

**FLY ASH USE IN CONCRETE AND OTHER CEMENT BASED PRODUCTS**

**BlueSource/EPCOR/TransAlta/Ashcor**

**No Comments – 3<sup>rd</sup> Round Review (Jan 7-Feb 7/09)**

**SUBSTITUTION OF BITUMEN BINDER IN HOT MIX ASPHALT PRODUCTION AND USAGE**

**BlueSource/Shell**

**No Comments – 3<sup>rd</sup> Round Review (Jan 7-Feb 7/09)**

**GHG REDUCTION PROTOCOL FOR THE CANADIAN DAIRY INDUSTRY**

**Atlantic Dairy Farmers/ClimateCHECK**

**No Comments – 3<sup>rd</sup> Round Review (Jan 7-Feb 7/09)**

**ENERGY EFFICIENCY IN COMMERCIAL AND INSTITUTIONAL BUILDINGS**

**Direct Energy/ClimateCHECK**

**No Comments – 3<sup>rd</sup> Round Review (Jan 7-Feb 7/09)**

**ANAEROBIC WASTEWATER TREATMENT**

**BlueSource/Cargill**

**No Comments – 3<sup>rd</sup> Round Review (Jan 7-Feb 7/09)**

## ENGINE FUEL MANAGEMENT AND VENT GAS CAPTURE – BlueSource / Encana

#	Clause/Section Number	Type of Comment (general, technical, editorial)	Comment or Justification for Proposed Wording Change	Proposed Wording Change	Alberta Environment Decision
1		General	Objection	A general comment - we believe that there are numerous errors and inconsistencies in the document that require a much more thorough technical review. We strongly believe that the protocol is not ready for approval at this time and should not be approved without additional review and revision.	
2		General	Clarification	There are numerous statements in the document that are either incorrect or misleading and that need to be corrected before the protocol is finalized. Modern gas engines are highly engineered pieces of equipment, and manufacturers must address numerous trade-offs when modifications are made regarding an engine's operational set points. Many of these decisions are optimized for specific applications and then adjusted to meet field and fuel conditions. The complexity and need to evaluate these factors are not addressed in the protocol.	
3	Page 47. Figure B1	General	Technical consideration	The protocol and Module 7 appear to ignore the impacts of changing the operating point to reduce fuel use on other parameters, particularly non-GHG emissions. In the stoichiometric case on Page 47, Figure B 1, the suggested protocol may produce a leaner engine but results in increased NOx emissions in the range of 5-10 g/bhp-hr. This will result in the NOx emissions exceeding the emission limit of 4.5 g/bhp-hr in Alberta and thus putting the engine and operator in noncompliance.	
4		General	Technical consideration	There is no discussion of the impacts of the proposed protocol and the resulting lean-burn condition on other emissions such as NOx. These are important issues that cannot be ignored. For example, rich burn engines use non-selective catalytic reduction (NSCR) systems in order to meet NOx emissions requirements. If the draft protocol is applied to an engine, the resulting lean combustion conditions will no longer be appropriate for NSCR systems, and selective catalytic reduction (SCR) systems will have to be added in order to meet regulatory emissions limits. This is a significant increased cost to the owner/operator, and such consequences are not considered nor addressed in the protocol.	
5		General	Technical consideration	Under the protocol, the operating margin to "knock", which is uncontrolled combustion in the engine cylinder, is reduced. This means that the engine is more likely to experience knock and may cause the engine to shut down or cause engine damage. This condition could have serious consequences. Moreover, increasing the Air/Fuel ratio on an engine designed to run at stoichiometric conditions increases the required air flow	

				and thus may limit power capability and require an even larger engine to complete the same task. Additionally, these conditions will also increase heat rejection capacity with negative impacts on the engine.	
6		General	Applicability	<p>The alterations of engines as proposed in the protocol are likely to affect warranty requirements, and the protocol needs to address who is responsible for any damage to the engine from its application.</p> <p>The above points are just several examples of significant issues that engine manufacturers have identified with the proposed protocol. Initial review has identified others that require clarification or revision. Many technical issues need to be addressed before this protocol is correct and ready for approval.</p>	
7	Protocol Scope (Pgs. 1-6)	Objection	General	<p>The scope of the Protocol (pg.1-6) is disjointed as only a commercial connection between quantifying GHG reductions from devices that re-insert vent gases and engine management systems exists. Furthermore, a separate quantification protocol for instrument gas to instrument air conversion has been submitted which has more continuity with vent gas mitigation than engine management system upgrades.</p>	
8	Glossary Pg. 10	Technical	Inaccuracy	<p>The definition given for an engine management system (pg. 10) is insufficient as only the air fuel ratio controller has been defined; neglecting the other available equipment, components and peripherals. Moreover, the definition ignores (one of) the most effective engine management goal; running an engine at its lowest speed and maximum Brake Mean Effective Pressure ("BMEP") to minimize BSFC.</p> <p>The Protocol is inadequate relating to the management of air fuel ratio control; post-combustion oxygen levels in nearly all internal combustion engines are instantly governed, maintained and monitored by an oxygen sensor, yet the Protocol states that the oxygen levels need only be monitored, measured and recorded once a year.</p>	
9		General	Technical considerations	<p>The Protocol falls short in other areas; i) not specifically measuring emission components, then trying to establish that fuel management will deliver GHG reductions, without actually measuring the emissions, and ii) deriving specific unit horsepower and BSFC through awkward and incomplete field tests, as opposed to relying on Original Equipment Manufacturer's ("OEM") or other widely recognized industry standardized, and proven methods of providing this important data for any engine regardless of age and/or location.</p>	
10	Protocol Scope	General	Technical	<p>The link between fuel consumption and GHG reductions (pg.3) is unconvincing and inconsistent with CAPP, EPA and UN standards. Although the Protocol claims "to meet the measurement,</p>	

				<p>monitoring and GHG quantifications requirements” (pg.1), it only references PTAC/Clearstone emission testing data that is incomplete and does not use EPA accepted test methods, testing equipment, testing duration, calculations or pre-post calibration. The handheld testing devices used have been rejected by the EPA for permit testing and proven inaccurate. The Protocol also suggests changing the combustion characteristics of the engine, from one extreme to the other (pg.1), and removing the catalytic converter (Technical Protocol Plan pg.16) but then uses the same static emissions factor for baseline and project calculations.</p>	
11	Page 2-3.	General	Technical Quantification	<p>The quantification of fuel consumption in this Protocol does not account for many engine performance variables and thus will allow easily skewed baseline measurements. For example, retarding ignition timing for the baseline and then advancing it for the project measurements will greatly distort the “fractional fuel saving”(pg.3). The OEM fuel consumption values are derived from rigorous testing under heavy engineering scrutiny and well established international standards. Unless the engine is improperly tuned or very poorly maintained, it is unfair to imply that OEM fuel consumption numbers are amiss by 30% (pg.2). Engine OEM's have well established methods and procedures to rationalize site-specific variations in BSFC as compared to standard test conditions, which have been neglected in this Protocol.</p>	
12		General	Technical Quantification	<p>The method used in the Protocol to measure and calculate horsepower is limited to engines driving reciprocating compressors and the statement that “the mechanical power from the engine equals the power required by the load” is false as it may be affected by devices specific to the application. Using horsepower as a measurement of production also does not conform to the intensity based Net Emissions Intensity (“NEI”) equation fundamental to SGER. While using the least amount of fuel possible to create horsepower is important; BSFC does not account for how well the horsepower is actually being used. Running a machine in bypass will create good BSFC but does little work to the gas that is flowing through the machine. It can be likened to idling your vehicle’s engine in the parking lot; which will reflect great BSFC, but does not generate any production (km’s).</p>	
13	General	Editorial	Technical	<p>Our major concern is that both documents contain incomplete, ambiguous, and misleading technical information and statements. Both documents emphasize reduction of fuel consumption (Brake Specific Fuel Consumption – BSFC) as a means to reduce Greenhouse Gasses (GHG) - using air/fuel ratio change to the apparent exclusion of the effects that this would have on other exhaust emission values, NOx, etc, and important engine performance characteristics such as stability and load acceptance.</p>	
14	Page 10, Lines 15-19	General	Definition	<p>For example, lines 15-19 on page 10 of the protocol apparently define an engine management system as a device that controls engine air and fuel flows – the engine's air/fuel ratio. In reality, engine management systems can and do control a multitude of parameters including air/fuel ratio, ignition timing, knock control, turbocharger (if so equipped) operation, and may even map for engine emissions control and compliance.</p>	

15	Page 1, Lines 12-17	General	Technical	<p>The protocol on page 1, lines 12-17, implies that engines can be operated at an air/fuel ratio different than original design resulting in easily obtained fuel consumption and GHG reductions. In principle that is true. In practice, however, many engine characteristics are affected and the entire picture must be evaluated. Refer to Figure B.1 on page 41 and Case Study III: Lean Burn Conversion on page 60, both in the module 7 document. Figure B.1 and notes imply that the lean region (#3) will meet NOx limits. That probably is incorrect. At the approximately 800-1600 ppm NOx shown, Alberta's 4.5 g/bhp-hr NOx limit will likely be exceeded. Refer also to the Case Study tabulation which shows clearly NOx levels ranging from 16-24 g/bhp-hr (neglecting the one zero value which is obviously in error). These values are well above the 4.5 g/bhp-hr limit.</p>	
16	Appendix	Editorial	Technical	<p>Refer now to Appendix C-2 on page 74 of the protocol. Waukesha believes that Table C-2.1 is misleading and contains measurement errors. Changing from the pre-audit 1.08% oxygen to the post audit 6.20% value shown in Table C-2.1 appears to show improvement in all measured parameters. However, compare the 3.43 g/bhp-hr NOx rate here at 6.2% oxygen with the values of Case Study III just discussed that are significantly higher at similar oxygen levels. The former would meet the 4.5 g/bhp-hr Alberta NOx requirement while the latter would exceed it by a large margin. Also, Table C-2.1 shows zero unburned hydrocarbons (HC) at the 6.2% oxygen setting. It</p>	
17	Page 2	Technical	Clarification	<p>In another area, the protocol on page 2, lines 33-36 and the referenced module 7 on page 8 state that field fuel consumption can easily be "up to 30% higher" than the ideal, manufacturer's published, values. Manufacturer published engine ratings and fuel consumption are based on ISO, or other, standard conditions – not "ideal" conditions. Obviously this does not take into account site specific conditions, fuel quality, or engine settings; all of which will be different in the field. Standard manufacturer data should not be used as a reference for comparison to site conditions. Even so, engines typically do not vary as much as 30% higher fuel consumption as it seems obvious in the fact that the impact of fuel costs (economics) would prohibit projects from applying an engine.</p>	

# INSTRUMENT GAS TO INSTRUMENT AIR CONVERSION IN PROCESS CONTROL SYSTEMS – Encana

#	Page Number; Line Number	Type of Comment (general, technical, editorial)	Comment or Justification for Proposed Wording Change	Proposed Wording Change	Alberta Environment Decision
1		General	Clarification	<p>It appears that this protocol only applies to a retrofit type of project where the existing gas system is replaced by an air system. This should be stated explicitly in the Protocol Applicability section.</p> <p>The protocol should define whether the equipment replacement is not just a normal replacement due to the end life of the equipment.</p> <p><b>The applicability criterion #1 may require additional guidance. Functional equivalence should likely be covered in the baseline section (2.2)</b></p>	
2		Technical	Clarification	<p>The instrument air flow rate is defined based on <u>one month</u> of measurements. The particular month is to be chosen by the proponent as being reflective. More guidance is likely prudent to facilitate verification (i.e. address production levels, facility/equipment down time/ shut downs). The concept of operational hours should likely be woven into the guidance on functional equivalence.</p>	
3		Technical	Clarification	<p>The project proponent should identify all vent sources served by compressed gas in the baseline and keep a list to track the sources of vent gas reductions. This way they can compare the equipment manufacturer's estimates for methane emissions to the claimed reductions based on metering of air flow rates.</p>	
4	Table 2.4	Technical	Addition	<p>Table 2.4 SSR B7- the measured volume of the compressed air does not state any reference conditions. The volume will vary based on the pressure that the air is compressed to, so this element is important to ensure functional equivalence – suggest corrected to STP. [On page 5 of the definitions it mentions that the pressure is the means by which functional equivalence is established, however, no reference to the pressure of the baseline or project systems are found in the quantification tables.]</p>	

5	Appendix B	Technical	Comment	Appendix B, pg 43, line 14. Retroactive credits do not appear to have any monitoring requirements in prior years (ie metering occurs several years after installation). There doesn't appear to be any way of assessing if the equipment actually operated in this time. It is 'noteworthy' that there would be differing requirements for historic as opposed to current practices.	
6	Flexibility Mechanism	Editorial	Addition	This protocol does not reference the destruction efficiency of the combustion device in the flexibility mechanism.	
7	Table 2.4	Technical	Policy	Table 2.4- SSR P7. The quantification methods include the GHG emissions from the consumption of electricity, which differs from other Alberta protocols which do not.	
8	Table 2.4	Technical	Policy	Table 2.4- SSR P7. The quantification methods reference "an approved displacement factor for self-generators," from Environment Canada, yet this emission factor could not be found anywhere.	
9	Quantification	Technical	Correction	Further, there appears to be a typo in equation #2 under SSR P7 as the 'volume of fuel' is never mentioned as a data point in the rows following the equation under P7 in the table. Additionally, the volume of fuel consumed does not correspond to the amount of electricity consumed by the compressed air system (ie another factor is needed to relate the proportion of electricity consumed by the system compared to the total generated at the site, not the amount of air consumed).	
Comments below are all general (unless indicted) correcting for grammar, spelling, and clarification.					
	1,4			Change "applications" to "systems"	
	1,6			Change "all" to "sometimes"	
	1,10			Delete "equipment", change "control" to "controller"	
	1, 19-20			Change "natural gas pneumatic to instrument gas for control instruments" to "instrument gas to instrument air in process control systems"	
	1, 24			Change "instruments" to "systems"	
	1,32			Change "natural gas pneumatic" to "instrument gas"	
	1, 36-37			Reword to "...use to compress and manage the air."	
	1,40			Reword to "...conversion to instrument air."	

2,1			Delete line1, reword to "In this baseline scenario, instrument gas is typically sourced from the fuel supply for the facility."
2,24			Delete "and conditioning;"
3, 9			Reword to "The instrument air system will replace the instrument gas system in process controls. Functional equivalence has not been compromised."
3, 29			Change "and" to "that"
3,33			Change "natural gas pneumatics" to "instrument gas"
3, 34			Add "...pressure to pneumatic devices."
3, 35			Delete pneumatic
5	Glossary		Change "Air pneumatic Instrument" to "Instrument Air" Add "pressurized" after "uses"
5	Glossary		Delete "In this protocol."
5	Glossary		Change "Gas pneumatic Instrument" to "Instrument Gas" Replace "compressed" with "pressurized"
11	Table 2.1 P7		Add "management" after "...for the air [] system"
11	Table 2.1 P4		Change "input" to "sent" Delete "The mostly likely... carbon dioxide."
12	Table 2.1 P16		Correct "pla[n]ting"
12	Table 2.1 P16		Change "GH" to "Greenhouse gas"
13, 3			Delete "pneumatic"
13, 7			Change "monitor" to "meter"
13, 13			Delete "and condition"
13, 21			Delete "to fuel gas"
13, 21-23			Delete last line
15	Table 2.2 B6		Delete "Emissions from processing...during activity B10."
16	Table 2.2 B6 and B7		Delete "...using various methods prescribed in this protocol."
16	Table 2.1 B4		Change "input" to "sent"
17	Table 2.2 P17		Correct "pla[n]ting"
28	Table 2.4 Discount Rate – Technical		Reword "1. DR(%)=0 if inspection occurred $\leq 1$ year 2. DR(%)= 2.5 %*minimum year interval for $1 < \text{year} \leq 10$ 3. DR(%)= 25% for year > 10  Change "and" to "/" in Fuel Extraction and Processing
29			Delete $\text{m}^3$ for $G_{\text{AIR}}$ and $\text{kg}/\text{m}^3$ for $G_{\text{CH}_4}$
32	Table 2.5		Delete all 3 rows in P7 volume, electricity, and total air produced

32	Table 2.5		Move Electricity used by desiccant to P7
41, 12			Change 10% to 12.5%.
41, 14			Change "percentage" to "factor"
43, 14			Add "... not metered and no inspection for leaks or repairs occurred."
43, 17			Change "6%" to "7.5%"; change "3" to "4"
43,31-32			Reword to "for gas that is combusted."
45	Table 2.4 Discount Rate – Technical		Reword "1. DR(%)=0 if inspection occurred $\leq 1$ year 2. DR(%)= 2.5 %*minimum year interval for $1 < \text{year} \leq 10$ 3. DR(%)= 25% for year > 10
46, 3			Change "altered" to "adjusted"
53	B.3		Add "0.057" to Forestry, Construction....
General			Change the yearly leak discount factor from 2.0% to 2.5% and other related calculations accordingly
General			Clarify the use of the term "vent" and "bleed" throughout protocol
29	Table 2.4		Clarify STP for $G_{\text{AIR}}$ and $G_{\text{CH}_4}$ and NTP for $k_{\text{AIR}}$ , $k_{\text{CH}_4}$
General	All Tables		Add "total" to tables to indicate facility general use i.e. "Total Managed Air", "Total Produced Air". Etc... Correct this in Table 2.4 Check for words that should be subscript i.e. i, electricity

## NITROUS OXIDE ABATEMENT FROM NITRIC ACID PRODUCTION – EPCOR/ClimateCHECK

#	Clause/Section Number	Type of Comment (general, technical, editorial, policy)	Comment or Justification for Proposed Wording Change	Proposed Wording Change	Alberta Environment Decision
1	Section 2.5.1 Quantification	Editorial	Clarification	To calculate the Emission Reductions the definition of NAP <b>must</b> be the Nitric Acid Production from the <u>project</u> campaign in both equations, as noted correctly in the TPP and in the CDM Methodology AM0034 v3.1.	
2	Table 2.4 Quantification Procedures	Technical	Clarification	<p>In <b>Table 2.4 Quantification Procedures</b> the formula for quantifying the <i>Emission Factor Project</i> includes Uncertainty.  <b>Emissions Factor Project = [(VSG Project * NCSG Project *10-9*OH Project) / NAP Project* (1- Uncertainty/100)]</b>                      The purpose of the Uncertainty is to estimate the uncertainty of the measurement of the nitrous oxide emission rate at the point of the monitoring systems implementation. As the uncertainty for the monitoring system is determined in the <i>Emission Factor Baseline</i>, it should not be included in the <i>Emission Factor Project</i> as well. In addition, <b>Section 2.5.1</b> notes only two differences between CDM Methodology AM 0034 v 3.1 and the AB Protocol; the Uncertainty is only found in the baseline emission factor calculation in CDM Methodology AM0034 v3.1.</p> <p>The correct formula is:  <b>Emissions Factor Project = [(VSG Project * NCSG Project *10-9*OH Project) / NAP Project]</b></p>	
3	Table 2.4 Quantification	Technical	Correction	<p>In <b>Table 2.4 Quantification Procedures</b>, the unit of measure for Uncertainty is identified as kg/h, however in the formula:  <b>Emissions Factor Baseline = [(VSG Baseline * NCSG Baseline *10-9*OH Baseline) / NAP Baseline] * (1- Uncertainty/100)</b>                      Uncertainty needs to be expressed in the unit of % to be applicable. Change the Unit of measure in <b>Table 2.4</b> for Uncertainty from kg/h to %.</p>	
4	Tables 2.1 & 2.2	Editorial	Clarification	<p>In <b>Table 2.1 and Table 2.2</b>, SS P1 and SS B1 both state that “ <i>Volumes, flow rates, temperatures and pressures must all be monitored and tracked.</i>” The purpose of monitoring these parameters is not for quantification but to avoid the possibility that the operating conditions of the plant are modified in such a way that may increase N2O generation during the baseline. These parameters are also monitored during the project campaigns to ensure the project is also operating under the same conditions as the baseline.</p>	

				These parameters should be clearly identified in the protocol, as they are in the CDM Methodology AM0034 v3.1.	
5	Section 2.2 Identification of Baseline	Technical	Addition for clarification	<p>Furthermore, <b>Section 2.2 Identification of Baseline</b>, the final sentence states “ <i>A permitted range of parameters that influence the level of N2O formation is established during the baseline campaign which must be demonstrated to be within the specifications of the plant</i>”</p> <p>For additional clarity to demonstrating that the baseline campaign was established within the specifications of the plant, the graph shown in the TPP and in CDM Methodology AM0034 v 3.1 should also be added with the identified parameters.</p> <p>A new subsection outlining the parameters and displaying the graph should be added in <b>Section 2.5.1</b> of the protocol.</p>	
6	Data Monitoring and Measurement	Technical	Addition for clarification	<p>The parameters that are required to ensure the baseline and project campaigns are operating under the permitted operating conditions have not been included in the Quantification Procedures.</p> <p>Oxidation Temperature and Pressure, as well as Ammonia Gas Flow Rate and Ammonia to Air Ratio must be included in Table 2.4 Quantification Procedures as demonstrated in the CDM Methodology AM0034 v 3.1.</p>	
7	Section 2.2 Identification of Baseline	Editorial	Clarification	<p>In <b>Section 2.2 Identification of Baseline</b>, the final sentence states “ <i>A permitted range of parameters that influence the level of N2O formation is established during the baseline campaign which must be demonstrated to be within the specifications of the plant</i>”.</p> <p>For additional clarity and consistency with the CDM Methodology AM0034 v3.1, the purpose of parameters should be added.</p> <p>Modify the sentence as follows:  <i>“A permitted range of parameters, identified in Section 2.5.1.1, that influence the level of N2O formation is established during the baseline campaign which must be demonstrated to be within the specifications of the plant. If these parameters are demonstrated as not being with the specifications of the facility, the baseline campaign must be reassessed.”</i></p>	
8	Section 2.5.1	Technical	Addition for consistency	<p><b>Section 2.5.1 Quantification Approaches</b> is written with reference to the CDM Methodology AM0034 v3.1, noting two differences. For consistency, clarity and conciseness, all the formulas which are applicable from the CDM should be</p>	

				<p>included in this section so as not to open the protocol to multiple interpretations.</p> <p>a. As referenced in the project TPP, a <i>“Statistical analysis is applied to both the baseline emissions factor and each campaign-specific project emissions factor. Only those N2O measurements taken when the plant is operating within the permitted range will be considered in the calculation of baseline emissions.”</i></p> <p>In <b>Section 2.5.1</b> include the CDM Methodology AM0034 v3.1 equation for performing the statistical analysis.</p> <p>i. Calculate the sample mean (x);</p> <p>ii. Calculate the sample standard deviation(s);</p> <p>iii. Calculate the 95% confidence interval (equal to 1.96 times the standard deviation);</p> <p>iv. Eliminate all data that lie outside the 95% confidence interval;</p> <p>v. Calculate the new sample mean from the remaining values (volume of stack gas (VSG) and N2O concentration of stack gas (NCSG)).</p>	
9	Table 2.4	Technical	Addition	<p>In <b>Table 2.4 Quantification Procedures</b>, to determine the VSG (Mean Stack Gas Volume Flow Rate) for the baseline and the project, the stack Velocity, Pressure and Temperature are the measured values and VSG is calculated to normal conditions.</p> <p>Add the VSG calculation formula and the appropriate parameters and variables to the table.</p> <p><b>VSG = (VEL*K)*PRESS/(PRESS*(TEMP+K))*Stack Area*60(seconds)*60(minutes)</b></p>	
10	Table 2.4	Technical	Addition	<p>In <b>Table 2.4 Quantification Procedures</b>, to determine NCSG (Mean Concentration of N2O) in mg N2O/m3 for the baseline and the project, the N2O Concentration is actually measured in ppm.</p> <p>Thus, the formula for calculating the Mean Concentration of N2O to normal conditions needs to be added to the table as well as the appropriate parameters and variables.</p> <p><b>NCSG = ppmv * MWN2O/Std V</b></p>	
11	Table 2.4	General	Removal	<p>In <b>Table 2.4 Quantification Procedures</b>, a note is made in the titles for the project and the baseline that <i>“Emissions Factor is calculated leveraging the UNFCCC approved CDM methodology AM0034 v.3.1”</i>.</p> <p>This reference can be removed as all the calculations have been added in detail and no longer require a reference to the CDM Methodology AM0034 v3.1.</p>	