Mariah CHP   | Cummins<br>Capstone 60<br>2 <sup>nd</sup> Gen Unifin          | Capstone 30<br>2 <sup>nd</sup> Gen<br>Unifin CHP          | Mariah 120/60                         | 2 Mariah 60/30     |
| April 2001                  | October<br>2000   | (Nov 2002)  | September<br>2002                     | December<br>2002   |
| 1500 hrs                    | In<br>Operation   | Not yet<br>Installed                                      | In Operation                          | In<br>Operation    |
| Starting<br>Reliability     |   | Contract<br>Issues  |                                       |                    |

# Trailer at Calgary Landfill Site 1000 hrs operation



## CETC's R&D Focus

- Increase thermal load factor by developing low capital cost chilling concepts
  - Investigating jet pump chillers using new refrigerants with University of Nottingham (UK)
  - Working with DY Technology(China) on ammonia adsorption chillers for refrigeration
- Increase efficiency using bottoming cycles
  - Investigating organic rankine cycle units
    - Freepower (UK)
  - Developing pyroelectric power generation

Jet Pump Chiller Prototype



Ammonia Adsorption Chiller Prototype

