

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 0.8tCO<sub>2</sub>e/MWh ‘sent-out’ rather than ‘as generated’;<sup>1</sup>
  - (b) Condition 3.1(a) ought to be retained in respect of emissions of sulphur dioxide (**SO<sub>2</sub>**);
  - (c) The exemption granted under clause 22 of the SEPP (AQM) in respect of emissions of oxides of nitrogen (**NO<sub>x</sub>**) ought to be revoked and set aside and the proposed works should comply with the SEPP (AQM) in this regard;
  - (d) DEA accepts that modelling for the 24 hour and annual averages of pollutants (NO<sub>x</sub>, SO<sub>2</sub> and particulate matter) has now been undertaken, albeit by Dr Ross on behalf of the EPA and not by Dual Gas;
  - (e) Conditions ought to be imposed to ensure that the works can and will comply with anticipated changes to air quality standards.<sup>2</sup>

### **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.

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<sup>1</sup> Expert Witness statement of Malcolm McIntosh [46]; EPA Assessment Report Application No. WA67043 (**EPA Assessment Report**) at 6.3.4 (p18); EPA.100.396-12.

<sup>2</sup> See *Review of the National Environment Protection (Ambient Air Quality) Measure Discussion Paper Air Quality Standards*, National Environment Protection Council, July 2010, Exhibit E7 and *National Environment Protection (Ambient Air Quality) Measure Review – Review Report* dated May 2011 (**NEPM Review Report**); see also Statement of Denison [34].

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;
  - (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 CO<sub>2</sub> 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;<sup>3</sup>
  - (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.<sup>4</sup>
8. Planning issues (relevant to health concerns) that were identified in relation to the proposed site include:

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<sup>3</sup> See for example, Hugh Outhred pp 14 to 15.

<sup>4</sup> EPA Assessment Report, [3.1].

- (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.<sup>5</sup> 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:
    - (i) modelling highlights that the local airshed appears to be approaching a ceiling for SO<sub>2</sub> 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 presented to review of air quality standards by the National Environment Protection Council (**NEPC**) and summarised in the *National Environment Protection (Ambient Air Quality) Measure Review – Review Report* dated May 2011 (**NEPM Review Report**) (Attached) should inform any future strategy for managing SO<sub>2</sub> in the Latrobe Valley airshed.

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<sup>5</sup> EPA Assessment Report, [3.2].

- (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.<sup>6</sup>
- 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 SO<sub>2</sub> emission control for new power plants;
  - (d) advice from the Dept of Health about the need for increased public health protection from SO<sub>2</sub>;
  - (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<sub>x</sub>) was granted subject to the ability to revoke it if the turbines subsequently run solely on natural gas. The Schedule

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<sup>6</sup> EPA Assessment Report [6.3.2].

E limit in the SEPP (AQM) for gas turbines operating on gaseous fuels is 0.07g/Nm<sup>3</sup> but the limit said to apply in this instance (as there is no actual limit for syngas) is 0.15 g/Nm<sup>3</sup> for ‘other fuels’.

13. SO<sub>2</sub> 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)*”.<sup>7</sup>
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;<sup>8</sup> and
    - (ii) provision must be made for the future installation of Dry Low NO<sub>x</sub> technology in the event that the plant ceases to operate as a syngas plant;<sup>9</sup>
  - (b) reporting conditions that specify details of:

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<sup>7</sup> EPA Assessment Report, [8.2].

<sup>8</sup> Works Approval, Work Condition 2.4.

<sup>9</sup> 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);<sup>10</sup>
- (ii) provision for the future installation of carbon capture equipment;<sup>11</sup> and
- (iii) provision for the future installation of Dry Low NOx technology in the event that the plant ceases to operate as a syngas plant.<sup>12</sup>

### **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% SO<sub>2</sub> 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.
20. These submissions can be taken into account by the VCAT when considering the merits of those applications to which DEA is not a party. The VCAT has a broad discretion to inform itself as it sees fit subject to the rules of natural justice: VCAT Act, s. 98(1)(c); *Ching Shih Jeng v Maroondah CC* [1999] VCAT 43 (31 July 1999). All parties have had an opportunity to consider and respond to the issues raised by DEA in its application and will not be prejudiced.
21. Further, should the VCAT determine that DEA has no standing to bring its application herein (that decision having been reserved), the VCAT may still take these submissions into account.

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<sup>10</sup> Works Approval, Reporting Condition 3.1(a).

<sup>11</sup> Works Approval, Reporting Condition 3.1(c).

<sup>12</sup> Works Approval, Reporting Condition 3.1(d).

## Legal framework

22. 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. It does so on the basis that if the proposed works are completed, the use of the works will result in levels of emissions that are inconsistent with the SEPP(AQM).<sup>13</sup>
23. Consideration of whether there will be inconsistency cannot, and ought not, be constrained to the emission limits set out in the schedules to the SEPP (AQM), but must require an analysis of whether the levels of emissions are consistent with the principles, intention and overall application of the SEPP (AQM).
24. The powers of the VCAT are contained in s. 37 of the EP Act 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).<sup>14</sup> The SEPP (AQM) is the starting point for the VCAT.
25. In exercising its review jurisdiction, the VCAT has all the functions of the original decision maker: VCAT Act, s. 51.
26. The EP Act must be applied having regard to the principles of environment protection<sup>15</sup> as set out in ss. 1B to 1L of the EP Act. Relevantly, those principles include:
  - (a) the precautionary principle;<sup>16</sup> and
  - (b) the principle of intergenerational equity.<sup>17</sup>
27. 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)<sup>18</sup> and s. 20C(3A) of the EP Act, the EPA had the power to impose conditions that are more stringent than specifically required by the SEPP (AQM) where local environment conditions require a higher level of protection than would

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<sup>13</sup> s. 33B (2)(b).

<sup>14</sup> s.37A(c)

<sup>15</sup> Section 1A.

<sup>16</sup> Section 1C.

<sup>17</sup> Section 1D.

<sup>18</sup> SEPP (AQM), clause 30.

otherwise be provided. The discretion under the EP Act is broader allowing for the imposition of a condition requiring pollution control technology to achieve more stringent standards where such technology is commonly available in the relevant industry.<sup>19</sup>

28. The Latrobe Valley has been designated an Air Quality Control Region (AQCR) under the SEPP (AQM) specifically for the SEPP(AQM)'s purposes. 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.'
29. 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-efficient<sup>20</sup> 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.
30. A generator of a new source of emissions, such as Dual Gas, must apply best practice to the management of those emissions. This includes the management of GHGs.<sup>21</sup> The SEPP (AQM) also provides<sup>22</sup> that one of its aims is to support Victorian and national measures to address the enhanced greenhouse effect.
31. One such measure is the *Climate Change Act 2010 (CCA)*, not in force at the time of the Works Approval. The VCAT must consider the CCA<sup>23</sup> in its review of the original decision by the EPA and in determining whether the proposed works will manage the emissions of GHGs in accordance with best practice and consistently with the SEPP (AQM). The matters to be taken into account by the VCAT are enumerated in s. 14 of the CCA and include the impacts of climate change.

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<sup>19</sup> EP Act, s. 20C(3A)(b).

<sup>20</sup> Being the production of more goods with less energy and fewer natural resources: SEPP, 16.

<sup>21</sup> Clause 33.

<sup>22</sup> Clause 6(c).

<sup>23</sup> Which came into effect on 1 July 2011.

32. The precautionary principle and the principle of intergenerational equity<sup>24</sup> have been taken into account in the development of the SEPP (AQM).<sup>25</sup> However, there is an independent obligation to take these principles into account in any works approval by reason of them being primary considerations under the EP Act.
33. 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.<sup>26</sup> Dual Gas and to some extent, EPA bear the burden of demonstrating that the threat is negligible.<sup>27</sup> The application of the principle may not require a permanent prohibition on an activity but rather, the implementation of appropriate procedures that can adapt to changing circumstances.<sup>28</sup>
34. 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.<sup>29</sup>

## Grounds

35. The grounds of the DEA's application to VCAT are that the Works Approval, including the conditions attached by the EPA are inconsistent with the SEPP (AQM) by reason of the following:

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<sup>24</sup> Derived from the *1992 Intergovernmental Agreement*, 1 May 1992, <http://www.environment.gov.au/about/esd/publications/igae/index.html>.

<sup>25</sup> SEPP (AQM), Clause 7(2) and 7(3); see also *Telstra Corporation Limited v Hornsby Shire Council* (2006) 67 NSWLR 256 [184] to [186].

<sup>26</sup> *Telstra Corporation Limited v Hornsby Shire Council* (2006) 67 NSWLR 256 [125] to [139] [184]

<sup>27</sup> *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]

<sup>28</sup> Brown Mountain case [184].

<sup>29</sup> *Taralga Landscape Guardians Inc v Minister for Planning and RES Southern Cross Pty Ltd* (2007) 161 LGERA 1 at [74].

- (a) EPA's definition of 'industry best practice' insofar as it relates to the generation of power and the management of GHG, SO<sub>2</sub>, NO<sub>x</sub> and other emissions;
  - (b) A failure to uphold the precautionary principle or the principle of intergenerational equity on human health grounds;
  - (c) the granting of an exemption under clause 22 of the SEPP (AQM) in relation to Schedule E NO<sub>x</sub> 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 (NO<sub>2</sub>) and SO<sub>2</sub>;
  - (e) there is no safe level of fine (PM<sub>2.5</sub>) particulate matter for human health.
36. 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 accepts that the modelling referred to in (d) has now been undertaken. Otherwise, DEA refers to and relies upon its further and better particulars as part of this submission.

### **The Project as a Whole**

37. 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 the approach taken fails to protect human health effectively from the consequences of emissions from the works and is therefore inconsistent with the aims and principles of the SEPP (AQM).
38. In applying best practice to the electricity industry it is inadequate to compare the works only with existing local traditional brown coal-fired power stations.<sup>30</sup> In the management of emissions, best practice energy generation is

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<sup>30</sup> Denison did not accept that current power stations in the Latrobe Valley are operating at best practice: XXN T1617.20 – T1617.24; Bellair acknowledged that at that the measure of best practice is worldwide technology for brown coal generation: XXN T1700.17 – T1700.20.

energy generated by technologies that produce the least emissions.<sup>31</sup> A broad approach should be taken 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.<sup>32</sup>

39. At the very least, comparison ought to have been made with best practice for natural gas fired electricity generation, not just in respect of GHGs but all emissions.<sup>33</sup> Should the ‘demonstration’ of syngas fail, power generated by the proposed works over the next 30 years or so will be produced by natural gas.<sup>34</sup>
40. The entire project is speculative, largely as a consequence of the way in which Dual Gas has both prepared the works approval application and advanced its case in the VCAT. The assessment undertaken by the EPA seems to have been based largely on hypotheticals and guesswork. The EPA’s own witness, Tsmelis, gave evidence that in undertaking the assessment and in determining whether the proposed works met best practice, he had insufficient information to make proper comparisons due to the redaction of documents.<sup>35</sup> The Works Approval in its current form would require Dual Gas to redesign the project and this has yet to be done.<sup>36</sup> The extent of such redesign has not been able to be assessed by other parties due the redaction of critical documents.

### **Carbon Dioxide and Greenhouse Gases (GHG)**

41. 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 (**CO<sub>2</sub>**), one of the most important GHGs causing the earth to warm and producing irreversible climate change.<sup>37</sup> Sources of such emissions and GHGs include coal-fired power stations.

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<sup>31</sup> Karoly, XXN T1200.3 – T1200.5.

<sup>32</sup> Expert witness statement of Hugh Outhred, 4 to 5; EVL.300.606 to EVL.300.607.

<sup>33</sup> McIntosh, XN T1045.26 – T1045.28 comparing with Tallawarra and Swanbank being F-class equivalent turbines.

<sup>34</sup> Witness statement of Blatchford, p16.

<sup>35</sup> Tsesmelis, XN T935.13.

<sup>36</sup> Walton, XXN T1395.27 – T1394.29.

<sup>37</sup> *Walker v Minister for Planning* (2007) 157 LGERA 124 at 121.

42. The proposed works, both as currently approved and in the original form, will be inconsistent with the SEPP in that GHG emissions will not be managed in accordance with best practice and will make a significant contribution to GHG emissions in Victoria.<sup>38</sup> Relevantly, Victoria's GHG emissions must be reduced to 20 per cent below Victoria's GHG emissions for the year 2000, not current levels.<sup>39</sup> There is no evidence beyond hypotheticals to indicate that the proposed works will be part of an overall strategy to reduce emissions.<sup>40</sup> Nor is there evidence that there is any real prospect of carbon capture and storage technology being available or appropriate.<sup>41</sup>

### *Health Impacts of Climate Change*

43. DEA is particularly concerned with the health impacts of climate change. Such impacts are amongst the matters that the VCAT must take into account, both in exercising its review jurisdiction standing in the shoes of the decision maker and also in determining whether the proposed works manage the emissions of GHS in accordance with best practice.<sup>42</sup> Those impacts include long and short term health impacts.<sup>43</sup> The CCA does not confine the consideration of such impacts to impacts upon Victoria, and nor can it, given the global nature of climate change, but does require consideration of the contribution to Victoria's GHG emissions.<sup>44</sup>

44. Most health impacts of climate change are likely to be adverse.<sup>45</sup> The projected health effects will be complex and varying.<sup>46</sup> 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

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<sup>38</sup> Expert witness statement of Professor David J Karoly. [17] to [19]; EVL.300.658.

<sup>39</sup> CCA, s. 5(1).

<sup>40</sup> Cf Blatchford XN, T752.6 – T752.24.

<sup>41</sup> Cf Blatchford XN, T742.3 – T742.10; cf current policy whereby government may be willing to fund this project to the extent that it will advance research into carbon capture and storage: Washusen, XXN T1487.5 – T1488.16. This does not change the speculative nature of such research and whether it is appropriate for VCAT to approve the works where they are dependent upon the success of carbon capture and storage to manage emissions of both CO<sub>2</sub> and SO<sub>2</sub>.

<sup>42</sup> CCA, s. 14(2).

<sup>43</sup> CCA, s.14(3)(b).

<sup>44</sup> CCA, s. 14(4).

<sup>45</sup> McMichael A, Lindgren E., Climate change: present and future risks to health, and necessary responses, *Journal of Int Med* 2011, 1.3; see also Costello A, et. al., Managing the health effects of climate change, *The Lancet*, 2009 at 1693.

<sup>46</sup> DEA second particulars, 2(a)(i) and 2(b)(i).

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.<sup>47</sup>

45. In 2009, leading international medical journal, The Lancet, published that ‘Climate change is the biggest global health threat of the 21st century’.<sup>48</sup> 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’.<sup>49</sup> 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’.<sup>50</sup>
46. For these reasons DEA is concerned that the Works Approval should be set aside or at least, that emissions of CO<sub>2</sub> from the proposed works are demonstrably minimised.

#### *Best practice*

47. According to the EPA Assessment Report, the proposed works can comply with a GEI target of 0.8t CO<sub>2</sub>-e/MWh.<sup>51</sup> However, to reduce the amount of CO<sub>2</sub>, they will need to rely on an increased amount of natural gas.<sup>52</sup> What is in fact proposed is a hybrid of natural gas and syngas.<sup>53</sup> Moreover, the proposed works will operate solely on natural gas, possibly for the first five years, while the gasification process is implemented.<sup>54</sup>
48. Best practice for natural gas was not considered.<sup>55</sup> If the demonstration of syngas fails, by the use of E class turbines, rather than F class, the works will

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<sup>47</sup> McMichael A, Lindgren E., Climate change: present and future risks to health, and necessary responses, *Journal of Int Med* 2011, 11; see also Costello A, et. al., Managing the health effects of climate change, *The Lancet*, 2009 at 1694.

<sup>48</sup> Costello A, et. al., Managing the health effects of climate change, *The Lancet*, 2009 at 1693.

<sup>49</sup> Margaret Chan, “Cutting carbon, improving health”, (25 November 2009),

[http://www.who.int/globalchange/publications/LCT\\_Climate\\_09cmt7843.pdf](http://www.who.int/globalchange/publications/LCT_Climate_09cmt7843.pdf).

<sup>50</sup> 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](http://www.unep.org/pdf/speeches/davos09.globalcompact_dcsFINAL.English.pdf).

<sup>51</sup> EPA Assessment Report, 6.3.4.

<sup>52</sup> Blatchford, T837.6, T852.1 – T851.5.

<sup>53</sup> McIntosh, XXN 1085.14.

<sup>54</sup> Blatchford XN, T722.1 – T722.3

<sup>55</sup> EPA Assessment Report, 6.2.

be nothing more than a suboptimal natural gas plant with higher CO<sub>2</sub> emissions.<sup>56</sup>

49. The VCAT also needs to consider the viability of carbon capture and storage in determining whether the proposed works, with a condition that they be carbon capture and storage ready, meet best practice in the management of CO<sub>2</sub> emissions. Save to note that there is insufficient information to determine whether carbon capture and storage is realistically viable,<sup>57</sup> DEA relies on the submissions of EV and LIVE in this regard.

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

50. The Works Approval Conditions require CO<sub>2</sub> emissions to comply with a GEI requirement of 0.8 tCO<sub>2</sub>-e/MWh.<sup>58</sup> It does not specify whether this is a 'sent-out' or 'generated' target. Despite this matter being extensively canvassed in evidence, it is as yet unknown what the precise legislated target will be or how it will be calculated.<sup>59</sup> DEA notes that 'sent out' is the measure currently used by the National Electricity Market.<sup>60</sup>

*Precautionary principle and principle of intergenerational equity*

51. DEA submits that the contribution of GHGs by the proposed works does not represent best practice in the face of an extensive renewables industry and that the Works Approval ought to be refused on the basis that neither of these principles have been applied.
52. At the very least, the application of both these principles requires that if the VCAT upholds the Works Approval and the GEI requirement of 0.8 tCO<sub>2</sub>-e/MWh, it ought to be on the basis that has the least effect on the environment. The VCAT should amend condition 2.1 so that it limits this target of CO<sub>2</sub> emissions on a sent-out basis, thus taking into account all power consumed in

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<sup>56</sup> See for example, expert witness statement of Malcolm McIntosh, [95]; Outhred, 15; EPA.100.409-12; EVL.300.617; see also Washusen, XXN 1449.16 – T1449.22; Bellair, XXN T1705.13 – T1705.17.

<sup>57</sup> Outhred, XXN T1131.20 – T1131.21; Bellair XXN T1712.26 – T1713.27.

<sup>58</sup> Works Condition, 2.1.

<sup>59</sup> Statement on behalf of State of Victoria, T1229.26 – T1230.12.

<sup>60</sup> Outhred, XXN T1127.16 – T1127.21. There is no government publication that confirms that 'as generated' is an appropriate basis: Blatchford XXN T840 ff, T883.2

the different components of the works during electricity production.<sup>61</sup> This will necessarily involve a higher use of natural gas to meet the target.<sup>62</sup>

### **Sulphur Dioxide (SO<sub>2</sub>)**

53. The maximum ground level concentrations of emissions of SO<sub>2</sub> from the proposed works will not comply with the design criteria of the SEPP (AQM), even at 300 MW<sup>63</sup> and will on a worst case scenario (as contemplated by the SEPP(AQM))<sup>64</sup> add an additional 13 mill kg/yr SO<sub>2</sub> to the quantities of SO<sub>2</sub> in the Latrobe Valley AQCR, or an estimated 10 to 13% to current emissions.<sup>65</sup> Current emission levels are reported by the electricity generation industry at 100 million kg/yr.<sup>66</sup> For these reasons, the works ought not be approved.
54. However, the EPA has seen fit to require SO<sub>2</sub> reduction technology. Even if there is uncertainty about the numbers and the likely level of SO<sub>2</sub> emissions is unknown due to, *inter alia*, possible variations in sources of coal,<sup>67</sup> best practice will require that there should be removal, no matter what the levels.<sup>68</sup> The lack of certainty arising from the evidence<sup>69</sup> points to maintaining the condition to install sulphur reduction technology.

### *Health effects of SO<sub>2</sub>*

55. The health effects of SO<sub>2</sub> are described in the evidence of Dr Lynette Denison<sup>70</sup> and DEA's second particulars.<sup>71</sup> 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

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<sup>61</sup> McIntosh, [46.]; EPA.100.396-12 XN T1019.17 – T1019.18.

<sup>62</sup> McIntosh, [58]. See also paragraph 37; EPA.100.400-12; Blatchford XN T741.1 - T741.4

<sup>63</sup> Ross, XN T1531.10 – T1531.16.

<sup>64</sup> Denison XXN, T6133.5; Blatchford XN T1728.19 – 1728.22.

<sup>65</sup> Expert witness statement of Dr D Graeme Ross, [68]; Expert witness statement of Dr Lyn Denison, [44]; EPA.100.119; EPA.100.376; see also Denison, XN T1583.22 – 1583.127.

<sup>66</sup> Denison, XN T1582.14 – T1582.17.

<sup>67</sup> Bellair was asked to make assumptions based on a single source of coal: Bellair XN T1674.10–T1674.12.

<sup>68</sup> Tsesmelis, XXN T992.19.

<sup>69</sup> Exhibit D11; Denison XXN T1635.5 – T1635.31; Dual Gas failed to model worst case scenarios or predicted maximum concentrations which must be in the 99.9 percentile or 100 percentile: Blatchford .

<sup>70</sup> Denison, [11] to [16], EPA.100.372 to EPA.100.373; XN T1574.4 – T1576.20.

<sup>71</sup> at 2(a)(ii) and 4(a).

particularly sensitive to the effects of SO<sub>2</sub>.<sup>72</sup> The WHO and the United States Environmental Protection Agency (USEPA) have concluded that there is no safe level of exposure to SO<sub>2</sub>, in particular for sensitive groups.

56. A disproportionate load of Victoria's SO<sub>2</sub> emissions are emitted in the Latrobe Valley AQCR, most being emitted by electricity generators.<sup>73</sup> In that same region resides one of Australia's population groups most susceptible to the effects of air pollution.<sup>74</sup>
57. The NEPM standards for SO<sub>2</sub> have been reviewed and it has been recommended in the Review Report that those standards be revised because such standards do not provide adequate protection.<sup>75</sup>

#### *Best practice for SO<sub>2</sub>*

58. International air quality standards for SO<sub>2</sub> have been revised since the introduction of the SEPP (AQM) in 2001.<sup>76</sup> The SEPP (AQM), insofar as it relates to an AQCR, is yet to be revised in accordance with the recommendations in the Review Report.
59. Significant amounts of SO<sub>2</sub> will be emitted by the proposed works, whether the 600 MW project or the 300MW project as currently approved, even though such emissions will be lower than those from other generators in the Latrobe Valley.<sup>77</sup> Best practice must be applied regardless of the standards for individual sources and the SEPPP (AQM) design criteria are primarily concerned with the cumulative impact.<sup>78</sup> International developments are such that best practice is now for the installation of sulphur reduction technology, irrespective of best practice considered in the more local sense.<sup>79</sup> This is a means of demonstrably minimising emissions of SO<sub>2</sub>.<sup>80</sup>

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<sup>72</sup> Dension, [12] to [13]; EPA.100.372.

<sup>73</sup> Denison, [43]; EPA.100.376.

<sup>74</sup> Denison, [25] to [26]; EPA.100.374; XN T1583.27 – T1583.31.

<sup>75</sup> Denison, T1612.10 – T1612.23.

<sup>76</sup> Denison, [20] and [28]; EPA.100.373 and EPA.100.374.

<sup>77</sup> Blatchford, XN T756.12; Denison did not accept that current power stations in the Latrobe Valley are operating at best practice: XN T1617.20 – T1617.24; Bellair acknowledged that the measure of best practice is worldwide technology for brown coal generation: XN T1700.17 – T1700.20.

<sup>78</sup> Denison, [37] to [38]; EPA.100.375. Dension, XN T1600.1 – T1600.6.

<sup>79</sup> EPA Assessment Report 6.4.4; Ross [68].

<sup>80</sup> Denison T1617.1 – T1617.4.

60. The VCAT should not take into account the mere possibility of reductions to SO<sub>2</sub> levels in the Latrobe Valley AQCR by the closure of existing sources. It is currently unclear what or when those closures might be or what the effect on emission levels would be.<sup>81</sup>
61. It is not just a matter of meeting the maximum levels permitted under the SEPP(AQM) where there is no threshold for the effects of SO<sub>2</sub>.<sup>82</sup> Clause 30 of the SEPP (AQM) has been appropriately invoked as a consequence of the request of the Department of Health.<sup>83</sup> Accordingly, Condition 3.1(a) ought to be retained in respect of emissions of SO<sub>2</sub>.

*Precautionary principle and intergenerational equity*

62. Caution ought to be exercised in light of the recent evidence about the levels at which SO<sub>2</sub> can have adverse impacts. The proposed works, as a new source of SO<sub>2</sub>, ought to be stringently regulated in this regard.

**Nitrogen Dioxide (NO<sub>2</sub>) and Oxides of Nitrogen (NO<sub>x</sub>)**

63. Emissions directly from the source are measured and referred to as NO<sub>x</sub> but the ground level concentrations and modeling is done for NO<sub>2</sub>, a subset of NO<sub>x</sub> and the most concerning with respect to human health.<sup>84</sup>
64. The proposed works will adopt ammonia scrubbing to reduce nitrogen levels in the syngas. It is said that NO<sub>2</sub> emission levels will comply with the design criterion in the SEPP (AQM) even at the updated levels.<sup>85</sup> However, emissions will exceed the SEPP (AQM) Schedule E limit (for the AQCR) of 0.07g/m<sup>3</sup> for gas turbines operating on gaseous fuels if >30MWh.<sup>86</sup>

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<sup>81</sup> Ross, XXN T1556.15 – T1556.21; Denison, XXN T1621.4 – T1621.10.

<sup>82</sup> Denison, XN T1577.15 – T1577.23.

<sup>83</sup> Letter dated 29 April 2011 from Rodney Dedman, Acting Manager Community Risk, Department of Health to John Marsiglio, Statutory Facilitation, EPA.

<sup>84</sup> Denison [83]; EPA.100.380.

<sup>85</sup> Ross [72] – [74]; Denison [83]; EPA.100.122; EPA.100.380; Statement of Ross, 8 November 2011.

<sup>86</sup> EPA Assessment Report 6.4.1(c). The Schedule E limit of 0.15 g/m<sup>3</sup> 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. There is ambiguity in the SEPP (AQM) as to how these limits ought to be applied.

65. The exemption granted by the EPA from compliance with the Schedule E limits is not constrained in any way. It is unclear how this is to be addressed. Significant amounts of NO<sub>x</sub> will be emitted. When operating on natural gas the works will not meet the SEPP (AQM) requirements and when operating on syngas, the NO<sub>x</sub> emissions will also be above the only SEPP (AQM) requirements relating to gas as a source.
66. Of particular concern is the fact that the works could be operating on natural gas only for up to five years. The rates of NO<sub>x</sub> during this period will be consistently higher. Dry low NO<sub>x</sub> burners (which are not feasible for syngas) could be used.<sup>87</sup>
67. Although DEA opposes the works in any form, there was evidence that the EPA would not have granted such an exemption if the works approval were to issue for the 600 MW power station operating, in the initial period, on natural gas alone.<sup>88</sup>

#### *Health effects of NO<sub>2</sub> and NO<sub>x</sub>*

68. Both the WHO and the USEPA have concluded that there is no safe level of exposure to NO<sub>2</sub>, particularly for sensitive groups.<sup>89</sup> The NEPM Review Report has confirmed this<sup>90</sup> and noted that compliance with standards alone may not achieve the desired environmental outcome of ‘adequate protection’.<sup>91</sup> Evidence from Australia and overseas reveals association between adverse health effects and short-term exposure to NO<sub>2</sub> levels below the current ambient air quality NEPM<sup>92</sup> standards of 0.12 ppm (1 hour average). Ambient NO<sub>2</sub> 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.<sup>93</sup>

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<sup>87</sup> Tsesmelis, XXN T1010.11 – T1010.14.

<sup>88</sup> Denison, XXN T1592.20 - T

<sup>89</sup> Denison [74]; DEA second particulars [3(b)]; EPA.100.379.

<sup>90</sup> At 14 and 28.

<sup>91</sup> NEPM Review Report, 14.

<sup>92</sup> and SEPP (AQM).

<sup>93</sup> DEA second particulars, [6], Denison XN T1587.21 – T1588.10.

### *Best practice for NOx and NO2*

69. If the levels of NOx exceed the Schedule E limits, there will be no adherence to best practice, which requires demonstrable minimisation of emissions, notwithstanding the fact that emissions will be lower than other coal fired power stations in the Latrobe Valley.<sup>94</sup> Similarly the absence of annual modelling prevents a meaningful comparison with the literature and standards.<sup>95</sup>

### *Precautionary principle and intergenerational equity*

70. 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 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.
71. Contrary to the assertions of the EPA that the criteria under clause 22 of the SEPP (AQM) have been met, on the face of the EPA Assessment Report, the factors in clause 22(1)(a) have not been taken into account. It is not possible to be certain that there will be no adverse affect upon beneficial uses and the precautionary principle demands in such circumstances that caution be exercised and the exemption overturned.<sup>96</sup> The granting of the exemption is inconsistent with the SEPP (AQM).

### **Particulate Matter (Fine Particles PM2.5)**

72. 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 (**PM2.5**) or ultra-fine (**PM0.1**) particulate matter in relation to human health. The WHO stated in a 2003 report: “Epidemiological studies on

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<sup>94</sup> McIntosh, XXN 1055.29 – T1055.30.

<sup>95</sup> 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](http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf), 17.

<sup>96</sup> Cf Denison, XN T1589.1 – T1589.11. Given that the findings that there are no safe levels of NO2, Denison has failed to explain how there will be no impact on beneficial uses.

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.”<sup>97</sup>

73. DEA accepts the observations of Dr Denison in respect of PM<sub>0.1</sub> that the evidence of the effects of PM<sub>0.1</sub> is insufficient for the purposes of establishing limits for emissions at this time.<sup>98</sup> 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<sub>0.1</sub> should appropriate standards be developed.
74. DEA maintains its concerns about emissions of PM<sub>2.5</sub> from the proposed works but now accepts that appropriate modelling has been undertaken. It also notes that particulate emissions will be regulated by conditions of any subsequent licence for the proposed works.<sup>99</sup>

#### *Health effects of PM<sub>2.5</sub>*

75. 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.<sup>100</sup> In children, particulate air pollution has been associated with increased chronic cough, and bronchitis.<sup>101</sup> 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 PM<sub>2.5</sub>)

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<sup>97</sup> 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](http://www.euro.who.int/_data/assets/pdf_file/0005/112199/E79097.pdf)

<sup>98</sup> Denison, [91]; EPA.100.382.

<sup>99</sup> Blatchford XN, T756.9.

<sup>100</sup> 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; Denison XN T1589.31 – T1590.11

<sup>101</sup> 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.

are strongly associated with mortality and other endpoints such as hospitalization for cardio-pulmonary disease.<sup>102</sup>

76. In Australia, several studies in coal-mining communities have confirmed links between particulate air pollution and respiratory disease.<sup>103</sup>

*Precautionary principle and intergenerational equity*

77. 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.<sup>104</sup>

**Other Pollutants**

78. DEA observes that the proposed works will also release quantities of toxic compounds into the environment, particularly mercury.<sup>105</sup> There will be 40,000 tonnes per year of fly ash. Fly ash contains arsenic, lead, mercury and cadmium.
79. 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.<sup>106</sup> Dr Denison has not

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<sup>102</sup> 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>.

<sup>103</sup> 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.

<sup>104</sup> Denison, [94]; EPA.100.382.

<sup>105</sup> DEA second particulars, 1(a) and (c).

<sup>106</sup> 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*

80. Toxins in coal ash can cause cancer and neurological damage in humans.<sup>107</sup>
81. 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.<sup>108</sup> 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.<sup>109</sup> In 2002, 83.3% mercury air emissions in the Latrobe Valley region (100kg) came from power stations.<sup>110</sup>

### *Principle of Intergenerational Equity*

82. 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.
83. 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.

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<sup>107</sup> 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>.

<sup>108</sup> Food Standards Australia New Zealand, 2004.

<sup>109</sup> 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)

<sup>110</sup> 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.

## **Conclusion**

84. DEA submits that the proposed works will emit significant quantities of CO<sub>2</sub>, NO<sub>2</sub>, SO<sub>2</sub> 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.
85. Should the VCAT uphold the approval, it ought to maintain the conditions imposed by the EPA, and ensure that reporting measures include 24 hour modelling for SO<sub>2</sub> and NO<sub>2</sub> and also ensure that the SEPP (AQM) Schedule E criteria for NO<sub>2</sub> emissions will be met.

Dated: 2 February 2012

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