Breaking free of freon

By Chris Clark
Graduate School of Journalism

In recent years the air has been as thick with talk of ozone as with the stuff itself. Every year scientists warn of its depletion and officials pledge to preserve it. Every year people wonder what they can do to help.

For John Tarasuk—a professor of mechanical engineering at Western for 23 years—the answer was obvious: build a freon-free air conditioner. Traditional air conditioners ooze freon, cooling the air but attacking ozone.

Ranging from 50 to 80 kilometres above the earth, the ozone layer filters out the most harmful of the sun's powerful rays. Freon eats away at it the way a moth devours a sweater. For every one percent of the ozone layer destroyed, incidents of skin-cancer rise by four per-cent, scientists estimate.

Tarasuk, chair of Western's Mechanical Engineering Department, began work on a revolutionary air conditioning system 18 months ago. It not only eschews freon but also renders obsolete the energy-draining compressor in current air conditioners.

With the help of research assistant Rashid Showole, graduate student Richard Berkmortel, and $90,000 from the Natural Sciences and Engineering Research Council, Tarasuk is poised to revolutionize the air conditioning industry and reduce the pressure the world is applying to its ozone layer.

A careful and reserved researcher, Tarasuk does not describe his work in such sweeping terms, but its importance is easy to infer as he patiently describes the concept and its ramifications.

Freon is essential in traditional air conditioners. It pulses through coils, is compressed to high temperatures, and is allowed to expand and cool to well below room temperature. At its coolest, it chills air blown into a house or office. The system is good at keeping buildings cool, but there are peripheral problems. The noisy compressor has a thirst for electricity. To make matters worse, as the unit ages, freon escapes from its coils, wafting up to meet and destroy the ozone layer.

A solution had been simmering in Tarasuk's mind. "My basic studies have been of heat transfer by convection, trying to predict the flow of air," he explains. "Freon was my primary concern. I've had a sense this could work for a long time."

Like others who have made scientific breakthroughs, Tarasuk has brought together some basic concepts, mixed them uniquely, and thrown in an original thought. The result is an experimental air conditioner capable of cooling a medium-sized house, powered by natural gas or a solar collector.

Anyone who has a humidifier owns part of the Tarasuk system. The concept is simple: as air is saturated it cools. Many hotels in Arizona use humidifiers as air conditioners, he notes. In the bone-dry Arizona air, the water needed to cool a hotel does not make the air muggy.

In most climates, where the air is hot and already humid, adding moisture is not feasible. Herein lies the brilliance of Tarasuk's approach. By filtering outside air through a non-toxic substance called triethylene glycol, he removes any trace of moisture. The air is heated up well above outside temperatures, but it is as dry as Arizona in July.

Tarasuk then takes his dry, hot air and cools it with outside air cooled by saturation. The two air flows run through a heat exchanger but never mix. The dry air is cooled but not moistened. The result is cool, dry air: air conditioned.

Alas, there is a hitch. The crucial triethylene glycol breaks down quickly and must be regenerated, much as a car battery is constantly being recharged while the engine is running.

To regenerate the glycol, Tarasuk needs an energy source. "I think we've beaten the regeneration problem," he says, nodding but suppressing a smile. His solution is natural gas. He sees a day when new homes will be equipped with a small unit next to the furnace, pumping cool air during summer, burning clean, plentiful natural gas. Although the system would require electricity to power fans, without the compressor the electricity demand plummets. The glycol pushes the system past the status of simple heat pump. Cooling is increased significantly.

Could be adapted for cars

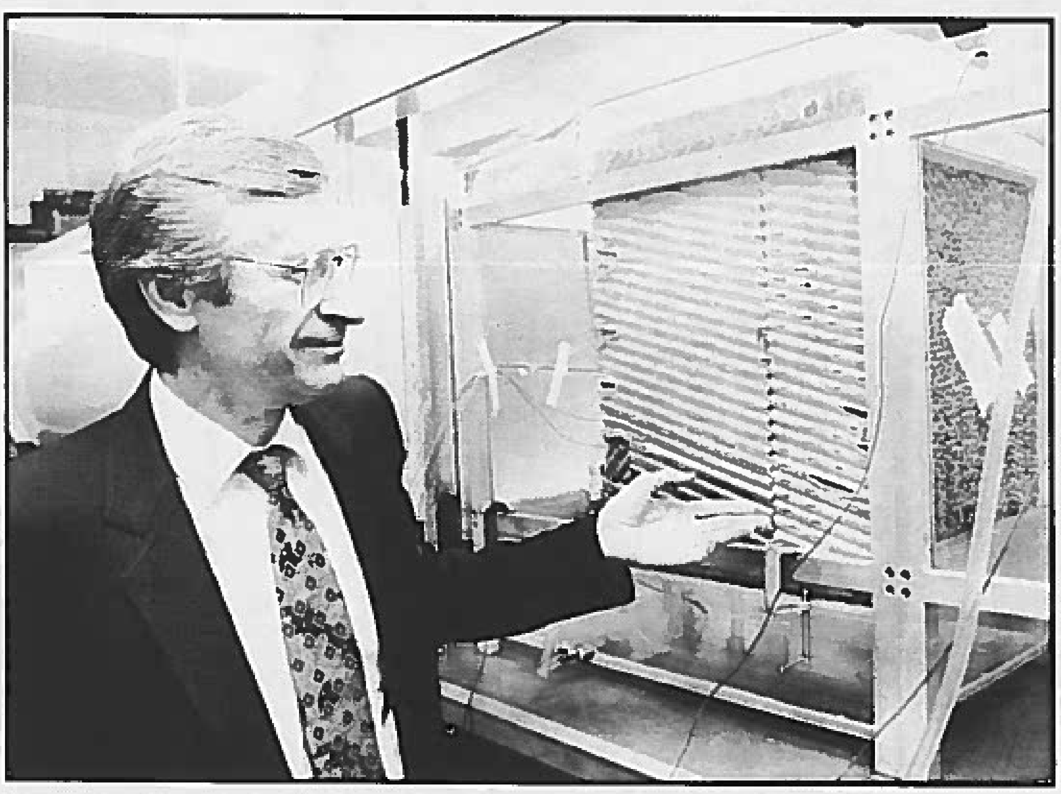
The system could be adapted for cars. Although companies such as General Motors and Nissan have begun recycling freon when servicing air conditioners, it still escapes into the atmosphere during normal use.

Tarasuk is anxious to adapt the technology in another project: a solar car. He and his Sunstang team have kicked off a campaign to raise $500,000 to build a car that they'll race across the Australian outback in 1993. In a race where simply finishing is a major accomplishment, the driver of the car, if nothing else, at least will be cool as he crosses the continent down under.

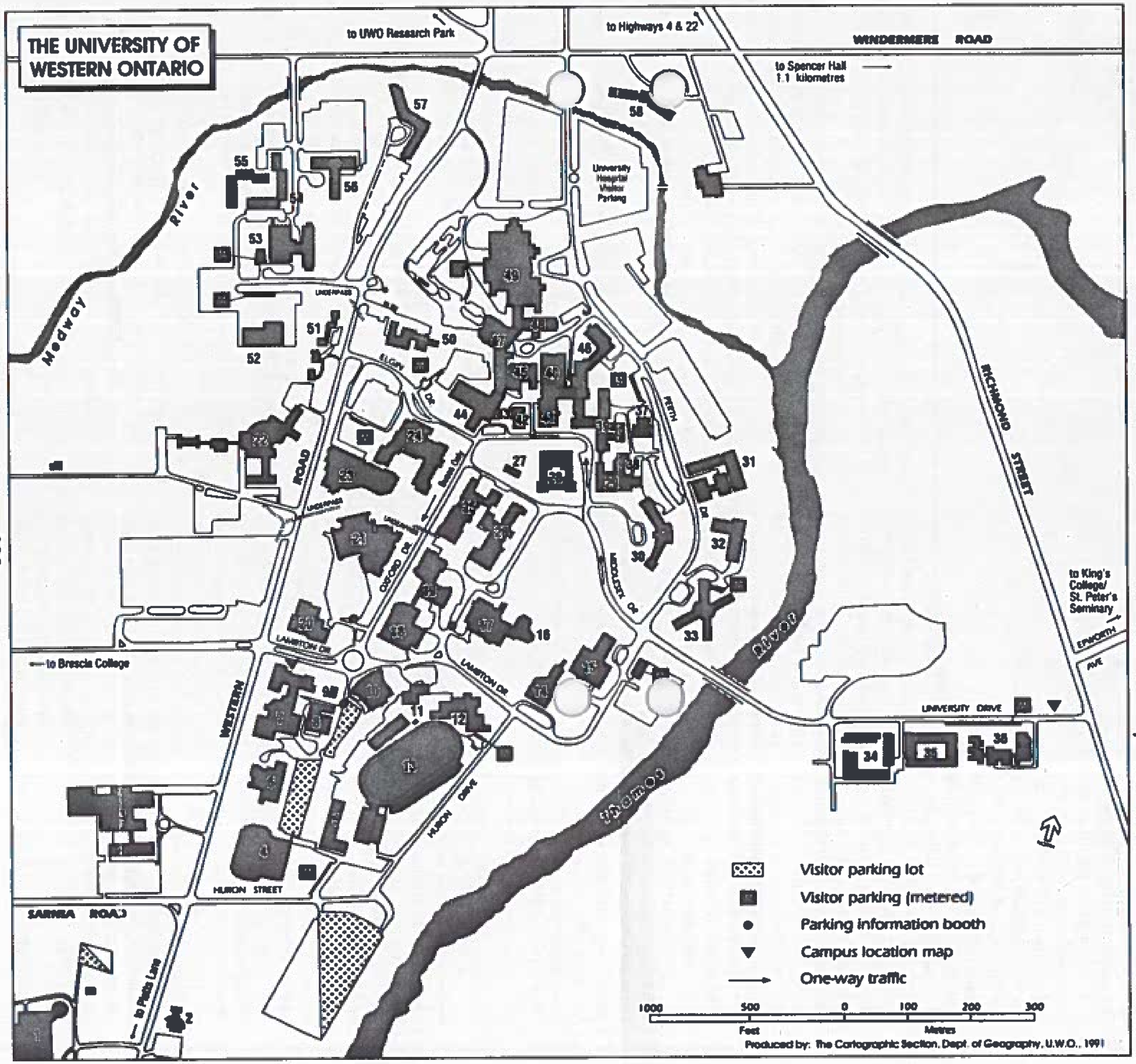
It's just one of many examples Tarasuk imagines in which the glycol technology will be used, keeping people cool without destroying the ozone layer.

He expects to complete this phase of his air conditioning research within 18 months. By then, "we will be in a position to draw significant conclusions."

Right now Tarasuk is neck and neck with a group of Houston researchers who are working on a related project, using silicone gel in place of Tarasuk's triethylene glycol. He's hoping to get more funding so that when's he's ready to actually build a prototype air conditioner for home use, he can go ahead.



Prof. John Tarasuk with his freon-free air conditioner (Photo: Chris Clark)



CAMPUS LOCATIONS

Agricultural Research Institute	50
Althouse College	1
Alumni Hall	10
Alumni House	36
Applied Health Sciences and SLIS	3
Ausable Hall	55
Bayfield Hall	56
Beaver Hall	54
Bio-Engineering Building	8
Biological and Geological Sciences Building	39
Business Administration	17
Central Food Commissary	52
Chemistry Building	46
Collip Building	38
Cronyn Observatory	9
Delaware Hall	33
Dental Sciences Building	47
Faculty of Education	1
Elborn College	3
Engineering and Mathematical Sciences	7
Graphics Building	5
Greenhouses	37
Health Sciences Addition	45
Heating Plant	11
Huron College	22
Kresge Building	42
Lambton Hall	57
Law Building	20
J.W. Little Stadium	13
McIntosh Gallery	27
Medical Sciences Building	44
Medway Hall	35
Middlesex College	30
Molecular Biology Lab	43
Music Building	14
Natural Sciences Centre	41
National Centre for Management Research and Development (NCMRD)	16
Physics and Astronomy Building	28
Robarts Research Institute	48
Saugeen-Maitland Hall	53
Services Building	12
Social Science Centre	24
→ Somerville House	19 ←
Staging Building	32
Stevenson-Lawson Building	25
Sydenham Hall	34
Talbot College	15
Taylor Library	40
Thames Hall	18
Thompson Arena	4
University College	26
University Community Centre	23
University Hospital	49
Visual Arts Building	31
Weldon Library	21
Western Day Care Centre	2
Western Science Centre	29
Westminster College	58
Wind Tunnel	6
1383/89/93 Western Road	51

Parking Office ph. 661-3973 x3973