ISEMA: Perspectives on Innovation, Science and Environment

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- Members of the 2008 ISEMA Executive for their guidance and support
- All of our reviewers, editors, and senior editors for committing their time, lending their expertise, and above all, their dedication to making this year’s edition of the journal a success

ABOUT ISEMA

ISEMA is a student organized, annually published academic journal. Articles are nominated by professors teaching courses in the Innovation, Science and Environment (ISE) stream of the School of Public Policy and Administration as well as other courses focusing on ISE-related topics. Nominated papers are submitted to a double-blinded peer-review process by ISE alumni and other specialists in the field. The highest-ranked papers then undergo an editorial process with the Editorial Board before publication.
 DISCLAIMER
Expressed views are the author(s)’s own only, and do not represent to views of the author(s)’s employer, the SPPA or ISEMA. Articles were written by graduate students in requirement for course work at Carleton University’s School of Public Policy and Administration.

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ISEMA began as an idea. Students in the School of Public Policy and Administration at Carleton University were inspired to create a journal that would showcase their best academic efforts in the areas of Innovation, Science, and Environment (ISE). These initial students, along with support from faculty and alumni, established a journal that was used as both an example of outstanding work, as well as an academic resource.

This journal is comprised of the very best student papers on topics of Innovation, Science, and Environment. These papers were nominated by professors, assessed by reviewers both internal and external to the School, and were chosen by a student-comprised Editorial Board. Finally, authors worked together with student editors through the editorial process to attain the excellent papers of this journal.

ISEMA is made up of the Editorial Board, the senior editors, the copy editors, and the Executive. Together, students in these roles worked to choose articles and produce this publication, and promote ISEMA to the broader population.

These tasks could not have been performed alone because ISEMA is a community, comprised not only of the Editorial Board and Executive, but also of the professors who nominate papers and provide advice; alumni and professionals who review and advise; and others who support the group.

ISEMA is many things, but it began as an idea, born out of the inspiration of students who wanted to share student effort and ingenuity. We hope that this pioneering and inventive character of ISEMA will be reflected through this publication and will continue to inspire the students of today and tomorrow.

The 2009 ISEMA Executive
ABSTRACT

The papers in this fourth volume of ISEMA were written and selected by students in the Innovation, Science, and Environment concentration of the Master of Arts in Public Administration programme at Carleton University. These papers were chosen out of many that were nominated by professors in the School of Public Policy and Administration.

Selected papers were chosen not only for their superior quality, but also for their relevance, interest, topicality, and thought-provoking nature.

In addition to these meritorious qualities, the articles contained herein reveal forward-looking analysis and the use of knowledge and policy choices to affect a better future. This reflects upon the zeitgeist and tone of the current-day citizenry be it in lessons from Europe for greenhouse gas policy; a discussion of mortuary practice and future land-use issues; the effect of trust in organizational relationships and its role in risk-management; short-haul transportation means and the realignment of a faltering industry to support it; or a discussion of recommendations for the Federal Sustainability Act.

This year, as a part of our expansion efforts, ISBNs and ISSNs have been obtained for ISEMA to assist in wider dissemination through traditional outlets such as libraries. We have also expanded the role of Website and Outreach into two separate positions, effectively increasing the number of Executive members from five to six.

In this 2009 edition, we have built upon the foundations that have been laid in the first three volumes of ISEMA but we have also endeavoured to expand. The papers selected for this edition are indeed of superior academic quality, as they have been in past volumes, but the content of this year’s edition has expanded the breadth of topics that are characteristic for ISEMA. These inclusions, however, reflect the innovative and outside-the-box thinking that is encouraged in the Innovation, Science, and Environment concentration of the Public Administration programme.

We are excited to release this fourth edition of ISEMA and wish to thank all who have been involved with its production. We trust that ISEMA will continue to serve as an example and benchmark of excellent papers, but also as a resource for students, academics, and professionals alike.

Marissa Bender
Editor-in-Chief

Jean Haley
Managing Editor
The European Union’s CO₂ Emissions Trading Scheme and Insights for North America

Mike Reddick

National cap-and-trade systems for greenhouse gas emissions have emerged as distinct possibilities in the near future for Canada and the United States. In the United States, both Barack Obama and John McCain endorsed cap-and-trade in the 2008 presidential campaign, and implementing “an economy-wide cap-and-trade system to reduce greenhouse gas emissions 80 percent by 2050” remains a priority for the Obama Administration.¹ In March 2009 Democrat members of the House of Representatives introduced the Waxman-Markey bill, which pledges to introduce a cap-and-trade system to reduce greenhouse gas emissions (GHGs) by 17% of 2005 levels by 2020, and by 83% of 2005 levels by 2050.² This legislation has already accomplished the difficult task of getting passed through the House of Representatives (by a narrow margin of 219-212), though another difficult task looms as the legislation must again face fierce opposition from both Republicans and some Democrats when the Senate reconvenes later in 2009.³

Cap-and-trade appears to have a future in Canada as well. Although the Government’s current emissions plan is premised on intensity-based emissions standards without firm emissions caps, the government has been suggesting since November 2008 that it is interested in adopting a cap-and-trade system in the near future that is similar to a future American cap-and-trade system. Both Foreign Affairs Minister Lawrence Cannon and Environment Minister Jim Prentice said that the Government is seeking a common “North American” approach to climate change with the United States.⁴ Among provinces, there has also been a move towards creating a cap-and-trade system. The provinces of British Columbia, Manitoba, Quebec, and Ontario have joined seven American states in the Western Climate Initiative which plans to implement a market-based GHG cap-and-trade system for 2012. Both Canada and the United States seem to be moving forward on cap-and-trade, but this shift is just beginning and many details remain to be worked out.

The European Union (EU) is much further along the path of reducing carbon emissions through a cap-and-trade system. In 2003 the EU decided to create an Emissions Trading Scheme (ETS) for carbon dioxide (CO₂) emissions, which came into effect on January 1, 2005. There have been some problems and some controversy but, on the whole, the EU ETS has largely been successful and Europe has reduced carbon emissions to help achieve its Kyoto targets. Importantly, emissions have been reduced in a cost-effective manner which has not devastated industry, contrary to the predictions of some opponents. Additionally, the EU ETS is the only
relevant CO₂ cap-and-trade example to draw on; the second-largest carbon market is in New South Wales, Australia, and is less than 1% of the size of the EU ETS. Thus, an examination of the EU ETS demands the attention of North American policymakers, as the most important lessons about CO₂ or GHG cap-and-trade are to be learned from the European experience.

This paper will analyze the EU ETS in a chronological fashion. Part A will begin by examining the preliminary steps Europe took that led to the decision to create the ETS in 2003. The study will then move to Part B and briefly explore the economic principles behind cap-and-trade, before moving on to consider the administrative structure of the ETS. Specific attention will be directed towards permit allocation and emissions verification processes. Part C will begin by evaluating the outcomes, criticisms, and successes of Phase I (2005-2007). Observations from Phase II (2008-2012) will then be examined. Finally, in Part D the study will synthesize the strengths, weaknesses, successes, and failures of the EU ETS, and offer five broad lessons that policymakers in Canada and the United States (and elsewhere) should learn from the European experience, and how these lessons might be applied in a North American context.

**PART A: DESIGNING THE EU ETS, 1997-2003**

Perhaps surprisingly, during the 1990s there was little support for a cap-and-trade system for CO₂ in Europe. Opponents suggested that cap-and-trade was a more burdensome environmental policy strategy than a carbon tax. Cap-and-trade would require policymakers to perform at least four difficult main functions: 1) To set an annual emission cap in gross terms; 2) To distribute a corresponding number of emissions permits to polluters; 3) To facilitate a market for the trading of these permits; and, 4) To monitor the production processes of emitters to ensure they do not emit more than they claim. Conversely, a carbon tax would demand only two main functions from government: requiring policymakers to set the tax rate and monitor the emissions of firms. The dominant view in the 1990s among European politicians was that a carbon tax was a simpler, and thus more efficient, policy option for the European Union.

However, the 1997 United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Summit led to an agreement which was more compatible with cap-and-trade systems. The agreement at Kyoto would be largely shaped by the United States, who championed a cap-and-trade approach to GHGs analogous to the model they had successfully pioneered for reducing sulphur dioxide (SO₂) emissions. Ultimately, Kyoto would reflect the Americans’ wishes, as hard caps for national emission levels were set.

Two important flexibility mechanisms were included in the Kyoto Protocol: Joint Implementation (JI) and the Clean Development Mechanism (CDM). Joint Implementation refers to a situation where a developed country (such as an EU country) invests in another developing country as an
alternative to reducing emissions domestically. The CDM is a mechanism under which a developed country can receive credit for funding emissions reductions in a developing country (i.e. Bangladesh). These flexibility mechanisms are intended to be a cost-effective alternative to making emissions cuts in the more advanced economy. Crucially, only a specific share of a jurisdiction’s reductions may occur through CDM and JI (the EU can only reduce 2.5% of its emissions levels through these processes). This illustrates how Kyoto was designed with cap-and-trade in mind, as these pre-determined emission cap targets and specific limits on CDM and JI emission reduction can really only be calibrated with cap-and-trade systems.

Attitudes about cap-and-trade for CO₂ would change quickly in both Europe and America after the Kyoto protocol was negotiated. As the U.S. moved away from carbon emissions trading and Kyoto in 2001 under the Bush Administration and Republican Congress, the Europeans accepted that the cap-and-trade model was a better policy option than an emissions tax because cap-and-trade was the most certain way to ensure Kyoto emissions targets were met. That same year, the European Commission’s Climate Change Programme released a plan to implement a cap-and-trade system for CO₂ that would take effect in 2005. It took nearly two years of debate and adjustment before the plan was ratified by all fifteen member-states in October 2003. The twelve states which have acceded to the EU since 2003 have all been obliged to come under the EU ETS too.

The central goal of the EU ETS has been to move Europe closer towards compliance with the Kyoto Protocol. This is evident in how the ETS was constructed to evolve over three pre-determined time periods, or phases, with Kyoto in mind. Phase I (2005-2007), the “pilot” or “warm-up” phase, set out to ease the cap-and-trade system into place. The strain on emitters was intended to be minimal, but there also was the important goal to lower total European carbon emissions to 1990 levels before 2008 when the Kyoto Protocol kicked in. Phase II, from 2008-2012, was designed as the Kyoto compliance stage that would see further reductions in carbon emissions (8% less than 1990 levels), along with opportunities for the EU ETS to link up with other Kyoto-abiding emissions programs through the CDM or JI. Phase III, set for 2013-2020, will be more ambitious than the current phase (20-30% less than 1990 levels) but is not yet finalized as it will incorporate the targets set out to the successor to the Kyoto Protocol, hopefully to be drafted at this year’s UNFCCC Copenhagen summit.

It should be noted that the Kyoto Protocol seeks to achieve the reduction of all greenhouse gases, yet the EU ETS is only focussed on carbon dioxide emissions. Furthermore, in the first two phases the EU ETS only covers sectors that account for 50% of EU carbon dioxide emissions and 40% of EU GHG emissions. In these phases it has covered only the heaviest emitting sectors, including energy, iron and steel, mineral
extraction and processing, and pulp and paper. However, by coupling the EU ETS with other environmental measures (i.e. vehicle and building standards), the EU is confident that it will achieve its Kyoto targets.

**PART B: IMPLEMENTING THE EU ETS, 2003-2005**

The structure of the EU ETS that took shape in 2003 had the same economic foundation as the USA's SO₂ emissions trading system, which pioneered cap-and-trade. The economics that lie at the root of both systems are very basic, yet critical. After the initial allocation of permits in either system, a firm buys or sells permits to other firms until its marginal abatement cost (or MAC, the incremental cost of reducing emissions of a pollutant by one unit) is equal to the subsequent market-determined price of permits. Thus, in equilibrium, all emitters are at the same MAC, making the system cost-effective, and total compliance costs are minimized. At this equilibrium, total emissions, total permit allocation, and the total hard cap are all equal and do not fluctuate until the ETS moves to the next phase. This makes cap-and-trade systems attractive to policymakers because they can ensure that emission targets are met at minimum cost, even with the absence of perfect information when setting up the system.

The EU ETS maintains the integrity of fundamental cap-and-trade economic principles but significant administrative adjustments had to be made to the U.S. SO₂ model to account for the multi-jurisdictional nature of the EU. This decentralization in the EU ETS was most prominent in the 14 months between October 2003, when the EU ETS was created, and January 2005, when Phase I would begin. The ETS had to be somewhat centralized because the Kyoto Protocol set out only GHG emissions caps for member-states, meaning the EU would have to set its own CO₂ cap. In setting this cap, member-states transferred some authority to the newly created European Commission's Emissions Trading Directorate (EC ETD). Though the Directorate would take on the role of central coordinating body for the ETS, the scheme would not be entirely centralized as national governments would retain the important responsibility for allocating permits and monitoring emissions levels for Phase I.

The EC ETD asked countries to draft National Allocation Plans (NAPs) to show how they were going to reduce GHGs in non-trading sectors (i.e. building and auto emissions), and how much they planned to reduce their level of GHGs by reducing carbon emissions via the EU ETS. It turned out, many of the NAPs “generously” estimated the amount of GHG abatement they could achieve in non-trading sectors, thus enabling them to request larger quantities of carbon emission permits. However, the EC ETD had the authority to approve or adjust NAPs (as only so many permits could be issued to stay below the carbon cap), ultimately giving Brussels the final say on how many permits were given to national governments.
to allocate to its domestic emitters. Thus, a division of responsibilities emerged between the EC ETD and national governments in order to have the system set up on time. However, controversy arose as the allocation process had to be rushed through in order to be completed by January 2005.

The EU’s member states had only fourteen months to distribute carbon emission permits to domestic emitters before the EU ETS was launched on January 1, 2005. The EC ETD had decided that virtually all permits would be distributed freely to emitters (“grandfathered”) instead of being auctioned because policymakers feared a loss of competitiveness or negative backlash from business if a costly auction occurred in this first “warm-up” phase. But of all the countries, only Denmark had previously kept a registry of firms’ carbon emissions. So everyone but the Danes was in a bind: how could emissions permits be fairly allocated if there was no reliable information about emissions history and not enough time to create an historic emissions registry? Of course, the allocation would not threaten the emissions abatement goal or cost-effectiveness of the system; the number of permits issued would still equal the amount of emissions allowed, and all firms would still adjust until their MACs equated the market price for permits. But the allocation process would determine how many permits a firm would initially possess, thus determining how much additional expense or revenue would occur as a result of further trading to get the firm’s marginal abatement costs equal to the spot permit price.

Each member state would allocate permits through slightly different technical processes, but the general approach that all ended up utilizing was to grant permits on the basis of firm-supplied emissions history information. This was inherently problematic because there was a clear incentive for firms to provide misinformation; the more they said they emitted the more permits they would get. However, Denny Ellerman of MIT, one of the most respected EU ETS experts and the most cited author on the topic, suggests that though “an incentive to inflate emissions clearly existed, its role should not be exaggerated.” Although only the Danish government possessed a carbon registry, Ellerman states that most governments could cross-check information supplied by the firm with other data, because reliable information about firms’ energy inputs from previous years did exist. So though there was an incentive for firms to provide misinformation, it is possible that egregious over-allocations to dishonest firms were minimized.

This does not mean that the initial allocation for Phase I was equally fair to all firms. Firms who had abated previously did not receive extra permits as reward for their voluntary efforts. Firms that found it relatively easy to abate due to low marginal abatement costs (MACs) under this system accrued windfall profits, while those with higher costs of abatement were penalized. In 2005 there was a strong public backlash directed towards the grandfathered allocation process of the EU ETS, as it became clear that there were clear winners and losers from the allocation process. Criticisms
came from economists, opponents of big emitters who benefitted from windfall profits, and other firms who did not incur windfall profits but suffered a net loss by having to acquire permits. However, the criticisms came too late to change the approaches of legislators, as the allocation process had been completed in December 2004. Fortunately, the subsequent allocation for Phase II would go much more smoothly, as the pattern of how permits were distributed after the first few months of trading would double as an emissions registry.\textsuperscript{25} In the end, the initial allocation of permits for Phase I was probably the most controversial issue in the short history of the EU ETS.

Along with the responsibility for allocating emissions permits, national governments were entrusted with the task of monitoring emissions levels and ensuring that firms were not emitting more than their permits entitled them to. The EC ETD does set out a common policy for national governments to adhere to for monitoring, and it does mandate third-party verification as well, but it is up to member-states to do almost all the work.\textsuperscript{26} This decentralization presents another potential problem: was there an incentive for member-states to give their industries a competitive advantage by ensuring regulation was lax? The EC ETD has made it clear that there is a substantial fine placed on the member-state if regulation is found to be slack. However, the EC ETD has yet to accuse, let alone fine, a member-state for this infraction. Additionally, very few fines have been applied to firms for exceeding their emissions allowances.\textsuperscript{27} Perhaps the regulation has been successful, or perhaps national governments have been “gaming the system.”\textsuperscript{28} This dilemma, along with some of the other criticisms of the EU ETS, will be evaluated at the end of the analysis section in this study.

\textbf{PART C: ANALYZING THE EU ETS, 2005-2008}

The most fundamental observation to make about the EU ETS is that it has helped to successfully restrain the rise of EU CO\textsubscript{2} emissions. Verified emissions figures from Phase I show that the amount of carbon released in each year was significantly less than the hard cap set at 2,151 millions of tonnes (MT) per year for the phase, which is equal to 100% of 1990 levels. This data implies that the EU succeeded in its goal of controlling carbon

| Phase I CO\textsubscript{2} Emissions (in millions of tonnes) |
|-----------------|----------------|----------------|----------------|
| 2,151 MT per year | 2,012 MT | 2,033 MT | 2,049 MT |

\textsuperscript{29}EC ETD Press Release, May 23 2008.
emissions by use of the ETS. CO₂ reductions through the ETS were supposed to account for half of the EU’s GHG cuts, but the scheme did more than its expected share as emissions were at least 100 MT less than the cap every year. As a result, by 2006 the EU15 was already 0.8% beneath 1990 GHG levels. The Kyoto-mandated goal of returning to 1990 base levels in Phase I had been achieved, setting the stage for further emissions cuts in Phase II.

It is quite important to note how low emissions were in 2005. After the initial allocation for Phase I, there were many criticisms from the private sector that not enough permits had been allocated. These complaints were reflected in the market price for emissions permits, as firms thought there was excess demand for permits. The price of a permit for one tonne of CO₂ emissions reached a peak price of €29.20 in early April 2006, and market analysts at Point Carbon were even insisting that this price was too low. However, later that month the EC ETD released the first verified emissions figures under the EU ETS for 2005. With emissions of 139 MT, or 2.8%, below the allocation, it became clear that Europe had abated “too much”. The price of permits fell drastically, falling below €10 by May 2006. But even with the cheaper permit price, emissions did not increase greatly for 2006 and 2007; firms had already adopted permanent abatement measures and changes in production processes to comply with the high costs of permits in 2005. The EU ETS demonstrated that a cap-and-trade system for carbon could reduce emissions.

Other factors beyond emissions reduction must be considered before declaring the EU ETS a success though. Perhaps the most important consideration is the effect the EU ETS had on business—and specifically firms that were subject to it. Recall that the burden of the EU ETS falls almost entirely on four sectors for Phase I and II: energy, iron and steel, pulp and paper, and minerals. Each of these sectors experienced aggregate growth over the 2005-2007 time period, and all of the sectors enjoyed a rising growth rate over Phase I as well. Point Carbon’s annual report in 2008 showed that as a result of the EU ETS, less than 1% of major carbon emitters shut down or moved production, and less than 5% of heavy emitters have seen a meaningful reduction in production and net profits. A more comprehensive examination of the European economy is necessary to definitively say that the EU ETS has not hurt European industry, but preliminary evidence suggests that any effects would be very minor.

Since April 2006, a common criticism of the EU ETS has been that permits for Phase I had been over-allocated. Ellerman and Joskow review these criticisms, which mostly come from environmental experts that are pushing for larger immediate emissions reductions. These critics have a valid point, as deep emissions cuts must occur soon and on a global level to avoid catastrophe. But deep emissions cuts were not the aim of Phase I. Rather, the fundamental goal of Phase I was to establish an experimental and very large cap-and-trade system for CO₂. It was a pilot stage, constructed to prepare emitters for future phases when more ambitious emission reductions
would be pursued. The scope of the EU ETS is medium term, so judging its effectiveness only on Phase I emission reductions is somewhat premature. This caveat should apply to supporters of the system as much as it does to its critics.

Yet if judgement had to be passed on the EU ETS now, more factors point towards it being a success than a failure. Though the emissions cuts have not been very deep, they have occurred. Industrial competitiveness has not been devastated; in fact, it had already adjusted by April 2006 to accommodate a 2,012 MT carbon cap with permits priced at €30. Though the first phase could have been tougher, as little progress was made between April 2006 and December 2007, early results from Phase II show that emissions have been reduced significantly over 2008—the first year under Phase II and Kyoto compliance.

In April 2009, the EC ETU released the verified emissions data for 2008.36 These figures indicated that CO₂ emissions in 2008 fell by 5% from 2007 levels.37 Though some of this reduction is likely the result of an economic slump, a 5% cut in one year is very significant, accounting for roughly 100 million tonnes of carbon.

If Europe continues to release carbon at the 2008 rate over the rest of Phase II, the ETS will account for most of the EU’s actual GHG reduction to meet its Kyoto commitments. This is because of the 8% reduction of GHGs that is mandated for the EU, only 3.6% is planned to actually come from emissions cuts in Europe—the rest is to come through Land-Use, Land-Use Change, and Forestry activities (LULUCF), CDMs or JJ.38 So if 3.6% is to be the actual target for GHG reduction in Europe, the EU ETS will account for roughly 2.5% of this 3.6% if it maintains 2008 emission levels. The remaining 1.1% reduction would be achieved by the introduction of more stringent building and auto emissions standards, which are estimated to actually yield a 1.5% reduction.39 Though these estimates are based on preliminary information, it is very promising to see that the EU is on pace to achieve its Kyoto targets.

**PART D: LESSONS FROM THE EU ETS**

As the first, largest, and most advanced CO₂ cap-and-trade system, the EU ETS is the most relevant emissions trading system for North America to learn from. The EU’s achievement of its’ Kyoto targets certainly prove the effectiveness of cap-and-trade as the central instrument in a multi-pronged GHG reduction initiative. This relevance for North America is further underscored by noting the similarities between both regions’ established industrialized economies, the similar pressures they face for GHG reduction, and the similar concerns they have about the economic impact from GHG reduction. Thus, even the most obvious observations of the EU ETS yield valuable lessons which cannot be overlooked by North American policymakers as they consider cap-and-trade. This paper presents five such lessons.
1. The allocation process for emissions permits can be controversial.

It is dangerously easy for policymakers to be lulled into a false sense of security when addressing initial emission allocations. The economic theory of cap-and-trade systems could be interpreted to suggest that it doesn’t matter how permits are allocated, as trading will occur to a cost-effective level where the marginal abatement costs of all firms are equal and overall compliance costs are minimized. Indeed, these equilibria will all be achieved after allocation in a true cap-and-trade system. However, the compliance costs of individual firms vary greatly based on their permit allocation, and controversy arises from disparities in these costs.

The initial allocation of permits in the EU ETS demonstrated that clear winners and losers can emerge from the allocation process. Some large energy suppliers with low marginal abatement costs reaped large windfall profits as they sold the some of the permits they were allocated, and they then proceeded to raise energy rates as they reduced production, increasing their profit margin once again. Such behaviour blatantly violated the “polluter pays” principle, an ideal that many citizens and small businesses subscribe to and consider fair business practice. Other “winners” from the allocation process included firms who managed to convince regulators that their historical levels of emissions were higher than they actually were. On the other end, any private compliance costs were directly incurred by other firms or by European customers indirectly. At the very least, however, trading over the pilot phase revealed the distribution of permits amongst firms, which was cost-effective and thus socially optimal, enabling the Phase II allocation to be done right (as it mirrored the most recent post-trading distribution).

It is probably impossible to carry out an initial grandfathered allocation that distributes the compliance burden proportionately among firms; but, the EU experience demonstrates that the gaps between winners and losers are much greater when there is no previous emissions information on which to base the allocation. If North American legislators had information about emissions levels and marginal abatement costs from major emitters, the allocation could be designed in a way to be more “fair.” Now, large emitters would contend that permits should be allocated by previous levels of emissions; firms that are cleaner than their competitors might insist on an allocation that is done by industry benchmark; and, countless other factions would have their opinions too. However, with reliable information from an emissions registry, North American governments could decide how to balance these competing interests, creating an allocation process that is “fair” by the government’s subjective standards.

A future lesson that North American policymakers may be able to take from the EU ETS is that controversies may stem from an auctioned allocation. Though there are small auctions occurring in Phase II of the ETS (accounting for roughly 5% of permits), in Phase III of the scheme the share of auctioned permits will rise to 30% in 2013, and will continue to rise to 100% by 2020.
Though firms have time to prepare for the higher compliance costs that will arise from this allocation, it remains to be seen if any controversy will play out and what the effects might be. The EC ETD will be conducting all auctions in Phase III, centralizing the allocation process and eliminating NAPs. Perhaps this will make it easier to recycle auction revenues back to firms or consumers.

2. Decentralized emissions monitoring and verification can be unreliable and non-transparent.

Without third party verifiers in the EU ETS, there would be incentives for gaming to emerge amongst national governments that monitor emissions. In such a game, it is likely that the dominant strategy would be lax regulation all around, as there is no incentive to abide if others cheat without repercussion. Though it is assumed that the EC ETD’s third-party verifiers prevent such gaming, the reluctance to use fines for violating firms does not necessarily suggest strict monitoring by national governments. Also, there is no evidence found by this study that shows any pressure applied towards national governments by the EC ETD. This study’s inability to locate data or literature about the monitoring and verification process implies a worrisome lack of transparency, let alone action.

A cap-and-trade system works best when the rules and regulations are clear. The multiple layers of monitoring in the EU ETS, along with potential incentives to game for national governments, muddle the clarity of the verification process. A clear lesson for North American legislators then is to avoid the peculiarities of the EU ETS which create such problems. Verification occurring at a sub-national level (states and provinces) in North America might seem like a convenient task to download, but the process would likely be far more transparent and resistant to gaming if it were centralized. If a joint Canada-US system were adopted, a joint verification agency should be implemented. Perhaps the EU ETS should move towards an entirely centralized verification process as well, just as they have moved towards centralized allocation for Phase III.

3. In a cap-and-trade system with no floor or ceiling, prices for permits can be volatile.

Firms in a cap-and-trade system don’t like unstable carbon prices. It makes it hard to make medium and long run decisions, and forces firms to tie up larger amounts of capital in hedging. However, the nature of a cap-and-trade system facilitates frequent price fluctuations, as MAC curves are always changing and speculation on carbon futures often affects the spot price. These fluctuations may be unavoidable, but what could be averted are the dramatic changes in carbon prices when verified emissions information first emerges.

It was difficult for firms when the price of carbon in Europe dropped from €30 to €10 in Spring 2006. Business interests were very critical of how the release of information was handled, and this event has even somewhat tainted the reputation of cap-and-trade for CO₂/GHG emissions in America.²² However, the EU has learned from this experience already and their method of
releasing verified emissions information for Phase II (April 2009) has changed. In this new method, results were initially unveiled after 80% of the emissions had been verified, giving firms a basic idea of what the demand for emissions in 2008 was, but the rest of the results were released as they were confirmed over subsequent weeks with the final verified totals not known until much later. This strategy to soften the blow of the verified emissions release date has appeared to work well in stabilizing carbon prices, though the dip in economic output since mid-2008 might have lowered expectations already.

Utilizing a staggered verified emissions release process like this could help prevent volatility in North American carbon markets as well. Another option, which seems to have some support in the U.S. Congress, is to compromise cost-effectiveness to some degree and implement a ceiling price for permits in a potential cap-and-trade system. Perhaps both options will emerge together in the North American context as the volatility of carbon prices appears to be a major concern, and adding such provisions may be necessary to attract sufficient support for such a system. However, a price ceiling that is too low would seriously compromise the economic integrity of the system, yielding an outcome that is not socially efficient, though politically attractive.

4. Modest reductions in emissions can be achieved without compromising competitiveness.

Though there are lessons to be learned from the three previous issues that Europe has encountered, perhaps the most important lesson comes from what has gone right. Carbon emissions have been controlled and reduced as a result of cap-and-trade. The EU’s GHG and CO₂ emissions for 2006 matched 1990 levels, and emissions for 2008 were down 5% from 1990 and 2006 levels. Though the economic downturn has helped achieve this reduction, the EU ETS did mandate this cut, and will ensure that such reduction continues over the coming years.

The significant corollary to this reduction is that evidence shows that European industry seems to not have permanently suffered as a result—a very promising signal for jurisdictions that are seriously considering emissions reduction. All sectors that were forced to comply with the EU ETS (energy, iron and steel, pulp and paper, and minerals) experienced aggregate growth for each of the three years of Phase I. Though such growth did not continue for 2008, analysts from the consultancy Point Carbon say that the ETS cannot be blamed for poor economic performance. The broader economic slump forced the price of emissions permits to fall to a below average €10/tonne, but even with low carbon prices output in these industries did not increase to average levels of production in the final months of 2008. Thus, there remains scant indication that emissions trading seriously erodes the competitiveness of domestic industry.

Finally, it is important to note that the EU has withheld some sectors from EU ETS compliance until Phase III, notably manufacturing and commercial transport. These industries face stiff international competition,
so their absence from the EU ETS shows that policymakers had to accept some compromise for the EU ETS to be politically feasible. North American policymakers could adopt this approach to win support from opponents who are concerned about the competitiveness of vulnerable industries (i.e. auto). Though exempting too many industries from the system would erode the integrity of cap-and-trade, providing for one or two exemptions, as the EU has, may be a necessary political compromise.

5. A cap-and-trade system is an effective tool for working towards UNFCCC GHG reduction targets.

The European experience shows that targeted GHG reduction is much easier for policymakers to manage with a cap-and-trade system in place. Because the EU determines what the cap will be, the amount of emissions reduction is virtually predictable. This is an asset if the country is working within an international framework that requires specific levels of emissions reduction, like Kyoto.

Perhaps it is obvious, but cap-and-trade is the best way to ensure that hard caps are met. Emissions standards plans (such as Turning the Corner) or a carbon tax cannot provide similar guarantees. Because it is inherently impossible to predict every fluctuation in firms’ marginal abatement costs and changes in the demand for products of high carbon emission intensity, these plans cannot strike the same optimal balance between maximal emissions reduction and minimal compliance burden for emitters and consumers as cap-and-trade does. Unless the tax rate or emission standard is estimated with absolute precision, only cap-and-trade will achieve the targeted emissions reduction exactly, thereby avoiding an outcome that is “too high” or “too low.”

In the multilateral context, it would be sensible to re-establish hard caps for all members of the international community. The risk of relying on alternative policy options is undoubtedly too significant to be acceptable. Thus, Canada and the United States must be prepared for a Copenhagen summit where a post-Kyoto international emissions framework will be developed, mandating stricter hard caps. With this probable scenario in mind, it might be best for Canada and the United States to begin the policy transition and move towards cap-and-trade as soon as possible.

CONCLUSION

By 2020, the EU plans to reduce its CO₂ levels by 20% from 2005 levels. Coupled with additional GHG reduction measures, this initiative is to yield a 20% overall GHG reduction from 1990 levels, though the EU is willing to increase the reduction to 30% if it helps facilitate an agreement at Copenhagen. These proposals are very ambitious, but emissions abatement of this scale will have to be achieved not only by the EU but by all major emitters of the world if catastrophic global warming is to be avoided. Perhaps it is unfair to ask developing countries to make such deep cuts in the short term, but the
expectations for North America should be no different than those for Europe.

Canada and the United States appear to be moving towards cap-and-trade systems in the near future. There are important lessons to be gained from the European experience; some things to avoid, others to replicate. Though the EU ETS has had some major hiccups over Phase I, it should ultimately be viewed as a success so far because it achieved what it intended to do—reduce emissions modestly while easing industry into a cap-and-trade system that becomes more ambitious over time. The EU ETS has not eroded European competitiveness, most of its problems have been corrected, and the biggest controversies have died down. Additionally, it has pioneered a model for CO₂ and GHG emissions reduction through cap-and-trade, providing other countries of the world with a template to emulate. The European Union should be commended for the leadership it has displayed by introducing the EU ETS and North American governments should take a hard look at the European example if they choose to devise their own cap-and-trade systems.
ENDNOTES


7 Ibid. 68.


9 Ibid. 7-8.


11 Ellerman and Joskow. 3.


14 Ibid. 249-250.

15 Ibid. 249-250.

16 Ellerman and Joskow. 5.

17 Kruger et al. 115-116.


19 Kruger et al. 125.

20 Ellerman and Joskow. 9.

21 Skajaerseth and Wettestad. 285-286.


23 Ibid. 278.
Ellerman and Joskow. 24-27.
Røine et al. 29.
Ellerman and Joskow. 6.
King. 73.
Ibid. 270.
Røine et al. 15-16.
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The Necropolis and the Metropolis: Sustainability Issues in Funerary and Memorial Services

Dan Wright

In some ways, it is premature to think of death as an end. The end of a person’s physical life is also the beginning of another sequence of events. The body must be attended to in some fashion. There may also be a ceremony that creates a space for social acknowledgment of the demise. Decisions must be made about the appropriate funerary and memorial practices through which to process the physical and social aftermath of a death, and it is frequently less traumatic for all concerned if these decisions are made in advance. The benefits of advance preparation apply to the larger scale as well: communities do well to consider the final needs of their residents. At the civic level, it becomes important that this advance planning be integrated, that the various means by which the residents are honoured are mutually compatible. This sense of compatibility is important to meet the aggregated needs of the deceased and their bereaved, but also to reconcile those needs with other needs of the living, both in the present and in the future. More than simply a challenge for urban planning, this tension highlights the need to discuss sustainability concerns around thanatological practices, which concern death, dying, and memorialization. These issues touch upon us all, yet tend not to be discussed. For understandable reasons, many avoid considering these issues, at both the individual and civic levels, but such avoidance can lead to deleterious consequences.

The goal of this paper is to enable meaningful discussion of ways in which actors in municipalities and provinces can move towards sustainable funerary and memorial practices. Several elements of this discussion are provincially specific. Ontario will be the province of focus because its large population and long history of settlement have led to many well-established traditional thanatological practices. A working definition of thanatological sustainability will be developed followed by a presentation of the context of thanatological practices and relationships and how they have evolved into their current arrangements. Once the current arrangements are thus properly contextualized, the pressures and directions facing the sustainability of thanatological planning will be discussed in detail. This discussion will bridge into consideration of how best to encourage people, funeral service providers, communities, and other relevant actors to direct future funerary and memorial planning along sustainable lines. It is entirely possible to reconcile the dignity of the necropolis with the future of the metropolis, and thanatological sustainability is the means by which such reconciliation may be achieved.
"Sustainability" is a term with both range and nuance to its meaning. Timothy Beatley notes that “sustainability finds many of its roots in biology and ecology and specifically in the concept of ecological ‘carrying capacity’—the notion that a given ecosystem or environment can sustain a certain animal population and that beyond that level overpopulation and species collapse will occur.” Applying this concept to funerary and memorial practices may at first appear a bit of a stretch, but impacts upon ecosystems and environments are aggregations of the effects of a large set of factors. The population of the necropolis—the dead, in their various modes of rest—is subject to upper limits, in terms of the amount of space made available for them, the availability of the resources used by them, and the ability of the relevant caretaking bodies to maintain the spaces devoted to them.

More relevant to the idea of species collapse perhaps are the restraints placed upon the communities surrounding and responsible for necropoleis. Space and resources devoted to the dead are, generally, space and resources unavailable for use by the living. Furthermore, there may be ecological or other effects on the residents of the metropolis resulting from the use of specific resources towards funerary or memorial ends. Thus, it is possible to see how, in a broad sense, thanatological planning is commensurate with sustainability issues.

Because sustainability analysis is comprised of human and natural qualitative factors, it is far less reducible to economic terms than traditional cost-benefit analysis. Nor can the analysis be reduced simply to either ecological or social terms. Robert C. Paehlke notes that “each dimension (the social, the environmental, and the economic) considered by sustainability analysis either can contribute to or impose on each of the other two.” These three dimensions must be balanced. This is in direct contrast to the previous, and possibly still dominant, paradigm, which prioritizes economic goals above all others; the lack of an understanding of the interconnected nature of ecologic, economic, and social factors has been described as being “largely due to a belief of religious proportions in an economic system that overlooks or downplays the ecological imperative and most root causes of social and economic inequity.” An equilibrium among all three types of factors must be reached: failure to suitably address ecologic issues directly depletes a region’s carrying capacity; failure to suitably address economic issues directly depletes a region’s trade capacity; and failure to suitably address social issues directly depletes a region’s communal integrity. Thus, in “contrast to benefit-cost analysis, that has the same broad objective, sustainability analysis does not attempt to reduce all values to monetary terms.” One result of the way that sustainability analysis is performed is that any conclusions reached tend to be expressed in qualitative terms. The fact that social and ecological factors are not easily reducible to numerical form is not a slight against the importance of these factors; rather, it is a challenge to the reductionism of economic quantifications.
Although it is tempting to copy the sustainability analysis model’s examination of matters along ecologic, economic, and social lines, thanatological sustainability, despite being a function of the health and robustness of these domains, demands a more localized set of measures. In order to be able to make recommendations about the level of, and directions for improving, the sustainability of death-related issues, it is necessary to organize the discussion along the following lines:

- **Personal.** It is important to remain cognizant of the fact that at the heart of human experiences and responses to death are people whose lives have been affected. What decisions do people make when preparing for their passing, or in the discharge of their responsibilities for someone who has died?
- **Legislative.** How are actions that relate to sustainability allowed, tolerated, or forbidden by legislation and regulation?
- **Economic.** What are the economic drivers behind the funeral and memorial products offered and the decisions made by their consumers?
- **Ecologic.** This aspect considers the physical investments and impacts made over time by various methods of human remains treatment and disposal.
- **Cultural.** Cultural forces act to valorize or denigrate various modes of human remains treatment and disposal to various and changing degrees over time. Key cultural forces include attitudes towards death and the treatment of the dead that have their origin, not only with religious doctrines and conventional practices, but also in more secular impulses.

All of these matters can be discussed in terms of their status as and effects on ecologic, economic, and social parameters. None of these factors exist in isolation; some of the discussion may overlap, and the assignment of specific topics to specific components of the model may be open to interpretation. The next section will discuss the current state of the thanatological landscape followed by a discussion on the pressure points of, and emergent trends for, these dynamics.

**THANATOLOGICAL FACTORS: DEVELOPMENTS AND CONTEXTS**

Doug Smith presents a set of major questions that must be answered for every human death, two of which are particularly relevant for thanatological sustainability: 1) How will the body be disposed of; and 2) Will there be some form of permanent memorialization?

**Disposal of the Body**

Cultures have developed a wide range of methods for the disposal of human remains which could be grouped into four types, each associated with one of the four classical elements: exposure or sub-aerial burial (air), interment (earth), burial at sea (water), and cremation (fire). Of these, only two or three are prevalent in modern Ontario: cremation and earth burial. Embalming
is a component of earth burial and occasionally cremation as well, in the event of a viewing, or local laws requiring it. Note that, “except in Alberta and Ontario, unless you give instructions to the contrary, funeral homes will usually automatically go ahead with this procedure and charge you for it.”

Canadian rates of cremation were 47% in 2000 and are projected to increase to 55% in 2010, versus rates of 26 and 35% for the United States in the respective periods. In Ontario, the rate of cremation is close to the national average; the rate is lowest on the East Coast and highest on the West Coast. Funeral service providers were initially opposed to cremation. They saw little room for money to be made, and so tended to either ignore and shut out the practice where possible, or agitate to shut down the practice where it was not. Cremation’s appeal continued to increase, however, and the funeral service industry eventually changed its approach. Their new plan was to become providers of cremation services themselves, and to (up)sell merchandise in the process. One key turn in this occurred in Washington, D.C., where Tom Snyder found an opportunity for salesmanship in his establishment’s policy of requiring family members to identify the deceased (as a means of avoiding lawsuits over burning the wrong remains). By presenting the deceased to the family in a casket (as opposed to the simple cardboard boxes then used for this purpose), “families began trading up from undignified cardboard to dignified hardwood... [his establishment] brought in an average of $3,970 per cremation in 1995, up from only $1,332 in 1990.”

Burial is traditionally associated with Jewish, Christian, and Muslim funerals, and cremation with Hinduism and Sikhism. Note, however, that one’s declared religious tradition is not a guaranteed predictor of their behaviour.

The First Nations of Canada have, as befits their diversity, adopted a wide range of funerary customs over time and between groups. However, First Nations came under the influences of the dominating English and French cultures, resulting in earth burial becoming the standard, although the services themselves may incorporate some or all elements from either First Nations or Christian traditions.

Judaism was initially in a minority position for preferring earth burial. Traditional Jewish law forbids autopsies, embalming, and cremation on the grounds that “although the human body is no longer usable it was once a person and should not be violated.” The experience of the European Jews under the Nazi regime, which used crematories as one of several shockingly efficient tools for genocide, has solidified the opposition to cremation in modern observant Jewish culture.

Christianity itself has traditionally favoured earth burial, as a result of a belief in bodily resurrection come Judgement Day. Although the practice of embalming is problematic from the viewpoint of those believing in full physical resurrection, its effects are compatible with the notion of the dead being “at rest” and this is one factor driving the North American Christian
uptake of embalming. The other factor is historical—during the American Civil War, Dr. Thomas Holmes developed “effective embalming fluids, technologies and techniques that would allow the Union dead to be sent back for their families [sic] for a final viewing and interment.” Among the early subjects of these techniques was Abraham Lincoln, whose body was preserved after his death and his remains shown across the country; the “newspaper reports provided the public with graphic details about embalmers,” thus spreading interest in the practice. Protestant Christian denominations have traditionally been more open to cremation than Catholicism, which only began relaxing its prescriptions against cremation in the 1960s.

Adhering more closely to Jewish understandings of death and the appropriate means of treating the dead than Christian ones, Islam also traditionally forbids cremation, autopsies, and embalming (autopsies being allowed within both traditions if demanded with a court order). The self is viewed as comprised of both the body and the soul; cremating the body would thus be “an assault on that belief.” Like Judaism, there is a primacy placed on burying the body within twenty-four hours. However, as indicated by the power of court orders to force Jewish and Muslim bereaved to surrender their departed for autopsies, traditional preferences may be trumped by secular authorities. Earth burial, then, is the preferred mode of human remains disposal under traditional interpretations of all three Abrahamic faiths, although individuals are increasingly free in the modern era to follow or disregard traditional prescriptions and prohibitions, or may indeed be required to do so by external forces.

In contrast to the position of the Abrahamic faiths, Hinduism and Buddhism, both of which developed in South Asia, are much more open to the practice of cremation. Cremation has long been the dominant, nearly universal, mode of human remains disposal in Hinduism. Cremation is viewed as a religious sacrifice of the body; as such, only those who would disturb the logic of the sacrifice are barred from cremation. These include “those who are not fit sacrificial objects (paradigmatically the leper), those who have already been offered to the gods ([renunciants]) or possessed by them (the victim of smallpox) and those whose death cannot be represented as an act of self-sacrifice (young children and, in theory, those who have died various other kinds of “untimely” death).” Buddhism also tends towards cremation as the norm, in no small part perhaps because “the Buddha himself was cremated.” There is, however, variation across the various forms of Buddhism and the various societies in which Buddhism is prevalent. On the whole though, both Buddhism and Hinduism tend towards cremation.

Religions are not the only broad forces guiding people’s specific choices. Secular and community authorities may trump the wishes of religious authorities and demand autopsies upon occasion or require specific practices for the disposal of human remains. Two
other factors worth mentioning are economics and environmentalism.

Cost has proved to be a major influence over people’s choice of human remains disposal method and has been instrumental in the rise of cremation. In recent years, however, the funeral trade has done what it can to drive the price of a cremation back up: by the 1990s, “post-cremation spending on memorial ceremonies, urns, columbarium niches, and scattering was brisk.” The potential, however, is there for cost to continue to play a strong role in driving changes in how people consign their dead to the hereafter.

Environmental priorities are compatible in large part with the influences of cost. Frugality and simplicity frequently overlap. The environmental movement, however, attaches a wider significance to choices made and the reasons for them than simple affordability. The nascent cremation movement portrayed cremation as an environmentally superior alternative to burial with embalming, arguing that cremation followed by the scattering of ashes “restored to nature elements that, before death, constituted a living human body and, after death, nourished plants and animals. It was, moreover, a sensible use of land.”

Permanent Memorialization

Different disposal methods have different permanent memorials associated with them. Earth burials involve the purchase of a plot of land. The currently dominant mode of earth burial also inters a coffin or casket along with the body, which may also be surrounded by a grave liner or casket vault. The function of these is to prevent the lid of the coffin or casket from breaking over time, due to the effect of the weight of the soil above it. The plot of land, in addition to housing the grave, is also the site of a grave marker of some sort. These have varied in terms of size, material, and adornment over time and between different forms of interment sites.

Some cremations leave no opportunity for permanent memorialisation—scattered ashes dissipate with the wind or the waves. However, some people’s cremated remains are housed more permanently in urns, which may be kept privately or in a columbarium (an analogue to a mausoleum). The funeral service industry has further expanded the range of options open to a person wishing to display or otherwise retain all or some of the ashes, and keepsake urns and jewellery are available through most funeral service goods distributors.

Thanatological Sustainability: Pressures and Trends

These next sections will treat these same contexts in search of what might be termed sustainability “flash points”—points of pressure for the social, economic, and ecologic determinants of sustainability.

Personal

There has been a growing level of concern about potential environmental effects of embalmed earth burial and cremation. As a result
of this, two “new” means for human remains disposal have arisen: green burials and promession.

Also termed “natural” or “woodland” burials (the latter term being the standard in the United Kingdom), green burials are in one sense a recent development. Growth of the green burial movement has been particularly rapid in the United Kingdom: the first natural burial ground site was opened in 1993; “twelve years later there are over 200 around the UK.”

Additionally, while the goal is for green burial sites to spread, it may still be possible to have a green burial performed at a more generic cemetery, depending on the local legislation and cemetery regulations.

Viewed another way, however, green burials are less than entirely novel. The practice of burying the body unembalmed in a simple covering is a direct analogue of traditional Jewish and Muslim interment practices. There are two ways in which green burials are, however, different. The first is the separation of the burial practice from religious doctrines: natural burials are an orthodox interment process not bound to orthodox interment rites. This serves to expand the appeal of unembalmed burial within the unorthodox or liberal demographics. The second is that, where Jewish and Muslim groups tend to bury their dead communally (within dedicated cemeteries or in specific sections of larger burial grounds), green burials can situate the remains of the deceased within a specifically natural context. The act of green burial is presented as “a way of combining an eco-friendly interment with land conservation.”

On the whole, the eco-friendliness assumed of green burials is warranted. Dedicated natural burial grounds in particular allow for people to combine a burial that exposes the soil to fewer inputs (such as embalming fluid, the casket or coffin, the concrete vault liner, and other items frequently buried with the deceased in more “traditional” interments) with a purchase of a plot of land that then becomes a de facto nature conservatory. Green burial sites thus act as a novel means for preserving land against development. Furthermore, green burial grounds are neither irrigated nor treated with herbicides or pesticides, and tend to eschew the use of stone grave markers, preferring instead to register the location of the grave with reference to more natural markers, such as “shrubs and trees, an engraved flat stone native to the area or centralized memorial structure set within the emerging forest that provides places for visitors to sit.”

There is a small caveat, however. Some natural burial grounds still make use of heavy equipment such as backhoes, which is impossible in the variegated landscape of a fully natural environment. There is, thus, still a trade-off between the drives for efficiency and ecology. Furthermore, green burial grounds that do not make use of this equipment and that allow the trees and plants in the lot to develop naturally reach their capacity much more quickly than would a “lawnscape” of the same size.
The other development in the field of human remains disposal is, in fact, entirely new. Promession may be thought of as new analogue to cremation, seeking to reduce the final mass of human remains. In this method, “bodies are freeze-dried by dipping them in liquid nitrogen. A gentle wave vibration is then used to shatter the body into powder, from which any liquids and metals are removed. The remaining powder is placed in a biodegradable container and interred in a shallow grave.” The advantages of this technique are that it is almost entirely emissions-free, and that bodies treated by this method are fully biodegraded within a year. The drawback is that this is still very much an emergent technology. The first promessorium was scheduled to have opened in 2008 in Jönköping, Sweden, where the technology has been developed. However, there is no indication that the facility has opened. Furthermore, Promessa Organic, the company developing the technology, seems to have not updated their website since 2006 and their link to their Promessa Foundation is currently “down for maintenance.” Despite its potential, promession has yet to establish itself as a legitimate entrant to the field of human remains disposal methods. Even if it were to be shown as viable, there would necessarily be a period of delay as lawmakers and regulators satisfied themselves as to the safety of the process and promulgated rulings as to its implementation.

**Legislative**

Funeral services are regulated at the provincial level and are “otherwise regulated to varying degrees including by municipal zoning and public health bylaws and provincial and federal environmental, trust and consumer protection laws.” At present, two laws specifically circumscribe the actions of those working in or operating funeral homes and cemeteries:

- The Cemeteries Act (Revised), 1990
- The Funeral Directors and Establishments Act, 1990

These two acts were supposed to have been superseded by the *Funeral, Burial and Cremation Act, 2002*, but this piece of legislation has yet to be ratified by the Lieutenant-Governor. As a result, the previous laws are still in effect. The new Act, which might come into effect as of January 1, 2010, would have two main effects. The first is the establishment of a number of consumer rights, including standardized price lists, the right to purchase services individually, the right to purchase a no-frills service without resistance, the general right to be free of aggressive and manipulative salesmanship, and full disclosure of the ownership of funeral homes. Whereas these changes act to the advantage of the consumer, the other effect of the impending Act works to the advantage of the funeral goods and service providers: the Act would remove barriers to cemetery owners also owning funeral homes. At present, however, there is a distinct imbalance of power in favour of the funeral goods and services industry.

The fact that passage of Ontario’s *Funeral, Burial and Cremation Act, 2002* is currently seven years late in being ratified makes it difficult to
discuss the legislative context of thanatological sustainability. Considering the description of its provisions above, however, there are likely to be repercussions along both the social and economic fronts. The transparency of information clauses with regard to establishment ownership and individualized prices will transfer social power to the general public. With this social power will come increased capacity to direct the form and features of funerals.

This may very well cause financial hardship to the directors of these funeral establishments, particularly the independent owners. The industry average for profitability is around 11%; average salaries for funeral directors start at $32,469, increasing to $53,954 for directors with twenty or more years of experience. Without recourse to packaged sales or the ability to otherwise relieve themselves of slow-moving products, funeral establishments would face a need to stock only those items that will sell to an increasingly selective public. If these preferences can be communicated to the suppliers of funeral establishments, the shape of the supply chain can shift efficiently. If, however, funeral goods providers are slow to change their product lines to match changing demands, the industry as a whole may be in trouble. On the other hand, the allowance for funeral homes to operate on cemetery grounds will likely encourage consolidation, which could stabilize the death-care industry at the risk of buffering it from local signals for change.

Outside of the impending Act, two regulatory issues could strongly influence thanatological sustainability, and both relate to earth burial. The first is the matter of the status of formaldehyde. A discussant on an industry group web site indicated that, in the wake of England having declared formaldehyde a carcinogen, the ratio of green burials increased significantly; similar regulation on formaldehyde handling and use (which he felt was likely in both Canada and the United States in the near future) would have the effect of stimulating demand for either green burials or cremation. His argument against recommending cremation was based on the increased number of goods and services that could be sold to those performing a green burial: “This may end up less profit [sic] than a traditional funeral, but far more than a cremation, thus funeral homes should begin recommending, if not insisting, on a Natural Burial whenever the word cremation is brought up by families.” As with the earlier rise of cremation, the industry has responded to the advent of a popular yet revenue-unfriendly form of human remains disposal by seeking to convince customers to purchase superfluous merchandise. However, this also shows how economic interests can compromise, but not necessarily revoke or overturn, advancements made to the environmental sustainability of death practices.

If formaldehyde were declared carcinogenic and subjected to additional handling regulations and restrictions, that would drive up the price of a “traditional” earth burial, driving price-sensitive customers towards another means of human remains disposal. The question of whether people would be driven towards green burial or cremation will be answered in large
part by whether or not the way is cleared for unembalmed, vaultless burials. Embalming is the default practice across much of Canada, and goes hand-in-hand with coffin or casket burial. However, “no matter how well built a casket or coffin is, the weight of the soil above it will eventually cause the lid to collapse. This can leave a sunken appearance at ground level and increase landscaping costs for cemetery. The cemetery-industrial solution has been to require people to purchase either grave liners or casket vaults.” Green or semi-green funerals (a natural burial in a conventional cemetery), because they present no obstacles to the natural movement of materials, escape this effect. However, without a change in the regulations and ordinances around embalming and the use of grave liners, the funeral industry may find itself tied to a set of practices that are no longer socially or environmentally desirable.

**Economic**

Do funeral service providers, funeral goods providers, and consumer groups perceive a need to change what goes into a funeral, particularly in terms of the typical environmental effects?

Responses from the funeral service industry on the matter indicate that, although greening the industry is regarded as perhaps desirable, few establishments have made a large commitment in that direction. The industry has made some efforts towards educating its members. A recent issue of *The Director*, a periodical of the National Funeral Directors Association, contained a brief but highly informative article describing various degrees of green burials. The goal of the piece was to help funeral service establishments attract and cultivate the business of this presumably growing market. The article also featured a wealth of resources funeral establishments could avail themselves of, should they wish to go about “greening” their business. The funeral service industry is educating itself in preparation for green businesses to become popular.

Unfortunately, the number of green burials in Canada still seems very low. A member of the Funeral Service Association of Canada indicated that, “a recent survey of our membership found that a very low percentage (5%) had had more than 5 requests in 2008 for Green Funerals or Burials and a full 73% had no requests whatsoever.” There are two factors that may be contributing to this low rate of interest in green burials in Canada. The first is that funeral service establishments tend to retain a great deal of their customers: “one study done for the industry showed that when choosing a funeral home 47% of people simply select the home that had previously served their family.” The second is that there may well be a generational effect, where the majority of people currently in the market for funerals are not very interested in environmental issues. Put another way, “the people who are passing away right now are a generation above the most ardent Green advocates.”

As argued in the previous section, there is need for flexibility, at both the services and goods levels of the funeral industry. The funeral service
providers appear to be holding fast, seeing insufficient change in their customer base to warrant extensive changes to their services. The goods providers, however, seem more eager to position themselves as ready to take advantage of an increased desire for environmentally sustainable products. The Funeral Profession Coalition Council of Canada is currently engaged in a study of environmental issues and how they intersect with the funeral industry; the document is due to be released in June of this year.\textsuperscript{47} The funeral goods industry, like the funeral service industry, is seemingly educating itself about environmental issues. However, there is no sense that they are taking an active role in reducing their environmental effects. As long as formaldehyde is an allowable material, it will be sold and used. But what are the effects of formaldehyde and other funeral service products and practices? To answer these questions we advance to the next section.

**Ecologic**

Embalming is in many ways the obvious place to start this discussion. Formaldehyde has been declared carcinogenic in the United Kingdom, and other polities may follow suit. In Canada, it is subject to stringent safety requirements, and is regarded as highly toxic, particularly through inhalation or direct contact.\textsuperscript{48} The widespread adoption of embalming spurred the “ undertaker’s claim to professional standing, since it was seen as an innovation and a scientific service.”\textsuperscript{49} This aura of professionalism came at a high cost: embalmers used arsenic as the embalming fluid of choice before formaldehyde was developed and popularized; arsenic was banned for its danger to morticians, but “since an embalmer might use between six ounces to three pounds of arsenic per person, a cemetery that buried a thousand embalmed people between 1880 and 1910 might contain a ton of arsenic.”\textsuperscript{50} So how toxic are our cemeteries?

The main way that the public health effects of cemeteries are measured has traditionally been in terms of possible effects on the water supply. This has been the case since the cholera outbreaks of the mid-nineteenth century and the contributions of Louis Pasteur to epidemiology.\textsuperscript{51} Smith holds that arsenic levels near old cemeteries are elevated.\textsuperscript{52} However, some primary data (all from Ontario) have painted a less ominous picture. The first study, conducted in the summer of 1990, tested six sites for “formaldehyde, nitrates and phosphates. Bacteriological analyses were also done.”\textsuperscript{53} The results indicated that, not only were the observed levels of formaldehyde very low, but their calculations indicated that, for cemeteries where the deceased were embalmed and casketed, neither formaldehyde nor nitrates added to the groundwater with sufficient intensity to constitute a probable source of contamination.\textsuperscript{54} The other study focused on a large rural cemetery, Toronto’s Mount Pleasant, and tested for “formaldehyde, methanol, arsenic, solvents and various metals.”\textsuperscript{55} The results of this study were as encouraging as those
of the other: “for the parameters of concern such as formaldehyde, methanol, arsenic etc., the results were either below the applicable by-law or guideline or less than the detection limit.”

However, a British study raises concerns about the above conclusions. Where the previously mentioned studies examined the groundwater effects of established grave sites, the British study argues that the rate of formaldehyde leaching from embalmed corpses varies over time: “over half of the pollutant load leaches within the first year and halves year-on-year. Less than 0.1 per cent of the original loading may remain after 10 years.” This suggests that the principal long-term dangers of formaldehyde may be to those directly exposed to it, rather than those living near cemeteries, whose chief concern is for the short-term. In order to avoid unsustainable formaldehyde loading rates, cemeteries could ensure that they distribute their new interments across their property as widely as possible. This would limit the dangers of formaldehyde effects on cemetery groundwater.

Since bodies that are cremated in Canada are frequently embalmed beforehand, there may be separate effects for formaldehyde released into the atmosphere as part of the incineration procedure. A cremation company claims that “formaldehyde’s flash point (the temperature at which it will ignite and burn) is ... far below the range of cremation temperatures. Exposed to cremation temperatures, CH₂O reacts with the oxygen (O₂) of the combustion process and breaks down into carbon dioxide (CO₂) and water (H₂O). Formaldehyde emissions from the stack are just about nonexistent in cremation.”

The degree of reassurance afforded by this claim is tempered somewhat by consideration of the other pollutants that cremation releases into the atmosphere. Chief among these is mercury, which is used in dental fillings; in England, cremation accounts for 16% of mercury pollution; cremation also accounts for 11% of English atmospheric dioxins. Furthermore, the energy demands of cremation are intense, using “285 kilowatt hours of gas and 15 kWh of electricity on average per cremation—roughly the same domestic energy demands as a single person for an entire month.” Considering these factors, cremation begins to look less and less environmentally friendly.

Formaldehyde leaching is not the only environmental issue facing earth burial. For the United States, some key resource usage rates are shown below:

- **Chemicals**: (embalming) 830,000 gallons / year.
- **Timber**: (coffins/caskets) More than 39 million board feet of hardwood lumber / year.
- **Steel**: (coffins/caskets) More than 90,000 tons of steel / year.
- **Concrete**: (grave liners / casket vaults) 1.6 million tons of reinforced concrete / year.
- **Rock**: (grave markers) Thousands of head stones are made from granite and marble, which are quarried using fossil fuels.
burners, heated to 3,000°F, are used to remove the rock from the earth.

- **Water**: (maintenance) Traditional cemeteries maintain the landscape with gas-powered mowers, as well as synthetic fertilizers and water irrigation systems.⁶²

Note that all of these resources are used in drastically lower amounts in green burials, if at all. Without intending disrespect to those who wish to mourn the passage of their loved ones, the level of resource use associated with “traditional” burial seems woefully extravagant.

Cemeteries are also inefficient on two other grounds, the first environmental and the second social. On the environmental side, cemeteries have been described as comparable to landfills, but designed less efficiently. Boyd J. Dent and Michael J. Knight present the cemeteries-as-landfills model as follows: cemeteries inter relatively small quantities of organic waste, but they reach capacity far quicker than would a generic landfill. Furthermore, the area is excluded from further usage, yet is cultivated to a pristine condition. Finally, “the sites are large and occupy a significant place in the hydrologic cycle with which they readily interact.”⁶³ Many of these issues are addressed elsewhere within this paper, but the capacity issue bears mention, as it is a problem for a number of extant cemeteries. Officials at Arlington National Cemetery in Virginia “are estimating that all currently available land will be occupied by 2030,”⁶⁴ and one Australian cemetery is planning to bury people vertically, in order to save room.⁶⁵ To address this problem, Knight argues in a separate paper for an increased rate of cremation and also for the development of high-rise mausoleums, which would allow for nearly ten times as many remains to be stored on the same land footprint. ⁶⁶

Thinking of burial grounds in this utilitarian way is arguably demeaning: graves are more than simply sites for detritus; they enable people to connect with their familial, local, and cultural heritages. However, in order for this critique to apply with full force, cemeteries would have to be shown to be important enough to people to justify these inefficiencies. And, while cemeteries may be of high value to people who have relatives interred there, they are visited far less frequently than was the case in previous generations. Smith notes that “while family and friends may make a number of visits to the grave side in the first three months after the burial the average North American grave receives only two visits from then on.”⁶⁷ The viability of the cemetery model is thus problematic in terms of its seemingly negligible social value, as measured by its level of use.

If cemeteries are to be defended as a use of land, how can more people be encouraged to visit these grounds? There are three potential mechanisms for raising the social sustainability of graveyard arrangements. The first consists of finding other uses for the cemetery grounds. At present, the paths through cemeteries make them popular as a form of greenspace with some local residents, but a Californian example shows how this can be expanded upon. Residents of
Boyle Heights, lacking local access to parks or other conventional open spaces, “transformed a cracked sidewalk that ringed the Evergreen Cemetery into a 1.5 mile rubberized jogging path.”\textsuperscript{68} The effect of this was to boost the number of people who visit the cemetery per day from “about 200 to more than 1,000 people who use the path for jogging, walking, and socializing.”\textsuperscript{69} This represents an incredible achievement in cultivating local engagement with the facility.

Another way of making use of the resources available within cemeteries is through pedagogy. Cemeteries are rich with potential for education: for young students, “teachers can use graveyards for scavenger hunts, lessons in English, history, art, sociology, and geology.”\textsuperscript{70} More senior students can use graveyards as a site for learning general field research skills, as well as specific details concerning “the settlement patterns and history of the community in the surrounding region.”\textsuperscript{71} As with the previous example, this use of cemeteries increases the social dividends of these facilities for residents of the nearby communities.

The third way of increasing the traffic of the living in the interment grounds of the dead also has the potential for bringing economic rents to the community. This is through cemetery tourism, also dubbed necrotourism (which expands the term’s coverage to include columbaria and other properties associated with thanatological treatment and storage sites). Cemetery tourism was first popularized with the advent of rural cemeteries; Paris’ Père Lachaise “became a fashionable destination for the living as well as the dead” as of the early nineteenth century.\textsuperscript{72} This form of tourism is not without its detractors, with critiques against the practice saying that it resembles anything from sentimentalism to an “aphrodisiac for necrophilia.”\textsuperscript{73} Furthermore, not all cemeteries are significant enough to attract visitors beyond the existing numbers of mourners and genealogists. However, these examples go to show that there are a range of possibilities available for owners of and residents near cemeteries to improve the social dividends of burial grounds, turning them into a cultural resource.

**Cultural**

Here we return to the three topics discussed in previous sections: religious, economic, and environmental considerations. How are trends within these fairly broad domains likely to affect people and the specific choices made by individuals?

Modern industrialized nations are frequently portrayed as moving towards secularism. This may affect the funeral industry in two ways. First, members of the funeral service industry are concerned by this because it directly affects their businesses. B.T. Hathaway, a funeral home owner, used the release of a survey in which 27% of respondents indicated that they wanted no religious service at all at their funeral to “drive home the need for funeral home professionals to find a broader array of services beyond traditional religious observances.”\textsuperscript{74} The funeral industry has traditionally
responded to threats to its business model by increasing the diversity of goods available. Increasing the array of services offered could, in effect, translate into an increased willingness on the part of funeral service providers to offer types of funeral beyond that which they have built into their bread and butter: the “traditional” embalmed, casketed earth burial. These alternate services could very well still be in keeping with the broad theologies of the religions themselves, if not the present way the industry attends to these theologies.

A reduction in the desire for religious services at a funeral is also significant on the consumer end of this transaction. If people are looking to other sources of meaning when constructing and arranging their final provisions, could matters of economic or ecologic nature be more strongly affective?

If economics are a strong driver, then the current economic climate would signal a movement away from expensive funerals, which could reduce the rate of embalmed, casketed interment. This will, however, only emerge slowly. The high rate to which the “traditional” burial is subsidized both directly (through pre-arranged, pre-paid funerals) and indirectly (through the existing structure of insurance and other benefit types), as well as existing cemetery regulations (such as those requiring grave liners or casket vaults), will allow it a considerable amount of inertia. Cost pressures would, however, drive people towards cremation or natural burial, and, as argued above, natural burial has the potential to be better for establishment owners’ revenue streams than cremation.75

An increase in the centrality of environmental considerations when making final provisions would also be slow in establishing itself. The industry is aware of the possibility of an increase in interest in green burials, once the generation of people who grew up with the environmental movement become a larger demographic of their business.76 What will aid a sustained pressure of interest in the meantime, however, is the work of consumer organizations such as the memorial societies and the natural burial movement. Assisted by an increased social receptivity to environmental concerns and an increased ability to disseminate information through digital media, these groups may be able to increase the strength of their position within the death-care dynamic.

CONCLUDING REMARKS

The preceding discussion has hopefully shed some light on the complexities of human arrangements for the final disposition of the dead, and some of the pressure points created by these arrangements over time. Although people wish to honour their dead, this can be ruinous, both to people’s financial resources and to the natural environment. Traditional earth burial appropriates much land to its ends, as well as large quantities of other resources. Cremation avoids the problem of land use, but its high rate of energy use and airborne pollution detract from its desirability. Green burials are much more palatable from a resource use perspective, and the
land they use may be within existing cemeteries or within conservation projects. However, legislation and regulation may bar the way to the uptake of this practice, and the funeral goods and services industry is wary of encroaches against the “traditions” of burial that they have helped create. While cemeteries are a significant use of land within a territory, their level of use speaks against their relevance, and may suggest a cultural change.

Furthermore, this paper has hopefully also shown how developments within the domains of this dynamic have created opportunities for movement towards increasing thanatological sustainability. In most cases, green burial or, if it ever gets off the ground, promession could be advanced as the most sustainable forms of final disposition. Such choices cannot be forced on people: the idea of state-mandated death practices is distasteful. One way to reduce the reliance on “traditional” burial procedures would be to declare formaldehyde as carcinogenic. Barring the advent of an inexpensive, environmentally benign substitute to formaldehyde, the regulatory and handling effects of this would drive up the price of embalming. Cost has long been a significant driver in changing peoples’ choices, and should be the target of deliberate actions. Only by finding ways to take care of the dead that are more affordable along economic, ecologic, and social lines can we be said to have cultivated thanatological sustainability.
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Canada’s 2007 Isotope Crisis: Examining the Dimensions of Trust in Nuclear Risk Management

Sandra Noël

With growing energy needs and an aging population, placing increasing demands on nuclear medical imaging and treatment, ensuring Canada has a safe and efficient nuclear industry will be critical over the coming decades. Maximizing the benefits of nuclear technologies means addressing their associated risks, both real and perceived, and effectively balancing those risks with other societal needs. Should the risk of a frightening, but unlikely, reactor accident overshadow the risk of doctors being unable to diagnose serious ailments early enough to save lives?

Establishing and maintaining trust is an essential component of meeting this challenge. Can citizens trust the motives and competence of the agencies operating and regulating our technologies? Can regulators trust licensees to meet agreed-upon requirements? Can licensees trust regulators to be flexible when warranted? Moreover, can these groups be trusted to plan ahead together to head off potential crises? Sadly, the events of the past few years suggest the answer may be no.

Until its extended shutdown following a heavy water leak on May 15, 2009, Chalk River’s National Research Universal reactor (NRU) produced over fifty percent of the global supply of a key medical isotope for diagnostic imaging. This follows on the heels of a controversial shutdown of the NRU in late 2007 which resulted in a political and media storm culminating with the forced departure of the head of Canada’s nuclear regulator, the Canadian Nuclear Safety Commission (CNSC). This 2007 “isotope crisis” may have appeared on the surface to be a regulatory over-reaction as patients relying on nuclear diagnostic procedures faced uncertain delays. Upon further inspection, however, it becomes clear that myriad breaches of trust played a critical role in bringing about this crisis and may be key to averting future crises.

This paper examines the 2007 medical isotope shortage, exploring the events leading up to this crisis and the resultant opportunities for improvement. In particular, the roles of the three main players will be examined with attention to their trust relationships and how they relate to the public trust. These players are: Atomic Energy of Canada Limited (AECL), which owns and operates the NRU; the Canadian Nuclear Safety Commission (CNSC), the civilian nuclear regulator; and MDS-Nordion, the publicly-traded company responsible for selling Canadian-produced medical isotopes. The paper will conclude by considering what can be, and in the author’s opinion still needs to be, learned from this crisis regarding the important and varied roles of trust in risk management.
**Atomic Energy of Canada Limited (AECL)**

Atomic Energy of Canada Limited (AECL) was incorporated in 1952 as a Crown corporation responsible for Canada’s emerging nuclear program.\(^3\) With a staff of over 4700 employees,\(^4\) AECL operations are divided into three units: the CANDU Reactor Unit, the Liability Management Unit, and the Research and Technology Division which owns and operates the Chalk River NRU.\(^5\)

Although wholly owned by the government of Canada, AECL’s mandate to “create customer and shareholder value through: managing the Canadian nuclear platform responsibly and cost-effectively; leveraging the technology base to deliver nuclear products and services to market; and paying dividends from profitable growth”\(^6\) also suggests a profit motive. Its vision sounds similarly growth-driven, seeking “to be the top worldwide nuclear products and services company”\(^7\) but also includes such societal commitments as “to protect the health and safety of the public, our employees and the environment”\(^8\) and “to minimize nuclear legacy obligations for future generations.”\(^9\) AECL reports to the Minister of Natural Resources who, at the time of the 2007 crisis, was the Honourable Gary Lunn. Continued operation of AECL’s NRU is contingent upon active licenses from the Canadian Nuclear Safety Commission, Canada’s nuclear regulator.

**Canadian Nuclear Safety Commission (CNSC)**

In 1946 the Atomic Energy Control Board (AECB) was established through the Atomic Energy Control Act to regulate Canada’s nascent nuclear activities.\(^10\) The role of the agency evolved until in 1997 the Nuclear Safety and Control Act established the Canadian Nuclear Safety Commission (CNSC), which subsequently replaced the AECB.\(^11\) Agencies and individuals seeking to use nuclear substances or nuclear energy must be licensed by the CNSC. Licenses must be renewed regularly and the CNSC can impose conditions on renewal. The CNSC reports to Parliament through the Minister of Natural Resources rather than to the Minister to reduce the risk of the regulator being “captured” by the interests of the mining and energy industries within the Minister’s portfolio, including AECL. This fine distinction was sorely tested by the 2007 isotope crisis when Natural Resources Minister Gary Lunn threatened to call for the removal of then CNSC CEO and President Linda Keen for her handling of the NRU licensing issue.

Regulatory activities are handled by either a full seven-member quasi-judicial tribunal (the Commission), or by CNSC staff members.\(^12\) The Commission tends to handle regulatory policy issues and higher risk licenses, including addressing significant compliance issues.\(^13\) The mandate of the CNSC, in the words of its former President and CEO Linda Keen, is “to regulate all activities related to nuclear energy and nuclear substances in a manner such that their development and use do not pose an unreasonable risk to health,
safety, the environment and national security, and that these activities adhere to Canada’s international commitments on safeguards and non-proliferation.”

As with most Canadian regulatory agencies, the scope of the CNSC’s mandate is narrow and does not extend to examining the benefits of the technologies being regulated or to balancing the risks of licensing versus not licensing. It is worth noting that CNSC’s identity is heavily invested in being a guardian of the public trust, a role particularly important to Ms. Keen, as evidenced when she named Canadian citizens as “the CNSC’s only clients.” Further, the CNSC-defined objective for the safe performance of nuclear reactors is as much a measure of attending to the needs of public trust as it is attending to public safety: “Safe and secure operation of the facility solely for peaceful purposes and public confidence in the operator’s ability to achieve this outcome.”

MDS Nordion

In 1991 AECL spun off its medical isotope business into Nordion International Inc., subsequently purchased by MDS Health Group. The resulting publicly-traded company, MDS Nordion, is a leading world supplier of radioisotopes. MDS Nordion does not report to Parliament. It reports publicly to its shareholders and has a responsibility to ensure continued solvency, profitability and investment growth. The isotope business brings parent company MDS a little under $300 million per year in net revenue (roughly a quarter of its net revenue) and MDS expected the 2007 supply crisis to reduce profits by as much as $8-$9 million. MDS Nordion is accountable through the market, and a loss of public trust in its ability to deliver key medical isotopes will push clients to create alternate sources, despite the high investment cost.

THE 2007 ISOOTOPE CRISIS IN BRIEF

Nuclear medicine using radioisotopes has become an important part of diagnostic procedures for screening and treating such serious ailments as cancer and cardiovascular disease. MDS Nordion, through AECL’s NRU, provides critical isotopes, principally molybdenum-99, for over 30,000 patients a week in Canada and over 76,000 diagnostic tests per day worldwide. The aging NRU, which began operation over 50 years ago, has no North American backup and is one of fewer than ten reactors in the world supplying this key isotope whose very short half-life makes it impossible to stockpile.

CNSC licenses Canadian nuclear reactors and agreed to allow AECL to continue operation of the NRU provided that it was modernized as closely as possible to contemporary safety standards. In 1992 AECL identified seven “Safety System Upgrades” to accomplish this task. Among them was an independent Emergency Power System (EPS) to provide emergency backup power to the motor starters for the two Main Heavy Water Pumps (MHWP), and other safety upgrades, in the event of both a power loss and failure of existing backup generator systems. According to AECL, the NRU was to
have been decommissioned by December 31, 2005

but significant delays in bringing replacement reactors online necessitated an extension. In light of these difficulties, CNSC continued licensing for the NRU up to 2011 expecting that all Safety System Upgrades initially identified by AECL had been made.

Communications failures and inadequate tracking processes at both AECL and CNSC led to the final Safety Upgrade still not having been completed when CNSC inspected the NRU on November 5, 2007. Meanwhile, AECL had concluded that the “seismically-qualified” (earthquake-proof) connection of the remaining two MHWP motor starters to the EPS, which it had committed to completing by 1998 in a 1997 Safety Note to CNSC’s predecessor, had become “optional” and not part of the licensing agreement. Over the nine years that followed, CNSC repeatedly expressed concern in the slippage of timelines regarding the seven Safety System Upgrades. On several occasions, documents to CNSC implied that the EPS connections were complete only to later indicate that the EPS connections of the two MHWP were still pending.

At no time during this period did CNSC initiate enforcement. When AECL shut down the NRU for regularly-scheduled maintenance on November 19, CNSC strongly advised that the reactor not be restarted until these final upgrades were completed or else AECL could be found in violation of its operating license. AECL complied and began negotiations with CNSC for permission to restart the reactor with only one of the two remaining MHWP motors connected to the EPS, a compromise to allow reactor operation while awaiting parts to complete the second connection. With the NRU shut down for an extended period, MDS Nordion became concerned about its ability to meet isotope demand. In early December, both AECL and MDS Nordion issued press releases raising public awareness of the pending isotope shortage. At the same time, the Canadian Society for Nuclear Medicine held an emergency meeting on the issue resulting in a press release indicating the effects of this shortage on patients. Immediately following these releases, Minister of Natural Resources Gary Lunn phoned CNSC President and CEO Linda Keen to push for a speedy end to the shutdown. When it became clear that regardless of immediate isotope needs, Ms. Keen would require AECL to follow due process and present a full safety case for operation with only one MHWP connected to the EPS, the Ministers of Natural Resources and Health tabled a parliamentary directive on December 11 that the CNSC be required to consider the potential health risks of an isotope shortage in its regulatory processes. Temporary emergency legislation was also adopted to allow the NRU to restart with only one pump connected to the EPS, which it did on December 16, 2007, 27 days after it had shut down.

These decisions are at the centre of the 2007 isotope controversy. The Minister, and others, saw Ms. Keen valuing the prevention of the remote possibility of an accident that could not be handled through other safety systems (between 0.001% per year and 0.0001% per year) over the immediate
medical needs of Canadians. In mid January, Ms. Keen was removed as head of CNSC by Minister Lunn, essentially for confining the CNSC to its mandate and not considering the broader picture. But when it comes to guarding the important trust relationships central to this balancing of risks, who, if anyone, was right? Certainly this Parliamentary override failed to solve the underlying isotope supply problem. A subsequent global isotope shortage in late August 2008 when four of the five major isotope producing reactors, including the NRU, all required closely-timed maintenance shutdowns while the remaining Belgian reactor was closed for safety reasons following a radioactive iodine leak, and an extended NRU shutdown following a heavy water leak in May 2009, which may last into early 2010, clearly demonstrate an ongoing supply issue. Further, the MAPLE reactor program, a joint initiative with MDS Nordion to replace the NRU in supplying medical isotopes over a decade ago, was cancelled in May 2008. This development makes it unclear when the aging NRU could be decommissioned. Despite unprecedented intervention by Parliament in reaching a short-term solution to the 2007 isotope crisis, no long-term isotope supply solution is in sight, a quandary further amplified by Prime Minister Steven Harper’s 2009 statement that although the NRU will be repaired and operate until 2016, Canada will be “getting out of the isotope business” and hoping other nations will resolve long-term supply issues. Yet, if the Canadian government was concerned enough about the risks to patients of insufficient isotope supply to have undermined public and industry trust in its regulatory system in 2007, one has to wonder, why are we still in this mess?

**What Do We Mean by Trust?**

Before delving into the trust relationships between the organizations involved in the isotope crisis, it is important to be clear what we mean by “trust”. At its core, trust means a willingness to put one’s fate or interests in the hands of others. There are distinct rational, emotional and behavioural elements to trust:

“We trust you” may mean that we believe you can give us right answers and reliable information. It may mean that we believe you are honest, and will tell us all that you know. Or it may mean that we trust your judgement, and rely on you for decisions which are wise, impartial, ethical and in the public interest. We may trust you in one of these ways, without trusting you in the others.

A trust relationship can be characterized by five dimensions: competence (ability to fulfil responsibilities), openness (transparency, fairness and honesty), commitment (the willingness and ability to see decisions through), concern (understanding and caring about what is at stake for both parties), and predictability (consistency of action). Trust may be stronger along some dimensions than others but individuals, groups and agencies who must work together on managing risks would do best to aim for high levels of trust in all five.
There is a solid body of research on the importance of trust in communicating risks to the public but less explored, and more relevant to this paper, is the idea of trust between organizations or between groups in the face of risks. The regulatory environment of the nuclear industry often forces groups and organizations into relationships with one another that would ideally be characterized by trust, essentially imposing the need to trust. Understandably, these trust relationships can be fragile and, if not nurtured, may quickly deteriorate. When trust functions well, clear communication, collaboration, and efficient decision-making ensue, easing the process of risk management. When barriers to trust arise, or when trust is undermined, it stands to reason that the opposite is true. Parties may become polarized and begin to work at cross-purposes. As we will see, leading up to and during the 2007 isotope crisis, trust relationships among the key players were sorely tested. Further, it would seem that stronger trust relationships among these groups might even have averted the crisis entirely.

**TRUST LINKS AND DEPENDENCIES AMONG KEY PLAYERS**

Looking at CNSC, AECL and MDS Nordion, and adding the Canadian public to the picture, apparent trust links and dependencies emerge with citizens and AECL bearing the brunt of expectations from all groups (see Figure 1).

![Figure 1: Framework of trust relationships among the involved agencies and the Canadian public.](image)

Overall, Canadians appear cautious about nuclear reactors. Yet, with 30,000 Canadian patients per week benefiting from isotopes generated by the NRU, it is also easy to imagine that most Canadians either know or can imagine someone close to them who would be affected by a prolonged isotope shortage. Although the Canadian public was not a direct actor in the 2007 isotope crisis, involved agencies purported to work on their behalf and interest, namely the CNSC and Parliament.
The public needs to trust that MDS Nordion will continue to nationally and globally supply the short-lived isotopes needed in diagnostics and therapies for cancers and cardiovascular conditions. It needs to trust in the CNSC’s effectiveness as a nuclear regulator and guardian of the public safety. It also needs to trust that AECL will operate in accordance with safe practices. MDS Nordion needs to trust that AECL will continue to reliably supply the radioisotopes it needs for its global medical market and it relies on public trust in its viability as a business in order to remain competitive in the marketplace. AECL needs to trust that CNSC will be flexible and understanding as it attempts to continue safely operating a reactor designed over fifty years ago and as it seeks to find alternative methods of meeting its isotope supply commitments to MDS Nordion. It needs to trust that the public will not succumb to its discomfort with nuclear technologies and push government to disband Canada’s nuclear program. For this, it relies on public trust that nuclear regulation is sufficiently rigorous to prevent a Chernobyl or Three Mile Island from happening in Canada. CNSC needs to trust that AECL will abide by its rulings and that, if it does not, Parliament will allow CNSC to escalate reasonable regulatory enforcement measures without interference. As Parliament, by definition, exists to act on behalf of the public, CNSC essentially relies on public trust to safeguard public interests. The trouble is that CNSC’s interests are narrowly defined by its mandate while those of the public are not.

DEGRADING TRUST AND THE 2007 ISOTOPE CRISIS: A DIMENSIONS OF TRUST APPROACH

It is important to note that among the key players of the isotope crisis, there is no visible downside to establishing a high degree of trust across the five dimensions: competence, openness, commitment, concern and predictability. Despite this, all players engaged in activities which deeply undermined at least one component of trust between them. Further, the activities of outside players in government, in Parliament and in the media, exacerbated many of these effects. It is unfortunate to note that there are too many examples of these actions to examine even a significant proportion of them in any detail in this paper. Instead, one or two key examples will be explored for each of the dimensions of trust.

Competence

MDS Nordion is heavily reliant on AECL’s aging NRU for its radioisotope supply business and with this over-fifty-year-old reactor active well beyond its expected life, plans have emerged to bring reliable new isotope generating reactors online. In 1996, MDS contracted AECL to design, build and operate two reactors designed for the commercial generation of radioisotopes. Following construction, some serious design issues began to emerge, namely around AECL’s prediction
that the reactor would have slightly negative power coefficient of reactivity (PCR) value. A negative PCR essentially slows down nuclear reactions as the reactor core heats, enhancing the reactor’s safety. Such was AECL’s confidence in this prediction that, according to a nuclear industry insider, MAPLE reactor safety systems were designed and constructed assuming a negative PCR. Once constructed, however, it became apparent that the MAPLE reactors had a slightly positive PCR, meaning that nuclear reactions would speed up as the reactor core heats. This result has stubbornly persisted despite extensive testing and without a satisfying explanation as to why the reactor’s predicted and actual behaviour are so different, even ten years after the construction of MAPLE-1. Following this revelation, MDS began to doubt AECL’s competence in moving this project forward and sought to reduce its exposure to the project risks. It pushed the government to reopen its MAPLE contract and a new arrangement was negotiated in 2006. AECL would assume ownership of the two MAPLE reactors and commit to MAPLE-1 being operational by October 31, 2008. Further, it would repay MDS $25 million of the company’s $350 million investment and be responsible for providing MDS Nordion with a regular supply of medical isotopes for the next 40 years. With the license issued by CNSC to AECL for operation of the MAPLE reactors based on the inherent safety of a negative PCR, CNSC has been reluctant to allow full licensing of a positive PCR MAPLE reactor. It’s understandable that they may also question the safety of these reactors whose actual behaviour differs so greatly from prediction for reasons that are still not understood. It’s easy to see how this three-way stalemate would have eroded trust between MDS Nordion and AECL and between AECL and CNSC.

Public confidence in AECL’s competence may also have been shaken by the Prime Minister’s recent statement on their handling of MAPLE: “For whatever reason, Atomic Energy was not able to make that project work. There was no prospect that it would work.”

**Openness**

Perhaps the greatest trust casualty leading up to the isotope affair, and beyond, is openness. It is not clear that the lack of clarity and transparency between these players and with the public was intentional. Still, when reading through the timeline of the 2008 report by Talisman on the crisis, jointly commissioned by AECL and CNSC, the lack of openness in communications between the agencies leading up to the crisis is palpable. From both sides, expectations and assumptions were not clearly communicated. CNSC repeatedly referred to documents or alluded to terminology from much earlier communications in licensing conditions rather than explicitly laying out AECL’s responsibilities for complying with a given license. This lack of clarity led AECL to believe that connecting the MHWPs to the EPS had become an optional licensing condition, mistakenly informing CNSC in
2005 that all seven Safety Upgrades had been completed. No less culpable, AECL communicated to CNSC on at least six separate occasions between 1998 and 2007 in a way that suggested the seismically-qualified DC motor starters were, or were on the verge of being, connected to both MHWPs, only to subsequently report that these connections remained incomplete.\(^{49}\)

Such actions could easily undermine the commitment and competency components of trust between AECL and CNSC as CNSC was left wondering whether it was AECL’s inability or refusal to undertake the last of these upgrades that prevented them from being completed over a nine year period.

In another example of lack of openness, MDS stated that it first became aware of the government decision to discontinue the MAPLE reactor project through a May 16, 2008 public announcement. In light of this serious breach of trust, it should not be surprising that MDS announced that it would sue AECL and the Government of Canada for $1.6 billion.\(^{50}\) Should this suit succeed, Canada will have paid an estimated $2.3 billion\(^{51}\) to solve its long-term isotope supply needs and still be no further ahead.

**Commitment**

Up until November 2007, CNSC had been flexible on enforcement. It is not difficult to imagine that the regulator was finding it increasingly difficult to trust AECL’s assurances that upgrades would be made at all, much less in a timely manner. Then CEO and President of the CNSC, Linda Keen had publicly stated that she was very aware of the importance of isotopes during the crisis.\(^{52}\) This rationale is likely one reason AECL was allowed to operate NRU for so many years without full compliance regarding the Safety Upgrades. It also explains why the CNSC continued to license the NRU after its scheduled decommissioning date of December 31, 2005. In terms of trust, one might imagine that CNSC felt it had been flexible, showing commitment to balancing safety requirements with the necessity of keeping the NRU operational until problems were solved with the MAPLE reactors, thus solving the isotope supply issue. By contrast, CNSC might sense that AECL was not similarly committed to its objective of ensuring that the NRU was safe, or to ensuring the steady supply of isotopes because it repeatedly failed to honour its commitments to upgrading the reactor and to answering the safety concerns about the MAPLE reactors.

**Concern**

AECL has not involved itself in any of the global isotope supply coordination efforts spearheaded by the other main global isotope suppliers to create contingency planning, stating that “Nordion is the interface. We can only communicate to the rest of the industry through them.”\(^{53}\) Although AECL, MDS Nordion, and Minister Lunn appeared to have an interest in keeping the NRU operational to provide a continued supply of isotopes, none of these groups chose to take an active role in either global contingency planning or in
working towards an alternate solution to the MAPLE reactors when the 2005 data showed serious discrepancies between designed and actual behaviour.

**Predictability**

During the 2007 isotope crisis, CNSC was harshly criticized by the Minister of Natural Resources, among others, for being inflexible. Talisman counted, however, at least four instances between 2006 and 2007 alone where it would have been appropriate for CNSC to initiate enforcement against AECL for non-compliance. CNSC did not take any enforcement action apart from requesting clarifications and more regular updates until November 2007 when the threat of a strongly-worded letter prompted AECL not to restart the NRU after a maintenance shutdown. It is not difficult to imagine that AECL, after years of compliance slippage with respect to the seven Safety System Upgrades, would not have predicted that it might be asked to keep the reactor shut down until complete compliance with the originally agreed-upon upgrades had been completed. After a decade of accommodation by the regulator, this sudden and harsh response in November 2007 must have seemed frustratingly unpredictable, leaving AECL staff wondering why the reactor, which CNSC had seen as safe enough to operate over the last nine years in its current state or with fewer safety systems than at present, would suddenly need to be shut down for safety reasons.

Predictability, for the regulator, was further undermined by Parliament stepping in to interfere with CNSC’s autonomy when the Commission finally did reach the point of mistrust in AECL’s commitment to undertaking the safety upgrades. With a lack of other enforcement options, a narrow mandate that limits the ability to consider competing risks, and “arm’s-length” clearly meaning something very different to the Minister of Natural Resources than to most regulators, it is difficult to see how CNSC’s regulatory behaviour can become more predictable in current circumstances.

**Lessons Learned?**

Given that AECL, CNSC and MDS Nordion will need to continue to work together, at least in the near term, to resolve the instability of the supply of medical isotopes available to citizens in Canada and to deal with an ongoing array of issues around nuclear technologies, the important question is how do we establish working trust relationships between these key players? It appears from this analysis that reduced trust in one dimension may lead to diminished trust in other dimensions, helping a small issue grow into a crisis. Looking at the key elements that undermined trust leading up to and through the 2007 isotope crisis, three core dimensions of trust emerge as being of particular importance: openness, predictability and commitment.

To enhance openness, the Talisman report, commissioned jointly by CNSC and AECL, was an important first step. It clearly and
objectively laid out how a lack of open communication contributed greatly to the crisis in the first place and makes concrete suggestions on initial frameworks for improved communications between groups.

To resolve the underlying trust issues between CNSC and AECL around predictability, it will be important for the Minister of Natural Resources, Lisa Raitt, to clearly indicate support for the regulatory independence of the CNSC and become more actively engaged with AECL’s activities. To date, her action on these fronts has been less than promising. This may involve making changes to the Nuclear Safety and Control Act to provide more predictable, and graded, enforcement options to the CNSC, such as monetary fines suggested by Talisman. Such changes may be especially important with open talk by the federal government of privatizing AECL’s CANDU Reactor Unit. Minister Lunn did not appear particularly engaged in planning ahead to meet future challenges, leaving AECL in the awkward position of being under-resourced and over-extended with both its own, and MDS Nordion’s, projects. This is not a good recipe for regulatory compliance and will likely continue to erode trust between CNSC, AECL, and MDS Nordion.

As well, AECL appears to be caught in the middle between CNSC and MDS Nordion when it comes to nuclear regulation and isotope supply. Further consideration needs to be taken on how to ensure MDS Nordion can be pushed into committing more strongly to projects that are of broader importance such as international collaboration on isotope supply and closer involvement in isotope generation, although this may be difficult given the small portion of MDS’s business that isotope sales represent. Similar challenges of long-range planning may emerge with other private firms as they become involved in Canada’s nuclear industry. With trust between AECL and MDS Nordion having deteriorated to the point where MDS is suing AECL, any actions here may simply not be possible since increased openness at this stage could work against AECL by providing further evidence for courts to decide in favour of MDS.

**Conclusion**

Trust, in its various forms, can be an incredibly useful tool in seeking to understand how crises come about. If we are to move ahead with a long-term, rather than a stop-gap, solution to Canada’s medical isotope uncertainties, it is important to acknowledge that breaches of trust between the key parties played a significant role in the development of the 2007 crisis. Although trust is often considered on an individual level, the notion of one organization or group trusting another and understanding the dimensions that define that trust may both help us move forward from the recent, and now ongoing, isotope crisis and be a useful tool in defining interactions between key players in the nuclear risk management sector for future projects. The pivotal role of trust in preventing or mitigating crises goes far beyond the Canadian nuclear sector.
and we would do well to investigate strategies for enhancing the dimensions of trust among key players in other areas of technological risk management.
ENDNOTES

5 Ibid. 6.
6 Ibid. i.
7 Ibid. i.
8 Ibid. i.
9 Ibid. i.
11 Ibid.
13 Ibid.
14 Ibid.
15 Ibid.
19 Collier (26 Feb. 2008), 536.
21 CBC News. “In Depth Health: Medical Isotopes.” CBC.ca. Canadian
22 Molybdenum-99 has a half-life (the time in which half of it decays into Technetium-99m) of 66 hours. Technetium-99m, the isotope used in over 85% of nuclear medicine, has an even shorter half-life of only 6 hours. Once separated from Molybdenum-99 and incorporated into generators, the Technetium-99m must be used quickly as the amount available in a given generator decreases by roughly 20% every day. See Ad Hoc Health Experts Working Group on Medical Isotopes. “Lessons learned from the shutdown of the Chalk River reactor: A report submitted to the Minister of Health.” HC-SC.gc.ca. Health Canada, May 2008. Web. 1 Nov. 2008. <http://www.hc-sc.gc.ca/hcs-sss/pubs/qual/2008-med-isotope/index-eng.php>.


26 Talisman. D1.
27 Talisman. D1-D11.
28 Talisman. D1-D11.
29 Talisman. D1-D11.

30 Ad Hoc Health Experts. 4.
31 Morrison and Menely.
32 Morrison and Menely.
33 Morrison and Menely.

41 Mishra. 271-277.

42 Half of Canadians are either opposed to or unsure about building more nuclear power stations; 76% are concerned about an accident at a nuclear power plant and 70% are concerned about potential health risks for communities living close to nuclear power plants. See Angus Reid Strategies.


44 A positive PCR means that if the water coolant surrounding the reactor core starts to boil away, the number of neutrons in the reactor would increase, making the core hotter. Chernobyl is famous for having a large positive PCR. This has led to an international push for negative PCR reactors, which instead slow down the nuclear reaction as the reactor core heats. CANDU reactors have a slightly positive PCR but safety systems can compensate quickly enough that this has not been deemed a safety hazard. See Magnus, Ben. “Over budget, overdue and, perhaps, overdesigned.” CMAJ. 178.7 (25 Mar. 2008): 813-814. Print.

45 Magnus. 813.

46 Magnus. 813.


48 CTV.

49 Talisman. D1-D10.

50 MDS Nordion (9 July 2008).

51 Aside from the lawsuit, taxpayers are estimated to have paid as much as $700M to date on MAPLE (numbers not confirmed by officials). See Mosey.


55 Talisman. D6-D9.

56 CNSC is unable to impose fines, except through the involvement of the Department of Justice, and lacks a variety of mid-level enforcement options, forcing it to most often be at the level of requesting clarification until it becomes apparent that the licensee is simply not complying, at which point its enforcement quickly becomes heavy-handed. See Talisman. 24.
High Speed Rail Fail: How Complacency for Incremental Innovation may Derail TGV Passenger Trains for Canada

Ken Doyle

Canada is the second largest country in the world, stretching nearly 5,500 km from coast to coast. Around 80% of the population lives in urban areas within 200 km of the US/Canada border, and around 30% live in one of Canada’s three largest cities: Toronto, Montreal, and Vancouver.\(^1\) Canadian cities are not close to one another and autos, trucks, and buses are the most common and accessible ways of connecting sparsely populated regions. Over its history as a nation, major technological projects have been designed to overcome these huge distances and build the confederation, such as the transcontinental Canadian Pacific Railway, telegraph system, microwave system, radio, and the internet.

The first Canadian mega-project was rail, which played an enormous role in unifying the country. Currently, passenger rail and freight use the same tracks. Rail freight is growing and VIA Rail’s passenger service is getting crowded.\(^2\) Air travel is expensive and the highways are getting more and more congested as vehicle ownership continues to grow. The question this paper will examine is what does High-Speed Rail (HSR) offer and why should governments support it now?

One way to support HSR would be to repurpose the productive and high quality Canadian auto assemblers and parts suppliers, who are currently underutilized in light of the economic downturn, and have them build and support HSR. To do so would be to support the auto industry and those dependent on it while realizing a HSR line that has been a long time coming. In times of changing consumer demand and global economic turmoil, serious consideration needs to be given to investing in made-in-Canada high-speed passenger rail by making use of long-standing investments in the automotive industry, the skilled workers, and other industrial sectors that support it.

This paper will provide an explanation of HSR; examine previous Canadian studies on HSR feasibility; compare existing modes of transport along the same corridor; look at the economic crisis facing Canada’s automotive sector; and explain how HSR is uniquely positioned to turn the auto crisis into an opportunity that compliments many priority policy areas.

**High-Speed Rail (HSR)**

Generally, HSR is defined as having a top speed in regular use of over 200 km/h.\(^3\) Although almost every form of HSR is electrically driven via overhead lines, this is not necessarily a defining aspect and other forms
of propulsion, such as diesel locomotives, may be used. HSR is best suited for trips ranging from two to three hours, or between 200 to 700 km, since the HSR train is quicker than both a passenger car and airplane downtown-to-downtown. With the addition of wireless internet and cell phones, HSR could become competitive with airplanes on long haul trips.

In Canada, CN Rail placed some early hopes in HSR with the TurboTrain along its Toronto–Montreal route during the 1960s. The TurboTrain was a true high-speed train achieving speeds as high as 200 km/h in regular service. Unfortunately, CN’s, and later VIA Rail’s, TurboTrain service had lengthy interruptions to address design problems and had to cope with poor track quality (accounting for dual passenger-freight use); as such, the trains were only operated at 160 km/h and went out of service in the mid-1970s.

For present-day Canada, there are two options for HSR, although this paper will focus on one option along one corridor. The first type of HSR uses diesel locomotives operating at over 200 km/h on existing tracks with upgrades. In the United States, the Acela Express diesel-powered train built by Bombardier operates between Washington D.C. and Boston at 240 km/h on tracks originally built in the 1920s but fitted with upgrades. While this route services 10 million riders annually, it only reaches its top speed on a 30 km stretch in Rhode Island and a 16 km stretch in Massachusetts.

The second HSR option for Canada is Train a Grand Vitesse (TVG) technology which is the type of HSR this paper will focus on. TVG is a generic term to describe the electric-powered passenger trains travelling from point to point at speeds over 300 km/h. The first European TVG high-speed line, from Paris to Lyon, did not begin operation until 1981. As of early 2007 there were 4,883 km of HSR lines operating in Europe, with another 2,737 km to be added by 2010. Europe provides nearly 250 million annual TVG rides. The European Union’s goal is to have a Europe-wide HSR system integrating the new eastern countries—including Poland, the Czech Republic and Hungary—into a continental TVG network by 2020.

Almost 20 years before Europe started operating TVG routes, the technology was pioneered by the Japanese. The Japanese started in 1964 with a 515 km line between two of its biggest cities, Tokyo and Osaka. Japan’s HSR network now stretches for 2,176 km, linking nearly all of its major cities at operating speeds up to 320 km/h. Japan is constantly evolving TVG technology, setting the speed record in 2008 at 574.8 km/h in a closed demonstration with no passengers. One of the most heavily traveled links is the original line between Tokyo and Osaka on which the TVG trains carry 117,000 passengers a day. The transit time of two hours and 30 minutes between the two cities compares with a driving time of eight hours. Japan provides nearly 300 million annual TVG rides. On some of the heavily used intercity HSR lines, trains depart every three minutes.
Although Japan’s TGV trains have carried billions of passengers, there has not been a single casualty. Late arrivals average a remarkable six seconds.\textsuperscript{10}

**HIGH-SPEED RAIL IN CANADA**

When the HSR evolution was in its infancy, Canada had the choice of high-speed diesel trains or electrically powered trains. Canada chose diesel while Japan and Europe chose TGV. Forty years later it is clear that Canada bet wrong. Sadly, innovation is not binary. Canada could have put some resources into diesel locomotives and some into electric rail, but that was not the case. Since the TurboTrain shut down in the mid-1970s, HSR of one form or another has been proposed a number of times and seems to get serious consideration and study every five years.

In 1981, VIA Rail studied the feasibility of the Quebec-Windsor and Calgary-Edmonton HSR corridors. The study was extensive and examined options for electric trains that would involve constructing new dedicated electric lines under VIA control. Outside experts were called in from Europe and Japan and consultants from the freight railways were consulted. The consensus was for 300 km/h trains for the Montreal-Ottawa-Toronto (M-O-T) corridor with slower speeds out to Quebec City and Windsor on either end of the corridor. The cost of the corridor in 1981 would have been $1.6 billion and the estimated ridership would be 7.1 million annually. The report was submitted to Transport Canada in 1984 and shelved.\textsuperscript{11}

In 1989, with their previous report collecting dust, VIA commissioned a follow-up study with a more rigorous methodology to gauge consumer demand. The study used complex financial models and a survey of 34,000 Canadians. The results showed that at a cost of $3.5 billion and 6.5 million projected annual riders, an M-O-T line was financially viable, but not profitable enough to risk the investment. VIA asked the federal government to provide financial support for the mega-project, and the government responded by creating a Task Force on High Speed Rail. The Ontario-Quebec Rapid Train Task Force was given the task of “undertaking a research and investigation program aimed at identifying the most viable options for high-speed rail in the Central Corridor, with a view to recommending a course of action.” The findings of the Task Force were inconclusive and recommended further study.\textsuperscript{12}

While the Task Force was hard at work, in 1991 Air Canada and CP Rail commissioned a market assessment of their own to analyze what impact HSR would have on their ridership and profits. Their study found that 30% of HSR ridership would come from airlines, which would lose 45% of market share and lose $200 million in revenue. The airline lobby successfully pressured the government to avoid investment in HSR.\textsuperscript{13}

In 1995, the Ontario, Quebec, and federal Governments launched a follow-up study to the Task Force’s inconclusive study. Their study examined
ridership along the existing corridor, consumer demand, cost, and return-on-investment and found that along the Quebec City to Windsor corridor in 1992, there were 99 million inter-city personal trips by car, 4.1 million by air, 2.9 million by rail and 2.6 million by bus. The study projected that HSR would have an uptake of 12 million riders annually, 40% of whom come from cars, 18% from air travel, 15% from rail, 8% from buses, and 20% would be induced to travel because of HSR. The cost of constructing the corridor was $6 billion, with only 25% coming from the government, and could result in a profitable return on investment. The projections showed that the government would recoup more than their initial investment within 30 years. Perhaps it was due to the economic recession of the early 1990s, or perhaps it was due to pressure from the airline and bus lobby, but the government said they would examine HSR again in three to five years.

True to their word and in the spirit of New Public Management and Public-Private Partnerships, in 1998 the federal government invited proposals from industry groups on the topic of HSR. The most promising was the 1999 Lynx proposal. Lynx was a consortium made up of SNC-Lavalin, AGRA Monenco, Bombardier, Alstom, AXOR, Ellis-Don, backed up by lending institutions. The proposal recommended a 320 km/h corridor between Quebec City and Toronto with trains operating every half hour. The project would require $7.5 billion of public money and $3.6 billion of private money. The public money would be recovered over 60 years through lease payments since the consortium would operate the system and lease the infrastructure. The 41-month “next step” required land acquisitions, environmental assessments, and engineering studies and would cost $102 million, to be split between the government and consortium. Since the consortium could not secure the $51 million in financing, the proposal fell apart.

In 2007, VIA Rail commissioned a study to study the previous Canadian studies on HSR. The study found that there is clearly a need for HSR, but it requires leadership from risk-averse decision makers who are reluctant to fund mega-projects, however, the main conclusion of this study was that no further study was necessary.

In January 2008, the federal government and provincial governments of Ontario and Quebec announced that they would be conducting another one-year study into HSR along the M-O-T corridor. In July 2008, a Nanos Research poll conducted on behalf of the Railway Association of Canada found that 78% of Canadians support HSR, and 78% would consider traveling by HSR if they had the opportunity. In February 2009 the governments launched the study and awarded $3 million to a consortium to examine the same aspects every other study had examined. One aspect of HSR that the previous studies had not examined in depth (aside from the Van Horne Institute in 2004) are the environmental benefits of HSR compared to existing methods of transportation. Perhaps it was because the environment had
only recently become a policy priority for Canadians, but it is hoped that this new study will examine this issue at length. Particular attention must be given to the initial carbon footprint created in the construction of the HSR infrastructure as the available body of research on this particular subject is very light. The consortium is scheduled to release their report in 2010.\(^\text{18}\)

The real question this paper will address is why HSR for Canada and why now? HSR does not currently exist in Canada, but the Canadian studies over the last 30 years have shown there is an appetite for it from consumers and once operational, it would turn a profit.\(^\text{19}\) The carbon footprint of TGV is considerably lighter than that of planes and cars, with HSR producing half as much carbon dioxide (CO\(_2\)) emissions as airplanes and one-sixth as much as cars.\(^\text{20}\) HSR is also an efficient use of land. A four-lane divided highway that services 10,500 passengers per hour is 120m wide, whereas a high-speed rail line is only 35m wide but can service 16,000 passengers per hour.\(^\text{21}\) HSR along Canada’s busiest transportation corridor would go a long way towards reaching the climate change reduction targets identified by all levels of government. While the estimated cost of a line from Montreal to Ottawa to Toronto is between $12-15 billion,\(^\text{22}\) spread among three levels of government and over 8 to 10 years of construction, it is a negligible sum compared to what has been spent on economic stimulus and bailouts to the automakers. While there are many proposed routes, the most realistic would be an initial corridor between Montreal, Ottawa and Toronto. As previous studies have pointed out, this corridor would be the quickest to build and would offer the quickest opportunity for revenue generation while the corridor is expanded on either end.

**A QUESTION OF DEMAND**

The most recently commissioned study, from January 2008, will explore the feasibility of HSR along the M-O-T corridor. With the M-O-T corridor proposed as the most logical initial HSR project, the question to consider is the current level of demand for transportation between these three cities via existing modes of transit. Currently servicing that corridor with commercial passenger transportation are the airlines Air Canada, Westjet and Porter; train line VIA rail; and bus line Greyhound. By accessing the public websites of Air Canada, Westjet, Porter Airlines, VIA Rail, and Greyhound, one can conduct a random comparison of the available number of inter-city trips and the capacity of the equipment that are available between these three cities.

Since these routes are in operation 365 days a year, an arbitrary travel date of Friday, May 1, 2009 was used for the comparison. Through an examination of the Ottawa-Montreal, Ottawa-Toronto, and Montreal-Toronto corridors, it seems clear that there is sufficient demand for passenger trips along the M-O-T corridor: On an average Friday in May,
there are 279 airplane, train and bus trips between these three cities moving 34,366 possible passengers. Over the course of a 365 day year, that equals roughly 101,835 trips and 12,543,590 passenger seats.

As previous Canadian studies have shown, airlines and bus companies have lobbied hard to stall or prevent the adoption of HSR along this corridor since it would reduce their ridership. Canadian airlines have not been alone in this aversion to HSR. Southwest Airlines successfully lobbied, sued and stopped HSR in Texas in the 1990s. This resistance may become a thing of the past due to the changing nature of air travel. With an increase in air traffic, particularly international and long-haul traffic, gate space at these three Canadian international airports is an increasingly finite commodity as evidenced by the ongoing expansions and increased landing fees at Toronto’s Pearson airport and Ottawa’s MacDonald-Cartier airport. If airlines could offload some of this short-haul passenger demand to HSR, it would free up aircraft and gate space for much more profitable and fuel efficient long haul flights. Since there is a demand for fast travel times between these cities, the airlines will continue to service them with short-haul, inefficient flights since some of their passengers are connecting to longer haul flights at other airports and there is no viable time-saving alternative.

As the above M-O-T corridor examination has shown, there is clear passenger demand for travel along the corridor; this demand may be set to grow further due to the growing focus on low carbon travel. As mentioned earlier, a strong argument in favour of HSR is the extremely low emissions generated by the TGV system. With the environment remaining important in policy circles and public opinion polls, the traditional modes of transportation are clamouring to show how environmentally conscious their mode of transportation is compared to their seemingly biggest competitor and perennial environmental nemesis, the passenger car. While all of the conventional modes of transportation seem to be claiming that they are the eco-friendly choice, all of the data show that cars, particularly single-occupant vehicles, are the least environmentally-friendly method of transportation, despite their leaps and bounds in fuel efficiency and technology over the last 30 years. Until single occupant vehicles can be powered with alternative fuels, such as clean electricity, they will continue to burn fossil fuels and account for the bulk (13%) of Canada’s transportation sector greenhouse gas (GHG) emissions.

**Canadians Love Cars**

Despite accounting for 13% of Canada’s annual GHG emissions, Canadians love their cars and the ratio of registered vehicles to the overall population has been steadily increasing over the last 20 years. As the statistics from Transport Canada show, in 1987 there were 16.9 million licensed drivers and 11.7 million registered vehicles. At the time, Canada’s population was
26.4 million, meaning there was slightly less than one registered vehicle for every two Canadians. Twenty years later, in 2006 there were 22.3 million licensed drivers and 18.7 million registered vehicles; increases of 32% and 60% respectively. Canada’s population in 2006 was 32.9 million, an increase of 25%. In 2006, there was more than one car for every two people in Canada. From 2002 to 2006, there was an annual average net increase of 223,000 newly licensed drivers. Over that same time frame, there was an average net increase of 239,000 newly registered cars and trucks, and 117,000 newly registered commercial vehicles being put on the road every year.

Unfortunately, injury and death are also associated with motor vehicle accidents with 3,729 fatal collisions and 28,000 collisions with serious injuries in 1987, and 2,604 fatal collisions and only 15,281 collisions with serious injuries in 2006 (decreases of 30% and 45%, respectively compared to 1987). From 2002 to 2006, with the enormous increase in new drivers and new vehicles sharing the road, it is surprising that the amount of traffic fatalities and collisions resulting in serious injuries remained virtually constant over the same five year timeframe at an average of 2,534 deaths and 15,541 seriously injuries each year.26 Regardless, these risks have not hampered the Canadian appetite for driving.

While it is difficult to accurately capture the number of personal car trips directly between the three cities of the M-O-T corridor or their levels of occupancy, traffic volume data from the Ministry of Transportation of Ontario gives us an idea of the volumes of vehicles at certain exchanges of the 401, 416 and 417 highways. While it does not distinguish between passenger cars and commercial transport trucks, it can provide an idea of the volume within the corridor. To get from Montreal to Toronto, drivers can take Highway 40 out of Montreal to Highway 20 and cross over to Ontario on Highway 401 and drive to Toronto. Alternatively, drivers can take Highway 40 out of Montreal to Highway 417 at the Ontario border, drive through Ottawa to Highway 416 and then travel south to Highway 401. In 2005, the average daily traffic volume at the Ontario-Quebec border on Highway 401 was 17,400 vehicles. In Toronto at the junction of Highway 401 and Avenue Road, the average daily traffic volume was 364,900 vehicles. For the alternate route through Ottawa, the average daily traffic volume at the Ontario-Quebec border on Highway 417 was 16,900. On Highway 417 through downtown Ottawa at Nicholas Avenue, the volume was 154,400. At the connection where Highway 416 feeds into Highway 401, the average volume was 11,900. Anyone who has actually driven the trip at the wrong time of day can attest to just how congested these highways can be. Even assuming only 10,000 daily trips from Montreal to Ottawa, Ottawa to Toronto, and Montreal to Toronto, that is still 3,650,000 annual car trips between these points along the same corridor that could be serviced by HSR for the same purpose. Converting these GHG emitting car trips to low emission HSR trips would present a significant carbon reduction. But without a reliable,
cost-effective, environmentally friendly, high-speed alternative; airplanes, trains, buses, and cars, will clearly remain in demand by Canadians.

**CANADA’S AUTO SECTOR IN CRISIS**

If cars are in such great demand, why has Canada’s automotive sector been in so much trouble lately, and why is that important for the rest of Canada? This paper will now briefly examine the automotive assembly and parts manufacturing industry to provide some context as to why a crisis affecting the automotive industry is a crisis affecting Canada, and how the existing physical and human capital is relevant to HSR.

Canada’s automotive industry is more than 100 years old and was started when Henry Ford opened a Ford plant in Windsor, Ontario in 1904. The automotive industry is Canada’s largest manufacturing sector, accounting for 12% of manufacturing GDP and 24% of manufacturing trade. Almost all of Canada’s auto manufacturing is clustered in Ontario while distribution is spread across the country. As of 2007, Canada had nine assembly plants for passenger cars and trucks, and 12 assembly plants for heavy trucks and buses; the majority of which are located in southern Ontario. The total Canadian automotive manufacturing employment has grown from an annual average of 152,000 in 1997 to a peak of 172,000 in 2000. Since 2000 it has steadily declined to 158,000 as of 2006. This decline is mainly in the auto assembly subset which fell from 56,000 employees in 2000 to 47,000 in 2006. According to the Canadian Automotive Human Resources Council, each of the 47,000 assembly jobs in Canada provides seven to ten spin off jobs, which is the highest ratio of any manufacturing industry sector.

Employment in automotive parts and accessories fell from a high of 99,000 employees in 2001 to 92,000 employees in 2006, while employment in automotive retail sales grew from 298,000 employees in 1997 to 336,000 in 2006 with the majority of that growth coming from automotive dealers.

While auto assembly employment has decreased in the past ten years, auto production has increased significantly, which shows that Canadian plants are productive plants. In fact, Canada has the 1st, 2nd and 4th most productive assembly plants in North America. Canadian assembly plants have won more than one-third of all J.D. Power plant quality awards for North America, yet they account for only one-sixth of total production. The 2007 Harbour Report concluded that, at 21.0 labour hours per vehicle, Canada is 7.9% more productive than the U.S. for assembly, and 82.2% more productive than Mexico.

In a knowledge-based economy, ongoing innovation and the constant development and dissemination of technologies are essential to maintaining competitiveness. In the Canadian auto industry, the actual number of companies performing research and development (R&D) has grown steadily since 1997. According to Industry Canada data, automotive R&D expenditures have gone
from $229 million in 1997 to $537 million in 2006. While expenditures in R&D have been growing steadily, the value of shipments has been declining since 2002, presumably as market share and demand are lost to other countries.34

Although Canadian assembly plants use the latest technologies, R&D in the Canadian auto industry remains very low compared to other countries. Industry Canada has identified eight federal R&D programs and incentives and eleven private and public R&D organizations available to assist the Canadian auto sector,35 the sector invests 25 times less in R&D than does the American auto industry, and four times less than the Canadian manufacturing sector as a whole.36 Perhaps this is because while Canada is the ninth largest vehicle-producing country in the world, it is producing vehicles designed in other countries for companies headquartered in other countries. Canada is the only country in the top 15 auto producing countries without its own national automaker.37

The government, however, appreciates the auto industry. Aside from the large employment numbers and spin-off jobs, tax revenues from the auto industry to all levels of government in Canada total over $10 billion annually. With an average annual salary of $72,000, auto workers pay an average of $22,480 in federal and provincial taxes. To attract more auto sector jobs to Canada, the government has tried to position Canada as a competitive country for the global industry. Labour wages and benefits are generally lower than the United States, due largely to government-funded health care.38 Further, corporate income taxes are generally lower than the United States, capital taxes have been eliminated, and Canada has the most generous tax treatment for R&D among the G-7 countries.39

While Canada may not have an auto brand that is wholly Canadian designed, produced and assembled, it does have branch plants producing top notch parts and vehicles for global automakers. Focusing solely on auto parts and component manufacturing, Canada is a big player, with more than 650 establishments producing original equipment and aftermarket auto parts, components and systems.40 Of these auto parts firms in Canada, 73% are in Ontario, 14% in Quebec, and 6% in British Columbia.41 43% of parts firms have under 50 employees and over three quarters have less than 200 employees. Unfortunately, these small firms have been greatly affected in the economic slowdown.

The century-old Canadian auto industry has seen tough times before. From the World Wars to the Canada-United States Auto Pact of 1965 to the energy crisis in the 1970s to the Chrysler bailout in the 1980s to the emergence of Japanese automakers in the 1990s, the sector has had a turbulent past. Currently, Canada is experiencing a downturn that is having a staggering impact on its largest industry. According to Scotiabank economist Carlos Gomes, between 12,000 and 13,000 fewer Canadians work in the industry today than at the end of 2007, a decline of 10%.42
A growing one-way flood of auto parts from other countries (including China) is also affecting thousands of jobs.43 According to a 2004 survey by KPMG, nine out of ten auto executives believe Asia and especially China will become a major source of growth for global auto demand over the next five years. The two major reasons cited are the growing middle class in China and greater ease of financing for auto purchases in that market. It is no surprise therefore that automakers are rapidly expanding their presence in all parts of Asia, and China in particular.44 With demand for autos growing in China and slowing in North America, companies are forced to move assembly and production to the countries where the demand is. Canada’s comparatively high labour costs and distance from Asia are quickly eroding its competitive advantage.

Another cause of the auto industry’s decline is the shrinking market share of Ford, General Motors, and Chrysler (who purchase 85% of Canadian parts output) and the product mix that Canadian plants assemble.45 Of the 15 best-selling passenger cars in Canada in 2006, only four were made in Canada.46 Sport-utility vehicles, full-size cars, and minivans make up the majority of vehicles assembled in Canada and no hybrid vehicles are currently assembled in Canada.47 As consumers have shifted their demand towards smaller, more fuel efficient cars and hybrids, Canada’s assembly plants are in trouble. If there is no demand for the types of vehicles Canadian plants are producing, there will be an over-supply, which will result in assembly shifts being cut back and reduced demand for orders from auto parts manufacturers.

The fortunes of the Canadian auto assemblers and the auto parts manufacturers are completely intertwined. Several parts suppliers have been forced to shut down operations in recent months as the weak economy cuts into demand for new vehicles and the parts that go into them.48 This in turn creates a vicious cycle where assembly plants are forced to shut down because a key supplier has gone under, which forces other parts suppliers of those plants to cease operations since they are not receiving the orders that keep their bills paid. One of the greatest innovations for the manufacturing sector was the Just-In-Time inventory system that does not require manufacturers to keep large inventories of parts on hand for production. Assemblers and manufacturers are now discovering the downside to Just-In-Time. When a financially troubled Wallaceburg, Ontario parts supplier stopped shipping aluminum brackets to the Windsor Chrysler plant in April 2009, the assembly plant shut down almost immediately.49 If the plant stops producing minivans for a week, other suppliers relying on the plant’s orders could go out of business, further delaying Chrysler’s assembly and affecting other suppliers.

With automakers in dire straits and literally hundreds of thousands of assembly and parts manufacturing jobs at stake, what has the government decided to do to assist the Canadian auto sector? In December 2008, the federal and Ontario governments provided $4 billion in loans to General Motors and Chrysler. Analysts have predicted that, even with the aid package,
the Canadian industry will lose as many as 20,000 more jobs as General Motors and Chrysler work to restructure and streamline their operations. Another attempt to assist the sector came in the federal budget of 2008 with the creation of the Automotive Innovation Fund (AIF). According to the government, to maintain its leadership and competitive advantage, “Canada’s automotive sector will need to become more innovative and adapt to new environmental standards.” In line with Canada’s Science and Technology Strategy, Budget 2008 provided $250 million over five years to support strategic, large-scale research and development projects in the automotive sector to develop innovative, greener, and more fuel-efficient vehicles. Under the AIF, Industry Canada will consider funding proposals that provide for private sector investment in Canada of more than $300 million over five years. Eligible projects will include vehicle and powertrain assembly operations associated with significant automotive innovation and R&D initiatives.

Due to the globalization of the auto industry, the majority of research, development, and innovation conducted by automakers occurs in the countries where they are headquartered. Since Canada is a branch plant assembler without a national automaker, the AIF seems geared towards attracting R&D operations and expenditures for the large automakers to Canada. While a noble idea, the program does not seem timely enough to help the companies going out of business monthly and the $300 million minimum threshold for projects excludes virtually all parts manufacturers.

Although the governments have promised billions of dollars in aid to General Motors and Chrysler, no direct aid has been forthcoming for their suppliers, where the bulk of the auto sector’s employees reside. Budget 2008 also announced $1 billion in tax relief to the auto sector by 2012-13. After the budget, the President of the Automotive Parts Manufacturers’ Association commented that tax reductions are only good for profitable companies. The smaller companies who are struggling and not currently profitable do not benefit from tax relief and could end up closing their doors.

**A Perfect Storm**

As this paper has shown, the auto industry is Canada’s largest industrial employer and due to a number of circumstances coming together at the same time, the industry is in trouble. The fortunes of the auto parts suppliers in Canada are tied largely to that of the auto assemblers in Canada. A lack of demand for the models assembled at Canadian plants means fewer orders for the parts suppliers which puts them in jeopardy of closing their doors. Disruptions with suppliers affect the assembly line at the plant causing delays, which mean delays for orders at other suppliers. Unfortunately, the product mix of vehicles produced at the majority of Canadian plants—sport-utility vehicles, minivans, etc.—are vehicles that have seen their demand
evaporate over the last few years as gas prices have risen and consumers move towards smaller, more fuel efficient models. Although the auto industry in Canada is spending more than ever on R&D and Canadian plants are some of the most productive in North America, the costs of refitting the plants to make different models would be prohibitive for the automakers on the verge of bankruptcy. The government has done an excellent job of making R&D funding available to automakers to support the assembly industry, but considering there are seven spin-off jobs attached to every assembly job in Canada, perhaps more could be done to support parts suppliers.

While much has been made of investing in specialized products and services, and increasing commercialization of innovation to develop new markets around the world, no one seems willing to admit that there is a possibility that the Canadian domestic auto industry may not rebound. With countries like China, India, and Russia offering cheaper labour, similar quality of production, and a domestic consumer demand for vehicles, automakers with finite resources concerned with their own survival have to strongly consider moving their operations to other jurisdictions. In the worst case scenario, simply walking away from plants and employees in Canada would be devastating for domestic industry, but might be the automakers’ only option.

The environment, transportation alternatives, the manufacturing sector, and the economy are all very important public policy issues, yet most of the time they seem to be examined in silos. Is there any way for an innovative public policy idea to reduce GHG emissions, meet the passenger demand along the M-O-T corridor, help manufacturers, suppliers and assemblers, and get the thousands of displaced skilled workers back to work and contributing to the economy? The answer, in a word, is yes.

**High-Speed Rail: Deus Ex Machina?**

A solution that does not appear to have been explored is the positive impact that high-speed passenger rail could have on Canada’s automotive parts and supply industry. The environmentally friendly TGV technology, powered domestically by electricity, would result in GHG emission reductions. Hamilton’s steel industry, which has seen its own economic downturn, could provide the steel for the dedicated track and other materials needed for the construction of the corridor. Bombardier, a Canadian company, is already the world’s largest producer of trains. If the auto industry continues to slump, it is conceivable that plants closed by automakers and suppliers could be purchased by the government and refitted to construct rolling stock and components for HSR. Bombardier has the technology and experience and would be able to guide the transition and refit.

The Golden Horseshoe region, the densely populated and industrialized area stretching from Niagara Falls to Oshawa and home to a quarter of Canada’s
population, has the displaced employees with the necessary experience; Human Resources and Skills Development Canada’s (HRSDC) study of the auto parts industry has demonstrated that over 25% of the auto industry workforce as a whole, both parts and assembly, consists of skilled workers, including the mechanical assemblers, millwrights, pipefitters, welders, carpenters, painters, and glaziers. For displaced workers from the auto industry who would need to be retrained or upskilled, specialized courses could be developed to bridge the gap between auto and HSR production. Specific training for people outside of the auto industry could be developed in the same way specialized automotive programs have been developed at Georgian College in Barrie, Ontario. Georgian houses both the Canadian Automotive Institute and the Centre for Automotive Parts Expertise (CAPE). At Georgian, Auto Parts Design, Auto Parts Manufacturing Technology, and skilled trades apprenticeship programs in tool and die, robotics and automation, millwright, electronics and system design are part of the program.

Since TGV HSR is used in Asia and Europe and has been proven safe and reliable over 30 years, Canada could license or borrow training programs and curriculum for other countries as well as duplicate their manufacturing processes and products for use domestically. Previous studies have shown that for every $10 billion invested in HSR, 40,000 construction-related and 112,500 permanent jobs are created.

The core components of HSR—the corridor, power, construction supplies, facilities, and people—are already available, and training is theoretically feasible; so the remaining issue is demand. As previous studies have shown, there is a clear demand for HSR along the Quebec City to Windsor corridor. Is that enough to sustain a HSR industry in Canada? Once the corridors are operational, the service would only require upkeep and maintenance. Would this potential restructuring be a set-up for another obsolete manufacturing sector 20 years down the road? Possibly, but while TGV has been proposed many times before, it was not economically feasible while the auto industry was booming because of a lack of skilled employees, a need for new facilities, and a lack of government willingness to fund a mega-project.

**If We Build It (First), They Will Come**

There is, however, an opportunity emerging that Canada could take advantage of to boost public support for certain mega-projects: the new administration in Washington. Before he was Vice-President, Joe Biden took the Amtrak train from Washington to Wilmington, Delaware every night for 30 years. HSR only exists in the north-eastern United States; it is a limited corridor, and even then it is not TGV rail. Biden and President Obama are big supporters of rail, and President Obama set aside $8 billion in the recent stimulus package for high-speed inter-city rail. Transportation Secretary Ray LaHood said he believes that HSR is going to be President Obama’s
top transportation priority. The State of California recently approved a $10 billion bond to get started on a HSR corridor from San Diego to San Francisco. The corridor would create a 1,300 km HSR system that would move 32 million passengers per year. Because the HSR is powered by electricity, and because of the efficiency of moving 1,200 people per train, California projects its CO₂ emissions may be reduced by 12 billion pounds per year by 2020 and 18 billion pounds by 2030. There are, however, still many hurdles for the United States to overcome, including acquiring the privately owned land or abandoned tracks along the proposed corridors.

If Canada moves quickly enough, it could become a North American centre for HSR production and Bombardier could be the leader. Canada could export HSR products, components, and construction expertise to the United States. It is conceivable that the Quebec to Windsor corridor could be expanded across to Michigan and across the north-eastern United States to New York City, up to Boston, and back to Quebec City, creating an incredible North-American passenger transportation and tourism system. If Canada becomes a leader in this technology, it would be making the most of its resources: high-quality and productive assembly plants and suppliers, experienced workers, natural resources, and innovation infrastructure. There is even financial incentive: as Industry Canada has identified, there are at least eight publicly-funded programs and incentives for the automotive sector to help them become more innovative and competitive. Some of these programs would be a great fit for HSR innovation.

Clearly, alternative fuels, renewable energy and reduced emissions are a science and technology priority for Canada’s government. Once operational, TGV’s electricity-powered HSR would have virtually zero direct emissions. TGV trains require about one-third as much energy per passenger kilometre as cars and airplanes. With regenerative braking technology, the trains would be able to reduce the amount of power they require by capturing the energy generated during braking, like hybrid cars. There would also be great environmental benefit from the reduced emissions from the cars, trucks, and buses not using the highways along HSR corridors, and from the reduced number of airplane trips and train trips between cities in the corridors. While the question remains open as to what source of electricity generation the trains would rely upon, TGV trains produce no direct emissions and are considerably more energy efficient than most other forms of transportation.

The major environmental concern revolves around the initial carbon footprint required to create the dedicated, brand new HSR corridors. There is surprisingly little information available on the carbon footprint required to construct the dedicated high-speed electrical lines required by TGV. French railway network company RFF is currently developing a life-cycle assessment for the carbon footprint of HSR. While the report will not be released until late 2009, it seems clear that most of the CO₂ emissions are a result of deforestation.
related to the construction of new lines. The major elements that contribute to the carbon footprint of an HSR line are the deforestation along the corridor, the creation and transportation of incoming materials (rails, bridges, concrete, tracks, wires, etc.), the emissions from maintenance operations, the energy to power the TGV line, and the waste at the end of the infrastructure’s life-cycle.

One benefit for the initial M-O-T HSR corridor is that most of the proposed routing does not involve deforestation by making use of existing rights of way and would mainly involve going through farm fields and the Canadian Shield. However, the federal government offers a variety of funding programs aimed for projects that address sustainable energy, cleaner transportation, and leading-edge energy products and processes for alternative transportation fuels. With these programs, both the construction industry and the HSR industry have the support mechanisms to develop new processes and technologies that could reduce the initial carbon footprint of constructing HSR corridors, which would make HSR an even more attractive transportation alternative as the made-in-Canada technology evolves and it becomes more environmentally friendly.

CONCLUSION

In conclusion, TGV trains have provided billions of rides over the last 40 years in countries with climates and geography similar to Canada, without one single casualty. Airplanes, passenger cars, and conventional trains cannot match that safety record. When one thinks of the GHG emissions from cars and planes that TGV has already prevented in its 40 year operating life, it becomes clear that this is a winning technology that needs to be embraced in North America. HSR has been studied in Canada at great length with the conclusion that there is a demand, it would be profitable, and no further study is necessary. In addition, Canada’s proud automotive industry, which has spanned over a century and has helped to build many communities, is in trouble. Perhaps it is time to stop worrying about the automakers and attempt to use innovation to make the best of a regrettable situation. Canadian auto assemblers and parts suppliers are productive and provide a top quality product for global automakers. Unfortunately, if global consumers are not buying the product mix that Canadians assemble, a viscous circle of plant closures and supply chain problems is created. This problem, compounded with cheaper labour and more consumer demand in foreign countries means Canada’s auto industry is in decline. When gas was cheap and consumers wanted full-size cars, sport-utility vehicles and minivans, Canada’s auto industry was thriving. Since Canada is simply a branch plant country for global automakers, when consumer demand shifts and Canada’s product mix is no longer in demand, the country suffers. All of the billions of dollars in bailouts and research and development will not fix this problem.
Canada needs to face the reality that its largest industrial employer is in decline and may result in mothballed factories and supply plants and hundreds of thousands of displaced workers. If Canada is serious about spending money and wants to make the best use of some existing infrastructure and highly-qualified people, perhaps serious consideration needs to be given to investing in made-in-Canada TGV high-speed passenger rail. Traditionally, with transportation, Canadians are cautious and opt for incremental innovation. In that case, HSR in the Canadian context would involve faster passenger trains on slightly upgraded existing tracks, which would still be shared with freight trains and offer no environmental benefit or comparative time advantage to passengers. In January 2008, the government decided to once again examine the concept of high-speed rail in Canada and commissioned another study of the corridor. Over one year later, in February 2009, the government awarded the contract for the study with the report due in 2010, assuming no delays. At roughly the same time, in its 2009 budget, the federal government also announced $400 million to upgrade tracks along the M-O-T corridor so VIA Rail can reduce the travel time of the Montreal to Toronto express train to the same level it was in the 1970s.71

If Canada wanted to think outside of the box, it would consider TGV HSR along the Quebec City to Windsor corridor with electric powered trains on dedicated tracks. Canada has the world’s biggest train producing company headquartered in Canada and Hamilton’s steel industry could provide for the tracks. After a refit or conversion, the rolling stock and components could be produced in mothballed auto assembly and manufacturing plants, by the displaced auto workers who are highly-productive and have experience with this kind of skilled manufacturing work.

The government’s generous R&D programs and Canada’s highly skilled workforce mean this could be an industry that sustains itself by constantly expanding and innovating and including other regions of the country in the design, prototyping, assembly, production and construction of TGV. With Canada’s largest trading partner and neighbour, the United States, seriously exploring HSR with no domestic TGV industry of their own, Canada may even have its first customer.

In 1942, the auto industry stopped production of vehicles because of the War and more Canadians ended up employed when the auto plants stopped assembling autos and started assembling and producing the military equipment that was urgently needed. Perhaps a sense of urgency is needed if Canada is willing to take the risk on TGV to become a North American leader which could make the collapse of the auto industry a footnote in history books. Three things are certain: first, high-speed TGV rail needs to come to Canada; the studies must cease and the environmental assessments must begin. Second, the auto industry in Canada will not be rebounding any time soon, so the best of a bad situation must be made. Third, there certainly needs to be further examination of this auto-assembly-refitting-to-TGV-assembly
idea soon or the first mover advantage on TGV HSR might be lost to the United States and Canada may end up importing yet another innovation that could have been an environmentally friendly made-in-Canada mega-project.
ENDNOTES


4 Ibid.


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71 CBC.
For more than two decades, sustainable development has been advanced as a means to reconcile economic development with environmental protection and social justice. In 1987, the Brundtland Report coined the now widely accepted definition of sustainable development as “meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.”

Eight years later, in 1995, Canada recognized the importance of integrating sustainable practices into its policies, programs and operations by passing legislation requiring the development and implementation of federal departmental sustainable development strategies. However, due to numerous challenges with this initial legislation, the Government of Canada is now developing the first-ever Federal Sustainable Development Strategy. In 2008, Bill C-474, the Federal Sustainable Development Act (FSDA), was introduced and passed by Parliament. The FSDA requires the federal government to establish a set of sustainable development goals and targets to be implemented in 2010.

Bearing in mind the objectives of Bill C-474, and under the assumption that a set of targets and indicators will be established pursuant to the Act, this paper develops a set of recommendations to inform the implementation of the FSDA and help federal departments and agencies achieve these targets at the strategic planning, operational, program, and policy levels. Before delving into these recommendations, this discussion paper will begin with a review of the history of sustainable development strategies in Canada, a brief analysis of the key points of the FSDA, the key players’ positions relating to the implementation of the Act, as well as governance issues. The document will close by highlighting the enabling conditions, challenges and barriers to the development and implementation of the FSDA.

Departmental Sustainable Development Strategies: Challenges

In 1995, an amendment to the Auditor General Act required departments and agencies to prepare sustainable development strategies and update them every three years. Since then, and until 2008, departmental sustainable development strategies (DSDS) had been the primary vehicle for the integration of sustainable development into federal decision-making processes and practices. The objective of the DSDS was to “outline each department’s concrete goals and action plans for integrating sustainable development into their policies, programs and operations.”

As highlighted by François Bregha, co-founder of the sustainability
consulting firm Stratos, Canada’s “bottom-up approach,” or the choice to distribute responsibility for sustainable development “to all government departments rather than having all departments subscribe to a government-wide strategy,” was unique world-wide. In this context, the responsibility for developing, implementing and funding individual DSDS was left to individual departments. While the decentralized approach provided flexibility for the departments, it has not yielded the overall objective intended. For instance, the Commissioner of the Environment and Sustainable Development has highlighted several times the need for a top-down and centralized approach to guide departments and agencies. Indeed, in a 2002 report, the Commissioner equated the existing situation with “assembling a jigsaw puzzle without the picture box.” It is hoped that the current Federal Sustainable Development Act—which will be described in more detail in the next section of this document—will address this major limitation.

Another aim of the Act is to remedy problems with the DSDS’ targets, which have been severely criticized in the past for being weak. Indeed, the Commissioner underscored in 2007 the “lack of clear and measurable targets” and, in 2005, that “commitments are not measurable nor meaningful.” As a consequence of these insufficient benchmarks, reporting has been difficult and uneven. This is problematic, because the raison d’être of the DSDS is precisely to assess progress in sustainable development.

Other challenges have been highlighted in recent assessments of departmental sustainable development strategies. For example, Environment Canada’s Management Review noted that no “new policy authority or funding” has been associated with the DSDS process to finance new initiatives. Several departments and agencies, as a result, have lacked the human and financial resources necessary to develop and implement their strategies. Furthermore, a senior policy advisor at Environment Canada recently underscored the difficulty in creating one-size-fits-all guidance for individual departmental strategies, as some departments are more implicated than others based on their departmental mandates (for example, Natural Resources Canada has more stakes in sustainable development than Veterans Affairs Canada). Moreover, the implementation gap for the DSDS is underpinned by a general lack of accountability for the sustainable development strategies process. As Bregha notes, the “lack of accountability for failure and the absence of incentives for performance” must be addressed to correct management weaknesses associated with current DSDS. These two issues have contributed to a low level of senior management support across departments and agencies. Possible solutions to these implementation barriers will be explored in the recommendations section.

The preceding discussion highlights that while there have been four rounds of departmental sustainable development strategies, their success has been limited in advancing sustainable development within federal departments and agencies. The following section will provide an overview...
of the newly enacted *Federal Sustainable Development Act*, which was established in part to address the shortcomings of the previous federal approach to integrating sustainable development within government operations.

**THE FEDERAL SUSTAINABLE DEVELOPMENT ACT**

The *Federal Sustainable Development Act* received Royal Assent on June 26, 2008. The stated purpose of the *Act* is to provide “the legal framework for developing and implementing a Federal Sustainable Development Strategy that will make environmental decision-making more transparent and accountable to Parliament.” Under the *Act*, the Minister of the Environment is required to develop a government-wide Federal Sustainable Development Strategy (FSDS) with sustainable development goals, targets and implementation strategies by 2010, and to update the Strategy every three years. Departmental strategies need to be tabled in Parliament in 2011, and every three years thereafter, and will have to contribute and comply with the FSDS. In terms of accountability, the *Act* states that a specific Minister will be identified for meeting each target.

While the ultimate responsibility for the development of the Federal Sustainable Development Strategy will lie with Environment Canada, it is important to note that many other key players within the federal government will play a role in the implementation of the Strategy.

**KEY PLAYERS**

**The Office of the Auditor General**

Under the *Auditor General Act*, the Commissioner of the Environment and Sustainable Development is tasked with overseeing the government’s efforts to protect the environment and promote sustainable development. Specifically, the Commissioner is to monitor and report to Parliament on the progress that the departments and agencies are making with regards to the Strategy.

**Standing Committee of the House of Commons**

Comprised of Members of Parliament, this committee (likely the House of Commons’ Standing Committee on Environment and Sustainable Development) will review the Strategy and provide feedback to the Minister of the Environment.

**Sustainable Development Advisory Council**

The *Act* calls for an advisory council to provide advice on the Strategy. The Minister of the Environment, as Chair, is required to appoint one representative from each province and territory. Furthermore, three representatives will be appointed from each of the following groups: Aboriginal peoples, environmental non-governmental organizations, organizations representing business, and organizations representing labour.
**Interdepartmental Working Group**

In designing the Federal Sustainable Development Strategy, Environment Canada will work closely with a core group of departments and agencies whose mandates and responsibilities are closely tied with the sustainable development agenda.\(^{15}\) While not specified in the FSDA, the Office of Greening Government Operations (OGGO) from Public Works and Government Services Canada may assist Environment Canada in the design of the Strategy. In particular, OGGO’s assistance may be to provide support to departments implementing sustainable practices at the operational level. Other “core” departments include Natural Resources Canada, Indian and Northern Affairs Canada, Health Canada, Transport Canada, the Department of Fisheries and Oceans, and Agriculture and Agri-Food Canada.\(^{16}\)

**Governance Issues**

As stressed by James Meadowcroft and François Bregha, “sustainable development is above all a governance challenge. It is about reforming institutions and social practices to ensure a more environmentally sound and equitable development trajectory.”\(^{17}\) The International Institute for Sustainable Development (IISD) has identified, in a 2006 report on governance structures in national sustainable development strategies, six main criteria for effective governance for sustainable development.\(^{18}\) Amongst those six criteria, four are particularly relevant for this discussion; namely the legislative underpinning, the nature of the coordination mechanisms, the placement of overall responsibility and the integration with national plans and budgeting processes.

**Legislative Underpinning**

The legislative underpinnings of Canada’s commitment to sustainable development as per the *Auditor General Act*, as well as its formal three-year process, have earned the country a reputation as an example of good practice.\(^{19}\) However, the three-year cycle has been criticized for leading departments to think short-term. Considering the intergenerational aspect inherent in sustainable development, this poses a significant challenge.\(^{20}\) Integrating sustainable development within strategic planning mechanisms is one method to address this problem, which will be explored further in the recommendations section.

Similarly, Canada is applauded internationally for having a Commissioner of Environment and Sustainable Development. On the one hand the Commissioner has been effective in carrying out her or his auditing and reporting role, particularly in highlighting issues with the DSDS process. However, the fear of harsh scrutiny has created the perverse incentive for departments to make very modest commitments.\(^{21}\) The challenge then is to develop strategies to convince senior managers that with the right tools and support, delivering on targets—modest or not—is both painless and achievable.
Responsibility

In terms of governance, it seems fair to question whether leaving responsibility for implementation with a department that does not have the authority to exert influence on other departments is a strategic allocation of responsibility. Moreover, the current placement of the Sustainable Development Office inside Environment Canada—rather than in central agencies such as the Privy Council Office or the Prime Minister Office—may reinforce the “lack of interest and ownership in non-environmental (and social) ministries or departments.”22 Indeed, framing sustainable development as strictly an environmental issue is a problem that transcends all levels of government operations.

Our recommendations will thus emphasize transforming such erroneous perceptions of sustainable development. Particular attention will be placed on building organizational cultures that are supportive of, and dedicated to, the sustainable development agenda, regardless of the mandate of the department.

Integration with Departmental Planning and Budgeting Processes

Generally, at present, sustainable development is poorly integrated into departmental business planning and, as such, the departmental strategies have been criticized as not fulfilling their “strategic” purposes and as being mainly a “compliance-oriented exercise.”23 Solutions to this shortcoming are explored in the subsequent recommendations and enabling conditions section.

Horizontal Governance

Sustainable development is inherently a horizontal problem that needs a long-term perspective. Historically, governments in Canada have found it difficult to manage horizontal concerns in a decision-making system focused on sectoral thinking and on a vision shaped by four-year political mandates. Addressing the horizontal governance challenge, particularly through the use of inter-departmental communications and knowledge sharing, will be explored further in the recommendations section.

The following recommendations are aimed at providing strategic advice as to how the implementation of the Federal Sustainable Development Act can be best achieved, drawing on the reality and complexity of the federal public service.

Recommendations

The following set of strategic planning, policy, program and operational level recommendations outline how departments can make use of existing tools to help achieve their sustainable development goals. Further mechanisms are recommended to engage employees and senior managers to set robust targets, and to achieve and surpass them. These recommendations are intended to guide Environment Canada’s work in coordinating the implementation
of the Federal Sustainable Development Act within the Government of Canada in close collaboration with relevant entities such as the Treasury Board Secretariat and the Canadian Environmental Assessment Agency.

Another important consideration in guiding departments, as explained by James Meadowcroft, is that

Government activity is complex and multi-faceted, and it is hard to imagine encompassing all important sustainable development decision-making into a single planning process. Hence the importance of ensuring that an understanding of sustainable development informs behaviour across all of government, including in contexts that will remain only loosely connected to the formal strategy process.24

It is thus primordial to understand that the successful implementation of sustainable development in policy, programs and operations needs to take into consideration the normative change, or change in values, that are implicit in the sustainable development paradigm. As Charles Holliday Jr., Stephan Schmidheiny and Philip Watts remind us, “most institutional change is really personal change, and personal change does not happen when people are simply told to do so.”25 Hence, building a mindset and a culture around sustainable development in the public service, at all levels, will be another crucial component of the Federal Sustainable Development Act’s implementation.

**Strategic Planning Level Recommendations**

**Opportunity 1: Fully Integrate Sustainable Development Commitments into Reports on Plans and Priorities (RPPs) and Departmental Performance Reports (DPRs)**

Sustainable development targets should be integrated into Reports on Plans and Priorities (RPPs) of relevant departments and agencies. In establishing performance targets, strategic outcomes, program activities, and expected results, these expenditure reports represent the primary mechanism for departments to delineate their strategic direction over a three year period.26 Isolating sustainable development targets from the regular business planning cycle marginalizes the sustainable development agenda and reinforces the impression that sustainable development is not a departmental priority; a key weakness identified in existing sustainable development strategies.27 Integrating targets within existing planning mechanisms allows for a simplified, “one path” approach to strategic business planning, ensures that the financial and human resource expenditures necessary to achieve targets are laid out in a clear and transparent manner, and assures regular reporting on progress through the corresponding Departmental Performance Reports (DPRs) at the end of the calendar year. In addition, as individual DPRs are rolled up into an annual Canada-wide performance report, this is an excellent opportunity for a regular, accurate and transparent assessment of Canada’s overall progress towards reaching the targets set out
in the Federal Sustainable Development Strategy.\textsuperscript{28} Moreover, Environment Canada should establish guidance on how to integrate sustainable development targets within existing resource documents for planning and performance reporting, in close collaboration with the Treasury Board.

Norway is an example of best practices in this domain as its National Sustainable Development Strategy is closely linked to the national budgetary process. Implementation of the sustainable development strategies occurs through regular planning and budget processes of national departmental authorities. The Ministry of Finance chairs the special committee for the National Agenda 21, effectively ensuring integration of sustainable development and the country’s economic planning. This also provides financial assurance for the implementation of the National Strategy.\textsuperscript{29}

\textbf{Opportunity 2: Engage Senior Management}

Successful engagement of senior management is imperative in order to advance sustainable development goals and shift organizational culture within departments. Evidence from past experience suggests that support and interest at upper levels has been a major obstacle to the successful management of sustainable development strategies.\textsuperscript{30} If newly established targets are to be a major component of sustainable development strategies, it is imperative that senior level support be established not just to provide oversight, but to validate the department or agency’s commitment to achieving targets. Still, simply designating the Assistant Deputy Minister as “Champion,” for example, will do little to address any existing lack of interest in the sustainable development agenda. Perceptions must be changed and incentives must be put in place to engage senior management in the establishment and pursuit of robust targets.

The \textit{Federal Sustainable Development Act} stipulates that “performance-based contracts with the Government of Canada shall include provisions for meeting the applicable targets referred to in the Federal Sustainable Development Strategy and the Departmental Sustainable Development Strategies.” The interpretation of this clause should include both Deputy Ministers’ and Assistant Deputy Ministers’ performance agreements. The goal should be to provide incentives for exceptional performance by targeting senior bureaucrats responsible for delivery on sustainable development objectives. A similar practice is in place in the private sector. For example, at Shell, performance against corporate social responsibility goals determines up to 25\% of executive bonuses.\textsuperscript{31}

\textbf{Policy, Program and Project Level Recommendations}

At the policy, program and project levels, two key opportunities may ensure that sustainable development goals are integrated within the policy, program and project proposal design, selection and evaluation processes.

\textit{Opportunity 1: Include Sustainable Development Targets within Environmental Assessments of Policy, Plan and Program Proposals}
Strategic Environmental Assessments (SEAs) are currently the main tool used to help ensure that environmental considerations are incorporated into the development of public policies. SEAs have the potential to become an effective planning and implementation tool for the Federal Sustainable Development Act by incorporating sustainable development analysis into the initial design stage of a policy or program with the inclusion of the federal sustainable development targets. In this sense, departments will have to consider how each new program and policy can contribute to the achievement of their targets. In effect, if departments are to make progress towards attaining their sustainable development targets, a prime opportunity is to ensure that from the most initial stages, policies and programs are designed with these targets in mind. In addition, while departments initially identify how they will meet sustainable development targets in the design of their sustainable development strategies, the use of SEAs could allow departments to continuously consider ways to meet and surpass targets above and beyond initial projections.

Opportunity 2: Include Sustainable Development Targets Within the Project Proposal Evaluation Process

Subsequent to policy and program development is the opportunity to tie projects arising from the policies and programs to sustainable development targets. Attention to targets should be included in the process of evaluating and selecting projects that will be funded by the department. Again, an effective existing tool to achieve this goal is the individual department’s guidelines for submitting project proposals and reports. As in the previous recommendation, the general requirement of such guidelines is an explanation of how environmental planning has been incorporated into the design and implementation of the project. Taking this a step further by giving partners the opportunity to explain how the project may or may not fall in line with departmental sustainable development targets will at minimum provide project managers with a sense of how their projects are contributing to the departmental sustainable development goals. This is particularly important for projects where the links to a sustainable development goal are less obvious or indirect.

Requiring a linkage between project proposal evaluations and departmental sustainable development targets may provide an opportunity to shift the internal culture of the bureaucracy to consider how day-to-day decisions can be made to incorporate the sustainable development targets. In addition, communicating that the department is serious about achieving sustainable development targets will require project proponents to equally consider the environmental effects (be they socio-economic or related to health or the ecosystem) of their operations.

Operational Level Recommendations

The operational level is an important starting point for most federal departments and agencies beginning to pursue their sustainable development
objectives. There are many possible strategies at the operational level that departments can pursue, such as green procurement strategies, sustainable transport plans for business travel, or strategies to manage and reduce waste and to improve energy efficiency. Support systems and guidelines already exist to help departments decide which strategies are suitable for their needs, and how to design and implement them. Therefore, our recommendations at the operational level aim to assist departments in developing concrete and effective action plans to maximize their potential ability to meet targets.

Opportunity 1: Establish Action Plan for Departmental Delivery on Targets

When goals are clear, timelines specific, and responsibilities clearly assigned, the likelihood is greater that departments will meet their sustainable development targets. The following is a list of key components for an effective and comprehensive action plan based on a review of evaluations, existing guidance documents, and existing sustainable development strategies and action plans of Canadian and British government departments:

1. Develop a set of clear and reasonable target statements. The purpose of this component is to develop targets that are appropriate, well thought out, and feasible for the department.

2. Define a set of short, medium and long-term activities, with corresponding time deadlines. This component will facilitate departmental planning for achieving sustainable development targets.

3. Define who will be accountable for achieving targets, as well as responsibilities over the individual activities of the action plan. While the senior level Sustainable Development Champion is expected to have overall oversight on achieving targets, clearly defining which working group(s) or units take the lead on the particular activity areas will serve to clarify employee expectations, identify those responsible if commitments are not met, and help facilitate horizontal coordination among units within the department.

4. Specify how data will be collected and tracked to ensure that sufficient data is available to monitor progress, and sufficient resources are being devoted to data collection.

5. Identify the performance measures that will be used to measure progress towards targets. These performance measures should be standardized across government.

6. Specify how progress will be monitored. Designing a regular monitoring schedule and monitoring team will help to ensure that progress is regularly evaluated. This will help to keep departments on track, highlight areas where additional or fewer resources may need to be allocated, and to make changes to activities, timelines and responsibilities, if necessary.

7. Specify reporting requirements including how progress will
be reported, how often, through what channel, and to whom. Identified best practices suggest that progress towards targets should be formally reported to the management level Sustainable Development Champion.\textsuperscript{36} To ensure that the sustainable development agenda is integrated within departmental business planning, reporting should be conducted on a regular basis, in line with existing departmental performance reporting cycles, be they on a quarterly or biennial basis. Internal reporting on progress should be rolled up into annual Departmental Progress Reports.

8. Specify how progress and achievement will be \textit{communicated} within the department to engage employees, share information, and to highlight best practices and success stories.

These action plans should form an important component to the departmental sustainable development strategies.

\textit{Opportunity 2: Develop a Comprehensive Internal Communications Strategy}

An effective internal communications strategy is a crucial element to raise awareness and engage employees in the sustainable development agenda. It is unlikely that employees will demonstrate commitment to achieving targets if they do not understand what sustainable development means and how it relates to their work and the mandate of their department as a whole. Employee buy-in is therefore key to achieving sustainable development goals. A comprehensive communications strategy could include an intranet site or e-newsletter showcasing updates, information links, best practices, and success stories; training and information sharing through lunchtime seminars with motivational guest speakers from other departments or the private sector; a sustainable development component to the staff orientation package; or, access to sustainable development policy courses.

Another crucial aspect to foster engagement at all levels would be to have ministerial or deputy minister level involvement in communicating the strategy to send a strong signal on sustainability issues.

\textit{Recommendations on Supporting Departments to Achieve their Targets}

Ensuring that departments and agencies have the support they need to design and implement their sustainable development targets is imperative. Beyond existing guidelines and communications tools, Environment Canada could use the timing of the launch of the Strategy in 2010 to match each of the “core” departments with a sustainable development “consultant” from within their department. This consultant would work with management to help develop targets, design communications strategies, and create action plans. Similarly, at the operational level, Public Works and Government Services Canada could designate a similar team of consultants for “secondary” departments, available at the request of the department or agency. Subsequently, an email address could be created and posted on the
launch website with consultants from both teams designated to constantly monitor this email address and respond to queries within 24 hours.

It must be noted that the aforementioned recommendations for enhanced support (and the introduction of an overarching Federal Sustainable Development Strategy) could render the Interdepartmental Network on Sustainable Development, a voluntary network chaired by Environment Canada, obsolete. Indeed, the transition from a decentralized approach to the top-down strategy could be a golden opportunity to transfer financial resources formerly attributed to the Network towards new mechanisms fostering guidance based on individual departmental needs. Moreover, issues with the Network have been noted in the past, such as high turnover, unequal cost sharing, or the lack of a commitment threshold. As knowledge sharing remains a crucial component of the sustainable development agenda, an internal communications strategy could provide forums to exchange ideas, as recommended above.

**CONCLUSION: ENABLING CONDITIONS AND CHALLENGES**

From the preceding discussion, we have extracted the following list of enabling conditions for success:

- √ Integrate Sustainable Development into Every Aspect of Departmental Business
- √ Engage Senior Management
- √ Clarify Accountabilities
- √ Provide Incentives
- √ Allocate Sufficient Resources to Deliver on Targets
- √ Design a Comprehensive and Feasible Action Plan
- √ Provide Proper Guidance and Support
- √ Communicate, Communicate, Communicate

With these conditions in place, federal departments and agencies will be well positioned to achieve their sustainable development targets. While the intuition behind each of these enabling conditions has been detailed in the recommendations section of the paper, attention must be given to the challenges that will be confronted in moving forward with the recommendations.

First, while the support of senior management is imperative, senior executives are faced with competing priorities. Therefore, in order for sustainable development targets to be achieved, managers must be in tune with the sustainable development agenda and accountable for its delivery. The real challenge is “converting” the senior management on the importance of achieving sustainable development targets by, above all, providing worthwhile incentives. Still, the choice of incentives will likely be constrained by the current political and economic environment, presenting another challenge. With the Sponsorship Scandal still relatively fresh,
and given the current economic downturn, monetary incentives such as bonuses may be a politically risky move and could result in public outcry.

Another important losing condition relates to financial resources. Departments must allocate an appropriate amount of resources to achieve their sustainable development targets. Working to achieve more robust targets, and staff education and training all require money. If budgets are not increased, this requires a reallocation of current expenditures, meaning cuts will have to come to other operational areas. In addition, Environment Canada has not received any additional funding pursuant to the Act, which is problematic if they are expected to properly support the implementation of the new Strategy.

There is also an urgent need for a department or agency to lead by example, act as a benchmark and raise the bar for the others. Environment Canada is the lead developer and implementer of the Federal Sustainable Development Act. As such, it has an explicit responsibility to serve as a model to other departments, both in its formal and informal implementation processes. However, according to Bregha, Environment Canada has not played this role in 2006, despite its government-wide coordinating role. The implementation of the Act is a golden opportunity to reverse this trend. Environment Canada may not be looked at as the center of power and authority in the federal government, but in terms of sustainable development, authority also comes by exemplifying best practices and solid expertise.

Another challenge to the successful delivery on sustainable development targets is political backing for the Strategy. Because the Act was driven by a Liberal Member of Parliament in a Conservative-led House, it has limited support within the current power structure. In the public service, both money and pressure for implementation comes primarily from the Prime Minister, Cabinet and the Members of Parliament. Therefore, the best way to make the Federal Sustainable Development Strategy successful would be to have the backing of Stephen Harper. Fortunately, evidence suggests that Canadians are still concerned about the environment despite the economic downturn, as is Mr. Harper’s counterpart in the United States. Supporting the Federal Sustainable Development Strategy is an excellent and relatively easy opportunity for our Prime Minister to demonstrate that his priorities are in line with those of Canadians, and President Obama. Symbolic or not, he would do well to take advantage of the 2010 Federal Strategy to communicate this support.
ENDNOTES


9 Personal interview with a senior policy advisor at Environment Canada, 27 Feb. 2009.


11 Bregha. 47.


14 Ibid.


Ibid. 27.

Bregha. 45.

Personal interview with a senior policy advisor at Environment Canada, 27 Feb. 2009.


International Institute of Sustainable Development (IISD). Governance Structures for National Strategies for Sustainable Development. 16.


An example of these guidelines can be found at http://www.acdi-cida.gc.ca/CIDAWEB/acdicida.nsf/En/STE-320155246-SKL.


38 Bregha. 37.