The Regulation of Greenhouse Gases and the Energy-Efficient Use of IT

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Introduction

This paper is a modest effort to connect a few dots. Human-generated climate change is one of the most pressing issues of our time. The excessive emission of greenhouse gasses (“GHG”) is causing widespread damage to both ecosystems and the economy. Governments around the world are responding by regulating carbon (and CO2 equivalent) emissions. As we saw during the 2009 United Nations Climate Change Conference in Copenhagen, governments and industry leaders are engaged in efforts to find ways to reduce our carbon footprint to sustainable levels. In this context, information technology has a role to play. IT is both a source of significant carbon emission and a critical tool to be used to greatly increase our energy efficiency. It is critical that we develop increasingly energy-efficient uses of IT resources, and that we use information technology to increase our energy efficiency in a variety of sectors of the economy are without a doubt, a part of the solution.

This paper presents a very high-level overview of i) certain North-American carbon markets and their regulation; ii) the carbon impact of the explosion of electronic data; and iii) some preliminary thoughts on the energy-efficient use of technology.

This paper is intended as a complement to the presentations of the two other members of our panel: William Tanenbaum of Kaye Scholer LLP, who is presenting on “Green IT, Green Outsourcing, Remanufacturing, and Sustainable Supply Chain Requirements” and Dr. Thomas Stögmüller of the Teclegal Habel partnership, who is presenting on cloud computing.

Climate Change

As it is now widely known, excessive emissions of GHGs have created humanity’s greatest challenge yet: climate change. The urgency of the situation is well described by the United Nations Environment Program:

“For now, the evidence suggests we may be within a few years of crossing those tipping points which could disrupt seasonal weather patterns supporting the agricultural activities of half the human population, diminish carbon sinks in the oceans and on land, and destabilize major ice sheets that could introduce unanticipated rates of sea level rise within the 21st century.
But the basic scientific building blocks behind forecasts of widespread and damaging climate change, especially those from the Intergovernmental Panel on Climate Change (IPCC), are irrefutable. Unless action is taken soon to stabilize and then decrease concentrations of greenhouse gases in the atmosphere, these changes will cause widespread damage to ecosystems, natural resources, and economic activities. Such damages could end prosperity in developed countries and threaten human survival in developing countries.”

Carbon Markets and Regulations

1. What is offset trading

Although it is referred to as the carbon market, carbon is not necessarily the only gas targeted under such a system, other gases considered as GHGs, such as methane for example, may be targeted as well. All gases are however accounted for under the common denomination of “CO₂ equivalent”. This represents for a given GHG the amount of carbon dioxide that would produce the same global warming effect over a specified timescale (usually 100 years).²

Offset trading results from a cap-and-trade system. This system implies that a centralized agency, usually the government, fixes the overall emission levels by fixing a set number of pollution credits or allowances. After setting the cap, the centralized agency allocates the allowances (which should be equivalent to the cap) to emitters. This can be done in different ways; they could be given, auctioned off or allocated in some other way. Firstly, the centralized agency must determine which industries will have their emissions capped. It might, for example, include only industries that emit more than 100,000 tons of CO₂ as is the case under Alberta’s system or it might decide to target only electrical utilities as may be the case in the United States if the Waxman-Markey bill passes.³ Each company in the targeted industry must then measure and report its emissions. If its emissions exceed its allowances it must then buy credits or allowances equivalent to the amount of excess CO₂ it emitted or pay a fine. Companies who reduce their emissions below the cap can sell their excess allowances or keep them for future use. Also, under most systems, entities which may or may not be targeted by the cap, can sell credits for projects which reduce existing CO₂ levels, such as carbon capture and storage, or reduce

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2 Carbon neutral government regulation, BC reg. 272/2009. Note that under this regulation the time frame is 100 years.

3 “Cap-and-trade’s last hurrah” The Economist (20 march, 2010) p. 32.
future emissions, as energy economy measures. They can then sell these credits to companies who need more credits in order to respect their cap. Carbon credits are in other words the right to emit a set amount of $\text{CO}_2$. Carbon trading is then the trade of these permits to pollute. Once they are used, i.e. the $\text{CO}_2$ is emitted and compensated by an equivalent amount of credits, the credits are retired and cannot be used again. Correct accounting of retirement is important because it ensures the real impact on the environment and the legitimacy of the whole system. In order to do so the credit is usually numbered and registered with a third party registry. Legitimacy is also ensured by the project being certified by a recognised standard as well as continuous reporting and verification by a third party.

2. **Cap-and-trade verse carbon tax**

In the debate on climate change and how governments should go about achieving a reduction in carbon emissions there are many models. We can however divide them under two general categories: cap-and-trade and carbon or emission tax.

As described above, a cap-and-trade system implies that the government fixes the overall emission level by fixing a set number of pollution credits. The philosophy behind such a system is that the market is the most efficient way to reduce total emissions. This is the system used by the European Union. On the other hand a carbon tax does not directly set the total amount of emissions but rather dissuades emissions by taxing them. The philosophy behind such a system is that everyone is treated equally as the more they pollute the more taxes they pay. It is also believed that such a system increases the competitiveness of low carbon technologies. Québec’s tax on gasoline is an example of this type of a system.

Obviously, as you will see below, these two systems are not mutually exclusive.

3. **How to “cap”: flat verses intensity**

Emissions can be capped at a flat amount, 150 000 tonnes of $\text{CO}_2$ for example, or the cap can be an intensity cap whereas it is relative to something else such as productions or Gross Domestic Product (“GDP”). British Columbia for example has opted to cap its global emissions in 2020 at the flat rate of 33% of emission levels in 2007\(^4\), Alberta on the other hand caps its global emissions as well as industry emissions relative to GDP and production. It has a reduction target for December 31, 2020 of specified gas emissions relative to GDP of an amount that is equal to, or less than 50% of 1990 levels.\(^5\) Hence if Alberta’s GDP shrinks so will its reduction obligations regardless of the actual amount of GHG emitted, this is not however the case for B.C. who uses a flat cap.

4. **Existing Canadian carbon markets**

\[^4\] *Greenhouse Gas Reduction Act*, B.C. c. 42, s.2.

\[^5\] *Climate Change and Emissions Management Act*, A. 2003, c. C-16.7, s.3
A. British Columbia (“B.C.”)

On January 1, 2008 the Greenhouse Gas Reduction Target Act, (SBC 2007) chap. 42, came into force in B.C. Under this act the government of B.C. is committed to reducing emissions by 2020 by at least 33% of emission levels in 2007 and by 80% of 2007 emission by 2050. Furthermore, under this act the government has committed itself to a carbon neutral public service by 2010.6

In order to respect these promises the B.C. government is using a variety of measures which include a Revenue neutral Carbon Tax and a cap-and-trade system. The Revenue neutral Carbon Tax is a tax on fossil fuels whose revenues will be returned to tax payers through reductions in other taxes. The goal of this tax is to encourage people and business’s to reduce their use of fossil fuels.7 The carbon tax has been gradually phased in since July 1, 2008. The Cap-and-trade system on the other hand is not actually running at this time. Although B.C. has legislation in place for carbon trading through the Greenhouse Gas Reduction (Cap and Trade) Act, B.C. 2008 c. 32, and its corresponding Reporting Regulation, B.C. reg. 36/2010, targeted industries have yet to be “capped”. For the moment, Reporting Operations and Regulated Operations who emit more than 10 000 metric tonnes of CO₂ equivalent must collect and report their greenhouse gas emissions.8 Reporting Operations and Regulated Operations are listed at tables 1 and 2 of the Reporting Regulation and include such activities as pulp and paper production, cement production and electricity transmission. The B.C. Ministry of Environment has announced that such legislation will enable it to participate in the carbon trading being developed with other jurisdictions through the Western Climate Initiative9 (for more information on this initiative see below). Hence B.C. is still awaiting a fully operational carbon trading system.

(a) Pacific Carbon Trust (“PCT”)

Although it is not trading, B.C. is nevertheless buying offsets. The PCT is a Crown agency that has been given the mandate to buy B.C. based qualifying offsets. The PCT’s initial mandate is to acquire offsets on behalf of the B.C.’s public sector to achieve its commitment under the Greenhouse Gas Reduction (Cap and Trade) Act to be carbon neutral by 2010. However, local governments, businesses and individuals who voluntarily wish to offset their emissions may also buy offsets from PCT.

(i) What are offsets?

6 Supra note 3.
8 Greenhouse Gas Reduction (Cap and Trade) Act, B.C. 2008 c. 32, s.4 and Reporting Regulation, B.C. reg. 36/2010, s.6.
Offsets are qualifying reductions in greenhouse gas emissions generated by activities, such as energy efficiency, that are used to balance the emissions from another source.\(^{10}\)

(ii) Who are the suppliers of offsets?

Suppliers of offsets are project proponents whose projects have been accepted by PCT. The following are conditions projects must meet in order to be eligible for PCT to buy their offsets:

- The project must begin after November 29, 2007
- The emissions reduction or removal enhancements must be reflected in the British Columbia Greenhouse Gas inventory accomplished in 2007 to reflect total GHG emissions in BC in 2007.
- The project proponent must have, or be able to establish, a clear title to the carbon attributes of the project.
- Emission reductions are not attributed to electricity in areas integrated into the BC Hydro centralized electrical grid.
- The project must result in quantified an independently verified emission reduction which results from a specific action or decision. The quantification and verification of GHG reduction must be compliant with ISO 14064-3 standards.
- The GHG reduction achieved through a project activity must be incremental to that which would have occurred in the absence of the project activity.
- There are financial, technological or other obstacles to carrying out the project which are solved by selling the offsets.
- The project must not be already required by law.
- The project plans must be validated by PCT and regular reports must be verified by a third party assurance provider under ISO 14064-3 standards.\(^{11}\)

(iii) How are offsets sold to PCT?

If all the conditions are met at the pre-qualification stage, the project proponent becomes a Qualified Supplier. PCT then issues a final selection solicitation to all the Qualified Suppliers. These suppliers will then submit a complete project plan that has been verified by an independent third party under ISO 14064-3 standards. In considering projects at this stage, PCT will consider the price and volume of the project as well as other criteria. The winners of this bid will begin discussions in order to sign an offset purchase agreement\(^{12}\). The proponent must then generate a project report based on the actual performance of the project which will again be verified by an independent third party under ISO 14064-3 standards. Once the report has been reviewed by PCT, the emission reduction or removal enhancement becomes an Offset which is then purchased by PCT who then places it in its inventory. To ensure careful tracking and to avoid double counting, PCT gives each offset an identification number.

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\(^{10}\) Pacific Carbon Trust, “Guidance Document v.1.0”, p. 3.

\(^{11}\) Ibid, p. 7.

\(^{12}\) For an example of such an agreement see the standardized contract by PCT available on their website at: www.pacificcarbontrust.com, copy of which is in the binder prepared for this memo.
Example of an offset project

PCT has contracted to purchase offsets generated from Lafarge Canada Inc’s cement plant in Richmond, B.C. The cement producer is reducing the amount of coal burned by replacing a portion of this coal with biomass and other materials from construction waste. Changing to these different fuels involved considerable investment into technology and process alterations for a plant which was originally designed to burn coal. Selling the offsets to PCT allowed these changes to be financially viable.13

B. Alberta

Under section 3 of the Climate Change and Emissions Management Act, A. 2003, c. C-16.7 Alberta has a reduction target for December 31, 2020 of specified gas emissions relative to GDP of an amount that is equal to or less than 50% of 1990 levels.

There are four regulations under the Act currently in effect. The Alberta Specified Gas Reporting Regulation, AR 251/2004 lays out the reporting requirements for large emitters in the province and the Specified Gas Emitters Regulation, AR. 139/2007 lays out targets for regulated entities and guidelines for achieving compliance. The Climate Change and Emissions Management Fund Administration Regulation, AR 120/2009 lays out the regulations of the Climate Change and Emission Management Fund. The Administrative Penalty Regulation sets out the penalty for non-compliance with the Climate Change and Emissions Management Act.

The Specified Gas Emitters Regulation forces facilities that emitted more than 100,000 tones of CO₂e in 2003, 2004, 2005 or 2006 to reduce their emissions intensity by 12 per cent annually.14 In 2007 according to the most recent available report, these emitters were: the utilities sector, oil sands facilities, chemical manufacturing, in-situ and conventional oil and gas extraction sector, oil and gas extraction facilities, oil refining facilities.15 These emitters can reach this goal by becoming more efficient, purchasing Alberta-based offset credits, by contributing to the Climate Change and Emissions Management Fund or by purchasing or using Emission Performance Credits.

(i) Alberta-based offset credits

These are created by facilities and sectors not subject to the regulations that are able to reduce their greenhouse gas emissions according to a government approved protocol and that meet the requirements of section 7 of the Specified Gas Emitters Regulation:

14 Specified Gas Reporting Regulation, AR 139/2007, s. 3,4.
7(1) The following requirements must be met in order for a reduction in specified gas emissions to constitute one or more emission offsets:

(a) the specified gas emissions reduction must occur in Alberta;
(b) the specified gas emissions reduction must be from an action taken that is not otherwise required by law at the time the action is initiated;
(c) the specified gas emissions reduction must
   (i) result from actions taken on or after January 1, 2002, and
   (ii) occur on or after January 1, 2002;
(d) the specified gas emissions reduction must be real and demonstrable;
(e) the specified gas emissions reduction must be quantifiable and measurable, directly or by accurate estimation using replicable techniques.

(2) An emission offset may be used in meeting net emissions intensity limits under section 3 or 4 subject to the following rules:

(a) an emission offset must be held by the person responsible using it;
(b) an emission offset may only be used once;
(c) if an emission offset is jointly held, each holder may only use a portion of the offset on a pro rata basis;
(d) the use of an emission offset must accord with any Ministerial guidelines issued under section 62 of the Act.

Eligible reductions generate Offset Credits where one tone of CO₂ equivalent reduction is equal to one Offset Credit. These credits, once registered and serialized on the Alberta Emissions Offset Registry, become a tradeable unit that can be bought and sold by entities who, subject to the regulations, must reduce their emissions. Credits remain active until such time as they are submitted to Alberta Environment for compliance by a regulated facility, or sold outside the Alberta marketplace.¹⁶

(ii) Fund Credits and Emission Performance Credits

Fund credits are obtained by contributing to the Fund, where for each 15$ contribution one fund credit of one tone reduction in CO₂ equivalent is obtained.¹⁷ The Fund is used to support emission reduction technologies and improve Alberta’s ability to adapt to climate change.

Emission Performance Credits are credits from regulated emitters who have gone beyond the 12% reduction target.¹⁸

¹⁷ Specified Gas Emitters Regulation, A.reg. 139/2007 s.8.
¹⁸ Ibid, s.9
Alberta also has a sulphur dioxide and nitrogen oxides emissions trading program for the electricity sector. It is one part of an overall emissions management framework for the electricity sector in Alberta. The Emissions Trading Registry is established by the Emissions Trading Regulation (Alberta Regulation 33 / 2006) under the Environmental Protection and Enhancement Act.\(^1\)

C. Ontario

Ontario is trading nitrogen oxides (NOx) and sulphur dioxide (SO2) under a cap-and-trade system. Seven large industrial sectors; electricity, iron and steel, cement, petroleum refining, pulp and paper, glass and carbon black\(^2\); are required to lower their emissions in stages in according to the Emissions trading regulation, O. reg. 397/01. If the emitter's actual emissions are higher than their allowances they must buy extra allowances from other emitters or they may buy emission reduction credits.

Trading of allowance and credits in Ontario is done in accordance with the Ontario Emissions Trading Code.\(^2\) Eligible emission reductions credits are described as follows in the Technical description of the regulation:\(^2\):

Eligibility for emissions reduction credit (ERC) creation is limited to emitters in 12 key states named in the Ozone Annex (New York, Pennsylvania, New Jersey, Delaware, Maryland, West Virginia, Kentucky, Ohio, Michigan, Indiana, Illinois, Wisconsin), the District of Columbia and Ontario. The regulation allows a “scientific over-ride” for credits created beyond these states. If acceptable scientific evidence is produced to show that emissions reductions at places outside these states will improve Ontario’s air quality, then these credits can be used (with appropriate discounting of the value of the credits) to meet the obligations under the Ontario emissions trading regulation.

Emissions reduction credits can be created by any emitter in the aforementioned area not facing obligations under the regulation but who takes positive action to reduce emissions at their site. The emissions baseline for any emitter will be set against emission rates in the year prior to when the credit creating action was taken. Credits will result from actions taken at the project level rather than the corporate level. Credits cannot be created by a company that reduces its emissions by going out of business or by cutting back on production.

Credits can only be claimed using a 12 month accumulation period, and only for actions taken since January 1, 2000, when the government formally proposed emissions trading.

\(^1\) Alberta Government, online: http://www.environment.alberta.ca/1374.html


For credit creation actions before January 2000, ERCs shall only be accepted if they:
• were submitted to the Pilot Emissions Reduction Trading (PERT) program for review and registration;
• meet the credit creation rules outlined in the Code; and
• are for emissions reductions created since July 1, 1998. A reduction initiative or action will be able to create ERCs for a period of seven years from the date the initiative becomes operational; or until emissions from subject facility or sector are included in emissions trading or other emissions regulations reduce allowable emissions.

The Ontario Emissions Trading Code has been developed to define requirements for credit creation protocols and quantification and verification reports. The Code defines the process for adding new credit creation technologies and actions to the list of those that are acceptable. New NOx or SO2 sources not subject to the regulation, such as alternative stations or cogeneration power plants, cannot create ERCs by displacing electricity production from traditional generators subject to the regulation. However, new NOx or SO2 sources can create ERCs by lowering emissions other on-site emission sources (e.g. by lowering the emissions from is being served by the new NOx source).

The Ministry of the Environment will approve ERCs prior to registration Emissions Trading Registry. ERCs will be deemed to exist only after been created (by being approved by the Director) and registered. 23

Types or projects that qualify for ERC creation are set out in the Standard Methods in Appendix A of the Emissions Trading Code and include combustion control technologies such as: Low Excess Air (LEA) Firing: Ignition Timing and Lean Air-to-Fuel Operation, Staged Combustion: changing the air and fuel flow patterns in order to reduce the peak flame temperature and oxygen concentrations, etc. 24

Another type of project that may qualify for emission reduction is the Set-Aside Reductions (SRs). These projects indirectly reduce a facility’s NOx and/or SO2 emissions by reducing the amount of NOx and SO2 emissions from the power generation mix in Ontario. The requirements for these projects are set out in the Standard Methods in Appendix B of the Emissions Trading Code. In order to be eligible under this Standard Method, the project must:
• Be the result of construction that began after January 24, 2000.
• Be located in the province of Ontario.

23 Ontario, Ministry of the Environment, Technical description of the regulation, Emissions Trading and NOx and SO2 Emissions Limits for Ontario’s Electricity Sector, (March 26, 2010)
• Produce electricity using one or more of the following methods: photo-voltaics, wind turbines, run of river hydro-electric, new hydro-electric power from existing dams (projects which produce no increase in reservoir size). 

5. And the rest of Canada?

(a) Western Climate Initiative (“WCI”)

British Columbia, Québec, Manitoba and Ontario are all part of the WCI. This initiative describes itself as a collaboration of independent jurisdictions who commit to work together to identify, evaluate and implement policies to tackle climate change at a regional level. Along with the Canadian provinces listed above Arizona, California, Montana, New Mexico, Oregon, Utah and Washington are also partners in the initiative. They are developing a joint strategy to reduce greenhouse gas emissions in the region. At the center of this strategy is a regional cap-and-trade system. In order for this system to take place each partner will begin reporting emissions in 2011. The WCI states that the first phase of the program will begin on January 1, 2012 with a three year compliance period. In this first phase the targeted industries are: “imported electricity, industrial combustion at large sources and industrial process emissions for which adequate methods exist.” The second phase of the program will begin in 2015, when the program will be expanded to include transportation fuels and residential, commercial and industrial fuels not otherwise covered in the first phase.

(b) GHG Clean Start Registry

The GHG CleanStart Registry is a web based registry established by the Canadian Standards Association which allows Canadian businesses to showcase their emission reductions or removals. In order to be eligible to post on the registry, businesses must follow ISO 14064 series of standards for greenhouse gas inventories and reporting. Projects listed on the Alberta registry are also available on this online registry. This registry tags each tonne of verified emission reduction/removals with a unique serial number. Projects listed under the GHG CleanStart Registry include McGill University Health Centre’s energy efficiency measures for GHG emission reductions, Enfoui-Bec Inc.’s avoidance of methane production from decay of biomass through composting, and many others.

26 Western Climate Initiative: http://www.westernclimateinitiative.org/organization
27 Ibid
28 Ibid
29 GHG CleanStart Registry: http://www.ghgregistries.ca/cleanstart/index_e.cfm
6. The voluntary market

Although not regulated by any government limit or offset their emissions many businesses and individuals buy carbon offsets. According to a report published by Ecosystem Marketplace and New Carbon Finance the size of the voluntary market in 2008 is established at 123.4 million tons of CO₂ equivalent and 704.8 million US $.\(^{30}\) Customers of the voluntary market are principally (at least 66%) private firms. Their reasons for buying these credits are mainly enhanced corporate social responsibility and public relations branding as well as the anticipation of a regulated market.\(^{31}\) These voluntary transactions take place either directly between the buyer and the offset provider, through a wholesaler or retailer or on exchanges such as the Chicago Climate Exchange and the Montréal Climate exchange.

(a) Chicago Climate Exchange (CCX)

The Chicago Climate Exchange is by far the largest exchange with 69.2 million tons of CO₂ equivalent traded at a value of 306.7 million US $.\(^{32}\) The CCX is commodities exchanges where emitting Members make voluntary but legally binding commitment to meet annual GHG emission reduction targets. Members who reduce their emissions below the target can sell or bank their surplus allowances to those who’s emissions are above the target.

Members voluntarily join the CCX and sign up to its legally-binding reductions policy. Like the Kyoto markets, the CCX trades six different types of greenhouse gas (GHG) emissions converted into one common unit denominated in tonnes of carbon dioxide equivalent (tCO₂e).

There are three levels of membership in the CCX:

**Full Members** are entities with significant direct GHG emissions who have committed to reducing their emissions 1% per year from a baseline determined by their average emissions from 1998 through 2001. The current goal (Phase II) is for members to reduce their total emissions to 6% below the baseline by 2010. Hence, members who have been participating for the past four years must only reduce an additional 2% between now and 2010, while new members need to reduce 6% during this time.\(^5\) As of April 2009, there were 92 Full Members of the CCX. These include amongst others: Rolls-Royce, Ford Motor Company, Baxter International, Bayers Corporation, Smurfit Stone and many more.

**Associate Members** are entities with negligible direct GHG emissions. Associate Members commit to report and fully offset 100% of their indirect emissions associated with energy purchases and business

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\(^{31}\) Ibid, p.80,81.

\(^{32}\) Ibid, p.ii
travel from year of entry through 2010. As of April 2009, 52 companies were participating as Associate Members. These include: Rainforest Alliance, Open Finance LLC, Amerex Energy, Orion Energy Systems Ltd, and others.

**Participant Members** are project developers, offset providers, offset aggregators, and liquidity providers, the last of which trade on the Exchange for purposes other than complying with the CCX emissions reduction schedule. As of April 2009, there were 33 offset providers, 92 offset aggregators, and 68 liquidity providers participating in the CCX. These include Cargill inc, MGM International, Tata Motors limited, Gazprom Marketing and trading ltd, JP Morgan Ventures Energy Corporation, and more.

The CCX’s unit of trade is the Carbon Financial Instrument (CFI), which represents 100 tCO2e. CFIs may be either *allowance-based credits*, issued to emitting members in accordance with their emissions baselines and the exchange’s reduction goals, or *offset credits* generated from qualifying emissions-reduction projects. Offset-based credits can only be used to offset 4.5% of a member’s total emissions reduction requirement, so the vast majority of credits traded on the CCX are allowance-based. In 2008 the average price for one tonne of CO₂ traded for US$ 4.43.33

In 2008, the CCX launched the Chicago Climate Futures Exchange (CCFE) to trade futures contracts and derivatives based on different climate emissions vehicles, including regulatory instruments and offset credits. Traded products on the CCFE are the CCX CFI, Regional Greenhouse Gas Initiative (RGGI) allowances, regulatory compliance credits for a future U.S. federal system, Kyoto Clean Development Mechanism Certified Emission Reduction (CER) credits, and Climate Action Registry (CAR) Climate Reserve Tons (CRTs).

The CCX is owned by the Climate Exchange Plc group of companies, which also includes the European Climate Exchange (ECX), the Montreal Climate Exchange, and the Tianjin Climate Exchange. 34

(b) Montreal Climate Exchange (“MCeX”)35

The Montreal Climate Exchange is a joint venture between the Chicago Exchange and the Montreal Exchange. Its mission is to provide a credible market place where contracts on pollutants and GHG emissions are traded. It follows the rules set by the Bourse de Montreal inc.

The Montreal Climate Exchange trades in futures contracts and options on future contracts. Each Futures Contract is equal to 10 Canada carbon dioxide equivalents (CO2e) where each CO2e unit, as defined by the government of Canada, is an entitlement to emit one metric ton of CO₂e.

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33 *Supra* note 26, p.iii.
34 The following section is wholly from *Fortifying the Foundation, state of the voluntary carbon markets 2009*, ibid, at p.6-7.
35 [http://www.mcex.ca](http://www.mcex.ca)
Although the MCeX website sets quotes there appears to be no apparent transactions on the exchange on or around March 26, 2010.

(c) Retail

The voluntary market also includes an expanding retail market that sells emission reductions to businesses and individuals wanting to voluntarily offset their “carbon emission footprints.” The type and reliability of these transactions varies greatly as there is no unified standard to evaluate and certify the emission reduction. In its 2007 report on the carbon markets the World Bank stated: “Reports of increased interest of banks, credit card issuers, private equity funds and others in this segment suggest that it could grow exponentially if only there were a credible, voluntary standard for such assets.”\(^3\) This view is however rapidly changing as we can see from the report on the state of the voluntary carbon in 2009, 96% of voluntary credits were verified by third parties in 2008.\(^3\) The prices for credits sold in retail in 2008 varied between US$ 1.20 to US$ 46.90 per tone of CO\(_2\) equivalent.\(^3\) The credits sold in this market come from all sorts of emission reduction or removal projects such as: wind and hydro energy, landfills, geological sequestration and others. These projects took place all over the world from China to Canada.\(^3\)

7. Conclusion

Although not uniformly organised or standardised, carbon trading is alive and well. Project proponents looking to sell credits should firstly consider the geographical location of their project as the existing Canadian regulated markets are location specific. If the project is in Alberta, B.C. or Ontario it might be eligible for credits in the provincial market. If however the project is not located in these provinces, or not eligible, it should consider the voluntary market. Accordingly the type of certification and standard used to quantify the emission reduction will be different if the proponent is proposing to sell its credits to the regulated market or to the voluntary market. Each provincial program requires a specific standard and similarly buyers in the voluntary market may require different standards. The question will then be: who is the end buyer and what is his certification requirements?

Awaiting federal regulations on a cap-and-trade system in Canada, many provinces have adhered to the Western Climate Initiative and are proposing a regional cap-and-trade system which would include many American states. Although they are currently designing the system they plan to be fully operational in 2015, much could happen between then and now.


\(^3\) Fortifying the Foundation, state of the voluntary carbon markets 2009, supra note 26, p.47.

\(^3\) Ibid, p.v.

\(^3\) Ibid, p.24.
IT: Part of the Problem; Part of the Solution

(a) Explosion in Data

The quantity of data stored and available around the globe is exploding. Here are some examples that illustrate the sheer enormity of the quantity and the speed at which it is growing:

- The Sloan Digital Sky Survey, a telescope in New Mexico, has amassed 140 terabytes of information (that is 140 times 1,000 Gigabytes) in ten years. As large as that number is it shrinks when compared to its successor the Large Synoptic Survey Telescope due to come out in 2016, which will acquire that quantity of data every five days.40
- eBay inc. began with 14 terabytes in 2002 and now processes 50 petabytes (50 times 1,000 terabytes) of information each day while adding 40 terabytes of auction and purchase data.41
- Wal-Mart handles more than one million customer transactions every hour and stocks 2.5 petabytes (this is 167 times the books in America’s Library of Congress).
- Particle physics experiments at the Large Hadron Collider at CERN generate 40 terabytes every second, much more than can be stored or analyzed.42

All of this data processing comes with its associated carbon cost. Twitter has recently calculated that sending one “tweet” generates 0.02 gram of CO2 into the atmosphere. This may seem very little but with 50 million “tweets” and this number is growing, Twitter is emitting one tone of CO2 into the atmosphere every day.43 This ever-increasing quantity of data is why data centre are responsible for 76 MtCO2e and why this number is expected to more than triple to reach 259 MtCO2e by 2020.44 In a report by The Climate Group in 2008 the ICT sector as a whole (this includes PCs, telecom networks and devices, printers and data centers) is evaluated to be responsible for 2% (830 MtCO2e) of global carbon emissions.45 This figure is predicted to grow 6% a year until 2020 when ICT will be responsible for 3% of

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40 “Data, data everywhere”, Special report on managing information, The Economist, 394:8671 (February 27, 2010) 3.
42 “All too much”, Special report on managing information, The Economist, 394:8671 (February 27, 2010) 5.
43 Philippe Mercure, “Quand Twitter réchauffe la planète” La Presse (April 21, 2010).
45 The Climate Group, ibid. This is roughly the same figure as the often cited Gartner, Green IT: The New Industry Shockwave, presentation at Symposium/ IXPO conference, April 2007.
all GHG emissions: 1,54 metric gigatons which is equivalent to twice what the United Kingdom emitted in 2008.46

(b) The Energy Efficient use of IT

In a report by The Climate Group in 2008 the ICT sector as a whole (this includes PCs, telecom networks and devices, printers and data centers) is evaluated to be responsible for 2% (830 MtCO\textsubscript{2}e) of global carbon emissions. 47 This figure is predicted to grow 6% a year until 2020 when ICT will be responsible for 3% of all GHG emissions: 1,54 metric gigatons which is equivalent to twice what the United Kingdom emitted in 2008.48 There is hope however that ICT could also be used to reduce emissions. Since the carbon generated by ICT stems largely (75%) from its use, materials and manufacturing are responsible for only one quarter of emissions,49 more efficient use of energy may lead to great improvements in carbon emissions.

Data centers are the fastest growing contributor to the ICT sector footprint. Due to the ever increasing amount of data, data centre’s carbon footprint is expected to more than triple by 2020, reaching 259 MtCO\textsubscript{2}e in 2020 from 76 MtCO\textsubscript{2}e in 2002.50 However, increased efficiency in server utilization and data centre energy consumption could bring important reductions in carbon emissions.

It is estimated that the current utilization rates of servers, storage and other assets in the data centre worldwide are very low (6% average server utilization, 56% facility utilization) and vary depending on the installation.51 Considering these numbers, it is clear that there is room for consolidation. Cloud computing or the relocation of processing workloads from smaller company-operated facilities to massive computing warehouses is a solution.52 If instead of having many personal data centers more businesses used the power of bigger centralized data centers available to them through the internet, when they need them, efficiency would be gained and energy consumption reduced. Another tool that

47 The Climate Group, Supra note 14. This is roughly the same figure as the often cited Gartner, Green IT: The New Industry Shockwave, presentation at Symposium/ IXPO conference, April 2007.
48 Giulio Boccaletti, Supra note 16.
49 The Climate Group, Supra note 14.
50 Ibid, p. 02/21.
51 Ibid, p. 02/23.
is similar to cloud computing in that it involves the pooling of resources that are underutilized; is virtualization. It is estimated that it could reduce emissions by 27% (111 Mt CO2).53

Different business models are evolving to address this potential. “Utility computing” where companies pay to use server space on demand to build their own applications, execute complex calculations or host websites, and pay monthly fees in the same way they pay for other utilities, as well as “software as a service” which allows companies to access key enterprise applications such as customer relationship management databases or collaboration tools via web browsers without hosting their own data centre facilities, are both examples of the application of cloud computing.54

Improvements to data centre themselves could greatly reduce their energy consumption and therefore carbon emissions. Half of the energy consumed by data centers is used to run back-up uninterruptible power supplies (5%) and cooling systems (45%).55 By allowing the data center temperature to fluctuate along a broader operating temperature a 24% reduction in energy consumption is possible. Simply allowing the outside air into the data center can reduce energy consumption. Furthermore, technologies that detect where within data centre temperatures are running high and direct cooling to those areas could reduce cooling costs by 12%. Another measure is distributing low voltage direct current (DC) into the data centre, which would eliminate the need for mechanical back-up, uninterruptible power supply units.56

However, an important factor in determining the carbon impact of data centre or the IT sector as a whole will be the source of the electricity. Data centre may reduce their carbon footprint by simply ensuring their energy comes from a clean source.

Companies big or small, are all faced with: a flood of data, increasing energy costs, sooner than later carbon regulations and or taxes. In order to maintain their competitive edge, companies will have to be increasingly energy-efficient and limit their carbon emissions.

(c) Examples companies reducing their carbon footprint

Data centers themselves can be improved to reduce their carbon footprint. GE announced on February 2nd, 2009 that it is updating its data center in Ohio in order to save 11% of the current annual energy use for cooling and up to 20% less water (three million gallons) as well as a 50% reduction of the use of water treatment chemicals at the facility. Similar efforts will hopefully increase with Energy Star’s new data center energy criteria in development.

53 The Climate Group, Supra note 14, p. 02/22.
54 Ibid, p. 02/23.
55 Ibid, p.02/22.
56 Ibid, p. 02/22.
Eli Lilly a pharmaceutical company uses cloud computing to do its heavy computing. Instead of owning their own data center and paying for its maintenance they rent time in the “cloud” when they need it. They say that not only do they save money, they are also saving time. What used to take them seven or eight weeks on their own data centers now takes them five minutes online at Amazon. 57

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