STASHING OUR TRASH: “CLEAN COAL” AND CARBON SEQUESTRATION

While this may seem like a ridiculous idea, it is a cycle we engage with on a regular basis. When we drag our garbage to the curb, it ends up buried underground somewhere in Michigan. When we use the toilet, our waste goes through the underground tunnels of our sewage system (hopefully). When steel industries like Hamilton’s very own Stelco have toxic waste to get rid of, they dump it into the Hamilton Harbour. When we create carbon dioxide by-products from the burning of fossil fuels such as coal, we bury it underground.

This process, referred to as carbon capture and storage, is the cornerstone technology of the ‘clean coal’ idea. Coal is a major energy resource in North America, and throughout the world. In 2004, 25.5% of the world’s energy was from the burning of coal (World Coal Institute). In 2006, it was reported that the world consumed over 6.7 billion tonnes of coal, a statistic that is project to increase by 48% by 2030 (EIA). Thus, in less than 20 years it is projected that the world will be consuming almost 10 billion tonnes of coal on an annual basis. China is leading the way in the use of this energy technology, as it produces 2.38 billion short tons of the stuff every year.

India is catching up, clocking in at about 450 million tons produced per year. Not to be outdone, the United States uses up about 14% of the coal consumed in the world on a yearly basis, 90% of which they use for energy. (EIA)

Based on its projected growth, and major role in the quickly developing nations of China and India, it has become a safe assumption to make that coal is not going anywhere. That, however, is very problematic from an environmental perspective. Coal burning has been demonstrated to interfere with groundwater resources and water tables, as well as cause acid rain from its high-sulphur levels. In terms of human health, coal-burning has been shown to increase the likelihood of lung cancer ("Deadly"). Of course, coal also plays a leading role in the production of greenhouse gas emissions in the world. In the United States, 41% of CO2 emissions come from the electricity-producing sector. Coal is responsible for over half of those emissions (EIa). In fact, coal is the largest contributor to anthropogenic global warming according to the Intergovernmental Panel on Climate Change (IPCC).

So what is a world to do about all of this nasty pollution going on because of coal? The answer, of course, is obvious. Bury the damned stuff.

Wait… what? Shoving the empty McDonald's container from my late-night munchies seems acceptable, and so does clogging the sewers with 'cashmere' toilet paper. But burying carbon? That just sounds silly. Burying the problem does not seem like a viable solution to this kind dilemma.

Carbon capture and storage (CCS), however, is regarded as the saviour of coal's evil ways. As a 'clean coal' technology, coal will no longer be the environmental nuisance it once was if coal's emissions were sequestered. This waste management strategy for carbon dioxide provides a depository for the nasty GHGs to keep it from harming the environment (Griffiths 2005). Essentially, this strategy will shift the burden of GHG emissions from one sink, the atmosphere, to other sinks like geological formations and oceans. The process begins when the CO2 is isolated and extracted from fossil fuels. The CO2 is then transported by pipeline to a storage site. CO2 is eventually injected into "carbon sinks," where they stay for a really long time. We're talking centuries, or potentially tens of thousands of years. (Griffiths, 2005)

Actually, this idea seems kind of brilliant. This strategy requires no reduction in CO2 emissions, so nothing about our lives would have to change. Plus, this gross stuff is buried where we no longer need to see or deal with it.

Hey, it worked for garbage and industrial waste! Not.

Over and over again, the burial of the crap we no longer want is getting us into trouble. Because it is the easiest plan of action—behaviours need not be changed, and once the refuse is out of our sight, it is surely out of our minds. When I think of how burial has come to fail us, the two examples that immediately come to my mind are garbage disposal and industrial dumping. I believe that these two entombment strategies have failed in major ways, and that those failures foretell where CCS will inevitably go wrong.

At first, landfills seem like a great idea for our garbage. Once our garbage is on our curb, it goes to some place we hope to never visit, where it will decompose quickly or chill out for a couple thousand years. Despite how lovely they sound, landfills are huge problems. Aside from the fact that they smell, leachate from the waste seeps through the water table, and contaminates the water supply. This is not so bad, as one would imagine that landfills would not be located close to water tables. But, alas, most landfills sit right on top of aquifers. Anywhere we try to dig a hole and bury our waste, we put it on a water table. (Flynn 2010)

Furthermore, these babies are bad for business. No one wants a landfill near them, because they do a fabulous job of driving property values way down. The current landfill for the City of Toronto, which is located near London, Ontario is projected to be full by 2030, or 2035 at best.

There is hope that by the time these landfills run out, we will have developed technology to use it in other ways. Landfills are not a permanent solution, because they do not address the root of the problem at all, which is that we produce way too much garbage. (Johns 2009)

The case of waste disposal draws some parallels to CCS. The possibility of leakage once carbon has been sequestered is a major concern. In fact, it is unclear who is liable over the long term in the event of a significant leakage of stored or transported CO2 into the atmosphere. This is a temporary fix, and the owners of CCS operations might not even exist anymore in the case of a severe CO2 leak say, in a hundred years or so (Williams 2006). This problem also connects to garbage—This solution is not the best in the long term. So, we hope to find something better in the meantime while we use this one. Yet, we have been filling landfills for years and have failed to come up with anything better.

The case of water pollution in Hamilton's Randle's Reef demonstrates how industrial strategies of dumping waste highlight some of the problems with CCS. An outfall from Stelco steel company in Hamilton discharges into the area of Randle Reef, where sediments are largely contaminated by coal tar compounds and metals, many of which exceed the Ontario Ministry of Environment's (MOE) 'Severe Effect Levels.'

There are also detectable amounts of other toxic chemicals, and levels of polycyclic aromatic hydrocarbons (PAH, which are coal contaminants, carcinogenic and very toxic to humans) which exceeded 800 parts per million in some parts of the reef. These levels are only exceeded in Canada by the Sydney Tar Ponds. While Environment Canada has chosen not to legally pursue Stelco for point contamination of the Reef (because they cannot prove that Stelco was the point source of the contaminant—but we can all guess), they have tried a whole whack load of options for cleaning up the reef. Dredging did not work out because Stelco would not support it, and the plan to confine, fill and cap the reef was just too expensive. (*) So the waste from Stelco is just sitting there in Randle's Reef, basking in its own disgustingess. It is also home to the world's only three-eyed fish. (Okay, I made that last one up. But you get the point.)

The dumping of industrial waste in Hamilton Harbour sheds light on the issue of carbon sequestration into oceans. Oceans have been proposed as a potential carbon sink. Injections into the ocean, however, do not seem to be a good idea because it could significantly raise the acidity of the water. CO_2 and H_2O react to yield carbonic acid, which would certainly throw off the pH in the oceans. (Williams 2006) While this may not give way to three-eyed fish, such a shift in water quality could seriously affect the oceanic ecosystem. Furthermore, one of the reasons why Hamilton Harbour is still a mess is because the cost for cleanup was way too high.

This same problem has been identified in the CCS discourse, as it has been projected that it would cost anywhere from $15 billion to $30 billion for the system to be fully implemented so that CCS actually has a meaningful impact on GHG reduction (Ball 2009).

We know that ‘clean coal’ strategies of carbon capture and storage do not have predecessors that indicate anything greater than failure. Building these sinks, and shoving all of our unwanted waste inside of them seems like a really bad idea when you think about it. To make it even worse, it is not even a simple solution. In fact, its cost, required infrastructure and construction make it an increasingly complex strategy. As Occam’s razor so eloquently put it, the simplest solution is often the correct one. There is really nothing simple about clean coal, except for the fact that it really is not clean at all.

Source: http://www.sassweb.ca/3bb3/volume1-0/coal1-0/stashing_our_trash