

**Alberta Offset System Quantification Protocol**  
**2<sup>ND</sup> Round Stakeholder Review**  
**October 29-30, 2009**  
**Edmonton, Alberta**  
**Day 1: 8:00 – 4:00 PM**

AGENDA: Thursday, October 29, 2009	
8:00 am to 8:30 am	Welcome & Continental Breakfast
8:30 am to 9:30 am	Agenda Overview and Overview of Protocol Development Process <b>Climate Change Central</b>
9:30 am to 10:30 am	<b>SOLUTION GAS CONSERVATION</b> - Review of Draft Alberta Protocol <b>Protocol Developer - ICF</b>
10:30 am to 11:00 am	REFRESHMENT BREAK
11:00 am to 12:00 am	<b>REDUCTION OF METHANE EMISSIONS FROM OIL AND GAS PROTOCOL</b> - Review of Draft Alberta Protocol <b>Protocol Developer – BlueSource</b>
12:00 pm to 1:00 pm	LUNCH BREAK
1:00 pm to 2:00 pm	<b>PUMP SYSTEM CONVERSION EMISSION REDUCTION PROTOCOL</b> - Review of Draft Alberta Protocol <b>Protocol Developer – Encana</b>
2:00 pm to 3:00 pm	<b>CARBON CAPTURE AND STORAGE EMISSION REDUCTION PROTOCOL</b> - Review of Draft Alberta Protocol <b>Protocol Developer – BlueSource</b>
3:00 pm to 3:15 pm	REFRESHMENT BREAK
3:15 pm to 4:15 pm	<b>MECHANICAL PULP SLUDGE UTILIZATION – AGRICULTURE APPLICATION</b> - Review of Draft Alberta Protocol <b>Protocol Developer – Alberta Research Council</b>
4:15 pm to 4:30 pm	Day Wrap-up; Questions; Closing Comments <b>Climate Change Central</b>

## **Day 1 – Thursday October 29, 2009 – Discussion**

### **8:30 am to 9:30 am**

Agenda Overview and Overview of Protocol Development Process

### **Climate Change Central; Alberta Environment**

**-See PowerPoint Presentation**

#### **Climate Change Central Presentation Discussion:**

1. Overview of ISO 14064-2 principles (relevance, completeness, consistency, accuracy and conservativeness and transparency)
2. Overview of Standards based consensus building exercise.
  - a. ISO 14064-2
  - b. AB Offsets Rules
  - c. Alberta Protocol Application
  - d. Project Plans
3. Overview of Steps of Protocol Development
  - a. Steps before the review process (traditional)
    - i. Phase I – Scoping and compilation of available science
    - ii. Phase 2 – Science Discussion Document
    - iii. Phase 3 – Science Coordination
    - iv. Phase 4 – Protocol Standardization into template
4. Principles that Guide the Review (1<sup>st</sup>, 2<sup>nd</sup> and Public)
  - a. Environmental Integrity
  - b. Usability
  - c. Adapting from others
  - d. Streamlined Life Cycle

#### **Alberta Environment Presentation Discussion:**

1. Coordinator for offset program for AE. One of three roles – Rob H. works with tech reviews and M.S. and J.S.B work as well. Report to B.S. and A.R. Now the Climate change secretariat. A.R. is Director.
2. Overview of Policy Context – AB is 40% of Canada's emissions. We are FF based and extract resources by the nature of our economy. We have a responsibility to manage our emissions. 90% Thermal electricity (coal and NG). Industry is a major emission sources and therefore we regulated. 100 regulated facilities account for 50% of provincial emissions. AB has ideal geology and large scale carbon sequestration is a major component of addressing CC. New technology is considered to be an important part of addressing CC. Market instruments (i.e. offsets program) are a way to engage sectors outside the regulated facilities (i.e. small sectors, agriculture, etc.)
3. Overview of 07 & 08 compliance years:
  - a. 43 million paid to CCEMC in 07
  - b. 82 in 08
  - c. 1 million tonnes or 25% of true up in 07
  - d. 2.7 million in 08
  - e. 07 – 6 facilities, 4 protocol types – 7 projects

- f. 08 – 25 facilities, 29 projects covering 10 protocol areas
- g. 24 approved protocols – 4 more are in the process of being posted (today or tomorrow)
  - i. Bitumen Binder
  - ii. Engine Fuel Management
  - iii. Instrument gas to Instrument air conversion
  - iv. Nitrous Oxide Abatement
- 4. Other protocols still under review:
  - a. Dairy – need more clarification of industry activity and baseline uptake
  - b. Flyash Use – needs to understand industry uptake and current adoption
  - c. EE in Commercial Buildings – some concerns during review. To Dept. of Infrastructures for comments. Need to expand to include building management practices. AENV will host a stakeholder session to review revised protocol. Estimated date of release early 2010.
  - d. EE Small and Large Scale – no decisions at this time – no time spent yet
  - e. Biofuel Expansion – on to do list. Want to look at how it fits with treatment of AENV's expansion treatment for regulated facilities
  - f. Afforestation protocol – being revised to correct errors
- 5. Learning's to Date – substantial interest in the offset market including market participants and other jurisdictions
  - a. Credibility of offset system was a major issue flagged by the AG. System needs to hold up to scrutiny from other jurisdictions.
  - b. Protocols need to be high quality, based on science. AENV is getting inundated with protocol ideas. Need to be well thought through. If it is not a regulated gas, it doesn't qualify. Must meet minimum requirement of SGER. Need to ensure the review process is well balanced.
- 6. AENV Role – want to engage early in the process. Try to review the science information and ask policy questions upfront. Protocols are subject to minor changes until they are approved. Strongly discourage making business decisions based on DRAFT.
- 7. When we review protocols look at
  - a. Eligibility against SGER
  - b. Additional
  - c. Suitability and defensibility of baseline
  - d. Balanced review process
  - e. Ability to support higher level of assurance. AG wants to move to higher level in the next couple years. Make sure that monitoring proposed in protocols is able to support reasonable level of assurance
- 8. Timing – moving to annual protocol intake in fall. Allow sufficient time to review proposed protocols and staggers protocol development compared to compliance review. Provides a fixed time for planning purposes. Barring unforeseen issues should be usable next year.

**\*\*Proposed Timing for Protocols: Protocols approved after Nov 30, will not be eligible for the following compliance cycle. Mid to late Nov, Environment will finalized revisions on guidance documents for Project/Protocol Developers and Verifiers. Will hold 2 workshops - Nov 16<sup>th</sup> in Edmonton and Nov 23<sup>rd</sup> in Calgary for Regulated Facilities and the SGER regulation focused on speaking to Large**

**Industry. Workshop on Dec 8<sup>th</sup> will focus on the Alberta Offset System and speak to the revised offset guidance and changes to submitting projects/protocols. \*\*Registration is required for these workshops, contact Alberta Environment for more information.**

**Question – Fall intake of protocols, no usability after Nov 30. If you get a protocol in for a September deadline, there are no guarantees it will approve by 30<sup>th</sup> timing is unlikely. Does this mean a year and a half timeframe for protocols to be approved and ready for commercialization?** Problematic on a business investment perspective.

- a. Response - Trying to avoid April 1<sup>st</sup> deadline because of compliance period. Still need to do 30 day public process. Maybe if a really clean protocol, it could get done but need to ensure that internal review processes are met.

**Drafts in November – when do those take effect for compliance. I.e. tonnes being verified now**

- i. Won't apply to this year. If they get out Dec 15<sup>th</sup>. If the verification date is prior and serialized and up on registered, it will be good. But these will be on a go forward.

**SOLUTION GAS CONSERVATION** - Review of Draft Alberta Protocol (See full presentation)  
**Protocol Developer - ICF**  
Chris Cannors – ICF

\*\*NO SUSTAINED OBJECTION RECORDED

Initiating entities include work with Husky and CNRL

1. Project Overview
  - a. CNRL and Husky
  - b. References from CDM, AENV, CASA
  - c. Technical review Mar 09
  - d. Minor changes to draft include typos, flex mechanism and change to quantification
2. Project Type
  - a. Part of Oil and Bitumen gas industry
  - b. Released from solution during extraction and contains mostly methane
  - c. AKA associated 'Bit gas'
  - d. Directive 60 requires certain wells to conserve that gas. Take that gas and transport to pipeline for use in homes, etc. Test for this is economic test. Is it economic depends on amount/volume, distance to NG pipeline, etc. Gas to Oil ratio determines what volume of solution gas is coming out of a site. Directive 60 changes periodically.
  - e. Often it is not economic – therefore not economic. Then this protocol applies. Baseline is considered to be the venting of gas and the project is the conservation of that gas and the injection into a NG pipeline.
  - f. Solution gas projects won't typically go beyond 8 years.
3. Applicability
  - a. Must be vented prior to project
  - b. Not required with Dir. 60 or other
  - c. Based on measurement
  - d. Meet all ABOS requirements – Eligibility Criteria
4. Quantification
  - a. Baseline Condition
    - i. Represents the operation of the facility without the project – direct venting of solution gas to atmosphere. Baseline is calculated using measurement under the project condition. Do the project, measure and apply to baseline. Baseline is calculated based on actual measurement.
  - b. Project Condition
    - i. Represents the operation of the facility once solution gas conservation has begun. Quantifies emissions from the use of conserved solution gas and other fossil fuels.
    - ii. Monitoring consists of volume of gas conserved, volume of gas used and concentrations of gas.
5. Flexibility Mechanisms
  - a. Allow for displacement of FF on the equivalent energy basis (natural gas or other fossil fuels)

- b. Credits may be claimed for gas flared instead of vented under the baseline condition with appropriate modifications. When Dir 60 doesn't apply, sometimes others do that require flaring. This can be accommodated with modifications.
  - c. Aggregation of projects
  - d. Quantification methodology contained may be simplified by including only SS P8 and SSB4 where it is conservative to do so. This allows for simple and conservative quantification.
6. Quantification Methodology
- a. Review of Equations
    - i. Emissions Reductions
    - ii. Emissions Baseline
      - 1. Baseline does not apply B5 Fuel Extraction/Processing to Solution Gas
    - iii. Emissions Project
      - 1. Suggested change to quantification procedure: removal of P1 Oil and Bitumen Extraction and P2 Oil & Bitumen Storage. It is conservative not to include these.
      - 2. Includes emissions from the use of any other fossil fuels; does not apply P9 Fuel Extraction/Processing to solution gas.
7. Review of Example Calculation
- a. Baseline: Solution gas is consumed to extract and store oil & bitumen and the balance of solution gas is vented.
  - b. Project: Solution gas is consumed to extract and store the Oil and bitumen, the remaining gas is used to operate a compressor and inject the gas into a natural gas pipeline.
8. Note that we want to look at the volumes of gas from the compressor and volume put into pipeline – not the volume extracted. **This is different from protocol.**
9. Chris Cannors  
Senior Associate  
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#	SOLUTION GAS CONSERVATION DRAFT PROTOCOL
1	<p><b>Volume going into pipeline multiplied by factors; would you look at the volume going out (account for leakages)?</b> When you put solution gas into pipeline, you need to transport and during that transport, there will be transmission losses. We can include this. Look at other protocols and how they dealt with this issue. Could follow that path. Need to quantify and determine approach for accounting.</p> <p>This is a point that we may need to make an adjustment relative to the path. One of the things that the Auditor General is really concerned about is missed emission sources. The 5% materiality is not an opportunity to omit emissions. Always need to quantify, even if set aside. Need to account and might result in a discount factor. Should be indicated in the protocol</p>
2	<p>Another missed emission source could be emissions from the compressors? <b>Is there a way to estimate them and include in project quantification?</b></p> <p>Absolutely, in the event that we include the emissions from compressors, then we need to account for those under project condition as well. Increase our Baseline emissions but also need to include in Project emissions. If we want to make it more simple, remove compressor and don't need to account for emissions occurring as a result of compressor. If there metering works out, including the compressor will result in more emissions credits.</p>
3	<p><b>Are there any specific emissions factors (EF) for the compressor? Specifications?</b></p> <p>Uncertain, assumption here is solution gas will generate CO2e independent of the equipment type. Still will generate same amount of CO2. The protocol uses a standard set of EF associated with Natural Gas. **Require reference to EF tables in protocol.</p> <p><b>How as accurate is that?</b></p> <p>Look at total carbon content of the fuel and convert to Co2.  How do you deal with Nitrous Oxide and Methane?  Can use manufacture specific EF for CH4 and N2O? Typically very small and &lt;1% of CO2e.</p> <p>There needs to be an attempt. Don't know how to handle these small emissions sources, but AENV will be examining in closer. Need to review the EF from Environment Canada as clarify the intent and how these factors were determined.</p> <p>Need to ensure consistency.</p> <p>Review work in other protocols (eg. Engine Fuel Management – may contact protocol developer for more information).</p>
4	<p><b>Was ERCB consulted about this offset protocol?</b></p>

	<p>They are aware of this. It's been reviewed around at CASA working groups also. Alberta Environment has reviewed with ERCB to discuss. No major concerns at this point.</p>
5	<p><b>Methane that comes off with Solution Gas – is it pipeline quality?</b></p> <p>Not always pipeline quality. That is what processing SSR is in there for. Processing will be captured.</p>
6	<p><b>Protocol doesn't speak to flaring, under Dir 60, you need to flare. If your baseline is flaring, than you can get credits from there.</b></p> <p>Part of the issue is if you are venting there isn't always sufficient fuel and you need to sometimes bring in other fuel sources to maintain flare. If you need to bring in extra fuel it will be accounted for.</p> <p>If your baseline is flaring maybe you shouldn't get credit for flaring **Add a Flexibility Mechanism for flaring in the baseline condition and then project to conserve</p>
7	<p><b>Does this cover project condition if you are using solution gas for power generation?</b></p> <p>Yes – in a flexibility mechanism</p>
8	<p><b>Would this mechanism also cover displacing diesel fired power generation with solution gas?</b></p> <p>Yes it would - likely have to use two flex mechanisms but Protocol should cover  Concern over baseline as flaring. If you conserve the flared base and capture.  Misunderstanding that credits were generated for flaring. **Need to ensure the protocol is clear.</p> <p>**Didn't read electrical generation in flexibility mechanism. Some protocols allow both. If it is allowed, should spell it out. Existing examples can be drawn from.</p> <p>For Directive 60, you determine directive requirements through the Gas to Oil ratios.</p> <p>**Consider the addition of a Flexibility Mechanism to exclude P1/P2 due to equivalence in the baseline to project condition if displacement of fossil fuel/natural gas.</p>

9	<p><b>2002 Project Start Dates – Activities meet additionality requirements?</b></p> <p>You can claim credits retroactively based on the current Directive 60 at that time. I.e. if you start a project in 2003, you use the Dir. 60 in 2003 (even if it has become more lax over time).</p> <p>AENV is still uncertain how they will handle new regulations/directives that come into place during a projects lifetime. One of the times that is proposed to changed guidance documents is that project must start after 2002 but you will only be able to go back 8 years. I.e. if you start a project in 2011, you can only go back to 2003.</p>
10	<p><b>If this is only applying to unregulated facilities, what is the potential size of reductions? If it is not economic under the Directive 60, is it the value of the credit that makes it economic?</b></p> <p>Potential is estimated at around 4 MT including flaring and venting (annually). Significant but not huge. Yes, it is the value of the credits that makes it economical to undertake the project.</p>
11	<p><b>Context around Emission factor use of put into pipeline?</b></p> <p>EC is the source of emission factor. The intent of the emission factor is the combustion of Solution Gas in a pipeline. **Will ensure this is the case. Will include reference as to source.</p>
12	<p><b>How do you measure the concentration of Methane?</b> Annual measurement.</p>
13	<p>Process going forward, changes will be made and document will be posted. Are people comfortable with No sustained objection based on the suggested changes today? <b>No Sustained Objection.</b></p>

**REDUCTION OF METHANE EMISSIONS FROM OIL AND GAS PROTOCOL** - Review of Draft Alberta Protocol (See full presentation)  
**Protocol Developer – BlueSource Canada**  
Presenter: Kelly Campbell

\*\*NO SUSTAINED OBJECTION RECORDED

1. Process
  - a. Work with Keyera, Husky, EnCana, Shell, Nexen & TransCanada
  - b. Tech Review Session in February 09 – mostly monitoring and Baseline concerns. This led to additional work and back and forth consultations with AENV.
  - c. Collaborative Members developed a TSD in Oct 2008 outlining a number of quantification approaches, case studies and methodologies.
  - d. Also reviewed at CDM ACM0023
  - e. Scope – reduction of fugitive methane emissions from venting and other Fug. Emissions in O&G. Includes both planned (venting) and unplanned (equipment. Leaks). Both are difficult to quantify and sometimes difficult to locate... There are often a small number of large sources in a number of locations that may be difficult to quantify.
2. Protocol Requirements
  - i. Direct measurement
  - ii. Complete site coverage
  - iii. Virtually continuous monitoring – required because emission sources may be intermittent
  - iv. PTAC 07 study of emerging technologies and existing tech to quantify fug. Emissions. Appendix of protocol lists these.
3. Scope and Applicability
  - i. Use of monitoring meth (Appendix A) that fits all the req.
  - ii. To ensure functional equiv. must be no re-permitting because fug. Emissions are not based on thru-put.
  - iii. Must quantify large unplanned leaks before and after repair
  - iv. No Double Counting under other applicable protocols (i.e. EFM, and vent gas capture)
  - v. Provide a complete list of changes/actions taken to the verifier.
  - vi. Must re-evaluate baseline to account for BAU activities
  - vii. Additional to AB regulations, ARCB Dir 60. -> Improvement factor. For projects implemented in 2002 – 2009 the improvement factor is not applied. Projects after this point will apply the factor. Not a simple task. Recognize that the value is important.
4. Project Condition
  - a. Facilities methane emissions during operation of the facility following project implementation
  - b. Project activities to reduce methane emissions may include:
    - i. Reduced venting
    - ii. Detection and repair of fug. Emi
    - iii. Facility consolidated report

5. Baseline
  - a. Facilities emissions and operating conditions prior to project. Needs to be reevaluated following material changes that would have occurred under BAU. Very difficult to determine. Additional work was required at the behest of AENV and C3. Variability can be very large from both predictable and unpredictable sources. Partial monitoring period wouldn't capture such emissions. Came up with Industry Performance Approach as the most accurate approach to BL. Justification is based on historical data (variability), partial monitoring (seasonal variability, gaming opportunities) and calculated by referencing published best practice guidance from CAPP.
  - b. Two approaches to calculating an industry standard are identified in TSD
    - i. Short form method based on throughput. Fug. Emissions are not necessarily based on throughput – may overestimate or underestimate Fug. Emissions.
    - ii. Generic fitting Count (GFC) based on actual equipment/processes at a given. GFC method is selected in the protocol due to increased accuracy.
    - iii. There is also a detailed fitting count method however according to the group it is highly variable and wouldn't necessarily increase the accuracy of the approach.
6. Protocol Flexibility
  - a. Facilities that do not sell methane as end project, they need to assume that all methane is flared. While it may not be true, it provides a conservative accounting approach. Flex Mech. can be allowed for companies that do not sell methane as end product
  - b. May propose a monitoring plan that does not provide complete site coverage (limited number of processes/equipment).
  - c. May propose a measurement and monitoring frequency that is not virtually continuous (limited number of processes/equipment)
7. ABOS Fit
  - a. Summary of fit with rules (see presentation slide 13)
8. Barriers to implementing project
  - a. Costs associated with implementing a higher level monitoring (could be >\$200K per year)
  - b. Use of emerging and innovative tech (i.e. AIRDAR, LIDAR)
  - c. Accurate quantification of methane emissions (Labour/resource Intensive)
  - d. Achieving certainty of the reductions achieved (related to the characteristics of the fug. Emissions (i.e. locations, sizes, variability and frequencies generally unknown)
9. Review of Existing Projects (i.e. Keyera Energy Project) – see slides 16 & 17 & 18

Kelly Campbell  
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#	<b>REDUCTION OF METHANE EMISSIONS FROM OIL AND GAS PROTOCOL</b>
1	<p><b>Can you fully explain the definition of virtually continuous?</b> Monitoring with equipment at all times with intermittent measurements. Is it defined? A number is not defined (i.e. X readings per min).</p> <p>Makes sense, will clarify.</p>
2	<p><b>Where are the factors used from?</b></p> <p>Factors for use in example are based on CAPP using GFC method. May be based on limited number of observations - uncertain basis of CAPP factors. CAPP factors are published factors based on review of facilities.</p>
3	<p><b>With all the project data, is there a way to feed back continuously generated data to come up with new improved baseline? Over time can observed emissions be used to develop refined emission factors in the future?</b></p> <p>Good point, emissions from the project will be better than without project. When better data becomes available, it might be a valid approach. One reason why AENV was consulted prior to finalizing protocol approaches as presented today.</p>
4	<p><b>Are you thinking that the improvement factor is calculated on facility by facility basis?</b></p> <p>Thought was at an industry comparison level. Best data we have is industry based – not a lot of hard data.</p> <p><b>Will it be built into the improvement factor that it would be improved over time?</b></p> <p>Similar to the GIF, need to assign the appropriate value and change as necessary (update the protocol over time).</p> <p>**Improvement factor still needs to be worked on. Partially due to lack of time but this is an issue that is almost outside of the protocol. Might be a guidance document/companion document. FYI – GIF is reassessed every 3 years. Also why we have the 5 year protocol review to determine if the assumptions in the protocol are appropriate. Will require extra work to propose options on how to apply.</p>
5	<p><b>In using the GFC Method proposed – how does this ensure conservativeness. Could easily overstate baseline emissions.</b></p> <p>Given the nature of facilities, we could certainly over- and/or under-estimate.</p> <p>Due to complexity and human differences, could have differences between direct approaches. Also there are issues with being more difficult to</p>

	<p>verify. Consensus of the technical working group was it wouldn't improve accuracy.</p>
6	<p><b>Re: ex-post adjustments – if we apply improvement factor, and you discover that improvement factor is not what you thought it was, how does that work back to ex-post adjustment. Is it sticky going forward?</b></p> <p>Generally only go forward basis. How it would apply to specific projects is uncertain. There will be no retroactive downgrading of offsets as improvement factor changes.</p> <p><b>Does this mean that we should have a more frequent review?</b></p> <p>GIF is 3 years. If you allow offsets to be had where a more proper baseline is developed later on and you realize that offsets weren't there, there is a problem. To avoid this, there might be a need to have more frequent review and minimize the risk.</p> <p>Baselines can be static or dynamic. This case is static – gives project developers some certainty (for 8 years project crediting period). Assumptions hold for the project not the protocol. A number of other protocols have a similar approach. Need the balance of stability for investment and certainty for investment.</p> <p>The issue was figuring out what appropriate Baseline condition was applied to the protocol being most conservative with current knowledge. A lot of discussions were involved. The protocol five year review periods are to review and see if assumptions still hold. If something is brought to AENV attention before that we can re-open and make modifications to protocols that will apply immediately. Other protocols have already seen these types of modification and updates.</p>
7	<p>For the Flexibility Mechanisms - In certain circumstances it may be possibly to circumvent requirements. There may be some inherent risk to this given that AENV doesn't pre-validate projects. <b>Do you have set out criteria to determine criteria where it is allowed?</b></p> <p>Understand why criteria is desired, but not developed as of yet. Can be explored. Still struggling with "material differences". Flex. Mech. Have always been added burdens on Project Developer for additional justification and documentation that can be independently verified for use.</p> <p>**Concern that the protocol outlines required 3 criteria but the Flex. Mech. Contradicts them.  **Address Flexibility Mechanism 3 – it too broad as written right now – provide more clarity</p>
8	<p><b>A company that is a Specified Gas Emitter and have a facility that is under the cap, how could you use it with site specific factors?</b></p>

Good question. If you are at a regulated facility you do not qualify for Offset Projects. If you are a regulated facility, you can use these methodologies to reduce your own emissions. This will reduce your cost of compliance and could generate Emission Performance Credits.

**What if one facility reports and one facility does not report?** Is there a flex mech. for site specific emission factors.

\*\*Makes sense that it would be an option. Can include a Flex. Mechanism that reflects this. Risk of gaming by choosing site specific vs. GFC. Will need to consider criteria.

**PUMP SYSTEM CONVERSION EMISSION REDUCTION PROTOCOL** - Review of Draft Alberta Protocol (See full presentation)  
**Protocol Developer – EnCana**  
**Omar Hurtado, EnCana**

\*\*NO SUSTAINED OBJECTION RECORDED

1. Project Type
  - a. Pump systems are commonly used in oil and gas industry to displace fluids
  - b. Protocol to encourage the installation, update or retrofit of pump and or power source of pumps.
  - c. Protocol is used to quantify emissions from GHG reductions.
2. Process Overview
  - a. Develop Seed Materials
    - i. Reviewed CDM, UA EPA, ISO 14064-2 and industry experts.
    - ii. Developed TPP and TSD.
    - iii. Expert technical Review – Mar 3, 2009 internal and external reviewers (10) including industry, government, academia
    - iv. No sustained objection, revisions made and resent Mar 13, 2009.
3. Protocol Applicability.
  - a. Project Developer must supply sufficient evidence to demonstrate
    - i. Same liquid and level of service (functional equivalences)
    - ii. Includes end of life replacements – not facilities originally constructed to use low/no GHG intensive pump systems. See table in Protocol.
    - iii. ABOS Req.
4. Project Condition identified as the use of low/no GHG intensive pump systems at facility. PDF (Pump Displacement Factor) from manufacturer's technical specifications. This requires the PD to meter either the electricity consumed or the fluid displaced.
  - a. Low/No GHG intensive pumps systems powered by NG or on grid or off grid.
  - b. Project emissions electricity generation using pump and fuel extraction and processing
5. Baseline condition
  - a. Prior to conversion
  - b. Metered quantities of either electricity or fluid displaced in the project condition using PDFs
6. Flexibility Mechanisms
  - a. Site specific emission factors
  - b. Flex given regarding measurement of displaced fluids of electricity
  - c. Flexibility mechanism allows to increase baseline volume and therefore baseline emissions based on an adjustment factor for optimization (AFO)
  - d. Retroactive credits
  - e. Pump System conversion can take place at single or multiple sites. Flex in aggregation.
7. Addition of proposed flex mechanism:

- a. "instead of metering the volumes of fluid displaced, the project proponent may also calculate them using vendor's engineering specifications:
  - b. Justification : Practical and Cost Effective Approach to incent action
8. Review of ABOS
9. Barriers to implementation **(see slide)**
- a. Financial Budgetary
  - b. Technology/operation/maintenance/tech transfer
  - c. Infrastructure/resource availability
  - d. Market structure
  - e. Institutional/social/cultural/political-staffing
  - f. Co-benefits – work safety, VOCs reduced, energy efficiency.
10. Review of Existing Projects (solar, glycol, hydraulic submersible pumps (HSPS), electric submersible pumps (ESP), others

#	PUMP SYSTEM CONVERSION EMISSION REDUCTION PROTOCOL
1	<p><b>What is the size requirements on pumps?</b></p> <p>No limit.</p> <p>Definition of pump? Could be a number of different kinds. Could be anything that displaces the fluid. Definition is included in the protocol.</p>
2	<p><b>In the example, 24K tonnes is very high. Do you have a feel for the total potential?</b> (this is 8 pumps) This is on paper. Not implemented yet.</p> <p>Not known yet. Wide range of opportunities.</p>
3	<p><b>In the Flexibility Mechanisms... what is to stop someone from using the specs at all time?</b></p> <p>Is it necessary to discount these? Have a criteria that states that it is a flexibility and shouldn't be applied all the time. I.e. remoteness of some projects may require use of man. specs.</p> <p><b>**Under consideration. Good to add more language and criteria (calibration records etc.).</b></p> <p>If these are remote, do you have regular calibration, monitoring of these pumps. <b>Can this be verified?</b></p> <p>Will add more criteria.</p> <p>Could be in contingency calculation, not used 100% of time.</p> <p>Caution on discounting too much for small scale applications.</p> <p>Suggestion to make the engineering data the rule and make the specific observation data as the exception. Expect that in most cases you will use engine specs and you would likely find that they are very close.</p> <p><b>Is there precedent?</b> Energy efficiency protocol. Might be worth having a quick huddle on it.</p> <p><b>If it is a remote area, how do you ensure that the protocol is working according to specs?</b></p> <p>Metered data is always preferred.</p>

	Consider - Is there a size threshold that will trigger
4	<b>Is a brand new pump required or is 'modification' allowable.</b> Must have an enhanced environmental performance – if you can prove this it could apply.

**CARBON CAPTURE AND STORAGE EMISSION REDUCTION METHODOLOGY** - Review of  
Draft Alberta Protocol (See full presentation)

**Protocol Developer – BlueSource**

Jamie Callendar, BlueSource

1. Policy Considerations
  - a. Majority of CO<sub>2</sub> sourced for CCS will originate from sites regulated under SGER.
  - b. Offset system may not be the venue to commercialize emissions reductions associated with CCS
    - i. Some unregulated GHG sources are good candidates
  - c. Reporting and regulatory scope of SGER presently does not facilitate the complete accounting of all “project Emissions” related to a CCS project
2. Protocol Development Overview
  - a. **Developed a methodology** – applicable with regulated and unregulated facilities based on ISO format.
  - b. Draws on IPIECA, June 07, EOR and AGI Alberta protocols.
  - c. Limited technical review within ICO<sub>2</sub>N during preparation of draft. Technical review session held Mar 18, 1009.
3. Applicability Criteria
  - a. Protocol applies to:
    - i. All components of CCS projects that occur outside SGER
    - ii. New facilities with CCS designed into construction
    - iii. Retrofits
    - iv. CO<sub>2</sub> injection into producing and non-producing reservoirs
    - v. Project must have obtained approval of ERCM and demonstrate ongoing compliance with approvals.
  - b. Protocol does not apply to:
    - i. Facilities mandated to implement CCS
    - ii. Emissions already counted – no double counting.
4. Project and baseline Conditions
  - a. Project Condition – GHG emissions reductions from CCS – deliberately broad to account for full range of CCS.
    - i. Capture processing, transportation, injection and sequestration of captured CO<sub>2</sub> in geological formations.
    - ii. Intended to allow for multiple sources of CO<sub>2</sub> injected and defines both regulated facilities.
    - iii. Tried to ID ‘silos’, could be regulated or unregulated site. Also could be categorized based on fuel combustion, flaring, venting, process, biogenic emissions, etc. At any level you must do inventory of the site.
  - b. Baseline Condition – different from ne3w and existing
    - i. In existing, baseline is continued operation without CCS.
      1. Quantity of CO<sub>2</sub> that would have been vented to the atmosphere in BL may be projected based on quantity of CO<sub>2</sub> captured in project condition.

2. Projection based approach is project and site specific and provides a reasonable estimate of baseline emissions if all project emissions are accounted for.
3. Parasitic loads that result in incremental CO<sub>2</sub> generated are accounted for as project emissions.
- ii. New Facilities
  1. No historic data available, baseline will depend on assumed baseline technology; conventional technology or CCS ready tech
    - a. Choice of BL technology depends on GHG cost and expectations of regulations.
    - b. Baseline for new facilities is defined as the lowest carbon fuel predominately used as a fuel feedstock for that type of primary process.
5. Consistency with ABOS
6. Flexibility Mechanisms
  - a. Primary flexibility mechanisms
    - i. Project may incorporate alternative means of transporting Co<sub>2</sub> beyond pipeline
    - ii. Site specific emission factors
    - iii. Measurement and data management procedures may be modified as long as minimum standards are met.
7. Barriers
  - a. Technological
    - i. Overall tech is somewhat unproven
  - b. Financial
    - i. Clearly significant \$ involved
  - c. Regulatory
    - i. Long term liability framework has not been established
    - ii. Limited experience in AB with CCS
    - iii. Right to store or dispose of CO<sub>2</sub>
  - d. Infrastructure
    - i. Significant challenges
8. Existing Projects
  - a. SK is good
  - b. AB the natural gas industry has significant experience with AGI
9. Sample Calculations – **see slide**
10. Other considerations:
  - a. Eventual harmonizing of SGER and offset system
  - b. Permanence issue will need to be addressed
  - c. Liability over CO<sub>2</sub>: capture site vs. storage site
  - d. CO<sub>2</sub> recycling is very important in the quantification and in permanence
  - e. Indirect emissions from electricity usage may be significant for large CCS project – may need to be quantified to get the real environmental benefit.
  - f. CCS project will likely need a different crediting period (>8 years)
  - g. CO<sub>2</sub> EOR projects may not be suitable for annual reporting due to likelihood for >1 year time between injection and co<sub>2</sub> recycling.

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**GENERAL DISCUSSION ON METHODOLOGY**

#	CARBON CAPTURE AND STORAGE EMISSION REDUCTION METHODOLOGY
1	<p><b>For this methodology, only look at sequestration in reservoirs. What about tailings ponds? Can this meth be applied?</b></p> <p>At this stage, it's premature to quantify. Approach is likely quite different. There would be time to add it in. Not familiar enough with the differences.</p> <p>Take the discussion offline.</p>
2	<p><b>Concern over the tonnage going all too regulated sourceS. No incentive for downstream with 100% credits going upstream.</b></p> <p>That is the major driving force. Want to look at those downstream sources. There are a lot less incentives to do it properly. Need to link the current system.</p> <p>This is a great concern. Struggled with SGER and decoupling the liability between the physical CO2 liabilities. All the control goes to the guy who pumps it in the ground.</p> <ol style="list-style-type: none"> <li>1. Need to create a methodology to quantify tonnes.</li> <li>2. Then work on commercializing. If they are not decoupled, we can't create the commercialization. Need to move the risk/reward &amp; offset/liability.</li> </ol>
3	<p><b>Fourth slide – example between regulated and unregulated. On the regulated example, if you were to capture the additional fugitive emissions of 25K, is there anything?</b></p> <p>Again, there is the disconnect. It needs to be addressed.</p>
4	<p><b>In the current Enhanced Oil Recovery Quantification Protocol, if you get ERCB approval, it is presumed permanent.</b> There are other safeguards in place. There are some natural policy in place to cover reversals within Alberta.</p> <p><b>Has there been a project that has been recognized in the world for their stored CO2.</b> Yes – there have been some (on a voluntary basis). Methodologies are trying to ramp up.</p> <p><b>What is project configuration based on?</b></p> <p>Project configuration is laid out in process flow diagram. It's generic to apply to multiple configurations. Coal bed methane not covered.</p>
5	<p><b>Q Re: Baselines and Project conditions require clarification</b></p>

	<p>Yes, there are generalized right now as this is just the beginning of consultations and discussions for CCS project methodology.</p> <p>Best example is a H plant. With a power plant, the baseline is between the same fuels with different configurations. We have lots of Coal-based facilities AB.</p> <p>We realize that the province as a whole wants to incent CCS. Tried to take the conventional approach. Want to ensure we are in line with the provincial initiatives.</p> <p>Approach is for an intensity-based calculation to ensure functional equivalence between quantification in the baseline and project. Including not just what you emit but also what you capture.</p>
6	<p><b>Protocol is very broad and could be seen as a deviation from other protocols. Would it not be more effective to have a focus on where the reduction is occurring at the storage site?</b></p> <p>It was a challenge during the early days. First looked at this as the third protocol – geological sequestration. With the number of different options, would try to avoid a protocol for power plants, refineries, etc. We went broad. Commercial element involved... If the storage gets all the credit the investor gets all the liability and no control. It was a necessary complexity to go broad. Going generic was the best way to address the issues.</p> <p>Unless the CO2 goes in the ground, there is nothing. This is a protocol where capture facilities are paying a lot of money.</p> <p>Nowhere in the protocol does it assign ownership. At some point you need to draw a box. The methodology needs to be wholistic. Need to decouple the liability and the offset.</p> <p>By trying to aggregate it and idle the issues, you are not necessarily resolving issues.</p> <p>Need to have the experience at the specific level and can later gentrify it and bring it up to a higher level.</p> <p>EOR protocols are unworkable in SGER. Want to aggregate it – not gentrify. Need to interface technical and policy.</p> <p>Want to get the right tools. With this tool, can have a better discussion regarding commercialization, regulator, legal, etc.</p>
7	<p>Part of the reason it was looked at as a whole, it was never intended that the capturing entity would get the full tonne. Everyone down the line would also be responsible for that CO2. It would ensure responsibility down the line as they would be required to account for their emissions.</p>

	Strong pressure to reduce emissions, if a LFE releases 1MT and captures it in CCS. They have to report and essentially buy back the reduction through contractual agreements. Some perception problems exist.
8	<b>Add primary processing definition in the glossary</b>

**Sustained objection does not apply. Will not proceed further in Alberta Protocol Development process.**

Looking at upstream electricity generation and how to account for it. Will need to visit upstream electricity emissions presently not captured. Will need to work through and address. Further work and consultation to follow.

**MECHANICAL PULP SLUDGE UTILIZATION – AGRICULTURE APPLICATION** - Review of Draft Alberta Protocol (See full presentation)  
**Protocol Developer – Alberta Research Council (ARC)**  
Bonnie Drozdowski, ARC

\*\*NO SUSTAINED OBJECTION RECORDED

1. This is application of mechanical pulp on Agricultural lands. Still could develop
  - a. Credits from emission reductions because sludge is no longer land filled/incinerated.
2. Best Practice Guidance
  - a. National Inventory report – emission factors, formula to quantify LFG and incineration.
  - b. ISO 14064-2
  - c. Canada's national inventory
  - d. Standards and Guidelines for the Land Application of Mech. Pulp Sludge to Ag Lands. These are approved guidelines.
  - e. AAFC 2006 – Draft Tillage protocol – TSD. Mostly as background on TSD but also reversal coefficient.
3. Started working through this protocol on spring 2008. First round of review in October 2, 2008.
  - a. Given that the work has taken a while, there have been some process changes along the way (i.e. TPP requirement)
  - b. Several technical meetings with professionals, industry and government addressing:
    - i. Supplemental information and technical information document (on COS website)
      1. Quantification for nitrous oxide emission reductions (emission from incineration). In this protocol, emissions are negligible because <5% - both direct and indirect emissions. Therefore, it was excluded from the overall quantification. Methane gas was also brought up.
      2. Soil Organic Carbon Reversal Coefficient used to assess reversal.
      3. Justification for Adjustment factor for baseline. Examine adoption level for incrementality purposes. Want to ensure it is additional. Some action was undertaken prior to 2002. In Canada in 2003, only 30% of sludge is land applied.
4. Barriers to Implementation
  - a. Financial Barrier – it's more expensive 3-4 per tonne more expensive than alt. The pulp mills overcame this. Now they have lines of farmers waiting
  - b. Technology – a lot of pulping processes don't create sludge that are applicable for land applications. Even
  - c. Infrastructure Barrier – no t all places have enough land capable of accepting pulp. Need to ensure receiving soil is appropriate.

- d. Institutional barriers – Farmers were originally uncertain of benefits. Farmers wanted third party verification of benefits so a number of studies were done.
- 5. Protocol applicability
  - a. Need to follow application Guidelines which outline requirements (i.e. sludge handling parameters, proximity to water, soil properties)
  - b. Number of samples required for quantification increases with increased variability.
  - c. Project meets ABOS requirements. Ownership requires a contract between sludge producer and landowner.
- 6. Quantification Development
  - a. Baseline Emissions – BAU incineration and landfilling
  - b. Project Emissions – Sludge application on Ag Land – increased Soil Carbon Storage.
    - i. Sludge transportation needs to be quantified – can be quite large
    - ii. Soil Organic Carbon
    - iii. Sludge application is excluded. Sludge can only be applied once every 5 years whereas in BAU it would be annual every five years. This is a conservative exclusion.
- 7. Identification of Baseline
  - a. Comparison Baseline – actual measurements produce the most accurate and reliable results and cannot be discounted by variability
  - b. Adjusted Baseline – must account for the industry based adoption level of land application for 5 years prior to the start of the credit period to ensure the project is not as BAU practice.
- 8. Protocol Flexibility
  - a. Two approaches for quantification:
    - i. Advanced approach – comparison based sampling/monitoring approach
    - ii. Simple approach – if no control strip was established before sludge application, baseline soil carbon contents and bulk densities can be determined from soil maps and benchmarks and a discount factor will be applied to quantifications
    - iii. Discount factor was developed for range of organic carbon (variability max 70%) and bulk density (max variability of 40%). If we discount every credit by 55% than we should be conservative. If a project proponent wanted to decrease this it could be done with appropriate documentation.
- 9. Quantification **(see slides for example)**
  - a. Landfill Operations – Scholl Canyon Method
  - b. Incineration (assuming complete combustion)
  - c. Dryer Natural Gas Usage – metered value
  - d. Transportation – L fuel or KM transported
  - e. The advanced approach applies a reversal approach whereas the simple approach applies the discount factor.

#	<b>MECHANICAL PULP SLUDGE UTILIZATION – AGRICULTURE APPLICATION</b>
1	<p><b>Baseline set in 2002. Industry adoption was 53%. In 2007 – adoption is 93%. How does this meet additionality criteria for the Alberta Offset System?</b></p> <p>This was why the protocol was developed with an Adjusted Baseline Approach that would discount all projects due to adoption rates (currently 53% in protocol) so more work was conducted as more concerns were raised (statistics were calculated). Bottom line: Alberta’s rules will still apply. This protocol will not have applicability in Alberta, but have much potential outside the province. There has been a lot of work that has gone into the development of this protocol and research, but and unfortunately given AB adoption rates, it won’t be applicable.</p>
2	<p><b>Does the sludge not decompose?</b></p> <p>Given that it is a comparison-based protocol and you are sampling at the end, you are comparing you will still see the benefits.</p> <p>If you continuously apply sludge, it will delay the conversion to CO2 vs. the baseline (i.e. incineration) which will emit right away. The issue is permanency.</p> <p>This is a policy disconnect that we are seeing. However, this is the first soil amendment protocol that we have seen come through Alberta. When you apply to soil not all gets sequestered into Soil Organic Carbon (SOC). Only when it is converted to SOC do we worry about permanence. The emissions from sludge are a bio-genic source and therefore are carbon neutral. This is a challenge with amendments – what proportion gets converted into SOC. Not a policy connection – people are starting to catch this.</p> <p>One way would be to look at it as carbon negative. The carbon is taking a longer route back to the atmosphere but it still goes back. The question is are we sequestering carbon or not?</p> <p>No clear answer at this point. Policy is strange and out of whack on this. IPCC says that this is a rapidly cycling source of CO2.</p>
3	<p>If you add soil carbon, not all will be lost in 15 years. Look at respiration rates. This material increases the yields, additional photosynthesis, etc. This protocol probably underestimates the actual Carbon sequestration occurring in the soils. We have tracked for 15 years on plots. Found that the SOC is higher than thought but is conservative in this protocol.</p> <p>Argument that this should be monitored for a longer period of time.</p> <p>This protocol works on comparison basis thus is directly measured and compared to determine rates of sequestration. This protocol is the first to apply this approach.</p>
4	<p><b>Why didn’t you look upstream at N fertilizer use and how this would result in less N produced?</b> For the amount that would not be produced was</p>

	<p>not considered.</p> <p>N is 2% in the sludge. Argument that the N application is higher.</p> <p>Being more conservative this way – quantification available in Appendix in protocol. May consider discount to account for N emissions in future.</p>
5	<p>For incinerator, when you calculate N<sub>2</sub>O you assume all N is converted into N<sub>2</sub>O. This isn't necessarily the case. Did you look at the amount of N in the sludge that is being converted into N<sub>2</sub>O in the baseline?</p> <p>Did look and assume 2% of N is converted in baseline. Conversion factors consistent with best practice guidance available.</p>
6	<p><b>Looking at landfill equation, did you consider oxidation?</b> In the IPCC, there is a factor after that accounts for estimation of methane oxidized in soil.</p> <p>There is never a cover put on landfills for sludge. This isn't a conventional landfill. Sludge landfills could put a cover on it.</p>
7	<p><b>How many soil samples are required / per hectare?</b></p> <p>Listed in protocol is 8 samples per 32ha area</p> <p><b>Cost to conduct samples?</b> Pretty cheap. Both BD and SOC won't be a hindrance.</p>

**Alberta Offset System Quantification Protocol**  
**2<sup>ND</sup> Round Stakeholder Review**  
*Edmonton, Alberta*  
**Day2: Time: 8:00 am – 4:00 pm**

<b>AGENDA: Friday, October 30, 2009</b>	
8:00 am to 8:30 am	Welcome & Continental Breakfast
8:30 am to 9:00 am	Agenda Overview and Overview of Protocol Development Process <b>Climate Change Central</b>
<b>9:00 am to 10:30 am</b>	<b>DISCUSSION ON ALBERTA PROTOCOL DEVELOPMENT AND REVIEW PROCESS (Open Discussion)</b> <i>**Telephone dial-in capability for discussion</i>  <b>NORTH AMERICAN PROTOCOL UPDATE (Open Discussion)</b> <ul style="list-style-type: none"> <li>• AFFORESTATION PROTOCOL REVIEW of technical modifications</li> </ul> <i>**Telephone dial-in capability for discussion</i>
10:30 am to 11:00 am	<i>REFRESHMENT BREAK</i>
<b>11:00 pm to 12:00 pm</b>	<b>NITROUS OXIDE EMISSION REDUCTION PROTOCOL</b> - Review of Draft Alberta Protocol <b>Protocol Developer – BlueSource / ClimateCHECK (Canadian Fertilizer Institute)</b>
12:00 pm to 1:00 pm	<i>LUNCH BREAK</i>
1:00 pm to 2:00 pm	<b>SUMMERFALLOW REDUCTION AGRICULTURE PRACTICES</b> - Review of Draft Alberta Protocol <b>Protocol Developer – BlueSource / Alberta Agriculture</b>
2:00 pm – 2:15 pm	<i>REFRESHMENT BREAK</i>
2:15 pm to 3:15 pm	<b>SELECTION FOR RESIDUAL FEED INTAKE IN BEEF CATTLE</b> - Review of Draft Alberta Protocol <b>Protocol Developer – Alberta Agriculture/University of Alberta</b>
4:15 pm to 5:00 pm	Questions; Summary; Closing Comments <b>Climate Change Central</b>

**8:30 am to 9:00 am**

Agenda Overview and Overview of Protocol Development Process

**Climate Change Central**

**-Any comments or discussion from yesterday...**

Overall impressed with your process. Great work. Protocol development is very good. Urge both government and industry to keep at it. Encouraging to see many emerging opportunities coming forward for O&G sector. Expect that we will see more areas in the future.

Any comment on CDM process (previous experience)?

CDM handles minor changes poorly. Basic mechanism is the Exec. Board can pull a protocol at any time and make adjustments when they want to. Backlog is years once it goes back into process.

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**9:00 am to 10:30 am**

**DISCUSSION ON ALBERTA PROTOCOL DEVELOPMENT AND REVIEW PROCESS (Open Discussion)**

*\*\*Telephone dial-in available for discussion*

**See introductory slides within presentation.**

**DISCUSSION:**

Alberta Environment (AENV) - Admittedly resources are a challenge and are a reason why responses have been slow. Critical we have improvements on a go-forward basis. The requirement is to be able to follow the trail to real emission reductions stemming from these offset projects leading to higher credibility to the overall system. Working efficiently and effectively through these processes is a top priority.

Suggestion of deadline for the first steps in the protocol development process, submit the Technical Protocol Plan (TPP) to allow appropriate time for feedback. The TPP is like a protocol idea note with details.

C3 suggestion of February deadline for submission of TPP per year for ample time for feedback prior to a fall submission of draft protocols. This would give time to do the first round of technical review.

Quite a few new protocol ideas come forward over last few months. AENV will start to look at new ideas in November.

Once you have good TPP there has been a substantial amount of work already completed. **Where can we get the early feedback before investing a large amount of time in development of Technical Seed Documents, Science Discussion Documents etc?** Opportunity to get quick and early feedback on protocol ideas without completing the full TPP?

Does it need to be a formal process or informal? Is it good enough to have a frank discussion or meeting?

Concern over the implementation process of protocols. Any opportunity for consultation as protocols are being developed would be beneficial. Requirement to have appropriate people at the reviews to help address implementation of projects.

Approach from the regulators has been to always ask... a quick meeting to run ideas through. Good to involve C3 and AENV.

Deadline makes sense. Perhaps Feb 28 – will be determined. Suggestion to mash the TPP, TSD and Memo into one document. Suggestion of a formal process.

**Is it possible to have a 1-2 page higher level protocol idea with follow-up. There is a large amount of variation that goes into TPP. Feedback as to expectations would be beneficial.**

Modify protocol development process? Quick 2 pager that would be available to potentially trigger a meeting in more difficult project ideas. Good to meet with AENV and other relevant departments as soon as possible. This will streamline the process.

\*Suggest Process change – Opportunity for early high-level feedback on protocol ideas - 1<sup>st</sup> step could be to fill out Protocol Idea Note (1-2 page Summary of Protocol Idea) with ability to request meeting or receive feedback through email/other communications. Then proceed to current protocol development process.

No objections.

Move to a reasonable level of assurance was identified with the Auditor General review over the past year. Alberta is a member of The Climate Registry., watches closely what goes on in US. Use the language of reasonable assurance –there is lack of clarity to 'limited' vs. 'reasonable' requirements . Looking at some templates and additional guidance to help guide the process. As you go through and bring forward your protocols, pay close attention to monitoring – we don't know what we are going to working in the future.

**Would you consider reasonable for future offsets and difference going back. Difficult to apply reasonable level of assurance on past actions – from the verifiers.**

Will be looked at to see what makes sense. Cost effectiveness will be considered. We are managing the verification audit contracts for AENV. Contracts include asking AENV auditors whether they could have verified projects to reasonable level of assurance. To date, response has been mixed. A lot of jurisdictions are reaching for reasonable levels. Believes it is where we need to go – not without its difficulties. Some protocols will be very problematic as it is difficult to provide this level going back in time.

**Key work is opinions from verification community... you can get a different view from different verifiers as it depends on their approach.. Sampling, etc. This will apply to upstream O&G. In the perfect world, you need to lay out guidelines for limited and reasonable. We are talking about an accounting industry that may not want this. How would it work?**

Don't know right now. Accounting community doesn't necessarily not want this. We are essentially putting a financial charge on carbon and therefore this effects the bottom line of the corporations. We didn't design our system with this in mind. Reality is that these are financial units that have implications to corporate bottom lines. Need to be transparent. Need to provide assurance and as such we are seeing a huge amount of scrutiny. AENV intention is to make sure these units that come forward are as good as they can be. The reasonable level of assurance is seen internationally. Auditor's struggle with this. Reasonable level in accounting community has one set of meanings and expectations, engineering community that does audit and assurance expertise may have a different meaning. As regulators, need to be clear as to expectations.

**Greenhouse Gas Verification Meeting being held Nov 9 & 10 – Toronto Area. Group of stakeholders including government and industry to sort some stuff out. For more information contact AENV.**

At the end of the day we want to ensure that reductions are real and credible. How are we going to do this with an asset on the Accountants sheet? As a Chartered Accountant, admit don't have the necessary technical skills to say a reduction is real from a technical perspective. Auditing community can provide processes from lessons learned. Those providing verification services should be able to provide a level of assurance that a real reduction occurs and there is environmental integrity. There is a need for the engineering, science and accounting to come together.

**What about a list of approved verifiers for certain protocols? Can verify a project that you have no experience with.**

A CV (Statement of Qualifications) should be relevant to the protocol you are verifying anyway all the time. This is why AENV is looking to accreditation programs and looking for a team approach – keeping in mind cost. Trying to strike a balance. Went with accountants and P.Eng as they have professional signoff and there are repercussions. Started there as it is appropriate starting point. There were no accreditation programs at that time. We are seeing this area develop. Need to be clear that the verifier should have relevant expertise to the protocol.

**By moving to a higher level of assurance, you are taking away some of the profits. What are the thoughts on moving to free market on carbon price.**

\$15 wasn't meant for ever. First and foremost the objective was to develop a regulatory compliance system – not an offset system. The Offset system developed as a tool of compliance. Need to be concerned about exposure of Alberta and be reasonable. Recognize that \$15 per tonne won't get AB where it needs to go. \$15 is the entry price cap compliance. Over time the price of carbon will change. Cognizant that we don't make the offset system so burdensome that we impede the development – keeping in mind 2020 and 2050 objectives.

**Timing of protocol review. Fall is best time. If September deadline then only allows 2 months for Nov 30<sup>th</sup> deadline to complete 2<sup>nd</sup> and 3<sup>rd</sup> Rounds of Review??**

**AENV response: Our challenge is that AENV has been able to use the excuse that “we are learning” and this is “new” but can't rely on that forever. This was done to respect some of the early work. Want to honor the market by providing timelines – rather than promise things that can't be delivered. Want to be realistic on expectations. AENV has found that they need to take more time to get through these protocols. Taking some hits on justification as to why some things have gone through our system. AENV needs to ensure that the rules are clear as possible – need to tighten down the process.**

Certainty in this industry is at a premium. If we set up a September submission and November protocol usage drop date, we are increasing stresses on the system. Worried that might not get all the follow-up done.

\*Suggest - Move November deadline to January 15<sup>th</sup>. Worry over the development of material that could be a competitive advantage as information could be in the public domain for 18+ months.

System is strong and stands up well compared to other systems. Message has not been marketed very well. More DD, higher assurance, etc will strengthen the system but only if adequate resources are available. Thought that AENV is overwhelmed. Process is good but people who follow that process can be undermined at the end by policy decisions. Engagement time is so long that experts engaged at the beginning as they know they will be engaged again later. Mixed messages. Need to develop innovative and new ways of identifying resources. Won't get the quality you want by efficiencies along.

**Capacity concerns: The technical reference group – how do you see this working? Is it is a group of experts that can be called upon that AENV can bounce ideas off?**

There is a lot of opportunities for doing this. Biggest issue is fatigue on experts. Fewer and fewer are available due to burnout and budgetary... Expectations that regulatory agencies will call upon experts for their opinion. Extensive consultations upfront mean a more streamlined process as process through rounds of review and ultimately final

approval of protocols. Would be a need for experts to be compensated to be on the review – professionally committed.

AENV won't find more time or resources. Trying to lower the expectations – and get rid of sense of entitlement. Because we don't have the resources we need creative options for how to pay for resources. I.e. pay a couple cents extra a tonne.

Getting industry involved at an early stage will take some burden off the government. Evolving the right people will help because it will strengthen.

\*Process change: First round technical review should have a more balanced approach – coordinated by Climate Change Central (C3) to ensure correct balance is on review from beginning. No objections.

Comment made yesterday disturbing - on 'baseline stability'. If a facility later becomes regulated it could lose opportunity to generate offsets. This will have serious negative impacts on the market.

AENV is looking years down the road, yes thresholds will change – details uncertain. This is a new area. In a situation where offsets are created and later becomes regulated how we set the baseline might take into account. Need to be more aware of investments. Obligation is to share information. Don't want to strand investment.

Seems obvious that a regulated facility could generate offsets. Recognize that this is contrary to the Act.

Will look at it, hamstrung by the regulations which say that if required to reduce you can't generate offsets. There are avenues to explore – i.e. EPCs. Will look at options.

### **When AENV looks at higher level of assurance – will they guarantee offsets?**

Will not be any guarantees. Put together a good project, meet the rules and risk is lower.

### **Move compliance deadline from Mar 31?**

Looking at it. Reporting regulation and SGER – they are out of sink. The March 31<sup>st</sup> deadline for compliance submission is problematic but a decision will be made at some point in the future. Consultations will be made on this.

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**11:00 pm to 12:00 pm**

### **NORTH AMERICAN PROTOCOL UPDATE (Open Discussion)**

- AFFORESTATION PROTOCOL REVIEW of technical modifications

*\*\*Telephone dial-in capability for discussion*

## **DISCUSSION:**

There are many groups coming together right now to work collaboratively on offset protocols.

US Senate Bill information –renewable fuels are off the table, the focus is on Agriculture, Forestry and Waste Management project-types. Ongoing meetings and workshops between USDA and AAFC. Approaches' to inventory – countries are fairly in sync.

North American Protocol Working Group Update  
Work is ongoing. Part of the Industry Provincial Offsets Group (IPOG) coming together to review existing protocols and adaptation capabilities in North America. Currently gathering industry and experts participants. See website [www.offsetsgroup.com](http://www.offsetsgroup.com) for more information.

Voluntary Carbon Standard Initiative  
Review of VCS presentation (See full presentation)

### **Q: Cost are the costs of CAR appropriate?**

Look at the system... if the system works, than no matter the number of protocols, it will work.

There has been a bit of a rub between CAR and VCS... they are taking some time to review.

### **Q: Does it work going forward?**

Once they accept the system, they will accept new protocols with a review – not blind acceptance.

### **Q: Curious as to start date. VCS stated that historic projects won't qualify**

Conversations, when the board accepted Canada projects, they knew they would have to change to account. Will give them a sense of the timescale landscape – all the important dates in history.

### **Q: Provide insight into level of assurance for VCS registered tonnes?**

Uncertain of their definition of verification. Don't state reasonable or limited. Cost of verification for projects is approx on par with AB. Between 9k to 18K.

### **Q: Positioned as pre-compliance market, how do you argue new additionality i.e. if SK implements something in 2008 and wants to take into regulatory market?**

Can only count it once. Raises the bar to the highest level for additionality. Also raises the expectation on technical documentation. Policy decision is required by Government.

What other jurisdictions have gone through this review?

VCS market – prices between 3 – 7 per tonne. A VCS tonne could qualify for early action. Could add additional requirements for VCS plus (i.e. VCS plus in or province, after this date, etc...)

Set up a meeting with AENV to discuss proceeding

AFFORESTATION PROTOCOL UPDATE (in Alberta System)

(see presentation)

The Protocol was pulled and a technical review was initiated by Climate Change Central and other expertise, because it was unusable in previous state – the quantification was incorrect and could not be applied. Adaptation of the Nationally developed Technical Seed Document into the Alberta Protocol format was not translated correctly. In addition, it was determined that as the world has developed forestry related project protocols with different approaches it was the Alberta Protocol was out of sync in its application from other forestry protocols.

A technical and policy review of other protocols was conducted. The Alberta protocol quantification was clarified and revised. But there are still outstanding policy related issues that we need to address such as harvesting (100% sink, 100% source or somewhere in between?), permanence, and the current policy disconnect on how to treat green energy.

A technical review was conducted at the end of September and work is continuing to address these outstanding issues in the protocol. It is anticipated another review will occur on the protocol in January timeframe to propose approaches. We should have a revised protocol available early to mid-next year

Q. What is the general sense of opportunity for the protocol? Magnitudes?

This is currently unknown until the policy and science related issues are addressed and an approach is determined in the protocol.

**NITROUS OXIDE EMISSION REDUCTION PROTOCOL** - Review of Draft Alberta Protocol  
(See full presentation)

**Protocol Developer – BlueSource / ClimateCHECK**

**Rob Janzen (ClimateCHECK); Jamie Callendar (BlueSource)**

\*\*NO SUSTAINED OBJECTION RECORDED

1. Project Description
  - a. Quantifies the N<sub>2</sub>o emissions reductions achieved from the implementation of Nitrogen fertilizer Stewardship Plan were practices 'modify' or reduce the emissions relative to a baseline.
  - b. 4 R approach - Right source, right rate, right time, right place! It is a global framework for which regional practices are developed. Quantification of reductions achieved using a Canada specific methodology (adjusted for Eco-district conditions)
  - c. Protocol development uses IPNI, Technical Background N Fertilizer Use efficiency Protocol, Technical background papers by consensus
2. Process Overview
  - a. October 28&29, 2008. Only participants with a research based graduate degree in a relevant science voted to determine consensus. 22 individuals.
  - b. Participants resolved the development of NERP to allow standardization and submission to the formal review and approval process of the ABOS.
  - c. In parallel with process, CFI, IPNI and TFI are developing training and extension materials and programs to support implementation of the NERP across North America.
  - d. Series of training modules with examinations are in use to train CCAs regarding 4R
  - e. CFI investigating options to support the implementation of NERP
  - f. 3 years of baseline data are required to participate – cannot go back and claim credits back. Standardized baseline requires more development.
3. Applicability Criteria
  - a. Scope of protocol is limited to on-farm sources, sinks and reservoirs (exclude upstream SSR)
  - b. 4-R N Stewardship Plan must be approved by Approved Professional Advisor (APA)
  - c. A grade approach where increasingly comprehensive management practices result in greater GHG reductions
  - d. Potential to use the protocol with other related protocols (tillage, summerfallow)
4. Project Condition
  - a. Complete change at farm level necessary – 4 R – examining Basic, Intermediate and Advanced approach.
5. Baseline Condition
  - a. Historic benchmark looking at 3 years of farm specific data.
  - b. Emissions average over 3 years.

- c. Functional equivalence is maintained by calculating emissions per kg of crop produced on a dry matter basis.
- 6. Flex Mechanism
  - a. Project may choose to select non-consecutive years to set the baseline to match with data availability and to account for a any extra ordinary season
  - b. protocol can be combined
  - c. Standardized baseline
- 7. ABOS Requirements
  - a. In aggregate, looking at many farms, reductions will be real
- 8. Barriers
  - a. Uncommon for farmers to have a comprehensive nutrient management plan
  - b. Lack of capability of farmers and their professional advisors to design and implement
  - c. Co benefits – decreased loss of N into the environment (indicated for co-implementation with Wetlands)
  - d. Increased crop yields
  - e. Transforming tool for nutrient management
- 9. Review of existing projects
- 10. Quantification Approach
  - a. Canada specific quantification method accounts for N<sub>2</sub>O
  - b. Reduction modifier gives credit for decreased N<sub>2</sub>O losses associated with innovative N management at increasing degree of landscape-directed approach
- 11. Sample Calculation

#	<b>NITROUS OXIDE EMISSION REDUCTION PROTOCOL</b>
1	<b>General comment really like the approach in the protocol that links with other protocols and having the sign off in the beginning prior to project condition – makes verification easier.</b>
2	<p><b>Does this protocol have a requirement for an actual change in N use?</b></p> <p>Yes, will make more clear. This protocol is based on actual measurement and monitoring of the Nitrogen Management Plan that needs to be developed and signed off upon prior to project condition.</p> <p>Emission reduction claims will only be claimed if improvement to current management is documented.</p>
3	<p><b>Can implement part of Best Management Plans (BMPs) levels i.e. table in the protocol?</b></p> <p>No, more guidance is needed on this aspect – we are currently developing and Implementation Guide to accompany this protocol. If you cannot document the management change then you cannot prove it and cant be verified. Each individual component of the BMPs listed in the protocol are based on science, research and expert opinion and consensus that was reached during a two day consultation workshop held prior to development of this protocol.</p>
4	<p><b>What about proprietary/competitiveness concerns (expected to see with protocol)?</b></p> <p>This project will be aggregated as most Ag sector protocols that will require disclosure of information to contractors/verifiers as any other offset project requires. Public posting of project reporting and verification reporting is required on the Offset Registry, but not Legal Land Locations or agreed upon proprietary information.</p> <p>Although the Government is gathering information in regard to FOIP requirements (for example, water allocations are publically available) and requirements of information sharing from Government auditing, so this may change over time. It will be up to individuals to decide what they want to do.</p> <p>Protocols will cease uptake if posting of private information occurs...</p>
5	<p><b>Need to ensure that proper baselines are established...consecutive years? Flexibility mechanisms?</b></p> <p>**The baseline is determined on 3 years of data – will specify this is consecutive years per crop event - data for establishing. The additional guidance documents being developed will need to be specific in regard to soil testing for crops or it could be gamed.</p>

	<p>**The soil testing statistics should be removed from the protocol.</p> <p>Will apply comments.          Baseline calculated for each crop collected and quantified separately.          Address new crops in protocol.          Will also address the “language” used for project implementation guidance.</p>
6	<p>Does this preclude manure in the project condition?</p> <p>Manure is and was considered in the N inputs - synthetic N is quantified.</p> <p>Usage of National Inventory Factors, best available guidance. Is currently waiting to update the inventory numbers based on changes in IPCC quantification. Protocol will be updated as these factors change over time.</p> <p>What about existing credits and grandfathering to 2002?          New projects will be required to use the current protocol but registered projects have the standard 8 year crediting period using the protocol of the day.</p> <p>Eligibility back to 2002 will not be available with this protocol due to the requirements of developing a full Nitrogen Management Plan with sign off from Approved Professional Advisor prior to project implementation.</p>

**SUMMERFALLOW REDUCTION AGRICULTURE PRACTICES** - Review of Draft Alberta Protocol  
**Protocol Developer – BlueSource /Alberta Agriculture**  
**Sheilah Nolan (Ag); Keith Driver (BlueSource)**

\*\*NO SUSTAINED OBJECTION RECORDED

1. Objective is to increase soil carbon by converting farm areas in fallow to annual crops (continuous crops)
  - a. **Fallow** - Land that is intentionally left idle or unseeded during a growing season, with all weed growth periodically terminated with tillage (summerfallow) or pesticides (chemfallow).
  - b. Reduces amounts of soil C sequestered due to lower crop residue inputs and less oxidative environment
  - c. **Continuous cropping** - Increases soil C sequestration, energy use and fertilizer use compared to the baseline condition
    - i. Process Overview
    - ii. Direction from AENV in early 2008
    - iii. Began August 2008
    - iv. Streamlined development of Technical Seed Doc
    - v. ClimateCHECK
    - vi. Science Coordination Workshop - Nov 15<sup>th</sup> 2008
      1. Climate Change Central
      2. 80% consensus on protocol elements by scientists representing AAFC, UofA, Industry
    - vii. Standardized into Template – March 2009
      1. Bluesource
    - viii. First Round of Technical Review - April 1, 2009
      1. Address upstream emissions, on-farm energy emissions and permanence
2. ABOS Criteria
  - a. Quantifiable – science to quantify GHG removals from summerfallow is well established
  - b. Real/additional – based on the reduced proportion of land from summerfallow or chemfallow management as compared with a baseline
    - i. Farm Specific historic baseline is required to demonstrate improved practice change is justifiable and verifiable over a consistent area
3. Barriers to Implementation
  - a. No technological barriers
  - b. Some institutional barriers – part of traditional farm practices. Significant shift. Occurs on more than 2m acres.
  - c. Verifiable – some key data required.
    - i. Portion of land cropped in BL and project
4. Flex Mechanisms
  - a. If 3 years of historical data are atypical can use
  - b. Necessary to prove atypical
5. Requirements:

- a. Crediting period – minimum 8 years. Project can create offsets for 10 years with an extension for 10 years.
  - b. Ownership
  - c. Proof land was annually cropped
- 6. Baseline
  - a. Continue use of summerfallow, chemfallow
- 7. Project
  - a. Reduced use of fallow.
  - b. Carbon sequestration from reduced fallow on Brn and Dk Brn Soils
  - c. Incremental FF emissions from increased on site fuel usage from seeding, fret and herb
  - d. Incremental fuel remissions from upstream fertilizer production.
  - e. Rates of soil N<sub>2</sub>O emissions similar.
- 8. Quantification
  - a. Project includes soil conservation + emissions from energy + emissions from upstream fertilizer production
- 9. Addressing Permanency
  - a. Fallowing is easily reversible
  - b. Minimal capital investment; risk management tool for growers
  - c. Used to mitigate drought risk
  - d. Depends also on market factors
  - e. Decisions to use can be made in spring of planting year
  - f. Co-implementation with reduced tillage protocol reduces likelihood of reversal since moisture conservation is increased
- 10. Adapting Voluntary Carbon Standard (VCS) Sliding Buffer Approach
  - a. Combines risk of reversals in real time, while ensuring future reversals are covered by using a sliding buffer pool that sets mandatory reporting/verification
  - b. I.e. VCS 30% for forestry. Set aside in buffer account. At verification if no reversals were found, then 15% of the total buffer reserve is released back and the overall percentage deduction goes down for the next 5 year period. You earn back your tonnes over time. Wean yourself off to the point where you risk is managed and understood.
  - c. Adaptation of approach – mandatory minimum reporting/verification period of 5 years
    - i. Total credit duration of 20 years
    - ii. Agreed upon variability of fallow incidence of 20% initial buffer amount
    - iii. If no reversals, than 20% returned.
    - iv. Implementation of permanency approach:
      - 1. Project developer calculates total tonnes reduced
      - 2. Verifier weighs in – verification report
      - 3. Tonnes are serialized by the registry
      - 4. Registry sets aside the required set of verified tonnes and in a special account for the project developer
      - 5. Upon verification intervals, the registry could release the amount, put them back into circulation in the project

develops account, and then let the project developer know what the next buffer requirement would be.

#	<b>SUMMERFALLOW REDUCTION AGRICULTURE PRACTICES (Continuous Cropping)</b>
1	<p><b>Doubtful that a farmer would accept any liability over time. Are things registered on the title? Recommendation is simply calculating the economic basis and hold back. Difficult to sell to producers.</b></p> <p>If after the first 5 years, they lose their buffer – no liability. It operates like an assurance factor that is incentive based. If you could track back to the land, then it can move from farmer to farmer, aggregator to aggregator.</p> <p>This isn't a forward contracting thing... if we can pull out acres, it can be done. Heads up, in the Federal system, they will likely have a legal instrument against title.</p> <p><b>Why would you deliberately introduce a discount? Introducing discount factors, if permanency is real it is attached to the land as a contractual agreement?</b></p> <p>Environment needs assurance that benefits are permanent. Legal title on the land would do that.</p> <p>Two options at the time of tillage development were a (1) temporary credits or (2) 90% of a value of a permanent credit. Either take a discount and get higher value or take no discount and sell a temp credit for much less. Needed a way to manage risk like an insurance pool. 10% is essentially an insurance payment. Whereas the tillage protocol retires 10% to the environment, this approach could see them paid back. Provides incentive for continued avoidance of fallow over time. Social barriers also provide barrier to policy implementation.</p> <p>Need to think about setting up a buffer reserve that is 20 years – need a 20 year program. This is a lot of work for 2 million acres. Why not incentive early adoption. Is this really a summerfallow reduction? Chemfallow allows stubble and biomass to be there – significant difference form mech. Lempke data – how does that play within NERP protocol? (not an issue in N2O protocol)</p> <p><i>Summerfallow protocol talks about taking something from fallow to annual crop. Science in the prairies. The 1 is the SOM. The 1.25% is the amount that comes off from applied N. 100 order magnitude that comes off. Additional N2O is lost. There is no synthetic N applied. Needs to be in the Guidance Document being developed. Mineralized N is part of national inventory approach.</i></p> <p>Need for stackable credits! We are smudging the line on land ownership and management. Let's incentivize where possible the issue of maintaining what's there.</p> <p>A barrier to adoption – so this protocol provides incentive to continual annual cropping.</p>
2	<b>Who is confirming that there has been no reversal of activities?</b>

	<p>It can be verified. If they are not in the next batch, they are assumed to have reversed and lose their 20%. Until you step back you are assumed to be forward. Verification report should be able to track this. Farms are moving towards a digital footprint – hence there is interest in offsets. Assumption is reversal until you get the verification conducted.</p> <p>Is the variability (i.e. seasonal) significant? Can it be accounted for in calculation? I.e. potential concern if baseline was set in a period of time when natural high tendency for summerfallow – there could be a natural exaggeration of uptake.</p> <p>Numbers of acres of summerfallow are tracked. Could be taken into account. An average over time.</p>
3	<p><b>Concerns around practical implementation, minor edits.</b></p>
4	<p><b>Concern over the issue of defining summerfallow – significant different between chem. fallow and summerfallow. (was done early on – will confirm and re-visit)</b></p>

**SELECTION FOR RESIDUAL FEED INTAKE IN BEEF CATTLE** - Review of Draft Alberta Protocol  
**Protocol Developer – Alberta Agriculture/University of Alberta**

John Basarab (Ag); Amanda Stuparyk (Climate Change Central)

\*\*NO SUSTAINED OBJECTION RECORDED

1. History
  - a. Started fall 08.
  - b. Knowledge gathering was necessary.
  - c. A lot of expertise here in Alberta as well as with Australia and Dr. Paul Arthur (Aust.) Dr. Arthur developed Science Discussion Document.
  - d. March 09 researches workshop.
2. Direct & Indirect emissions in both enteric fermentation and methane reductions from manure – based on selecting cattle with specific genetics.
3. Applicability Criteria
  - a. Breeding bulls/replacement heifers – that must be measured for RFI value.
  - b. Must be done at an established facility.
  - c. RFI is calculated and converted to EBV (Estimated Breeding Value) – must be documented. A minimum accuracy value is required and determined for various methods of breeding value – this is for the testing facilities (not the feedlots).
  - d. Beef cattle must have an actual birthdates registered for verifiability.
  - e. Credit duration – first generation only within AB's 8 year crediting period. The means that reductions may be claimed on the animals with low RFI EBVs and their first generation progeny.
4. Project Condition
  - a. Using low (negative RI EBV sires and or replacement heifers and encompasses pens and/or pastures where the cattle are raised and fed, the facility where the cattle are raised and fed, the facility where manure is stored, and the land where the manure is spread.
5. Baseline Condition
  - a. Historic benchmark – based on actual records.
6. Flexibility Mechanism – Performance Standard – accept alternate scenarios based on historical based.
  - a. If a parent doesn't have certified RFI, the EBV is assumed zero.
  - b. Site specific emission factors with justification
7. Functional equivalence on per Kg beef basis (consistent with other beef)
8. Goal is to bring breeding stock into centralized location and test for feeding efficiency. Some animals convert their feed into growth much more efficiently than others. There are 4 facilities in AB being used to test various things including breeding stock. Minimum time to do the test is 70 days. Tests generate feed efficiency values – some are positive some are negative. Positive and negative relative to the average. There is a biological reason why this occurs. The value that is determined is used to generate the Estimated Breeding Value using heritability. If no data, assumed to be zero (common practice in genetics). **(see sample calculation in presentation)**
9. (CowBytes is an NRC program for feedlot rations.)

10. Projects will result in reduction of GHGs and significant reductions in feed intake. Less than .5% of bulls are tested for RFI.

#	<b>SELECTION FOR RESIDUAL FEED INTAKE IN BEEF CATTLE</b>
1	<p><b>2.40 Per head for offsets, 21 per head for feeding. This is substantial. Why aren't more doing this.</b></p> <p>Main barrier is bringing animal to centralized facility to test. Less than 0.5% bull tested for RFI. Works out to be 70 per head to test. This value is decreasing over time. What about genetic tests? This protocol does not look at genetic markets. This technology is still in developmental stage. Genetic market test is where we want to get to and is being worked towards. We are not there yet.</p>
2	<p><b>Trait is not breed specific. Essentially, within every population there is a similar range of efficiencies. Within the beef industry, we have made no genetic process for the efficiency.</b></p> <p>Appendix C lists procedure of approved testing facilities.</p>
3	<p>Heifers are being fed and have different dry matter intake than steers.</p> <p>Typically animals are grouped in feedlots. Feedlots have established common practices which generates records used for this protocol. Are separated in the Project Condition.</p>
4	<p><b>The impact of methane in the manure and the N2O, is it significant enough to worry about spreading manure. The main value is feed value. Could involve bringing in feed from outside the province and exporting nutrients (Manure)? Do we need to worry?</b></p> <p>The protocol doesn't worry about where the manure is spread. All the protocol figures out is that it is less and how much less. It assumes it is going to be spread. If it is managed differently than it would be part of a manure management protocol.</p>
5	<p><b>Penetration rate will take a long time because the cost&gt;return. Needs to wait until it is more economical.</b></p> <p>Australians have done some work with economic modeling. It is the feed savings that really drive this. Economic benefits from feed utilization – it's not the C credits. Australians have looked 25 years out (based on \$AU300 per test) and estimate that the break even place would be in 7 years. It is currently cheaper in Alberta per animal thus quicker return.</p>
6	<p><b>As the science improves, you will move towards genetic markers?</b></p> <p>Yes, the intent is to do this. Some individuals at the University of Alberta are researching this right now – looking for genetic markers for RFI and others... it's too soon to include genetic markers as too variable and not deemed valid right now within the scientific community. It has not successfully been validated in US, Can, AUST or Europe.</p>