

**Date:** 21 October 2014

**Report No:** R000011

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GridX Power Pty Ltd  
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Sydney NSW 2001

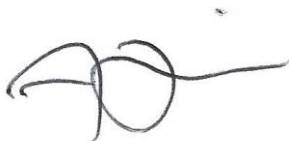
***Emission Testing – October 2014***  
*DP1 and DP2*

Dear Mr Chris Smith,

Tests were performed 7 October 2014 to determine emissions to air from 2 locations at the Botany plant of GridX Power Pty Ltd.

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Yours faithfully  
Emission Testing Consultants



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## EXECUTIVE SUMMARY

Emission Testing Consultants (ETC) was engaged by GridX Power Pty Ltd to perform emission monitoring to satisfy conditions within NSW Environment Protection Licence 20246 in respect of the trigeneration facility located at Botany NSW. Monitoring was performed on Discharge Points 1 and 2 (DP1 and DP2) and for the following parameters:

- Nitrogen oxides (NO<sub>x</sub>);
- Volatile Organic Compounds (VOCs);
- Oxygen;

Testing was conducted on DP1 and DP2 on 7 October 2014 under maximum load conditions. Testing on both DP1 and DP2 was conducted with the Chilling Unit off.

The methodologies chosen by ETC are those recommended by NSW EPA publication *The Approved Methods for Sampling and Analysis of Air Pollutants in NSW* January 2007.

## RESULTS

### DP 1 – Unit 1

7 October 2014



Flow Results		Measured MW	DP1 - Unit 1R000011
Date and time of flow test		7/10/2014 9:15	
Date and time of flow test		7/10/2014 10:25	
Stack dimensions at sampling plane		900	mm
Velocity at sampling plane		20	m/s
Average temperature		374	°C
Moisture content	Alt008	8.4	% v/v
Flow rate at discharge conditions		760	m <sup>3</sup> /min
Flow rate at discharge conditions		13	m <sup>3</sup> /sec
Flow rate at wet NTP conditions		5.4	m <sup>3</sup> /sec
Flow rate at dry NTP conditions		4.9	m <sup>3</sup> /sec

Continuous Analyser Results	DP1 - Unit 1R000011 300	Sampling Times	Concentration at NTP	Concentration at 3% O <sub>2</sub>	Mass rate
Oxygen (dry basis)		0916-1015	10.1 % v/v	-	-
Dry gas density		0916-1015	1.3 kg/m <sup>3</sup>	-	-
Molecular weight of stack gas, dry basis		0916-1015	29 g/g-mole	-	-
Nitrogen oxides as NO <sub>2</sub>		0916-1015	67 mg/m <sup>3</sup>	110 mg/m <sup>3</sup>	20 g/min

Volatile Organic Compound (VOC) Results	DP1 - Unit 1R000011 300	Sampling Times	Concentration at NTP	Concentration at 3% O <sub>2</sub>	Mass rate
Total VOC as n-propane		0918-1018	< 0.7 mg/m <sup>3</sup>	< 1 mg/m <sup>3</sup>	< 0.2 g/min

Refer to "SAMPLING PLANE OBSERVATIONS" on page 5.

## DP 2 – Unit 2

7 October 2014



Flow Results		Measured MW	DP1 - Unit 2 R000011
Date and time of flow test		7/10/2014 10:45	
Date and time of flow test		7/10/2014 11:50	
Stack dimensions at sampling plane		900	mm
Velocity at sampling plane		22	m/s
Average temperature		403	°C
Moisture content	Alt008	8.5	% v/v
Flow rate at discharge conditions		14	m <sup>3</sup> /sec
Flow rate at wet NTP conditions		5.7	m <sup>3</sup> /sec
Flow rate at dry NTP conditions		5.2	m <sup>3</sup> /sec

Continuous Analyser Results	DP1 - Unit 2 R000011 310	Sampling Times	Concentration at NTP	Concentration at 3% O2	Mass rate
Oxygen (dry basis)		1047-1146	10.3 % v/v	-	-
Dry gas density		1047-1146	1.3 kg/m <sup>3</sup>	-	-
Molecular weight of stack gas, dry basis		1047-1146	29 g/g-mole	-	-
Nitrogen oxides as NO <sub>2</sub>		1047-1146	83 mg/m <sup>3</sup>	140 mg/m <sup>3</sup>	26 g/min

Volatile Organic Compound (VOC) Results	DP1 - Unit 2 R000011 310	Sampling Times	Concentration at NTP	Concentration at 3% O2	Mass rate
Total VOC as n-propane		1049-1149	< 0.8 mg/m <sup>3</sup>	< 1 mg/m <sup>3</sup>	< 0.2 g/min

Refer to "SAMPLING PLANE OBSERVATIONS" on page 5.

## SAMPLING PLANE OBSERVATIONS

### DP1

The sampling plane had 2 x 1 inch BSP Ports. The location was determined to be “non-ideal” as per AS4323.1. It was 4 duct diameters less than the required 6 duct diameters downstream from a junction. It was more than the required 2 duct diameters upstream from the exit. The number of sampling points was increased as per AS4323.1. The sampling plane passed the flow assessment (items (a) to (f) of AS4323.1) and was therefore “compliant”.

### DP2

The sampling plane had 2 x 1 inch BSP Ports. The location was determined to be “non-ideal” as per AS4323.1. It was 4 duct diameters less than the required 6 duct diameters downstream from a junction. It was more than the required 2 duct diameters upstream from the exit. The number of sampling points was increased as per AS4323.1. The sampling plane passed the flow assessment (items (a) to (f) of AS4323.1) and was therefore “compliant”.

## PLANT OPERATING CONDITIONS

Plant operating conditions were supplied by GridX personnel.

Testing was conducted on DP1 and DP2 on 7 October 2014 under maximum load conditions. Testing on both DP1 and DP2 was conducted with the Chilling Unit turned off.

## TEST METHODS

The following methods are accredited with the National Association of Testing Authorities (NATA) and are approved for the sampling and analysis of gases unless otherwise stated. Specific details of the methods are available on request.

All sampling and analysis was conducted in accordance with the test methods (TM) prescribed in NSW EPA's *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*, Jan 2007 and in accordance with the *Protection of the Environment Operations (Clean Air) Regulation 2010* unless otherwise specified.

All parameters are reported adjusted to dry NTP conditions unless otherwise stated.

Parameter	Sampling			Analysis			
	NATA	NSW TM Method	Sampling Method	NATA	Analytical Laboratory	Analytical Method	Analytical Laboratory Report Number(s)
Selection of sampling positions	Yes	TM-1	AS4323.1	Yes	Emission Testing Consultants	NA	R000011
Flow rate	Yes	TM-2	USEPA 2	Yes		NA	
Velocity	Yes	TM-2	USEPA 2	Yes		NA	
Temperature	Yes	TM-2	USEPA 2	Yes		NA	
Moisture	Yes	TM-22	USEPA ALT008	Yes		NA	
Dry gas Density	Yes	TM-23	USEPA 3A	Yes		USEPA 3A	
Molecular weight	Yes	TM-23	USEPA 3A	Yes		USEPA 3A	
Oxygen (O <sub>2</sub> )	Yes	TM-25	USEPA 3A	Yes		USEPA 3A	
Nitrogen oxides (NO <sub>x</sub> ) as NO <sub>2</sub>	Yes	TM-11	USEPA 7E	Yes		USEPA 7E	
Volatile organic compounds (VOC)	Yes	TM-34	USEPA 18	Yes		SGS Australia Pty Ltd	



## DEFINITIONS

The following symbols and abbreviations are used in test reports:

BSP	British standard pipe.
Concentration	Mass of analyte per cubic metre expressed at NTP dry conditions (ng, µg or mg/m <sup>3</sup> ).
Flow rate at discharge conditions	Volume of gas flow per unit time expressed at discharge temperature, pressure and moisture content (m <sup>3</sup> /min).
Flow rate at wet NTP conditions	Volume of gas flow per unit time expressed at 0°C, an absolute pressure of 101.325 kPa and discharge moisture content (m <sup>3</sup> /min).
Flow rate at dry NTP conditions	Volume of gas flow per unit time expressed at 0°C, an absolute pressure of 101.325 kPa and 0% moisture content (m <sup>3</sup> /min).
Mass rate	Mass of analyte per unit time (µg, mg or g/min).
Moisture content	Percentage of gaseous moisture in the gas expressed on a volume / volume percentage basis. This does not include moisture in the gas stream that is in the liquid phase (free moisture).
NA	Not applicable.
NTP	Normal temperature and pressure. Gas volumes and concentrations are expressed on a dry (wet in the case of odour only) basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.
Sampling plane	Location at which measurements were conducted.
TOC	Total Organic Compounds. Total gaseous organic concentration of vapours consisting primarily of alkanes, alkenes, and/or arenes (aromatic hydrocarbons) The concentration can be expressed in terms of propane, hexane (or other appropriate organic calibration gas) or in terms of methane.
Velocity	Gas velocity expressed at discharge temperature, pressure and moisture content (m/s)
VOC	Any chemical compound based on carbon in the boiling range 36 to 126°C, with a vapour pressure of at least 0.010kPa at 25°C (or having a corresponding volatility under the particular conditions of use) that adsorb onto activated charcoal and desorb into CS <sub>2</sub> , or that can be collected in a tedlar bag and be quantitatively recovered, and that are detected by GCMS. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are CO, CO <sub>2</sub> , carbonic acid, metallic carbides and carbonate salts.
>	Greater than.
<	Less than the minimum limit of detection using the specified method.
~	Approximately.