



# CAPTURING THE VALUE OF THERMAL ENERGY

## Innovations in Ejector Technology from CanmetENERGY

Ejectors have been around for over 150 years and are a standard tool in a number of industries. Ejectors are thermally driven compressors that can produce heating, heat upgrading, and cooling (including freezing, refrigeration, air conditioning and process cooling) as well as improve the efficiency of heating and cooling systems.

Traditionally quite large in size, ejectors are normally used to create a vacuum. Similar in function to mechanical compressors, ejectors utilize thermal energy rather than electricity to perform the work; they can thus be used to reduce or even replace the load of electrical driven compressors. Ejector technology is a viable alternative not only to mechanical compression but also to absorption and adsorption systems.

### The main advantages of ejectors are that they:

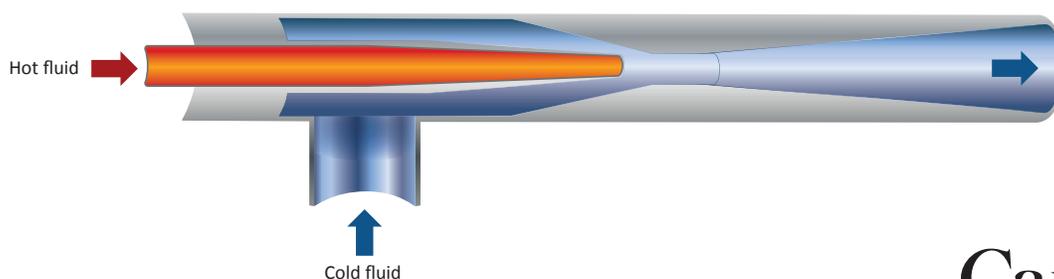
- Have no moving parts
- Require no maintenance
- Have simple construction
- Can be fabricated from a wide range of materials
- Do not require lubricating oil

CanmetENERGY in Varennes has considerable expertise in applying ejector technology (including ejector design, refrigerant selection, and system integration) to capture value from low grade heat efficiently and at very low cost. This expertise has led us to develop innovations which greatly expand the application of ejectors and make them even more useful. Aimed at refrigeration, cooling and heating applications, CanmetENERGY's ejectors are much smaller than traditional ejectors and can utilize a large variety of operating refrigerants, which permits a far wider range of operation.

The proof is, of course, in the results. Based on pilot scale projects, heating/cooling systems which incorporate ejectors can expect **increases in efficiency** ranging from 10% to 50%.

The adoption of ejector technology also offers tremendous potential for the industrial sector to decrease the energy intensity of its processes and thereby increase its productivity.

### An ejector



The large number of ejector applications for heating/cooling systems and in industrial sectors, along with expected benefits and results, is summarized in the table below:

APPLICATION	ENERGY SOURCE	BENEFITS
<b>BUILDINGS</b>		
Refrigeration for supermarkets and ice rinks	<i>Internal losses</i>	✓ 10% increase in energy efficiency
Thermal solar systems for air conditioning	<i>Available thermal energy</i>	✓ 10% reduction in electric compressor requirements
	<i>Heat from thermal collectors</i>	✓ Lower cost and greater reliability than competing technology
Cold climate air source heat pumps	<i>Internal losses</i>	✓ 15% increase in energy efficiency ✓ Temperature lift of 15-20°C
<b>ELECTRICITY PRODUCTION</b>		
Trigeneration (CHP) air conditioning	<i>Engine heat</i>	✓ Able to use natural gas for air conditioning
Air inlet cooling for gas turbines	<i>Turbine exhaust</i>	✓ 5-10% increase in electrical production
Gas separation in carbon capture process	<i>Internal losses</i>	✓ 30% reduction in energy requirements
<b>TRANSPORT</b>		
Air conditioning for vehicles	<i>Engine heat</i>	✓ Elimination of 3-5 HP power requirement for air conditioning
Car engine cooling	<i>Engine heat</i>	✓ 1-5% increase in performance
<b>INDUSTRIAL PROCESSES</b>		
Lowering operating temperature of cooling towers	<i>Waste heat</i>	✓ 20% improvement in energy efficiency ✓ 35% capacity (kW) increase
	<i>Waste heat</i>	✓ 10% reduction in electric compressor requirements
Refrigeration	<i>Internal losses</i>	
Low temperature thermal recompression in bio-refining	<i>Waste heat</i>	✓ 15-30% reduction in operating costs of CO <sub>2</sub> removal

Ejectors are a cross-cutting technology that can be used across multiple sectors, including but not limited to energy intensive industrial processes, buildings, and renewable energy. This brief fact sheet provides only a snapshot of how CanmetENERGY has advanced ejector technology and made it even more useful. We invite you to see for yourself how our innovations can save you energy and money. To further discuss whether ejector technology is right for your organization and to arrange a demonstration, please contact:

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