

VICTORIAN CIVIL AND ADMINISTRATIVE TRIBUNAL
PLANNING AND ENVIRONMENT LIST
AT MELBOURNE

VCAT PROCEEDING NOS. P1820/2011, P1829/2011,
P1846/2011, P1822/2011,
P1816/2011 and 1818/2011

BETWEEN

DUAL GAS PTY LTD

Applicant

and

ENVIRONMENT PROTECTION AUTHORITY

Respondent

and

**DOCTORS FOR THE ENVIRONMENT AUSTRALIA INC
& ORS**

Third Party Applicant

**OUTLINE OF SUBMISSIONS OF
DOCTORS FOR THE ENVIRONMENT AUSTRALIA INC**

Relief sought by Doctors for the Environment Australia Inc (DEA)

1. DEA seeks orders that the Victorian Civil and Administrative Tribunal (**VCAT**) review and set aside Works Approval No 67043 in respect of the works defined therein on the grounds that even if the works are completed in accordance with the Works Approval, the use of the works will result in a discharge or emissions to the environment in a manner which is inconsistent with the State Environmental Protection Policy (Air Quality Management) (**SEPP(AQM)**). This is because there has been a failure by the EPA in the approval process to consider adequately or lend sufficient weight to:
 - (a) whether Dual Gas as the generator of a new source of emissions will apply best practice to the management of those emissions;
 - (b) whether in applying best practice, the emissions will be reduced to the maximum extent achievable;
 - (c) the precautionary principle as defined in the SEPP (AQM); and
 - (d) the principle of Intergenerational Equity, also defined in the SEPP (AQM).
2. Alternatively, should the VCAT decline to set aside the Works Approval on the above grounds (or the grounds contended for by the other Third Party applicants), the DEA submits that:

- (a) the greenhouse emissions intensity (**GEI**) ought to comply with a measure of GEI 0.8tCO₂e/MWh ‘sent-out’ rather than ‘as generated’;¹
- (b) Condition 3.1(a) ought to be retained in respect of emissions of sulphur dioxide (**SO₂**);
- (c) The exemption granted under clause 22 of the SEPP (AQM) in respect of emissions of oxides of nitrogen (**NO_x**) ought to be revoked and set aside and the proposed works should comply with the SEPP (AQM) in this regard;
- (d) Dual Gas should be required to perform modelling for the 24 hour and annual averages of pollutants (NO_x, SO₂ and particulate matter);
- (e) Conditions ought to be imposed to ensure that the works can and will comply with anticipated changes to air quality standards.²

Description of Proposed Works

- 3. On 1 September 2010, Dual Gas applied to the Environment Protection Authority (EPA) for a works approval under s. 19B of the *Environment Protection Act 1970 (EP Act)* for permission to develop a 600 MW power station (proposed works).
- 4. Power would be generated by the power station utilising (for the first time) a new integrated drying gasification cycle (**IDGCC**) technology for power generation. IDGCC uses a combination of synthesis gas (**syngas**), produced from brown coal, and natural gas.
- 5. Dual Gas, the applicant for the works approval, is a member of the HRL Group of Companies that has developed the IDGCC technology.
- 6. Features of the proposal are said to include:
 - (a) IDGCC technology has the potential to significantly improve the efficiency of resource use (coal and water) in power generation compared to the existing coal fired plants in the Latrobe Valley [emphasis added];
 - (b) the IDGCC has already been proven but only at a 10MW pilot plant in Morwell that operated between 1996 to 1997;

¹ Expert Witness statement of Malcolm McIntosh [46]; EPA Assessment Report Application No. WA67043 (**EPA Assessment Report**) at 6.3.4 (p18).

² Such as those anticipated by the *Review of the National Environment Protection (Ambient Air Quality) Measure Discussion Paper Air Quality Standards*, National Environment Protection Council, July 2010, http://www.ephc.gov.au/sites/default/files/AAQ_DiscPpr_Review_of_the_AAQ_NEPM_Discussion_Paper_AQ_Standards_Final_201007.pdf; see also Denison [34].

- (c) if the proposed demonstration is successful at a commercial level, it could provide a pathway for lower GHG emissions intensive power generation from brown coal;
- (d) it is intended to test the potential for retrofitting of pre-combustion CO₂ capture technology (that might result in GEI lower than that of current natural gas combined-cycle power generation) although such technology is not yet available;³
- (e) it received both Australian Government and Victorian Government funding support.

Works Approval Process

7. Under the *Environmental Effects Act 1978* an Environmental Effects Statement Referral was required. The proposal triggered one of the referral criteria in the Ministerial Guidelines namely '*potential ghg emissions exceeding 200,000 tonnes of carbon dioxide equivalent per annum, directly attributable to the operation of the facility.*' On 23 November 2009, the Minister for Planning decided that no EES was required. The reasons are set out in the EPA Assessment Report.⁴
8. Planning issues (relevant to health concerns) that were identified in relation to the proposed site include:
 - (a) no planning approval is required for the use of the land for industry but will be required for ancillary aspects. This is the subject of this hearing and DEA makes no comment in this regard;
 - (b) located in a Special Use Zone;
 - (c) occupies a portion of the existing site occupied by Mecrus Pty Ltd and Energy Briz Australia Corporation immediately north of the briquette factory;
 - (d) 1 km from the nearest sensitive uses namely residential areas of Morwell.⁵ This is relevant to the potential health impacts of the works.
9. The EPA sought comment from Government agencies and other stakeholders. Relevantly, they included:
 - (a) the Health Department which had no objection provided the proposal complies with SEPPS and Environmental Guidelines. In particular it noted that:

³ See for example, Hugh Outhred pp 14 to 15.

⁴ EPA Assessment Report, [3.1].

⁵ EPA Assessment Report, [3.2].

- (i) modelling highlights that the local airshed appears to be approaching a ceiling for SO₂ and therefore specific reference to Clauses 30 and 31 of the SEPP (AQM) is recommended in the overall assessment i.e. to require a higher standard of emission control than would ordinarily be required;
 - (ii) Under clause 31 of the SEPP (AQM), the EPA can develop an Air Quality Improvement Plan in an Air Quality Control Region (**AQCR**) (of which the Latrobe Valley is one) in the longer term;
 - (iii) health evidence before the current review of air quality standards by the National Environment Protection Council (**NEPC**) should inform any future strategy for managing SO₂ in the Latrobe Valley airshed.
- (b) the Department of Sustainability and Environment and particularly the Environment and Climate Change Division which commented that:
- (i) the details of GHG emission calculations could not be determined from the application;
 - (ii) the form of the proposed GEI target in the Climate Change White Paper had not been determined, but the application would only comply if the GEI was on a “generated basis” (rather than on a ‘sent-out’ basis);
 - (iii) relevant emission comparisons should be made with data in the 2008 National GHG Inventory.
10. The assessment of the efficiency of proposed technology and in particular its GHG emissions was informed by a literature review and the advice of two technology experts.⁶
11. The air quality assessment was informed by:
- (a) the application itself;
 - (b) the advice of an independent technology expert about international requirements for best practice emission controls in new coal-based power plants;
 - (c) a review of international legislation for SO₂ emission control for new power plants;
 - (d) advice from the Dept of Health about the need for increased public health protection from SO₂;

⁶ EPA Assessment Report [6.3.2].

- (e) review by the EPA and by an independent consultant of air quality modelling undertaken for Dual Gas; and
 - (f) air quality modelling undertaken for EPA.
12. Under clause 22 of the SEPP (AQM) an exemption from the emission limit in respect of oxides of nitrogen (**NO_x**) was granted subject to the ability to revoke it if the turbines subsequently run solely on natural gas. The Schedule E limit in the SEPP (AQM) for gas turbines operating on gaseous fuels is 0.07g/Nm³ but the limit said to apply in this instance (as there is no actual limit for syngas) is 0.15 g/Nm³ for ‘other fuels’.
13. SO₂ reduction will be required as even best practice will not ensure the limits in the SEPP (AQM) being met.
14. In respect of particles, no controls will be required for the coal delivery system, as much will be enclosed. The proposed emission rates for particles when burning syngas are almost identical to those for natural gas combustion.
15. Emissions of other air pollutants are expected to be small and will not breach design criteria.
16. Application of the precautionary principle is said to found the approval of only one ‘train’ rather than two. It allows “*a potentially beneficial technology to be demonstrated at commercial scale yet minimising the GHG emissions and mitigating the risk that two E class gas turbines may be operated solely on natural gas in the future (which is not considered to be best practice)*”.⁷
17. The Works Approval (Approval Number WA67043) was issued on 20 May 2011 for the construction of an integrated drying, gasification combined cycle power station with a maximum “sent out” electricity generating capacity of 300 MW, rather than the 600MW in the original application. It was subject to a number of conditions including:
- (a) work conditions:
 - (i) for the installation on the main process exhaust stack a device for measuring and recording emissions;⁸ and
 - (ii) provision must be made for the future installation of Dry Low NO_x technology in the event that the plant ceases to operate as a syngas plant;⁹
 - (b) reporting conditions that specify details of:

⁷ EPA Assessment Report, [8.2].

⁸ Works Approval, Work Condition 2.4.

⁹ Works Approval, Work Condition 2.9.

- (i) sulfur dioxide reduction equipment that will reduce the emissions by at least 90% of uncontrolled emissions (based on the average sulfur level in the coal feedstock);¹⁰
- (ii) provision for the future installation of carbon capture equipment;¹¹ and
- (iii) provisions for the future installation of Dry Low NOx technology in the event that the plant ceases to operate as a syngas plant.¹²

Works Approval Appeal Process

- 18. By an application, Dual Gas seeks a review of the works approval by the VCAT under s. 33(3) of the EP Act. In particular, it says that the 600 MW plant ought to have been approved and complains of the conditions attached requiring it to operate with a 45% SO₂ emissions per MWh than any brown coal fuelled power plant in the Latrobe Valley.
- 19. If DEA's application for review under s. 33B(2)(b) of the EP Act is dismissed, then DEA also requests that the VCAT refuse the application for review by Dual Gas.

Legal framework

- 20. DEA seeks a review of the Works Approval under s. 33B(2)(b) read in the context of the further provisions of s. 33B of the EP Act. The powers of the VCAT are contained in s. 37 and the matters of which it must take account are set out in s.37A. In particular, it must take account of and give effect to any relevant State environment protection policy, in this case the SEPP (AQM).¹³ The SEPP (AQM) is the starting point for the VCAT.
- 21. The EP Act must be applied by both the EPA and the VCAT having regard to the principles of environment protection¹⁴ as set out in ss. 1B to 1L of the EP Act. Relevantly, those principles include:
 - (a) the precautionary principle;¹⁵ and
 - (b) the principle of intergenerational equity.¹⁶

¹⁰ Works Approval, Reporting Condition 3.1(a).

¹¹ Works Approval, Reporting Condition 3.1(c).

¹² Works Approval, Reporting Condition 3.1(d).

¹³ s.37A(c)

¹⁴ Section 1A.

¹⁵ Section 1C.

¹⁶ Section 1D.

22. In approving the works, the EPA was required to have regard to policy so that the Works Approval and any condition in or relating to it is consistent with all applicable policy. However, pursuant to the terms of both the SEPP (AQM)¹⁷ and s. 20C(3A) of the EP Act, the EPA had the power to impose conditions that were more stringent than specifically required by the SEPP (AQM) where local environment conditions require a higher level of protection than would otherwise be provided. The Latrobe Valley has been designated an Air Quality Control Region (**AQCR**) under the SEPP (AQM) specifically for these purposes.
23. AQCR is defined in the SEPP (AQM) as a ‘segment of the air environment which, because of its population size or density, industrialisation, projected development, or meteorological characteristics, has been gazetted as requiring the regional effects of emissions of wastes to the air environment to be considered in formulating control requirements.’
24. Clauses 18 and 19 of the SEPP (AQM) require best practice to be applied to the management of emissions. ‘Best practice’, as defined in the SEPP (AQM), is the best combination of eco-efficient¹⁸ techniques, methods, processes or technology used in an industry sector or activity that demonstrably minimises the environmental impact of a generator of emissions in that industry sector or activity.
25. The precautionary principle and the principle of intergenerational equity¹⁹ have been taken into account in the development of the SEPP (AQM).²⁰ However, there is an independent obligation to take these principles demonstrably into account by reason of them being primary considerations under the EP Act.
26. The precautionary principle ought to be applied where there is a threat of serious or irreversible environmental damage, including harm to the health or safety of people.²¹ Dual Gas and to some extent, EPA bear the burden of demonstrating that the threat is negligible.²² The application of the principle

¹⁷ SEPP (AQM), clause 30.

¹⁸ Being the production of more goods with less energy and fewer natural resources: SEPP, 16.

¹⁹ Derived from the *1992 Intergovernmental Agreement*, 1 May 1992, <http://www.environment.gov.au/about/esd/publications/igae/index.html>.

²⁰ SEPP (AQM), Clause 7(2) and 7(3); see also *Telstra Corporation Limited v Hornsby Shire Council* (2006) 67 NSWLR 256 [184] to [186].

²¹ *Telstra Corporation Limited v Hornsby Shire Council* (2006) 67 NSWLR 256 [125] to [139] [184]

²² *Environment East Gippsland Inc v VicForests* [2010] VSC 335 (Brown Mountain case) at [212]; *Telstra Corporation Limited v Hornsby Shire Council* (2006) 67 NSWLR 256 at [150]

may not require a permanent prohibition on an activity but rather, the implementation of appropriate procedures that can adapt to changing circumstances.²³

27. The principle of intergenerational equity requires the present generation to ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. This specifically includes a requirement, as far as is practicable, increasingly to substitute energy sources that result in fewer emissions for energy sources that produce greater emissions.²⁴
28. To the extent this submission is silent on matters in the regulatory framework, DEA refers to the submissions of the EPA under the heading Statutory Framework Applicable to Applications for Review.

Grounds

29. The grounds of the DEA's application to VCAT are:
 - (a) EPA's definition of 'industry best practice'.
 - (b) Failure to uphold the precautionary principle or the principle of intergenerational equity on human health grounds;
 - (c) Exemption under clause 22 of the SEPP (AQM) in relation to Schedule E Nox emissions for as long as the plant operates as a syngas plant;
 - (d) There is no modelling for the 24 hour average and annual averages of nitrogen dioxide (**NO2**) and SO₂;
 - (e) There is no safe level of fine (PM_{2.5}) particulate matter for human health.
30. These grounds have been particularised in DEA's further and better particulars dated 5 August 2011 (**first particulars**) and the further and better particulars dated 24 August 2011 (**second particulars**). DEA refers to and relies upon its further and better particulars as part of this submission.

The project as a whole

31. No Environment Effects Statement was done in respect of the works on the assumption that best practices would have to be applied to minimise GHG emissions and adverse effects with respect to air quality. DEA submits that

²³ Brown Mountain case [184].

²⁴ *Taralga Landscape Guardians Inc v Minister for Planning and RES Southern Cross Pty Ltd* (2007) 161 LGERA 1 at [74].

the approach taken fails to protect human health effectively from the consequences of emissions from the works.

32. In applying best practices in the electricity industry it is inadequate to compare the works only with existing traditional brown coal-fired power stations. In the management of emissions, best practice energy generation is energy generated by methods that produce the least emissions, particularly where the proposed method is novel and has no direct comparator. All processes generating energy should be examined and compared. DEA relies on the approach advanced by Hugh Outhred.²⁵

Carbon Dioxide and Greenhouse Gases

33. An examination of the authorities reveals a legal and scientific acceptance of the fact that the burning of fossil fuels (including coal) produces carbon dioxide (**CO₂**), one of the most important GHGs causing the earth to warm and producing irreversible climate change.²⁶ Sources of such emissions and GHGs include coal-fired power stations. The works as currently approved will make a significant contribution to the emissions of CO₂ associated with electricity generation in Victoria.²⁷

Health Impacts of Climate Change

34. Most health impacts of climate change are likely to be adverse.²⁸ The projected health effects will be complex and varying.²⁹ They include increased exposure to extreme weather events, shifts in patterns of infectious diseases, deterioration in food yields and nutritional quality, diminished water flows and deterioration in sanitation, deterioration in air quality and increases in ozone levels, disruption to shelter and human settlements, conflict through food and water shortages and human displacement and migration.³⁰
35. In 2009, leading international medical journal, The Lancet, published that 'Climate change is the biggest global health threat of the 21st century'.³¹

²⁵ Expert witness statement of Hugh Outhred, 4 to 5.

²⁶ *Walker v Minister for Planning* (2007) 157 LGERA 124 at 121;

²⁷ Expert witness statement of Professor David J Karoly. [17] to [19].

²⁸ McMichael A, Lindgren E., Climate change: present and future risks to health, and necessary responses, *Journal of Int Med* 2011, 1; see also Costello A, et. al., Managing the health effects of climate change, *The Lancet*, 2009 at 1693.

²⁹ DEA second particulars, 2(a)(i) and 2(b)(i).

³⁰ McMichael A, Lindgren E., Climate change: present and future risks to health, and necessary responses, *Journal of Int Med* 2011, 1; see also Costello A, et. al., Managing the health effects of climate change, *The Lancet*, 2009 at 1693.

³¹ Costello A, et. al., Managing the health effects of climate change, *The Lancet*, 2009 at 1693.

World Health Organization (**WHO**) Director-General Margaret Chan stated that 'The real bottom-line of climate change is its risk to human health and quality of life'.³² United Nations Secretary-General Ban Ki-Moon has said 'Climate change threatens all our goals for development and social progress' and 'it is a true existential threat to the planet'.³³

36. For these reasons DEA is concerned that the Works Approval should be set aside or at least, that emissions of CO₂ from the proposed works are minimised.

Best practice

37. According to the EPA Assessment Report, the proposed works can comply with a GEI target of 0.8 tCO₂-e/MWh.³⁴ However, to reduce the amount of CO₂, they will need to rely on an increased amount of natural gas. Best practice for natural gas was not considered.³⁵ If the demonstration of syngas fails, by the use of E class turbines, rather than F class, the works will be nothing more than a suboptimal natural gas plant with higher CO₂ emissions.³⁶

0.8t/MWh 'sent-out' v 0.8t/MWh 'generated'

38. The Works Approval Conditions require CO₂ emissions to comply with a GEI requirement of 0.8 tCO₂-e/MWh.³⁷ It does not specify whether this is a 'sent-out' or 'generated' target. It is as yet unknown what the likely legislated target will be.

Precautionary principle and principle of intergenerational equity

39. The application of both these principles requires that if such a condition is to be imposed, it be the one that has the least effect on the environment. Therefore, the VCAT if it determines that the Works Approval is appropriate, should amend condition 2.1 so that it limits this target of CO₂ emissions on a sent-out basis, thus taking into account all power consumed in the different

³² Margaret Chan, "Cutting carbon, improving health", (25 November 2009), http://www.who.int/globalchange/publications/LCT_Climate_09cmt7843.pdf.

³³ Ban Ki-Moon, Plenary speech at World Economic Forum on "The Global Compact: Creating Sustainable Markets" (29 January 2009), http://www.unep.org/pdf/speeches/davos09.globalcompact_dcsFINAL.English.pdf.

³⁴ EPA Assessment Report, 6.3.4.

³⁵ EPA Assessment Report, 6.2.

³⁶ See for example, Expert witness statement of Malcolm McIntosh, [95]; Outhred, 15.

³⁷ Works Condition, 2.1.

components of the works during electricity production.³⁸ This will necessarily involve a higher use of natural gas to meet the target.³⁹

Suphur Dioxide (SO2)

40. The emissions of SO₂ from the proposed works will not comply with the design criteria of the SEPP (AQM) and will add an additional 13 mill kg/yr SO₂ to the quantities of SO₂ in the Latrobe Valley AQCR, or an an estimated 10 to 13% to current emissions.⁴⁰

Health effects of SO2

41. The health effects of SO₂ are set out in the report of Dr Lynette Denison⁴¹ and DEA's second particulars.⁴² They include respiratory causes of mortality, exacerbation of asthma and a reduction in lung capacity. People with asthma and other respiratory disease, the elderly and children are particularly sensitive to the effects of SO₂.⁴³ The WHO and the United States Environmental Protection Agency (USEPA) have concluded that there is no safe level of exposure to SO₂, in particular for sensitive groups.
42. A disproportionate load of Victoria's SO₂ emissions are emitted in the Latrobe Valley AQCR, most being emitted by electricity generators.⁴⁴ In that same region resides one of Australia's population groups most susceptible to the effects of air pollution.⁴⁵

Best practice for SO2

43. International air quality standards for SO₂ have been revised since the introduction of the SEPP (AQM) in 2001.⁴⁶ On the other hand, the SEPP (AQM), insofar as it relates to an AQCR, is currently consistent with the 2010 National Environment Protection Council (NEPC) Ambient Air Quality Recommendations. The design criteria requires a lower standard for an individual source.
44. Significant amounts of SO₂ will be emitted by the proposed works, whether the 600 MW project or the 300MW project currently approved. Best practice

³⁸ McIntosh, [46].

³⁹ McIntosh, [58]. See also paragraph 37.

⁴⁰ Expert witness statement of Dr D Graeme Ross, [68]; Expert witness statement of Dr Lyn Denison, [44].

⁴¹ Denison, [11] to [16].

⁴² at 2(a)(ii) and 4(a).

⁴³ Denison, [12] to [13]

⁴⁴ Denison, [43].

⁴⁵ Denison, [25] to [26].

⁴⁶ Denison, [20] and [28]

would see the project at either size conform with the WHO standards where it will be in an AQCR where the levels of SO₂ can and do exceed existing standards.⁴⁷

45. Sulphur reduction technology is required because the proposed works do not meet best practice in this regard.⁴⁸ Clause 30 of the SEPP (AQM) has been appropriately invoked as a consequence of the request of the Department of Health.⁴⁹ Accordingly, Condition 3.1(a) ought to be retained in respect of emissions of SO₂.

Precautionary principle and intergenerational equity

46. Where it has been determined that there is no safe level of exposure to SO₂, hourly modelling is insufficient. The National Environment Protection Measure (NEPM) for Ambient Air Quality recommends the reporting of 24 hour averages of SO₂ ground level concentrations, as do the WHO 2006 guidelines, with no annual guideline on the assumption that low 24 hour averages will ensure low annual averages.⁵⁰
47. The NEPC Draft Discussion Paper states that the 24hr objective is based on epidemiological evidence that sensitive groups within the population could develop respiratory symptoms at SO₂ concentrations above 0.087ppm.⁵¹ Any approval of the works should be subject to a condition that there be 24 hour modelling of SO₂ to ensure continued compliance with the WHO Guidelines and NEPC recommendations.

Nitrogen dioxide (NO₂) and oxides of nitrogen (NO_x)

48. Emissions directly from the source are measured and referred to as NO_x but the ground level concentrations and modeling is done for NO₂, a subset of NO_x and the most concerning with respect to human health.⁵²
49. The proposed works will adopt ammonia scrubbing to reduce nitrogen levels in the syngas. It is said that NO₂ emission levels will comply with the design

⁴⁷ Denison, [37] to [38].

⁴⁸ EPA Assessment Report 6.4.4; Ross [68].

⁴⁹ Letter dated 29 April 2011 from Rodney Dedman, Acting Manager Community Risk, Department of Health to John Marsiglio, Statutory Facilitation, EPA.

⁵⁰ Assessment Report 6.4.3, 33; WHO, 'Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide, Global update 2005, Summary of risk assessment', http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf, 19.

⁵¹ NEPC, 2010 pg 22, lines 30-35

⁵² Denison [83].

criterion in the SEPP (AQM).⁵³ However, emissions will exceed the SEPP (AQM) Schedule E limit (for the AQCR) of 0.07g/m³ for gas turbines operating on gaseous fuels if >30MWh.⁵⁴

50. The Schedule E limit of 0.15 g/m³ for 'other fuels' if plant <30MWh will be met, however this plant is >30MWh in capacity and there is no SEPP (AQM) Schedule for 'other fuels' in this category.
51. Significant amounts of NO_x will be emitted. When operating on natural gas the works will not meet the SEPP (AQM) requirements and when operating on syngas, the NO_x emissions will also be above the only SEPP (AQM) requirements relating to gas as a source.

Health effects of NO₂ and NO_x

52. Both the WHO and the USEPA have concluded that there is no safe level of exposure to NO₂, particularly for sensitive groups.⁵⁵ Evidence from Australia and overseas reveals association between adverse health effects and short-term exposure to NO₂ levels below the current ambient air quality NEPM⁵⁶ standards of 0.12 ppm (1 hour average). Ambient NO₂ concentrations from 0.018 to 0.036ppm (24 hour average) have been associated with increased hospital admissions and emergency department attendance for respiratory symptoms, particularly in asthmatics and children.⁵⁷

Best practice for NO_x and NO₂

53. If the levels of NO_x exceed the Schedule E limits, there will be no adherence to best practice. Similarly the absence of annual modelling prevents a meaningful comparison with the literature and standards.⁵⁸

Precautionary principle and intergenerational equity

54. A failure to undertake sufficient monitoring is inconsistent with both the precautionary principle and the principle of intergenerational equity.
55. In light of the evidence that there are no safe levels of exposure to NO₂, DEA submits that emissions of NO₂ by the proposed works would ideally occur at levels below those set out in the SEPP (AQM) (which could be achieved by

⁵³ Ross [72] – [74]; Denison [83].

⁵⁴ EPA Assessment Report 6.4.1(c).

⁵⁵ Denison [74]; DEA second particulars [3(b)].

⁵⁶ and SEPP (AQM).

⁵⁷ DEA second particulars, [6].

⁵⁸ WHO, 'Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide, Global update 2005, Summary of risk assessment', http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf, 17.

invoking clause 30) but at a minimum, should comply with Schedule E of the SEPP (AQM). Residents in the AQCR, already vulnerable to the effects of NO₂, should have the minimum exposure achievable.

Particulate Matter (Fine Particles PM_{2.5})

56. Although the emissions of particulate matter (**PM**) are not expected to elevate ground level concentrations above SEPP (AQM) levels there may be no safe levels for fine (**PM_{2.5}**) or ultra-fine (**PM_{0.1}**) particulate matter in relation to human health. The WHO stated in a 2003 report: "Epidemiological studies on large populations have been unable to identify a threshold concentration below which ambient PM has no effect on health. It is likely that within any large human population, there is such a wide range in susceptibility that some subjects are at risk even at the lowest end of the concentration range."⁵⁹
57. DEA accepts the observations of Dr Denison in respect of PM_{0.1} that the evidence of the effects of PM_{0.1} is insufficient for the purposes of establishing limits for emissions at this time.⁶⁰ It does not pursue relief in this regard, save to say that provision ought to be made, and conditions imposed, for the future management of PM_{0.1} should appropriate standards be developed.
58. DEA maintains its concerns about emissions of PM_{2.5} from the proposed works.

Health effects of PM_{2.5}

59. Particle pollution (PM), especially fine particles, contains microscopic solids or liquid droplets that can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of health problems, including increased respiratory symptoms, decreased lung function; aggravated asthma, irregular heartbeat and premature death in people with heart or lung disease.⁶¹ In children, particulate air pollution has been associated with increased chronic cough,

⁵⁹ World Health Organization (2003). Health Aspects of Air Pollution with Particulate Matter, Ozone and Nitrogen Dioxide. Report on a WHO Working Group 2003
http://www.euro.who.int/_data/assets/pdf_file/0005/112199/E79097.pdf

⁶⁰ Denison, [91].

⁶¹ United States Environmental Protection Agency (2008) Integrated Review Plan for the National Ambient Air Quality Standards For Particulate Matter. IN AGENCY, U. S. E. P (Ed.). Research Triangle Park, North Carolina, United State Environmental Protection Agency; United States Environmental Protection Agency (2009) Second External Draft of the Integrated Science Assessment of Particulate Matter. U.S. Environment Protection Agency, Washington, DC, EPA/600/R-08/139B, 2009.

and bronchitis.⁶² According to the WHO, a large body of new scientific evidence has emerged that has strengthened the link between ambient PM exposure and health effects. Research shows that fine particles (commonly measured as PM2.5) are strongly associated with mortality and other endpoints such as hospitalization for cardio-pulmonary disease.⁶³

60. In Australia, several studies in coal-mining communities have confirmed links between particulate air pollution and respiratory disease.⁶⁴

Precautionary principle and intergenerational equity

61. Although the modelling indicates that predicted ground level concentrations meet the design criteria in the SEPP (AQM), this only takes into account existing industrial sources in the Latrobe Valley. It does not take into account other sources such as planned burning. The evidence is that there are no safe levels. A proper application of the precautionary principle and the principle of intergenerational equity would require modelling and management of emissions from all sources to ensure that that the levels in the AQCR do not exceed SEPP (AQM) levels.⁶⁵

Other pollutants

62. DEA observes that the proposed works will also release quantities of toxic compounds into the environment, particularly mercury.⁶⁶ There will be 40,000 tonnes per year of fly ash. Fly ash contains arsenic, lead, mercury and cadmium.
63. According to the EPA, 30% of the mercury content of the coal, albeit low, will be discharged. The view was expressed that this discharge will not significantly increase current ground level impacts.⁶⁷ Dr Denison has not

⁶² Dockery DW, Speizer FE, Stram DO *et al.*, Effects of inhalable particles on respiratory health of children. *Am Rev Respir Dis* 1989; 139: 587-94.

⁶³ World Health Organization (2003). Health Aspects of Air Pollution with Particulate Matter, Ozone and Nitrogen Dioxide. Report on a WHO Working Group 2003
Morawska L, Moore M, Ristovski Z. Health Impacts of Ultrafine Particles. Desktop Literature Review. Commonwealth of Australia 2004
<http://www.environment.gov.au/atmosphere/airquality/publications/health-impacts/pubs/health-impacts.pdf>.

⁶⁴ Lewis PR, Hensley MJ, Wlodarczyk J, Toneguzzi RC, Westley-Wise VJ, Dunn T, *et al.* Outdoor air pollution and children's respiratory symptoms in the steel cities of New South Wales. *Med J Aust* 1998; 169: 459-63.

Voigt T, Bailey M, Abrahamson M. Air pollution in the Latrobe Valley and its impact upon respiratory morbidity. *Aust N Z J Public Health* 1998; 22: 556-561.

⁶⁵ Denison, [94].

⁶⁶ DEA second particulars, 1(a) and (c).

⁶⁷ EPA Assessment Report, 6.4.1

addressed these matters in her report. Ground level mercury emissions are not the key issue for human health.

Health effects

64. Toxins in coal ash can cause cancer and neurological damage in humans.⁶⁸
65. Emitted mercury can bio-accumulate in marine food chains becoming more concentrated. Children are particularly vulnerable to the adverse health effects of mercury. Its accumulation is a reason why pregnant women and young children are advised to restrict their seafood intake.⁶⁹ Methyl-mercury is a neurotoxin and can affect the development of growing nervous systems including the brain. Over one third of human global mercury emissions are derived from coal-fired power stations.⁷⁰ In 2002, 83.3% mercury air emissions in the Latrobe Valley region (100kg) came from power stations.⁷¹

Principle of Intergenerational Equity

66. Any further mercury emissions have the potential to adversely effect future generations (and the neurological development of present day young children and in-utero fetuses). This will result in future generations either being required to further reduce fish intake to remain within safe levels of consumption, or in neuro-developmental damage to those children exposed, with expected decrements in lifetime ability and achievement.
67. In contributing to rendering fish and seafood unsafe for consumption at currently recommended levels, the Dual Gas project will reduce the productivity of the environment for future generations.

Conclusion

68. DEA submits that the proposed works will emit significant quantities of CO₂, NO₂, SO₂ and PM, all of which do and are likely to cause local adverse effects on human health. Given that there are now viable alternatives for base load energy in Victoria, the proposed works should not be permitted to proceed, at the level approved by the EPA or at all.

⁶⁸ Gottlieb B, Gilbert S, Evans L (2010), Coal ash: the toxic threat to our health and environment: a report from Physicians for Social Responsibility and EarthJustice, Washington DC: PSR 2010. <http://www.psr.org/assets/pdfs/coal-ash.pdf>.

⁶⁹ Food Standards Australia New Zealand, 2004.

⁷⁰ Lockwood AH, Welker-hood K, Rauch M, Gottlieb B (2009), Coal's assault on human health: a report from Physicians for Social Responsibility. Washington DC: PSR, 2009. <http://www.psr.org/assets/pdfs/psr-coal-fullreport.pdf> (assessed September 2011)

⁷¹ HRLT (2007). *State Environment Protection Policy Class 1,2 and 3 Indicator Air Emissions in the Latrobe Valley*. Report No. HLC/2007/087, June 2007.

69. Should the VCAT uphold the approval, it ought to maintain the conditions imposed by the EPA, but ensure that reporting measures include 24 hour modelling for SO₂ and NO₂ and also ensure that the SEPP (AQM) Schedule E criteria for NO₂ emissions will be met.

Dated: 24 October 2011

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