



Advice to the Government of Alberta on a NO_x Emission Standard for Coal-to-Gas Converted Units

Final Report by the CASA Coal-to-Gas Working Group

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Working group members are grateful for the opportunity to recommend a NO_x emission standard for coal-to-gas unit conversions in Alberta, and appreciate the confidence placed in CASA by the Government of Alberta in requesting that this work be done. Working group members worked efficiently and with respect for each other and want to acknowledge the spirit of constructive collaboration that underpinned the process.

About CASA

The Clean Air Strategic Alliance (CASA) was established in March 1994 as a new way to manage air quality in Alberta. CASA is a multi-stakeholder partnership composed of representatives selected by industry, government, and non-government organizations. Every partner is committed to a comprehensive air quality management system for Alberta. CASA's mandate is to:

1. implement the comprehensive Air Quality Management System for Alberta
2. conduct strategic air quality planning for Alberta through shared responsibility and use of a consensus-building, collaborative approach
3. prioritize concerns about air quality in Alberta, and develop specific actions or action plans and activities to resolve those concerns

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Acronyms and Abbreviations

AEP	Alberta Environment and Parks
AESO	Alberta Electric System Operator
CASA	Clean Air Strategic Alliance
CO ₂	Carbon dioxide
CTG	Coal-to-gas
ECCC	Environment and Climate Change Canada
ENGO	Environmental Non-Government Organization
EoDL	End of design life (referring to a generation unit)
EoUL	End of useful life (referring to a generation unit)
EPEA	Environmental Protection and Enhancement Act
GHG(s)	Greenhouse gas(es)
GoA	Government of Alberta
GWh	Gigawatt-hour
kg	kilogram
LNB	Low NO _x burners
MCR	Maximum Continuous Rating as reported by AESO
MW	Megawatt
NO _x	Nitrogen oxides
PM	Particulate matter
SO ₂	Sulphur dioxide
SOFA	Separated Over Fire Air
t	tonne

Executive Summary

In October 2017 Alberta Environment and Parks (AEP), via a letter from Deputy Minister Andre Corbould, asked CASA to develop and recommend by December 31, 2017 a nitrogen oxides (NO_x) emission standard that could be applied to coal-fired electricity generation units that converted to fire natural gas instead of coal. This work was to include:

- Draft technology requirements for a coal-to-gas (CTG) unit conversion
- A draft NO_x emission standard for a CTG unit conversion
- Allowable lifespan for a CTG unit conversion based on the draft NO_x emission standard

Following discussions between the board of directors and the executive director, CASA established the Coal-to-Gas Working Group to undertake this work.

The multi-stakeholder group met for five days in October and November, and its discussions were informed by a third-party engineering consultant's report commissioned by the Government of Alberta. The group reached consensus on a Coal-to-Gas Unit Conversion NO_x Emission Standard Agreement, and subsequently obtained the endorsement of industry, ENGO and Government of Alberta stakeholders who were represented on the working group.

The agreement is a two-page document that was presented to and approved by the CASA board at its December 13, 2017 meeting. This agreement addresses the three points in AEP's request to CASA.

- With respect to **technology requirements for a CTG unit conversion**, the group recommends a technology design target to achieve a 55% reduction in NO_x emissions below the benchmark. The emission intensity benchmark is the NO_x Baseline Emission Rate per unit, as defined in s1(1)(f) of the Emissions Trading Regulation (Alberta Regulation 33/2006 under EPEA). How the operator intends to achieve this target will be documented in the approval amendment application required under section 67 of EPEA.
- The recommended **NO_x emission standard for a CTG unit conversion** is a compliance limit of 50% NO_x emissions reduction below the benchmark.
- The **operational life for a CTG unit conversion** is recommended to be aligned with the federal greenhouse gas regulation for converted coal units.¹ Once converted, the group recommends the above coal-to-gas NO_x emission standard be maintained until the proposed federal end of life for that converted coal unit.

This report incorporates the agreement along with background and rationale for each component and elaborates on what the group viewed as additional key points. Due to time constraints, this report was approved by the co-chairs, but not by the entire working group nor by the CASA board. This report will be presented to CASA as information at its spring 2018 meeting.

¹ The group made its recommendation based on the recommendations of Environment and Climate Change Canada staff to the Minister and not the final regulations regarding coal-to-gas conversion.

1 Introduction and Background

1.1 Managing Air Emissions from Alberta's Electricity Sector

The Clean Air Strategic Alliance (CASA) has a long and successful history of bringing together diverse organizations to collaboratively develop innovative solutions and provide strategic air quality advice to the Government of Alberta (GoA) and other stakeholders. This body of work includes an emission management framework for Alberta's electricity sector prepared by CASA's Electricity Project Team and published in 2003. The Framework was developed in response to a request from the then-Minister of Environment to determine a better way to manage air emissions from Alberta's electricity sector. The ministerial request was made following several highly contentious and adversarial hearing processes in 2001 related to proposed new coal-fired units. Supported by all stakeholders including industry, government, and environmental non-government organizations, the Framework applies to both existing and new facilities; its goals are to:

- provide operators with long-term regulatory certainty
- provide operators with flexibility in complying with emission requirements
- set agreed-to environmental outcomes

The 2003 Framework was designed to introduce more stringent air emissions requirements at a time when a company would start to plan for replacement or refurbishment of existing units. This could include either modification to or replacement of existing units.

Alberta Environment and Parks (AEP) continues to implement the Framework wherein at the end of design life (EoDL),² existing units must meet a more stringent emission standard for both nitrogen oxides (NO_x) and sulphur dioxide (SO₂). Nine coal-fired units will reach their EoDL by the end of 2020.

The Framework requirements around natural gas-fired NO_x emission standards were developed at a time when natural gas prices were extremely high, and modern large natural gas-fired turbine electricity generation projects (outside of cogeneration) were unlikely to be proposed. Thus, existing standards are based on combustion capabilities of modern gas-fired turbines at the time the standards were set. When the Framework was produced and during the two subsequent five-year reviews (2008 and 2013), there was no discussion of possibly converting an existing coal-fired boiler to fire natural gas, as stakeholders were of the view that the price of natural gas would deter this type of conversion. However, this situation is changing in the face of persistently low natural gas prices and a changing regulatory environment.

1.2 The Changing Regulatory Environment for Electricity Generation

In August 2012, the federal [Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations](#) became effective and placed a stringent CO₂ emissions limit (420 t/GWh based on combined cycle gas turbine performance) on coal-fired generating units at a defined end of useful life (EoUL) date. In December 2016, the federal government published a Notice of Intent to regulate greenhouse gas (GHG) emissions from coal-to-gas (CTG) converted units. Recently, Environment and Climate Change Canada (ECCC) staff recommended to the ECCC Minister that coal units be phased out by December 31, 2029, and CTG units be subject to emissions intensity performance standards. To support the transition from coal to cleaner sources of electricity generation, ECCC staff recommended that CTG units operate for no more than 10 years after EoUL, with a life extension of 0, 5, 8 or 10 years. The length of the life extension period would be determined by demonstrated GHG emissions intensity running at baseload, and CTG units would be subject to the 420 t/GWh performance standard at the end of that

² EoDL is used in the CASA Framework, but the federal government uses the term "End of Useful Life," or EoUL. EoUL is used in this report unless the reference is specifically to the CASA Framework.

life extension period. Converting existing coal generation assets to natural gas will smooth out “cliffs” caused by expected unit retirements under the federal regulation.

Over the last two years the GoA has announced multiple initiatives that will support the province’s transition to a new electricity system, including the transition from coal to less carbon-intensive power generation. Emissions from coal-fired electricity generation will be phased out by 2030 with Alberta moving toward more renewable energy and natural gas-fired electricity. As part of the Off-Coal Agreements signed in late 2016 with coal generators affected by the 2030 emissions phase-out, the GoA has committed to providing regulatory clarity for coal facility owners to convert coal-fired generation units to natural gas where it is economically and environmentally viable. The GoA is also in discussions with the Government of Canada to ensure that the pending federal regulations will work for Alberta.

Some coal generators have indicated an intent to convert their units, beginning as early as 2018. The GoA is exploring ways to support the communities and workers that would be most affected by these potential facility conversions. As part of this transition, Alberta requires a provincial NO_x emission standard for a CTG converted unit that will enable generators to make imminent business decisions regarding potential conversions.

The shift from an energy-only market to capacity market structure is another key element of the GoA’s plan to reform the electricity system. A capacity market allows for competition and private investment within a framework that delivers stable, affordable prices and a reliable system for consumers, and it will ensure Albertans have a reliable supply of power as the electricity system evolves. Alberta’s capacity market will be in place in 2021.

Other initiatives are also contributing to the transformation in the province’s electricity sector. The Renewable Electricity Program will add approximately 5,000 megawatts of capacity by 2030 through a series of private sector competitions. This program is being administered by the Alberta Electric System Operator (AESO) using a transparent and competitive process while ensuring that projects come online in a way that does not compromise the reliability of the provincial grid. The GoA has also introduced a four-year 6.8-cent-per-kilowatt-hour price cap for the Regulated Rate Option, effective June 1, 2017. This cap was put in place to provide more stable electricity prices for consumers as Alberta transitions to the capacity market. Micro and community generation are another important part of the overall plan. This initiative will empower more Alberta households and businesses who are interested in generating their own renewable electricity to do so. Finally, the GoA is investigating how interties could increase Alberta’s reliability standards and support the competitive capacity market framework with the adoption of a capacity market and the target of 30% renewable energy by 2030.

All of these factors were in play when the CASA Coal-to-Gas Working Group began its work.

1.3 The CASA Coal-to-Gas Working Group

In October 2017, AEP asked CASA to develop and recommend, by December 31, 2017, a NO_x emission standard that could be applied to the coal-fired generation units that are considering conversion to firing natural gas; this work includes:

- Draft technology requirements for a CTG unit conversion
- A draft NO_x emission standard for a CTG unit conversion
- Allowable lifespan for a CTG unit conversion based on the draft NO_x emission standard

Appendix A describes additional project details that were included in the October 5, 2017 letter from AEP’s Deputy Minister.

In mid-October, CASA established the Coal-to-Gas Working Group with representatives from the GoA, the electricity sector, affected communities and environmental non-government organizations, as shown on p. ii. As a

basis for establishing the NO_x emission standard for CTG conversions, the GoA commissioned a third-party engineering consultant (Black & Veatch) to undertake a technical review that would provide:

- the air quality performance of indicated CTG conversions depending on the operation, installed control technologies, and other modification that may impact emissions
- costs associated with varying control technologies and other modifications as it relates to the total capital cost of conversions
- estimations of the air quality performance of Alberta coal-fired units if converted to natural gas

A draft of Black & Veatch’s report entitled *Performance and Air Quality of Converted Coal to Gas Units* was made available to the group and the consultants participated in one group meeting to present the report’s findings and respond to questions.³ Following this meeting, Black & Veatch refined the report based on stakeholder feedback to ensure that updated information was available for the group’s subsequent discussions.

The group held three face-to-face meetings for a total of five days between October 30 and November 29, 2017, reaching consensus on a Coal-to-Gas Unit Conversion NO_x Emission Standard Agreement. This agreement was presented to the CASA board at its December 13, 2017 meeting, where it was approved by consensus for transmittal as advice to the Government of Alberta.

All members came to the group with the particular interests of their stakeholder group in mind. They collaboratively shared their perspectives and experience and this report reflects the results of their efforts.

2 Electricity Sector Context

2.1 Current NO_x Source Emission Standards in Alberta’s Electricity Sector

The emission requirements for Alberta’s electricity sector are outlined in the 2003 [Electricity Emissions Management Framework](#) developed by CASA, and in the 2005 Alberta Air Emission Standards for Electricity Generation and Alberta Air Emission Guidelines for Electricity Generation. The emission standards are implemented through inclusion in operating approvals issued under the *Environmental Protection and Enhancement Act*.

Coal-Fired Electricity Generating Units

The annual emission intensity limits for new coal-fired electricity generating units are shown in Table 1. These limits were reviewed and updated with full stakeholder consensus at the first review of the Electricity Emissions Management Framework completed in 2010. The annual NO_x emission intensity limits applied to these units is based on the capabilities of selective catalytic reduction.

Table 1: Annual Emission Intensity Limits for New Coal-Fired Units

Substance	Unit Limit (kg/MWh _{net})
Nitrogen oxides (NO _x)	0.47 (design specification: 0.40)
Sulphur dioxide (SO ₂)	0.65 or 90% removal (whichever is less stringent)
Primary Particulate Matter (PM)	0.066
Mercury (Hg)	75% capture target (optimization plans to meet 80% capture by 2013)

*where the MWh includes the total net generation of electricity to the electricity grid and excludes any electricity used at the plant site

³ The Black & Veatch report is neither a CASA report nor a report of the working group; it represents only the views of its authors.

Natural Gas-Fired Electricity Generating Units

The annual NO_x emission intensity limits for new natural gas-fired continuously operating combined cycle units and cogeneration units were set based on the combustion capabilities of modern gas turbines at the time the standards were set. Table 2 presents an overview of these limits.

Table 2: Annual NO_x Emission Intensity Limits for New Natural Gas-Fired Combined Cycle Units and Cogeneration Units

Electrical Power Generating Capacity of the Plant	Unit Limit (kg NO_x/MWh_{net})
0 < 20 MW	0.60
≥ 20 – 60 MW	0.40
> 60 MW	0.30

*where the MWh includes both the combined total thermal energy and the net generation of electricity, excluding any electricity used to produce the electricity.

2.2 Coal-to-Gas Unit Conversions

While the timing of coal generation phase-out is mandated by federal and provincial policies and regulations, converting coal units to fire natural gas is ultimately an owner's commercial decision. In early 2017, some owners of coal units announced the intention to consider converting certain coal-fired units to natural gas-fired generation. The final decision on whether to convert depends largely on outstanding uncertainties, including the NO_x emission standard.

2.2.1 Rationale

Converting from coal to natural gas offers an efficient way to continue using existing generation boilers, steam turbines and other site infrastructure, while reducing GHGs and other air pollutants during the transition to a less carbon intensive power sector. However, the decision to convert coal units will reflect the fact that unit conversion is an economic investment requiring a reasonable opportunity to recover the conversion costs and yield a return on investment. The economic case for conversion is supported by lower natural gas prices. In addition, CTG conversion provides an option to extend operations beyond EoUL, supports the communities where existing facilities are located, and improves electricity system reliability by using existing infrastructure to maintain dispatchable power and to help smooth the transition to renewable energy.

The construction period to convert a coal unit to natural gas is shorter than the time required to build a new natural gas combined cycle installation. The cost-effective use of existing infrastructure and short conversion timeline allows for early action to reduce emissions and allows electricity needs to continue to be met reliably while providing some time to transition to renewable generation.

2.2.2 Expected Environmental Benefits

Working group members recognized and acknowledged that converting coal plants to natural gas will substantially reduce emissions prior to 2030. It is expected that CTG conversions will reduce total annual and cumulative NO_x emissions relative to existing coal-fired generating units. A CTG conversion at an existing coal-fired unit will also eliminate emissions of SO₂ and mercury, significantly reduce primary particulate matter, and lead to significant drops in internal electricity load and hence, reductions in GHGs. Early action on conversions can also potentially provide considerable support to overall NO_x reduction objectives in regional air zones.

2.2.3 Supercritical and Subcritical Units

Alberta has, in general, two types of coal-fired power plant units – supercritical and subcritical. A supercritical unit operates at much higher steam pressures and temperatures, making it more thermally efficient; that is, the unit can produce power more efficiently. Keephills 3 and Genesee 3 units are the only supercritical units in Alberta.

A subcritical unit uses older technology that operates at lower pressures and temperatures than a supercritical unit. The remaining units in Alberta’s coal fleet are of this type. The more thermally efficient supercritical units produce slightly lower NO_x emissions on an emission intensity basis (measured in kg/MWh) than subcritical units. More substantive reductions of NO_x emissions come from combustion modifications to supercritical units, with the addition of low NO_x burners (LNB) and Separated Over Fire Air (SOFA) within the boiler. When both supercritical units received regulatory approval, companies installed this combustion modification technology to meet the required NO_x emission standards.

2.2.4 Challenges

CTG conversions are not considered “business as usual” for operators, as coal units have the option to continue to operate while firing coal until the federal EoUL as long as existing provincial emission framework requirements are met. One of the many uncertainties affecting investors contemplating conversion is the lack of an applicable NO_x emissions standard. Eliminating this uncertainty with a NO_x emission standard for CTG converted units will positively influence investor confidence.

There can be site-specific design challenges in conversion to natural gas. No two units are exactly the same, meaning careful consideration of site-specific aspects is required to evaluate the suitability of a generating unit for successful conversion. Impacts from firing on natural gas include changes to temperatures, flue gas flow rates, heat transfer and boiler efficiency.

There could be challenges associated with Power Purchase Arrangements, coal contract obligations and impacts from a new electricity market design and how units will operate. It is reasonable to assume that during their operational lifespan, CTG units may operate at long duration at low load conditions, potentially with frequent starts and stops. Operating a unit converted to natural gas at low load conditions will require flexibility in how emission requirements are applied.

Uncertainty will continue until planned regulatory changes are implemented. In Alberta, the Capacity Market design, regulations associated with the Climate Leadership Plan, and other key requirements are not final. At the federal level, some uncertainty will remain until the amendment to *Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations* is finalized and a final GHG regulation for natural gas units in the electricity sector is introduced.

3 Coal-to-Gas Unit Conversion NO_x Emission Standard Agreement on Advice to the Government of Alberta

The working group and the CASA board reached consensus agreement on the following advice:

- Overarching Concept
- For Subcritical Units:
 1. Benchmark
 2. NO_x emission standard for a CTG unit conversion
 3. Technology requirements for CTG unit conversion
 4. Allowable lifespan
- For Supercritical Units:
 1. The pre-existing NO_x emission standard will continue to apply until federal end of life for that converted unit.
 2. Relative to subcritical units, supercritical units are already low NO_x emitters.
- Reporting for Subcritical and Supercritical Units:
 1. Reporting obligation
 2. Annual NO_x mass emission performance reporting obligation
- Further Details of a NO_x Emission Standard for Coal-to-Gas Converted Units
 1. Annual emission intensity compliance test
 2. Commissioning period

Rationale developed through the group’s discussions is presented for each component of the agreement. Due to time constraints, this text was approved by the co-chairs but not by the entire working group nor by the CASA board. This report will be presented to the CASA board as information at its spring 2018 meeting.

Overarching Concept

Stakeholders agree with the benefits of and need for coal-to-gas conversion in terms of transitioning to cleaner electricity generation as well as the need to provide investment clarity for operators with regard to environmental performance and regulatory certainty.

For Subcritical Units

1. **Benchmark**
 - Emission intensity benchmark to be the NO_x Baseline Emission Rate per unit (see Table 3)

Table 3: NO_x Baseline Emission Rate for Alberta Coal-Fired Generation Units

Approval	Company	Facility	Unit	NO _x Baseline Emission Rate (kg/MWh)
123	ATCO	Sheerness	1	1.925
123	ATCO	Sheerness	2	1.925
773	Capital Power	Genesee	1	2.125
773	Capital Power	Genesee	2	2.125
773	Capital Power	Genesee	3*	0.621
1512	ATCO	Battle River	3	2.276
1512	ATCO	Battle River	4	2.276
1512	ATCO	Battle River	5	2.394

Approval	Company	Facility	Unit	NO _x Baseline Emission Rate (kg/MWh)
9814	Maxim Power	Milner	1	2.876
9830	TransAlta	Sundance	1	1.520
9830	TransAlta	Sundance	2	1.554
9830	TransAlta	Sundance	3	1.627
9830	TransAlta	Sundance	4	1.641
9830	TransAlta	Sundance	5	1.497
9830	TransAlta	Sundance	6	1.499
10324	TransAlta	Keephills	1	2.191
10324	TransAlta	Keephills	2	2.173
10324	TransAlta	Keephills	3*	0.621

* Indicates a supercritical unit. All units without an asterisk are subcritical units.

Each number is a “baseline emission rate” as defined in s1(1)(f) of the Emissions Trading Regulation (Alberta Regulation 33/2006 under EPEA). How the rates are determined is defined in Part 4 of the regulation.

Rationale for basing the emission intensity benchmark on the NO_x baseline emission rates:

- These emission rates were derived through the initial CASA process that created the Electricity Framework in 2003.
- They are established, published numbers that are generally understood.
- This approach makes the benchmark transparent, it acknowledges a shortened unit life, and it recognizes any early action leading to improved environmental performance that might have been taken prior to a CTG conversion.

2. NO_x emission standard for a CTG unit conversion

- Compliance limit of 50% NO_x emission reduction below the benchmark

Rationale for a compliance limit of 50% NO_x emission reduction below the benchmark:

- The amount of the emission reduction is based on the Black & Veatch technical report that was prepared for the GoA as part of this project and presented to the working group. This reduction was considered to be reasonable and within the capabilities of existing pollution control technologies.
- The limit provides operator flexibility by recognizing operational difficulties of add-on pollution control technology, given the possible operating scenarios of coal-to-gas conversions and the uncertainty associated with the conversion outcome.
- The 50% reduction should be considered together with the technology requirement for a CTG unit conversion recommended below.

3. Technology requirements for a CTG unit conversion

- Design target of 55% NO_x emission reduction below the benchmark.
- How the operator intends to achieve this will be documented in the amendment application.

Rationale for a design target of 55% NO_x emission reduction below the benchmark:

- Although the outcome of CTG conversions is uncertain at this time, there is a desire to see improved performance; a design target of 55% is expected to deliver additional reductions in NO_x emissions beyond those associated with simply installing fuel-switching technology (i.e., LNB).

- To give operators the flexibility they need, no specific technology requirements are defined. However, it is expected that achieving the 55% design target will involve a level of investment greater than just installing fuel-switching technology (i.e., LNB) and that through the selection and application of cost-effective NO_x combustion-based control technologies applicable to their particular units, operators will strive to minimize emissions.
- Industry has accepted the risk associated with a commitment to improved performance and is willing to set a higher design target to ensure compliance with the emissions standard and to aim to achieve further reductions.

4. Allowable lifespan

- Operational life is aligned with the federal greenhouse gas regulation for converted coal units
- Once converted, the above coal to gas NO_x emission standard will be maintained until the proposed federal end of life for that converted coal unit

Rationale:

- This approach does not hinder early conversion from coal to gas.
- This approach recognizes there will be a period of transition for Alberta's electricity system during which the provincial and federal regulations need to be aligned. The working group made assumptions based on the best information available at the time, but the allowable lifespan for converted units may need to be revisited once the final federal regulation is released.

For Supercritical Units

- The pre-existing NO_x emission standard will continue to apply until federal end of life for that converted unit.
- Relative to subcritical units, supercritical units are already low NO_x emitters.

Rationale:

- As noted earlier, the two existing supercritical units in Alberta already have lower NO_x emissions than subcritical units due to the combustion modification technology that was installed when they were constructed. The group agreed that subcritical and supercritical units should be treated differently, as the supercritical units are already meeting much lower NO_x emission requirements. Should the two supercritical units (Keephills 3 and Genesee 3) convert from coal to gas, the pre-existing NO_x emission standard will continue to apply until federal end of life for that converted unit.

Reporting for Subcritical and Supercritical Units

1. Reporting obligation

- All coal-to-gas unit conversions will continue to report NO_x emissions to demonstrate emission reductions achieved.

Rationale:

- The reported emissions do **not** represent an allotment or allocation or credit that can be used for emissions trading or to meet any other emission reduction obligation.
- A clear reporting obligation provides transparency to the public, particularly affected communities.

2. Annual NO_x Mass Emission Performance Reporting Obligation

- Annual performance reporting obligation is based on 50% of benchmark emission intensity (kg/MWh) x NET MCR (MW) x 8760 hours
 - Net MCR = Maximum Continuous Rating as reported by AESO

- If an exceedance is identified in the annual performance reporting obligation, it will require an explanation and what can be done to prevent it from re-occurring.
- Start/Stop annual mass emissions = annual mass emissions for periods ramping up to the minimum stable load reported by AESO, and down from minimum stable load to off-line.
- Total annual mass emissions = start/stop annual mass emissions plus annual performance reporting obligation.

Rationale:

- The performance obligation is meant to show, on an annual basis the environmental improvements achieved by a CTG unit conversion, and is to be used only for reporting purposes.
- 8760 hours is the total number of hours a unit operates in a year

Further Details of a NO_x Emission Standard for Coal-to-Gas Converted Units

Two other key aspects of this agreement are an annual emission intensity compliance test, and the importance of having an established commissioning period.

1. Annual Emission Intensity Compliance Test

- Conduct an annual test to show compliance with emission intensity using a manual stack survey or existing continuous emission monitoring system equipment under optimal operating conditions at or near MCR.
- Determine compliance through an annual emission intensity compliance test. Compliance is applied in accordance with the GoA's [Compliance Assurance Program](#).

Rationale:

- A compliance test provides transparency and a way to affirm progress in reducing emissions. However, important details associated with compliance testing will require further discussion in a future forum or through the approval amendment process; examples include methodology to determine emissions from a common stack where generating units use different fuels, and test considerations where MCR cannot be achieved.

2. Commissioning Period

- The compliance emission intensity limit will come into effect approximately one year after the coal-to-gas unit conversion to allow for the commissioning, tuning and optimizing of the unit.
- Criteria
 - Commissioned: the unit is fully commissioned, meets performance guarantee and is safe and reliable for commercial operation.
 - First test is completed within 12 months of the commissioned date then annually thereafter. Commissioned date is established during the amendment process and will appear in the EPEA Approval.

Rationale:

- There is no precedent for CTG conversions in Alberta and jurisdictions where they have occurred have encountered some challenges.
- A period of time is needed following the conversion to resolve any operational issues and address uncertainties with respect to performance.
- The expectation is that supercritical units will be the first to be converted.

4 Conclusion

The consensus agreement contained in this report represents a practical and progressive approach to managing NO_x emissions from converted coal units and provides a reasonable assurance that NO_x emissions in Alberta will be reduced. It is expected that existing coal units that do not undergo a CTG conversion will continue to be subject to requirements for coal-fired units in the 2003 Electricity Emissions Management Framework, including NO_x emission limits and EoDL emission reduction obligations.

Appendix A: Project Details

Project

Coal-to-Gas (CTG) Draft NO_x Emission Standard Working Group*

Background

On October 5, 2017 a request for assistance was brought forward by Andre Corbould, Deputy Minister of Alberta Environment and Parks, that the Clean Air Strategic Alliance (CASA) convene a working group to develop and recommend a draft nitrogen oxides (NO_x) emission standard for a CTG unit conversion, which includes the following:

- Draft technology requirements for a CTG unit conversion;
- A draft NO_x emission standard for a CTG unit conversion; and
- Allowable lifespan for a CTG unit conversion based on the draft NO_x emission standard.

CTG is not addressed in the current *Emissions Management Framework for the Alberta Electricity Sector* (the Framework) as it was considered unlikely to occur when the Framework was originally developed. Therefore, this work is related to, but slightly outside the realm of the Framework as it currently exists. The Framework is scheduled to be formally reviewed in 2018. Given the urgency around this work, the NO_x emission standard for a CTG unit conversion is being developed by the government prior to the Framework review through a CASA working group.

Recommendation 29 of the 2003 *Emissions Management Framework for the Alberta Electricity Sector Report to Stakeholders* does, however, provide some guidance about how a standard should be developed; namely, through a technology review to identify the Best Available Technology Economically Achievable (BATEA) emission limit standard. It also provides guidance related to process including that a multi-stakeholder group should be used as well as a consensus decision-making process.

Goal

Develop and recommend a draft nitrogen oxides (NO_x) emission standard for a CTG unit conversion by December 31, 2017. This deadline is firm.

Key Tasks

- Review technology and technology-specific requirements for CTG unit conversions in the electricity sector, including those technologies potentially used to minimize NO_x emissions beyond combustion control modifications.
- Review any unique operational characteristics of a CTG unit that could impact NO_x emissions.
- Review the proposed federal regulatory agenda for CTG unit conversions as it relates to this initiative along with allowable life spans.
- Propose specific NO_x emissions standard for CTG unit conversions.

Scope

- To meet the overall timelines, the working group's scope should remain tightly focused on developing the draft NO_x emissions standard for CTG unit conversions.
- The review of the Framework itself, as well as other elements of the five-year review, are out of scope. This review will occur through the five-year review currently scheduled for 2018.

Deliverables

*In Appendix A: Project Details, 'working group' and 'project team' are synonymous and used interchangeably.

The working group is expected to complete a final report. The report should document the recommendations of the working group as well as the rationale. In the case of a non-consensus, the report will document all stakeholder perspectives in as much as detail as possible so that government can make an informed decision.

Timelines

October 2017 Convene CASA working group.

November 2017 Provide an update to the CASA Board on progress and draft recommendations (both consensus and non-consensus).*

December 2017 Final report to CASA board on findings of the project team.
Officially forward final report to the Government of Alberta.

*Note: As per the *CASA Guide to Managing Collaborative Processes*, “[t]eam members should also establish communication with the decision makers in the organizations/groups they represent, so that information and feedback can be solicited”.

Membership

Membership on the working group will include representatives of all affected and interested stakeholders. CASA should provide notice to all previous Electricity Project Team members to provide them with an opportunity to participate.

The following are suggested working group team members:

Alberta Energy	NGO from affected communities
Alberta Environment and Parks	NGO from health
Alberta Health	Oil and gas sector
ATCO Power	Pembina Institute
Capital Power	Prairie Acid Rain Coalition
Environment Canada	TransAlta Corp.

Decision Making

As per the established CASA process, the working group will use a collaborative, consensus decision-making approach. If consensus cannot be achieved, the working group will document all perspectives in as much detail as possible in their final report to the CASA Board. This report will then be forwarded to the Government of Alberta for decision.

Roles and Responsibilities

Roles and responsibilities for the working group will follow the guidelines outlined on pages 20-25 of the *CASA Guide to Managing Collaborative Processes*.

Budget

No additional monetary resources are anticipated to complete this work. Alberta Energy has contracted a third-party consultant to complete a technical review of CTG unit conversions. The resulting report from this work will provide the background information required for the work of the project team. This information will cover a jurisdictional review of emissions standards, source characterization and a review of emissions control technology for CTG conversions. Therefore, no further budget for a consultant is required by the working group.

The consultant’s task list will be distributed before the first meeting. The information gathered by the consultant will be made available to the working group when it is available, likely in early November 2017.