



# **Understanding Carbon Credits**

**Banff Park Seminar**

**January, 2000**

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# Presentation Outline

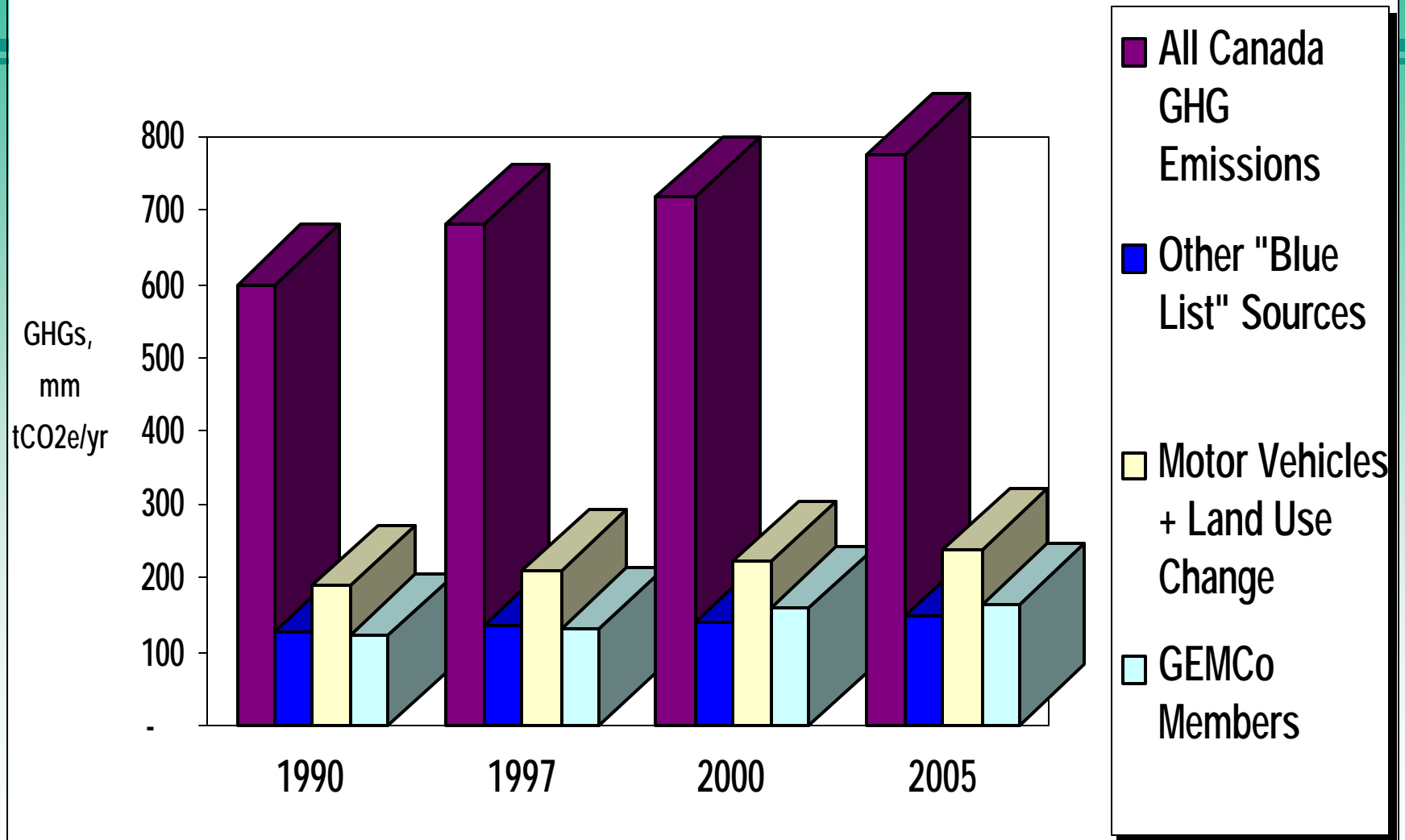
- ✍ What Does the Kyoto Protocol Mean, in Corporate Share Value Impacts?
- ✍ Who Will Bear the Brunt of a Canadian Mandate to Reduce GHGs?
- ✍ Where Should Major Emitters Seek to Purchase Carbon Emission Reduction Credits?
- ✍ Where Does Science Fit Into an ERC Purchase Agreement?
- ✍ How Much Should Carbon Emission Offsets Trade For in the Long Run?

# Who Is GEMCo?

## Membership for 2001:

- ✍ BC Gas Utility Ltd.
- ✍ ATCO Utilities Ltd.
- ✍ Enbridge Ltd.
- ✍ EPCOR Utilities Inc.
- ✍ Nova Scotia Power Inc.
- ✍ Ontario Power Generation Inc.
- ✍ PanCanadian Pipelines Ltd.
- ✍ SaskPower
- ✍ TransCanada Pipelines Limited

## Canada's National GHG Inventory & GEMCo's Forecast



# What is the Kyoto Protocol?

The Kyoto Protocol establishes a global system of national GHG Quotas, called “AAUs”. Any one nation’s AAU supply governs its absolute combined rights to:

**((produce fossil fuels) + (consume fossil fuels) +  
(produce beef +pork) + (produce rice))**

From a Practical Perspective once Canadian total GHG emissions reach any internationally agreed “cap”, after accounting for Kyoto “AAUs” purchased from other nations:

- ✍ domestic fossil fuel consumption can not increase other than at the expense of fossil fuel exports or domestic beef or pork production; or,
- ✍ fossil fuel exports can not increase other than at the expense of domestic fossil fuel consumption or domestic beef or pork production; or,
- ✍ beef or pork production can not increase other than at the expense of fossil fuel exports or domestic fossil fuel consumption.

# Accepting the Proposed Kyoto “Allocated Amount” = Reforming Canada’s National “Balance Sheet”

<b>Assets</b>		
Target, 6% below 1990 levels	581	2,907
Firm Contracts to Reduce Emissions (RE) at Existing Canadian Sources		
Firm Contracts to Enhance (SC) Canadian Sinks		
Guaranteed AAU Transfers from Nations with Commitments		
Securitized Contracts to RE or SC in CDM Nations		
Total Assets	581	2,907
<b>Liabilities</b>		
GEMCo Estimate of Actual Canadian GHG Emissions, Dec 31, 2000	719	3,593
Inventory Adjustments		
<b>Cdn. Credits Issued for "Selected" Entity Reductions that were Realized between January 1, 1995 and Dec 31, 2000</b>	<b>34</b>	<b>172</b>
<b>Credit reserve for emissions growth @ existing Canadian sources &amp; provision for new sources</b>		
<b>...set aside for growth to 2005 at "Selected" Entity Sources</b>	<b>16</b>	<b>82</b>
<b>...set aside for other and new point, area and mobile sources and land use change</b>	<b>30</b>	<b>150</b>
Credit reserve to cover domestic reduction contract performance risk		
<b>Government of Canada contributions to ER projects and inventories outside Canada</b>		
Total Liabilities	799	3,997
<b>Canadian Net Equity</b>	<b>(218)</b>	<b>(1,091)</b>
<b>Net Equity as % of Current Emissions</b>	<b>-27.28%</b>	

C8 = 44.6%

	B	C	D	E	F	G	H	I	J	Z
4	<b>Table A - General Risk Analysis</b>				1992	1993	1994	1995	1996	2012
5	<i>marginal cost to comply</i>	<i>current value of CO<sub>2</sub>e =</i>		\$3.24		<i>nominal =</i>	\$10.00	<i>\$/s per MTCO<sub>2</sub>E, marginal</i>		
6	<i>probability of scenario</i>			20.00%	in	2003	red'n to	100.0%	of 1990 levels	
7	<i>Banking for pre-2008 reductions?</i>	y		60.00%	in	2005	red'n to	100.0%	of 1990 levels	
8	<i>Effective tax rate</i>	44.60%		70.00%	in	2006	red'n to	95.0%	of 1990 levels	
9	<i>Use after tax values?</i>	y		80.00%	in	2010	red'n to	90.0%	of 1990 levels	
10	<i>the base year for NPV calculations is</i>	2000								
11	year	totals	1990	1991	1992	1993	1994	1995	1996	2012
12	<i>1990 emissions</i>	1,642,621								
13	<i>probability of compliance obligation</i>									80.
14	<i>forecast 1999-2020 DIRECT Bal emissions</i>	35,998,526	1,642,621	1,560,985	1,545,599	1,593,132	1,683,526	1,670,533	1,555,381	1,659,
15	<i>reduction stream required, 1999 - 2020</i>	1,927,542								180,9
16	<i>(ref: max. allowable emissions 1999-2020)</i>	34,070,985								1,478,
17	<i>one time costs adjustments</i>									
18	<i>prob.-weighted cost to comply</i>	\$15,586,448								\$1,447,4
19	<i>net present (cost)/return to business</i>	\$6,237,715								\$707,2
20	<i>risk (benefit) in \$/share</i>	\$0.0693								
21	<i>share value at risk - range</i>	1.21%		to	1.63%					
22	<i>early ERs banked, tCO<sub>2</sub>e</i>	335,017								
23	<i>Entity Market Value, amortized over 20 yrs</i>	Cdn\$/tonne CO <sub>2</sub> e		before reg.	\$95.72	after reg.	\$95.53			

## What is the Current Impact of the Future Risk of the Introduction of the Kyoto cap on Canadian Entities' Market Capitalization?...some sample scenarios

Probability	Target Description	Nominal Reduction Cost per ER, in Year of Expenditure	Risk as Cost per ER in 2000 Constant \$s (CoC = 5.25%)	Market Value of Risk, Year 2000 \$s
100%	emissions capped at 1990 level - 6%, 2008 - 2020	\$30.00	\$15.13	\$44,863,405,411
100%	emissions capped at 1990 level - 6%, 2008 - 2012, no restrictions on emissions from 2013 on	\$20.00	\$10.36	\$26,304,004,911
100%	emissions capped at 1990 level - 6%, 2008 - 2020	\$15.00	\$5.04	\$14,954,468,471
100%	emissions capped at 1990 level - 6%, 2008 - 2012, - 12% for 2013 - 2020	\$10.00	\$4.96	\$16,677,825,479
50%	emissions capped at 2% below 1990 level, 2010 - 2020	\$20.00	\$4.80	\$11,082,422,343
50%	emissions capped at 4% below 1990 level, 2010 - 2020	\$20.00	\$4.80	\$11,724,948,983
100%	emissions capped at 1990 level + 10%, 2005 - 2007; 1990 level, 2008 - 2010; - 10%, 2011 - 2020	\$20.00	\$10.36	\$35,352,416,591
20%	emissions capped at 1990 level + 10%, 2005 - 2007; 1990 level, 2008 - 2010; - 10%, 2011 - 2020	\$10.00	\$1.04	\$3,535,241,660

# The Current Canadian Situation

- ✍ The combined facts (1) that the Government of Canada has signed the Kyoto Protocol *and* (2) that the government(s) of Canada have failed to send strong “baseline protection” and “early action” policy signals...have already likely cost existing owners of Canadian energy company shares at least \$3.5 billion in market value.
- ✍ The combined indications that the Government of Canada (1) favours not-carbon-weighted energy or emissions taxes as central GHG mitigation “measures” and (2) perceives a GHG permit auction will be the source of significant future federal revenues...suggest to the market that investing in emission reducing activities in Canada, at this time, is not a prudent business response.
- ✍ A prudent major emitter’s first response to the current domestic GHG policy/political context would be to slow down all capital spending in Canada preparing to disinvest or to preserve cash to pay anticipated new taxes and acquire permits. In other words, the impact of Canada’s policies to date likely has been to increase national GHG emissions.

# In a “Kyoto-Ratified” Future, When Would It Be Prudent for a Nation to Sell/Trade AAUs?

## Almost *NEVER!* If...

- ✍ there are consequences for nations that allow GHG production to exceed GHG QUOTA supply, and
- ✍ global GHG QUOTA supply is anticipated to decline.

*Bankable tradable GHG QUOTA supply = future share of a market for increasingly precious core economic commodities in which demand will exceed supply for some time. A nation, prudently managed, would not sell surplus “AAUs”, unless it’s leaders (1) have no fear of the consequences of non-compliance, and/or (2) are so desperate for foreign capital that they feel they have no choice but to sell their future access to global market share.*

# What Principals Apply to ER Development Partnerships with Customers and Suppliers?

## In a mature market:

- ✍ The major GHG emitter should be willing to pay 2x as much for ERs supplied by customers as it is willing to pay for ERs of equivalent quality achievable in own operations, all other things being equal. This strategy minimizes customer retention costs.
- ✍ Because of the cost of delivery risk, ERs supplied by non-customer, non-supplier third parties should be deemed of lower value than ERs of equivalent quality achievable in own operations.
- ✍ Therefore, to be of equal value to the purchaser, ER purchases from third parties who are not customers or strategic suppliers (from whom the ER purchaser takes prices) must be less than 1/2 the price of customer-supplied ERs of equivalent quality.

# Which Canadian Entities *Should* Also Be Interested in Developing ER Trading Partnerships?

Abitibi-Consolidated	EPCOR	NOVA Chemicals
Air Canada	Falconbridge	Nova Scotia Power Inc.
Alberta Energy Company	Ford Motor Company	Ontario Power Generatic
Alcan	Fording Coal	PanCanadian Pipelines
ATCO Group	General Motors Canada	Petro Canada
BC Hydro	Government of Ontario	Poco Petroleum
BP Energy Canada Ltd.	Gulf Canada Resources	SaskEnergy
Canadian Hunter Resources	Honda Canada	SaskPower
Canadian National Railway	Husky Energy	Shell Canada
Canadian Occidental	Imperial Oil Ltd.	St. Lawrence Cement
Canadian Pacific Railway	INCO	Suncor
Chevron Canada	Irving Oil	Syncrude
City of Calgary	Kimberly-Clark	Teck Corp
DaimlerChrysler Canada	Kruger Inc.	Toyota Canada
Dofasco	Luscar Ltd.	TransAlta Corporation
Domtar	Methanex	TransCanada Pipelines
Dow Chemical	Mobile Oil Canada	Veridian
Dupont	New Brunswick Power	Westcoast Energy
Enbridge	Nexfor	Weyerhaeuser Canada

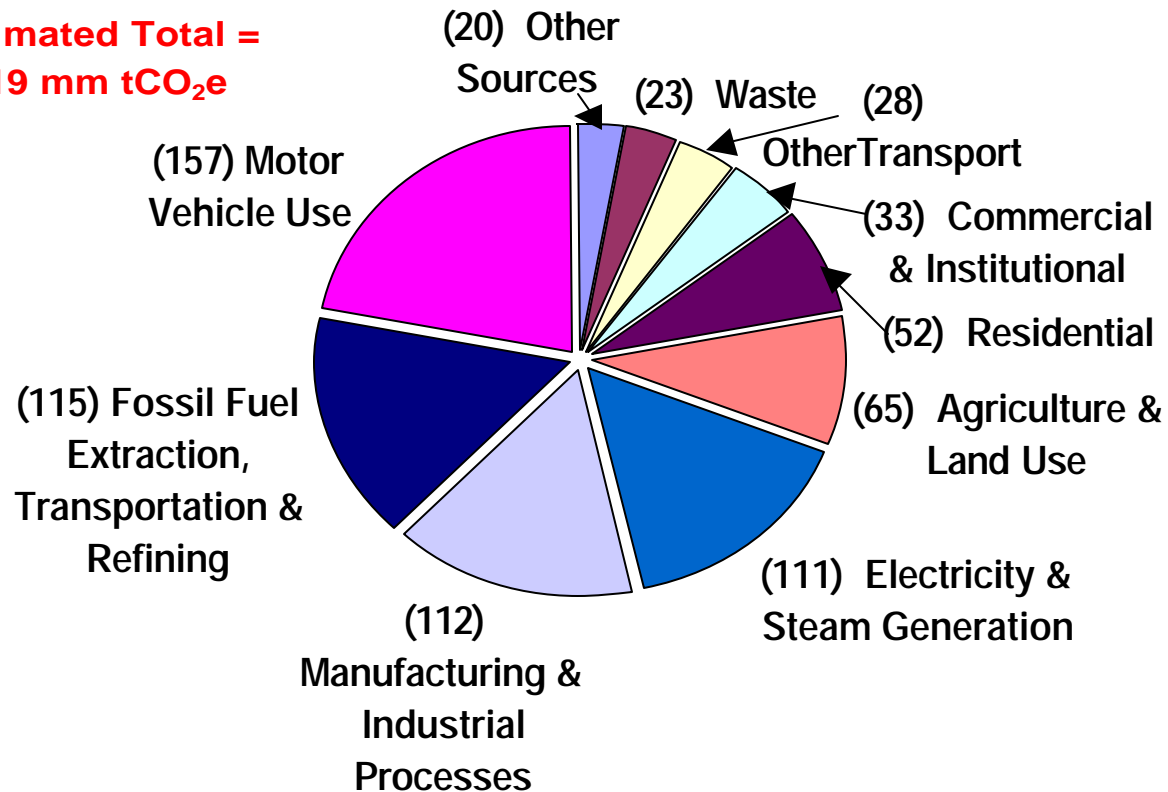
# What These 54 Entities Represent?

- ✍ 66% of Canada's GHG emissions from non-mobile sources in the year 2000;
- ✍ (directly or through parent corporations) the vast majority of transportation refueling infrastructure in Canada;
- ✍ (directly or through parent corporations) the vast majority of automobile manufacturing and sales in Canada;
- ✍ a strong combined commitment to "early action" and a significant measurable 1990-1999 period shift to lower emissions relative to "Business as Usual" forecasts;
- ✍ 16.5 million tCO<sub>2</sub>e in forecast additions to non-mobile source accounts Canada's national GHG inventory between 2000 and 2005, *after they take all actions listed in their VCR submissions.*

# Where Should Canadian Emitters Look for Partnerships?

## Canada's GHG Inventory in 2000, by Major Activity, GEMCo Forecast

**Estimated Total =  
719 mm tCO<sub>2</sub>e**



## **Before Considering Domestic Policy and Regulatory Risk, Who Should Major Emitters Prefer as Partners in Emission Reduction (ER) Development Projects?**

- ✍ First, in our customers' operations, particularly in the operations of customers who are energy price takers.**
- ✍ Second, in the operations of critical strategic suppliers.**
- ✍ Third, in markets in which we have existing sales.**
- ✍ Fourth, in markets we are targeting for new sales.**
- ✍ Fifth, in upwind markets (because reducing GHGs also tends to reduce criteria pollutants).**

# Agriculture: Sector Characterization

- ✍ Canadian agriculture is a significant emission generating sector that operates a significant, possibly cost-effectively “enhance-able” carbon sink
- ✍ Overall wealth creation in the sector relies heavily and increasingly on continued production of beef and pork.
- ✍ The sector is generally energy price-taking, so
- ✍ Canadian energy suppliers’ “carbon emissions problem” is disproportionately Canadian agriculture’s future operating cost problem.
- ✍ The Canadian ag sector manages large carbon sinks that are “enhance-able” through the adoption of best management and conservation practices.
- ✍ The relationship between the energy and food sectors is similar in many regions around the world, so carbon crediting sustainable ag techniques we develop in Canada should have export market value.
- ✍ Elsewhere, significant deforestation is driven by unsustainable ag practices, i.e. expertise in sustainable ag is central to most forest restoration/preservation strategies.

# Building Science into ER Contracts

- ✍ For any one project, if existing estimates of GHG absorption/emission reduction potential fall into a positive value range, relative to a starting baseline and over a project lifetime, it is likely possible to put together an ERC trade. This is true even if the uncertainty associated with estimates of the project's ER potential is very large.
- ✍ If the existing estimates of the GHG absorption/emission reductions associated with a project span zero, it can be harder to put together a trade even if the uncertainty associated with the estimates is relatively small.
- ✍ A Knowledgeable Buyer will likely accept some downside science and measurement risk, but an unknowledgeable Buyer can not do so.
- ✍ Forward agreements to purchase ERCs can and should always include language that recognizes the science will progress over the term of the agreement.

# **What Agricultural Practices are Recognized in the GEMCo “Iowa” ERC Purchase Agreement?**

## **Agricultural Land Use or Farm Practices Changes to...**

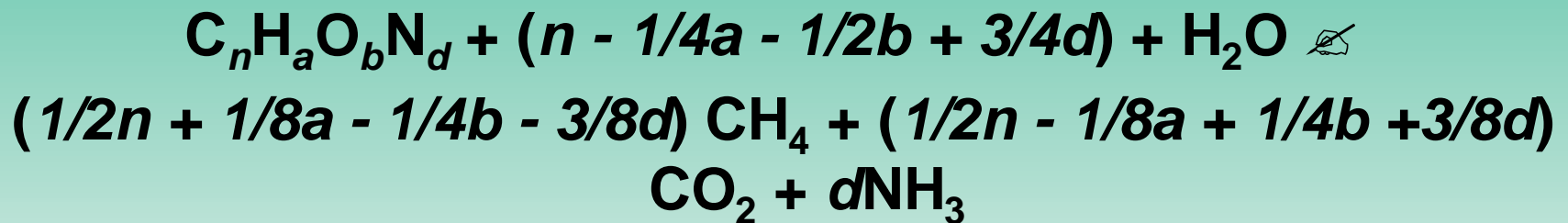
- 1.0 Soil Conservation, No Till, Low Till or Conservation Tillage Crop Management**
- 2.0 Grassland Preservation & Afforestation Management**
- 3.0 Land Conservation**
- 4.0 Buffer Strip**
- 5.0 Abatement of GHG Emissions in Animal Waste Storage and Handling Systems**
- 6.0 Ethanol Production**
- 7.0 Biomass Combustion and Other Methods of Creating Electricity on Farm**

# Building a Framework for the Development of an ERC Estimation Protocol: Agreeing on Key Estimating and Reporting Principals

<i>Excerpts from an Agreement...</i>	
<p><b>1.1 Soil carbon sequestration = xxx.x MTCO<sub>2</sub>E per acre per year, no distinction between beans and corn</b></p>	<p>To claim incremental soil carbon sequestered landowner/tenant farmer must maintain each acre in no till, low till or conservation tillage crop management for at least 6 continuous years, allowing one year forgiveness over the period, as set out in paragra...</p>
<p><b>1.2 Farm equipment fuel use = as demonstrated in fuel purchase and equipment records showing decline, on average, over six year period.</b></p>	<p>To claim GHG ERCs due to reduced farm equipment fuel use landowner/ tenant farmer must keep fuel consumption and equipment use records for two years before and for at least six years after the change in management practice is implemented. If records do n...</p>
<p><b>1.3 Nitrogen fertiliser use = as demonstrated in fertiliser consumption records showing decline, on average, over six year period.</b></p>	<p>To claim GHG ERCs due to reduced fertiliser use landowner/ tenant farmer must keep fertiliser and pesticide consumption records for two years before and at least six years after the change in management practice is implemented. First claim can be filed at...</p>

# Building the Detailed Protocol Governing ERC Transfers: the Animal Waste Example, Step 1

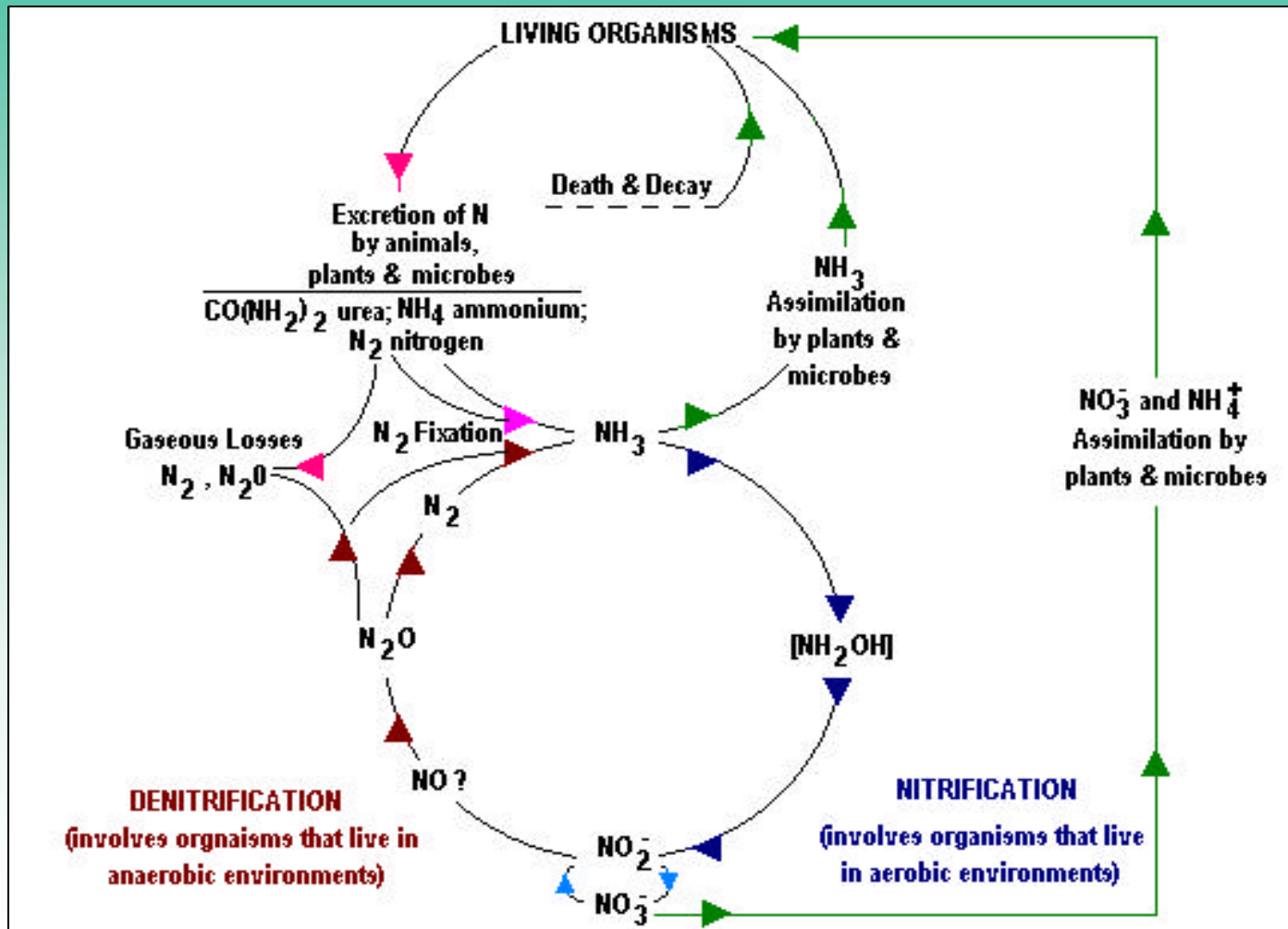
The production of carbon dioxide and ("CO<sub>2</sub>"), methane ("CH<sub>4</sub>") and nitrous oxide ("N<sub>2</sub>O") for organic material follows this general reaction formula:



For many naturally occurring compounds,  $a = 2b$  and  $d \ll 1/2 n$ , so that roughly equimolar amounts of carbon dioxide and methane are formed." But hog manure is over 90% water and more water is added to the holding facility over time. Generally, due to the high solubility of CO<sub>2</sub> in water, biogas evolving from the digestion of organic material in the liquid phase may contain large amounts of CH<sub>4</sub> and small amounts of CO<sub>2</sub>. Nitrous Oxide ("N<sub>2</sub>O") emissions are indirectly derived from ammonia ("NH<sub>3</sub>").

Generally, **all** GHG Emissions should be higher when animal waste is stored in anaerobic systems than aerobic systems.

# The Animal Waste Example, continued: Settling on a Common Understanding of the Nitrogen Cycle



# The Animal Waste Example: Developing Project-Specific GHG Emission & ER Estimates and Reconciling Them to the IPCC Guidelines

HOG MANURE	CH <sub>4</sub> Emissions <i>measure</i>	IPCC					Regional Data (NOT FINAL)					
		CH <sub>4</sub> EF = B <sub>(0)</sub> * VS * D * MCF	IPCC - Pit >1 mo &	IPCC - Pit >1 mo &	IPCC - Pit >1 mo &	IPCC - Pit >1 mo &	Type 3 - feeder to finish	Type 1 - feeder to finish	Type 4 - farrow to feeder	Type 3 - feeder to finish	Type 2 - farrow to finish	Type 3,4 - farrow to finish
		IPCC - Lagoon	IPCC- Pit <1 mo	IPCC - Pit >1 mo &	IPCC - Pit >1 mo &	Local data - Lagoon	Local data - Pit >1 mo, basin	Local data - Lagoon	Local data - Lagoon	Local data - Pit >1 mo, basin	Local data - Lagoon	Loc Pit
animal weight	IPCC default, farm data, kg/hu	82.00	82.00	82.00	82.00	68.04	68.04	??	??	??	??	??
B <sub>(0)</sub>	IPCC default, m(3)CH <sub>4</sub> /kg VS	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
VS	IPCC default, calculated back from NSTL sample data, kg/hu/day	0.50	0.50	0.50	0.50	0.46	0.46	1.30	0.46	0.77	0.77	0.77
D	days	365	365	365	365	120	120	120	120	120	120	120
MCF	temperate climate region, IPCC default, calculated back from NSTL sample data	90%	19%	35%	35%	94.8%	11.1%	77.0%	94.8%	30.3%	80.9%	80.9%
CH <sub>4</sub> EF =	IPCC calculated, calculated back from NSTL sample data, kgCH <sub>4</sub> /hu/yr	73.91	15.60	28.74	28.74	23.68	2.78	53.90	23.68	12.57	33.59	33.59
Lagoon to Pit/Basin	Default Emission Reduction ("ER") Factor = difference in kgCH <sub>4</sub> /hu/yr, IPCC default, GEMCo Protocol			58.31	58.31	kgCH <sub>4</sub> / hu/yr	20.90				kgCH <sub>4</sub> / hu/yr	
	Global Warming Potential of CH <sub>4</sub> =	21.00	kgCO <sub>2</sub> e/ hu/yr	948.54	948.54		438.99					

HOG MANURE		N <sub>2</sub> O Emissions <i>measure</i>	IPCC and Other References			Regional Data (NOT FINAL)							
			IPCC - Lagoon	IPCC - Pit <1 mo	IPCC - Pit >1 mo &	Type 3 - feeder to finish Local data - Lagoon	Type 1 - feeder to finish Local data - Pit >1 mo, basin	Type 4 - farrow to feeder Local data - Lagoon	Type 3 - feeder to finish Local data - Lagoon	Type 2 - farrow to finish Local data - Pit >1 mo, basin	Type 3,4 - farrow to finish Local data - Lagoon	Type 2 - farrow to finish Local data - Pit >1 mo, basin	
Direct N <sub>2</sub> O Emissions	N excreted kgN/hu/yr	IPCC default	20.0	20.0	20.0	16.6	16.6	46.5	16.6	27.6	28.98	27.6	
	N <sub>2</sub> O <sub>(d)</sub> /N <sub>(ex)</sub> IPCC default, ratio	IPCC default, ratio	0.2%	0.1%	0.1%	0.2%	0.1%	0.2%	0.2%	0.1%	0.2%	0.1%	
	Direct N <sub>2</sub> O kgN <sub>2</sub> O/hu/yr		0.040	0.020	0.020	0.033	0.017	0.093	0.033	0.028	0.058	0.028	
Indirect N <sub>2</sub> O Derived from NH <sub>3</sub> Emissions from Effluent in Storage	Calculated Max. N Remaining in Plant/Animal Cycle after Direct N <sub>2</sub> O Losses		19.93	19.97	19.97	16.54	16.57	46.34	16.54	27.53	28.88	27.53	
Indirect N <sub>2</sub> O from Losses in Effluent Disposition For purposes of comparison	D				days	120	120	120	120	120	120	120	
	NH <sub>3</sub> from facility				NSTL data, kgNH <sub>3</sub> /hu/yr	11.83	5.35	23.95	11.83	14.52	14.92	14.52	
	N/NH <sub>3</sub> emitted				kgN/kgNH <sub>3</sub>	9.73	4.40	19.69	9.72	11.93	12.27	11.93	
	N <sub>2</sub> O evolved from NH <sub>3</sub> emitted from storage				IPCC range 10% - 80% for all types of livestock, all storage options: Sprent, Janet "at least 40%"; GEMCo Protocol, 30%	30%	30%	30%	30%	30%	30%	30%	
	Calculated Indirect N <sub>2</sub> O from Storage Emissions				kgN <sub>2</sub> O/hu/yr	2.92	1.32	5.91	2.92	3.58	3.68	3.58	
	Calculated Max. N Remaining in Plant/Animal Cycle after NH <sub>3</sub> Emissions from Storage				kgN/hu/yr	6.81	12.17	26.66	6.82	15.60	16.61	15.60	
	Most Conservative Estimate of N Remaining in Effluent at Time of Transfer to Land				data from Iowa Environmental Protection, Ch. 65, Table 3, kgN/hu/yr Note: Iowa EPD CH 65 estimates 13.65 kgN/hu in manure solids when those solids are removed from storage.	2.72	8.16				2.00	6.80	
	Method of Transferring Effluent to Land				Farm data, actual methods	irrigation	injection	irrigation	injection	injection	blended factor	injection	
	% of N in Transferred Effluent Evolved to N <sub>2</sub> O				Govt. of Manitoba Guidelines, % , IPCC range 10% - 80% for all types of livestock, all storage options: IPCC default for all effluent = 20%	25.0%	2.0%	25.0%	2.0%	2.0%	15.6%	2.0%	
	Calculated N <sub>2</sub> O runoff from Land Application of Effluent				kgN <sub>2</sub> O/hu/yr	1.04	0.15	4.06	0.08	0.19	1.58	0.19	
Calculated Max N. Remaining in Plant/Animal Cycle				kgN/hu/yr	5.77	12.02				15.04	15.41		
N <sub>2</sub> O Emissions, over Full Storage and Disposal Cycle				kgN <sub>2</sub> O/hu/yr	3.99	1.48	10.06	3.03	3.80	5.31	3.80		
Emission Reductions ("ERs") = calculated difference between practices						difference - kgN <sub>2</sub> O/hu/yr		2.50			difference - kgN <sub>2</sub> O/hu/yr		1.52
GWP =						310.00		kgCO <sub>2</sub> e/ hu/yr			776.25		470.45

# The Animal Waste Example: Setting Default Emission Factors to Govern a Contract or a Single Transfer of ERCs

Manure Storage - Default Emission Factors (NOT FINAL)

Facility/Operating Practice Type: assumes effluent broadcast on cropland incorporates within 3 days, not immediately	CH4 Emission Estimates	NH3 Emission Estimates	Direct & Indirect N2O Emission Estimates	CO2e Emission Estimates
	<i>grams per hoo unit (hu) per veaar</i>			
Farrow to Finish, Anearobic Baseline Storage Practice (Lagoon)	33,593	14,925	5,315	2,353,021
Farrow to Finish, Aerobic Alternative Storage Options (Deep Pit, Earthen Basin, Concrete-lined Basin)	12,569	14,516	3,797	1,441,070
Feeder to Finish, Anearobic Baseline Storage Practice (Lagoon)	23,683	11,829	3,989	1,733,868
Feeder to Finish, Aerobic Alternative Storage Options (Deep Pit, Earthen Basin, Concrete-lined Basin)	2,779	5,353	1,485	518,628
Global Warming Potential (to convert other GHGs to CO2-equivalent volumes)	21	0	310	

**...we know this set of numbers is not right...more work needed!!!!**

Manure Storage - Default Emission Reduction Estimates

Facility/Operating Practice Type: assumes effluent broadcast on cropland incorporates within 3 days, not immediately	Uncertainty-adjusted CH4 Emission Reductions	Uncertainty-adjusted NH3 Emission Reductions	Uncertainty-adjusted N2O Emission Reductions	Uncertainty-adjusted CO2e Emission Reductions
	<i>grams per hoo unit (hu) per veaar</i>			
<b>Farrow to Finish</b>	21,024	409	1,518	911,951
<b>Feeder to Finish</b>	20,904	6,476	2,504	1,215,240
Global Warming Potential	21		310	



# Residual Asset Value Will Be the Key Determinant of the Long Term Average Price North Americans Will Pay for CO<sub>2</sub> Emission Reduction Credits

Microsoft Excel - Cda General Risk Calculation, after tax.xls

File Edit View Insert Format Tools Data Window Help

100%

Arial Narrow 8 B I U

J23 =IF(J14>0,\$F\$4/J22,0)

	A	B	C	D	E	F	G	H	I	J
23	<b>NPV of const of control</b>	\$8.22								
24										
25										
26	<b>Table C.1 - Company, Competitor, Customer &amp; Supplier Share Values per Tonne Emitted</b>									
27		current yr	current yr	current yr	current yr	Entity Market				
28	1997	Earnings	Price/	in MTCO2	Market Value	Value/MTCO2E				
29			Earnings	Annual	of Entity(ies)	over 1 year	10 years	20 years		
30	(all in million unless otherwise indicated)	\$	\$		\$					
31										
32	<b>Small Rural Canadian Utility</b>	\$89.53	11.7	9.50	1,051.55	110.69	11.07	5.53		
33	<b>Largest US Utility</b>	\$190.00	17.2	130.17	3,275.33	25.16	2.52	1.26		
34	<b>Other Competing Utilities Average</b>	200.00	18.0	30.00	3,600.00	120.00	12.00	6.00		
35	<b>Largest US Coal Producer</b>	210.00	11.0	21.11	2,310.00	109.43	10.94	5.47		
36	Sample: Oil Producer & RPP Refiner	170.00	24.0	6.50	4,080.00	627.69	62.77	31.38		
37	Sample: Automobile Manufacturer	539.83	12.0	3.50	6,478.01	1,850.86	185.09	92.54		
38	Sample: Nat Gas Processor, Transmitter & Distributor	600.00	20.0	5.00	12,000.00	2,400.00	240.00	120.00		
39	Sample: Energy Control Technology Manufacturer	20.00	22.0	0.50	440.00	880.00	88.00	44.00		
40										
41	<b>Direct Emissions by Source</b>	<b>689.53</b>	<b>18.9</b>	<b>206.26</b>	<b>33,234.88</b>	<b>6,123.83</b>	<b>612.38</b>	<b>306.19</b>		
42	(4) it is recommended that you complete the corporate valuation/MTCO2E emitted for your firm, critical strategic suppliers & customers.									
43										

Residual Value of majority of NAFTA GHG emission sources.

Draw AutoShapes

Ready

Start Microsoft Excel - Cda... Microsoft PowerPoint - [GL... 4:00 AM



# **Epilogue: What Would Canada' Kyoto Target Mean if We Had to Achieve it, without the use of Canadian Carbon Sinks?**

**Actual Canadian GHGs for the year 2000 will total roughly 700 million tonnes, in CO<sub>2</sub> equivalents. Assuming, for illustrative purposes (this is not a recommendation!!!!!!), there is NO CREDIT for ERs achieved prior to 2000. Achieving the Kyoto commitment would require measures equivalent to the following:**

- ✍ mandating that all new (post-2000) demand for energy must be supplied by new 0-emission generation capacity and/or international "AAU"/QUOTA purchases, PLUS**
- ✍ retiring ALL existing utility-source fossil-fueled electricity generation and replacing it with industrial-source natural gas CCGT or equivalent, PLUS**
- ✍ capping manufacturing sector emissions at 12% below 1991 levels, PLUS**
- ✍ retiring 12.5% of or converting 25% of existing passenger vehicle stock fuel systems to utilize CNG technology, PLUS**
- ✍ retiring 50% of or converting 100% of the existing stock of SUVs to CNG, PLUS**

# What Does Canada' Kyoto Target Mean if We Had to Achieve from Canadian Sources, without Sinks? (cont.)

- ✍ **banning all use of fossil fuel-burning lawnmowers, PLUS**
- ✍ **mandating 40% of long haul commercial freight off highway and back to rail, PLUS**
- ✍ **incorporating ethanol in fuel supply for 100% of equipment used on farm, PLUS**
- ✍ **mandating 100% of pipeline compressors be converted to electric drive, PLUS**
- ✍ **retrofitting all existing residential and commercial buildings and successfully achieving an overall 20% reduction in energy use, PLUS**
- ✍ **capping emissions from oil & gas production at 12% below 1991 levels, PLUS**
- ✍ **capping emissions from existing industrial processes at 12% below 1991 levels, PLUS**
- ✍ **reducing Canadian beef and pork production by 50% from current levels, PLUS**
- ✍ **combusting (flaring or utilizing to generate heat or electricity) CH<sub>4</sub> emission from 50% of medium-sized and large landfills.**

# What Adjustments Does Including Ag and Forestry Sinks Permit?

- ✍ capping manufacturing emissions at 1997 levels instead of 12% below 1991 levels, PLUS
- ✍ capping emissions from oil & gas production at 1997 levels instead of 12% below 1991 levels, PLUS
- ✍ capping emissions from existing industrial processes at 1997 levels instead of 12% below 1991 levels, PLUS
- ✍ maintaining 1997 levels of Canadian beef and pork production instead of reducing production by 50%, PLUS
- ✍ setting aside a credit for early action budget of 30 mm tCO<sub>2</sub>e/yr, or 150 mm tCO<sub>2</sub>e for the KBP, instead of withholding credit for all reductions achieved prior to 2008, PLUS
- ✍ setting aside a budget for new emission sources of 30 mm tCO<sub>2</sub>e/yr, or 165 mm tCO<sub>2</sub>e for the KBP, instead of requiring 100% offsetting of all new sources.

# What Else Can be Concluded from This Example?

- ✍ At a marginal cost of \$10US tCO<sub>2</sub>e, the assumption that all Canadian energy demand growth will be offset by green energy & international QUOTA purchases translates into a cumulative Canadian expenditure of \$8 to \$8.5 billion between 2000 and 2012, roughly equal to a doubling of the current Canadian domestic price of electricity generation or to taxing domestic consumption of oil at the incremental rate of \$4US/bbl.
- ✍ A Canadian National Implementation Strategy that relies primarily on changing domestic consumer choice and “green power” promotions is very unlikely to result in compliance with Canada’s Kyoto commitment, even if successfully complemented by offsetting international transfers of “AAUs”, or QUOTA, to Canada’s balance sheet.
- ✍ A protest that recognition of sink enhancing activities in Canada’s nation progress reports “gets the monkey off the energy industry’s back” is false and points to lack of stakeholder familiarity with our national inventory.

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