ENERGY SAVINGS
FOR BUSINESS

Investing to keep businesses competitive

ESB Small Producers Energy Efficiency Deployment (SPEED)
AFR Controller Checklist

March 7, 2022

Version 1.0

EMISSIONS REDUCTION ALBERTA

Table of Contents

INTRODUCTION 3

GUIDANCE ON APPLICATIONS 3

STEP 4 OF PRE-PROJECT APPLICATION: AIR FUEL RATIO CONTROLLER FOR NATURAL GAS CARBURETED ENGINE 4

STEP 5 OF PRE-PROJECT APPLICATION: AIR FUEL RATIO CONTROLLER FOR NATURAL GAS CARBURETED ENGINE 8

POST-PROJECT APPLICATION: AIR FUEL RATIO CONTROLLER FOR NATURAL GAS CARBURETED ENGINE 10

APPENDIX 11

INTRODUCTION

This document is intended as a guide to support the submission of accurate and complete AFR Controller project applications. All applicants with AFR Controller projects should ensure the application meets the SPEED Eligibility Requirements set out in the Participant Terms and Conditions, Contractor Code of Conduct and Eligible Measures List. The applicant must submit the requested documentation and answer the questions contained within this document.

This checklist includes guidance for what needs to be entered in each input field at Step 4 and Step 5 of the Application process. Step 5 specifically describes which documents need to be uploaded and their purpose.

GUIDANCE ON APPLICATIONS

The following sections provide guidance on AFR Controller applications, ensuring that they are complete, accurate and comprehensive.

The applicant and/or contractor will also need to provide the following information in Step 4 and Step 5 of the application submission, as further described in the tables below.

STEP 4 OF PRE-PROJECT APPLICATION: AIR FUEL RATIO CONTROLLER FOR NATURAL GAS CARBURETED ENGINE

- Air fuel ratio controller (lean burn).
    - Utilizes passive pre-chamber spark plugs or a special piston and head to achieve a Lambda greater than 1.4 after the controller installation.
- Air fuel ratio controller (rich burn).
    - Lambda should be operated at 1.0 or lower after installation of controller. A catalyst will need to be installed as well to achieve a target reduction lower than 2026 guidelines.
- Air-fuel ratio controller (rich burn to lean burn conversion).
    - Lambda should be operated greater than 1.4 after conversion.

Please note the other eligibility criteria in the SPEED Eligible Measure List.

***Application Tip:** Please ensure the documentation provided in Step 5 supports the information in the application fields below. Please note that at the pre-project stage, on-site measurements are not required. Instead, simulation data or estimates based on other sources (historical data, published studies, specification sheets, etc.) can be used. If the incentive application is approved, on-site measurements will be needed at the post-project application.*

The estimated values for the hours of operation and the load of the engine should be based on a typical year of production. This assumption should be used consistently between the pre-project and post-project scenarios.

Field	What to Enter	How Data or Input Provided is Used
Quantity	Enter the number of AFR controllers being installed. If multiple AFR controllers are installed, please ensure the application data for them is the same. Otherwise, please enter them separately.	• Calculate eligible incentive. • Project review and QA/QC.
Engine Manufacturer	Enter the name of the engine manufacturer.	• Project review and QA/QC.
Engine Model Number	Enter the engine model number.	• Project review and QA/QC.
Engine Serial Number	Enter the engine serial number.	• Project review and QA/QC.
Engine Age (Years)	Enter the age of the engine in years.	• Project review and QA/QC.
Engine Size (hp)	Enter the size of the engine in hp. This is the maximum output of the engine.	• Project review and QA/QC.

Estimated Average Engine Load Factor (%)	Enter the estimated average load factor as a percentage.	• Project review and QA/QC.
Estimated Engine Annual Operating Hours (hours)	Enter the estimated engine annual operating hours.	• Project review and QA/QC.
Estimated Lambda Value - Prior to AFR	Enter the estimated Lambda value prior to the AFR controller being installed. This should be a decimal.	• Project review and QA/QC.
Engine Estimated BSFC, LHV - Prior to AFR (BTU/bhp-hr)	Enter the estimated BSFC based on LHV in BTU/bhp-hr prior to AFR controller being installed.	• Project review and QA/QC.
Engine Fuel Consumption - Prior to AFR (m^3/year)	Enter the estimated engine fuel consumption in m^3/year prior to AFR controller being installed.	• Project review and QA/QC.
Engine Estimated NOx Emissions - Prior to AFR (tonnes/year)	Enter the estimated NOx emissions in tonnes/year prior to AFR controller being installed. If this value is unknown, please list 0.	• Project review and QA/QC.
Engine Estimated CO Emissions - Prior to AFR (tonnes/year)	Enter the estimated CO emissions in tonnes/year prior to AFR controller being installed. If this value is unknown, please list 0.	• Project review and QA/QC.
Engine Estimated CH_4 Emissions - Prior to AFR (tonnes/year)	Enter the estimated CH_4 emissions in tonnes/year prior to AFR controller being installed. If this value is unknown, please list 0.	• Project review and QA/QC.
Engine Estimated CO_2 Emissions - Prior to AFR (tonnes/year)	Enter the estimated CO_2 emissions in tonnes/year prior to AFR controller being installed. If this value is unknown, please list 0.	• Project review and QA/QC.
Engine Estimated CO_2e Emissions - Prior to AFR (tonnes/year)	Enter the estimated CO^2 equivalent emissions in tonnes/year prior to AFR controller being installed.	• Project review and QA/QC.
Estimated Lambda Value - Post AFR	Enter the estimated Lambda value post AFR controller being installed. This should be a decimal.	• Project review and QA/QC.
Engine Estimated BSFC, LHV - Post AFR (BTU/bhp-hr)	Enter the estimated BSFC based on LHV in BTU/bhp-hr post AFR controller being installed.	• Project review and QA/QC.

Engine Fuel Consumption - Post AFR (m^3/year)	Enter the estimated engine fuel consumption in m^3/year post AFR controller being installed.	• Project review and QA/QC.
Engine Estimated NOx Emissions - Post AFR (tonnes/year)	Enter the estimated NOx emissions in tonnes/year post AFR controller being installed. If this value is unknown, please list 0.	• Project review and QA/QC.
Engine Estimated CO Emissions - Post AFR (tonnes/year)	Enter the estimated CO emissions in tonnes/year post AFR controller being installed. If this value is unknown, please list 0.	• Project review and QA/QC.
Engine Estimated CH_4 Emissions - Post AFR (tonnes/year)	Enter the estimated CH_4 emissions in tonnes/year post AFR controller being installed. If this value is unknown, please list 0.	• Project review and QA/QC.
Engine Estimated CO_2 Emissions - Post AFR (tonnes/year)	Enter the estimated CO_2 emissions in tonnes/year post AFR controller being installed. If this value is unknown, please list 0.	• Project review and QA/QC.
Engine Estimated CO_2e Emissions - Post AFR (tonnes/year)	Enter the estimated CO_2 equivalent emissions in tonnes/year post AFR controller being installed.	• Project review and QA/QC.
AFR Manufacturer	Enter the name of the AFR controller manufacturer.	• Project review and QA/QC.
AFR Model Number	Enter the AFR controller model number.	• Project review and QA/QC.
AFR Specification Sheet	Upload the specification sheet for the AFR controller.	• Project review and QA/QC.
Was AFR installed with a catalyst?	Enter Yes or No.	• Project review and QA/QC.
Estimated Efficiency Improvement (%)	Enter the estimated efficiency improvement in fuel consumption from installing the AFR controller.	• Project review and QA/QC.
Estimated Lifespan for AFR (Years)	Enter the estimated lifespan that the AFR controller will last for. This should include any consideration where the technology becomes obsolete/must be replaced due to changes in emissions	• Project review and QA/QC.

	requirements, equipment failure or other issues.	
Equipment & Material Costs	Enter equipment and material costs as indicated on the invoice / final quote.	• Calculate eligible incentive. • Project review and QA/QC.
Labour Cost	Enter labour costs as indicated on the invoice / final quote.	• Calculate eligible incentive. • Project review and QA/QC.
Design Cost	Enter design costs and include all other costs as indicated on the invoice / final quote. This should include any costs for on-site visits that are required in the post-project application.	• Calculate eligible incentive. • Project review and QA/QC.

STEP 5 OF PRE-PROJECT APPLICATION: AIR FUEL RATIO CONTROLLER FOR NATURAL GAS CARBURETED ENGINE

Field	What to Enter	How Data or Input Provided is Used
Cost Quote	Quote or invoice should be itemized to include quantity, brand, model numbers for equipment, applicant name, contractor name, facility address and date (Sample quote provided in the Appendix). Costs should be indicated separately for: • Equipment and Material • Labour • Design and Others • Taxes	• Cross-reference against provided costs. • Calculate eligible incentive. • Project review and QA/QC.
Workplan	Please upload the completed Workplan template.	• Project review and QA/QC.
Pre-Project Photo	Please upload a photo of the equipment before the installation of the project.	• Project review and QA/QC.
Simulation of Performance/Estimate of Energy Savings and Emissions Reduction	Please upload documents from simulation software and/or other sources of information that supports the estimate of energy savings and emissions reduction in the application. Additional details are provided below. For the pre-project scenario where an AFR is not installed, a PDF document from a software simulation from EngCalc or GERP can be provided to show the fuel consumption and emissions. On-site data from historical projects can also be used to support the provided information. For the post-project scenario, the fuel consumption and emissions improvements values can be justified from on-site data from other historical projects. Additionally, curves, specification	• Project review and QA/QC.

	sheets and stated assumptions can be used to provide additional support to review the application. Please note that the more reliable the information provided is, the greater certainty the review will have for the estimated emissions reduction.	
Other Documentation	Please upload any other documentation that you think will be helpful for the review.	• Project review and QA/QC.

POST-PROJECT APPLICATION: AIR FUEL RATIO CONTROLLER FOR NATURAL GAS CARBURETED ENGINE

Note that for the post-project application, you will be required to confirm that no changes were made from the pre-project application, unless an Application Change Approval Notice was issued by ERA. You will need to confirm Actual Costs for the project.

In terms of additional documents required, you will need to provide evidence of the following:

- Invoice for Project Costs
- Proof of Payment for Project Costs
- Post-Project Photo
- On-Site Measurement Data
- Conditions stated in the Notice of Pre-Approval

Please upload any other documentation that you think will be helpful for the review. There may be additional documentation that we request during the review process. Please note that if the on-site measurement data changes the estimated performance of the project for energy savings and emissions reduction substantially, the incentive reservation may be updated to reflect the on-site measurement data.

Participants may be subject to a QA/QC check and may be asked for additional documentation or to facilitate a site visit.

APPENDIX

SAMPLE INVOICE/FINAL QUOTE

Quotes should be itemized to include quantity, brand, model numbers for equipment, applicant name, contractor name, facility address and date. Costs should be indicated separately for:

- Equipment and Material
- Labour
- Design and Others
- Taxes

A sample quote is provided below:

Company Logo

Company Address:	xxxx
Website:	xxxx
Phone:	xxxx

	PROJECT NAME:	XXXX	**Project Start Date:** xxxx
			Project Completion Date: xxxx
Applicant Company:	xxxx		
Applicant Name:	xxxx	**Quote #:**	xxxx
Facility Address:	xxxx	**Date:**	xxxx
Phone:	xxxx		

Measure #1			
Fixture Description	LITHONIA CPANL 2X4 40/50/60LM 40K M2	**DLC**	PMS5PPS6
Measure Description	LED 2x4 Recessed Light Fixture - 4,500 – 5,999 Lumen Output	**QTY**	63
Measure Equipment/Material Costs			$ 6,538.71
Measure Labour Costs			$ 13,251.74
Measure Design/Other Costs			$ -
		Measure Total Costs	$ 19,790.45

Measure #2			
Motor Description	ILA7080-H Siemens Semiotics 10 hp		
Measure Description	Premium efficient motor –ODP-10 hp	**QTY**	1
Measure Equipment/Material Costs			$ 934.10
Measure Labour Costs			$ 123.11
Measure Design/Other Costs			$ 50.00
		Measure Total Costs	$ 1,107.21

Measure #3			
Sensor Description	Occupancy Sensor		
Measure Description	Fixture Mounted Sensor	**QTY**	305
Measure Equipment/Material Costs			$ 15,250.00
Measure Labour Costs			$ -
Measure Design/Other Costs			$ -
		Measure Total Costs	$ 15,250.00

Total		
Total Equipment/Material Costs		$ 22,722.81
Total Labour Costs		$ 13,374.85
Total Design/Other Costs		$ 50.00
	Total Project Cost	$ 36,147.66
	GST	$ 1,807.38
	Total Cost w/ GST	$ 37,955.04