



Science for Peace

Bulletin

May 2005
Volume 25, Issue 2

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Update on OISE/IKIT Research Rose Ann Dyson

Strong opposition to the proposed research partnership between the Ontario Institute for Education's (OISE) Institute for Knowledge, Information and Technology (IKIT) and military contractor Atlantis Systems International has not abated. Although the matter has been extensively discussed, ambiguity surrounding the purpose and intent of the research continues to prevail. University of Toronto (UT) Provost Vivek Goel, among others, has emphasized the university's commitment to academic freedom. Numerous exchanges between Carl Bereiter, co-director of the proposed project, and several opponents have circulated on the Internet in recent months.

Goel insists there is "simply no truth to suggestions that school children have become military test subjects" (Jessica Whiteside, "University supports OISE/UT project targeted by protesters" *News@UofT* Feb. 18, 2005 <http://www.news.utoronto.ca/bin6/050218-1001.asp>). This is hardly reassuring for those of us who recall Atlantis President and CEO Andrew Day's original announcement that he expected "more

effective training solutions" for the purposes of bumping up "revenue opportunities" and creating "added value" for customers. Among other things, Atlantis designs flight training equipment with military applications, including simulators for the American-made F-15 and fighter Black Hawk helicopters. According to the Atlantis website, 70 per cent of Atlantis training systems have direct military applications (<http://www.atlantissi.com/>).

Although the Provost has pointed to "false and misleading statements" as inhibitors to the university's "research-intensive mandate" (Whiteside), no one seems to be clear on precisely what constitutes legitimate academic research at the university. Indeed, at the OISE/UT faculty council meeting held February 16, 2005, it was announced that a committee had been established to provide advice to the Dean on research partnerships. The committee was expected to have a preliminary report by early April.

On May 15 a victory potluck gathering was held at OISE/UT to formally acknowledge and cel-

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celebrate Dean Jane Gaskell's announcement at the Faculty Council Meeting held on April 4 that "IKIT has no partnerships with Atlantis or DND" (Canadian Department of National Defense).

This apparent change in research direction on the part of IKIT can be credited in large part to a coalition of students, faculty, alumni and other community-affiliated social activists focused on peace education, called People Against Militarization of OISE (PAMO). Throughout the winter, every Thursday in front of the building at 12 noon, a vigil was held against "Militarism/Corporatism at OISE." These vigils included a march to University of Toronto Schools (UTS), two blocks away. UTS was one of three Toronto-based public schools originally earmarked for participation in the project.

What this entire controversy has brought to light is the urgent need for reexamination of ethics in all university-based research. To blithely wave aside objections under the guise of ensuring academic freedom is no longer good enough in an era where massive change in global trends is needed in every sector of society if humans are to survive as a species. Unexamined research goals and how they impact on the community at large is the antithesis of "best practice" described as IKIT's intent in its original grant proposal to the Social Science & Humanities Research Council (SSHRC). According to leader Dr. Marlene Scardamalia, the entire project, based on the largest single education research grant ever awarded by SSHRC, is meant to "beam ideas into the communal open space."

But, as graphic designer Bruce Mau

(responsible for the exhibition currently showing at the Art Gallery of Ontario) puts it: "There is an urgent need to articulate precisely what we are doing to ourselves and our world and what we must do to change direction" (Scrivener, Feb. 24, 2005, *The Toronto Star*, D5). Entitled "Massive Change: The Future Of Global Design," the exhibition first opened at the Vancouver Art Gallery where it broke attendance records last year. It underscores the importance at this critical juncture in our human history for public funds, entrusted to the pursuit of knowledge, to be assessed to ensure that their acquisition serves the larger public good.

Responding to a request for assistance from PAMO in determining how decisions regarding research partnerships get made, Science for Peace, based at the University of Toronto, has focused attention on the TORONTO RESOLUTION. This blueprint offers a methodology for assessing particular ethical codes, which comprise the key elements that all codes of ethics in science and scholarship normally include. Its genesis was formulated at a workshop on ethical considerations in scholarship and science at the University of Toronto in 1991 and drew upon the expertise of scientists and scholars in a broad spectrum of disciplines. It can be accessed at <www.peacemagazine.org/archive/v10n2p25.htm>.

Clearly, it is time to broaden the discussion on research goals and ethics to include all university-based research proposals at and beyond the University of Toronto. Only then will we begin to see the kind of transformative learning envisaged by both Bruce Mau and leading edge educators in and around OISE/UT.



Terminators Galore! **Joe Cummins**

The author is Professor Emeritus at the University of Western Ontario.

In Canada, the Seed Sector Review advisory committee issued a report calling for changes to legislation to (A) collect royalties on farm-saved seeds, (B) compel farmers to buy officially certified seed, and (C) terminate the right of farmers to sell common seed. The report was financed by the Agriculture Ministry at a cost of nearly a million

dollars to the Canadian taxpayers but essentially rubber-stamped the demands of multinational agricultural corporations (1). The onerous licensing requirements of the biotechnology industry are to be extended to all seeds, imposing a form of serfdom on any remaining independent farmers. In the future it is likely that even home gardeners will face the loony corporate payments for those willing to spy on neighbors and report covert seed activity. We may be entering a time when the Royal

Canadian Mounted Police are required to raid grow operations such as a row of radishes in a backyard garden.

The development of “terminator” technology goes hand in hand with the corporate move to control production and use of seeds. Terminator technology is the use of genetic engineering to produce seeds that can be used only once. The progeny of such seeds would either produce no flowers or produce seeds that provide grain or oil but cannot germinate to produce as new plants. In other words, terminator blocks viable seed production, production of pollen or ovule or the production of flowers. The first terminators were developed by the United States Department of Agriculture (USDA) and corporate interests, and that technology was patented jointly by the corporation and USDA. As in Canada, the regulator of genetically modified (GM) crops also acts as an advocate and commercial developer of such crops (a clear conflict of interest).

The first terminator patent was granted to USDA and The Delta and Pineland Corporation (later joined to Monsanto Corporation) in 1999. That patent provoked a flurry of opposition both on the basis of the fundamental right of farmers to save seed and on the scientific ground that the genetic changes might harm those consuming the crops. In response to those concerns Monsanto Corporation backed off from immediate production of terminator seeds. But in spite of that action a great deal of government sponsored research in the U.S. has focused on development of terminator technology to provide financial benefits for corporations.

Beginning in 1999, the Institute of Science in Society in London, England has distributed a number of reports by Dr. MaeWan Ho and myself. In those reports we described the genetic technology of the original and later biotechnology inventions (2,3,4,5,6,7). The basic design of the constructions has been to prevent reproductive tissue from developing in a way that allows the seed producer to maintain fertile lines that can be maintained but also trigger the production of commercial seed lines that cannot produce pollen or eggs, or produce lines that lack flowers. The genes used to produce such lines usually involve reproductive cell ablation (cell suicide genes) using toxins such as barnase ribonuclease that digests cellular RNA,

diphtheria toxin or excess phytohormone production in the reproductive tissue. In some cases anti-sense genes have been used to block reproductive cells from maturing. Anti-sense genes are complementary copies of the RNA gene messages governing reproductive cell maturation forming double stranded RNA that is recognized as an invading virus by the plant cell and destroyed.

During the 1990s a startling new discovery in plant molecular genetics led to the identification of homeotic genes that govern the pathways leading to cell differentiation. These specify proteins produced by short stretches of DNA called MADS-boxes. These are the regions controlling transcription of the genes involved in formation of reproductive tissue, leaves, roots and branches that govern plant development (8). That discovery has led to a flood of inventions employing the MADS-boxes transcription factors to control flowering and gamete production as terminators in trees and in crops. Steven Strauss of the US Forest Service in Oregon has been field testing poplar trees modified with cell suicide genes to eliminate flowering and plans to extend that system to shade trees. Finnish researchers at Sopenan University are developing this for sterile silver birch (9). Along with concerns about the cell suicide toxins and their impact on animal life, the sterile trees must be propagated asexually and thus lack genetic diversity. This renders them sensitive to attack by emerging pathogens and without a reservoir of diversity to mitigate the attack of the novel pathogen. A flood of patent applications has begun to appear for control of flowering or sexual development in both evergreen trees and crop plants (10).

A flood of terminator trees and crops has been developed using government funding and in some cases by government researchers. The main scientific objection to such terminators has been the introduction of untested and hazardous toxins such as cell suicide toxins. As well, the technology would result in genetic uniformity in forest expanses and in crop lands rendering the trees and crops likely susceptible to plagues resulting from the spread of emerging pathogens because the forests and crops lack the reservoir of genetic diversity needed to counter novel pathogens. The inventions will drive farmers and foresters into serfdom at the behest of corporations and their lackeys in the

government bureaucracy.

Is it too late to terminate the terminators? It is not too late, but once they begin to crowd out natural trees and crops it will be too late. What can be done? We will soon have to have an international convention to limit use of terminators. In the meantime it is wise to alert the public to the extensive public funding of technologies that threaten the farm community and public alike and benefit corporations and their stockholders exclusively.

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Kyoto primer Students of Science for Peace

Research compiled for the Sustainable Energy Fair at the University of Toronto on March 30, 2005 by Max Touzel, Julie Tan and Eugenia Tam (Students of Science for Peace).

Why should we care?

- Scientific data shows that the temperature of the earth has risen in the past few centuries at an unprecedented rate (a rate much higher than what is believed to be the natural temperature cycle of the planet).
- CO₂ and other greenhouse gases in the atmosphere have increased, largely as a result of human activities including industrial processes, fossil fuel combustion, and changes in land use, such as deforestation.

Existing and projected consequences

- Sea-levels will rise and gradually cover populated coastal areas.
- Precipitation patterns will change, resulting in increased risk of droughts and floods leading to extreme stresses on farming and living.
- Habitat loss and extinction for millions of species.
- Adverse health effects on humans.

Together they result in two conclusions:

- 1) We are directly hurting our economy and our health.
- 2) Through the reduction of biodiversity we are destroying both the core mechanism through which life sustains itself and the ecosystem in which it lives. This results in the termination of the crucial dependent relationship we have with nature.

There are skeptics!

Some within the scientific community challenge the methods used in obtaining the data that supports human influence on global warming as well as global warming itself. The scientific evidence is sometimes presented as completely conclusive, but it is not, and there is a backlash from scientists who do not wish their profession to misrepresent an issue. Some see the use of climate change as a political platform (e.g. Gore in 2000).

The Kyoto Protocol: A binding document

- Applies to all developed country members (called Annex I) the only one outstanding is the U.S.
- The target is a five per cent (5%) reduction in emissions from those in 1990, to be achieved by

2012, after which a new round of reductions begins.

- Establishes a system of units each representing a tonne of carbon dioxide thereby quantifying each country's assigned amount to reduce by 2012. This sets up a market to enable the following:
 - Reducing emissions
 - Increasing sinks (Carbon absorbing areas such as forest)
 - Emissions Trading: If a country overshoots its target it can sell the 'surplus' to a country who could not make the target otherwise.
 - Clean Development Mechanism: Annex 1 states can fund projects in Annex 2 countries (developing world) that reduce emissions and/or increases sinks there and in return gets credit towards reaching their own target.
 - Joint Implementation: Industrialized countries help those less established again in return for credit.
 - To ensure compliance, a committee has been established:
 - Facilitative branch helps countries meet their targets
 - Enforcement branch deals with situations where they don't. In this case, the difference from target is added to the next round with 30 per cent interest. Within three months, the failing country must also submit a plan on how the next target will be made.

Loopholes

- Emissions Trading between developed countries: If one country reduces more emissions than its target, a country exceeding its target can buy these credits. This does not encourage a reduction in total world emissions. Theoretically, it may provide incentives to seek emissions reducing technology if the cost in doing so is less than the revenue in selling credits. Two essential provisions are currently being established: a body to transparently monitor these transactions, and a limit as to how many credits a country may buy.
- Joint Implementation between developed countries: allows one country to help fund a project that results in reduced emissions in another country that would not have occurred if not for that project. The "donor" country would then gain emissions credits.

It is difficult to determine what emissions would have occurred anyway, especially when considering excess credits, known as "hot air." Russia and the Ukraine are expected to be 22 per cent below their emissions target anyway. How these extra credits will be used is a major concern. Since they were assigned a target well above their projected emissions, these countries will not have to reduce the emissions that they are going to emit anyway. Countries not meeting their targets are able to take advantage of this hot air, which may lead to an increase in global emissions.

- Clean Development Mechanism: In order to gain credits to put towards achieving their own targets, developed countries may fund emissions reducing projects in developing countries. This is counterproductive since it allows the world's largest emissions producers to increase their output, while merely slowing down the rising emissions of low polluting countries. Also, developing countries do not have defined targets, hence it is difficult to determine efficacy of a project, or if the reductions would have occurred even without the CDM.
- Banking: If a developed country is under the target emission production, it may carry over these unused credits to increase emissions in the next commitment period.
- Use of sinks (natural processes that absorb CO₂ such as forests and oceans) as an emissions reduction strategy: Sinks can easily become sources of deforestation, which is not addressed in emissions calculation. Countries may increase emissions or slow their reduction rate by the amount absorbed by sinks, which is difficult to measure. Also, pre-existing sinks may be used in this calculation, thereby automatically giving some countries emissions credits.
- Developed countries may choose 1990 or 1995 as their base year for calculating high GWP gases. Emissions are converted to CO₂ equivalents based on global warming potential (GWP). HFCs (hydrofluorocarbons), PFCs (perfluorocarbons), and SF₆ (sulphur hexafluoride) are all more powerful global warming gases than CO₂. Choosing 1995 levels raises allowed emissions measured in CO₂

equivalents by 0.6-0.7%. Also, GWP does not take into account the comparative lifetimes of each gas, so some gases that have a less destructive rate may last longer and so produce the same amount of damage overall, or worse, a gas that has a comparable or higher destructive potential may last much longer than CO₂.

- Provision to choose base years earlier than 1990 for countries with economies in transition: Bulgaria (1989), Poland (1988), Romania (1989). Arguing economic consequences, some were allowed to set a lower target, while others were allowed to stabilize current emissions.

- Lack of legally binding consequences for non-compliance that give substantial incentive: When a country's target is not met, the emissions exceeding the target is added to the reduction target for the next term and the country must supply a plan within three months of the failure outlining how the next target will be met. However, there is a lack of true incentive (economical or other tangible sanction) to actually meet the targets or follow through with these plans should the target not be met, besides the country's own willingness and commitment to the Kyoto protocol. In the end, it is always possible for the country to withdraw from the commitment with no further obligations.

- Omission of bunker fuels (international air and marine transport) in calculation of emissions due to confusion over to whom they will be assigned.

From symbolic status to practical solutions

Presently, the Kyoto Accord is a symbolic agreement in recognition of the unacceptable state and pace of environmental degradation, and the importance in reversing this trend. As it stands however, the provisions do not translate into actual emissions reductions. The proposed strategies have great potential in providing monetary incentives for reducing global emissions. It is necessary however, to close loopholes and prevent policies that take advantage of the scenarios. A few thoughts:

- Implement a limit to emissions trading, JI, and CDM to ensure that domestic emissions reduction

is the primary method of meeting target. Since January 2005, there is a cap for companies within the European Union under the Emission Trading System's policy, however this scheme is separate from the Kyoto Protocol. The Kyoto protocol simply states that these flexibility mechanisms should be supplementary to domestic action.

- National and provincial policies and enforcement. Canada is in the beginning stages of discussing this issue with regards to emissions trading for companies.

- Provide credits to countries that place emphasis on phasing out the use of fossil fuels (coal, oil, gas) which produce the most CO₂ (ie. By withdrawing government subsidies from fossil fuels to development of renewable resources).

- Establish a target in emissions reduction that will be effective in curbing environmental degeneration rather than the arbitrary five per cent of 1990.

- Limit joint implementation and CDMs in sink projects.

What is Canada's obligation under the Kyoto Protocol?

By ratifying the protocol, Canada has committed itself to reducing its greenhouse gas emissions to 6% below the 1990 level of the country by 2010. This translates into a 240-megatonne reduction from the current emission amount. An average person produces five tonnes of greenhouse gases per year.

What plans does Canada have?

During Chretien's time as the Prime Minister, the government drafted a plan to meet its Kyoto obligations: the Climate Change Plan for Canada (CCPC). This plan outlined the sectors in which each portion of the 240 Mt of greenhouse gas reduction is to take place, and the steps the government will take to ensure that those reductions are made. Minister Stephane Dion has been appointed by Paul Martin's government to head the Cabinet committee to implement the CCPC.

Transportation

The government has so far been relying on voluntary measures by carmakers to lower greenhouse gas emission from the vehicles they produce. However, this has mostly failed, as the carmakers have shown no interest in committing to a large-scale plan to dramatically improve fuel efficiency. Dion has stated that if carmakers refuse to voluntarily reduce greenhouse gases, the government will consider implementing regulations.

The government has committed to over \$100 million in funding for the construction of ethanol fuel production plants. The Biodiesel Initiative was launched in 2003 to spread the knowledge of biodiesels in Canada and to investigate the economic and environmental effects of their use.

The government intends to implement plans to increase the usage of public transit, by improving the system and by advertisement. It will also encourage more efficient transportation of goods by businesses, by education and awareness programs.

The built environment

The plans for the reduction of greenhouse gases produced in the operation of buildings mostly involve making changes to currently existing buildings. The government has launched a successful program to evaluate existing homes and provide financial support for retrofitting them. The government has also taken steps to reduce emissions from federal buildings.

Large final emitters

The large final emitters are comprised of three sectors: thermal electrical energy generation, the oil and gas industry, and mining and manufacturing. The government plan allocated 92 of the required 240 Mt reduction to this group of emitters. Because of the different natures of greenhouse gas emission in each industry, the strategies involved are highly complex, and differ between the three sectors.

Renewable and cleaner energies

It is essential that power generation in Canada

shifts away from its reliance on fossil fuels towards renewable energy production, to reduce greenhouse gas emissions in the long term. The government has increased its incentive target of wind power generation from 1000 MW to 4000 MW. \$260 million has been provided for the installation of 1000 MW of wind power by 2007. The government has also committed to ensuring that 20 per cent of its energy purchases are made in green energy.

Agriculture, forestry, and landfills

The government launched Greencover Canada in 2003, and this initiative will run until 2008. The main goal of this campaign is to encourage agriculturalists to implement practices to enhance the carbon-sinking abilities of farmlands. Other government plans include educational programs and incentives to plant trees. Methane capture in landfills is another important strategy to reduce greenhouse gas emissions.

Are these strategies going to work?

The government has set respectable goals for greenhouse gas reductions. The main problem lies in the fact that many of their plans rely on voluntary measures. In order to meet its targets, the government must take a more active role in ensuring that the plans progress as planned and that the involved parties are achieving their own smaller targets. Our sights must be set on a society that is sustainable in the long term, rather than to simply “meet the target.” As Minister Dion remarked at the International Climate Change Conference in Buenos Aires, we must that an approach that sets “long term goals with short-term outcomes to ensure progress.”

Some proposed next steps

- Pass legislation to regulate the fuel efficiency of automobiles and to regulate greenhouse gas emission by large final emitters.
- Devote more funding and efforts into developing and installing green energy.
- Ensure that all new homes be built in accordance with the R2000 standard, an efficiency guide developed in the 1980s that was never fully enforced.

• Shift funding away from research for “cleaner” fossil fuels and towards research and installation of green energy.

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